Trust Lands Performance Assessment Project

Charting a Course for the Future

Legislative Report | January, 2021

WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES

Office of the Commissioner of Public Lands, Hilary Franz
Deputy Supervisor for State Uplands, Angus Brodie

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Prepared by
Washington State Department
of Natural Resources

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NATURAL RESOURCES

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List of Acronyms

CEP&RI	Charitable, educational, penal and reformatory institutions
COP	Certificate of participation
DNR	Washington State Department of Natural Resources
Deloitte	Deloitte Transactions and Business Analytics
FDA	Forest Development Account
GMA	Growth Management Act
HCP	Habitat conservation plan
RCW	Revised Code of Washington
RMCA	Resource Management Cost Account
TIMO	Timber Investment Management Organization

Executive Summary

Upon arriving in office in 2017, Commissioner of Public Lands Hilary Franz set a clear agenda for transforming state trust lands management to achieve a prosperous, sustainable future for trust beneficiaries and the people of Washington. This agenda includes optimizing policies, statutes, and operational business practices; investing in working forests and agricultural lands while improving and expanding other components of the state trust lands portfolio that show promise for immediate and continued growth; and rethinking existing state trust lands portfolio management tools while developing new tools that will help increase the revenue-generating potential of state trust lands and safeguard the natural resources that make Washington the beautiful place that we love.

To help set the Board of Natural Resources and the Washington Department of Natural Resources (DNR) on a course toward this future, the Commissioner worked with the Legislature on ESSB 6095, Section 7105 in 2018 (refer to Appendix D). ESSB 6095 required a comprehensive assessment of the state trust lands portfolio and its management (not inclusive of the Washington State Investment Board's management of public market assets [stocks and bonds] on behalf of the permanent funds). This assessment was conducted by Deloitte Transactions and Business Analytics (Deloitte), Earth Economics, and DNR.

Today, the Commissioner and DNR are excited to share the results of this important assessment, which provides valuable insight into the following: 1) the value of state trust lands and the revenue they produce, (2) opportunities and challenges the current holdings of the state trust lands portfolio present, and (3) initial ideas on ways to achieve this transformative agenda for the future of state trust lands management.

The Value of State Trust Lands

Across the approximately 2.9 million acres of state trust lands that DNR manages across Washington state, DNR generates revenue for trust beneficiaries through timber harvest, agriculture, grazing, commercial real estate, communication sites, solar and wind power, and other uses. The revenue generated from state trust lands funds local county services and facilities for many rural communities, making paramount the need to increase the amount and improve the reliability of that revenue.

State trust lands provide trust revenue and ecological services

DNR's active management of these lands provides more than just revenue for trust beneficiaries. Active forest management prevents wildfires, reduces and offsets carbon emissions, prevents conversion of these and adjacent lands to development, and contributes significantly to our state's rural economies. Active management of agricultural lands also provides significant value in growing our state's agricultural economies, ensuring critical food resources, maintaining water resources in public ownership, and reducing the loss of prime agricultural lands.

Actively managed state trust lands also provide significant, non-market environmental service benefits including wildlife habitat, scenery, recreation, clean air and water, and others. Earth Economics estimated that state trust lands provide nearly $1 billion per year in recreation value and approximately $1.4 billion per year in water quality and supply, pollination, and natural disaster risk reduction. Additionally, Earth Economics estimated that the carbon stored on state trust lands provides a social carbon benefit of approximately $19 billion. Much of that carbon is stored in sustainably managed working forests, making these forests a critical tool for limiting the effects of climate change. While revenue streams for the trust beneficiaries from these non-market values are very limited, they demonstrate that maintaining these lands as working forests and agricultural lands creates value far beyond the revenue they generate.

Commissioner Franz and DNR care deeply about the trust beneficiaries and the urban and rural communities where the people of Washington live, work, play, and raise families. We also care about the health and wellbeing of Washington's natural resources. We believe that the scale and importance of market and non-market benefits, especially when coupled with real dollar returns for schools, counties and rural communities, are critical to consider when charting a path toward a sustainable future.

Challenges

State trust lands have produced over $4.3 billion in non-tax revenue for trust beneficiaries in the past 25 years (nominal dollars, not adjusted for inflation). In that time, some components of the state trust lands portfolio have experienced rapid growth of revenue. Deloitte found that between fiscal years 1995 and 2018, commercial real estate revenue increased by 99 percent, agriculture revenue increased by 166 percent, and communication site revenue increased by 90 percent. And since March, 2019, DNR has converted three agricultural leases to solar leases. When fully operational, these leases will earn over $893,000 a year in gross revenue, which is approximately $870,000 more than these lands earned under agricultural leases. These are success stories that show promise for continued growth and portfolio diversification.

Yet this report also recognizes systemic challenges. Over the past 25 years, total net revenue from state trust lands has declined in real dollars (adjusted for inflation), and this decline has been coupled with difficulties in delivering steady and reliable revenue to trust beneficiaries. Timber, the largest asset class in the portfolio (generating 79 percent of total gross revenue produced on state trust lands), has shown an approximately 45 percent decrease in earnings in real dollars because stumpage prices have not maintained pace with inflation, the cost of operations has increased, and resource protection measures have been implemented to comply with federal and state environmental regulations, which decreased the size of the operable land base.

At the same time, Washington state is growing. According to the Washington Office of Financial Management, Washington's population has increased by nearly 2 million people in the past two decades, and it is expected to increase by roughly 2 million in the next two decades. That growth will result in more demand for renewable resources on state trust lands, such as timber and agricultural crops; more pressure to develop private forested and agricultural lands for other uses; more interest in different types of recreation; more need for water resources for irrigated agriculture and communities; more requests for view sheds and natural buffers for the increasing number of people living near working forest, agricultural, commercial, and industrial lands; and more urgency for carbon storage at a time when carbon emissions are rising and the climate is changing.

Mountain biking in Tiger Mountain State Forest near Issaquah, a fast-growing community in the Puget Sound area

Given the many changes that have occurred over the last twenty years and will occur over the next twenty years, we must develop solutions to help increase the revenue-generating potential of state trust lands, support our rural economies and communities, and protect our natural resources. These challenges represent a call to action, one that DNR is ready to meet.

Opportunities

This assessment of state trust lands demonstrates the potential of an impressive natural resource portfolio. Deloitte's findings underscore past gains in diversification and demonstrate how, with leadership and vision, DNR is generating significantly more income, today and into the future, from asset classes that historically have not been leveraged.

To realize the potential of the state trust lands portfolio, it is essential to optimize business practices to improve DNR's efficiency and revenue production. Following are examples of work that DNR has completed to date:

State trust lands leased for commercial use

- Improved marketing of commercial real estate and communication sites for lease (refer to dnr.wa.gov).
- Initiated the lean process for timber sales planning and compliance, which resulted in changes to appraisal timing and printing and suggested legislative changes to advertising. This work saves $140,000 in printing costs and two staff months each biennium.
- Completed plans for meeting timber volume targets. All of DNR's six regions have completed plans for the next two years, and four have completed plans for the next four to five years.
- Established new grazing permit fees in cooperation with Washington State University and industry to align with market conditions.
- Protected investments in water infrastructure to increase value of agricultural lands.

Yet these changes are just the beginning of our work. To increase the amount and reliability of trust revenue to support critical Washington state local government and education infrastructure and services, we must fundamentally transform the way DNR conducts business on behalf of trust beneficiaries.

Developing Solutions

Now equipped with the results of this assessment, Commissioner Franz and DNR are energized and committed to transforming state trust land management for a sustainable and prosperous future for our beneficiaries and the people of Washington. The goal is to develop and implement, over the next five years, significant, consequential, innovative, and multifaceted solutions that will maximize the potential value of state trust lands today and in the future for beneficiaries and the state of Washington. DNR envisions that these solutions will involve a combination of the following:

- **Optimize policies, statutes, and operational business practices** to improve DNR's efficiency and performance, make trust revenue more reliable on a year-to-year basis, and increase state trust lands portfolio performance for the benefit of current and future generations. One of Deloitte's suggestions is that the legislature create a "reliability fund" for beneficiaries. This fund would be invested to create additional value, allowing for a more reliable distribution of revenue to beneficiaries despite market fluctuations. Another initial idea is for the legislature to address the current, divided governance structure for trust assets, in which the Board of Natural Resources manages the land assets and the State Investment Board manages the public market assets, such as stocks and bonds, on behalf of the permanent funds. Deloitte believed that the trust beneficiaries might benefit from a more integrated and coordinated approach to the governance of the trust assets. A third idea is to provide DNR access to a consistent and adequate source of capital for investments in infrastructure and other improvements, which will enable it to operate more like a business and ultimately increase revenue for trust beneficiaries.

- **Maintain working forests and agricultural lands** as a core and valuable part of the state trust lands portfolio and **make strategic capital investments in these lands** to increase their revenue-generating potential. These lands are critical to rural communities and the people of Washington and vital in the effort to address climate change.

Agriculture on state trust lands

- **Improve and expand other components of the state trust lands portfolio** that show promise for immediate and continued growth. Two major opportunities are transition lands, which are lands that are transitioning from natural resource production to higher and better uses as a result of land use planning and urbanization, and other parcels of state trust lands that are too isolated, scattered, or landlocked for DNR to manage efficiently or effectively for forestry or agriculture. These lands present prime opportunities for communication sites, renewable energy production, or other uses that could yield significantly higher revenue for trust beneficiaries. These lands also present opportunities for sale and transition to higher production working forest and agricultural lands or commercial investments.

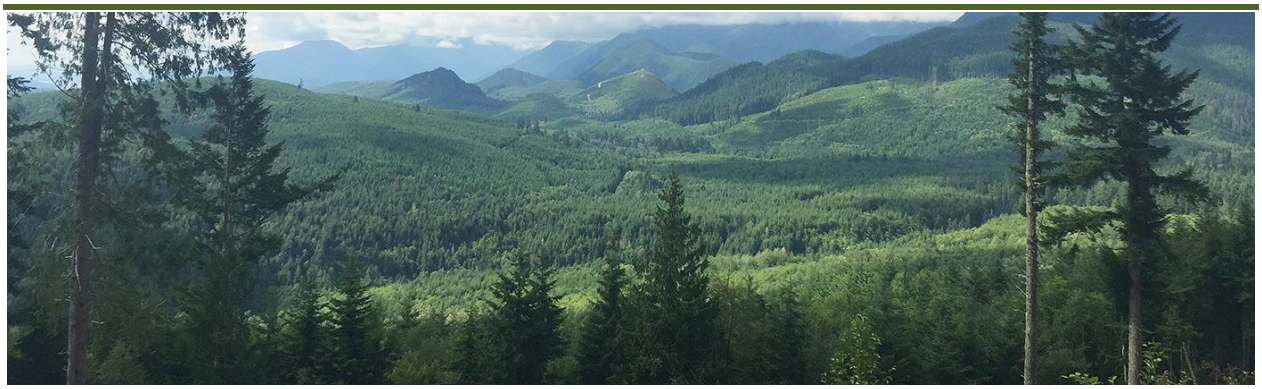
- **Develop new tools or rethink or improve existing state trust lands portfolio management tools,** such as the Trust Land Transfer program, Community Forest Trust program, and State Forest Land Replacement program, to help increase the revenue-generating potential of state trust lands and protect vital natural resources.

In the 2021 legislative session, DNR will bring an initial round of proposals for consideration, such as requests for improving the timber sale process and extending commercial real estate leases, which will

have zero fiscal impact in light of the current state budget challenges and impacts of COVID-19. DNR also will bring forth a number of capital funding requests to facilitate much needed replacement of outdated leasing data systems and investments in forests inventory, silviculture, and forest health to increase revenue from the timber asset class while also creating jobs.

Over the coming year, DNR will begin a collaborative process to develop multifaceted solutions that take into consideration changing environmental and economic realities. Developing these ideas will require careful consideration and the interest, time, and attention of legislators, beneficiaries, tribes, stakeholders, and advisory committees. Commissioner Franz has created a number of advisory committees to help advise DNR in the management of state trust lands. The Sustainable Harvest Technical Advisory Committee is advising DNR staff on forest inventory, economics, forest health, climate change, and other factors that affect the eastern and western sustainable harvest calculations. In addition, the Commissioner is launching a new advisory committee to explore opportunities and investments regarding DNR's commercial real estate lands.

The result of this process will be proposals for durable, actionable solutions for transforming and improving management and returns from state trust lands. DNR will bring these proposals to the Board of Natural Resources and then to the legislature for consideration.

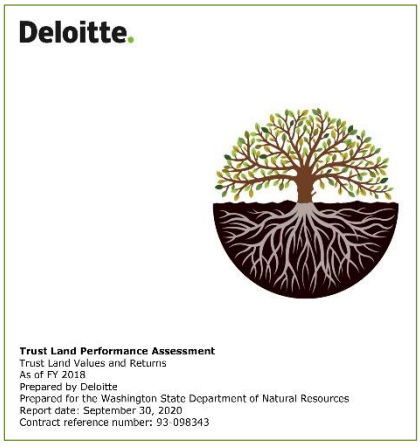


Introduction

The Trust Lands Performance Assessment Project

Commissioner of Public Lands Hilary Franz has set a clear agenda for transforming state trust lands management to achieve a prosperous, sustainable future for trust beneficiaries and the people of Washington. This agenda includes optimizing policies, statutes, and operational business practices; investing in working forests and agricultural lands while improving and expanding other components of the state trust lands portfolio that show promise for immediate and continued growth; and rethinking existing state trust lands portfolio management tools while developing new tools that will help increase the revenue-generating potential of state trust lands and safeguard the natural resources that make Washington the beautiful place that we love.

Achieving this future requires a comprehensive assessment of the state trust lands portfolio and its management.[1] Supported by ESSB 6095, Section 7105 (refer to Appendix D), this work has been completed by Deloitte Transactions and Business Analytics (Deloitte), Earth Economics, and the Washington Department of Natural Resources (DNR). Following is a summary of how this assessment meets the requirements of ESBB 6095:



- The *Trust Lands Performance Assessment: Trust Land Values and Returns as of Fiscal Year 2018* report by Deloitte (Appendix B) meets the Section 1 requirement to conduct an asset valuation of State Lands and State Forest Lands held in trust and managed by DNR.

[1] This analysis focused exclusively on DNR's management of state trust lands. It did not include any analysis of the State Investment Board's management of public market assets (stocks and bonds).

- This legislative report and Deloitte's report meets the Section 2 requirement to describe each asset class on state trust lands and the revenue that asset class generates.
- The Deloitte report meets the Section 3 requirement to estimate the current asset value of these lands for each trust beneficiary. The *Non-Market Environmental Benefits and Values Report* in Appendix C meets the Section 3 requirement to provide the value of ecosystem services and recreation benefits for the asset classes that produce these benefits.

- The Deloitte report meets the Section 4 requirement to calculate average annual gross and net income as a percentage of the estimated, current asset value.
- Section 5 of the proviso states that three progress reports must be submitted to the legislature. DNR submitted the first report in December 2018 and the second in December 2019. As required, this third and final report[2] includes options to (a) improve the net rates of return on different classes of assets, (b) increase the reliability of, and enhance if possible, revenue for trust beneficiaries; and (c) present and explain factors that either (i) define, (ii) constrict, or (iii) define and constrict DNR's management practices and revenue production. This report includes initial ideas gathered from past reports, the Deloitte report, and DNR as a starting point for discussion. Additional ideas can be found in Chapter 12 of the Deloitte report.

What is in This Report?

The Commissioner and DNR are eager to share the results of this important assessment in the following report. The report is presented in five parts:

- **Part One** provides background on state trust lands and DNR's role as a trust lands manager.
- **Part Two** includes the findings of the Deloitte and Earth Economics asset valuations.
- **Part Three** describes the key challenges and opportunities facing state trust lands management.
- In **Part Four**, DNR sets forth the steps it will follow and some initial ideas to optimize policies, statutes, and operational business practices; invest in working forests and agricultural lands while improving and expanding other components of the state trust lands portfolio that show promise for immediate and continued growth; and rethink existing state trust lands portfolio management tools while developing new tools that will help increase the revenue-generating potential of state trust lands and safeguard vital natural resources.
- **Part Five** is a conclusion and a call to action.

[2] Delivery of this report was expected by June 30, 2020. Due to the impacts of the COVID-19 pandemic, DNR agreed to extend Deloitte's contract to September 30, 2020, which delayed delivery of this report to the legislature until January, 2021.

Part One: Background

What are State Trust Lands?

State trust lands are lands held in trust and managed to generate revenue for specific trust beneficiaries. There are two categories. The first category is the federally granted lands, or State Lands,[3] which were granted to the state at statehood through the 1889 Enabling Act[4] as a means of support for various public institutions in the new state. The majority of state trust lands fall into this category. The federally granted lands support the following seven trusts, each of which is assigned acres on which revenue is generated.[5]

- **Common School Trust** (1,787,047 acres): Supports construction of public kindergarten through 12th grade schools.
- **Capital Building Trust** (109,510 acres): Supports state government office buildings.
- **University Trust** (89,051 acres)**:** Supports the University of Washington.
- **Scientific School Trust** (84,177 acres): Supports Washington State University.
- **Charitable, Educational, Penal and Reformatory Institutions (CEP&RI) Trust** (71,624 acres): Supports institutions such as those managed by the Department of Social and Health Services, Department of Corrections, and University of Washington.
- **Agricultural School Trust** (71,148 acres): Supports Washington State University.

[3] RCW 79.02.010 (15)

[4] 25 Stat. 676, chs. 180, 276–284

[5] For consistency with the assessment completed by Deloitte and Earth Economics, acres are based on DNR's June, 2018 GIS data.

- **Normal School Trust** (66,786 acres): Supports Eastern Washington University, Central Washington University, Western Washington University, and The Evergreen State College.

The second category is State Forest Lands,[6] which themselves are separated into two categories:

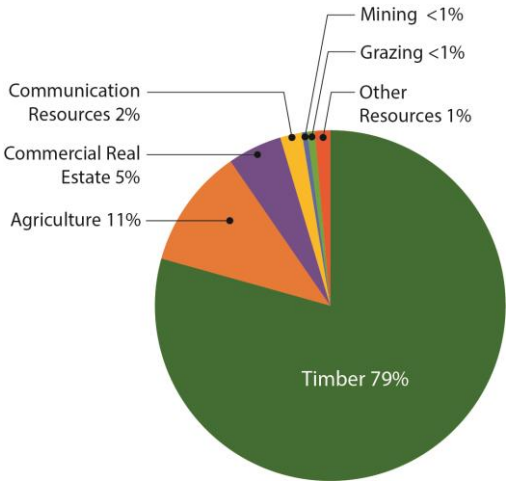
- **The State Forest Transfer lands** (538,015 acres) were acquired by 21 counties in the 1920s and 1930s through tax foreclosures. Pursuant to state law,[7] most of these lands were transferred to the state of Washington and placed in trust status.
- **The State Forest Purchase lands** (79,384) were either purchased by the state, or acquired by the state as a gift.

The beneficiaries of State Forest Lands are the counties in which these lands reside. In most cases, counties distribute the revenue they receive from State Forest Lands according to the general tax distribution by tax code areas. Examples of typical recipients include taxing districts such as state schools and county roads, as well as fire districts, cemeteries, emergency medical services, hospitals, ports, and libraries.

Revenue is generated from seven asset classes (Figure 1). Each asset class consists of state trust lands on which revenue is generated from specific uses. The largest asset class is timber (2,056,507 acres). On these lands, revenue is generated through timber harvest. For the remaining six asset classes, DNR generates revenue through agreements (such as leases, permits, easements and land use licenses) for the following uses:[8]

- **Agriculture** (237,635 acres)**:** Dryland and irrigated farms and orchards.
- **Grazing** (750,490 acres): Grazing of livestock.
- **Commercial real estate** (1,034 acres): Large retail outlets, single businesses, and small rural businesses; includes premise leases and ground leases.
- **Communication resources** (91 acres): Microwave antennas, emergency communication radio repeaters, private radio repeaters, and television (TV), radio, cellular, and digital telephone antennas.

Figure 1. Asset Classes and Percent of Gross Revenue Generated by Each



[6] 79.22 RCW

[7] 1935 c 126 § 1

[8] Some of the listed acres are counted more than once due to overlapping uses between asset classes.

- **Other resources** (530,202 acres)**:** Solar and wind energy; special uses such as archery clubs, underground storage, golf courses, and research agreements; right-of-way access; and special forest products such as floral greens (for example, salal) and boughs.
- **Mining** (5,869 acres): Extraction of rock, sand, gravel, and minerals, plus prospecting leases.

Mining on state trust lands

State trust lands management is funded through a portion of the revenue generated on these lands. Revenue retained from the federally granted lands is placed into the Resource Management Cost Account (RMCA), and revenue retained from State Forest Lands is placed into the Forest Development Account (FDA). The Washington State Legislature sets the maximum percentage DNR may retain for the RMCA through RCW 79.64.040, and for the FDA through RCW 79.64.110. The Board of Natural Resources sets the actual percentage and adjusts it periodically.

At the time of this writing, each beneficiary of the federally granted lands receives 69 percent of the revenue earned from these lands and the remaining 31 percent goes to the RMCA. Revenue for beneficiaries is placed into accounts specific to each trust (such as permanent funds) and distributed according to the rules that govern each account.[9]

Beneficiaries of the State Forest Transfer Lands receive 75 percent of the revenue generated on these lands and the remaining 25 percent is placed into the FDA. On State Forest Purchase Lands, 50 percent of the revenue goes to the FDA, 25 percent goes to the state general fund, and 25 percent goes to the beneficiaries.

What are the Trust Management Responsibilities of the Legislature and DNR?

The federally granted lands are held in trust pursuant to the Enabling Act and Washington Constitution. The Washington Supreme Court landmark decision in *County of Skamania v. State of Washington*, 102 Wn2d 127, 685 P.2d 576 (1984) clearly recognized that these are real, enforceable trusts that impose upon the state the same fiduciary duties applicable to private trustees. The legislature created the State Forest Lands trust by statute and these lands are also governed by fiduciary principals. *Skamania* recognized that the legislature's authority to enact statutes specific to the federally granted lands are constrained by the Enabling Act and Washington Constitution, and fiduciary principles. As a statutory trust, the State Forest Lands trust can be altered by the legislature. However, *Skamania* held that as long

[9] For more information, refer to the DNR annual report.

as the statutory trust exists, statutes specific to these lands also are constrained by fiduciary principles. In other words, the legislature, as the trustee of these asset classes, has fiduciary obligations to the beneficiaries in managing federally granted lands and State Forest Lands trusts. The fiduciary obligations can be found in common law principles governing the administration of private trusts. These obligations include, but are not limited to, undivided loyalty to the trust beneficiaries to the exclusion of all other interests, exercise of reasonable care and skill in managing the trust, and impartiality. These obligations are further described in the formal opinion of the Attorney General (AGO 1996 No.11) and in *Skamania*.

The legislature created DNR in 1957 and assigned to it many responsibilities with regard to state trust lands, including that of trust manager (RCW 43.30.010, RCW 43.30.030, RCW 43.30.215, RCW 79.02.010). In this role, DNR manages state trust lands on behalf of specific trust beneficiaries, consistent with federal and state law. In managing these lands, DNR must comply with laws of general applicability and follow the common law duties of a trustee. For example, DNR must administer the trust in accordance with the provisions that created it; maintain undivided loyalty to each of the trusts and its beneficiaries; manage trust assets prudently; make the trust property productive, while recognizing the perpetual nature of the trusts; deal impartially with beneficiaries; and reduce the risk of loss to the trusts.

Part Two: Valuation Findings

An important component of this assessment is a valuation of state trust lands and the non-market benefits ("ecosystem services") that accrue from sustainable management of these lands for revenue generation. Following is a brief summary of the results.

Valuation of State Trust Lands

Most real estate valuations are performed using a "sales comparison" approach, in which the value of the land is based largely on the value of other, similar properties currently being sold. This approach assumes there are willing buyers and sellers for like properties. In their 1996 valuation of state trust lands, Deloitte and Touche primarily use this approach. Another valuation approach is the income approach, in which asset value is based primarily on the income the land can generate.

DNR's ability to sell all state trust lands, as individual parcels or one property, is limited by the Washington Constitution and statutes. For example, federally granted lands can be sold, but only in parcels of 160 acres or fewer.[10] It would take thousands of transactions to sell the entire portfolio.

Therefore, Deloitte used the income approach to calculate the "trust value" of state trust lands, rather than their market value. Trust value is based primarily on the revenue these lands have generated over time for the trust beneficiaries. A detailed explanation of trust value can be found in Chapter 1 of Deloitte's report (Appendix B).

[10] Washington State Constitution, Article XVI, Section 4 and RCW 79.11.010.

Table 1 summarizes trust value of each asset class. Data is current as of fiscal year 2018[11] and is reported in nominal dollars (not adjusted for inflation).[12] For results at the trust and county level, refer to Appendix B.

In Table 1, net operating income is the income DNR provides to trust beneficiaries (gross revenue minus the revenue that DNR retains for management of state trust lands). The final column, which divides net operating income by trust value, provides a measure of the rate of return.

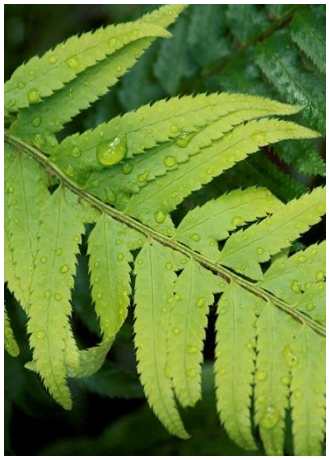
Table 1. Summary of Trust Value

Asset class	Gross income	Net operating income	Trust value	Net operating income/ trust value
Timber	$171,700,000	$123,624,000	$2,136,000,000	5.79%
Agricultural	$23,500,000	$16,685,000	$238,300,000	7.00%
Commercial real estate	$10,300,000	$7,210,000	$95,700,000	7.53%
Communication sites	$ 4,800,000	$3,360,000	$41,200,000	8.16%
Other resources[a]	$3,200,000	$2,240,000	$20,300,000	11.03%
Mining	$1,900,000	$1,330,000	$16,640,000	7.99%
Grazing	$1,050,000	$735,000	$10,500,000	7.00%
Total	**$216,450,000**	**$155,184,000**	**$2,558,640,000**	**6.07%**

[a]Includes clean energy; special uses such as archery clubs, underground storage, golf courses, and research agreements; right-of-way access; and special forest products such as floral greens (for example, salal) and boughs

Ecosystem Services

Earth Economics' *Non-Market Environmental Benefits and Values report* in Appendix C summarizes the annual value of ecosystem services for each asset class. The report included four classes of ecosystem services:



- Provisioning goods and services, such as energy, raw materials, food, medicinal resources, ornamental resources, and water storage.
- Regulating services, such as maintaining water quality, limiting soil erosion, regulating climate, and keeping wildlife populations and diseases in check.
- Supporting services, such as habitat and refugia for both plant and animal species.

[11] Fiscal year 2018 refers to July 1, 2017 to June 30, 2018.

[12] Refer to Page 11, Chapter 1 of Appendix B.

- Information services that support meaningful interactions with nature, including aesthetics, cultural uses, recreation and tourism, and science and education.

Ecosystem services benefits are not bought and sold in the marketplace, do not generate revenue directly, and are not paid for through taxes or other means. These benefits also do not represent revenue available to trust beneficiaries, although DNR may explore ways to capture a revenue stream from some of these benefits in the future. For these reasons, these benefits often are overlooked.

Beyond meeting the requirements of ESSB 6095, DNR included the valuation of these benefits in the Trust Lands Performance Assessment to provide a broader perspective on the magnitude of benefits that accrue from the sustainable management of working forests and agricultural lands. Ecosystem services benefits are in addition to these lands' value for revenue production. For example, in addition to providing revenue and jobs, working forests provide habitat, places to recreate, water and air filtration, and other benefits to society as a whole. The value of these benefits also can be viewed as avoided costs. If the working forests and agricultural lands did not provide these benefits, the costs of providing them would fall to society. For example, local governments may need to build additional water treatment facilities since the forest was no longer filtering water naturally.

Table 2 summarizes the total, annual value of all ecosystem services across all asset classes, not including recreation or carbon storage.[13] Table 3 summarizes the total, annual value of recreation on state trust lands.[14]

Table 2. Annual Ecosystem Service Value, Averaged by Land Cover and Asset Class (2018)

Asset class	Asset acres	Annual ecosystem service value
Forested	2,170,070	$1,231.64 million
Cultivated	301,807	$84.55 million
Grazing	366,240	$46.20 million
Other	124,969	$37.68 million
Total	2,963,086	$1,400.07 million

Table 3. Economic Value of Outdoor Recreation on State Trust Lands (2018)

Activities	Annual value
All recreational activities	$990 million

[13] Refer to Table 6, page 20 of Appendix C.

[14] Refer to Table 10, page 27 of Appendix C.

Earth Economics estimated the total social cost of carbon[15] stored on state trust lands at over $16 billion (refer to Table 4). This total demonstrates the social value of sequestering carbon on state trust lands through sustainable management. Refer to pages 28 through 30 of Appendix C for a more detailed explanation.

Table 4. Social Cost of Carbon

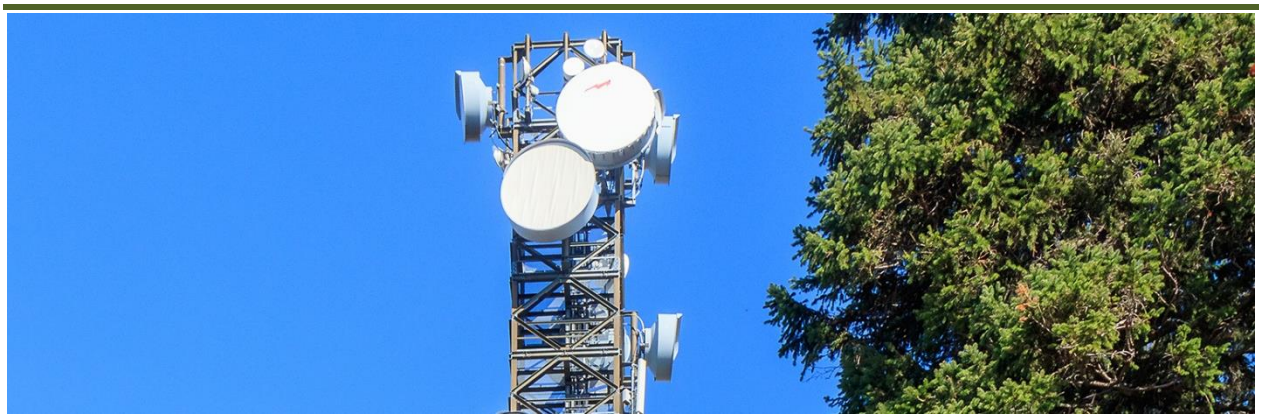
Asset class	Social cost
Forested	$16.56 billion
Cultivated	$0.74 billion
Grazing	$1.00 billion
Other	$0.44 billion
Total	$18.74 billion

Looking Ahead

In order to maintain or enhance trust value going forward, given increased growth in population and need, DNR will need to maximize revenue generation on state trust lands. Maximizing revenue for the trust beneficiaries is DNR's fiduciary duty as a trust lands manager. Trust revenue also is extremely important to trust beneficiaries and rural communities. For example, in 2019, trust revenue comprised approximately 22 percent of Skamania County's general expense budget, which funds services such as law enforcement, courts, senior services, food banks, domestic violence prevention programs, probation, and planning, to name a few. In another example, trust revenue comprises 4 percent of the Timberland Regional Library's operating budget each year. The library district serves approximately 518,000 people in Thurston, Lewis, Grays Harbor, Mason, and Pacific counties. Other taxing districts throughout the state have an even greater reliance on trust revenue to fund critical local services, often in rural areas.

For the remainder of this report, DNR will focus specifically on revenue generation and ways that both the amount and reliability of that revenue can be increased by optimizing policies, statutes, and operational business practices and investing in working forests and agricultural lands while improving and expanding other components of the state trust lands portfolio. Focusing on cash flow is one of Deloitte's key suggestions.

[15] The social cost of carbon represents the value of damages that are avoided when carbon is sequestered instead of emitted (in other words, the benefit of sequestering carbon). The social cost of carbon "is meant to be a comprehensive estimate of climate change damages and includes, among other things, changes in net agricultural productivity, human health, property damages from increased flood risk and changes in energy system costs, such as reduced costs for heating and increased costs for air conditioning." (EPA Fact Sheet, Social Cost of Carbon).



Part Three: Challenges and Opportunities

As this assessment has shown, state trust lands have produced over $4.3 billion in non-tax revenue for trust beneficiaries over the past 25 years.[16] These lands also provide extensive ecosystem services, which underscores the additional benefits provided by working forests and agricultural lands. Yet work remains to be done to ensure a sustainable and prosperous future for state trust land management, trust beneficiaries, and the people of Washington.

This part of the report will discuss the challenges and opportunities currently facing state trust land management. The first section provides a high-level overview of Deloitte's findings. The remainder of this part of the report will focus on the results of DNR's work.

Challenges and Opportunities Identified by Deloitte

Table 5 summarizes the challenges and opportunities that Deloitte identified, both for all asset classes and for each asset class. Note that Deloitte did not provide recommendations for either the mining or other resources asset classes.

Many of the concepts and ideas in this table are explained later in this section of the report and in Part Four, "Developing Solutions." Additional information can be found in Chapter 12 of Deloitte's report (Appendix B).

[16] Net revenue from fiscal years 1995 to 2019, in nominal dollars. Includes revenue from trust land transfers.

Table 5. High-level Overview of Challenges and Opportunities Identified by Deloitte

Asset class	Challenges	Opportunities
All	Decline in revenue and lack of reliability in revenue	• Explore alternative governance structures, such as integrated management of land and public market assets,[17] and create new funds for beneficiaries to provide more reliable and enhanced revenue. • Consider the use of debt to increase revenue reliability. • Improve financial systems (chart of accounts, cost accounting) to incorporate for-profit-enterprise practices and to make more strategic decisions about reducing costs and investing in profit-generating activities. • Improve operational business processes, such as developing a job cost accounting system. • Support the exchange of financial data with other state trust lands managers and private industry to establish credible benchmarks.
Timber	Stumpage price decline Decline in operating area	• Optimize revenue by reviewing rotation ages and lengths and selling timber when market conditions are favorable. • Explore other business models, for example using an external manager. • Improve operational business processes, such as consolidating timber appraisal data into one system. • Explore carbon market revenues as an additional benefit of working forest lands.
Agriculture	Lack of access to capital (for capital expenditures)	• Secure access to capital for investments in infrastructure to increase opportunities for higher-value agriculture.
Commercial real estate	Restricted ability to transact land (sales and exchanges) Lack of active management of transition lands	• Explore options for Enabling Act, constitutional, or statutory improvements to allow DNR more flexibility to transact land. • Establish transition lands as a separate asset class and establish an advisory committee for moving these lands into uses that produce higher net income for the trusts. • Secure access to capital for investments to increase revenue from commercial assets.
Grazing	Low returns that do not cover the cost of management	• Recognize the cost-reduction values that grazing provides through lowering land management costs for the trusts. • Explore potential carbon markets; maintaining lands as grazing instead of dryland agriculture has a carbon benefit. • Conduct periodic studies to ensure that the revenue earned is in line with private industry rates.
Communication resources	Lack of access to capital (for capital expenditures)	• Increase access to capital so DNR can invest in communication resources to improve existing sites and expand into new areas to keep pace with a rapidly evolving industry. • Improve operational business practices, such as improving data management and upgrading lease management software.

[17] Public market assets includes stocks and bonds; also referred to as "liquid" assets.

Challenges and Opportunities Identified by DNR

Per DNR's analysis, some asset classes have seen significant growth in the past 25 years. For example, agriculture has grown by 166 percent, commercial real estate has grown by 99 percent, and communication sites have grown by 90 percent. Clean energy represents another growth area. Since March 2019, DNR has converted three agricultural leases to solar leases. When fully operational, these leases will earn over $893,000 a year in gross revenue, which is approximately $870,000 more than these lands earned under agricultural leases. These successes demonstrate how the state trust lands portfolio can be diversified to increase the amount of revenue and offer other benefits, such as green jobs.

Clean energy is a potential growth area for the state trust lands portfolio

Yet in real dollars (adjusted for inflation), total net revenue has declined 35 percent in the past 25 years. Timber, the largest asset class in the portfolio (generating 79 percent of gross revenue distributed to beneficiaries), has shown an approximately 45 percent decrease in real revenue. As will be explained in this section, timber revenue has declined largely due to market forces, including increases in operational costs and changes in log supplies and mill closures; and environmental regulations, which decreased the size of the operable land base on state trust lands. Another contributing factor is urbanization, particularly of working forests. Urbanization results in more people living in or near working forests, which can affect timber sales. As people recognize more widely the environmental benefits of using wood instead of other building materials, including the potential for working forests to help mitigate climate change, the value of wood as a commodity could increase, presenting an opportunity for increasing trust revenues. In the meantime, the decline in timber revenue is part of the challenge facing DNR and beneficiaries and the communities that depend on the jobs and revenue these lands provide.

In the following section, DNR will first discuss the reduction in revenue over time and the need to increase reliability of revenue. Second, DNR will discuss the major opportunities it sees to address these challenges and make improvements that benefit current and future generations of beneficiaries and Washington residents. More specific ideas will be presented in Part Four of this report.

Challenges

▶ Changes in Trust Revenue Over Time

The previous valuation of state trust lands was completed in 1996 by Deloitte and Touche using data from fiscal year 1995, and the 2020 report was completed by Deloitte using data from fiscal year 2018.

Although the two reports differ in acres and methodology (refer to Appendix A), these reports show that net revenue has dropped 35 percent since fiscal year 1995, when adjusted for inflation (Table 6).[18]

Table 6. Differences in Net Revenue Between Fiscal Years (FY) 1995 and 2020

Asset class	FY 1995 revenue	FY 1995 revenue in 2018 dollars	FY 2018 revenue	Percent change
Timber	$139,827,000	$224,344,067	$123,624,000	-45%
Agriculture	$3,908,000	$6,270,152.5	$16,685,000	166%
Commercial real estate	$2,261,000	$3,627,639	$7,210,000	99%
Grazing	$386,000	$619,314	$735,000	19%
Communication resources	$1,100,000	$1,764,884	$3,360,000	90%
Mining	$1,079,000	$1,731,191	$1,330,000	-23%
Other resources[a]	n/a	n/a	$2,240,000	n/a
TOTALS	**$148,561,000**	**$238,357,248**	**$155,184,000**	**-35%**

[a]This category was not used in the 1996 report.

As stated previously, some asset classes have seen significant gains. These gains demonstrate how, with leadership and vision, DNR is generating significantly more income, now and into the future, from asset classes that historically have not been leveraged.

However, the timber resource asset class has seen a 45 percent decrease in earnings in real dollars since 1995. That decrease is significant because timber is the largest asset class. Over half of the federally granted lands and all of the State Forest Lands (transfer and purchase) are forested. Taken together, these lands comprise over 2 million acres of forest and generate approximately 79 percent of the gross revenue on state trust lands.

Why has Timber Revenue Declined?

Timber revenue has declined for two primary reasons: stumpage prices[19] have decreased due to changing market forces, including mill closures, and resource protection measures have been instituted to comply with environmental regulations, which decreased the size of the operable land base.

Stumpage prices and market forces: Stumpage prices on state trust lands have varied since 1995, but the overall trend is down, as shown by the dotted line in Figure 2. Log prices show a very similar trend. Figure 3 shows sold and removed timber volume on state trust lands over the same period.[20]

[18] Revenue in this table differs from totals in DNR annual reports due to methodology differences between Deloitte and DNR.

[19] Stumpage is the price a timber buyer pays for trees standing "on the stump." In Figure 2 it is shown as dollars per million board feet (mbf). Another term for stumpage is sold log price. Stumpage is different than the delivered log price, which is the cost of wood delivered to a mill. Unlike stumpage, the delivered log price includes the cost of cutting and transporting the wood.

[20] Data in figures 2, 3, and 4 is from DNR's product sales and leasing program.

Figure 2. Decline in Stumpage Prices from State Trust Lands, Fiscal Year 1995 to 2020, in 2018 Dollars

Log prices are based on "DF #2" saw logs, which are Douglas fir logs that are suitable for the manufacture of construction and better lumber.

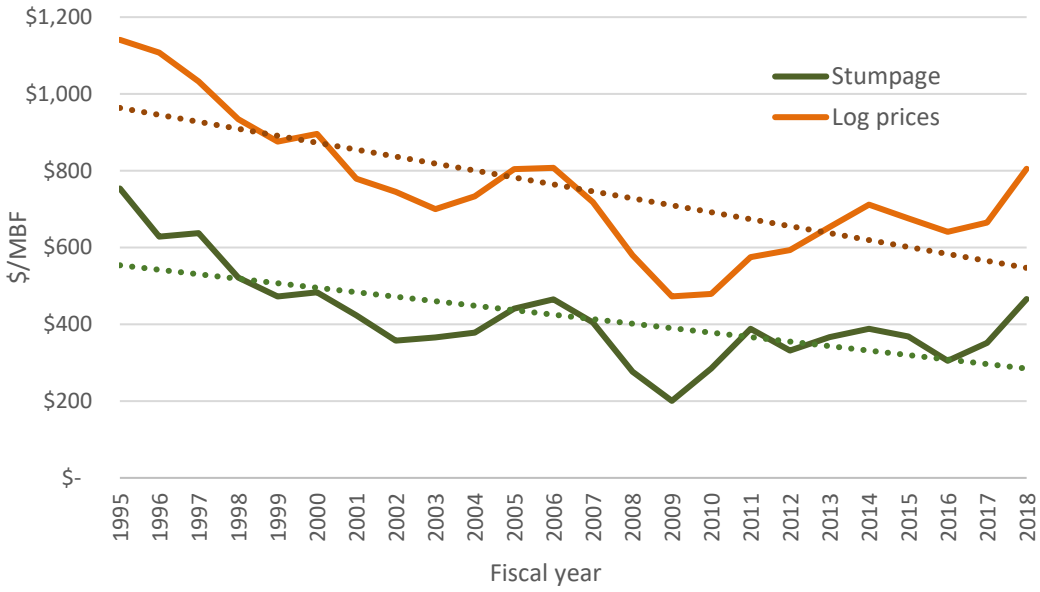
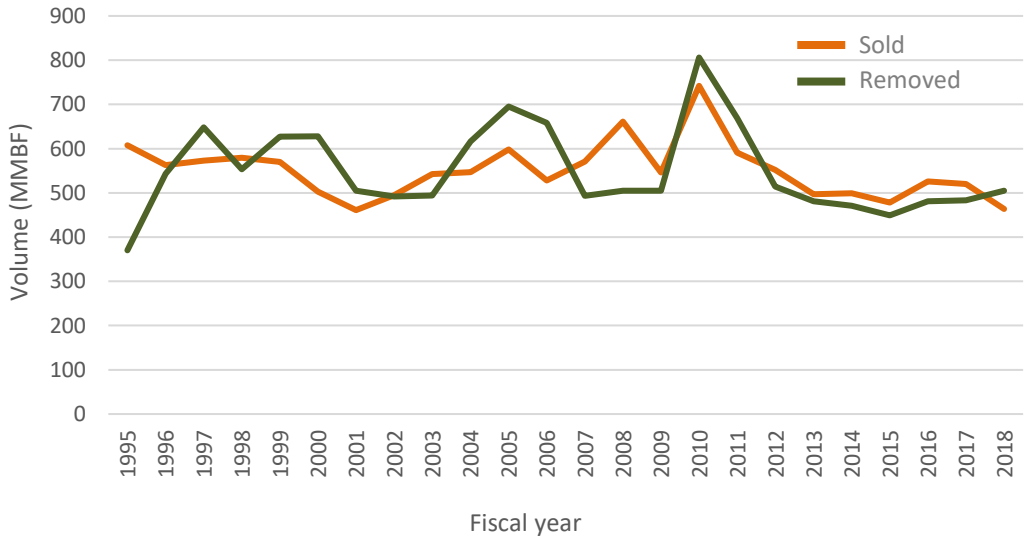
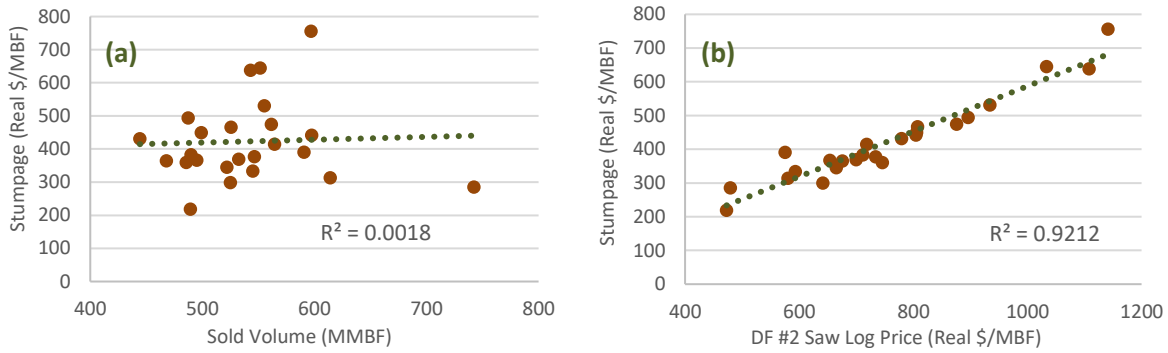


Figure 3. Sold and Removed Timber Volume from State Trust Lands, Fiscal Year 1995 to 2020



As shown in Figure 4, there is little correlation between stumpage price and timber volume, but there is a strong correlation between stumpage and log prices. A comparison of the spread of data points in Figure 4(a) to the alignment of data points along the trend line in Figure 4(b) reveals this correlation.

Figure 4. Correlation Between Stumpage Price and Timber Volume (a) and Stumpage Price and Log Price (b) from State Trust Lands, Fiscal Year 1995 to 2020, in 2018 Dollars
Log prices are based on "DF #2" saw logs.



Stumpage prices have declined because of changes in market forces. Examples include the ban on export of logs from state trust lands; increased labor costs; increased mill efficiencies, which have allowed mills to produce more lumber from fewer logs; mill closures; and natural disturbances such as wildfires and pine beetle impacts in Canada, which temporarily increased supply due to salvage operations. Another reason is the listing of the northern spotted owl (*Strix occidentalis caurina*) on the federal Endangered Species List and the subsequent decline in logging to protect their habitat. At the beginning of the time period shown in figures 2 and 3, log prices spiked as a result of reduced log supplies. In the latter half of the 1990s, log prices returned to normal with fewer domestic mills and increased supplies from Canada and other sources.

Resource protection measures: Most modern environmental statutes have been passed since DNR was established in 1957. Examples include the Clean Air Act (1963), State Environmental Policy Act (1971), Clean Water Act (1972), and Forest Practices Act (1973). The law that has influenced state trust lands the most is almost certainly the 1973 Endangered Species Act, and the subsequent addition of species to the Endangered Species List. One key example is the northern spotted owl.

The 1990 listing of the northern spotted owl as threatened under the federal Endangered Species Act created significant uncertainty for forest land managers in the public and private sectors, including DNR. At the time, 41 percent of the forest on state trust lands within

Mature forest

the range of the northern spotted owl was 51 years old or older,[21] largely due to DNR's commitment to sustained yield management.[22] Because many of these older forests were either functioning as habitat or had the potential to become habitat for the owl and other listed species, they were subject to requirements for "survey and manage," meaning they had to be surveyed for threatened and endangered species prior to timber sales, at great expense to DNR and trust beneficiaries.

In 1997, DNR adopted a 70-year, multiple-species habitat conservation plan (HCP) and obtained an incidental take permit from the Federal Services (NOAA Fisheries and U.S. Fish and Wildlife Service) to meet Endangered Species Act requirements for the owl and other listed and candidate species. The HCP provided operational certainty by helping define which lands are managed as habitat (for example, older forests and riparian areas) and where timber harvest can be conducted, effectively ending the costly "survey and manage" requirement and reducing risk to the trusts.

As a result of these environmental statutes, approximately 40 percent (816,000 acres) of forested state trust lands in the timber asset class are either unavailable or only partially available for harvest. DNR's past analysis has shown that meeting Endangered Species Act requirements through the HCP is more cost effective than withdrawing from it, although some stakeholders and beneficiaries do not agree. Deloitte has recommended that DNR work with the legislature, beneficiaries and stakeholders to compare DNR's current approach to Endangered Species Act compliance to other approaches.

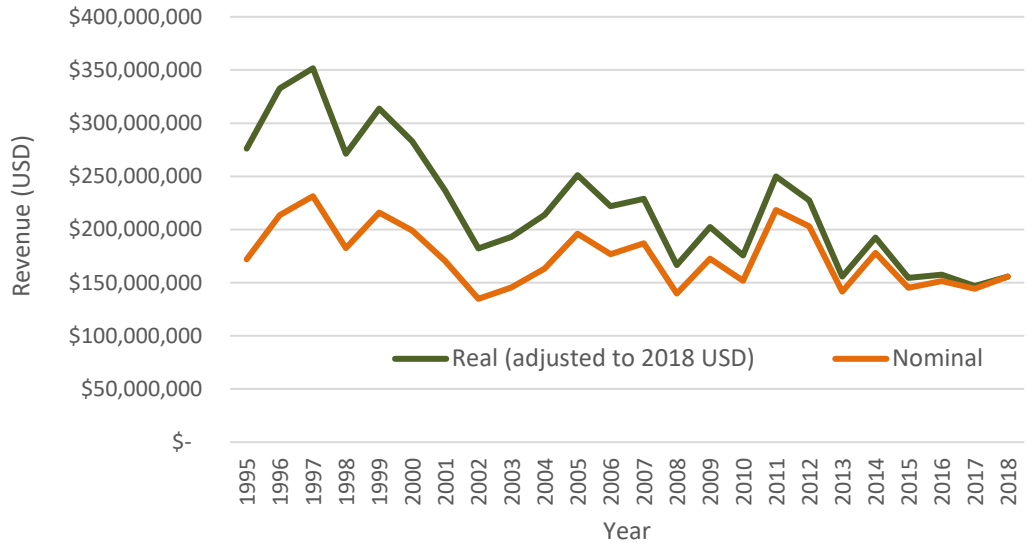
▶ Reliability of Revenue

Trust beneficiaries such as schools and rural counties and their tax districts rely on a predictable, reliable flow of revenue to provide services to the people of Washington. Because revenue is so heavily dependent on timber harvest, it tends to fluctuate. These fluctuations make it difficult for beneficiaries, particularly local governments like counties or taxing districts, to know when or how much funding they will receive, sometimes putting emergency response and other essential services at risk. Figure 5 shows the variability in trust revenue generated since 1995 from all asset classes in both nominal and real dollars. At smaller scales, trust revenue can be even more variable and unpredictable.

[21] Table 3.4.1, *Merged Final Environmental Impact Statement for the Habitat Conservation Plan,* DNR 1996.

[22] Management of the forest to provide harvesting on a continuing basis without major prolonged curtailment or cessation of harvest (RCW 79.10.310).

Figure 5. Total Net Revenue Generated from State Trust Lands from Fiscal Year 1995 to Fiscal Year 2018
Totals include revenue from trust land transfers.



The volatility in revenue is driven primarily by the dominance of the timber asset class in the portfolio and the year-to-year variation in stumpage prices due to market forces (refer to Figure 2). On both an annual and monthly basis, stumpage prices are affected by U.S. and Pacific Northwest housing construction, renovation and remodeling, which are major drivers of lumber demand and log prices; timber supply from competitors, both domestic and international; the species and product mixes being offered for sale by DNR; regional mill manufacturing capacity; competing foreign lumber supply; and other factors. Economic events like recessions can heavily impact log prices. In addition, natural events such as windstorms or wildfires, pest infestations, or disease outbreaks can reduce supply or result in a temporary but unsustainable flood of wood on the market from salvage operations. The instability and unreliability of wood supply can result in mill closures, which can compound negative consequences to revenue from state trust lands. Improving the stability and reliability of raw material supplies, investing in timber as well as other asset classes, and promoting wood products to increase demand presents opportunities to not only stabilize but also grow trust revenue.

Opportunities

The assessment highlights four major opportunities to increase the amount and improve the reliability of revenue: improve DNR's business model and systems, increase access to capital, improve DNR's ability to transact land, and expand tool sets to address evolving social expectations and needs.

▶ Improve Business Model and Systems

One of the major opportunities of this assessment is to improve DNR's business model and systems to create portfolio growth and performance, while establishing modern business practices and accountability. A business model is a design for the successful operation of a business or organization,

and includes products, markets, financing, and other information. As explained in Part One, "Background," DNR's business model is to generate revenue for trust beneficiaries on state trust lands through the sale of timber, and through agreements (leases, permits, easements and land use licenses) for agriculture, grazing, commercial real estate, and other uses. A portion of the revenue generated on these lands is retained to cover the cost of management.

Improvements to this model are needed. DNR currently manages a $200 million revenue operation; yet it has not made critical investments in accounting, financial reporting, and data management that a for-profit enterprise would use to understand and maximize the financial performance of its assets.

In their analysis (Appendix B), Deloitte identified several potential ways that DNR could improve its business model and systems to increase the amount and improve the reliability of revenue. These potential improvements are designed to enable DNR to operate more like a business, while also managing these lands in a way that is responsible and sustainable for current and future generations. Following is a brief overview of these improvements. Some of these improvements are discussed in more detail in Part Four, "Developing Solutions." Additional information can be found in Chapter 12 of Deloitte's report (Appendix B).

- **DNR should use an accounting and financial reporting system that is consistent with for-profit business enterprises**. This system would enable DNR to provide financial statements by asset class, allow it to determine if additional investment is appropriate to a particular asset class, help it understand the profitability of different properties, and provide the tools it needs to perform cost-benefit analysis for activities, so it can avoid activities without a net positive cash flow and pursue those that have a positive cash flow. It also would enable DNR to compare revenue from financial periods to its private market peers. A job costing and accounting system would allow DNR to track where time is spent and allocate expenses to specific properties or harvesting opportunities. DNR is now pursuing improvements to its current system.

- **DNR should modernize its property lease management system so it can track and report lease details, including options, annual increases, lease expiration reports, and important property details**. A modernized system would enable DNR to create better cash flow forecasts, account receivable reports, and detailed operation budgets, and to identify prospective lease opportunities. DNR will bring a capital funding request for this system to the 2021 legislative session.

- **Another initial idea is for the legislature to address the current, divided governance structure for trust assets,** in which the Board of Natural Resources manages the land assets and the State Investment Board manages the public market assets, such as stocks and bonds, on behalf of the permanent funds. Deloitte believed that the trust beneficiaries might benefit from a more integrated and coordinated approach to the governance of the trust assets.

- **The legislature should explore options for smoothing distribution of net revenue to beneficiaries,** including using debt or creating a reliability fund similar to the fund used by the State of Idaho.

- **The legislature could consider changing the way trust land management and investments are funded**. Instead of retaining a certain percentage of revenue, DNR could retain revenue based on actual management costs and liabilities, which would be different for each asset class.

- **Improving the performance of timber** will be challenging. Deloitte offered several initial ideas (Appendix B). Ideas included comparing DNR's current approach to Endangered Species Act compliance to other approaches, comparing the services DNR provides to the services of an external manager, and pursuing ways to monetize ecosystem services, for example by participating in carbon markets.

▶ Increased Access to Capital

The management of state trust lands is funded almost entirely through a portion of the revenue DNR generates. DNR's ability to access capital[23] through other means, such as borrowing money or issuing bonds, is very limited.

Vineyard on state trust lands

Per Deloitte's assessment, DNR could operate more like a business if it had access to consistent and adequate sources of capital. Using this capital to invest in infrastructure and other improvements would yield better return on investments and also improve reliability of revenue for beneficiaries. For example:

- **DNR should purchase additional water rights or invest in pipelines and other agriculture infrastructure.** To illustrate, DNR needed $23 million to build a large water pipeline in the Patterson area to avoid losing a water right worth over $40 million. This pipeline carries water from the Columbia River to state trust lands located approximately nine miles away.

  Lacking sufficient cash reserves, DNR requested capital funding from the Legislature to construct the pipeline. Because this request was not successful, DNR leased the land at public auction with the requirement that the lessee construct the pipeline at their sole expense. With these terms, only one bidder came forward on a very valuable piece of agricultural land, and DNR's ability to negotiate was limited. DNR agreed to abate the rent on this lease and ten other leases held by the lessee until the investment is repaid, at an annual rate of approximately $1.9 million and 5 percent interest.

[23] In this context, capital refers to capital expenditures, not working capital that covers day-to-day expenses.

While it was successful and benefited the trusts by ensuring DNR did not lose a major water right, this mechanism reduced near-term cash flow to the beneficiaries by approximately $1.35 million annually, at a higher rate of interest than may have been achieved by other means. Also, the requirement that the lessee build a $23 million pipeline very likely reduced the bidder pool for the lease. The smaller pool of bidders may have resulted in lower rents on the property, although bids were comparable to historic averages.

- **DNR should buy land or exchange existing state trust land for high-performing commercial properties, or secure capital from the legislature (or through other opportunities) to improve low-performing properties in its portfolio to attract tenants.** Re-tenanting vacant spaces in buildings requires capital investments to reconfigure the spaces to the tenant's needs. Per current industry standards, these expenditures are typically the landlord's responsibility. After improvements are made and the property is leased, returns on this investment capital are generally in the 6 to 9 percent range. These returns are similar to purchasing a new building with existing leases in place. As an example, the estimated return on DNR's recent purchase of a Bartell Drug store in Darrington is 5.32 percent in the first 10 years and 9.42 percent in years 36 through 40.

This Costco in Fife earns an annual rent of $668,769

  Without sufficient access to capital, DNR often relies on a prospective lessee to fund the tenant improvements in exchange for rent abatement. As a result, properties can remain vacant longer as DNR must wait for a tenant with sufficient capital on hand to make that investment. Programs such as the certificate of participation (COP) through the Office of the State Treasurer are not a viable option because the timing of a vacancy, a new tenant's inquiry into the vacant space, and the window of application for COP authority rarely, if ever, align. DNR has not successful in securing requested capital funding from the legislature over the years to make critical improvements to increase revenues from these properties, and should work with the legislature to identify other opportunities for securing capital.

- **DNR should increase its investment in working forests to increase timber value and volume.** One example of an investment is to fund more silviculture treatments. The cost of silvicultural treatments for young forest stands began to rise sharply in fiscal year 2017, in response to a tightening labor market and an increasing minimum wage. For some contract types, the initial jump in costs exceeded 40 percent and has remained at elevated levels ever since. Current revenue in the RMCA and FDA has not been sufficient to increase investments in silviculture to make up for these increasing costs, with the result being a budget shortfall in excess of $11

million dollars for both the 2019 to 2021 and 2021 to 2023 biennia. DNR is submitting an approximately $13 million capital funding request for silviculture for the 2021 to 2023 biennium. Funding silviculture will increase the marketability and value of these forests, and/or address forest health and wildfire risk. Investing more in silviculture also could generate more jobs in rural areas.

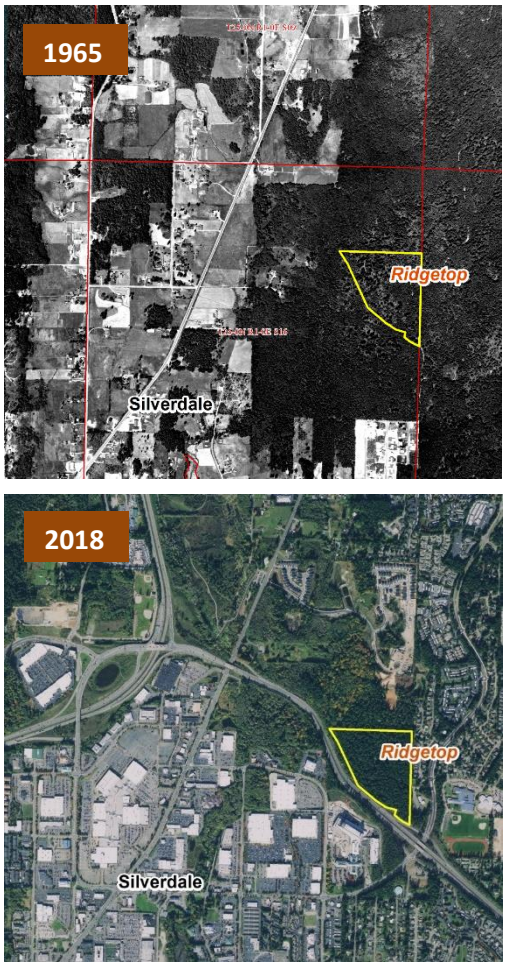
There are a number of ways DNR could increase access to capital. For example, when state trust lands managed for the Common School trust are sold at auction, the proceeds are deposited into the Common School permanent fund. Allowing DNR to retain some of that capital for investment in the asset classes could generate longer and larger returns from existing and new opportunities. These and other ideas will be discussed in Part Four, "Developing Solutions."

▶ Greater Ability to Transact Lands

Some of the state trust lands that DNR manages are no longer earning revenue. For example, some state trust lands are too isolated or scattered to manage efficiently or effectively for forestry or agriculture. Others are called "transition lands," which are lands that are transitioning from natural resource production to higher and better uses as a result of local land use planning and zoning.[24]

As the state population has grown over the past 25 years, homes and urban development have expanded farther into what has traditionally been natural resource working lands like farms and working forests. Particularly in fast-growing cities and counties, some state trust lands that were zoned for forestry or agriculture are now zoned for urban development as their higher and better use, per local land use planning under the 1990 Growth Management Act (GMA).[25] In fact, some of these parcels have become surrounded by urban development and are difficult to manage as natural resource lands.

These lands should be transitioned to other revenue-generating land uses. They also could be sold or exchanged for lands with a higher potential to earn revenue. These changes would align these lands with the GMA and local



Ridgetop transition land near Silverdale, Washington in 1965 and 2018

[24] Refer to Chapter 79.19 RCW.

[25] Refer to Chapter 36.70A RCW

land use planning and community goals, help to diversify the state trust lands portfolio, and ultimately increase needed revenue to trust beneficiaries.

DNR has made progress in selling or exchanging from state ownership underperforming properties that, as described above, are too isolated or scattered to manage as state trust lands or are no longer appropriate to their current asset class. DNR's ability to transact lands efficiently and expeditiously to keep up with market forces, however, is limited by its access to capital and by current constitutional and statutory limitations. For example:

- **Parcel size limitation**: Article XVI, Section 4 of the Washington Constitution limits the parcel size of any sale of federally granted land to 160 acres. RCW 79.11.010 sets forth the maximum acreage for any single sale at 160 acres with no minimum acre size. Aside from limiting the growth of the state trust lands portfolio, investors in real estate typically have minimum acreages for transactions. The parcel size limitation therefore limits the marketability of state trust lands, particularly for forestry and agriculture.
- **Platting requirements:** Unplatted lands within a city or within two miles of a city's boundaries are subject to Article XVI, Section 4 of the Washington Constitution (RCW 79.11.250). Prior to sale, DNR must either plat these lands into lots and blocks, or sell the land with the understanding that the purchaser cannot begin construction until platting requirements are met. This statute can discourage land transactions that are in the best interests of the trusts, limit the marketplace in which DNR can participate, and lower resulting land values.
- **Auction requirements:** Article XVI, Section 2 of the Washington State Constitution requires that sales occur at public auction, and RCW 79.11.090 states that "all sales of land under this chapter shall be at public auction, to the highest bidder…" This requirement was designed to ensure fair market value, but limits DNR's flexibility to work with potential sellers. Because these limitations are not standard business practice in the current real estate market, they put DNR at a competitive disadvantage and discourage potential business partners from engaging in state trust lands transactions.
- **Permanent fund:** When state trust lands managed for the Common School trust are sold at auction, the proceeds are deposited into the Common School permanent fund, not the Real Property Replacement Account (Washington State Constitution, Article XVI). This requirement limits DNR's ability to purchase lands that may yield a higher return to the trusts.
- **Auctions and professional real estate services:** According to RCW 79.11.340, DNR may hire a professional real estate service only after failing to sell a parcel at public auction. For some land dispositions, it is prudent business practice to hire a professional auctioneer or realtor with knowledge of the local challenges and opportunities at the onset, instead of waiting for initial failure at auction. Waiting to hire a real estate service can be an inefficient use of staff time and

other trust resources, and can result in a lower-than-optimal price for complex land transactions.

- **Land bank limitations**: RCW 79.19.020 established a land bank, which is an account that enables state trust lands to be sold and replaced in a way that maintains the corpus of the trust. The acreage held within the land bank at any given time cannot exceed 1,500 acres, which can severely limits DNR's ability to reposition low-value acres. Land must first be acquired, which requires capital, and then placed in the land bank. Once the acquired land is in the land bank, DNR can exchange it for state trust lands of equal value. The exchanged state trust lands are then placed in the land bank without trust status and sold at auction. This restriction prohibits DNR from disposing and acquiring lands at a pace and scale consistent with its responsibilities as a fiduciary manager.

- **State Forest Land limitations:** Although they can be exchanged, both State Forest Purchase and State Forest Transfer lands are reserved from sale under RCW 79.11.250. This statute makes it nearly impossible to reposition these lands to be consistent with land use planning objectives, and to avoid land-use conflicts with adjacent landowners. Additionally, State Forest Lands must remain in forestry and therefore cannot be converted to a higher and better use, such as commercial real estate, even if zoning and local land use rules allow that use. This statute limits DNR's ability to diversify this portion of the state trust lands portfolio.

Addressing these limitations would make DNR more nimble and able to respond to market opportunities as they arise, and ultimately better able to diversify the state trust lands portfolio at a pace consistent with the requirement of prudent portfolio management.

▶ Expanded Tools to Respond to Evolving Societal Expectations and Needs

As explained in Part Two of this report, the working lands of the state trust lands portfolio provide extensive ecosystem services as well as trust revenue. Demand for these critical but finite services is growing along with Washington's population, which has increased by almost 2 million people in the past two decades and is expected to grow by 2 million in the next 16 years.[26]

One way to address this demand is through state trust lands portfolio management tools that allow DNR to reposition trust lands assets in a way that safeguards them and increases the revenue-generating potential of the portfolio. DNR currently has three tools. These programs have worked well in the past but could be revitalized to address current and future challenges.

- **Trust Land Transfer program:** Under this program, the Washington State Legislature provides funding to purchase federally granted state trust lands that provide greater social benefit through non-revenue activities such as recreation. Once purchased, these lands are transferred to other public agencies or DNR's natural areas program to be managed as open space or parks.

[26] Washington Office of Financial Management

The proceeds of the sale are used to fund school construction and purchase replacement land. DNR has successfully transferred thousands of acres through this program, but legislative support for the program has decreased in recent years, making it more difficult to meet both the needs of the beneficiaries and the public. Currently, DNR is working with beneficiaries and stakeholders to create an updated, revitalized version of the program.

- **State Forest Land Replacement program:** Some of the State Forest Lands in small, rural, timber-dependent counties are no longer producing revenue because they are being used to meet Endangered Species Act requirements. Under the State Forest Land Replacement Program, these "encumbered" lands are purchased using legislative capital funding and transferred into conservation status. The purchase price is paid to the affected county. DNR requests legislative capital funding each biennium for this program.

  Since August 2017, DNR has been working with an encumbered lands steering committee to develop a long-term solution for Pacific, Wahkiakum, and Skamania counties to reduce their dependency on legislative funding. One possibility that has secured support from beneficiaries and other stakeholders is to acquire new forest lands or exchange forest lands within the three counties. Exchanges would be accomplished by acquiring new, revenue-generating assets elsewhere in the state. To date, DNR and beneficiaries have not been successful in securing the necessary funding.[27]

- **Community Forest Trust program:** This program transfers private and state-held properties under development pressure into community forests, which are self-supporting and managed consistent with local community values. Past successes include creation of the Teanaway Community Forest and the Klickitat Canyon Community Forest. This program has not had the critical funding and investments needed to be widely utilized to protect working forests significant to local communities. A reinvigorated Community Forest Trust program holds great promise for addressing shifting societal values in a forested landscape with increasing pressure from human development.

Teanaway Community Forest

In addition to revitalizing these programs, DNR could develop new portfolio management tools or pursue ways to capture revenue from ecosystem services on state trust lands or lands in conservation status. An example is participation in carbon markets.

[27] Refer to DNR's 2019 legislative update, "An Assessment of Options to Replace Timber Trust Revenues for Counties."

A significant amount of analysis and work has been done across many sectors to identify the value of carbon sequestration from forests and other natural and working lands. DNR has spearheaded efforts to improve carbon inventories and fully understand all available incentive-based programs that target carbon sequestration as a goal. The work of the Carbon Sequestration Advisory group, led by DNR, did this work by bringing industry, environmentalists, non-profits, and researchers together to explore different carbon markets for Washington State. Additionally, DNR is continuing to engage with the legislature over potential carbon opportunities for state trust lands. The forested state trust lands that DNR manages are well positioned to secure additional benefits and revenues as a result, if those efforts move forward.

Part Four: Developing Solutions

Commissioner Franz and DNR have pushed for this assessment because we are committed to transforming the way we work to deliver more efficient effective results for our beneficiaries, our economy, and our environment, and to set these trust lands, trust beneficiaries, and the people of Washington on a prosperous path for the future.

What Will Transformation Entail?

DNR envisions multifaceted solutions that address all aspects of the challenges and opportunities facing state trust land management. These solutions likely will involve a combination of the following:

Optimize policies, statutes, and operational business practices to improve DNR's efficiency and performance, make trust revenue more reliable on a year-to-year basis, and increase state trust lands portfolio performance for the benefit of current and future generations.

The framework for managing state trust lands dates almost entirely to the establishment of DNR in 1957 or soon afterwards. This framework of statutes and authorities was visionary and has stood the test of time; however, it is now half a century old. Optimizing this framework will provide DNR with the tools and flexibility it needs to meet the challenges of the future. Equally important are improvements to operational business practices that make DNR more efficient and effective.

Maintain working forests and agricultural lands as a core and valuable part of the state trust lands portfolio and **make strategic capital investments in these lands** to increase their revenue-generating potential.

Working forests and agricultural lands will continue to comprise the majority of the state trust lands portfolio because they are essential to our environment, our economy, and our quality of life in Washington. Aside from providing revenue, critical natural resources, and ecosystem services, working forests and farms provide jobs and therefore support local economies. Washington's climate and access to international markets also provide a competitive advantage.

Table 7 is an estimate[28] of the number of jobs in the wood product manufacturing industry that are supported by working forests statewide and by state trust lands specifically. Table 6 also includes the median annual income of these jobs. Indirect jobs include jobs in forestry and logging. Total gross revenue for this sector in 2017 was $8,310,937,292.

Table 7. Direct and Indirect Jobs in Wood Product Manufacturing in Washington State

	Direct jobs	Indirect jobs
Estimated jobs per $1 million in output in wood manufacturing, statewide	3.10	5.32
Estimated total jobs in wood manufacturing across state economy	25,764	44,214
Median annual income of a person working in the wood manufacturing industry	$39,888	$50,236
Estimated labor income (median income multiplied by total jobs)	$215,810,840	$466,440,212
Jobs in wood manufacturing attributable to logs from state trust lands (21%)	5,410	9,285
Labor income in wood manufacturing attributable to logs from state trust lands	$45,320,276	$97,952,445

What is needed now is investments in these lands to optimize their revenue-generating potential. Two examples are investments in irrigation pipelines and infrastructure to support irrigated crops and orchards and additional investments in silviculture to keep forests healthy and productive.

Improve and expand other components of the state trust lands portfolio that show promise for immediate and continued growth.

Two major opportunities are transition lands, which are lands that are transitioning from natural resource production to higher and better uses as a result of land use planning and urbanization, and other parcels of state trust lands that are too isolated or scattered to manage efficiently or effectively

[28] DNR used an input-output model to produce these estimates. The model is a snapshot in time that does not account for changes in supply and demand and assumes a perfectly elastic supply. For example, if there is an expansion in some sector's output, the price that the sector pays for labor or other supplies does not change. Because the model is a snapshot, results become less accurate over time. The model uses 2016 data and does not reflect the economic impacts of COVID-19. Source: "Employment Associated with DNR Managed Lands," September 2020.

for forestry or agriculture. These lands present prime opportunities for communication sites, renewable energy production, or other uses that could yield significantly higher revenue for trust beneficiaries.

Rethink existing state trust lands portfolio management tools.

DNR needs to revitalize existing programs such as the Trust Land Transfer program, Community Forest Trust program, and State Forest Land Replacement program, and to develop new tools that will help increase the revenue-generating potential of state trust lands and protect natural resources.

How Will Solutions be Developed?

Transformation is a substantial undertaking. For that reason, DNR is committed to working in collaborative partnership with the legislature, beneficiaries, tribes, stakeholders, and advisory committees to define and agree on solutions that have broad support.

In the following section of this report, DNR provides a number of initial ideas for addressing the challenges and opportunities identified in Part Three. These ideas represent a range of possibilities and are meant as a starting point for discussion. DNR will ask legislatures, beneficiaries, tribes, and stakeholders to provide feedback on these ideas and to brainstorm additional ideas. In addition, DNR will ask participants to provide recommendations for subject matter experts to serve on an advisory committee(s) that DNR will establish for this project.

The advisory committee(s) will do the following:

1. Develop an understanding of the challenges and opportunities facing DNR.
2. Review feedback gathered from legislatures, beneficiaries, tribes, and stakeholders.
3. Drawing on 1), 2), and subject matter expertise, develop recommendations for revenue generation, asset management, and trust revenue distribution. Some initial ideas may be researched and developed into proposals, some may not, and some may be combined and transformed into something new and innovative. To assure an actionable outcome, solutions should fall within the scope of the need, purpose, and objectives that DNR established for this project (Text Box 1 on page 36).

DNR has a strong track record in establishing and working with advisory committees. DNR created the Sustainable Harvest Technical Advisory Committee to advise DNR on forest inventory, economics, forest health, climate change, and other factors that affect the eastern and western sustainable harvest calculations. DNR also is launching a Commercial Lands Advisory Committee to explore opportunities and investments regarding DNR's commercial real estate lands.

Once the advisory committee(s) has crafted recommendations, DNR will gather feedback on them from legislature, beneficiaries, tribes, stakeholders. Once that process is complete, the recommendations will

be brought to the Board of Natural Resources and then to the legislature for consideration. The goal is to develop and implement, over the next five years, significant, consequential, innovative, and multifaceted solutions that will maximize the potential value of state trust lands today and in the future for beneficiaries and the state of Washington.

Throughout this process, DNR will brief the Board of Natural Resources on its progress and conduct outreach to ensure the public understands what DNR is doing and why.

Text Box 1. DNR's Need, Purpose, and Objectives

Need

DNR needs to increase the amount and the reliability of the revenue it generates through the assets it manages on state trust lands, in perpetuity.

Purpose

The project will transform state trust lands management by developing and implementing (1) legislative proposals to increase the amount and the reliability of the revenue generated by the state trust asset portfolio, (2) changes to Board of Natural Resources policies to improve trust asset management performance, and (3) updated operational business practices to increase DNR's efficiency and effectiveness in managing state trust assets.

Objectives

- **Objective 1**. **Revenue Generation**. Increase the total amount of revenue for current and future trust beneficiaries and its reliability by decreasing the difference between expected and actual revenue.
- **Objective 2**. **Working Lands**. Sustain the natural resource lands that were entrusted to the people of Washington State, while seeking opportunities to diversify the portfolio of revenue-generating assets.
- **Objective 3**. **Multi-Use Values**. Sustain or enhance the social, environmental, and cultural benefits of state trust lands consistent with the revenue generating purposes of the land.
- **Objective 4**. **Accountability, Transparency, and Flexibility**. Maintain accountability and transparency as a public agency but have the flexibility to take advantage of business opportunities and make management more efficient and effective.

Initial Ideas

The following selected, initial ideas were gathered from past reports, the Deloitte report, and DNR. These initial ideas are organized by the objectives established for this project. Additional ideas can be found in Chapter 12 of Appendix B.

Objective One: Increase Revenue

Following are initial ideas for structural changes to asset management.

- **Integrated investment strategy**: This idea addresses the current, divided management structure. The Board of Natural Resources oversees the management of the state trusts land assets, which are generally considered in the financial sector as relatively low risk and low return. The State Investment Board manages the trust's permanent fund accounts. Deloitte believed that the trust beneficiaries might benefit from a more integrated and coordinated approach to the governance of the trust assets, in which strategic investment and diversification decisions are made for all trust assets (land and public market assets) collectively. The public

market assets could be invested in higher-risk funds to balance the overall portfolio.[29] Idaho State Trust Lands are managed in this manner.[30] This solution would require statutory changes and possibly amendments to the Enabling Act and constitution.

- **Asset management:** Under this idea, DNR would update its *Asset Management Plan* and associated policies to provide strategic direction for each asset class to guide business decisions, funding, and deliverables. This solution would require action from the Board of Natural Resources.

Following are ways to increase access to capital.

- **Borrowing authority:** This idea grants DNR the authority to borrow money or issue bonds to allow more investment in opportunities with high initial costs but high potential for increased revenue. Examples include commercial real estate, communication sites, and water rights and infrastructure for converting dryland farms to the more lucrative irrigated farms or orchards. This solution may require legislative approval and statutory change.

- **New operational funding models:** Deloitte observed that the percentage of revenue DNR retains for management and investment is not well correlated with the actual costs and liabilities associated with each asset class. For some asset classes, the percentage is much lower than actual costs and liabilities, which must be covered using revenue from other asset classes and funding sources. For other asset classes, the percentage is much higher than actual costs and liabilities, resulting in less revenue being distributed to the beneficiaries. Deloitte recommends basing the percentage of revenue retained on actual management costs, which would be different for each asset class and which would rise or fall based on the needs of that program. For example, costs may rise to cover investments in land or infrastructure that would increase the revenue-generating potential of the asset class. This idea would allow DNR to make investments in different asset classes in a timely manner.

Following are ideas for increasing the reliability of revenue to the trusts:

- **Reliability fund:** In general, DNR's current business model distributes trust revenue either directly to beneficiaries or into permanent funds and other accounts. This direct connection, coupled with the predominance of timber revenue, makes revenue more volatile on a year-to-year basis. This idea involves establishing a "reliability fund" to help shield the trusts from revenue fluctuations and to increase revenue. Revenue would be deposited into this account and invested. Distributions would be set by policy and consist of earnings, principal, or a combination of both. This fund also would cover DNR's operating expenses. One example of this

[29] Liquid assets managed by the Washington State Investment Board are currently invested in accordance with an approved asset allocation study.

[30] https://efib.idaho.gov/

model is the very successful "earning reserve fund" being used by the State of Idaho's Department of Lands. Funds are distributed annually at a rate of 5 percent of the three-year, moving average of the permanent fund balance. Adjustments can be made to the distribution based on factors such as the level of earning reserves funds, and transfers to the permanent funds. This idea could be combined with the integrated investment strategy idea and would require statutory change.

- **Smoothing revenue through loans:** Deloitte recommends a program in which the State of Washington borrows money as needed to smooth the flow of revenue to trust beneficiaries. This program could be particularly useful during economic downturns. This solution would require statutory change.

Objective Two: Sustaining Working Lands While Seeking Opportunities to Diversify the Portfolio

Following are ideas for making it easier to diversify the state trust lands portfolio.

- **Land transactions**: This idea could involve changing the 160-acre limit on the sale of federally granted land, removing the requirement to plat lands within two miles of a city prior to sale, removing the public auction requirement, increasing the acre limit for lands within the land bank, or enabling DNR to sell State Forest Land. These solutions would require constitutional and statutory changes.

- **Advisory committee:** Deloitte suggests that an advisory committee or expert team be created to assess the state trust lands portfolio and identify opportunities for diversification. This solution is an operational change.

Objective Three: Sustain or Enhance Multi-use Values

- **Funding sources for recreation:** DNR provides recreation on state trust lands when such use is in the best interest of the state and the general welfare of citizens, and is consistent with the obligations of trust management (RCW 79.10.120). Recreational trails, trailhead parking, campgrounds, picnic areas, and other recreation facilities on state trust lands are accessed by forest roads that are financed with trust revenue. Trust revenue also is used for some ongoing costs to manage dispersed recreation and repair damaged facilities. Recreation is a benefit enjoyed by all Washington residents and does not specifically benefit the trust beneficiaries. For that reason, a consistent and adequate funding source is needed to support these public access projects. This solution would require statutory change.

- **Portfolio management tools:** This idea involves enhancing or rethinking existing state trust lands portfolio management tools, such as the Trust Land Transfer program, Community Forest Trust program, and the Forest Land Replacement program, and to develop new mechanisms

that will help increase the revenue-generating potential of state trust lands and safeguard the natural resources that make Washington a beautiful place to live. This idea could also include pursuing ways to monetize ecosystem services. This solution would require statutory change.

Objective Four: Maintain Accountability, Transparency, and Flexibility

DNR needs to maintain accountability and transparency as a public agency but it also needs the flexibility to take advantage of business opportunities and make its management more efficient and effective.

Deloitte recommends that DNR develop a comprehensive financial system that is consistent with for-profit business enterprises. This system would include financial accounting, cost accounting, operations (sales, planning, and so forth), and real estate management. This system would enable DNR to manage these assets more efficiently and profitably, as well as provide financial statements typical of for-profit businesses. This solution is an operational change. DNR is pursuing this idea now. For example, DNR is requesting funding to replace NaturE, the leasing system that tracks contracts and revenue for the asset classes. NaturE will become obsolete when the new One Washington system is completed in 2022.

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Part Five: Conclusion

The assessment conducted by DNR, Deloitte, and Earth Economics provides valuable insight into the strengths and opportunities presented by state trust lands and their abundant natural resources. The Commissioner and DNR are energized by these results.

Commissioner Franz and DNR are proud to embark upon a journey to transform state trust lands management for a sustainable and prosperous future. In the 2021 legislative session, DNR will bring an initial round of proposals for consideration, such as requests for improving the timber sale process and extending commercial real estate leases that will have zero fiscal impact in light of the current state budget challenges and impacts of COVID-19. DNR also will bring forth a number of capital funding requests to facilitate much needed replacement of outdated leasing data systems and investments in forests inventory, silviculture, and forest health to increase revenue from forested state trust lands while also creating jobs.

Over the longer term, DNR will work in partnership with the legislature, beneficiaries, tribes, stakeholders, and advisory committees to develop multifaceted solutions. These solutions likely will involve optimizing policies, statutes, and operational business practices; making strategic capital investments in working forests and agricultural lands; improving and expanding other components of the state trust lands portfolio; and rethinking existing state trust lands portfolio management tools. DNR will bring these proposals to the Board of Natural Resources and then to the legislature.

Washington state held on to its trust lands when many other states sold theirs, and these lands are part of the state's rich natural and cultural legacy. Washington now has the opportunity to be a leader in transforming management of these lands. DNR looks forward to working in a collaborative process over the coming year to make real changes that address the challenges and opportunities identified in this report.

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Appendix A. Comparing the 1996 and 2020 Trust Land Valuations

The last asset valuation of state trust lands was completed in 1996 by Deloitte and Touche. The 2020 asset valuation was completed by Deloitte Transactions and Business Analytics (Deloitte). The two valuations provide a useful set of benchmarks and information to understand how the performance of state trust lands has changed over time. However, DNR cautions against directly comparing these reports for three reasons: significant differences in methodology between the two valuations, economic changes since the 1996 report was written, and differences in how acres were classified.

Differences in Methodology

The 1996 report was a comprehensive and dependable document that represented the valuation practices and the markets of that time. However, the methodology of the 2020 report is reflective of current, state-of-the-art best practices for valuation and represents a significant advance over the earlier report. Following are examples of differences in methodology between the two reports.

- **Valuation approach**: The 1996 report estimated the market value of the trust assets using a sales comparison approach for all asset classes except mining. In the sales comparison approach, one property is compared to similar properties or similar, recently sold properties in the area to estimate value.

  The 2020 report estimated the "trust value" of the trust assets using the income approach, in which asset value is based primarily on the income the land can generate. For the timber asset class, Deloitte also used the whole property value method, in which bare land and timber are first valued separately and then combined. These two approaches were reconciled, with the income approach receiving primary weight.

  Deloitte used trust value instead of market value because DNR's ability to sell all state trust lands, as individual parcels or one property, is limited by the state constitution and statutes. For example, federally granted lands can be sold, but only in parcels of 160 acres or fewer.[31] As such, it would take thousands of transactions to sell the entire portfolio of these lands.

- **Communication resources asset class**: The 1996 report based value on acres and the 2020 report based value on average lease cost.

[31] Washington State Constitution, Article XVI, Section 4 and RCW 79.11.010.

Economic Changes

Nearly a quarter century has passed since the 1996 report. The economy has undergone numerous changes since then, including two major economic events and their lingering effects: the "dot-com bust" of March 2000 to October 2002, and the Great Recession of December 2007 to June 2009. Economic changes include the following:

- Volatility in market prices for primary products such as timber.
- A general reduction and compression of expected and achievable capitalization rates, yield rates, and other measures of rate of return; lower market rates of return increase the market value of assets, but the absolute value of the returns themselves remain stagnant or even fall.
- Larger changes in the structures of markets and the relative importance (hence desirability) of different market segments.
- Increased regulatory and environmental concerns, which influence management practices.
- The emergence of new market segments, such as renewable energy (wind and solar, for example), and the growing importance of submarkets such as irrigated agriculture (orchards and vineyards in particular).

These changes make direct comparison between the reports difficult.

Differences in Acre Classifications

The acres within each asset class differed significantly between the 1996 and 2020 report. For example:

- **Timber asset class:** In the 1996 report, the timber asset class included 2,113,760 acres. For the 1996 report, Deloitte and Touche made an assumption that the entire forested land base was available for harvest. This is an oversimplification, because some areas were not operable and some areas were not forested (for example, roads and water bodies) In addition, at this time 41 percent of the forest on state trust lands within the range of the northern spotted owl were 51 years old or older,[32] largely due to DNR's commitment to sustained yield management.[33] Because many of these older forests were either functioning as habitat or had the potential to become habitat for the owl and other listed species, they had to be surveyed for threatened and endangered species prior to timber sales, meaning they may or may not be available for harvest.

  In the 2020 report, the timber asset class included 2,056,510 acres. This total excludes non-forested areas such as roads and water bodies, natural resource conservation areas and natural

[32] Table 3.4.1, *Merged Final Environmental Impact Statement for the Habitat Conservation Plan,* DNR 1996.

[33] Management of the forest to provide harvesting on a continuing basis without major prolonged curtailment or cessation of harvest (RCW 79.10.310).

area preserves, and community forests. However, Deloitte based its valuation on 1,240,163 "net acres," which are acres that are known to be available or partially available for harvest. Net acres are a more accurate representation of the forested land base.

- **Commercial real estate asset class:** In the 1996 report, this asset class included 29,176 acres of transition lands, which are lands that are transitioning from natural resource production to higher and better uses. In the 2020 report, these acres were not valued based on their potential, future commercial use. Instead, they were valued based on their current use.

- **Mining asset class**: For the mining asset class, the two reports labeled and grouped lands differently. The 1996 report used three subgroups in the valuation, all of which included surface rights: surface rights only, surface and active mineral rights, and surface and mineral prospects. The surface rights only subgroup had the most acres of the subgroups valued.

  The 2018 report used only two subgroups in the valuation: surface and subsurface rights; and subsurface rights only. The subsurface rights only subgroup includes 185 acres with prospecting leases. There was no subgroup for surface rights only.

In addition, Deloitte valued the "other resources" asset class in the 2020 report. This asset class includes wind energy; special uses such as archery clubs, underground storage, golf course-related usage, and research agreements; right-of-way access; and special forest products such as floral greens (for example, salal) and boughs. The 1996 report did not include this asset class.

1996 and 2020 Results

Table A-1 shows the results of the 1996 valuation and Table A-2 shows the results of the 2020 valuation. Keep all the foregoing caveats in mind when reviewing this information.

Table A-1. 1996 Report Valuation Results (in 1996 Dollars)

Asset class	1995 market value
Timber	$5,883,000,000
Commercial real estate	$146,000,000
Transition lands[2]	$82,000,000
Agriculture	$84,000,000
Grazing	$100,000,000
Communication sites	$9,000,000
Mining	$10,000,000
TOTAL	$6,232,000,000

Table A-2. 2020 Valuation Results

Asset class	2018 concluded trust value
Timber	$2,136,000,000
Commercial real estate	$95,700,000
Agriculture	$238,300,000
Grazing	$10,500,000
Communication sites	$41,200,000
Mining	$16,640,000
TOTAL	$2,558,640,000

Appendix B. Deloitte 2020 State Trust Lands Valuation

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Deloitte.

Trust Land Performance Assessment
Trust Land Values and Returns
As of FY 2018
Prepared by Deloitte
Prepared for the Washington State Department of Natural Resources
Report date: September 30, 2020
Contract reference number: 93-098343

Table of Contents

Deloitte.

Source: WA STATE DNR

Chapter 1
Introduction

Introduction

The Trust Land Performance Assessment ("TLPA") is a study that seeks to (a) estimate the value of the trust land holdings of the State of Washington, (b) report the return on investment provided by income from the land, and (c) provide recommendations on ways to improve or enhance operations and returns.

ENABLING LEGISLATION

In March 2018, the Washington State legislature adopted ESSB 6095, a supplemental capital budget. In Section 7015, this bill mandated the preparation of a study that became known as the Trust Land Performance Assessment. The specific language of the bill is as follows:

"(1) The Department of Natural Resources must conduct an asset valuation of state lands and state forestlands held in trust and managed by the department. The analysis required in subsections (3) and (4) of this section may be provided through contracted services.

(2) The department must describe all trust lands, by trust, including timber lands, agricultural lands, commercial lands, and other lands, and identify revenues from leases or other sources for those lands. The department must briefly describe the income from these trust lands, and potential enhancements to income, including intergenerational income, from the asset bases of these trusts.

(3) The analysis must estimate the current fair market value of these lands for each trust beneficiary, including the separate beneficiaries of state lands as defined in 79.02.010 RCW, and the beneficiaries of state forestlands as specified in chapter 79.22 RCW. The estimation of current fair market values must specify the values by the various asset classes including, but not limited to, the following asset classes: Timberlands; irrigated agriculture; dryland agriculture, including grazing lands; commercial real estate; mining; and other income production. The analysis must also estimate the value of ecosystem services and recreation benefits for asset classes that produce these benefits. The legislature encourages the department and its contractors to develop methods and tools to allow tracking of the estimated fair market values over time.

(4) For each of the different asset classes and for each of the various trusts, the analysis must calculate the average annual gross and net income as a percentage of estimated current asset value.

(5) The department must provide a progress report to the legislature by December 1, 2018. A follow up progress report is expected to be provided by December 1, 2019 and may include any initial recommendations. The final report is expected to be submitted by June 30, 2020, and must include options to: (a) Improve the net rates of return on different classes of assets; (b) Increase the reliability of, and enhance if possible, revenue for trust beneficiaries; and (c) Present and explain factors that either (i) define, (ii) constrict, or (iii) define and constrict the department's management practices and revenue production. The

Covid-19 Disclosure

This Trust Land Performance Assessment has an effective date of December 31, 2018. The analyses and report writing occurred in 2019 and 2020, including the initial period of the Covid-19 pandemic beginning in March 2020 and continuing through 2020 until publication of this draft report.

In this analyses and report, no specific effort has been made to quantify or measure the financial impact of the Covid-19 pandemic upon the trust land assets evaluated, nor has any effort been made to evaluate present of future revenues, operating expenses, net incomes or rates of return of the trust land assets evaluated.

The impact of COVID 19 is creating tremendous amounts of uncertainty in the marketplace. Uncertainty and real estate investments increases risk and tends to have a negative impact on real

factors to be considered include, but are not limited to, statutory, constitutional, operational, and social factors."

In December 2018, as required by the bill, the Department of Natural Resources (DNR) (the "Trust Manager"), provided its Legislative Update. The introduction to this update states:

"DNR values the opportunity to complete this analysis and to develop recommendations for further enhancement of the trust portfolio. Similar reviews (1996 Deloitte and Touche Review, 2004 Evaluation of Effectiveness and Efficiency, 2006 Commercial Lands Program review) over the years have provided great benefit to DNR by identifying opportunities and challenges to create actionable recommendations toward improving the reliability and maximization of trust revenue through sustainable land management.

The trust portfolio is diverse in both land and revenue source. At more than three million acres, the portfolio extends from sustainable forest products (~2.1 million acres), commercial property leasing (39 properties), communication sites (~380 leases), irrigated agriculture (~50,000 acres), wheat and grains (~136,000 acres), grazing and range land (~800,000 acres), and green energy development (solar and wind). These assets hold tremendous value, providing intergenerational trust revenue, ecosystem services, sustaining jobs, and supplying sustainable food and timber for the state, region, and world.

The recommendations from the Trust Land Performance Assessment will help guide DNR for many years to come. We are continuously assessing and reassessing the performance of our programs and this undertaking will further enhance those efforts. We look forward to working with the Legislature on a commercial lands funding request that will assist in program improvements to increase near term monetary returns for the trusts while we continue this forward-looking assessment."

The Legislative Update reported the steps that are planned and underway for the Trust Land Performance Assessment, including scoping of the study, project outreach, contracting with specialized firms for the preparation of the study, business opportunity research, and the anticipated final report. The Legislative Update also contained Appendix B, *Background Information*, which was a concise description of the history of the state trust lands to be evaluated in the Trust Land Performance Assessment, including some statistical information about the trust land portfolio.

Subsequent to the release of the Legislative Update, the contracting process for the study was concluded and Deloitte was selected as the contractor. Deloitte had, in fact, prepared the June 1996 "Review" noted in the Legislative Update, which elsewhere has been noted as the "*only one report (that has) analyze (d) the asset value, income and returns for all DNR assets."*[1] Among the members of the 2020 Deloitte team were some of the original 1996 study team members, which provided some measure of continuity as to study methodology and analytical approach.

estate values and potentially performance. At this point in time, the biggest negative impacts on real estate have been to the hospitality industry and certain types of retail properties. However, to some degree the negative impacts on retail may be an acceleration of trends prior to COVID 19. The industrial real estate market tied to the distribution of goods has experienced stronger demand as customers have increased online shopping during this time of isolation and social distancing. Office usage is very uncertain as employers weigh the strengths and weaknesses of working remotely, but demand for space has generally softened.

So far, the housing market, which is dependent on timber, has been moving forward at a steady pace even though it did pump the brakes during the initial stages of the COVID 19 lockdown. Grazing and Agriculture is tied to the food production, which has been generally strong, but demand from the restaurant industry has been dealt with severe blows leading to distress including bankruptcies and closures.

[11] *Future of Washington's Forest and Forest Industries Study*, 2007, Study 5, Department of Natural Resources Granted Lands, page 306.

This Trust Land Performance Assessment is only the second effort by the Trust Manager to undertake a comprehensive evaluation of the value of the trust land portfolio, the annual incomes that result from each of the types of land within the trust land portfolio, and the returns on investment that can be estimated from the comparison of asset value and asset income.

That it took almost 24 years and an act of the legislature to commence this study is a testament to the cost and complexity of the task. The objectives of this summary report are to describe the study process and the trust land portfolio, including its estimated value, operating income, and returns in as concise a manner as possible to fulfill the requirements of the authorizing legislation. Also as required, this study effort provides evaluation and commentary on ways to improve the net rates of return; increase the reliability of, and/or enhance revenue for trust beneficiaries; and identify and explain factors that define and/or constrict the Trust Manager's practices and revenue production.

THE ESSENTIAL CHALLENGE OF TRUST LAND MANAGEMENT FOR THE TRUST MANAGER

As will be described in more detail in this report, the Trust Manager administers the trust land portfolio and, as such, must manage the trust land assets (i.e., forest, agricultural, and other lands) consistent with its fiduciary duties to the defined beneficiaries of the trust land portfolio. These duties are separate from other responsibilities that the Department of Natural Resources has as a regulator, service provider, and state agency.

The Trust Manager seeks to maintain intergenerational equity between current and future generations of trust beneficiaries. Producing revenue for trust beneficiaries in a manner consistent with applicable legal obligations, particularly endangered species and environmental laws, can at times involve a complex decision-making process. In addition, members of the public may express an interest in the management of state trust land, industries that rely upon the trust land for inventory (e.g., logging, construction) may have demands, and local communities may be concerned about economic and fiscal impacts.

Responding to competing and sometimes conflicting interests is not a new challenge. Prior studies, reports, and policy analyses published by the Trust Manager over the past several decades wrestle with these competing interests.

Notwithstanding efforts by the Trust Manager, including the Board of Natural Resources, to manage the trust land portfolio consistent with its fiduciary duties while considering competing interests, litigation against the Trust Manager has occurred in the past and continues to this writing.

TRUST LAND LITIGATION

In 1984, the Washington State Supreme Court ruled in County of Skamania v. State of Washington (102 Wn.2d 127, 685 P.2d 576) that the state had both an undivided loyalty to the trust beneficiaries as well as a duty to act prudently with respect to the trust land assets. This ruling and responsibility is often cited in policy and administrative materials as one of the Trust Manager's primary responsibilities.

In December 2019, the Board of Natural Resources adopted the Marbled Murrelet Long-Term Conservation Strategy for the State Trust Lands Habitat Conservation Plan (marbled murrelet is a bird species protected under the Endangered Species Act) and a Sustainable Harvest Level, which establishes a decadal sustainable harvest level for DNR managed forest lands in Western Washington.

Three lawsuits[2] quickly followed, challenging these decisions and the supporting environmental impact analyses. These lawsuits graphically illustrate the competing interests that the Trust Manager must manage. In *Conservation Northwest*, the plaintiff conservation groups and members of the public allege the Trust Manager prioritized the interests of the trust beneficiaries over other stakeholders. In the consolidated *Skagit County* and *Concrete School District* case, beneficiaries and other interested parties allege that precisely the same trust management actions failed to prioritize the interests of trust beneficiaries over other stakeholders.

The Trust Manager's challenge to manage trust land assets consistent with its fiduciary duties to trust beneficiaries while considering the interests of other stakeholders is not new. At the time of Deloitte's preparation of the 1996 Economic Analysis, the Trust Manager's State Trust Lands Habitat Conservation Plan was under review. The plan was controversial with trust beneficiaries and stakeholders because it restricted harvest in certain areas. Not much has changed in the 24 years since Deloitte's 1996 Economic Analysis and this Trust Land Performance Assessment.

These controversies are not unique to the State of Washington. Recently, several Oregon counties sued the State of Oregon over allegations of mismanagement of forest lands and a failure to act in the best interests of the counties that contributed land to the state-led forest land management program. In that litigation, plaintiffs sought economic damages of $1.4 billion. The trial resulted in a November 2019 jury verdict in favor of the plaintiffs (i.e., counties), and the jury awarded the plaintiffs a reported $1.1 billion. The case is under appeal. Litigation in other western states with educational trust lands has also directed and/or influenced state trust land practices across the western United States.

Understanding the continuing challenges of managing the trust land portfolio for the benefit of defined trust beneficiaries as well as all residents of Washington State, and the context in which such lands are managed (i.e., statute, regulation, policy, practice, and occasionally judicial decisions) are important starting points for the Trust Land Performance Assessment's valuation, income and return analyses, observations, and recommendations. The background and context of these issues and challenges has informed our inquiry, our analytical decisions, and the information and recommendations that we present.

PREDECESSOR STUDIES AND REPORTS OF NOTE

While completing our investigation and analysis, several of the Trust Manager's prior studies and reports have informed our work. We have relied in whole or in part on this prior work, which is listed below in reverse chronological order:

[2] Skagit County, et al., v. State of Washington, et al. and Concrete School District, et al., v. State, et al. (Skagit County Superior Court No. 19-2-01469-29, Consolidated); Conservation NW, et al., v. Franz, et al. (Thurston County Superior Court No. 20-2-01051-34).

DNR Strategic Plan 2018-2021 – The current agency strategic plan.

2018 Trust Land Performance Assessment Legislative Update — As required by the enabling legislation, this report outlines the completed and pending steps needed to fulfill the requirements of ESSB 6095, Section 7015.

2017 Forest Action Plan — The subject of this action plan are all forest lands in the state versus state trust lands. Topics include forest land conversion, biodiversity, upland water quality, forest health and restoration, wildfire reduction, and urban and community forestry.

2014: 2014-2017 Strategic Plan; Update to the Goldmark Agenda — An update to the earlier 2010 strategy document (see below), including seven primary strategies for the operation of the Department of Natural Resources.

2010: Strategic Plan 2010-2014; The Goldmark Agenda — A five-year strategy presented by then Department of Natural Resources Commissioner Peter Goldmark that contains six primary strategies, as well as numerous tasks and sub-tasks to implement the strategies.

2007 Future of Washington's Forest and Forest Industry Study — Included in this comprehensive analysis of public and private forest and forest industry segments is Study 5: An Assessment of the Expected Rate of Return from State Granted Lands, which is a fairly detailed evaluation of state trust lands, including their asset value and expected returns.

2006 Policy for Sustainable Forests — Sets forth policies for state trust lands with respect to economic performance, forest ecosystem health and productivity, and social and cultural benefits.

2006 Report to the Legislature, A Review of the Department of Natural Resources' Commercial Lands Program — A description and evaluation of the effectiveness of a specific program within the trust land portfolio for commercial land that comprises approximately 40 parcels worth an estimated $152 million.

2004 State Trust Land Management: An Evaluation of Effectiveness and Efficiency; A Report from the Independent Review Committee to the Commissioner of Public Lands — The Independent Review Committee examined the Trust Manager's practices and activities, as well as presented specific recommendations for forest lands and other assets in the trust land portfolio.

2003 Report to the Legislature; Options for Increasing Revenues to the Trusts; Comparison of Returns From Investment in Real Property and in Permanent Funds — Among its topics, this study evaluates, in some depth, returns to the trust land portfolio against other benchmarks.

1996 Deloitte Economic Analysis — A comprehensive review of the economic performance of the state trust lands, including property values, net incomes, imputed return on investment, non-monetary value of forest land assets, economic impact portfolio management issues, and economic trends.

We have, of course, reviewed and relied upon other materials and reports incidental to preparation of this analysis. Our bibliography is located in Appendix E of this report.

THE TRUST LAND PERFORMANCE ASSESSMENT

In essence, the enabling legislation that gave rise to the Trust Land Performance Assessment asks us—the study authors—to do two things: (1) *report* on values, incomes, and returns on investment and (2) *evaluate* the conditions and circumstances surrounding the trust land portfolio in order to offer insights and observations about how operations, incomes, and returns on investment can be improved or enhanced.

With respect to the authorizing legislation and our *reporting* obligations, the specific requirements of the legislation, the contracting requirements, and the methodologies we employed in the 1996 Deloitte Economic Analysis were most influential in the development of our scope of work and analyses for this study.

With respect to our *evaluation* of the conditions and circumstances surrounding the operation and management of the trust land portfolio, the policies, studies, and reports we cited above form, in large part, the basis for our evaluation and the starting point for our assessments and recommendations as to the statutory mandate to:

(a) Improve the net rates of return on different classes of assets

(b) Increase the reliability of, and enhance if possible, revenue for trust beneficiaries

(c) Present and explain factors that either (i) define, (ii) constrict, or (iii) define and constrict the department's management practices and revenue production. The factors to be considered include, but are not limited to, statutory, constitutional, operational, and social factors.

THE TRUST LAND PERFORMANCE ASSESSMENT AND ITS STANDARD OF VALUE

As discussed at greater length in the *Valuation Methodology* section, specific terminology used throughout this report clearly differentiates the valuation methods used in this study from those completed in a usual and customary real estate appraisal analysis and report. For instance, this Trust Land Performance Assessment uses the term **"Trust Value"** rather than "market value" or "fair market value" to describe the value of the trust land inventory, both in the aggregate and for each asset class.

Our decision to adopt the term **Trust Value** is primarily based on the belief that such a specialized term will clearly differentiate the dollar amounts specified in this Trust Land Performance Assessment from the market value estimates determined by real estate appraisers during typical real estate appraisals. Three additional reasons for adopting the term **Trust Value** are outlined below.

1. The term **Trust Value** makes it clear that the *trust land asset is different from most real estate assets insofar as the sale of land is subject to statutory limitations placed on the Trust Manager's ability to sell, exchange, or transfer trust lands across the portfolio* at any point in time. Given this limitation, **Trust Value** is not a value-in-exchange definition, which is different from and in direct contrast to a market value or fair market value definition.

Accordingly, users of this information must understand that the value estimates presented herein are different from conventional real estate property value estimates that are based on market value or a market value appraisal process. This difference is due to the statutory restrictions upon sale of trust lands, whereas a typical real estate property *can* be sold, which is presumed in the traditional definition of fair market value. See Appendix A in the Addenda of this report for a more detailed discussion of relevant restrictions upon sale.

2. The productivity and utilization of the state trust lands is different from physically similar, privately owned real estate property—whether forest land or land in some other category (i.e., asset class)—because state trust lands are subject to (i) statutes, (ii) regulations, (iii) policies, and (iv) management practices. These four levels of control and influence mean that, in the aggregate, the productivity and utilization of the state trust lands are materially different from privately owned land that is similarly situated.

3. The Trust Land Performance Assessment covers approximately 2.9 million acres of land, and the application of customary real estate appraisal techniques to the valuation of an inventory of land this large is beyond the scope and budget of this study. In the interest of efficiency and cost effectiveness, abbreviated appraisal methods were used to reduce the work effort and cost of preparation. When valuations are done on large property portfolios such as the state trust lands, it is common to use specialized appraisal methods to reduce preparation time and cost.[3]

In the preceding discussion, we explained why we chose to use a specific term—**Trust Value**—to describe the results of our investigation and analysis. Below we provide a definition for "Trust Value" and contrast that with two well-established value definitions.

TRUST VALUE DEFINED

Trust Value. The value of a specified portfolio of lands comprising approximately 2.9 million acres, under the ownership and control of the State of Washington, acting as a trustee on behalf of defined beneficiaries. Inherent in these lands are a variety of use and control limitations, including significant limitations upon sale of the trust lands, as well as other Washington State statutes, regulations, policies and management practices which are or may be different than otherwise similar, privately-owned lands.

The traditional market value or fair market value definition has a specific context, a specific assumption about use of the property or asset valued, and a number of conditions that further clarify the term and its appropriate application. The context of the market value definition is that it contemplates an exchange between two willing and able parties of a real property interest for money or its cash equivalent. The use assumption implicit in the market value definition is that the property exchange can be put to its highest and best use by the buyer (if not already put to its highest and best use). The additional conditions clarify that buyer and seller are acting knowledgeably and freely, that the price paid is a cash equivalent, and that there is not any undue stimulus to complete the exchange on either or both parties or in the marketplace.

[3] One good example of the use of abbreviated methods is the property tax assessment because there are so many properties in a typical county, the County Assessor uses abbreviated methods of property valuation.

Commonly juxtaposed against market value or fair market value is the concept of "value in use." Value in use addresses the worth or value of a *specific use* of real property or a tangible asset to a *specific user*, without regard to the presence of or need for an exchange of property for money, and without regard to the highest and best use or the property. There is no presumption of a prohibition of sale of the property to the specific user, but a contemporaneous exchange of property is not automatically presumed in the definition of value in use.

It is immediately apparent that the restrictions upon sale of state trust lands makes the use of the concepts and terms "market value" or "fair market value" problematic for the Trust Land Performance Assessment. It is also apparent that—in the presence of the restriction upon sale—that the concepts of value-in-use are helpful and provide some additional guidance.

In the following table, we summarize the attributes of the value concepts we discuss herein. The table indicates how restrictions upon state trust lands makes application of the market value standard problematic and potentially misleading to the users of this Trust Land Performance Assessment. Thus, because state trust lands (i) effectively cannot be sold; (ii) may have unique statutory, regulatory, or operating limitations; and (iii) because we are using abbreviated appraisal methods to value the portfolio, we have concluded that it is most appropriate to use the term **Trust Value** to describe the dollar amounts we attribute to each asset class and the total portfolio. Use of this specialized term reduces the potential for confusion, conflict, or misuse of the information presented in this report.

	Fair Market Value	Value in Use	Trust Value
Basis Of Value Estimate	**value in exchange**. A type of value that reflects the amount that can be obtained for an asset if exchanged between parties. Examples include market value, fair value, liquidation value, and disposition value.	**value in use.** The value of a property assuming a specific use, which may or may not be the property's highest and best use on the effective date of the appraisal. Value in use may or may not be equal to market value but is different conceptually.	**Because of the restrictions upon sale of trust lands… value in use.** The value of a property to a specific ownership interest assuming a specific use and specific third-party management, which may or may not be the property's highest and best use on the effective date of the appraisal.
Highest and Best Use May be Achieved	**Yes**	**NA** Existing use is evaluated	**NA** Existing use is evaluated
Exposure to the Open Market	**Yes**	**No**	**No**
Willing Buyer & Seller	**Yes**	**No**	**No**
Most Probable Price Estimated	**Yes**	**Yes**	**Yes**
Prudently Managed	**Yes**	**Yes**	**Yes** Managed in accordance with statutory mandate; cash may not be retained.
Buyer/Seller/Owner Well Advised	**Yes**	**Yes**	**Yes**
Market Exposure	**Yes**	**No**	**No**
No creative financing/ cash equivalent	**Yes**	**Yes**	**Yes**
No undue stimulus	**Yes**	**Yes**	**No** Stakeholder and public policy inputs**.**
Consummation of a sale as of a date specific	**Yes**	**Yes** No sale, but valued as of date certain	**Yes** No sale, but valued as of date certain

VALUATION METHODS EMPLOYED

Our valuation analysis incorporates the use of an income approach methodology and, to a lesser extent, other analytical methods. Our Trust Value analysis also considers and reports information about forest land portfolio sales that have occurred among large forest landowners and timber companies. Pursuant to the legislative mandate, our valuation analysis includes the segregation of Trust Value and trust land income, as well as delivers return information by asset class and trust.

THE STRUCTURE OF THIS REPORT

Our report contains the following sections:

- **Executive Summary** — An overview of our findings and recommendations.
- **Valuation Methodology** — A detailed discussion of how each asset class is valued.
- **Statutory, Regulatory, and Policy Requirements** — In this section we discuss the requirements and obligations that have a financially material effect on the value, income, or return on investment of the state trust lands.
- **Financial Rates of Return** — Because our valuation includes an income approach analysis, this section provides a detailed discussion of how we evaluate the rate indications, as well as a discussion of the conceptual underpinning of our rate selection. This section concludes with a discussion of rate selection for each of the asset classes.
- **Asset Class Descriptions and Valuations** — There are seven asset classes in the trust land portfolio: (1) timber, (2) commercial real estate, (3) agricultural resources, (4) grazing resources, (5) communication resources, (6) mining resources, and (7) other resources such as wind energy and sources of miscellaneous revenue. This section describes the state trust lands within each asset class, followed by a valuation analysis and discussion of return on investment.
- **Operational Assessments and Recommendations** — In this chapter, we present our operational assessments and fulfill our obligation to make recommendations to (a) improve the net rate of return on different classes of assets; (b) increase the reliability of, and enhance, if possible, revenue for trust beneficiaries; and (c) explain factors that either define or constrict the Trust Manager's management and revenue production practices.

OVERALL FINDINGS

Our valuation analysis includes the segregation of Trust Value and trust land income, as well as delivers return information by asset class and trust. The analysis also includes a list of observations and recommendations as detailed in Chapter 12 of the report.

The following table summarizes the overall findings of this report inclusive of Trust Value and rates of return for each asset class.

Asset Class	Stabilized Gross Income	NOI	Trust Value	NOI/Trust Value	Gross Income/ Trust Value
Timber	$171,700,000	$123,624,000	$2,136,000,000	5.79%	8.04%
Agricultural Resources	$23,500,000	$16,685,000	$238,300,000	7.00%	9.86%
Commercial Real Estate	$10,300,000	$7,210,000	$95,700,000	7.53%	10.76%
Communication Resources	$4,800,000	$3,360,000	$41,200,000	8.16%	11.65%
Other Resources	$3,200,000	$2,240,000	$20,300,000	11.03%	15.76%
Mining Resources	$1,900,000	$1,330,000	$16,640,000	7.99%	11.42%
Grazing Resources	$1,050,000	$735,000	$10,500,000	7.00%	10.00%
Total	**$216,450,000**	**$155,184,000**	**$2,558,640,000**	**6.07%**	**8.46%**

LIMITING CONDITIONS AND ASSUMPTIONS

Our investigation, analyses, and report are subject to the following limiting conditions and assumptions:

1. The analyses, advice, recommendations, opinions, or conclusions contained herein are valid only as of the indicated date and only for the indicated purpose.
2. The analyses, advice, recommendations, opinions, or conclusions contained herein are for the exclusive use of AGENCY for the sole and specific purposes noted herein and may not be used for any other purpose by AGENCY or any other party. Furthermore, the analyses, advice, recommendations, opinions, or conclusions are not intended by the author and should not be construed by the reader to be investment advice in any manner whatsoever. The analyses, advice, recommendations, opinions, or conclusions represent the considered opinion of CONTRACTOR based on information furnished to it by AGENCY, its representatives, and other sources.
3. No item in this report shall be changed by anyone other than CONTRACTOR, and CONTRACTOR shall have no responsibility for unauthorized changes.
4. Neither CONTRACTOR nor its personnel, by reason of this engagement, is required to furnish a complete valuation report, or to give testimony, or to be in attendance in court with reference to the subject assets, properties, or business interests unless arrangements have been previously made in writing.
5. CONTRACTOR conducted interviews with AGENCY or its representatives regarding past, present, and prospective operating results and has assumed that the information gathered in such interviews is accurate and complete.
6. Financial statements and related information provided to us in the course of this engagement by AGENCY or its representatives have been accepted without any verification as fully and correctly reflecting the business conditions and operating results of the relevant assets, properties, or businesses for the respective periods, except as specifically noted herein. CONTRACTOR has not audited, reviewed, or compiled any financial information provided to us and, accordingly, we express no audit opinion or any other form of assurance regarding such information.
7. If prospective financial information provided by AGENCY or its representatives has been used in this analysis, we have not examined or compiled the prospective financial information and, therefore, do not express an audit opinion or any other form of assurance on the prospective financial information or the related assumptions. Events and circumstances frequently do not occur as expected, and there will usually be differences between prospective financial information and actual results, and those differences may be material.
8. CONTRACTOR does not provide assurance on the achievability of any forecasted results contained herein because events and circumstances frequently do not occur as expected; differences between actual and expected results may be material; and achievement of the forecasted results is dependent on the actions, plans, and assumptions of management.
9. CONTRACTOR has relied on the representations of AGENCY or its representatives concerning the usefulness and condition of all real and personal property, intangible assets, or investments used or held in any subject business, as well as the amounts and settlement dates of its liabilities, except as specifically stated to the contrary in this report. CONTRACTOR has not attempted to confirm whether all assets of any subject business are free and clear of liens and encumbrances or that the entity has good and marketable title to any assets.
10. CONTRACTOR assumes that subject assets, properties, or business interests are free and clear of any or all liens or encumbrances unless otherwise stated herein.
11. CONTRACTOR believes the information obtained from public sources or furnished to us by other sources is reliable.

However, we issue no warranty or other form of assurance regarding the accuracy of such information.

12. CONTRACTOR assumes that the current level of management expertise and effectiveness will continue to be maintained and that the character and integrity of any subject asset, property, or business interest through any sale, reorganization, exchange, or diminution of the owners' participation will not be materially or significantly changed.

13. CONTRACTOR is not an environmental consultant or auditor and takes no responsibility for any actual or potential environmental liabilities. Any person entitled to rely on this report wishing to know whether such liabilities exist, or their scope and effect on the value of any subject asset, property, or business interest, is encouraged to obtain a professional environmental assessment. CONTRACTOR does not conduct or provide environmental assessments and has not performed one in the course of this engagement.

14. CONTRACTOR has not determined independently whether any subject asset, property, or business interest is subject to (a) any present or future liabilities relating to environmental matters (including, but not limited to, CERCLA/Superfund liability) or (b) the scope of any such liabilities. The analyses, advice, recommendations, opinions, or conclusions contained herein take no such liabilities into account, except as have been reported to us by AGENCY or its representatives or by an environmental consultant working for AGENCY, and then only to the extent that the liability was reported to us in an actual or estimated dollar amount. Such matters, if any, are noted in the analyses, advice, recommendations, opinions, or conclusions contained herein. To the extent such information has been reported to us, we have relied on that information without verification and offer no warranty or representation as to its accuracy or completeness.

15. CONTRACTOR has not made a specific compliance survey or analysis of any subject asset, property, or business interest to determine whether it is subject to, or in compliance with, the Americans with Disabilities Act of 1990, and the analyses, advice, recommendations, opinions, or conclusions contained herein do not consider the effect, if any, of noncompliance with such law.

16. CONTRACTOR assumes no responsibility for the legal description or matters, including legal or title considerations. Title to the subject assets, properties, or business interests is assumed to be good and marketable unless otherwise stated herein.

17. CONTRACTOR assumes that the subject assets, properties, or business interests are responsibly owned and competently managed.

18. CONTRACTOR assumes that AGENCY is in full compliance with all applicable federal, state, and local regulations and laws, unless noncompliance is stated, defined, and considered in this report.

19. Unless otherwise stated, no effort has been made to determine the possible effect, if any, on any subject asset, property, or business interest due to future federal, state, or local legislation, including any environmental or ecological matters or interpretations thereof.

20. CONTRACTOR assumes that all required licenses, certificates of occupancy, consents, or legislative or administrative authority from any federal, state, or local government; private entity; or organization have been or can be obtained or renewed for any use on which the analyses, advice, recommendations, opinions, or conclusions contained herein are based upon.

21. CONTRACTOR assumes no responsibility for any financial or tax reporting requirements; such reporting requirements are the responsibility of AGENCY for whom this analysis was prepared.

CERTIFICATION OF THE ANALYSTS

I, Matthew Kimmel, hereby certify to the best of my knowledge and belief the following statements with respect to the real properties included in this report:

1. The statements of fact contained in this report are true and correct.
2. The reported analyses, opinions, and conclusions are limited only by the assumptions and limiting conditions of this Trust Land Performance Assessment and include my personal, impartial, and unbiased professional analyses, opinions, and conclusions.
3. I have no present or prospective interest in the property that is the subject of this report, as well as no personal interest with respect to the parties involved.
4. I have no bias with respect to the property that is the subject of this report or to the parties involved with this assignment.
5. My engagement in this assignment was not contingent upon developing or reporting predetermined results.
6. My compensation for completing this assignment is not contingent upon the development or reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value opinion, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this report.
7. The reported analyses, opinions, and conclusions were developed in conformity with the requirements of the Appraisal Institute's *Code of Professional Ethics*, *Standards of Professional Appraisal Practice*, and *Uniform Standards of Professional Appraisal Practice*.
8. I have satisfied the continuing professional education requirements necessary to maintain my professional designations.
9. Because of my background, experience, education, and membership in professional associations, I am qualified to make appraisals of the type of property that is the subject of this report.
10. The following persons provided me with significant real property appraisal assistance with respect to the properties in this report:

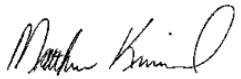
    - Daniel Provencio, MAI, CRE, MRICS
    - Eric Dicus, MAI, CFA
    - Jake Kumferman
    - Casey Nishizu

    The persons listed above aided in the financial modeling, report writing, market research, highest and best use analysis, sales comparison approach, income approach, and value estimate and reconciliation, if applicable.

11. I have not inspected the portions of the state trust lands that are the subject of this report.
12. As indicated below, I am certified and licensed to perform the appraisal of the real property described in this certification:

Individual	State	Certification of License Number	Expiration Date
Matthew Kimmel	WA	1100303	8/3/2021

13. Use of this report is subject to the Appraisal Institute's requirement for review by duly authorized representatives.
14. As of the date of this report, I have completed the Appraisal Institute's continuing education program.
15. I have not provided services related to the property that are the subject of this report, particularly within the three years immediately preceding acceptance of this assignment.



Mr. Matthew Kimmel
Certified General

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- David Chertudi — Lead Economist
- Kristen Ohlson-Kiehn — Forest Resources Assistant Division Manager, Projects and Planning
- Robert Greene — Conservation, Recreation and Transactions, Chief Appraiser
- Hilary Browning — Forest Resources Division, IT Analyst
- Candace Montoya — State Uplands Budget Manager
- Paddy O'Brien — Division Chief, Attorney General's Office
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- Cathy Baker — Olympic Region, Property & Acquisition Specialist
- Kellie Williams — Pacific Cascade Region, Natural Resources Technician
- Karen Robertson — South Puget Sound Region, Natural Resources Technician
- Katie Mink — Southeast Assistant Region Manager
- Chad Unland — Southeast Region District Manager for Agriculture
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- Dave Gordon — Conservation, Recreation and Transactions, Assistant Division Manager, Transactions
- Mike Buffo — Forest Resources Assistant Division Manager, Informatics
- Cathy Chauvin — Forest Resources Division, Project Manager
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- Michael Kearney — Product Sales & Leasing Division Manager, Leasing
- Pat Ryan — Product Sales & Leasing Division Manager, Agriculture and Water Policy
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- Bryan Larson — Product Sales & Leasing, Natural Resource Specialist
- Charlie Janislampi — Product Sales & Leasing, Natural Resource Specialist
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- Tom Heller — Product Sales & Leasing, Natural Resource Specialist
- Karie Fagerness — Product Sales & Leasing, Property & Acquisition Specialist

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- Ana Shafer — Product Sales & Leasing, Surface Mining and Reclamation Geologist
- David Bergvall — TLPA RFP Lead & Coordinator, TLPA Contract Negotiator, Project Manager and Subject Matter Expert Coordinator (Initial 12 months)

Deloitte.

Source: WA STATE DNR

Chapter 2
Trust Land Restrictions

Trust Land Restrictions

State trust lands are subject to specific statutes, regulations, policies, and management practices that are unique to state-owned lands and which are different from privately held lands in similar use. Collectively, these restrictions result in different and lower net revenues from the land, which result in a lower trust land value.

INTRODUCTION

The management of trust lands is the result of five levels of direction and oversight: 1) federal law and applicable regulations, 2) state statutes, 3) state regulations, 4) policies of the Board of Natural Resources and the Department of Natural Resources ("Trust Manager"), and 5) management practices implemented by the Trust Manager. These five levels of direction and oversight are also influenced by the Enabling Act (federal) that gave rise to the trust land portfolio, as well as the provisions of the Washington State Constitution.

Collectively, we can describe these as the "restrictions" that direct and/or influence how the trust land portfolio is managed and administered. While some of these restrictions also apply to the operation of similar, privately owned lands, many are unique to state trust lands. The purpose of this discussion is to call attention to those restrictions that we believe have a material effect on the value of the trust land portfolio, its net incomes, and, thereby, returns, and which are different from those restrictions that affect the use and management of similar, private-owned lands.

We need to emphasize that this chapter is not intended to be any form of detailed portfolio of statutes, regulations, policies, and practices that are specific to the trust land portfolio, nor is it intended to be an analysis of the appropriateness or suitability of any of the statutes, regulations, policies, and practices that direct or influence the management of trust lands. Rather, it is intended to be a commonsense discussion of how the use and management of trust lands is different from similar privately-owned land. Our focus here is on those restrictions that have the greatest impact on trust land value and net operating income.

Recognizing these differences in allowable operations and management of privately owned lands and trust lands is particularly appropriate, because, as a general statement, it is the operations and management of similar-use, privately owned lands that are the basis for the evaluation of the operational effectiveness of the Trust Manager, and that the values, net incomes, and returns of privately owned peers are the basis for evaluating the asset management effectiveness of the Trust Manager. Therefore, if we are going to compare the performance of the trust land portfolio with privately owned peers, we need to understand some of the differences between the two types of lands.

Because the sales of privately owned lands are reported in the marketplace and set an expectation of the price and value of land, we anticipate that readers of this trust land performance assessment (TLPA) have private market information about the value and net incomes associated with the various classes or types of trust lands under review (timber lands, agricultural lands, mineral lands, etc.). With our discussion here about the restrictions that direct or influence the management of trust lands, we hope to explain, in part, some of the underlying reasons for the difference between the market value of privately-owned lands and the Trust Value that we estimate in this TLPA.

In order to present this discussion, we have completed a high-level overview of the statutes, regulations, policies, and practices that direct or influence the management of the trust land portfolio. The objective of this review is to identify those restrictions that have the most significant impact on the value and/or net income of the trust lands and to evaluate their impact on value or net income. Further, the objective is to establish a basis on which the reader can begin to understand how and why the conclusions of Trust Value of this TLPA are or may be different from unit prices or values reported in the marketplace by a variety of reporters.

RESTRICTIONS DO AFFECT PRIVATELY OWNED LANDS

Similar-use, privately owned lands are also subject to statutes and regulations of the jurisdictions in which they are located. For example, privately owned forest lands are subject to federal, state, and local statutes and regulations. These include, for example, laws such as federal environmental protection under the Endangered Species Act and Clean Water Act; state statutes on the environmental impact of logging, mining, and agricultural activities; local ordinances involving permissible land use (zoning and land use entitlement); and other statutes and regulations further restricting or defining activities on the land and improvements to the land, as well as buildings on the land. In fact, all land prices and values are affected by the restrictions on land use, and the resulting impact on the nature and intensity of that use.

In this discussion, our emphasis and interest are on those provisions of statute, regulation, policy, and management practice that are specific to the trust land portfolio and which do not affect similarly used, privately held lands. For example, privately held lands are not subject to the policy mandates of the Board of Natural Resources (to which only trust lands are subject). Therefore, as we evaluate the policy decisions of the Board of Natural Resources, we can say that they are i) unique to state-owned trust lands (and other state lands) and ii) may or may not have a material impact on the Trust Value of those trust lands.

RESTRICTIONS MATERIALLY AFFECTING TRUST LANDS

Based on our review and investigation, we have concluded that the following restrictions likely do have a material, differential impact on trust lands, and that the Trust Value of the trust lands is materially impacted or influenced by these restrictions:

Environmental Laws and Regulations

Both privately owned lands and state trust lands are subject to statutes and regulations involving environmental protection and environmental impact mitigation, and the protection and mitigation of adverse conditions under these statutes is similar for both. However, there are differences in how these laws are implemented that may result in a material, differential impact on value or net operating income.

For example, management activities on both private and state trust lands may be subject to the Forest Practices Act and/or State Environmental Policy Act (SEPA), but because the Trust Manager is a public agency, SEPA places a greater burden on the Trust Manager to consider and disclose potential impacts as compared to private land managers. SEPA states that "all branches of government of this state, including state agencies, municipal and public corporations, and counties" must "utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision making…" and "identify and develop methods and procedures….which will insure that presently unquantified environmental amenities and values will be given appropriate consideration in decision making along with economic and technical considerations…" (RCW 43.21C.0301). On both private and public land, state and local permit decisions require SEPA review. In addition, most management decisions made by the Trust Manager involving state trust lands are agency actions that require SEPA review; SEPA does not apply to private land management decisions. For example, per RCW 43.21C.037, RCW 76.09.050, and WAC 222-16-050(1) and (2), a Class IV forest practice application for either a private or public timber sale requires SEPA review. But, as a public agency, the Trust Manager is also required to conduct a SEPA review to disclose potential impacts for all timber sales to the public and consider public comments, regardless of the forest practices application classification. Complying with this requirement increases public scrutiny of timber sales and may result in delays, changes to, or in some cases, cancellation of sales. Thus, the impact of the Trust Manager's obligations under SEPA may include higher costs associated with timber sales, as well as longer sale preparation periods. Both differences may affect net income from timber sales.

Reservations of Land From the Available Trust Land Portfolio

In Chapter 5, Timber Asset Class, we describe the timberlands valued in this TLPA and report that, in total, some 40 percent (816,000 acres) of the available land portfolio in the timber asset class is either not or only partially harvestable. Some areas have been deferred from harvest per Board of Natural Resources policies, such as the policy on old growth forests. Per the forest practices rules, some areas can be harvested only with surveys, consultation with tribes or federal partners, or other steps, which can effectively limit or restrict harvest. Further, thousands of acres are being managed as habitat mitigation for threatened and endangered species under the Trust Manager's 1997 State Trust Lands Habitat Conservation Plan (HCP).

The Trust Manager decided to pursue an HCP when the northern spotted owl was listed on the federal Endangered Species List as threatened in 1990. In addition to northern spotted owls, the HCP describes how the Trust Manager will meet Endangered Species Act requirements for other iconic, listed species as well, including bull trout and seven species of anadromous salmon, marbled murrelets, bald eagles, peregrine falcons, gray wolf, and grizzly bears, and other species of concern that have habitat in the forested environment. (Note, bald eagles and peregrine falcons have since been delisted.)

Unlike most private lands, which tended to be dominated by younger forests, the forest asset managed by the Trust Manager in the 1990s contained a large percentage of older forest: approximately 41 percent of the 1.6 million acres of lands managed by the Trust Manager and covered by the HCP were between 51 and 151 years old or older (Table 3.4.1, Merged Final Environmental Impact Statement for the Habitat Conservation Plan). Because many of these

older forests were either functioning as habitat or had the potential to become habitat for listed species, they were subject to requirements for "survey and manage," meaning they had to be surveyed for threatened and endangered species prior to timber sales.

Adopting an HCP was a means for the Trust Manager to meet the requirements of the Endangered Species Act without doing survey and manage, while providing management certainty (including a no-surprise clause) to its beneficiaries over the long term (to 2067). The proportion of the land base (40 percent) that today is either not or partially available for harvest nonetheless reduces the harvestable land base and, thus, represents a material financial impact to the income-generating capability of the portfolio for trust beneficiaries. This condition has a material effect upon net operating income and the value of the harvestable land base.

Sustained Yield

The state trust lands, both those granted at statehood and those created by statute, are perpetual in nature. Because these are perpetual trusts, the beneficiaries are represented by both today's generation as well as future generations. In discharging its duty as a trust manager, the department is required to manage state trust lands to provide "intergenerational equity" in perpetuity to its beneficiaries. Intergenerational equity means not favoring one generation of beneficiaries over another. Specific to forested state trust lands, the Trust Manager is required to manage on a sustained yield basis, which is defined as "management of the forest to provide harvesting on a continuing basis without major prolonged curtailment or cessation of harvest" (RCW 79.10.310).

The Trust Manager meets the sustained yield requirement by calculating a sustainable harvest level each decade for 20 sustainable harvest units. The sustainable harvest level is defined in RCW 79.10.300(5) as "the volume of timber scheduled for sale from state-owned lands during a planning decade as calculated by the Trust Manager and approved by the board." To ensure sustained yield, the mean annual timber volume for any decade cannot vary up or down more than 25 percent from the level of the preceding decade for any sustainable harvest unit.

If the Trust Manager cannot meet its sustainable harvest level in a given decade, an arrearage is created. Arrearage volume is the difference between the planned sustainable harvest level and the actual harvest level in a planning decade. If an arrearage exists, the Trust Manager is required by RCW 79.10.330 to conduct an economic and environmental analysis of any arrearage volume resulting from the previous planning decade and determine the best course of action for addressing it, for example, harvesting the arrearage in the next planning decade.

Sustained yield acts as a restraint on net operating income. Unlike a private land manager, the Trust Manager cannot harvest heavily in the current decade and then divest or exchange its holdings in the future. Instead, it must plan its harvest carefully over years and decades to ensure intergenerational equity, under the assumption that the land base will remain essentially intact and productive. The result is a harvest volume that may be lower than what a private land manager could achieve without these obligations.

In the 1990s, the Trust Manager had two options for managing the forest asset to comply with the Endangered Species Act, given that state trust lands covered by the HCP (1.6 million acres within the range of the northern spotted owl) contained significant tracts of mature stands. The first option was to survey for threatened and endangered species prior to each timber harvest. These surveys were time consuming and costly, and many timber sales were delayed due to concerns about habitat. Given the size and complexity of its land base, this option was impractical for the Trust Manager and the trust beneficiaries.

The Trust Manager chose the second option, which was to negotiate a HCP with the Federal Services (National Oceanic and Atmospheric Administration and U.S. Fish and Wildlife Service) to obtain an incidental take permit. In four major conservation strategies, the HCP describes how the Trust Manager will minimize and mitigate incidental take (harm) of listed species while conducting lawful activities, such as timber harvests. The Trust Manager minimizes and mitigates take primarily by limiting or restricting management activities in habitat areas. Outside of these areas, the Trust Manager has the flexibility to manage primarily for revenue production without needing to survey for threatened and endangered species. As such, the HCP provides the Trust Manager and its trust beneficiaries with a higher level of certainty in both habitat conservation and revenue production. The HCP is one of the largest in the United States and one of the few to contain "no surprises" provisions, which mean that that if a new species becomes threatened or endangered while the HCP is in place, the Trust Manager will not have to increase the protections already in place to cover that new species.

The Delayed Conversion of Transitional Forest and Agricultural Land into Commercial Land

Reportedly, approximately 9,000 acres of land are currently classified as timberland that is believed to be suitable for commercial and/or other suburban or urban land uses. These are lands that are located near or in towns and cities across western Washington. These lands may have a market value in an alternative use that is materially greater than their value in continuing timberland use. For example, with an average Trust Value in the vicinity of $1,500 per acre as timberland, it is likely that the value of transitional lands could easily be 10 times higher if the land were developed for other uses. The delay in converting these lands to other uses is, therefore, seen as a restriction that affects the total value of the portfolio.

Admittedly, because the transitional lands portfolio is small, at 9,000 acres, the effects of a 10-fold increase in transitional lands is also small. Were a 10-fold increase possible in this subset of timberlands, it appears it would represent a material increase in the value of all timberlands.

We have discussed five financially material restrictions that we believe can explain, in part, why and how the Trust Value conclusions of this TLPA may vary significantly from the market value indications of privately-owned lands of similar use. These restrictions include i) restrictions upon sale, ii) additional environmental impact assessment obligations, iii) the reduction in the available harvestable portfolio of timberland, iv) the effect of sustained yield on net operating income, and v) the delay in conversion of transitional lands within the timberland portfolio to other land uses.

We cannot provide a quantifiable dollar amount of impact from these restrictions, either at the asset class or the portfolio level. We are reasonably confident, however, that the sum of these restrictions is financially material in the context of the Trust Value conclusions, and represent, in part, explanations for the variance between our conclusions of Trust Value and the market values of similarly used, privately owned lands in Washington state.

Deloitte.

Source: WA STATE DNR

Chapter 3
Valuation Methodology

Valuation Methodology

Our valuation methodology, which estimates the Trust Value of each asset class, relies on the Income Approach to value, a commonly used method that estimates value based on the ability of the land to generate net operating income.

INTRODUCTION

In this chapter, we discuss the selection of the Income Approach method of valuation as well as our decision not to use either the Cost Approach or the Sale Comparison Approach, the other valuation methods commonly used in appraisals. We also describe the methodology used to value ecosystem services (under a separate cover) and contrast its conclusions of value with those of the Trust Value estimates for each asset class.

TRUST VALUE OF THE TRUST LAND ASSETS

The starting place of our discussion of the valuation methodology employed in this Trust Lands Performance Assessment (TLPA) is a review of the traditional valuation methods employed by real estate appraisers in conventional fair market value appraisals. We then address the three primary circumstances involving trust lands supervised by the Trust Manager that led to our conclusion that the appropriate term to use, when describing the value of these trust lands, is "Trust Value." These factors also influence our choice of valuation methods with which we shall value each trust land asset class. Finally, we describe in greater detail the specific methods we have used as well as any additional justification for our method selections.

TRADITIONAL REAL ESTATE APPRAISAL METHODOLOGY

The appraisal process that leads to a typical conclusion of Market Value in the United States today is the product of nearly 100 years of evolution and improvement, including conceptual and methodological improvements, as well as significant improvement to the data relied upon by appraisers and available technologies that permit more comprehensive analysis and reliable conclusions of value.

The Appraisal Institute, one of several professional organizations of real estate appraisers, provides the following illustration of the "appraisal process" in its publication, "Understanding the Appraisal."[1]

[1] The Appraisal Institute, "Understanding the Appraisal," brochure, 2013, page 8.

We offer the following comments and highlights for each of the core elements of the appraisal process identified in the Appraisal Institute brochure to lay a foundation for what is common among valuation professionals, and how we have tailored the analysis to accommodate the uniqueness of the asset classes and the ownership structure:

Element of the Appraisal Process	**Comments/Highlights**
Identification of the Problem	Why is the appraisal being completed? Who is it for? How will it be used by the intended users? Effective date? Special assumptions or conditions applicable?
Scope of Work Determination	How much work must be done in each of the areas of the appraisal to result in a reliable and appropriate valuation?
Data Collection and Property Description	Gathering information about the property that is the subject of the appraisal, its environs and its marketplace.
Data Analysis	Evaluation of market conditions and formulation of the highest and best use of the property being appraised.
Site Value Opinion	For an improved property, the value of the land as if vacant and available for development to its highest and best use.
Application of the Approaches to Value	Typically, one or more of the three traditional approaches (methods) of valuation – the Cost Approach, the Sales Comparison Approach and the Income Approach to value.
Reconciliation of Value Indications and Final Opinion of Value	Where two or more approaches to value are use, they are reconciled to a point estimate of value for the property that is the subject of the appraisal.
Report of Defined Value	Traditionally, the appraisal analysis is conveyed in a written form or narrative appraisal report. There are relevant standards for the content of a written appraisal report.

The three traditional valuation methods—Cost, Sales Comparison, and Income—are a reflection of three perspectives on the value in exchange of real property. A Cost Approach analyzes what it would cost to recreate the subject property through new construction and an analysis of losses in value from a variety of sources (physical depreciation and obsolescence). The Cost Approach reflects the principle of substitution, i.e., the ability of a buyer to obtain similar property by reconstructing or replicating the features and capabilities of the subject property.

The Sales Comparison Approach estimates the value of the subject property by comparison with similar properties, making adjustments to the comparable sales to compensate for differences between subject property and comparable property. It reflects the ability of a buyer to purchase alternative properties to the subject, and values the subject based on the asking and sales prices of similar property.

Finally, the Income Approach estimates the market value of the subject property based upon its ability to generate net operating income and to be resold at the end of an investment holding period. The Income approach to value is based on the principle of anticipation, in which the buyer bases his or her opinion of value upon future rents and profits from resale of the subject property.

In this TLPA, we have used the Income Approach to estimate Trust Value of each asset class. We have considered but have not used either the Sales Comparison Approach or the Cost Approach, as explained further below.

The Income Approach best captures the critical attributes of the value of each asset class—i.e., its ability to generate net income for distribution among trust beneficiaries—and the net income stream from asset class operations takes fully into account the statutory, regulatory, policy, and management practices utilized by the Trust Manager, both at present, and in recent years. Because the Income Approach reflects the fullest extent of asset class operations—both good and bad—we have relied upon this valuation methodology for each of our asset classes.

Because of the character of each of the trust land asset classes, the Cost Approach to value is either not applicable or is not believed to be a reliable indicator of value. This is largely true because most of the trust land asset classes are not improved with building improvements whose cost new and/or depreciation can be estimated based on substitution. Insofar as a Cost Approach also includes an estimate of the value of the vacant and available land, the value of which is commonly estimated via Sales Comparison methods, it is duplicative with the Sales Comparison Approach described below.

The Sales Comparison Approach is applicable and might be used to value the trust land asset classes, but the restrictions upon the sale of the trust lands, as well as other conditions under which we value the asset classes, render a Sales Comparison Approach analysis a less reliable indicator of value, and we have not included this approach to value.

FACTORS INFLUENCING THE SELECTION OF OUR METHODOLOGY

In the Introduction to the TLPA, we discussed our decision to use the terminology "Trust Value" and not "Market Value." This was done for the following reasons:

(1) To clearly communicate to the reader of the TLPA that the circumstances and conditions of the trust land valuation completed in the TLPA were different from in a conventional appraisal analysis and report;

(2) To remind the reader that the restrictions upon sale of trust lands has a pervasive and material impact upon the value of the trust land assets;

(3) That the (i) statutes, (ii) regulations, (iii) policies, and (iv) management practices utilized by the Trust Manager are or may be materially different from private owners of otherwise similar natural resource lands, and this has, or may have, a material impact upon the value of the trust land asset classes; and

(4) That we have valued each asset class in aggregate (i.e., its total acreage) and not individual parcels or tracts, and accordingly, we have either abbreviated or eliminated many of the typical steps and processes in a market value appraisal analysis and report.

DISCUSSION

As a practical matter, our options for valuation of any of the asset classes were to use the Income Approach and the Sales Comparison Approach. Use of Sales Comparison—i.e., the comparison of the trust land asset class with sales of private land of similar use—is or was made much less reliable and meaningful because of the restrictions upon the sale of the trust lands. Were we to have used the Sales Comparison Approach in the TLPA, we would have to make significant adjustments to the indications of value from private sales of similar lands to compensate for *not only* physical, locational, and other value influence, *but also* the restrictions upon the sale of the property. We have described these restrictions in detail in Appendix A to the TLPA, and have characterized them as a significant influence upon the value of the trust lands. Furthermore, our Sales Comparison Approach adjustments would have to take into account the difference in the size of our property comparisons and the asset class under analysis; we anticipate that were we to do so, an additional significant adjustment would be incorporated to reflect the size of the asset class (in acres) versus the size of the comparable transactions relied upon.

Consequently, a Sales Comparison Approach analysis used in the TLPA would include three types of adjustments: 1) for usual and customary differences in physical, locational, and other economic characteristics; 2) for the inability to sell the land at a later date; and 3) for the dramatic difference in parcel size between comparable sales and the size of the asset class (in acres). In our judgment, the size of the combined adjustments would be so great as to call into question the reliability of the conclusions of value of a Sales Comparison Approach analysis. Accordingly, we have omitted this approach to value in this TLPA.

By contrast, the Income Approach analysis does not share these weaknesses and provides a much cleaner and more direct means by which to value each asset class. Because of the consistent operation of each of the asset classes by the Trust Manager, we have access to revenue, operating expense, and net operating income data, and we have evaluated these revenue and expense categories for the period 2007 through 2018. These revenues, operating expenses, and net income of each asset class reflect a full implementation of the applicable statues, regulations, policies, and management practices that govern the operation of the asset classes, and we have a comparatively strong ability to anticipate future revenues, operating expenses, and net operating incomes for the foreseeable future. The net income forecast that emerges from the evaluation of historical operations is not affected by the inability to sell the trust lands within any asset class. As described in more detail in the following Financial Rate of Return chapter, suitable rates of return from similar lands can be reliably applied to our forecast of net operating income, and we can estimate a Trust Value that embodies both the net operating income potential as well as the restrictions upon sale of the trust lands.[2]

OTHER METHODOLOGY NOTES

Frequent users of appraisals will understand that our definition of Trust Value is largely a "value in use" definition and not a "value in exchange" definition (as is a market value appraisal analysis). This is consistent with the idea that the severe restrictions upon the sale of the trust lands means that a) they cannot be sold (i.e., no value in exchange) and b) they will be held in perpetuity (i.e., value in use).

Closely related to the idea of value in exchange is the concept of highest and best use, which is the ability (in an appraisal context) of the buyer to put the property to its highest (i.e., most profitable) use. This TLPA analysis, estimating Trust Value, evaluates the trust land asset classes in their current use only, and does not include any investigation or analysis into alternative uses different from the uses employed within the asset class (e.g., agricultural land use for land within the agricultural land asset class). Given that the objective of the analysis is to estimate the trust value of each asset class portfolio as economic units, this position is appropriate.

Income Capitalization and Discounted Cash Flow Analysis

Within the Income Approach analysis, this TLPA Trust Value analysis relies upon the use of direct capitalization. Direct capitalization of stabilized net operating income means the division of an estimate of net operating income by a financial rate of return, specifically called a "capitalization rate" or "cap rate." The resulting product is then an indication of the value of the property.

Direct capitalization is an alternative to discounted cash flow analysis, which is another form of income approach valuation. Discounted cash flow analysis provides for the individual discounting of expected annual cash flows from property operations and from the future sale of the property, all discounted to a net present value (i.e., the indicated value), at a selected discount rate. Direct capitalization and discounted cash flow analysis are both commonly used appraisal methods within the Income

[2] We should also note that our Income Approach analysis does not directly address any impact on Trust Value that might arise from the size of the asset class (versus the size of a typical transaction involving similar lands). To a large extent, recognition of a size adjustment is related to the operational efficiency of the asset class holding, and to a smaller extent, the actual size difference between the trust land holding and the typical transaction size within the asset class. In short, the traditional size adjustment seen in many real estate appraisal is rendered moot by the inability to sell the lands within the asset class. What matters is net operating income, and the higher the net operating income, the higher the Trust Value.

Approach and each has specific strengths and weaknesses. Both direct capitalization and discounted cash flow analysis are discussed in much greater length in the following Financial Rate of Return chapter, which follows. Both methods are used in the Timber Asset Class valuation chapter.

Income Approach Analysis and the Timber Asset Class

As described above, this TLPA Trust Value analysis uses direct capitalization of expected net operating income as its sole valuation methodology. Within the Timber Asset Class valuation, however, our Income Approach analysis is expanded. We have added a second form of Income Approach analyses to the Timber Asset Class valuation, which is commonly referred to as a Whole Property Value method by experienced forest and timberland appraisers. More specifically, this analysis is a form of income residual analysis, in which the land is valued based upon its ability to grow marketable timber, have the timber harvested and sold at market price, less the costs of harvesting and silviculture, and with cash flows discounted to a net present value. This net present value indication, however, represents only the value or worth of the timber which has been (or will be) sold, so the value of the underlying timberland (without timber) is added to the net present value amount. The contribution of the net present value of timber sold and the underlying timberland value together forms an indication of value for the "whole property value" of the timberland.

By contrast, for timberland, the Income Approach analysis using direct capitalization forecasts a stabilized net operating income from timber operations on a perpetual basis and this net operating income is capitalized to an indication of value via direct capitalization. The two indications (whole property value and direct capitalization) are then reconciled to a point estimate of value for the Timber Asset Class.

Finally, as a reasonableness check on the conclusion of value, the indicated value of the Timber Asset Class is informally compared with the reported sales prices of timberland located around the country, as reported by large institutional timber owners and integrated forest products companies.

THE VALUE OF ECOSYSTEM SERVICES

Among the mandates of the enabling legislation for the TLPA cited in the Introduction chapter was the following: "The analysis must also estimate the value of ecosystem services and recreation benefits for asset classes that produce these benefits." This mandate gives rise to our evaluation of the worth or value of ecosystem services within the TLPA. This analysis is transmitted under a separate cover.

This part of our report discusses the dollar-equivalent value of ecosystem services, such as natural systems found on trust lands that offer benefits such as natural crop pollination, clean air, extreme weather mitigation, and mental and physical well-being. Collectively, these benefits are known as ecosystem services, and they are grouped into four broad categories: (i) *provisioning* the production of food and water; (ii) *regulating* to control climate change and disease; (iii) *supporting*, such as the habitat and refugia for both plant and animal species; and (iv) *cultural*, including aesthetic, science/education, and recreation and tourism. Two ideas around the value of ecosystem systems are particularly important: 1) that the natural environment provides "services" to the surrounding environment that have economic value or worth, and 2) that these benefits are nonexclusive to the recipients or beneficiaries (i.e., the benefits are available to all without payment or compensation).

As an attribute of property, particularly large contiguous tracts of land, it has been recognized for at least two generations that the worth or value of the nonexclusive benefits of land can or should be evaluated and considered by landowners, managers, and other stakeholders when long-range planning or benefit-cost analysis of the lands is underway. In Deloitte's 1996 Economic Analysis of the trust land portfolio, these property attributes were referred to as "nonmarket" values, and dollar equivalent amounts of these values were provided. Generally, using the terminology of the time, these nonmarket benefits could be divided into two groups—those arising from nonrevenue use of the lands, and those arising from nonuse or existence benefits. Use-based benefits are more obvious and result from the ability to use lands for recreational service or other activities, either today or in the future. Existence-based benefits are a reflection of the worth or value of these lands to people who (a) may not or will not actively use or interact with these lands, but for whom (b) the mere existence today and continuing in the future has or will have monetary value.

Through additional academic research and evolution of the body of thought around nonmarket valuation of land, the term "ecosystem services" came into use, and the concepts and a structure for analysis were implemented in the Millennium Ecosystem Assessment of 2001.[3] Since that project, "ecosystems services" is a general term describing a body of human benefits (i.e., services) that can be realized by humans to improve human existence. Some, but not all of these benefits may give rise to a measurable economic output or benefit, because the service provided by the natural environment has a measurable economic benefit either through direct production of a good or product, or because it allows society to avoid or discharge certain dollar costs.

One example of an ecosystem service is the service of carbon sequestration, i.e., the ability of a forestland to remove carbon dioxide from our atmosphere. The value of forestlands' ability to remove carbon can be estimated based upon academic studies that seek to measure the social cost of carbon, based on a variety of methodologies.

In the valuation of ecosystem services the actual valuation methods used are "benefit-transfer" and "consumer surplus." Benefit-transfer analysis assigns an economic value to the benefit and applies it to the applicable ecosystem service based upon the value and volume of the benefit that is transferred. Consumer surplus is estimated through the value that people place on their experiences above what they paid for those experiences and is used as a measure of social welfare. The specific methods used in this TLPA are described at greater length in our Ecosystem Services chapter (under separate cover).

[3] From the Millennium Ecosystem Assessment website: "The Millennium Ecosystem Assessment (MA) was called for by the United Nations Secretary-General Kofi Annan in 2000. Initiated in 2001, the objective of the MA was to assess the consequences of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems and their contribution to human well-being. The MA has involved the work of more than 1,360 experts worldwide. Their findings, contained in five technical volumes and six synthesis reports, provide a state-of-the-art scientific appraisal of the condition and trends in the world's ecosystems and the services they provide (such as clean water, food, forest products, flood control, and natural resources) and the options to restore, conserve or enhance the sustainable use of ecosystems." See: https://www.millenniumassessment.org/en/About.html

Trust Value versus Ecosystem Services Values

Much has been written about the merits of valuing ecosystem services and how that financial analysis should be used with respect to market value estimates for real property. This is a controversial topic among academics, policymakers, appraisers, and property owners, and has been so for at least a generation. Other than to acknowledge the debate, the purpose of this discussion is not to argue for or against one position or another, but to clearly and concisely remind the reader that the dollar amounts of the Trust Value analysis of this TLPA should not be compared directly to (or against) the indications of value in the Ecosystem Services analysis. Although both analyses results in dollar estimates, the amounts are not directly comparable; the reader needs to understand a very critical difference between the two types of dollar estimates, as we explain below.

We have noted earlier that our term of choice, Trust Value, is derived from the concepts underlying Market Value in exchange, but in fact is a specialized term that is intended to remind the reader that our value estimate is most likely different from a conventional market value estimate because (a) the sale of trust lands is so heavily restricted, and (b) the term is effectively describing the value of the trust lands in perpetuity as presently used and not in some alternative use. Notwithstanding these important distinctions, Trust Value is intended to be a cash equivalent estimate of value to the owners, managers, and beneficiaries of the lands (State of Washington, DNR including Board of Natural Resources, and beneficiaries). Accordingly, both market value and Trust Value express the value or worth of the trust land asset classes on a direct and *exclusive* basis to the owners, managers and beneficiaries. They are the "owners" of those property benefits and they enjoy those benefits exclusively.

By contrast, ecosystem services represent dollar estimates of benefits that are "*nonexclusive*" and which are derived from the trust land asset classes but whose benefits are available to any member of society who use and who may not use the lands, but either directly or indirectly receives benefits from the lands. There is no exclusivity associated with an ecosystem service, whether the dollar equivalencies are expressed on an annualized basis (i.e., worth or value per year or interval of time) or on a capitalized (lump-sum) basis.

As utilized in this TLPA, the exclusivity of the benefits of ownership to the Trust Manager and the beneficiaries should be contrasted with the nonexclusive benefits of ecosystem services to all members of society able to receive those nonexclusive benefits.

CHAPTER-CONCLUDING REMARKS

In this TLPA, we have used a specialized term, Trust Value, to describe the nature of the benefits of ownership and operation of the trust land asset classes in order to distinguish it from a conventional market value definition used in most real estate appraisals. Trust Value, as a term, reminds the reader that the ability to sell trust lands is heavily restricted, and that the analysis is effectively a value in use analysis, assuming perpetual operation in their current use categories.

We have used the Income Approach to value as our primary valuation methodology, having concluded that the Cost Approach is not applicable and that use of the Sales Comparison Approach would result in the application of so many adjustments that its conclusions may not be credible. The Income Approach has the added benefit of fully reflecting the burdens and unique regulatory status of the trust lands and benefits from the extensive data on revenues, operating expense, and net operating incomes associated with each asset class.

The values associated with the Trust Value of each asset class and the ecosystem services values are different and cannot be directly compared. Like market value, our term Trust Value conveys the worth of value of the *exclusive* benefits of ownership and operation. Ecosystem services value estimates are *nonexclusive* and the worth of those benefits are shared by all members of society.

Deloitte.

Source: WA STATE DNR

Chapter 4
Financial Rate of Return

Financial Rate of Return

Selection of the appropriate financial rate of return is an essential part of estimating the Trust Value of each of the asset classes within the trust land portfolio. When applied to trust net incomes, the rate of return helps value the trust assets, and it also serves as a benchmark for evaluation of recent returns.

INTRODUCTION

In this chapter we discuss the relationship of a financial rate of return to the value of the trust land assets, the impact of the restrictions upon the ability to sell[1] trust lands on the financial rate of return selection, the extent to which the financial rate of return used in the 2019 Sustainable Harvest calculation should be used in this Trust Land Performance Assessment ("TLPA") analysis, and the selection of specific rates of return for each of the asset classes.

This includes an extended discussion of the types of investment criteria used in estimating value. They include:

- A basic discussion of the importance of time value of money, ROI (return on and return of investment), capitalization rates, and discount rates;
- The appropriate criteria for valuing the DNR's trust portfolio;
- A discussion of social discount factors (SDF) and private discount factors (PDF), and distinctions between intergenerational equity and intragenerational equity;
- A summary of our extensive surveys of capitalization rates and discount rates, together with our concluded valuation benchmarks.

The comparison of net income from property or a business enterprise with the value of that property or business enterprise is commonly called a "return on investment" rate, or "ROI". This kind of comparison is made at a single point in time and reflects a snapshot view of the price or value of an asset and its ability to generate net income.

For traditional forms of investment real property, like an apartment building or office building, the relationship between expected net operating income and the current market value of the property is referred to as a "capitalization rate," (also known as a "cap rate"). In our earlier chapter, Valuation Methodology, we reported that one of the means of valuing the asset classes within the trust land portfolio is by "capitalizing" the net income from the asset class. This means that one can estimate value by dividing net income by a capitalization rate. For example, if the asset class produced a net operating income of $1,000,000 each year, and if the capitalization rate is 10%, the indicated value of that asset class is then $10,000,000 as shown below:

[1] See Appendix A.

FIGURE 1

Net Operating Income:	**$1,000,000**
Capitalization Rate:	**10%**
Indicated Value:	**$10,000,000**

We earlier referred to this value indication as a "snapshot" because it reflects this relationship only at a *specific point in time*.

In financial analysis and in real estate valuation, a valuation analysis or an evaluation of returns *over a period of time* can be called a time-series analysis; in real estate valuation and investment analysis, an evaluation of value or of returns over a period of time is most commonly called a "cash flow analysis" or a "discounted cash flow analysis."

The term "discounted cash flow analysis" emphasizes and reveals an important concept in financial analysis and valuation, and that is the idea that a dollar received in the future is worth less than a dollar received today. For example, for the investor hoping to earn a 10% return on investment, and forced to wait one year to receive $100, the "present value" or "net present value" of that future $100 is worth only $90.91, as shown below:

FIGURE 2

Future income:	**$100**
Discount Factor:	**X .0909090**
Indicated Value:	**$90.91**

The discount factor is a function of two factors, including a) the rate of return expectation[2] and b) the time until the cash payment is assumed to be received. The actual formula for the present value is:

FIGURE 3

$$PV = \frac{C}{(1+i)^n}$$

where "C" is the amount of money to be received, "i" is the interest rate (rate of return) sought by the investor and "n" is the number of periods until the money to be received is actually paid. Thus, our example would be shown as:

FIGURE 4

$$\$90.91 = \frac{\$100}{(1+10\%)^1}$$

If a series of payments are to be received over time, for example, for a period of 3 years, the present value of that stream of cash flows ($100 each in years 1, 2 and 3, would have a total value of $248.69, as shown below:

FIGURE 5

Year	*Payment*	*Discount Factor*	*Present Value*
1	*$100.00*	*0.9090909*	*$90.91*
2	*$100.00*	*0.8264463*	*$82.64*
3	*$100.00*	*0.7513148*	*$75.13*
Total	*$300.00*		*$248.69*

[2] The rate of return expectation is the rate of return on investment sought by the hypothetical investor, i.e. the individual or entity that will receive the future payment.

The example above clearly illustrates two aspects of this financial analysis: 1) why it is referred to as a "discounted" cash flow analysis, and 2) why the term "flow" is included in the terminology. There is a stream or "flow" of cash from the investment, and the longer the cash flow stream is forecast to continue the greater the discount from the undiscounted or par value of the cash flows.

The example above illustrates another important distinction in financial analysis, which is the weakness of considering only the snapshot or capitalization rate of return in a financial analysis or valuation.

In our example, if we used the snapshot method to value the asset class or describe the return on investment in any one year of the three year projection, the indication would not be mathematically correct, because the snapshot does not specifically reflect or consider the time value of money of the investment (over the three year period).

Discounted cash flow analysis, which takes into account the time value of money, is the appropriate financial analysis method to use in the valuation of most cash flow streams; this is because most cash flow streams change over time. If those cash flows are produced by real property, we have a classic discounted cash flow ("DCF") methodology used to value the real estate that is the subject of analysis. DCF analysis is widely accepted and used by real estate appraisers in the valuation of real property.

Use of a capitalization rate to value real estate is not only a snapshot methodology, but it can be also described as a "short-cut" methodology. Under specific conditions, many of which are common for income producing real estate, capitalization (also known as "direct capitalization") can produce a mathematically reliable indication of value for the property.

The following table is an example comparing direct capitalization with discounted cash flow analysis for an income property investment, with net operating income of $100,000 per year and a capitalization rate assumption of 10%.

We see in the example that the two forms of analysis produce an identical indication of value.

FIGURE 6

Income Capitalization

Net Operating Income	*$ 100,000*
Capitalization Rate	*10%*
Indicated Value	*$ 1,000,000*

Discounted Cash Flow Analysis

Year	*Net Operating Income ("NOI")*	*Reversion*	*NOI + Reversion*	*Discount Factor*	*Present Value*
1	*$ 100,000.00*		*$ 100,000.00*	*0.9090909*	*$90,909.09*
2	*$ 100,000.00*		*$ 100,000.00*	*0.8264463*	*$82,644.63*
3	*$ 100,000.00*		*$ 100,000.00*	*0.7513148*	*$75,131.48*
4	*$ 100,000.00*		*$ 100,000.00*	*0.6830135*	*$68,301.35*
5	*$ 100,000.00*		*$ 100,000.00*	*0.6209213*	*$62,092.13*
6	*$ 100,000.00*		*$ 100,000.00*	*0.5644739*	*$56,447.39*
7	*$ 100,000.00*		*$ 100,000.00*	*0.5131581*	*$51,315.81*
8	*$ 100,000.00*		*$ 100,000.00*	*0.4665074*	*$46,650.74*
9	*$ 100,000.00*		*$ 100,000.00*	*0.4240976*	*$42,409.76*
10	*$ 100,000.00*	*$ 1,000,000.00*	*$ 1,100,000.00*	*0.3855433*	*$424,097.62*
Total					*$1,000,000.00*

There are, however, a number of important assumptions that are explicit and evident in the DCF analysis, but unapparent in the direct capitalization method. In our example, the reader should note that the net incomes do not change from year to year, and that the value of the property does not change over a ten year period ('reversion" is the term used to describe the assumed sale of the property at the end of the investment holding period).

What financial analysts know is that if the net income stream is not expected to change over the holding period, and the asset value is also not expected to change over the holding period, direct capitalization is a financially accurate method of estimating the value of the asset. If net incomes or property value are expected to change or vary, however, discounted cash flow analysis (that can incorporate this change) is the more reliable method of valuation.

In short, both methods have a place in real estate analysis depending upon the character of the asset and how its income and value will change over time, and both methods are employed in this TLPA.

DISCOUNT RATE SELECTION AND DCF ANALYSIS

As discussed in the preceding Valuation Methodology chapter, discounted cash flow analysis consists of forecasting net operating income from a property or (in this case) an asset class and selection of an appropriate discount. The net present value of those future cash flows is then an indication of the value of the property or asset class.

As applied to the asset classes of the trust land portfolio, there are two important additional factors that we discuss below that have a significant impact upon the discount rate that we select as appropriate in this TLPA. These factors are (1) ***recognition of the restrictions upon sale of the trust land assets***[3] and (2) ***selection of the appropriate basis and/or benchmarks from which we determine the appropriate discount rates*** and capitalization rates to be applied to the net incomes from operations of the trust land portfolio.

Impact of the Restrictions upon Sale of Trust Lands and Its Effect Upon Rate of Return Selection

Traditionally, real estate investment, just like investments in stocks and bonds, depends upon the investor receiving a return "on" investment, and a return "of" the investment. For income property investment, return on and return of investment is received in the form of net income and at the time of sale of the property.

When the property sells for more than was paid for it, an investment gain is realized, i.e. the selling price was higher than the purchase price. Regardless of the extent of gain or loss, the sale of the property at the end of an investment holding period is an essential, fundamental and usual part of the real estate investment process. In most respects the sale of the asset represents the return *of* investment capital and a portion of the return *on* investment capital. Similarly, the sale of a share of stock or the redemption of a bond at the end of the investment period is also an essential part of the investment process – receiving the return *of* and return *on* investment.

The restrictions upon sale of the trust land portfolio has an important impact on our evaluation of the Trust Value and on the investment performance of the trust land portfolio. The effective inability to sell this land makes its ownership, and an evaluation of its value and returns atypical.

For example, in the above discounted cash flow example, we see that the assumed sale of the property at the end of the holding period has a present value of $424,097; this is actually a combination of the 10th year net operating income of $100,000, and the assumed sale of the property for $1,000,000.

[3] See Appendix A.

If we multiply the discount factor of .3855433 by the assumed sales price, we see that the value of the future sale is worth (today) only $385,543 ($1,000,000 X .3855433). Does this mean that – since we effectively cannot sell the property - it is worth $385,543 less? The answer is "no."

The reader should note that even though the property cannot be sold, the owner of the property will still continue to receive the annual net income of $100,000 in perpetuity. While we do not show the math in this discussion, the present value of these future net operating incomes (years 11 through "n" – a perpetuity) is, in fact, $385,543. Combined with the present value of the cash flows from years 1 – 10, with a present value of $614,456, the present value of the cash flows (years 1 through "n") into perpetuity is $1,000,000. Mathematically, the values are the same.

This discussion and example allow us to see how the restrictions upon sale of the land portfolio does not necessarily reduce or change the present value of the cash flows. It does, however, change how we consider or evaluate market-indicated capitalization rates demonstrated by the sale of land owned or sold by owners *who can sell their land*, without restriction.[4]

To illustrate why this is so, we return to our earlier capitalization rate and discount rate example. While our prior example assumed no change in net operating income and no change in property value, most investors and owners expect to see both growth in net operating income and property value during the holding period of their investment. This, of course, is why real estate is perceived as a good investment. It usually provides growth in income and value over a holding term. If we assume that our example property shows growth in net operating income and value (for example a 3% annual growth in net operating income, and a 3.8% annual increase in property value), our cash flow forecast would look like the following:

FIGURE 7

Discounted Cash Flow Analysis

Year	*Net Operating Income ("NOI")*	*Reversion*	*NOI + Reversion*	*Discount Factor*	*Present Value*
1	*$ 100,000.00*		*$ 100,000.00*	*0.9090909*	*$90,909.09*
2	*$ 103,000.00*		*$ 103,000.00*	*0.8264463*	*$85,123.97*
3	*$ 106,090.00*		*$ 106,090.00*	*0.7513148*	*$79,706.99*
4	*$ 109,272.70*		*$ 109,272.70*	*0.6830135*	*$74,634.72*
5	*$ 112,550.88*		*$ 112,550.88*	*0.6209213*	*$69,885.24*
6	*$ 115,927.41*		*$ 115,927.41*	*0.5644739*	*$65,438.00*
7	*$ 119,405.23*		*$ 119,405.23*	*0.5131581*	*$61,273.76*
8	*$ 122,987.39*		*$ 122,987.39*	*0.4665074*	*$57,374.52*
9	*$ 126,677.01*		*$ 126,677.01*	*0.4240976*	*$53,723.42*
10	*$ 130,477.32*	*$ 1,450,000.00*	*$ 1,580,477.32*	*0.3855433*	*$609,342.42*

In this example, assuming a property price or value of $1,000,000, the capitalization rate for this investment would still be 10% ($100,000/ $1,000,000) but the return on investment would clearly be higher, because over the investment holding period, the property would have produced much more net operating income (greater by $146,388) and more income or cash flow at the time of sale of the property ($450,000 more).

[4] The inability to sell land also necessitates an adjustment to the discount rate for liquidity (i.e. the ease or difficulty in bringing an asset to market and successfully completing its sale. Liquidity is an issue to be considered but is not a topic of this discussion.

In our earlier example, the rate of return sought by the investor was 10%, and that investment produced a 10% rate of return. Because there was no change in income or value, the discount rate (also known as the internal rate of return) was 10%. In this second example, however, because of growth in net operating income and value, the discount rate is, in fact, 13.505%.

In other words, an investor who purchased this property for $1,000,000 and who received the cash flows shown above would have earned 13.505% on their investment. Yet the capitalization rate, at the time of the purchase of the property, remained 10%.

This example helps illustrate a very common occurrence in real estate investment; in fact the predominant occurrence, and that is that the capitalization rate is routinely lower than the internal rate of return that the investor hopes to receive over the life of the investment. In our example above, the capitalization rate is 10% and the internal rate of return is 13.505%. This is a difference of 350 basis points between the capitalization rate and the discount rate (one basis point equals 1/100 of a percentage point; 100 basis points = 1%).

The extent to which income growth and property value growth changes from the time of property purchase until sale determines the difference between the capitalization rate and the internal rate of return (aka discount rate). Various surveys of real estate investors suggest that they routinely expect a 200 basis point to 300 basis point difference between capitalization rate and discount rate (e.g. a capitalization rate expectation of 5.5% and a discount rate expectation of 8.0%, equals a difference of 250 basis points).

Property investors expect net operating income to grow and property value to grow over the investment holding period; thus the capitalization rate would be lower than the hoped-for discount rate.[5] Where there is no change in net operating income and property value over the investment holding period, the capitalization rate equals the discount rate (as we saw in our first example). If net operating income and property value both decline during the investment holding period, the capitalization rate will exceed the discount rate.

As Applied to the Trust Lands Valued in the TLPA

With respect to the TLPA then, the above helps illustrate why – as we evaluate the rate of return either sought by or achieved by other owners or operators of lands like those held in the trust land portfolio (but without the restriction upon sales) - we must make a distinction between the rates of return sought or achieved by those private and/or unrestricted buyers or sellers and the restricted lands valued in this TLPA.

That distinction is that the capitalization rates sought by or achieved by private owner/investors most likely include an expectation of the future sale of the property at a gain, causing the capitalization rate to be below the discount rate. *Accordingly, these capitalization rates are a less reliable indication of an appropriate rate of return for land – like the trust land portfolio – that is restricted and effectively cannot be sold*.

[5] We remind the reader that the terms "internal rate of return" and "discount rate" are synonymous.

It is the discount rate suggested by private market activity, however, that *can* be directly compared and/or applied to the trust land portfolio. This is because it represents the total return sought or achieved by the investor owner – whether or not the property is held in perpetuity or can be sold at the end of an investment holding period. This means, for example, that a sale of timber land that suggests a 5% capitalization rate, likely indicates an internal rate of return expectation that is anywhere from 6% to 7%.

As the TLPA considers transactions that provide an indication of capitalization rate and/or discount rate, we should consider first and foremost the discount rate suggested by that transaction (a measure of total return) and to a lesser extent, the indicated capitalization rate. This is because the restrictions upon sale of the trust lands effectively mean that the trust lands cannot be sold, but only held in perpetuity. Thus, for trust lands, the financial ownership benefits are received only through property operations that produce net operating income and not through sale.

Selection of the Appropriate Basis and/or Benchmarks for Discount Rates and Capitalization rates

In the 2019 Sustainable Harvest Calculation, the DNR's Forest Estate Model incorporates a discount rate to allow the discounting of future cash flows from the harvest of timber for a number of alternative harvest plans. In that analysis, DNR uses net present value among the alternatives studied in order to assist in its decision about the preferred harvest plan. From the Final Environmental Impact Report for the Sustainable Harvest Level analysis:

"A forest estate model is a mathematical computer model that is designed to find the optimal solution to the problem of deciding where, when, and how many forest management activities, such as harvest and thinning, should be conducted in order to meet DNR's fiduciary responsibilities pursuant to all state and federal laws. In building this model, DNR utilized commercial software, Remsoft Spatial Planning System (Remsoft Inc., Fredericton, Canada), that is based on a mathematical programming technique known as "linear programming."….

The objective function of DNR's forest estate model is to maximize the "net present value" of revenue derived from forest management activities over 10 planning periods (decades) into the future subject to a set of constraints that reflect operational, ecological, financial, or other policy considerations. Some of the constraints in this model are termed as "hard," meaning such constraints must be met to achieve a feasible solution to the problem. There also "soft" constraints, mostly relating to a set of future desired forest conditions that do not exist today. These soft constraints involve a "slack variable," which assumes a level of shortfall in meeting that particular constraint. Therefore, if the forest condition today is not ready to meet a particular constraint, the expression of soft constraints allows the model to find a feasible solution depicting when such constraints can be met."[6]

The Forest Estate model is, in effect, a benefit-cost analysis ("BCA") applied in a manner generally consistent with the guidelines of the U.S. Environmental Protection Agency ("EPA"). The methodology of a BCA are described more fully in the EPA publication "Guidelines for Preparing Economic Analyses."[7] These guidelines are used by a variety of federal, state and local agencies when they are engaged in the evaluation of public investments, public policies and regulations intended to provide benefits to targeted populations, communities and regions.

[6] Alternatives for the Establishment of a Sustainable Harvest Level FEIS, Appendix F at page F-1, October 2019
[7] Washington Board of Natural Resources Resolution 1560, December 3, 2019.

The Forest Estate model uses net present value analysis to evaluate the most appropriate harvest plan. In its Draft Environmental Impact Statement, the Forest Estate model utilized a 2% discount rate, which was subsequently amended to 3% in the Final Environmental Impact Statement The recent adoption of the Sustainable Harvest Level by the BNR[8] raises the obvious question "Is the appropriate discount rate for the TLPA Trust Value analysis the same discount rate adopted by the BNR in its sustainable harvest level?"

We have concluded that the answer to this question is "No," and that the discount rate used in the TLPA should be different from that used in the calculation of the sustainable harvest level.

In order to explain our conclusion, we provide relevant background on the basis for selection of the rate of return – a discount rate – and the rationale for our conclusions.

Building on our earlier discussion in this chapter about capitalization rates and discount rates, we see that the discount rate is a necessary part of determining the "time value of money." It allows the evaluation or comparison of the worth of a dollar today versus the worth (today) of a dollar received in the future. Most people will agree that a dollar to be received in the future is worth less than a dollar received today, because the "waiting" represents deferral or delay in the realization of whatever the deferred outcome was or is hoped to be. The "discount" represents the worth or value of the delay.

If we think about the deferral or delay as having a worth or value, we can then begin to ask questions about how valuable (i.e. how costly) is the deferral or delay? In our first capitalization rate and discount rate example, where the wait was one year and a 10% return on investment was sought, the worth or value of the delay was $9.09 ($100.00 - $90.91 = $9.09). The higher the discount rate, the greater the dollar discount; the lower the discount rate, the lower the discount in dollars. Because of the compounding effect of the discount rate, the longer the deferral or delay the greater the discount.

For example, a 10% discount rate applied to a $100 cash flow to be received in 50 years results in a very substantial discount - 99.15%. This means that the present value today of this cash flow to be received in year 50 is only 85¢. Similarly, if the discount rate is 3%, the present value today of that future $100 is worth $22.81 (and the discount is then $77.19). Using these same two examples, we could also say that for the individual whose investment goal is 10%, the worth or cost of delay is $99.15; if that same individual had an investment goal of 3%, the worth or cost of that deferral or delay was then only $77.19. These examples show the sensitivity of value to discount rate, particularly over a long-term projection period.

Earlier in this chapter, the emphasis of our discussion was on the rate of return and the net present value of an investment. In the above examples, we look at the flip side of time value of money concepts, as we evaluate the worth or cost of the delay in receiving a cash flow. Of course, this single cash flow represents both a return *of* the initial investment and a return *on* the investment. Ultimately the investor asks, "how much of a discount should I receive or require until I receive cash flows at a future date?"

[8] Washington Board of Natural Resources Resolution 1560, December 3, 2019.

These ideas around the worth or cost of delay or deferral in receiving a return of and return on investment are central to the concept of ***intergenerational equity***, which, in lay terms, is the recognition of the fact that when the investment holding period is very long, the current owner-investor may be making investment decisions today, while the return of and on investment may be received by a subsequent generation. Where the investment holding period is very long, or where the asset that generates the returns cannot be sold, intergenerational equity can and should be considered.

According to Wikipedia, intergenerational equity is:

Intergenerational equity in economic, psychological, and sociological contexts, is the concept or idea of fairness or justice between generations. The concept can be applied to fairness in dynamics between children, youth, adults and seniors, in terms of treatment and interactions. It can also be applied to fairness between generations currently living and generations yet to be born. Conversations about intergenerational equity occur across several fields. It is often discussed in public economics, especially with regard to transition economics, social policy, and government budget-making. Many cite the growing U.S. national debt as an example of intergenerational inequity, as future generations will shoulder the consequences.

Intergenerational equity is also explored in environmental concerns, including sustainable development, global warming and climate change. The continued depletion of natural resources that has occurred in the past century will likely be a significant burden for future generations. Intergenerational equity is also discussed with regard to standards of living, with the focus falling on inequities in the living standards experienced by people of different ages and generations. Intergenerational equity issues also arise in the arenas of elderly care and social justice.

In the context of institutional investment management, intergenerational equity is the principle that an endowed institution's spending rate must not exceed its after-inflation rate of compound return, so that investment gains are spent equally on current and future constituents of the endowed assets. This concept was originally set out in 1974 by economist James Tobin, who wrote that, "The trustees of endowed institutions are the guardians of the future against the claims of the present. Their task in managing the endowment is to preserve equity among generations."[9]

Intergenerational equity is specifically identified as a management consideration by the DNR in its management of trust lands. The 2006 Policy for Sustainable Forests notes ten policy objectives, including #2:

*"Balance trust income, environmental protection and other social benefits from four perspectives: the prudent person doctrine, undivided loyalty to and impartiality among the trust beneficiaries, **intergenerational equity**; and not foreclosing future options."*[10] *(Our emphasis – Ed.)*

The management objective of intergenerational equity is mentioned again in the definition of "sustainability" for the sustainable harvest calculation [11] and again, in the definition of the "trust mandate" ("*DNR's legal duty to produce long-term income for the trust beneficiaries. The trust mandate is grounded in four tenants: the prudent person doctrine, undivided loyalty to the trusts, intergenerational equity versus maximizing current income, and avoiding foreclosing future options.")*

[9] Wikipedia at https://en.wikipedia.org/wiki/Intergenerational equity
[10] Washington Dept. of Natural Resources, Policy for Sustainable Forests, December 2006, at page 3
[11] Ibid, at page 29

Returning to the question we posed earlier – "Is the appropriate discount rate for the TLPA Trust Value analysis the same discount rate adopted by the BNR in its Sustainable Harvest Calculation?" Our review of the Draft EIS strongly suggest that the Sustainable Harvest Calculations use of a 2% and later a 3% discount rate arise from how the DNR perceives its obligations for intergenerational equity among trust beneficiaries.

The recognition of intergenerational equity is intended to protect future beneficiaries from the actions of current beneficiaries. At its simplest and most illustrative, if *current* beneficiaries sold an asset producing the net income today, and then spent the cash from the sale, *future* beneficiaries would have been short-changed (to say the least). Conversely, if *current* beneficiaries implemented management decisions that reduced current net income to zero, in favor of net operating incomes decades into the future, *current* beneficiaries would be short-changed. The concept of intergenerational equity implies the balancing of management and financial decisions so as to provide the highest present net income for *current* beneficiaries while preserving sufficient asset value and income-producing capabilities so that *future* beneficiaries can also enjoy the same level of net income as did their predecessors.

EPA Guidelines recommend a variety of economic factors that a project sponsor or evaluator should consider in a BCA (benefit-cost-analysis), among them the selection of a discount rate. Where a public policy and/or public investment is contemplated that will have widespread costs and/or benefits, the discount rate is referred to as a "social discount rate" or "SDR." The economic concepts underlying a social discount rate are that (i) costs and benefits of a public investment, expenditure or policy decision are very long term, with (ii) costs and benefits that are spread widely across society. Consequently, according to the Guidelines, a financial analysis for public policy or public projects should take these factors into account; economic theory suggests that the discount rate should or may be different from discount rates used for private *intra*generational investment.

The topic of social discount rates and their use in public policy and public investment contexts is not without controversy. The concepts that underlie the analysis of a social discount rate include recognition of the social cost of capital, measures of the rate of consumption, the expected recovery of the cost or investment and other factors. Further, there is more than one method for the selection of a social discount rate, and there is some disagreement among economists about which method is more reliable.

Literature on social discount rate typically refers to the alternative perspective as a "private" or "financial" discount rate; that is, a discount rate that is based on competitive investment returns from comparable investments or assets. Traditionally in real estate analysis, including valuation, a "private" discount rate is used. The context around private discount rates is that the investment or expenditure uses private capital and that the investor/beneficiary will be the party to receive the return on and of investment (i.e. it is an *intra*generational investment).

We note that while the EPA Guidelines make a strong case for use of a social discount rate for BCA (benefit-cost-analysis), the Guidelines themselves do not cite a specific amount as the recommended or preferred rate. Other literature does, however. The broad range of recommended social discount rate is from 2% to 7%, with rates from 3% to 3.5% recommended more frequently. We note that the EPA Guidelines incorporate by reference OMB Circular A-4 (September 2003); Circular A-4 recommends the use of 3% and 7% discount rates. From Circular A-4[12]:

"Agencies should provide benefit and cost estimates using both 3 percent and 7 percent annual discount rates expressed as a present value as well as annualized. These are "real" interest rates that should be used to discount benefits and costs measured in constant dollars. Unlike typical market interest rates, real rates exclude the expected rate of future price inflation. The 7 percent rate is an estimate of the average before-tax rate of return to private capital in the U.S. economy, based on historical data. It is a broad measure that reflects the returns to real estate and small business capital as well as corporate capital. It approximates the opportunity cost of capital, and it is the appropriate discount rate whenever the main effect of a regulation is to displace or alter the use of capital in the private sector. The 3 percent discount rate is based on a recognition that the effects of regulation do not always fall exclusively or primarily on the allocation of capital. When regulation primarily and directly affects private consumption, a lower discount rate is appropriate. The alternative most often used is sometimes called the "social rate of time preference." This term simply means the rate at which "society" discounts future consumption flows to their present value. If one assumes the rate that the average saver uses to discount future consumption is a measure of the social rate of time preference, the real rate of return on long-term government debt may provide a fair approximation. Over the last thirty years, this rate has averaged around 3 percent in real annual terms on a pre-tax basis."

In contrast to the range and/or indications of social discount rate, the relevant indicators of private discount rate range for real estate and timberland range from a low of 5% to as high as 10% depending on source. Our source data for private discount rates is discussed in greater length later in this chapter.

As we consider whether or not it is appropriate to use the same discount rate used in the Sustainable Harvest Calculation in the TLPA, having explained the difference between types of discount rates, there are three reasons that cause us to conclude that use of a private discount rate is the appropriate basis for discount rate selection in the TLPA:

1) The TLPA is a Valuation and not a Benefit Cost Analysis

It is clear from our review of the EPA Guidelines, Circular A-4 and other literature about social discount rates that the intended context for use of SDRs is where public policy or projects are being evaluated (i.e. benefit-cost analysis) and where the benefits of such action are distributed across society and possibly generational groups.

We can contrast that intended use of analyses very clearly with the intended use and users of the TLPA; it is, at its core, a valuation of specific real property assets conducted in a manner generally similar to a real property appraisal process. The benefits of ownership, net operating income and (hopefully) value growth over time inure to specifically defined beneficiaries. In this respect, the TLPA deviates very specifically from the traditional context in which an analyst is comparing alternatives and where the benefits of each alternative are broad, societal-level groups.

[12] Office of Management & Budget, Circular A-4, September 2003, "Discount Rates".

2) Use of A Private Discount Rate Does Not Necessarily Preclude or Impair Intergenerational Equity

We have described earlier how discounting of future cash flows can be perceived as somehow disfavoring the benefits of an investment to subsequent generations, particularly to the extent that it could shift benefits from the distant future to the present (or at least to earlier years in the investment horizon). Literature concerning social discount rate doesn't spend much time, however, evaluating the concepts and/or best practices for the application of private discount rates.

There is, however, one common management objective in private investment management practice that is both widely implemented, and which has the significant effect of protecting intergenerational equity. That is the investment objective of maintaining the "corpus" of the investment fund as a high priority. The corpus of an investment fund is also sometimes called the "principal dollar balance" of a fund, account, or the trust assets.

In the context of a trust relationship, the idea of prioritizing the maintenance or growth of the trust corpus is, in fact, a practical means of protecting the intergenerational equity of a private trust or fund. So long as the corpus (fund balance or dollar value of the trust assets) do not decline, in all practical respects, intergenerational equity among trust beneficiaries is preserved. Any subsequent generation will enjoy the benefits that flow from the investment performance of the trust corpus, as well as reflecting whatever then current returns on investment are able to be produced.

Intergenerational equity then would only be threatened if the decisions of the current trustee had the effect of reducing the fund corpus so that it could not produce an approximately comparable net income for the future beneficiaries.

It is also fair to note that not all forms of investment increase in value over time. Some types of investments actually decline in value over time, or have a fixed or unchanging payout, including some forms of real estate investment. We can think of these as depreciating assets or declining assets. As land assets, however, the asset classes of the Trusts generally do not have intrinsically declining values, [13] but do, in fact, maintain their productivity over successive generations.[14]

Thus, the renewable resource nature of much of the Trust land portfolio has a natural and inherent form of protection of intergenerational equity insofar as the value of the fund corpus – driven by the productivity of the real property – does not or need not diminish to the disadvantage of future generations. This financial attribute of the trust land portfolio is directly connected to the restrictions upon sale of the trust lands incorporated in the federal land grant; i.e. if the land cannot be sold, the value of the corpus may be maintained, thus protecting future generations.

[13] We note that Trust mineral rights are or may be subject to depletion, which does represent a permanent loss in value.
[14] We note the roughly 50 year production cycle of forest land; this is different from and is not a form of depletion that gives rise to a permanent loss in value.

3) Prudential Standards Do Not Recognize Intergenerational Equity as a Mandate

Prudential standards are practices and procedures used by financial institutions, investment managers and fiduciaries to manage risk and maintain adequate capital. Prudential standards are generally silent on the topic of intergenerational equity. Clearly, some trusts have a multi-generational character, but so far, the concept of intergenerational equity has not been incorporated into prudential standards. We have confirmed this through our review of the Uniform Prudent Investor Act (1994) and its implementation in Washington State (RCW Chapter 24.55 – Prudent Management of Institutional Funds Act).

Concluding Comments – Selection of the Appropriate Basis and/or Benchmarks for Discount Rates and Capitalization rates (Use of a Social Discount Rate in the TLPA)

Because the TLPA is an *asset specific valuation* completed for a *defined beneficiary group* (i.e. the trust beneficiaries) and in the presence of DNR policy statements that emphasize its duty as a trustee for the beneficiaries, we have concluded that the TLPA should use, as a basis for its valuation analysis and evaluation of returns, discount rate(s) that are reflective of private investment in private assets or their equivalent. Use of private discount rates is not contrary to law but may be considered as inconsistent with DNR policy statements that identify maintenance of intergenerational equity as one of several management objectives for trust lands.

Use of private discount rates in the TLPA does not necessarily diminish or impair intergenerational equity within the trust beneficiary group because the great majority of the value of the trust assets are not subject to depreciation or depletion. The restriction upon sale of much of the trust land assets provides a high degree of assurance that the corpus of the trusts will be maintained through the continuity of capital value among trust lands.

It is also appropriate to note that nothing in this TLPA should be described as critical of, or inconsistent with, the Sustainable Harvest Calculation and its use of discount rate with a numerical value different from the TLPA.

Selection of Discount Rates and Capitalization rates for the TLPA

Having established the appropriate basis for rate of returns (capitalization rates and discount rates) as that coming from and suitable for private investment, we present the data and analysis of rates leading to specific financial rate or return (discount rate and capitalization rate) selections for the several asset classes.

The evaluation and selection of a financial rate of return can be accomplished in a number of ways and from a variety of sources. There are two important concepts that the reader should be aware of as we describe this portion of our investigation and analysis. First, financial rates of return can be evaluated based on *investor* expectation or on the basis of *actual (rate of return) historical performance*. Second, financial rates of return can be evaluated *directly* or *indirectly*.

In a valuation of property, much more frequently, it is the investor expectation indication of rate of return that is given greater weight by the appraiser or analyst because the valuation analysis is completed as of a specific date of valuation. Most analysts agree that it is easier to assess investor expectations as of a date certain than it is to evaluate historical rate of return performance and then make specific adjustments to update or simulate a specific valuation date. Investor expectation data is available through periodic surveys of qualified investors and/or market participants.

Historic performance data is usually available; in the TLPA, varying by asset class, we also present and consider historic rate of return performance as we evaluate our discount rate and capitalization rate selections.

Financial rates of return can be evaluated based on direct evidence – for example, based upon specific property transaction evidence, or based on indirect evidence – where the analysts examine a related source of rate information, and not a direct indication of rate. An example of an indirect source of rate of return information is (i) to analyze the weight average cost of capital of a forest products company and then (ii) apply that weighted average cost of capital to the income stream of timberland. Because the source rate or return data was not explicitly from a timberland transaction or offering, we characterize that source of rate information as indirect.

In this TLPA, we consider financial rate of return information that is based on investor expectation and based on historical performance data, and we use rate of return data that is from both direct and indirect sources.

Finally, we again reference the introductory concepts about capitalization rates and discount rates at the beginning of this chapter.

1. Where the income stream from a property or asset class is level over the investment holding period, and where the property does not appreciate in value, the capitalization rate and the discount rate are equal (page 5).
2. When the income stream and reversionary value do not change, capitalization of net income (as a means of Income Approach valuation) is as reliable as discounted cash flow analysis (page 3).
3. Accordingly, our discussion and source data focusses on discount rates indicated in the marketplace; because the trust land assets cannot be sold, and are not expected to experience material growth in net income over the long term, the discount rates indicated in the marketplace are then a suitable basis for our discount rate and capitalization rate selections.

In the following sections of this chapter, we present rate of return information from a variety of sources. Most of these sources include rate of return information that follows our valuation date of June 30, 2018. We've chosen to present this post-valuation-date information in the belief that the reader benefits from a broader understanding of how financial returns performed before and after the valuation date. Our selections of discount rate, however, are intended to be appropriate and effective as of the valuation date of June 30, 2018.

Timberland Discount & Capitalization Rates

For the timberland asset class, the primary sources of our discount and capitalization rate information are from rate of return expectation and historical performance surveys. We have reviewed three sources of information:

National Council of Real Estate Investment Fiduciaries ("NCREIF") Timberland Index – 2nd Quarter 2019

James W. Sewall Company

Sewall Investor Survey, Winter-Spring, 2019

Sizemore & Sizemore

Pacific Northwest Timberland Investment Survey Results; as of March 2019

Each of these three sources report the estimated return on investment (total return or internal rate of return) on direct timberland investment. The results and/or indications of total return are summarized in the following tables:

National Council of Real Estate Investment Fiduciaries ("NCREIF") Timberland Index – 2nd Quarter 2019

FIGURE 8

TIMBERLAND TOTAL RETURNS

	NPI	Total Timberland	Property Count	South	Northwest	Northeast	Lake States
2nd Qtr 2019	1.51	1.04	446	1.11	1.15	-0.21	0.40
1st Qtr 2019	1.80	0.11	447	0.04	0.25	-0.42	0.73
One Year	6.51	2.95		1.61	6.35	2.52	0.67
Three Years	6.89	3.29		2.08	6.95	1.46	1.92
Five Years	8.83	4.62		3.83	7.36	2.29	2.96
Ten Years	9.25	3.98		2.52	8.25	1.68	4.35

TIMBERLAND EBITDDA RETURNS

	NPI	Total Timberland	South	Northwest	Northeast	Lake States
2nd Qtr 2019	1.12	0.64	0.65	0.72	0.28	0.25
1st Qtr 2019	1.11	0.71	0.70	0.77	0.60	0.57
One Year	4.53	2.96	2.64	3.77	3.40	2.06
Three Years	4.62	2.91	2.62	3.78	2.99	2.07
Five Years	4.79	2.82	2.65	3.36	2.81	2.23
Ten Years	5.42	2.70	2.41	3.63	2.10	1.32

TIMBERLAND APPRECIATION RETURNS

	NPI	Total Timberland	South	Northwest	Northeast	Lake States
2nd Qtr 2019	0.38	0.40	0.47	0.43	-0.49	0.15
1st Qtr 2019	0.69	-0.59	-0.65	-0.52	-1.02	0.17
One Year	1.91	0.00	-1.01	2.51	-0.85	-1.37
Three Years	2.19	0.37	-0.53	3.09	-1.50	-0.15
Five Years	3.90	1.76	1.16	3.90	-0.50	0.72
Ten Years	3.68	1.25	0.11	4.50	-0.41	3.00

The Timberland Total Returns table provides information for total returns (income returns + appreciation returns) for the reporting properties in the NCREIF Timberland Index. These tables provide indications of both quarterly returns and annuals return. "NPI" is an acronym for the NCREIF Property Index, a national indication of real estate investment returns. Significantly, NCREIF total return reports are a combination of actual returns (to the extent that they report actual net incomes from timberland operations) and estimated or anticipated appreciation returns (because the NCREIF reporting member also estimates the value of the timberland property at the end of each quarter). We see in the first table that total returns for the preceding one year period are 6.51%, with three year and five year returns reported at 6.89% and 8.83% respectively. The average of the three indications is 7.41%.

The EBITDA returns (earnings before interest, taxes, depreciation and amortization) represent the return on investment from operating income only, and we see income returns of 4.53%, 4.62% and 4.79%, respectively, for one year, three year and five year returns. The average of the three indications is 4.65%

Appreciation returns for the NCREIF portfolio are 1.91%, 2.19% and 3.90% for the one, three and five year investment periods.

Because NCREIF provides the breakout of returns between income returns and appreciation returns, we can see the proportion of total return that is provided by appreciation. Significantly – because the trust land portfolio cannot be sold – we can see the extent to which appreciation in the value of timberland provides a significant share of total return (29.3% of total return at one year; 31.7% and 44.1% for three year and five year periods, respectively). The average of the three indications of appreciation return for the one, three and five year investment periods is 35.0% - meaning that, on average, appreciation in timberland value provides just over one-third of the total return from timberland investment for the private timberland owner/investor. This is important information for the timberland owner that cannot sell their timberland.

How does this information affect our assessments of the suitable rate of return for use in the TLPA? As we have described above, as we value the trust land assets, it is appropriate to apply the total return rate to the timberland net income stream, because the beneficiaries are entitled to a competitive return on investment, even though the timberland cannot be sold.

The following example illustrates the impact on resulting timberland value using the total return rate and the income-only return rate:

FIGURE 9

Example Net Income from Trust Land	$10,000,000
Capitalization at ***Income Return Only***	4.65%
Indicated Trust Land Value	$ 215,208,034
Example Net Income from Trust Land	$10,000,000
Capitalization at ***Total Return Rate***	7.41%
Indicated Trust Land Value	$ 134,952,767
Value Difference in Dollars	$ (80,255,268)
Value Difference in Percentage	-37.29%

The appropriate rate to use is the total return rate, and not the income return only rate, regardless of the fact the trust land portfolio effectively cannot be sold. We see above that the resulting value of the timberland with restrictions upon sale is lower than it might otherwise be, precisely because the owner cannot accelerate their return through property sale and must wait for income from subsequent years to provide additional return.

The NCREIF Timberland Index provides a strong indication that the discount rates for timberland investment range from 6.00% to 8.00%, and these discount rates can be applied to trust timberland net incomes to estimate Trust Value of the timberland asset class. These NCREIF rates are non-leveraged and nominal, i.e., inclusive of inflation.

James W. Sewall Company
Sewall Investor Survey, Winter-Spring, 2019

The Sewall Company Investor Survey is a traditional rate of return expectation survey, insofar as it is based upon a periodic survey of knowledgeable market participants, and they report their results by respondent count and for timberland investments in different regions of the United States, including the Pacific Northwest. The Sewall survey is a well-established source of timberland investor expectation data. We see in the following table that the mean (average) discount rate for Pacific Northwest timberland, in their Winter/Spring 2019 survey was 5.00%, within a range from 4.00% to a high of 5.50%.

FIGURE 10

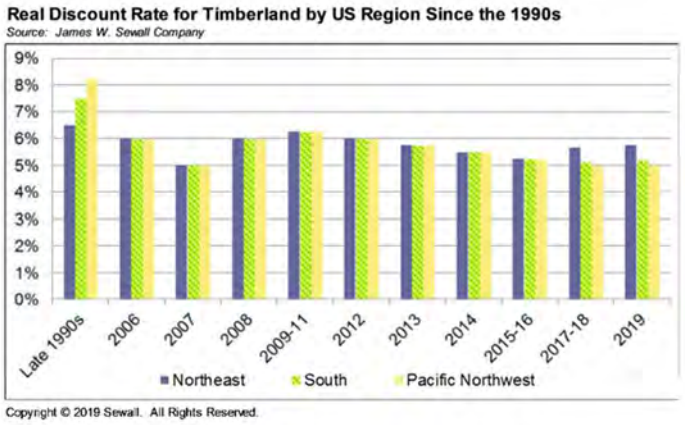
SEWALL INVESTOR SURVEY WINTER - SPRING 2019© - Regional Breakdown

Respondent	PNW	Inland West	South	Northeast	Lake States	Appalachia	USA[1]	USA[2]
1	4.75%	6.00%	4.75%	5.25%	5.00%	6.00%	5.00%	
2	5.25%							
3	5.50%	6.00%	5.50%	6.00%	6.00%	6.00%	5.50%	
4	5.50%	6.25%	5.50%	5.75%	5.75%	6.00%	5.50%	
5	5.50%	6.50%	5.50%	5.50%	6.50%	6.00%	5.50%	
6	5.25%	5.75%	5.50%	6.00%	6.25%	6.25%	5.50%	
7	5.00%		5.00%				5.00%	
8			6.00%				6.50%	
9	5.00%		5.25%	5.50%			5.25%	
10	4.00%		4.50%				4.25%	
11			4.50%				5.25%	
12	4.75%		5.00%				5.00%	
13	4.50%	5.00%	5.50%	6.50%	6.50%	7.00%	6.00%	
14	5.00%	5.50%	5.00%	5.50%	5.25%	6.00%	5.25%	
MEAN	5.00%	5.86%	5.19%	5.75%	5.89%	6.18%	5.35%	5.07%
MEDIAN	5.00%	6.00%	5.25%	5.63%	6.00%	6.00%	5.25%	5.00%
LOW	4.00%	5.00%	4.50%	5.25%	5.00%	6.00%	4.25%	4.00%
HIGH	5.50%	6.50%	6.00%	6.50%	6.50%	7.00%	6.50%	6.50%
# Responses	12	7	13	8	7	7	13	27

[1] Regional respondents only.
[2] All respondents.

In the Sewall data table below, we see their presentation of the real discount rate sought by timberland investors over a long period of time, from the late 1990's into 2019. Most striking about this data table is the narrow range of variance across the years, including periods of time such as the Great Recession, when timber prices were adversely affected by a severe decline in housing construction and demand for timber.

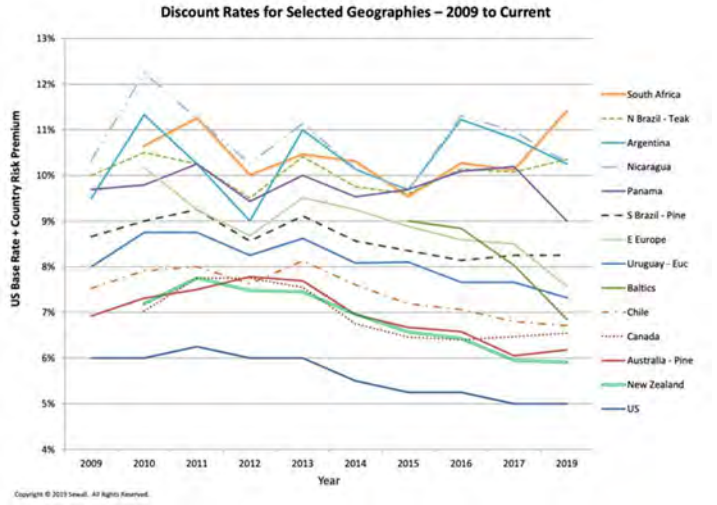
FIGURE 11



The reader should note that Sewall presents a "real" rate of return, which does not include an assumption of inflation. A rate of return that includes inflation is commonly called a nominal rate of return.

In the following chart, Sewall presents real discount rates for selected geographies, from 2009 to its Winter/Spring 2019 report. In this chart we see how the average discount rates for the United States have changed over time (not much) and how they compare to other nations or regions elsewhere in the world. In this year by year presentation, we see average U.S. discount range ranging from 5.00% to 6.00%.

FIGURE 12



Sizemore & Sizemore
Pacific Northwest Timberland Investment Survey Results; as of March 2019

Sizemore and Sizemore is a timberland consulting firm that publishes a discount rate expectation survey; their March 2019 results are shown below. This survey is for Pacific Northwest timberland only, and we see their reported average rate of 5.60% in a range of from 5.29% to a high of 6.21%, similar to our other indicators. Sizemore treats their recognition of timberland management fees slightly differently than our other reporters, and the table reveals this distinction has a slight impact on results. Notably, Sizemore and Sizemore also survey the inflation expectation of market participants, and we see (a) how it influences the survey results and (b) the expectation of the range of inflation expectation. The average inflation expectation of survey participants is 2.37%.

FIGURE 13

	Real				Real w/oFees				Real w/Fees			
SUMMARY	Average	High	Low	#	Average	High	Low	#	Average	High	Low	#
Average	5.60%	6.21%	5.29%	61	5.62%	6.20%	5.32%	58	5.33%	6.33%	4.83%	3
Median	5.50%	6.00%	5.25%	61	5.50%	6.00%	5.25%	58	5.00%	6.00%	4.50%	3
Mode	5.00%	6.00%	6.00%	61	5.00%	5.50%	6.00%	58	5.00%	6.00%	4.50%	3
Max	8.00%	10.00%	7.00%	61	8.00%	10.00%	7.00%	58	6.00%	7.00%	5.50%	3
Min	4.75%	5.00%	4.50%	61	4.75%	5.00%	4.50%	58	5.00%	6.00%	4.50%	3
StdDev	0.67%	0.92%	0.63%	61	0.67%	0.94%	0.63%	58	0.58%	0.58%	0.58%	3

	Inflation	Nominal				Nominal w/oFees			
SUMMARY	Average	Average	High	Low	#	Average	High	Low	#
Average	2.37%	7.67%	8.33%	7.00%	3	7.67%	8.33%	7.00%	3
Median	2.25%	7.50%	8.00%	7.00%	3	7.50%	8.00%	7.00%	3
Mode	2.25%	7.50%	8.00%	7.00%	3	7.50%	8.00%	7.00%	3
Max	3.00%	8.00%	9.00%	7.00%	3	8.00%	9.00%	7.00%	3
Min	2.00%	7.50%	8.00%	7.00%	3	7.50%	8.00%	7.00%	3
StdDev	0.33%	0.29%	0.58%	0.00%	3	0.29%	0.58%	0.00%	3

The reader should appreciate that, while it is helpful to understand the inflation expectations of the survey participants, it is a respondent expectation, that may be influenced by other factors. For example, the respondent's expectation of inflation may be influenced by other indications, such as the Consumer Price Index. This is equally true in other discount rate expectation surveys, such as those for other property types (retail buildings, apartments, etc.).

The three surveys we have described above make a strong case for a discount rate selection (i.e. total return or discount rate) of from 5.00% to 7.00%. We note, however, that the NCREIF survey includes an inflation expectation, while Sewall and Sizemore & Sizemore present discount rates in in real terms. All three are considered credible sources, and we remind the reader that the NCREIF Timberland index is a blend of actual performance and expectation, while the Sewall and Sizemore & Sizemore are yield expectation surveys.

Other Indications of Total Return or Discount Rate

In addition to the surveys summarized above, we have also gathered information on three indirect indictors of rate of return suitable for timberland analysis: 1) the rate of return indicated by publicly-traded forest products companies that own and harvest timberland (among other business activities); 2) the rates of return indicated by real estate investment trusts that own and operate timberland (only) and 3) a unique indication of rate of return from a recent higher education bond offering supported by the net income from our trust land portfolio.

Our first indication is from a study of the weighted average cost of capital of six publicly traded companies that are either integrated forest products companies or timberland-owning real estate investment trusts ("REIT"). As a business sector, the number of public timber products and timberland company is small, so integrated companies are combined with real estate investment trusts. Integrated companies not only own and operate timberland, but also own timber mills and other forest product business lines, so they are somewhat different from companies that only own and harvest timber.

The measurement used to evaluate total return is that of the weighted average cost of capital ("WACC"). The WACC is a widely used financial indicator for the analysis of operating companies and it provides a measure of the total return produced by the company based on a comparison of its income and its asset value. Accordingly, WACC is a "performance" measure and not an "expectation" measure. It is also an indirect measure, for purposes of our analysis, because these indications of return come from the operation of a business enterprise and not of a specific timberland inventory or transaction. Finally, we note that

a WACC calculation also takes into account additional adjustments to reflect the comparative variability of stock price (beta) and it makes an adjustment for corporate tax costs. The return indication is then an after-(corporate) tax rate of return indication.[15]

Our WACC comparison of seven[16] public companies – Weyerhaeuser Company, Rayonier, Inc., PotlatchDeltic Corporation, Catchmark Timber Trust, Inc., Louisiana-Pacific Corporation and Pope Resources, L.P., indicate a weighted average cost of capital ranging from a low of 6.80% to a high of 8.20%, as of November 2019.

Our second source of an indirect indication of rate of return comes from Forisk Consulting, a timber industry consultant. They monitor and publish the Forisk Timber REIT (FTR) Index. Their survey of performance is published monthly. Significantly for this study, the FTR Index reflects the operation of timberland real estate investment trusts, which, generally speaking, are public companies that own timberland and sell timber, but who do not operate other business units (such as timber mills) or sell other forms of forest products. Further, REITs are income tax flow-through entities, so their indicated returns are "pre-tax" to the investor. Accordingly, the timber REITs represent a form of business enterprise that is more similar to our timberland asset class, insofar as they own timberland and sell timber and because their indicated returns are pre-tax. Unlike the trust land portfolio, however, timber REITs can sell their timberland holdings and routinely do so. It is important to note that the returns reported by Forisk are based upon the financial performance of the REIT shares, and not the underlying company. The return calculation is based upon the distributions (dividends) to shareholders and the value of the REIT share at or over specific periods of time.

According to the Forisk Timber REIT index as of April 9, 2020, the average total return for a three year term is 6.24%, the five year return is 4.38% and the ten year return is 9.91%. The average of the three indications is 6.84%.

Finally, we note as a single indicator of investor return expectation the interest rate reported for the June 2019 sale of revenue bonds by Washington State University ("WSU"). In this bond sale, WSU sold $65,010,000 of refunding bonds, which proceeds are used to retire existing bonds that were used for capital improvement purposes. The source of repayment of these refunding bonds are "(a) building fees, (b) Trust Land Revenues and (c) additional fees and revenues that may in the future be pledged by the University for payment of debt service…" "Trust Land Revenues" are defined as "(a) all moneys received from the lease or rental on account of the trust land set apart by the 1889 Enabling Act of the federal government for a scientific school, all interest or income arising from the proceeds of the sale of such lands or of the timber, fallen timber, stone, gravel or other valuation material thereon…" (i.e. the lands in the trust land portfolio). The interest rates payable on these bonds vary by maturity, as follows: Maturity – 2020 – 5.183%; 2021 – 5.283%; 2029 – 6.314% and 2034 - 6.414%. The weighted average interest rate (arithmetic) is 6.245%.

What is particularly interesting about this bond sale as a single indicator of investor expectation is that its primary, if not sole, source of repayment is precisely the trust land portfolio we are evaluating. While the source of repayment

[15] The previous indicators of rate expectation (NCREIF, Sewall and Sizemore and Sizemore) are pre-tax indications of rate of return, although the tax impacts are modest because a high percentage of these timberland investments are held in tax-exempt or tax flow-through entities.
[16] Before Rayonier, Inc. announced its plans in January 2020 to acquire Pope Resources.

is from all trust lands, since timberland income represents approximately 79% of all trust income over the past five years, it is, we believe a reliable indication of return expectation for the timberlands within the trust land portfolio.

We should also note that some financial analysts would argue that this indication is a strong lower limit of investor expectation, because the bonds, in and of themselves, are much more liquid than the underlying lands that are the source of repayment. While we don't reject this argument, we note that it is beyond the scope of this study to resolve liquidity adjustments between bonds, whose source of repayment is the trust land portfolio, and the portfolio itself, whose sale or liquidation in default is significantly restricted.

Recap of Timberland Discount Rate Indications

Our research has identified the following indications of discount rate or total return for timberland:

Source:	Range	Point
NCREIF Timberland Index(1)	6.00% to 8.00%	6.50%
Sewall Survey(2)	4.00% to 5.50%	5.00%
Sizemore & Sizemore (2)	5.29% to 6.41%	5.60%
Forest Products WACC(1)	6.80% to 8.20%	NA
Forisk REIT Index(1)	4.38% to 9.91%	4.40%
WSU Bond Sale(1)	5.18% to 6.41%	6.20%

(1) = Reporting nominal rates of return
(2) = Reporting real rates of return

In reaching our conclusion of discount rate or total return rate to be applied to timberland, we place greatest weight on the indications of the NCREIF Timberland Index and of the recent WSU Bond Sale, as they reflect most closely the pattern of income and gain most similar to that of the trust beneficiaries and of the timberland portfolio itself. The range of these indications is also strongly supported by our other indicators, including the Forisk REIT Index. Again, noting that the timberland portfolio should be valued based upon total returns indicated by competitive investments or investment opportunities, and recognizing the inability to sell the land portfolio, we conclude to a discount rate selection of 6.00% as of our analysis date.

We have cited sources of discount rate information that include presentation of both "real" (i.e. without an inflation component) and "nominal" (i.e. with an inflation component). It is apparent in the reconciling table above that there is substantial overlap between real and nominal sources of discount rate information. While an in-depth analyses of the impact of inflation on our rate selection is beyond the scope of this analysis, we offer the following comments.

Insofar as the incorporation of inflation in our analysis is concerned, as explained in the preceding Valuation Methodology chapter, our fundamental approach to value is use of the Income Approach to value, and we capitalize net operating income, after operating costs and management fees, to an indication of Trust Value. To the extent that inflation is present in, or acting upon, net operating income, our Trust Value estimate should take that net income change into account.

Our review, however, of change in net operating income of timberland reveals that both the long-term trend and the medium-term trend (i.e. the 12 year period of analysis described in our Timberland chapter, strongly suggests that there is little or no net change in net income. Accordingly, as will be discussed in the timberland chapter, there is no inflationary change or growth assumed in net operating income, and no adjustment is made for inflation in the discount rate. We should also note, for the reader's benefit, that the proper treatment or recognition of inflation would have the analyst recognizing the effects of inflation either (a) in the forecast of net operating income or (b) in the discount or capitalization rate applied to net operating

income, but not both (which could lead to double-counting the effects of inflation).

Our review of timberland net operating income for the period 2007-2018 (twelve years) reveals no stable pattern of change that might be translated into an adjustment for net income change in our discount rate selection. For example, with dollar amounts ranging from a low of $91.31 million ((2009) to a high of $134.1 million (2011), the average net operating income for the twelve year period is $114.2 million. In six of twelve years, net income from timberland was below this amount, and for six of twelve years, the annual net income was above this amount. The pattern of change was quite irregular. Accordingly, we find no pattern of net income change that causes us to adjust our discount rate for net income change. In short, we find no evidence of inflation in timberland net operating income.

Accordingly, we make no inflationary adjustment to our discount rate. Therefore, to the extent a distinction is important, we characterize our discount rate as a "nominal" discount rate – because we have considered inflationary change and find no support for such an adjustment.[17]

From A Discount Rate to a Capitalization Rate

Early in this chapter we discussed the relationship between capitalization rates and discount rates; capitalization reflects an income and asset value relationship at a point in time, while a discount rate addresses (or reports) total return over time:

"What financial analysts know is that if the net income stream is not expected to change over the holding period, and the asset value is also not expected to change over the holding period, direct capitalization is a financially accurate method of estimating the value of the asset. If net incomes or property value are expected to change or vary, however, discounted cash flow analysis (that can incorporate this change) is the more reliable method of valuation." Although there is greater uncertainty in forecasting multiple years in a discounted cash flow than a single year forecast in a direct capitalization calculation.

As described in our preceding Valuation Methodology chapter, our income approach analyses is based upon a stabilized level of net operating income for each asset class. As a stabilized net income forecast, our inherent assumption is that this income forecast will show little change following the valuation date. Further, because the sale of trust land assets is heavily restricted, there is no opportunity for a land sale (reversion) to influence return on investment. The "investment", i.e. the trust land asset class, produces net income in perpetuity. Accordingly, the selected discount rate is *also* the capitalization rate for the asset class, because income is not expected to change materially, and the value of the asset class is similarly not expected to change materially. Our timberland capitalization rate is then also 6.00%, effective as of June 30, 2018.

Agricultural Lands Discount & Capitalization Rates

Evaluating discount rates for agricultural lands is somewhat more difficult and uncertain because the source data of surveys and studies specific to identifying or forecast a land-based rate of return is smaller than for timberland, for example. Our asset classes include grazing lands and agricultural (crop) lands, with four sub-categories of cropland. Conceptually, the types of tools are the same as for timberland – actual performance evaluations, expectation surveys and from indirect sources; in reality

[17] This is different from characterizing our discount rate as a "real" discount rate (exclusive of inflation) and incorporating inflationary net income change into our cash flow forecast.

however, the structure of farmland investment analysis is much more focused on the planting, harvest and processing of crops, and correspondingly less focused on the investment characteristics of the underlying agricultural land. Fortunately, two very relevant sources of information are available to us – again, the National Council of Real Estate Investment Fiduciaries ("NCREIF"), who gather performance and valuation data on farmland just as they do on timberland (and other real estate investment classes) and from the TIAA Center for Farmland Research at the University of Illinois. We present their data below.

NCREIF Farmland Index

Following is a data table and accompanying chart for the NCREIF Farmland Index. NCREIF presents data for the nation (i.e. farmland properties within the index from across the U.S.) and for regional subsets, including the Pacific Northwest, and they present total return information as well as returns from operating income and from property value appreciation.

From the data table, we see that total returns range broadly, from a low of 2.42% to a high of 11.25% depending upon category of return and the investment duration. We note that longer-duration returns are most likely heavily influenced by the recovery in agricultural land values emerging from the Great Recession, and it appears from some of the data that annual cropland (row crops, etc.) had strong rates of property appreciation in this period. As with our timberland evaluation, we tend to put greatest weight on the indications of one, three and five year returns. We also rely more on the regional Pacific Northwest indicators than on the nation indicators.

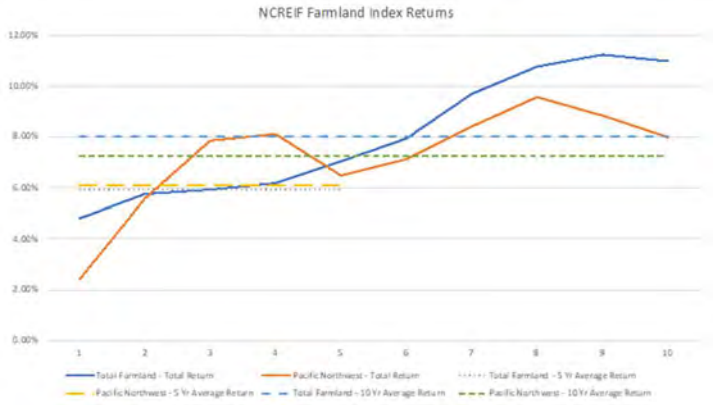
FIGURE 14

Investment Duration - Years	1	2	3	4	5	6	7	8	9	10
Total Farmland - Total Return	4.81%	5.77%	5.91%	6.20%	7.02%	7.94%	9.70%	10.77%	11.25%	11.00%
Pacific Northwest - Total Return	2.42%	5.59%	7.85%	8.09%	6.47%	7.12%	8.42%	9.56%	8.83%	8.00%
Total Farmland - 5 Yr Average Return	5.94%	5.94%	5.94%	5.94%	5.94%	NA	NA	NA	NA	NA
Pacific Northwest - 5 Yr Average Return	6.08%	6.08%	6.08%	6.08%	6.08%	NA	NA	NA	NA	NA
Total Farmland - 10 Yr Average Return	8.04%	8.04%	8.04%	8.04%	8.04%	8.04%	8.04%	8.04%	8.04%	8.04%
Pacific Northwest - 10 Yr Average Return	7.24%	7.24%	7.24%	7.24%	7.24%	7.24%	7.24%	7.24%	7.24%	7.24%

The ten year average total return for Pacific Northwest farmland is 7.24% (2010-2019). The five year average is 6.08%. The average of indications at one, three and five year investment durations for the Pacific Northwest is 5.58%. For the national index, ten year average total returns are reported at 8.04%; 5 year total returns averaged 5.94% and the average of the one, three and five year investment durations was 5.91%. We also note that for the national portfolio, the one, three and five year duration appreciation returns averaged 1.28% and the income returns averaged 4.76%. Annual farmland (1/3/5) averaged 4.80% and permanent cropland (1/3/5) averaged 7.50%.

Below are NCREIF Farmland Index returns presented in a chart form:

FIGURE 15

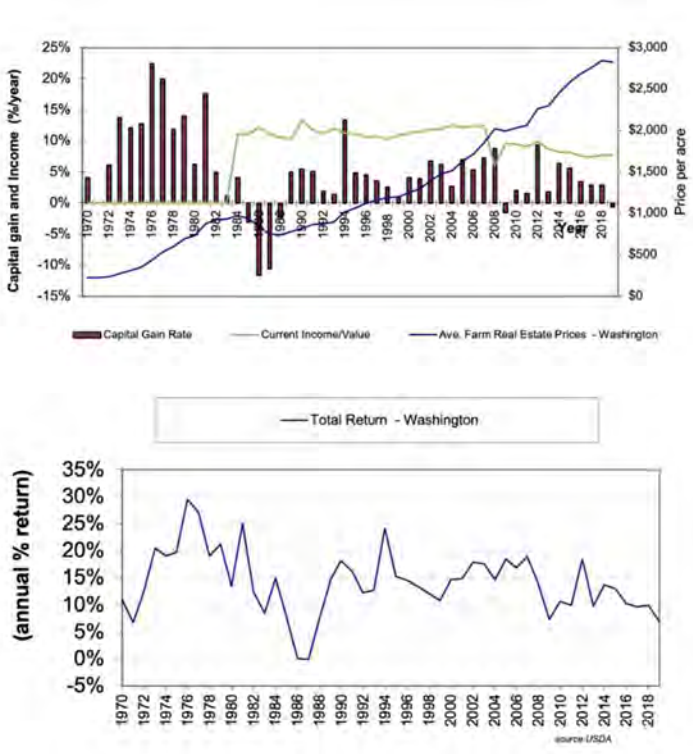


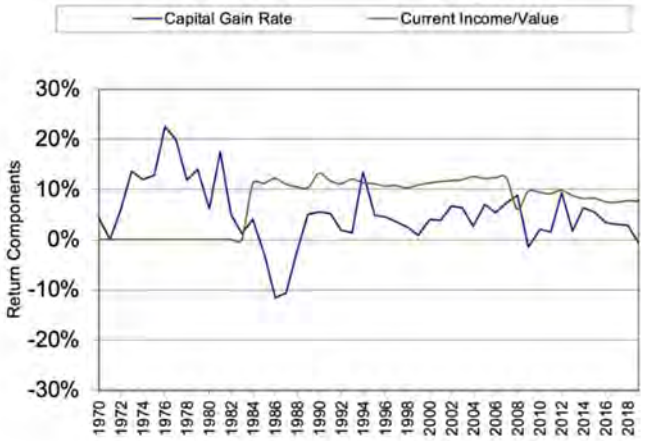
As we evaluate the return indications of the NCREIF index, we place greatest weight and reliance on the indications from investment durations of five years and less, and upon the total returns for the Pacific Northwest regional subset; these are then returns in the 5.00% to 7.00% range.

TIAA Center for Farmland Research at the University of Illinois

The TIAA Center for Farmland Research provides a variety of data, both for farmland investment as well as investment information for different crop types. Among other offerings, they provide an Excel software-based tool that reports total returns, capital gain returns and income returns on a state by state basis. The following charts come from that tool – the Farmland Values and Returns by State Center tool. The following three charts are for Washington State:

FIGURE 16





The following is a data table taken from the charts above for the period 2014-2019:

FIGURE 17

Calendar Year	2019	2018	2017	2016	2015	2014
Washington State - Total Return	6.94%	9.94%	9.69%	10.22%	13.03%	13.76%
Washington State - Appreciation Return	-0.71%	2.86%	2.94%	3.42%	5.56%	6.32%
Washington State - Income Return	7.64%	7.72%	7.44%	7.53%	8.22%	8.17%

We note that the TIAA Center reports their data source as the U.S. Dept. of Agriculture, and we believe that this dataset, in comparison with NCREIF, is somewhat less reliable. Most importantly, however, it reinforces the comparatively high rates of return suggested by the NCREIF data, and suggests more stability, and at higher rates of return, for income-based returns. Like all surveys and analyses, the quality of the data determines the reliability of the results.

The 1/3/5 returns for Washington State, as reported by the TIAA Center are then an average of 9.89% for total return, 2.60% appreciation return and 7.77% income return. The six year average total return for Washington State is 10.60%. Based on this source (only) the range of total return for the trust land portfolio would be from 7.00% to as much as 10.00%. Although 2014 and 2015 reported returns in excess of 10%, we do not regard those high rates as sustainable, and appropriate for our long-term forecast.

Based upon the two data sources we have evaluated, the range of total return for agricultural land is generally from a low of 6.00% to a high of 9.00%. We place greater reliance upon the NCREIF data source in the belief that (a) the data that comprises the analysis is more timely and reliable, and (b) because of the similarity between the farmland managers that report data to NCREIF and our beneficiaries (i.e. they hold the farmland for investment purposes). That said, the data suggests that a rate of 6.00% is a strong lower limit and is likely too low to be applied to our agricultural trust land asset class. We select a 7.00% total return rate for grazing lands and all four categories of cropland (dryland crops, orchard land, irrigated annual crops and irrigated permanent crops).

We characterize this discount rate conclusion as a nominal discount rate – i.e. inclusive of inflation, however noting that more stable than timberland net operating incomes, the change in income is negative in five of twelve years, and an increase in net income is present in seven of twelve years. Accordingly, we assume that there is not a solid basis for an assumption of growth and that the inflation assumption is zero.

For the same reasons described in our timberland discount and capitalization rate selection, our capitalization rate selection is also then 7.00%, effective as of June 30, 2018.

Commercial Real Estate Discount & Capitalization Rates

We have relied upon several sources of discount rate and capitalization rate information in order to select an appropriate discount rate and capitalization rate for the commercial property asset class. In the following section we discuss the source data and its indications of discount rate and capitalization rate. For this specific asset class, because of the clear segregation of rate information, our analysis will differentiate between urban and rural properties, and between income from building space rentals (premises leases) and ground leases.

Pricewaterhouse Coopers Investor Survey

Our primary source of discount rate information comes from the Pricewaterhouse Cooper's ("PwC") Investor Survey, one of the most commonly cited sources of real estate investor yield expectation data. Including its predecessor, the survey has been used by real estate analysts and appraisers for over thirty years. The PwC survey provides yield and capitalization rate information by property type, region and center cities. It also segregates urban and suburban locations. Because the survey asks respondents about discount rates and capitalization rates,

we also can form opinions about the impact of property price appreciation on total return. Although less explicit in the PwC survey, total return is the discount rate; the capitalization rate is a general indication of return from operating income, and the difference is a general indication of the return from property appreciation.

The following is a summary of the discount rate and capitalization rate averages taken from the October 1, 2019 PWC Real Estate Investor Survey:

FIGURE 18

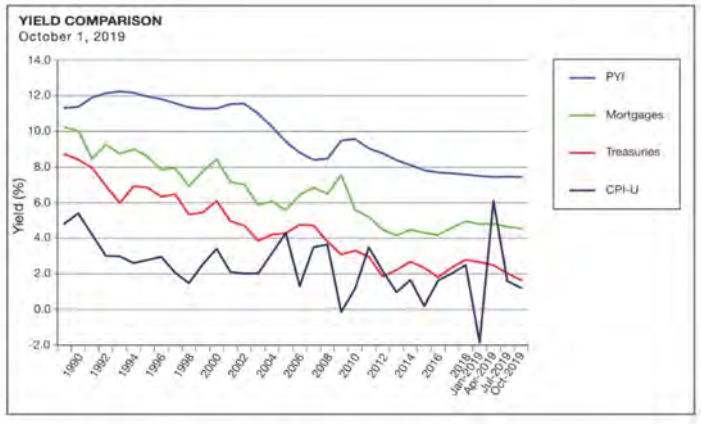
	2014	2015	2016	2017	2018	1Q 2019	2Q 2019	3Q 2019	4Q 2019
PwC Yield Indicator	8.11%	7.82%	7.70%	7.65%	7.58%	7.50%	7.45%	7.46%	7.45%
PwC Dividend Indicator	6.66%	6.38%	6.26%	6.21%	6.05%	6.03%	6.01%	6.02%	6.00%
Spread in Basis Points	145	144	144	144	153	147	144	144	145

The reader should note that the PwC Yield Indicator is the indication of discount rate or total return, and the PwC Dividend Indicator is the indication of capitalization rate.

The PwC survey indications are the average for all U.S. locations and for all five property types (office, industrial, retail, and apartments). We see in the table above a very consistent pattern of investor expectation for yield (discount rate or total return). Also very stable are the indications of capitalization rate, and thereby, a very stable spread between discount rate and capitalization rate at about 145 basis points (1.45 percentage points). The discount rate/capitalization rate spread is relevant as we later consider market-derived capitalization rates and then consider what those capitalization rates say about total return expectation.

The five year average discount rate is 7.77%, and the average of 1/3/5 year returns is 7.80%. Shown below is a graph showing the PwC yield indication over a twenty-nine year period (1990 to 2019).

FIGURE 19



In the chart we see how real estate investment yields have declined over time and we also see the short-term decline and subsequent increase associated with the Great Recession between 2006 and 2012. Also presented are the average returns for commercial mortgages, 10 year treasuries and the consumer price index. Contributing to the stability of investor yield or discount rate expectation is the historically low interest rate environment of the post-Great Recession era. So long as interest rates remain at historic lows, it is likely that closely correlated rates of return – like investment real estate – will also stay at or near historic lows.

The reader should appreciate that imbedded in the averages of the PwC yield rate indications are financially-material differences by property type and by city or region. For example, the average discount rate for central business district office buildings is 6.88%, almost 100 basis points below the five year PwC Yield Indication ("PYI"). The average yield rate for Pacific Northwest Office is 7.22%, about 50 basis points below the national average for all properties. By contrast, the average yield rate for Pacific Region warehouses is 5.85% (very much in demand by investors) and for the national strip shopping center market, a rate of 7.77% (much lower investor demand).[17]

In summary, the PwC Investor Survey sets an expectation of discount rates in the 7.00% range for the commercial real estate asset class – in aggregate – combining the three sub-categories within the asset class; urban buildings, suburban or rural buildings and ground leases. Because the PwC survey reports suburban and central business district office yields, we can infer a 50 basis point to 120 basis point difference for locational differences (central business district versus suburban).

NCREIF Property Index ("NPI")

Because of the wide utilization by analysts and appraisers of yield expectation surveys by PwC and others, for typical income property valuation purposes, somewhat less weight is placed on the actual yield performance indications of the NCREIF index. We report summary aggregate data here.

For the 1st Quarter 2020, the trailing twelve month return for the NPI was 5.28%. This represents all property categories across the entire nation, reflecting a property portfolio with a total market value of $683.5 billion. For contrast, for the same period, retail returns were -1.91%

[17] Demand for property by investors typically results in a lowering of discount rate. Properties with high investor demand commonly demonstrate a lower discount rate, because prospects for income and value growth are better, while inferior properties have higher discount rates, because expectations for net income and value growth are lower.

and industrial returns were 12.88%. For the Western Region of the U.S., the total returns were 7.12%, with retail returns at -0.56%, and industrial returns at 14.00%. The Western Region includes Washington State and ten other western states.

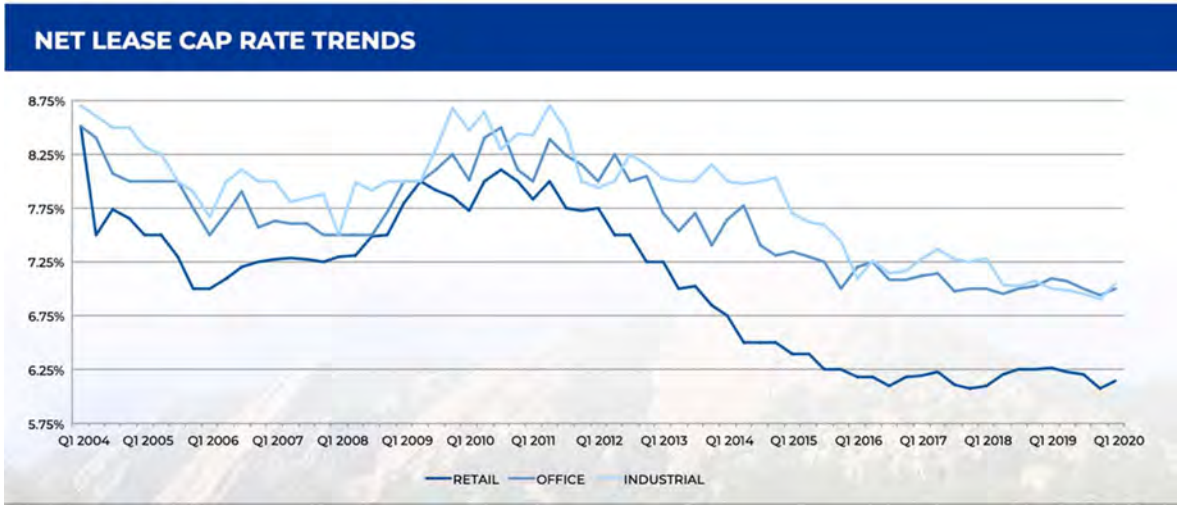
Three quarters earlier, the NPI reported an annualized return of 6.52%, indicating lagging returns in the subsequent quarters on a national basis. These declining returns are consistent with the late stage of an economic expansion. Returns have been lagging as property capitalization rates have gotten quite low, and property turnover has slowed. These are typical outcomes in the late stages of an economic expansion.

Most notable across the portfolio are the now very poor returns from retail investments – likely due to continued re-alignment of retail shopping by consumers (from on-site traditional store visits to increased on-line shopping), and, on the other side of the equation, the superior returns provided by industrial properties, now the beneficiary of retail's turmoil, as warehouse demand by e-commerce users has continued to grow. The Western Region indication of total return of 7.12%, rounded to 7.00% is relevant for our commercial real estate asset class.

Boulder Group Net Lease Market Report

Because of the presence of ground leases in the commercial real estate asset class, we have included the results of the Boulder Group's Net Lease Market Report. This publication is a survey of the recently indicated capitalization rates of net lease properties such as freestanding retail and drug stores, single tenant office buildings and single tenant industrial buildings. Because ground leases are so infrequently traded, and do not represent a particularly sought-after asset class, the net lease property category is our best analog for ground lease returns. In the chart shown below, we see indications of net lease cap rates over a fifteen year period:

FIGURE 20



In the chart above, we see a range of capitalization rates ranging from as low as 6.00% to as high as 8.00% over the past five years. If we apply the 145 basis point average spread between capitalization rates and discount rates suggested by the PwC Investor Survey, this suggests discount rates for the ground leases of not less than 7.45% to 9.45%.

Deloitte's Capitalization Rate Research

In order to gather additional information specific to the sub-categories within the commercial real estate asset class, Deloitte examined additional comparable property sale date from Washington State in order to identify market-derived capitalization rates. Once identified, the capitalization rates can be adjusted, as above, by the average spread (discount rate to capitalization rate) to indicate discount rates.

Commercial Properties - Urban

We compiled sales comparables with capitalization rate data from the CoStar database. We looked at more than 60 comparable sales that have sold two years before the date of value within the Seattle/Tacoma metro areas. These comparables represent office, retail, and industrial properties that have similar sizes and ages as the Subject's improved properties. Specifically, the majority of comparables are built from 1980 to 2000 and contain from 20,000 and 100,000 total square feet of building area. The recorded capitalization rates from these transactions are summarized in the table on the following page:

FIGURE 21

Comparable Sales Summary (Seattle/Tacoma)				
Year	**Use Type**	**Min**	**Max**	**Average**
2016-2018	Office	4.80%	10.00%	6.81%
2016-2018	Retail	4.50%	10.30%	6.37%
2016-2018	Industrial	3.97%	6.50%	5.53%
			Overall Average	6.24%

Capitalization rates from office transactions ranged from 4.80% to 10.00% with an average of 6.81%. Capitalization rates from retail transactions ranged from 4.50% to 10.30% with an average of 6.37%. Capitalization rates from industrial transactions ranged from 3.97% to 6.50% with an average of 5.53%. The overall average from the sales transactions is a capitalization rate of 6.24%. As such, we have concluded to a capitalization rate of 6.25% to be applied to the income stream received from improved properties. To this indication, we add the aforementioned spread of 145 basis points, to indicate a discount rate of 7.70%.

Ground Leases

For ground leases, we compiled and analyzed survey data provided in the RealtyRates.com Investor Survey. The survey data compiled includes national capitalization rate data for different uses of leased land. We note that DNR's lands are leased for an array of uses including single family residential uses, resorts, retail centers, restaurants, offices, as well as recreational resorts, lodging and camping. They are also located in both urban and rural settings. As such, we have incorporated the markets of survey data most relevant from the RealtyRates.com investor survey. The survey data ranges are summarized in the following table:

FIGURE 22

Ground Lease OAR Survey Data (RealtyRates.com)	2Q 2018		
Market	**Min**	**Max**	**Average**
Apartments	3.01%	10.79%	7.02%
Industrial	3.15%	10.76%	7.34%
Lodging	3.15%	16.49%	7.93%
Mobile Home/RV Park	3.15%	13.71%	8.29%
Office	3.15%	10.50%	7.13%
Restaurant	3.15%	15.95%	8.74%
Retail	3.06%	11.87%	7.46%
Self-Storage	3.15%	10.87%	8.44%
Special Purpose	3.55%	16.91%	9.14%
		Overall Average	7.94%

The averages reported above range from 7.02% to 9.14% with an overall average of 7.94%. Again, adding the rate spread of 145 basis points, this survey suggests discount rates of 9.39%.

We also note that we attempted to locate comparable transactions of leased land with uses similar to DNR's land uses; there were, however, insufficient numbers of comparables to warrant inclusion.

Urban/Rural Differences

Next, we performed a search for transactions of single-tenant improved properties throughout the state of Washington with capitalization rate data to address urban versus rural location. Transactions were segregated into different groupings depending on if the property is located in the larger metro areas of Seattle/Tacoma or in more rural locations throughout the state. Nearly 60 transactions occurring within two years prior to the date of value were collected with single tenant uses. The tenants include Rite Aid, Shopko, Big 5, Monroe Business & Professional Center, etc. The summary of the capitalization rates for these transactions are shown in the following table.

FIGURE 23

Comparable Sales Summary (Single Tenant Improved Sales)				
Year	**Location**	**Min**	**Max**	**Average**
2016-2018	Rural	6.56%	12.17%	8.05%
2016-2018	Urban	4.34%	8.78%	6.27%
			Rural to Urban Spread	-1.78%

Approximately 20 of these sales were found in rural locations and the remainder were pulled from the larger Seattle/Tacoma metro areas. The summary of the capitalization rate reported for these transactions are shown above. The average capitalization rate reported for transactions found in more rural locations is 8.05%.

The transactions found in the Seattle/Tacoma larger metro area report capitalization rates ranging from 4.34% to 8.78% with an overall average of 6.27%. This average falls 178 basis points below the average found in more rural areas.

We therefore expect the discount rates and capitalization rates used for commercial sites leased in more urban areas to be materially lower than sites leased in more rural areas. The difference likely includes the additional risks associated with market size, locating tenants in more rural locations and releasing risk.

Washington State Investment Board Commercial Real Estate Returns

Finally, we note our review of the investment returns of the Washington State Investment Board ("WSIB") taken from its Quarterly Report for the quarter ending December 31, 2019. In its investment policy for real estate, a target total return of 8.00% is set forth. In their quarterly report, for an allocated $20.95 billion in real estate investment, the WSIB reports one year returns of 12.10%, three year returns of 11.02% and five year returns of 11.31%. The average of returns for the 1/3/5 investment durations is then 11.47%. Ten-year average returns are reported at 11.42% and twenty-year average returns are reported at 10.74%.

It is apparent from our review that the WSIB's real estate investment pool has been quite successful. The prior years' quarterly report ending 12/31/18 reported 8.14%, 9.77% and 11.98% for the 1/3/5 year investment durations, for an average of 9.96%; one year later the average of the durations had risen 151 basis points.

Commercial Real Estate Summary

The following are the key indicators we have reviewed in this section:

Source:	Range	Point
PwC Investor Survey(1)	7.40% to 8.00%	7.70%
NCREIF Property Index(1)	5.28% to 12.00%	7.00%
Boulder Group Survey(1)	7.45% to 9.45%	NA
Deloitte Trans. Survey(1)		
Urban	5.50% to 11.50%	7.70%
Rural	7.25% to 13.00%	9.10%
Ground Lease	8.40% to 10.50%	9.50%
Washington State I.B. (1)	8.00% to 12.00%	11.47%

(1) = Reporting nominal rates of return

Insofar as the incorporation of inflation in our analysis is concerned, as explained in the preceding Valuation Methodology chapter, our fundamental approach to value is use of the Income Approach to value, and we capitalize net operating income, after operating costs and management fees, to an indication of Trust Value. To the extent that inflation is present in, or acting upon, net operating income, our Trust Value estimate should take that net income change into account.

Our review, however, of change in net operating income of commercial real estate reveals that both the long-term trend and the medium term trend (i.e. the 12 year period of analysis described in our Commercial Real Estate chapter, strongly suggests that there is little or no net change in net income. Accordingly, as will be discussed in the Commercial Real Estate chapter, there is no inflationary change or growth assumed in net operating income, and no adjustment is made for inflation in the discount rate.

Our review of commercial real estate net operating income for the period 2007-2018 (twelve years) reveals no stable pattern of change that might be translated into an adjustment for net income change in our discount rate selection. For example, with dollar amounts ranging from a low of $5.943 million ((2015) to a high of $7.526 million (2018), the average net operating income for the twelve year period is $6.8 million. In six of twelve years, net income from timberland was below this amount, and for six of twelve years, the annual net income was above this amount. The pattern of change was irregular. Accordingly, we find no pattern of net income change that causes us to adjust our discount rate for net income change. In short, we find no evidence of inflation in Commercial Real Estate net operating income.

Accordingly, we make no inflationary adjustment to our discount rate for Commercial Real Estate. Therefore, to the extent a distinction is important, we characterize our discount rate as a "nominal" discount rate – because we have considered inflationary change, and find no support for such an adjustment

For commercial real estate we conclude to discount rates of 7.50% for improved properties (urban), 7.00% for urban ground leased properties and 9.00% for rural ground leased properties, effective as of June 30, 2018.

For the same reasons described in our timberland discount and capitalization rate selection, our capitalization rate selection for commercial real estate are the same as our discount rate selections.

Remaining Asset Classes – Mining & Aggregates, Communication Sites, Green Energy Land Uses and Other Uses

For our four remaining trust land asset classes, we do not have either actual experience or investor expectation surveys for real properties devoted to these purposes. In the alternative, an indirect method is theoretically available to us, by an examination of public companies that are engaged in business activities that operate in these commercial activities. Our challenge in using an indirect methodology is that (i) not only are the companies engaged in primary business activities that dwarf the revenue volumes available from the scale of the trust land portfolio, but also the industry emphasis of investment and return, and share of capital improvement cost, is on the commodity or service and not upon the land assets that facilitate such activities. Consequently, any return or rate information from the indirect measurement is no more than an inference about rate of return, versus the land asset represent a materials share of total capital cost, and then deserving a material share of investment return.

We also note the very small share of net trust revenues that are derived from these asset classes.

The starting place for our rate selection is our conclusion for timberland, a rate of 6.00%. We select this starting point because of the specialized nature of timberland investment and because each of the land utilization activities for these remaining asset classes also begins with a specialized business investment activity – mineral extraction, construction and operation of communication sites, for alternative (green) energy and leases of DNR-owned rights of way. Each of these investment areas has their own set of specialized needs, skills and other assets, and each is burdened by market and intrinsic costs that burden net income and investment return.

For mining and aggregates, one dominant aspect of investment return is depletion – that is the decline in the amount of recoverable mineral that is associated with the extraction of minerals and aggregates. Once gone, there can be no continuing income from the land associated with the extraction activity; it is customary to add a depletion adjustment to the returns to account for this eventual loss of income and value. Appraisers refer to this form of rate adjustment as recapture, and it is commonly expressed as function of remaining life of the realty asset. We assume – in the absence of any effective estimate of the remaining life of the mineral and aggregate resource – a fifty year life. This corresponds with a 2.00% rate of recapture (100% of value/50 year remaining life). Thus, an 8.00% discount rate is indicated (6.00% + 2.00% = 8.00%) for mining and aggregate lands.

In a manner much similar to the concept of depletion for mineral assets, we believe it is appropriate to make a rate of return adjustment for the rapid loss of value of the communication sites and green energy land uses. This rapid loss of value comes from the shared effect of the rapid depreciation of technology associated with these communication and green energy investments. The rapid pace of improvement in the vertical technology situated on the land (perhaps antennae, solar panels, wind generation turbines, and their associated technologies (hard and soft) burden these investments with a routine loss in utility and value (in other words, depreciation) that likely affects the productivity and net income of the land associated with these communications and green energy activities. Again, the appraisal term for this adjustment is recapture, and we again apply an age/life concept. In this instance, we believe that the life of these technologies is much shorter than for mineral assets, and we assume a 20 year life. The resulting recapture adjustment is then 5.00% (100% of value/20 year life). The resulting discount rate is then 11.00%; 6.00% + 5.00% recapture rate.

We need to note however, that our transaction research suggests a material difference in return requirement between cellular communication sites and other types of communication sites (microwave, radio, etc.). Because of the split in capitalization rates, we believe it is appropriate to segregate the communication rate between cellular and all other communication sites; we conclude to a discount rate of 8.50% for cellular sites and the aforementioned 11.00% for other communication sites.

For communication sites, however, our review of historic net operating income change suggests that an adjustment for growth in net income is warranted.

Over the twelve-year period 2007 to 2018, net operating income has grown at a stable rate, from a low of $2.112 million in 2007 to a high of $3,375 million in 2018. The average rate of annual change has been 1.53% per year, and total growth since 2007 has been 15. 12%. Average net operating income has been $2,873,379, and annual net operating income has been below this average six of twelve years and above for six of twelve years. We believe it is appropriate to assume that net operating income will continue to show growth, and we have deducted this expected growth of 2% per year from our discount rate of 8.5% and 11% for communication sites only, for an indicated 6.5% and 9.0% capitalization rate for communication sites.

Revenues are also received for additional resources which include energy (wind) and miscellaneous uses such as special forest products, rights of way, and other special uses. These other resources comprise a basket of use agreements, physically large and small, for a variety of uses and users, and varying in term. Because of the diversity of uses, users and durations, we believe they should have a comparatively high discount rate, and we select an 11% discount rate.

For the same reasons described in our timberland discount and capitalization rate selection, our capitalization rate selection for mining and aggregates, communication sites and green energy land uses are the same as our discount rate selections.

Summary of Discount and Capitalization Rate Selections

We recap our discount rate and capitalization rate selections by asset class, all effective as of June 30, 2018:

Asset Class	Discount Rate	Cap. Rate
Timberland	6.00%	6.00%
Agricultural Land	7.00%	7.00%
Grazing Land	7.00%	7.00%
Commercial Real Estate		
Improved Properties	7.50%	7.50%
Ground Leases (Urban)	7.00%	7.00%
Ground Leases (Rural)	9.00%	9.00%
Mineral & Aggregates	8.00%	8.00%
Communication Sites		
Cellular Leases	8.50%	6.50%
Radio/TV/Other Leases	11.00%	9.00%
Other Resources	11.00%	11.00%

Deloitte.

Chapter 5
Timber Asset Class

Table of Contents

Executive Summary

The Timber Asset Class consists of approximately 2.1 million gross acres of timberlands. The majority of acres are grown and tended to maximize growth and revenue. Nearly 60 percent (approximately 1.2 million) of the acres are projected as harvestable under existing regulations and are stocked with commercial species. The table below provides a brief summary of the Trust Value for the Timber Asset Class. We have provided this valuation subject to the following Extraordinary Assumptions:

We assume that all timberlands adhere to the proper zoning regulations outlined in regional plans. If not fully compliant, we assume that each property is legally nonconforming to the proper zoning standards. For the purpose of this analysis, we assume that the ownership interest is non-transferable resulting in the land not being able to be sold. We relied on information provided by the Trust Manager for all specific data regarding age, species, totals, and other forest inventory metrics. We assume that the information provided is accurate and sufficient for the purpose of this valuation.

Timber Asset Class – Reconciliation	
Valuation Approach	**Value (Rounded)**
Gross acres	2,056,510
Net acres	1,240,163
Whole Property Value Method Conclusion	$2,569,200,000
Income Approach Conclusion	$2,060,000,000
Reconciled Trust Value	**$2,136,000,000**
Value per gross acre	**$1,039**
Value per net acre	**$1,722**

Introduction

The Timber Asset Class is the largest asset class. It spreads across the State of Washington, although the majority of the gross land area lies west of the Cascades.

INTRODUCTION

The Timber Asset Class is the most significant real estate investment from a land size and economic perspective. There are approximately 2.9 million[1] acres of Upland State Trust Lands; however, this chapter will primarily focus on approximately 2.1 million gross acres in the Timber Asset Class related to timber revenue and timber-related activities. Approximately 850,000 acres of Upland State Trust Lands are excluded from the Timber Asset Class, and include Agricultural lands, open water bodies, and non-forested lands that are mostly used for roads.

The Timber Asset Class consists of land (i.e., timberland) with tree cover (i.e., timber) managed for its commercially marketable timber. The tree cover, or timber, comprises various types of tree species and a wide range of ages.

Typically, the Timber Asset Class includes timberland, timber, and other products contained within the geographic areas west of the Cascade mountain range crest ("western Washington") and east of the Cascade mountain range crest ("eastern Washington"). Western Washington forest land predominately comprises highly productive timber forests that contain well-stocked stands of timber. Eastern Washington forest land is not nearly as productive or high quality as the land to the west, and in addition to producing timber, it may also be used for various levels of grazing.

Per data provided by the Washington State Department of Natural Resources ("Trust Manager" or "Trust Management"), the FY 2018 combined total gross revenue related to the Timber Asset Class was approximately $174.4 million The gross revenue from this land is reduced by a specific operating cost percentage deduction to account for management and operating expenses, with the net cash flow distributed to the trust beneficiaries.

As a general note, all dollar amounts reported in this chapter are nominal and have not been adjusted for inflation. Additionally, the years referenced herein are not calendar years; instead, they refer to fiscal years that begin on July 1 of the year prior and end on June 30 for each year.

Timber Asset Class

This asset class consists of approximately 2.1 million gross acres of forests that are grown and tended to maximize growth and revenue. In some areas, forest trust lands comprise the middle ground between lowland rural/urban areas and mid- to high-elevation national forests. Forest landscapes are under a tremendous amount of public scrutiny. Many private working lands restrict public access or provide no public access at all, while others are implementing an access fee model.

[1] The 2.9 million gross acres excludes approximately 224,000 acres attributable to Tidelands Second Class, Shorelands Second Class, Milwaukee Road Corridor, Natural Area Preserve, Natural Resources Conservation Areas, Administrative Sites, Water Pollution Control Division Trust Land, and the Community Forest Trust.

It is helpful to keep in mind that land areas can be moved from one asset class to another asset class over time. These are called Transition Lands and are defined as lands currently being managed for natural resource production that have characteristics indicating an opportunity for more efficient management to obtain a higher economic return by conversation of the land to another use. For example, an area of the Timber Asset Class that is currently being used for timber production may be reclassified in the future to the Commercial Real Estate Asset Class as its planned use changes to accommodate market conditions and opportunities.

Timber Asset Class Ownership. The Trust Manager manages and operates state trust lands owned by the State of Washington for the benefit of designated trust beneficiaries. To be concise, this report uses the term "ownership" or "ownership interests" to describe the amount or percentage of gross revenue or land managed by the Trust Manager on behalf of specific trust beneficiaries, even though the land is owned by the State of Washington and not the trust beneficiaries.

The trust with the largest land base is the Common School and Indemnity Trust, which supports public statewide school construction and other designated programs. Beneficiary interests in these lands are the result of federal land grants to Washington at the time statehood was granted. This trust represents approximately 53 percent of the total gross acres in the Timber Asset Class.

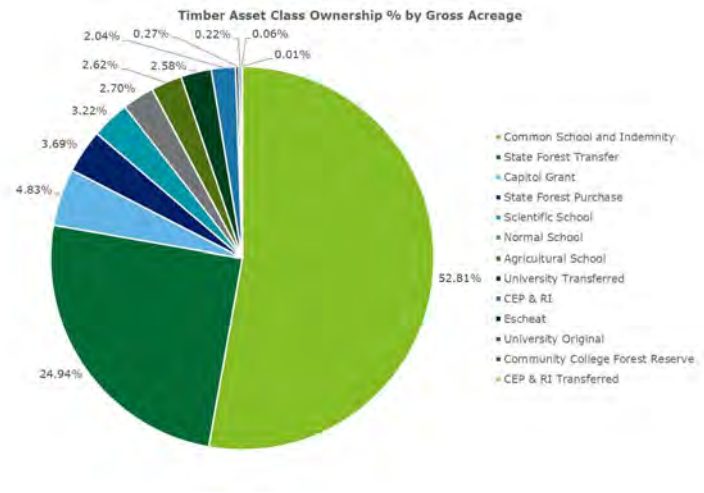
The trust with the second largest land base is the State Forest Transfer Trust. These lands were acquired by counties in the State of Washington through property tax delinquencies or purchases and later deeded by the counties to the State of Washington to be managed and operated by the Trust Manager for timber production to generate income for local services in the counties in which the lands are located. While the counties deeded their ownership interests to the State of Washington, the counties retain the right to revenue generated from timber sales and timber-related activities, net of a specific operating cost percentage deduction (defined further in the expenses section of the next page) to account for management and operating expenses related to these lands. This trust represents approximately 24.94 percent of the total gross acres in the Timber Asset Class.

The following table and chart present the trust ownership percentages based on gross acres held in the Timber Asset Class.

FIGURE 1

Trust Name	Gross Acres	%
Common School and Indemnity	1,086,060	52.81%
State Forest Transfer	512,905	24.94%
Capitol Grant	99,361	4.83%
State Forest Purchase	75,981	3.69%
Scientific School	66,193	3.22%
Normal School	55,628	2.70%
Agricultural School	53,840	2.62%
University Transferred	53,142	2.58%
CEP & RI	41,921	2.04%
Escheat	5,525	0.27%
University Original	4,471	0.22%
Community College Forest Reserve	1,277	0.06%
CEP & RI Transferred	203	0.01%
Total	**2,056,510**	**100%**

FIGURE 2



Timber Revenue. Gross revenue for the Timber Asset Class is mostly generated by selling (through public auction) the rights to harvest timber on specifically identified stands. Timber stands are offered and sold to the public for short contract periods of two to three years to harvest the timber; generally, the typical term is two years. Payment for the standing timber is paid at the time the timber is removed and harvested,[2] or at the expiration of the term if the harvest is not completed (a rare occurrence). Prior to the auction, the Trust Manager estimates the value of the standing timber to establish a minimum bid price. In some cases, there are no bids, which results in a no sale outcome. Timber stand pricing is based upon the species, quality of logs, and estimated quantity of timber available, as well as the costs related to harvesting the timber and distance to market (i.e., sawmills). Among the most important indicators of value for a timber stand are the price for the timber "on the stump," the "stumpage price" for the species type, and the corresponding volume of timber within a stand.

Expenses. Beneficiary trusts incur expenses related to operating the Timber Asset Class. The expense amount is based on a fixed percentage of revenue collected, and the fixed percentage varies by trust ownership (i.e., trust revenue is tracked by ownership and charged the appropriate rate). In this report, expenses are referred to as "operating cost percentage deduction." This is the contractual rate the beneficiary trusts must pay. This rate accounts for expenses related to trust lands in the current operating year and costs related to future revenue. For example, tree replanting in areas that have been harvested will benefit the beneficiaries in the future and produce new harvestable timber. Hence, these costs are both operating expenses and capital investment expenditures. The operating cost percentage deduction is paid to the Trust Manager, in its managerial role, to pay for operating expenses and capital expenditures.

Net Cash Flow. The net cash flow, after the operating cost percentage deduction[3], is distributed to trust beneficiaries based upon their percentage of revenue.

[2] Per RCW 79.15.100, an initial deposit may be collected on the day of the sale and held for the purposes of performance security. Once all contract obligations are satisfied, the deposit may be applied towards the final timber invoice.
[3] Per RCW 79.38.030, the Trust Manager may charge purchasers of timber for use and associated maintenance and construction of access roads. This has the potential to impact bid prices.

Valuation Factors. The Timber Asset Class is a very large and complex real estate portfolio. In the planning and scoping of this valuation analysis for this asset class, the following items were noted and evaluated.

- **Trust Ownership.** The Washington State Constitution restricts the liquidation of large areas of federal grant lands to 160 acres at a time. In compliance with the Washington State law, state forestlands are reserved from sale except under specific conditions outlined in RCW 79.22.060. The intent of both restrictions is to preserve the corpus of the trust estate. Compared to traditional real estate ownership interests, this restriction impacts the property interest definition and corresponding valuation analysis.
- **Commodity.** Timber is a commodity that is often described as a raw material or primary agricultural product that can be bought and sold. There is little difference between a commodity that comes from one producer versus another producer. The wide availability of commodities typically leads to small profit margins and diminishes the importance of factors other than price.
- **Gross to Net Acreage Adjustments.** While the total acreage size of the Timber Asset Class is large (2,056,510 gross acres), the portion that can be harvested is much smaller. In this report, the process to determine this portion is referred to as the "gross to net acreage adjustment."

There are various reasons why some acres within the Timber Asset Class are restricted from harvest[4] and generate less or no revenue for the trusts. For example, the land may contribute to the ecological goals of the 1997 *State Trusts Habitat Conservation Plan* (HCP), which was written to comply with federal laws, or may be required for forest practices rules (Title 222 WAC). Descriptions of these restrictions follow:

- *Long-Term Deferrals:* Long-term deferrals are areas that are not available for harvest. Examples include but are not limited to areas such as permanent research plots, timber gene pool reserves, or habitats that meet the ecological commitments to protect threatened and endangered species under the 1997 HCP, including nest patches for the Northern Spotted Owl (NSO) and occupied Marbled Murrelet (MM) habitat.
- *Non-Commercial:* Non-commercial acres that contain tree species with little to no commercial value, including but not limited to Cherry, Crabapple, Pacific Madrone, and Willow trees. These acres are dispersed throughout the Timber Asset Class acres. These areas fall outside the typical long-term deferral areas and, as such, are not included in the long-term deferral totals. Non-commercial acres are not considered as part of the harvest program.

[4] All restrictions are current as of the 20180629 Large Data Overlay, a Geographic Information System (GIS) database that combines and classifies a variety of GIS and tabular databases into a single large GIS layer that encompasses all surface and timber lands managed by the Trust Manager. These restrictions are not permanent designations. The Trust Manager may change classification as specific forest stands or sites are re-evaluated. Acreage updates and changes can occur over time due to technological refinements in data gathering and analysis.

- *Riparian Management Zones (RMZs):* These areas are only partially available for harvest and are generally limited to thinning only. Management activities that occur on state trust lands near streams must comply with one of three rule sets: (1) the 1997 HCP riparian conservation strategy for state trust lands within the Olympic Experimental State Forest (OESF), (2) the 1997 HCP riparian conservation strategy for all other state trust lands managed under the 1997 HCP in western Washington, and (3) the forest practice rules (Title 222 WAC) for state trust lands in eastern Washington. Each rule set establishes RMZs on all fish-bearing and perennial streams and have varying levels of protection depending on the size or "Type" of the stream. These rules specify the silvicultural treatments that can be used (e.g., stand thinning) to speed the development of structurally complex forests without sacrificing short-term ecosystem function.

  Based on the Riparian Forest Restoration Strategy published in 2006, the "management goal for RMZs is the restoration of high-quality aquatic habitat to aid in federally listed salmon species recovery efforts, and to contribute to the conservation of other aquatic and riparian obligate (i.e., dependent) species. To achieve this goal, the department will use a combination of various types of active management through stand manipulation, and also the natural development of unmanaged stands. This will result in the restoration of structurally complex riparian forests that provide the ecological functions to meet the conservation objectives."

  For this analysis, nearly 20,000 miles of stream area estimates were provided by the Trust Manager using existing recognized data systems (FP_Hydro). A transition to a new LiDAR stream mapping system is underway by the Trust Manager. On-the-ground validation of identified streams still needs to take place. Buffer zones need to be established around the streams, which further reduces the acreage available in the harvest base. Buffer zones adjacent to identified streams are mapped out as follows:

  Type 5 streams. These streams have a defined channel and very little water part of the year. They do not require a harvest buffer.

  Type 4 streams. These streams are small (i.e., under two feet), but have water. They require a 100-foot buffer.

  Type 3 streams. These streams range from small to large (i.e., more than two feet) and have either a presumed or verified fish presence. On average, they require a 170-foot site index buffer on the westside.

  Types 1-2 streams. These streams contain large, navigable bodies of water. On average, they require a 170-foot to 200-foot site index buffer.

  Note: If unencumbered by an HCP, Washington state regulations in WAC 222-30 prescribe RMZs with somewhat different no-cut buffer requirements.

- *General Ecological Management (GEM) Lands*: These lands are managed for economic rotational harvest with leave trees or patches and are subject to the 1997 HCP, The Policy for Sustainable Forests, and all relevant laws including forest practices, but otherwise are available for harvest.

- *Uplands:* These are areas where landscape and/or site-specific objectives extend harvests beyond an economic rotation. They are subject to the 1997 HCP, The Policy for Sustainable Forests, and all relevant laws including forest practices. These lands must also comply with specific ecological objectives that constrain (but do not preclude) harvest. Examples include areas managed for northern spotted owl conservation or for hydrologic maturity.

  In this report, the gross acres within the Timber Asset Class are reduced to reflect these restrictions and limitations. This reduction is referred to as the "gross to net acreage adjustment."

  The gross to net acreage adjustment methodology accounts for two issues. First, it determines which acres are available for harvest. Second, of the acres available for harvest, it accounts for the intensity of management that can be practiced.

- *Sustainable Yield.* "Sustained yield plans," as defined in RCW 79.10.310 , means management of the forest on a continuing basis without major prolonged curtailment or cessation of harvest. The sustainable harvest level is the volume of timber to be scheduled for sale during a planning decade from all state trust lands located in Washington. The Trust Manager determines the level of timber harvest for present and future trust beneficiaries that considers revenue production as well as ecological values, such as healthy forest ecosystems and habitats for threatened and endangered species. The sustainable harvest level is a policy decision that requires approval by the Board of Natural Resources.

  The mean annual timber volume that can be sold and harvested from year-to-year in the planning decade may only change plus or minus 25% and must be consistent in the near term to the decade's harvest plan.

- *Portfolio Size and Location:* Compared to other timber real estate holdings situated elsewhere in the United States, the large size of the Timber Asset Class coupled with its superior location (i.e., western Washington) is truly unique. As a result, the availability of meaningful comparable data is limited. These characteristics combined with the trust ownership and restriction issues highlighted above affect the valuation approaches selected and the execution of those approaches.

- *Expenses:* Trust expenses are defined as a fixed percentage of revenue based on the trust ownership.[5] The actual expenses utilized to manage the timber and harvesting process may not align with the percentage deducted from gross revenue.

[5] Different rates apply based on the management account associated with each trust ownership.

A summary of the Timber Asset Class follows:

- The Timber Asset Class is a real estate interest (i.e., trust value) that for the purposes of this analysis, the ownership interest in non-transferable, which results in the land not being able to be sold.
- A large portion of the gross acreage is removed from the revenue-generating harvestable land due to restrictions and deferrals; these are real estate areas that cannot be sold and cannot generate timber revenue
- All revenue is the result of harvesting a commodity (i.e., timber and other valuable materials), and commodities typically have low margins and fluctuating market prices
- Operating costs are defined as a fixed percentage of revenue, regardless of profitability
- Sustainable harvesting requirements limit any changes in the timber volume harvested in any given year

Given these valuation factors and issues summarized above, there is a low expectation of value growth for the Timber Asset Class from the trust beneficiary's perspective, as well as minimal expectations that the net cash flow will grow in the near term.

Timber Acreage

The land areas in the Timber Asset Class are located throughout the State of Washington, but are generally evaluated on a geographic basis (i.e., western Washington versus eastern Washington)

INTRODUCTION

The Trust Manager operates and manages the Timber Asset Class holdings for the beneficiary trusts in the following six managerial regions:

- Western Washington
  - Northwest Region
  - Olympic Region
  - Pacific Cascade Region
  - South Puget Sound Region
- Eastern Washington
  - Northeast Region
  - Southeast Region

The Timber Asset Class land areas in western Washington are characterized by the Douglas Fir and western hemlock species that are the dominant products that supply dimensional lumber mills in the market. western red cedar is a secondary product that commands a high price due to its limited supply. Timber Asset Class locations in western Washington are considered some of the most productive and valuable harvesting areas not only in Washington State, but anywhere in the United States.

Forest trust lands in western Washington are located in a temperate wet climate that provides ample precipitation to productive soils. Trees in the region grow at a much faster pace relative to other areas in the country. Additionally, the timber infrastructure in the west includes several new, highly efficient mills built at new and former mill sites resulting in a strong and readily accessible marketplace.

The Timber Asset Class land areas in eastern Washington are constrained by where moisture is most available. Precipitation drives where forests are able to grow in eastern Washington. Timber Asset Class locations in the east are considered much less productive and valuable.

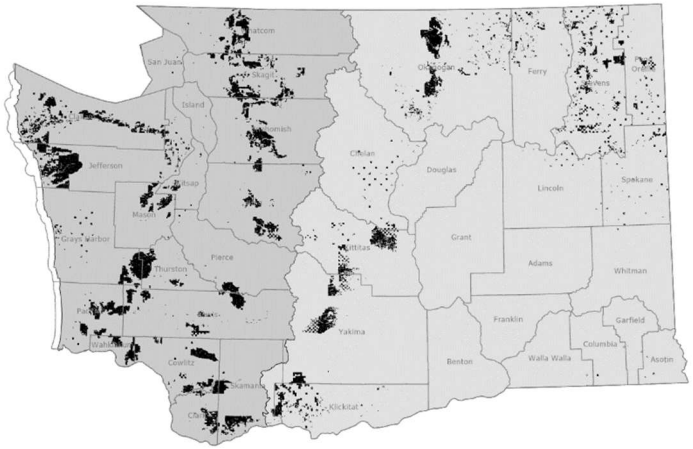
In eastern Washington, the most productive areas are found near Colville where sufficient moisture allows for higher productivity. However, moisture and productive soils are generally lacking in the region. As such, growth rates for stands of timber lag behind the growing conditions in western Washington and require longer or multiple harvest rotations. Additionally, the milling infrastructure has become significantly more limited over the past 20 years.

IMAGE SHOWS A DOUGLAS-FIR TREE
SOURCE: TREESEEDONLINE.COM

GROSS ACREAGE

The reported total gross acreage of the Timber Asset Class is 2,056,510 forested acres. The following map highlights the location of the forested gross acreage in the Timber Asset Class and provides general demarcations of the boundary between western and eastern Washington.

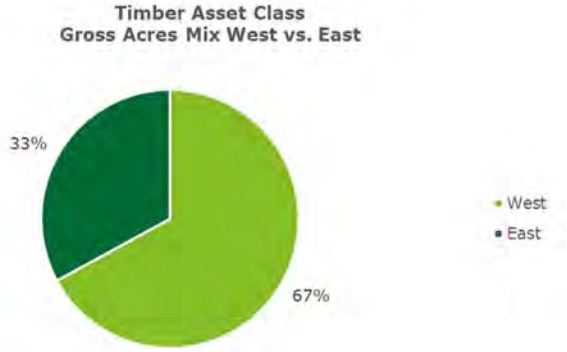
FIGURE 3



The following charts present the total gross acreage and the allocation between western and eastern Washington. On a gross acreage basis, western Washington comprise a large majority of the Timber Asset Class, and as mentioned earlier, western Washington contains the most productive land in this asset class. The following exhibits highlight the gross acreage allocation between western and eastern Washington.

FIGURE 4

FIGURE 5



Gross Acreage. It is important to distinguish gross acreage of the Timber Asset Class from net acreage. While the beneficiary trusts own all of the gross acreage, a substantial portion is excluded or restricted from the commercial harvestable base that generates revenue (i.e., net acreage). At the same time, the Trust Manager is responsible for managing all of the gross acreage, including monitoring, maintaining, and protecting the land and determining whether or not the acreage is able to generate revenue for the beneficiary trusts.

As a result, there are unavoidable operating costs and capital expenditures related to managing areas of the gross acreage that will not generate revenue. Additional details are provided later regarding the operating expenses and capital expenditures incurred to manage, maintain, and operate the Timber Asset Class.

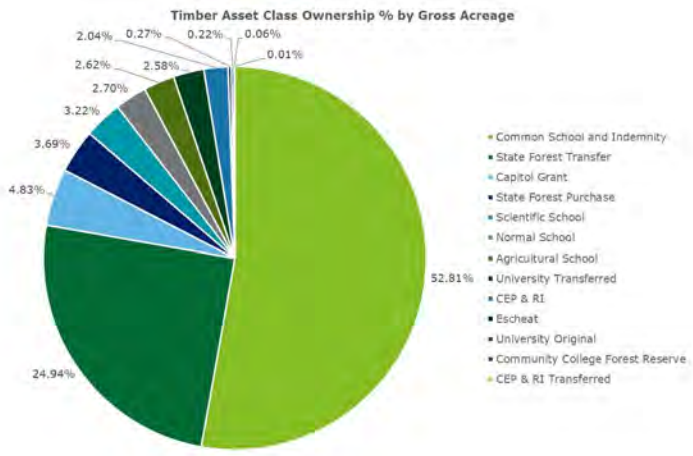
Trust Beneficiary – Gross Acreage. The trust beneficiary ownership interests in the gross acreage of the Timber Asset Class are presented in the following table and chart.

FIGURE 6

Trust Name	Gross Acres	%
Common School and Indemnity	1,086,060	52.81%
State Forest Transfer	512,905	24.94%
Capitol Grant	99,361	4.83%
State Forest Purchase	75,981	3.69%
Scientific School	66,193	3.22%
Normal School	55,628	2.70%
Agricultural School	53,840	2.62%
University Transferred	53,142	2.58%
CEP & RI	41,921	2.04%
Escheat	5,525	0.27%
University Original	4,471	0.22%
Community College Forest Reserve	1,277	0.06%
CEP & RI Transferred	203	0.01%
Total	**2,056,510**	**100%**

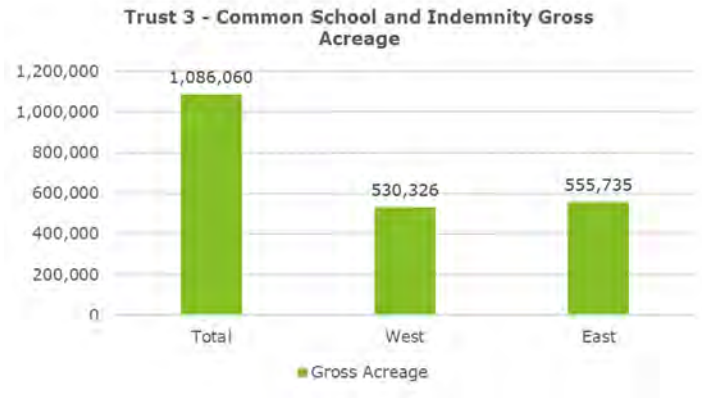
The two largest trusts are the Common School and Indemnity Trust and the State Forest Transfer Trust, which have a combined 77.75 percent beneficiary interest.

FIGURE 7



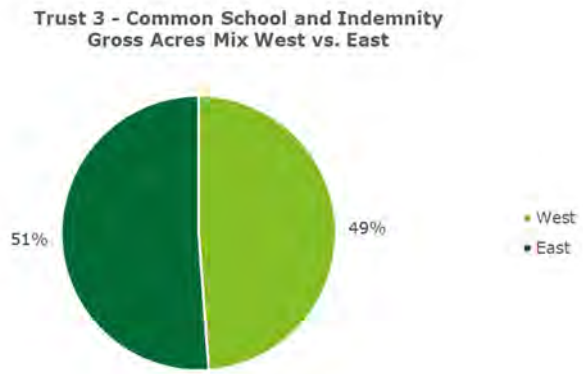
Common School and Indemnity Trust – Gross Acreage. The following table and chart display the gross acreage for the largest trust.

FIGURE 8



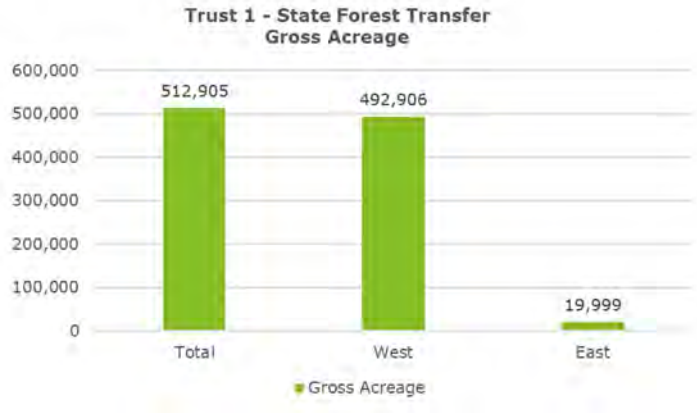
The acreage is split nearly equally between western and eastern Washington.

FIGURE 9



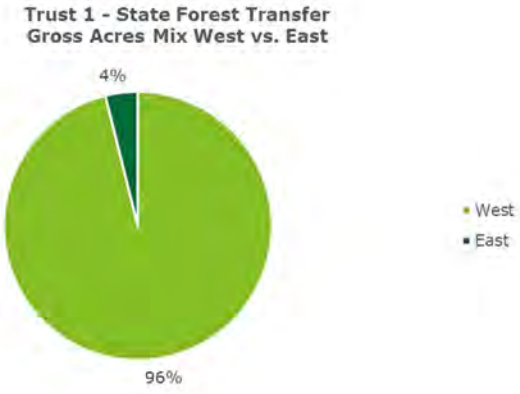
State Forest Transfer Trust – Gross Acreage. The following table and chart display the gross acreage for the second largest trust.

FIGURE 10



For the State Forest Transfer Trust, nearly all of the gross acreage is in western Washington. During the 1920s and 1930s, most of this acreage was harvested, abandoned, and foreclosed upon for back taxes.

FIGURE 11



The discussion continues below with the net acreage analysis.

NET ACREAGE

The Timber Asset Class consists of a total gross area of 2,056,510 acres. However, certain restrictions and limitations are in place that prohibit or prevent the harvesting of timber on all of these acres. These factors vary from location to location but are generally categorized as statutory, regulatory, policy, and operational.

The result is that the net acreage available to generate timber sales revenue and timber-related activity revenue is significantly less than the total gross acreage of the Timber Asset Class.

The following highlights the reported adjustments to the gross acreage that derive the net acreage available for timber harvest, which in turn generates the resource revenue for the trust beneficiaries.

Adjustments. As a reminder, the reader is directed to the detailed discussion of the gross to net acreage adjustments provided earlier in this chapter.

Described previously, the gross to net acreage adjustment methodology must account for the fact that many restricted areas overlap and that a limited amount of harvest is allowed in some restricted areas. To address the restrictions, acres that are *unavailable for harvest* were subtracted in the order shown in this section: all long-term deferrals were subtracted first and then non-commercial lands. *Each acre was subtracted only once.* For example, if a long-term deferral has non-commercial species, the area was subtracted as a long-term deferral and was not be subtracted again as non-commercial land.

To address the limitations on harvest, acres of RMZs, GEM lands, and Uplands were multiplied by a weighting factor that represented the expected level of harvest.

The RMZ net acreage was weighted at 2 percent[6] of its area based on an analysis of the actual harvest level in these areas over the past 10 years. This weighting factor reflects the fact that RMZs produced 2 percent of the net harvestable volume per acre in comparison to GEM lands.

The net acreage for GEM lands was weighted equal to its area in acres (100 percent).[7]

The Uplands net acreage was weighted at 55 percent[8] of its area based on an analysis of the actual harvest level in these areas over the past 10 years.

The weighting factor was used to determine the equivalent acres of land in each category that are available for revenue generating activities. For example, 100 acres of RMZ land multiplied by 2 percent is 2 acres; the equivalent acreage for revenue generating activities.

- **Long-Term Deferrals.** Includes approximately 331,923 acres (16.14 percent of the total gross acreage for the Timber Asset Class). Since these acres are not available for harvest, all of these acres have been subtracted from the total gross acreage.

- **Non-Commercial Land.** Includes approximately 6,778 acres (0.33 percent of the total gross acreage for the Timber Asset Class). Since these acres do not have commercial value, all of these acres have been subtracted from the total gross acreage.

- **RMZs.** Include approximately 246,249 gross acres. An operable weighting factor of 2 percent was applied to RMZ acres to estimate the total net acres available for harvest in this category. The effect of this weighting is that 241,324 acres (or 11.73 percent of the total gross acreage of the Timber Asset Class) have been subtracted from the total gross acreage, resulting in 4,925 net acres available for harvest.[9]

[6] Trust Manager estimate
[7] Trust Manager estimate
[8] Trust Manager estimate
[9] RMZ category also accounts for wetlands and their associated buffers within the Timber Asset Class acreage.

- **Uplands.** Includes approximately 525,160 gross acres. An operable weighting factor of 55 percent has been applied to these acres to estimate the total net acres available for harvest in this category. The effect of this weighting is that 236,322 acres (or 11.49 percent of the total gross acres in the Timber Asset Class) has been subtracted from the gross acres, resulting in 288,838 net acres available for harvest within this category.

- **GEMS lands.** These lands encompass approximately 946,400 acres (or 46 percent of the total gross acreage for the Timber Asset Class).

The following table illustrates the gross to net acreage adjustment for the Timber Asset Class.

FIGURE 12 – GROSS TO NET ACREAGE ADJUSTMENT

Category	Gross Acres	Operable Weighting	Net Acres restricted from Harvest	Net Acres available for Harvest
Long-term Deferrals	331,923	0%	331,923	0
Non-Commercial	6,778	0%	6,778	0
Riparian Management Zones	246,249	2%	241,324	4,925
Uplands	525,160	55%	236,322	288,838
General Ecological Management (GEM) Lands	946,400	100%	0	946,400
Total	**2,056,510**		**816,347**	**1,240,163**

Net Acreage Example. Using data for a specific area provided by the Trust Manager, the following figures highlight graphically the areas with restrictions which determine the estimated net acreage available for harvest. The following images are for illustrative purposes only are intended to highlight how legal and policy requirement impact harvestable acres.

FIGURE 13 – LONG-TERM DEFERRAL ADJUSTMENTS

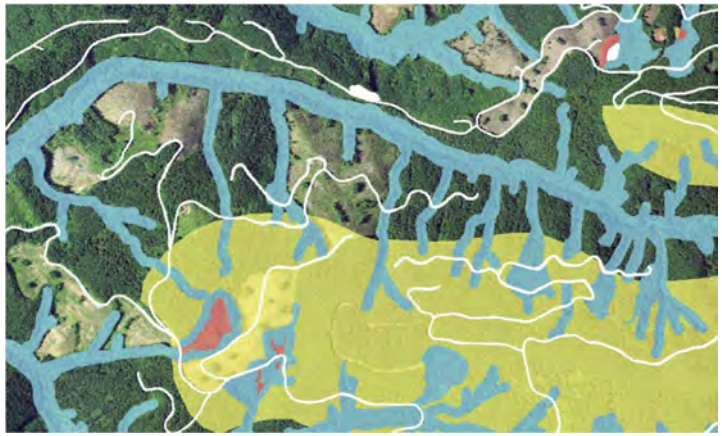
The prior figure and the figures that follow highlight the areas with legal and policy restrictions that result in the calculated net acreage amount.

The prior figure is an aerial image of timber areas. Roads and other non-forested areas are presented with white shading, while long-term deferral lands are presented with red shading illustrating areas unavailable for harvest.

FIGURE 14 – RIPARIAN ADJUSTMENTS

In the prior figure, blue shading identifies restricted areas in the RMZ category, which further reduces the available timber area for harvest.

FIGURE 15 – HABITAT CONSERVATION PLAN ADJUSTMENTS



In the prior figure, yellow shading represents areas in the Uplands category where harvesting is restricted.

FIGURE 16 – NET HARVESTABLE AREAS

The final figure adds green shading to represent where harvesting is not restricted (i.e. GEM lands).[10] The figure displays to the reader the multiple areas where legal and policy requirements restrict harvestable acres.

Net Acreage. The following two maps highlight the difference between the gross and net acreages. Again, these images are provided for illustrative purposes.

The first map is identical to a map presented earlier in this chapter and shows the gross acreage locations in black.

[10] In this example, the green shading represents only GEM lands. However, we note that net harvestable areas can also include RMZ and Uplands lands deemed operable.

FIGURE 17 GROSS ACREAGE

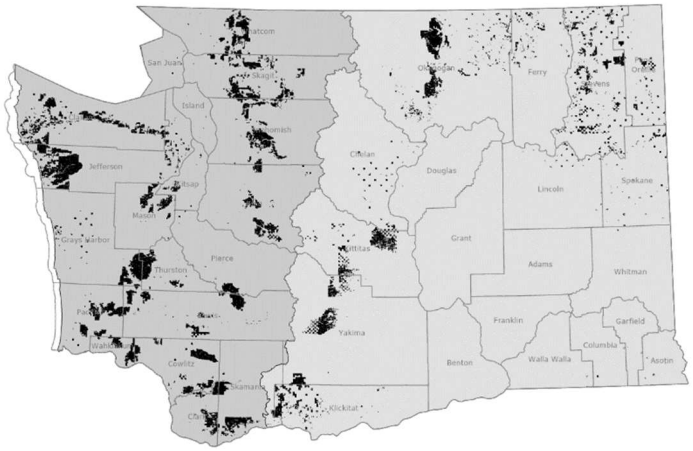
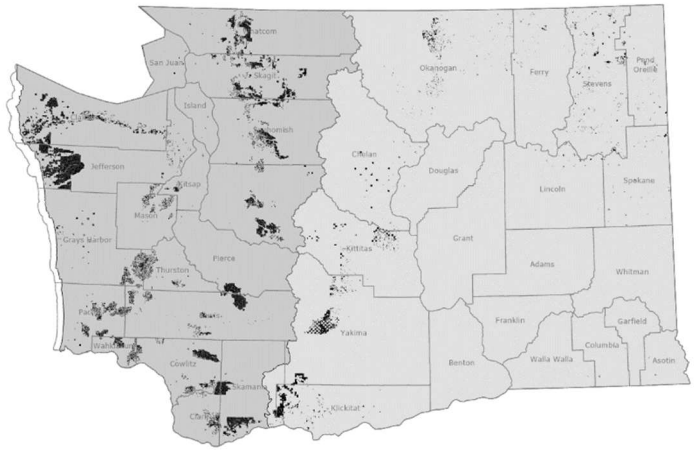


FIGURE 18 NET ACREAGE



The next map only shows the location the net acreage in black, after all restricted lands are removed. Again, the map provides the general demarcation of the boundary between western and eastern Washington. Note that the acres and boundaries highlighted in the following map are not exactly to scale because displaying a high-level view of the state complicates the image.

The following table and chart highlight the reported impact of the restrictions and limitations detailed earlier on the Timber Asset Class. Due to the weighting factor associated with different categories of the Timber Asset Class, the equivalent of 816,347 acres or 40 percent of the total gross acreage has restrictions or limitations on revenue generating activities.

FIGURE 19

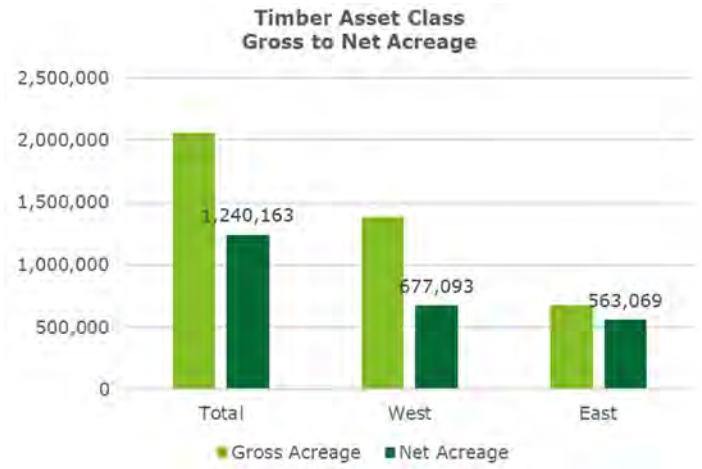
Timber Asset Class Net Acreage Impact	Total	West	East
Gross Acreage	**2,056,510**	**1,379,171**	**677,338**
Less: Long Term Deferral	331,923	296,229	35,693
Less: Non-Commercial	6,778	1,363	5,415
Less: Riparian Management Zone	241,324	218,589	22,734
Less: Uplands	236,322	185,896	50,426
Less: GEMs	0	0	0
Less: Adjustments	**-816,347**	**-702,078**	**-114,269**
Less: Adjustment % of Gross Acres	**-40%**	**-51%**	**-17%**
Net Acreage	**1,240,163**	**677,093**	**563,069**
Net Acreage % of Gross Acres	**60%**	**49%**	**83%**

Clearly, the restrictions and limitations affect western Washington acreage the most. The total adjustments to the western Washington gross acreage included 702,078 acres or 51 percent of the total gross acreage.

Since western Washington includes the most productive and valuable acreage in the Timber Asset Class, the restrictions and limitations have a large impact on revenue potential for the trust beneficiaries.

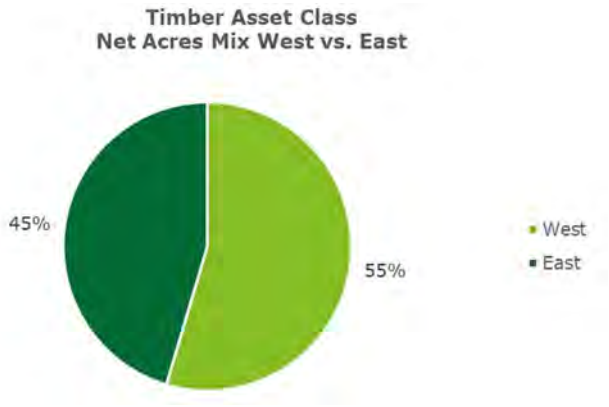
The following chart highlights the impact of the gross acreage adjustment in the western and eastern Washington.

FIGURE 20



Compared to the gross acreage mix whereby western Washington accounts for 67 percent of the total gross acreage, the western Washington percentage decreased to 55 percent of the total net acreage after adjustments. The factors (i.e., water, soil, species, climate) that contribute to the high quality and productivity of western Washington also leads to the limitations and restrictions discussed previously.

FIGURE 21



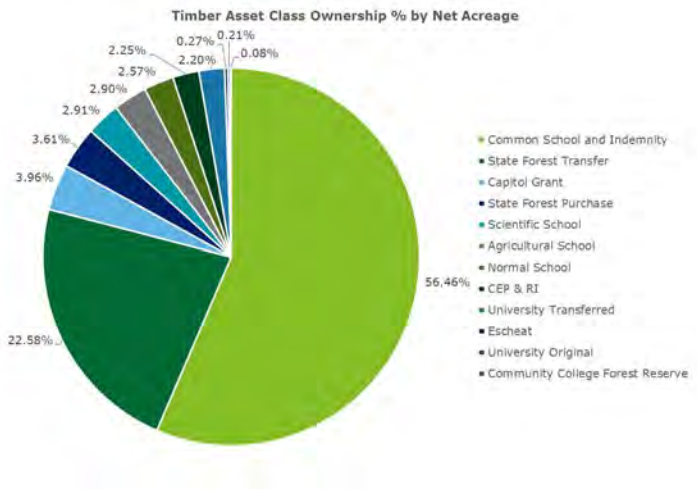
The discussion of the net acreage adjustment continues with an overview of the impact on the two largest trust beneficiary interests in the Timber Asset Class.

Trust Beneficiary – Net Acreage. The trust beneficiary interests in the net acreage of the Timber Asset Class are presented in the following table and chart.

FIGURE 22

Trust Name	Net Acres	%
Common School and Indemnity	700,201	56.46%
State Forest Transfer	280,010	22.58%
Capitol Grant	49,146	3.96%
State Forest Purchase	44,720	3.61%
Scientific School	36,048	2.91%
Agricultural School	36,009	2.90%
Normal School	31,926	2.57%
CEP & RI	27,875	2.25%
University Transferred	27,330	2.20%
Escheat	3,340	0.27%
University Original	2,572	0.21%
Community College Forest Reserve	986	0.08%
CEP & RI Transferred	0	0.00%
Total	**1,240,163**	**100.00%**

FIGURE 23



The following is an overview of the two largest beneficiary interests in the Timber Asset Class.

Common School and Indemnity Trust – Net Acreage. The following table and charts highlight the impact of the net acreage adjustment on the largest trust beneficiary interest. This trust comprises 52.81 percent of the gross acreage, but the net acreage adjustment is approximately 385,859 acres, or -36 percent of the trust's beneficiary interest in the Timber Asset Class.

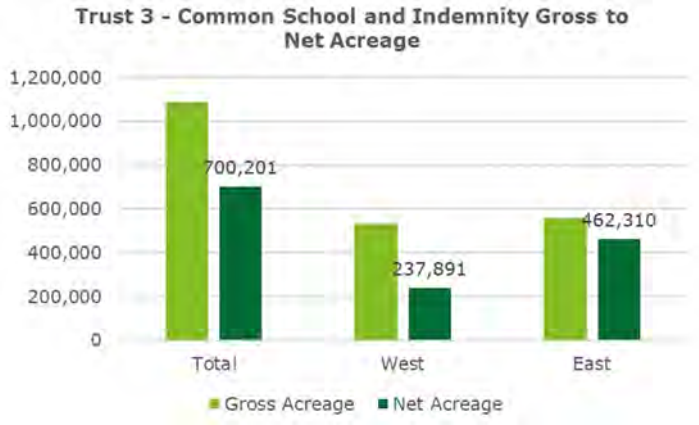
FIGURE 24

Common School and Indemnity Net Acreage Impact	Total	West	East
Gross Acreage	**1,086,060**	**530,326**	**555,735**
Less: Long Term Deferral	158,975	128,598	30,377
Less: Non-Commercial	4,961	600	4,361
Less: Riparian Management Zone	103,461	84,595	18,866
Less: Uplands	118,463	78,643	39,820
Less: GEMs	0	0	0
Less: Adjustments	**-385,859**	**-292,435**	**-93,424**
Less: Adjustment % of Gross Acres	**-36%**	**-55%**	**-17%**
Net Acreage	**700,201**	**237,891**	**462,310**
Net Acreage % of Gross Acres	**64%**	**45%**	**83%**

Additionally, most of the trusts restricted acreage is located in western Washington, which in turn results in a decrease adjustment of 292,435 acres, or -55 percent of the most productive acreage for the Common School and Indemnity Trust.

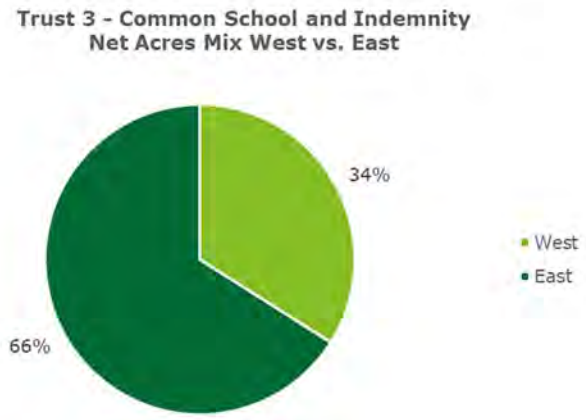
The following charts highlight the impact of the net acreage adjustment on the Common School and Indemnity Trust.

FIGURE 25



Compared to the gross acreage mix whereby the Common School and Indemnity Trust lands in western Washington comprise 49 percent of the total gross acreage, the percentage of total net acres found in western Washington decreases to 34 percent.

FIGURE 26



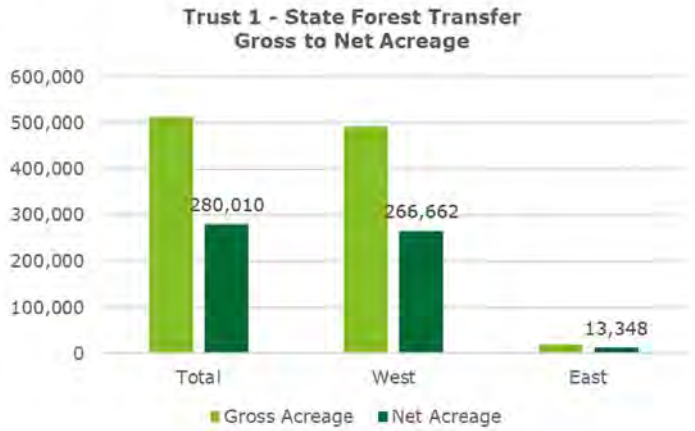
State Forest Transfer Trust – Net Acreage. The following table and charts highlight the impact of the net acreage adjustment on the second largest trust beneficiary interest. This trust comprises 24.94 percent of the gross acreage, but the net acreage adjustment is approximately 232,895 acres, or -45 percent of the trust's beneficiary interest in the Timber Asset Class.

FIGURE 27

State Forest Transfer Net Acreage Impact	Total	West	East
Gross Acreage	**512,905**	**492,906**	**19,999**
Less: Long Term Deferral	96,273	96,054	219
Less: Non-Commercial	1,440	469	971
Less: Riparian Management Zone	72,816	72,274	542
Less: Uplands	62,366	57,446	4,919
Less: GEMs	0	0	0
Less: Adjustments	**-232,895**	**-226,243**	**-6,652**
Less: Adjustment % of Gross Acres	**-45%**	**-46%**	**-33%**
Net Acreage	**280,010**	**266,662**	**13,348**
Net Acreage % of Gross Acres	**55%**	**54%**	**67%**

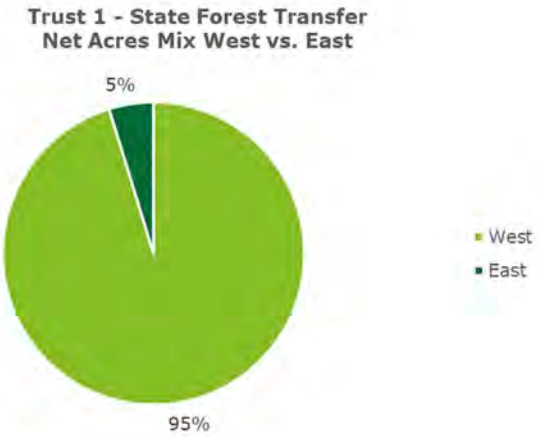
Additionally, nearly all of the net acreage is located in western Washington, which in turn results in a net acreage (decrease) adjustment of 226,243 acres, or -46 percent, to the most productive acreage in this asset class for the State Forest Transfer Trust.

FIGURE 28



Given the small acreage size in eastern Washington, nearly all of the impact of the adjustments occurs in western Washington.

FIGURE 29



The analysis and discussion continue on the following page with timber volume.

Timber Volume

The gross timber volume and density are substantially higher in western Washington than in eastern Washington.

GROSS TIMBER VOLUME

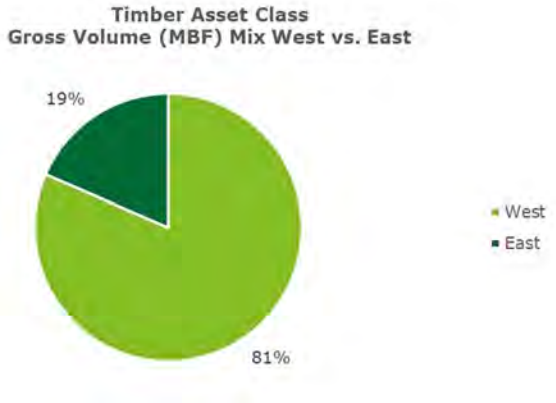
The reported total gross timber volume of the Timber Asset Class is 41,773,197 MBF (1,000 board feet).[11] The reader is reminded that this estimate is gross volume, which captures all timber associated with the gross acreage. This includes timber associated with the acres that are restricted or limited as described earlier when listing the net adjustment to arrive at a net acreage that is harvestable. Further discussion is provided later for the net timber volume that reflects adjustments similar to those made to find the net acreage harvestable.

The following charts present the reported total gross timber volume and the allocation between western and eastern Washington.

As can be expected, the highly productive western Washington holds substantially more gross timber volume than Eastern Washington.

FIGURE 30

FIGURE 31



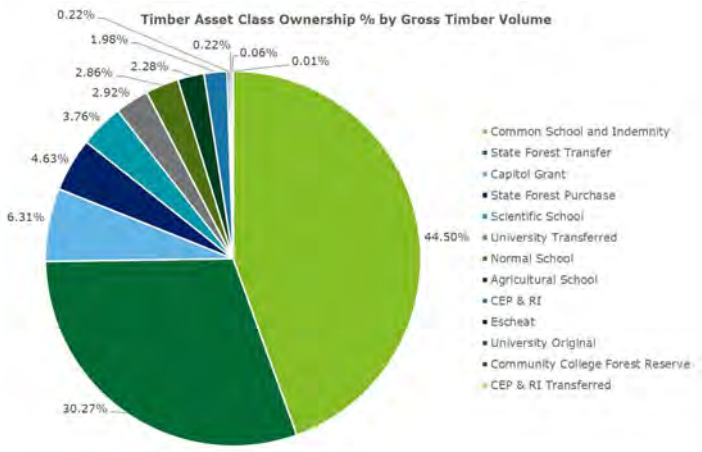
[11] MBF is a forestry term that means "1,000 board feet." M = Roman Numeral = 1,000 and BF = board feet. It is common to report timber and log prices in $/MBF. The Trust Manager uses "Board Feet, Scribner Scale".

Trust Beneficiaries– Gross Timber Volume. The trust beneficiary interests in the gross volume of the Timber Asset Class are presented in the following table and chart.

FIGURE 32

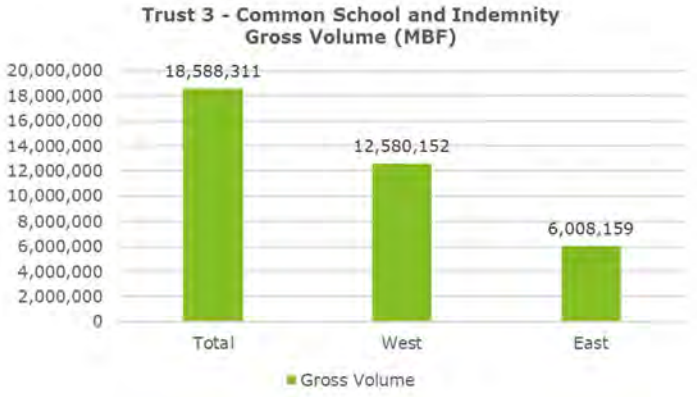
Trust Name	Gross Volume (MBF)	%
Common School and Indemnity	18,588,311	44.50%
State Forest Transfer	12,642,816	30.27%
Capitol Grant	2,635,171	6.31%
State Forest Purchase	1,932,122	4.63%
Scientific School	1,571,982	3.76%
University Transferred	1,218,786	2.92%
Normal School	1,194,634	2.86%
Agricultural School	950,555	2.28%
CEP & RI	827,083	1.98%
Escheat	92,701	0.22%
University Original	90,673	0.22%
Community College Forest Reserve	23,829	0.06%
CEP & RI Transferred	4,533	0.01%
Total	**41,773,197**	**100.00%**

FIGURE 33



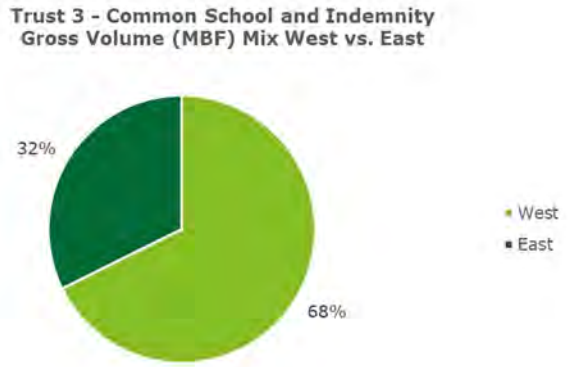
Common School and Indemnity Trust – Gross Timber Volume. The following table and chart display the gross timber volume between western and eastern Washington for the largest trust—the Common School and Indemnity Trust.

FIGURE 34



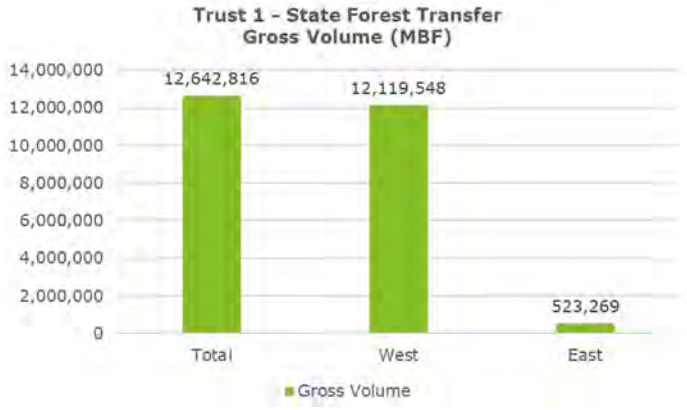
Most of the gross timber volume is in western Washington.

FIGURE 35



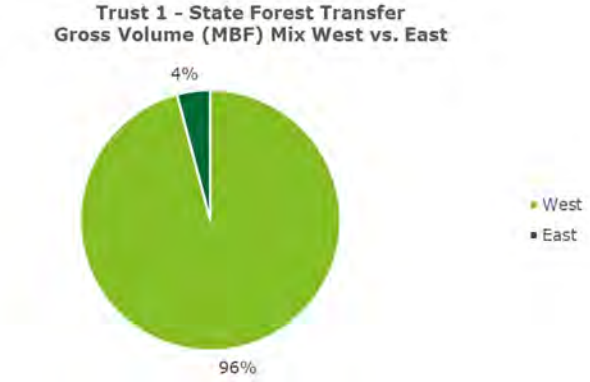
State Forest Transfer Trust – Gross Timber Volume. The following table and chart display the gross timber volume between western and eastern Washington for the second largest trust—the State Forest Transfer Trust.

FIGURE 36



Nearly all of the gross timber volume is in western Washington.

FIGURE 37



The discussion continues in the following section with the net timber volume.

NET TIMBER VOLUME

Consistent with the net acreage discussion provided earlier, the available net timber volume is limited to the net acreage that can be harvested.

The result is a net timber volume amount available to generate timber sales revenue and timber-related activity revenue that is significantly lower than the total gross timber volume amount in the Timber Asset Class.

The following categories highlight the impacts of the net acreage adjustments to the gross timber volume amounts that derive the net timber volume available for timber harvest, which in turn generates the resource revenue for the trust beneficiaries. In general, the adjustments as a percentage of the gross timber volume tend to be higher than the percentage adjustment to the acreage given the species type and average age of the timber stands in these restricted and limited acres. Since the acreage is not harvested, the total volume will continue to age and grow[12].

Long-Term Deferral. Includes approximately 331,923 restricted acres that have an estimated restricted timber volume of 11,505,913 MBF or approximately 27.5 percent of the gross timber volume in the asset class.

Non-Commercial Land. Include approximately 6,778 restricted acres that have an estimated restricted timber volume of 37,585 MBF or approximately 0.1 percent of the gross timber volume in the asset class.

[12] Natural disturbances such as wind throw, landslides, wildfire, etc. may affect growth.

RMZ. Include approximately 241,324 restricted acres that have an estimated restricted timber volume of 6,375,530 MBF or approximately 15.3 percent of the gross timber volume in the asset class. This results in 4,925 net acres that have an estimated 122,238,535 MBF of net harvestable timber.

Uplands. Include approximately 236,322 acres that have an estimated restricted timber volume of 5,578,426 MBF or approximately 13.4 percent of the gross timber volume in the asset class. This results in 288,838 net acres that have an estimated 6,004,952 MBF of net harvestable timber.

GEMs. Include no restricted acres yet certain trees are still restricted to harvest as GEMs lands are still subject to the 1997 HCP and all relevant laws including forest practices. The restricted timber volume is estimated to be 871,564 MBF or approximately 2.1 percent of the gross timber volume in the asset class. This results in an estimated timber volume of 11,276,987 MBF of net harvestable timber.

Net Timber Volume. The following table and charts highlight the impact on the reported gross timber volume in the Timber Asset Class due to the restrictions and limitations detailed earlier. In total, 24,369,019 MBF or 58 percent of gross timber value is limited or restricted based on the weightings of each category. The result leaves a net timber volume of 17,404,178 MBF or 42 percent of the gross timber volume.

FIGURE 38

Timber Asset Class Net Volume Impact (MBF)	Total	West	East
Gross Volume	**41,773,197**	**34,038,116**	**7,735,082**
Less: Long Term Deferral	11,505,913	11,124,118	381,795
Less: Non-Commercial	37,585	11,314	26,271
Less: Riparian Management Zone	6,375,530	6,050,013	325,518
Less: Uplands	5,578,426	4,581,340	997,086
Less: GEMs	871,564	548,205	323,360
Less: Adjustments	**-24,369,019**	**-22,314,989**	**-2,054,030**
Less: Adjustment % of Gross Volume	**-58%**	**-66%**	**-27%**
Net Volume	**17,404,178**	**11,723,127**	**5,681,051**
Net Volume % of Gross Volume	**42%**	**34%**	**73%**
Gross Volume Average MBF Per Acre	20.3	24.7	11.4
Net Volume Average MBF Per Acre	14.0	17.3	10.1

Before the net adjustment, the reported western Washington gross timber volume exceeded eastern Washington by nearly a factor of five. After adjustment, the net timber volume for western Washington dropped substantially to a factor of approximately two. This is a result of the number of acres impacted and the corresponding higher density of volume on that acreage.

FIGURE 39

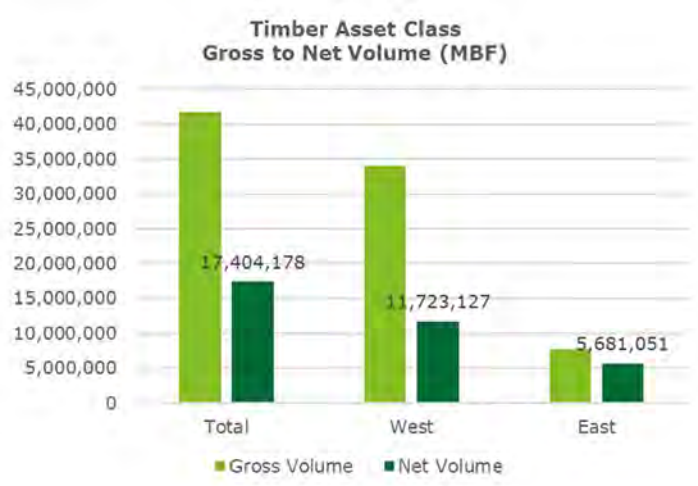
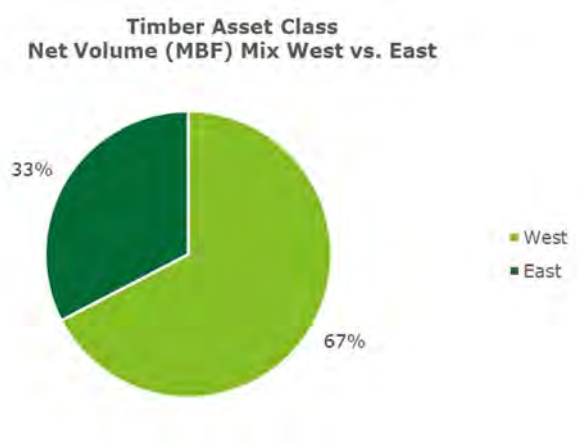


FIGURE 40



Average MBF Per Acre. The table above also highlights the quality and productivity variances between western and eastern Washington. Specifically, the average gross volume per acre (based on gross acreage) in western Washington is 24.7 MBF versus 11.4 MBF for eastern Washington.

After the net acreage adjustment, the average net volume per acre (based on net acreage) decreases substantially to 17.3 MBF for western Washington and slightly downward to 10.1 MBF for eastern Washington. The average volume per acre clearly shows the acreage in western Washington has the most productive and older stands in the Timber Asset Class.

FIGURE 41

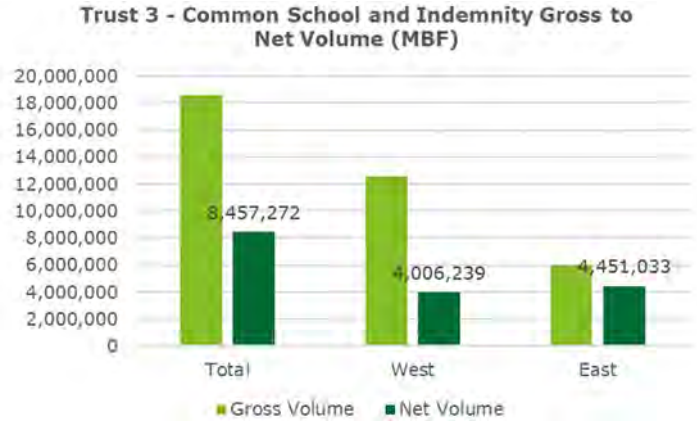
Common School and Indemnity Trust – Net Timber Volume. The following table and charts highlight the impact of the net volume adjustment on the timber volume for the largest trust ownership interest.

FIGURE 42

Common School and Indemnity Net Volume Impact (MBF)	Total	West	East
Gross Volume	**18,588,311**	**12,580,152**	**6,008,159**
Less: Long Term Deferral	4,895,266	4,584,485	310,781
Less: Non-Commercial	24,239	4,237	20,002
Less: Riparian Management Zone	2,301,395	2,043,472	257,923
Less: Uplands	2,489,018	1,788,392	700,626
Less: GEMs	421,122	153,327	267,795
Less: Adjustments	**-10,131,040**	**-8,573,913**	**-1,557,126**
Less: Adjustment % of Gross Volume	**-55%**	**-68%**	**-26%**
Net Volume	**8,457,272**	**4,006,239**	**4,451,033**
Net Volume % of Gross Volume	**45%**	**32%**	**74%**
Gross Volume Average MBF Per Acre	17.1	23.7	10.8
Net Volume Average MBF Per Acre	12.1	16.8	9.6

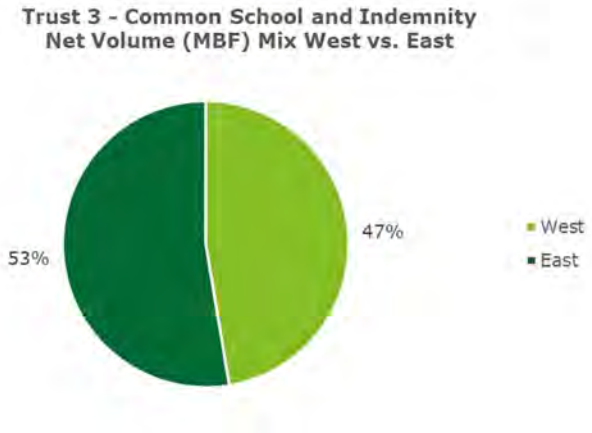
The impact on the timber volume for the highly productive western Washington stands was a substantial decrease of 8,573,913 MBF or 68 percent[13] of the gross volume and resulted in only 4,006,239 MBF or 32 percent[14] of the gross volume available for harvest.

FIGURE 43



The net effect is a reduction in the western Washington percentage of total gross volume from a large majority of the timber volume down to 47 percent of the total net volume (4,006,239 MBF / 8,457,272 MBF).

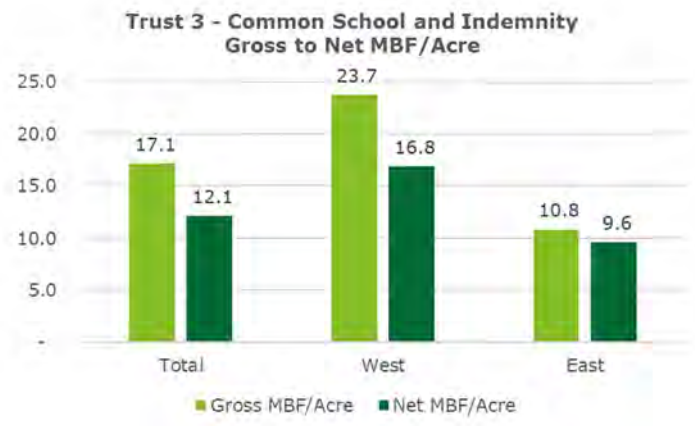
FIGURE 44



Average MBF Per Acre – Common School and Indemnity Trust. The Common School and Indemnity Trust table above also highlights the quality and productivity variances between western and eastern Washington. Specifically, the average gross volume for western Washington is 23.7 MBF per acre (i.e., gross volume / gross acreage) versus 10.8 MBF per acre for eastern Washington.

[13] (8,573,913 MBF / 12,580,152 MBF)
[14] (4,006,239 MBF /12,580,152 MBF)

FIGURE 45



After the net acreage adjustment, the average net volume (i.e., net volume / net acreage) decreased substantially to 16.8 MBF per acre for western Washington and slightly downward to 9.6 MBF per acre for eastern Washington. The average volume per acre clearly shows the acreage in western Washington has the most productive and oldest stands in the Timber Asset Class.

State Forest Transfer Trust – Net Timber Volume. The following table and charts highlight the impact of the net volume adjustment on the second largest trust ownership interest. This trust owns 30.27 percent of the gross volume (12,642,816 MBF / 41,773,197 MBF), but the net volume adjustment was approximately 7,794,520 acres or 62 percent of its Timber Asset Class ownership interest (7,794,520 MBF / 12,642,816 MBF).

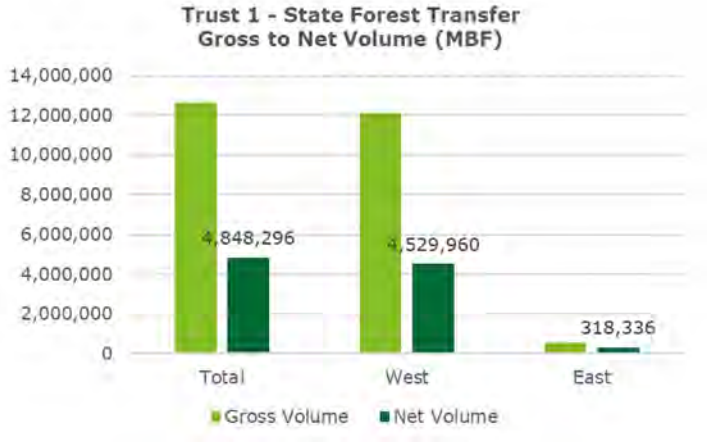
FIGURE 46

State Forest Transfer

Net Volume Impact (MBF)	Total	West	East
Gross Volume	**12,642,816**	**12,119,548**	**523,269**
Less: Long Term Deferral	3,646,171	3,636,957	9,214
Less: Non-Commercial	8,013	2,552	5,461
Less: Riparian Management Zone	2,207,926	2,192,886	15,040
Less: Uplands	1,666,159	1,505,950	160,209
Less: GEMs	266,250	251,242	15,008
Less: Adjustments	**-7,794,520**	**-7,589,588**	**-204,932**
Less: Adjustment % of Gross Volume	**-62%**	**-63%**	**-39%**
Net Volume	**4,848,296**	**4,529,960**	**318,336**
Net Volume % of Gross Volume	**38%**	**37%**	**61%**
Gross Volume Average MBF Per Acre	24.6	24.6	26.2
Net Volume Average MBF Per Acre	17.3	17.0	23.8

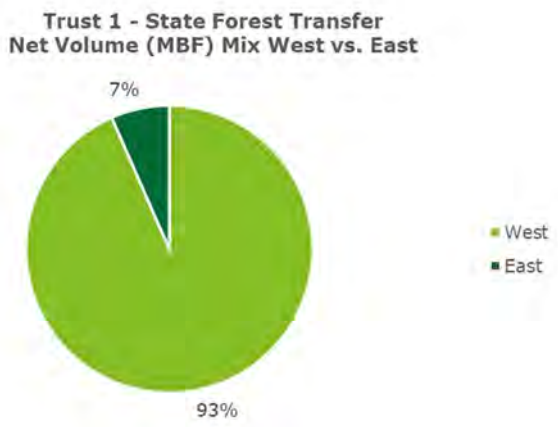
The impact on the timber volume for eastern Washington stands was a decrease of 204,932 MBF of timber volume, or 39 percent of the gross volume (204,932 MBF / 523,269 MBF) and results in only 318,336 MBF or 61 percent (318,336 MBF / 523,269 MBF) available for harvest.

FIGURE 47



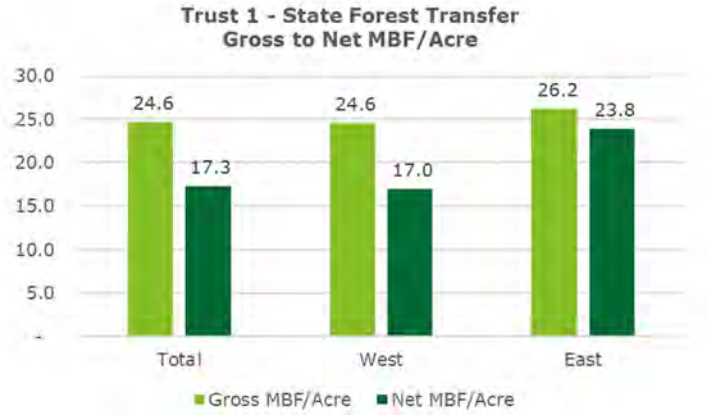
93 percent of the total net timber volume for this trust was on the side of western Washington.

FIGURE 48



Average MBF Per Acre – State Forest Transfer Trust. At first glance, the State Forest Transfer Trust table appears to indicate this trust's timber volume in eastern Washington has timber densities superior to western Washington on both a gross volume and net volume basis.

FIGURE 49



However, the entire eastern Washington land holding for the State Forest Transfer Trust only comprises approximately 19,999 gross acres and 13,348 net acres. The gross acreage to net acreage calculation table from earlier in this chapter is provided again in the following table.

FIGURE 50

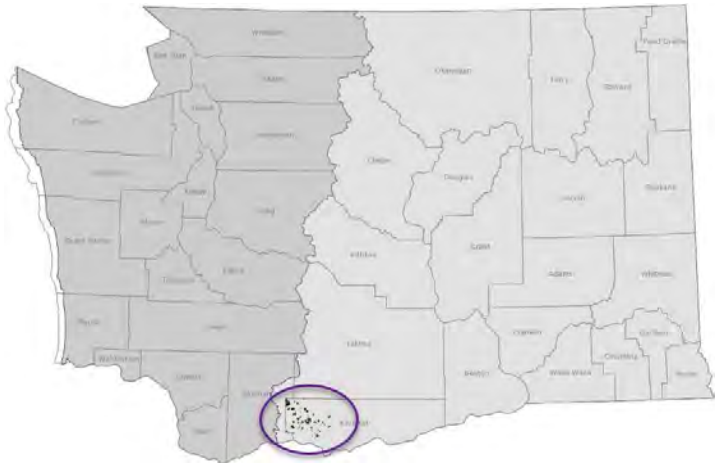
State Forest Transfer

Net Acreage Impact	Total	West	East
Gross Acreage	**512,905**	**492,906**	**19,999**
Less: Long Term Deferral	96,273	96,054	219
Less: Non-Commercial	1,440	469	971
Less: Riparian Management Zone	72,816	72,274	542
Less: Uplands	62,366	57,446	4,919
Less: GEMs	0	0	0
Less: Adjustments	**-232,895**	**-226,243**	**-6,652**
Less: Adjustment % of Gross Acres	**-45%**	**-46%**	**-33%**
Net Acreage	**280,010**	**266,662**	**13,348**
Net Acreage % of Gross Acres	**55%**	**54%**	**67%**

This trust's high-density timber volume in eastern Washington was related to its specific location within the eastern Washington classification. In this case, a reported 17,870 (89 percent) gross acres out of the 19,999 gross acres is located along the western and southern borders of Klickitat County on the north side of the Columbia River. This acreage is detailed in the following map.

FIGURE 51

State Forest Transfer – Eastern Washington Location



At this location, the Cascade mountain range is tapering down to the state border at the Columbia River and creates an environment similar to western Washington. As a result, the timber volume densities are similar to the western Washington timber volume densities. Later in the valuation analysis, the unique location of this acreage was taken into consideration and refinements were made to account for the quality of the land and timber volume for this trust's eastern Washington ownership.

TIMBER SPECIES SUBGROUPS

Timber is a sustainable natural resource and a commodity. The demand for and related value of timber varies by species and quality.

For the purposes of analyses, the Timber Asset Class was further divided into various subgroups (as appropriate) for analysis. The subgroups selected were based on either asset management criteria, asset valuation criteria, or the availability of asset data needed for the purpose of the analyses. We find the segregation of the Timber Asset Class into the relevant subgroups is appropriate given the overall scope of the engagement.

Timber stands vary in when they were established. Individual stands located in western Washington are typically of a uniform or consistent age; while stands located in eastern Washington are less uniform and are called uneven-aged stands.

Access to most of the forest lands is provided by nearly 9,000 miles of state-owned roads that vary in quality and condition; some stands have no legal or road access.

The Timber Asset Class is broken out into subgroups based on multiple factors including age, soil productivity, topography, region, and species type.

Within the Timber Asset Class, four species type groups were selected for analytical purposes.

Species Type Groups. The four species type groups and their definitions are as follows:

1. **Douglas Fir:** Species include Douglas Fir and western Larch
2. **Hardwood:** Species include Aspen, Bigleaf Maple, Birch, Black Cottonwood, Mixed Hardwood, Oregon Ash, Paper Birch, and Red Alder

3. **Whitewood:** Species include Engelmann Spruce, Grand Fir, Lodgepole Pine, Mountain Hemlock, Noble Fir, Pacific Silver Fir, Ponderosa Pine, Sitka Spruce, Subalpine Fir, True Firs, Western Hemlock, Western White Pine, and Whitebark Pine
4. **Cedar:** Species include Alaska Yellow Cedar and Western Red Cedar

Other species of trees are found on state trust lands but have no commercial value. These include but are not limited to Cherry, Crabapple, Pacific Madrone, and Willow trees. All non-commercial species have been excluded from the net harvestable acreage and volume totals.

Species Group by Net Acreage. The following table presents the reported net acreage compiled by species type group.

FIGURE 52

The previous figure indicates most of the net acreage has been predominately Douglas Fir timber. Douglas Fir lumber is considered one of the best woods for home building due to its ability to withstand more extreme weather and last longer than other wood types. From the marketplace's perspective, Douglas Fir is more desirable (i.e., higher demand) as it is stronger, more durable, and can handle higher impacts and weight loads than other wood types. As a result, its market demand is tied closely to the national housing market.

Species Volume. The following table presents timber volume (MBF) on the reported net acreage compiled by species type group.

FIGURE 53

Timber as a Commodity

The value of timber (trees) is related to the value and demand for the products that can be made from timber. This is dictated by size (height and diameter), species, and quality of the timber trees.

Timber, like any other commodity, experiences price fluctuation according to the laws of supply and demand; prices may vary significantly from one part of the state to another. Implicit in the timber price is the cost to harvest the timber and deliver it to the market.

Timber has a built-in hedge against price fluctuations. If log prices drop, owners can postpone harvesting trees. During this time, the trees grow more valuable as they grow larger and thicker, creating more timber volume. However, as a timber tree reaches maturity, the rate of growth slows.

Operational History

Timber Asset Class operations produce a large majority of revenue generated by the asset classes.

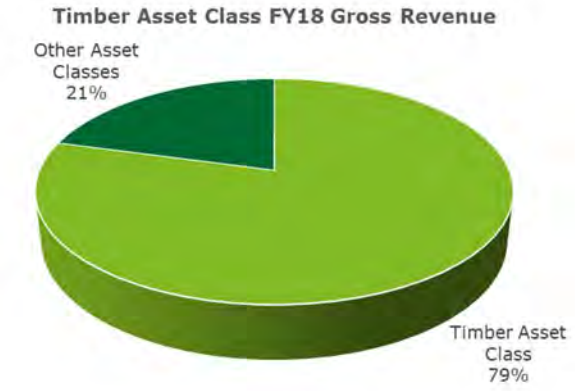
OPERATIONS

From the perspective of the beneficiary trusts, Timber Asset Class operations comprises three components:

1. **Timber Revenue**—Set by market price for the timber commodity via a public auction bidding process
2. **Operating Cost Percentage Deduction**—A fixed percentage of revenue paid for all operating expenses and capital expenditures
3. **Net Cash Flow**—Revenue minus the operating cost percentage deduction[15]

The Timber Asset Class generates approximately 79 percent of all revenue generated by all of the asset classes and as a result pays the largest amount of the operating cost percentage deduction that funds all operating expenses and capital expenditures.

FIGURE 54

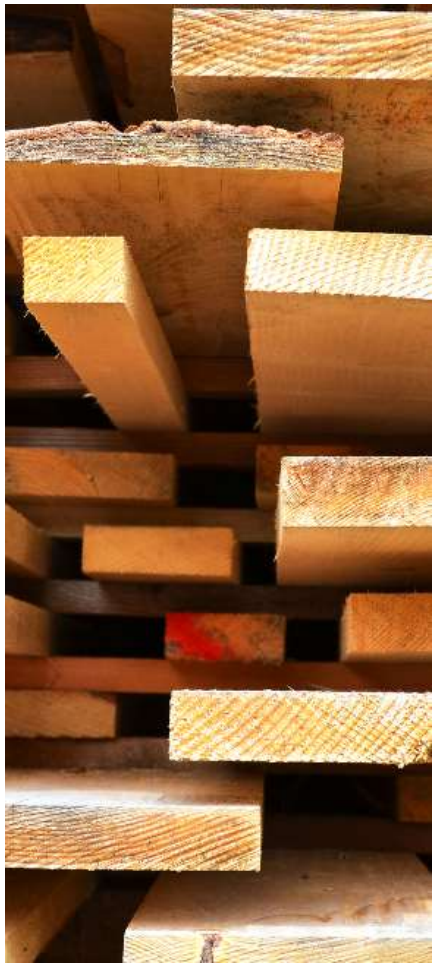


TIMBER ASSET CLASS REVENUE FROM 2007 TO 2018

The following table displays the total reported gross revenue (before the operating cost percentage deduction) received from annual timber-related activities from 2007 to 2018.

The revenue is from:

- All contract harvest sales
- Forest health and forest improvement sales
- Stumpage scale sales
- Stumpage lump-sum sales



[15] Purchasers of timber contracts also pay a charge for the use of roads maintained by DNR in addition to stumpage amount bid at the auction, authorized under RCW 79.38.030. This charge is paid separately but may impact the stumpage bid.

Contract Harvest Sales. Timber operations occurring on state trust forests in which the department contracts with a firm or individual to perform all necessary harvesting work to process trees into logs sorted by department specifications. The department then auctions the individual log sorts.

Forest Health and Forest Improvement Sales. Sales authorized by The Forest Health Program[16], which are not necessarily profitable, but are needed to set stands on a healthy trajectory.

Stumpage Scale Sales. Any sale offered with per unit prices to be applied to the material conveyed. Units can refer to the weight or MBF volume of valuable materials being removed.

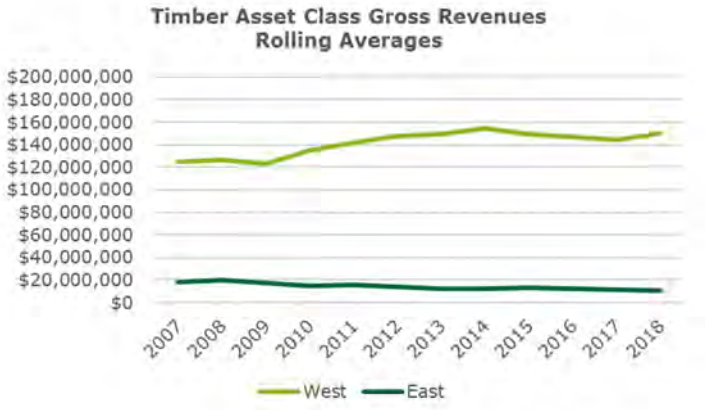
Stumpage Lump-Sum Sales. Any sale offered with a single total price applying to all the material conveyed.

The reported annual gross revenue in the following chart has been divided to show portions attributed to areas in western and eastern Washington. Revenue amounts were not adjusted for inflation and are presented in this report in nominal values, not real values.

FIGURE 55

The following chart shows the rolling five-year average gross revenue for the western and eastern Washington regions.

FIGURE 56



[16] In 2018, the Forest Health program started to be used in lieu of the Forest Improvement Treatment Program

Payments that comprise gross revenues are paid right before the physical removal of the timber takes place. (e.g. If a buyer desires to remove 30 percent of timber from a timber stand won at an auction, the buyer must pay 30 percent of the agreed upon payment before the timber can be removed.) The following chart highlights the purchased timber volume removed to source the revenue generated by the West and East regions. Note that the volume removed does not include volume from Forest Health and Forest Improvement Treatments.

Forest Health and Forest Improvement Treatment timber sales operate through legislatively designated revolving accounts that allow the Trust Manager to capture all costs from the proceeds of the timber sale. The volume from these sales are not reflected in the Trust Manager's revenue system. This volume is reported separately to the legislature. As such, gross revenues received from Forest Health and Forest Improvement sales are included when presenting total gross revenues, but they are excluded when presenting revenue-per-MBF measurements.

FIGURE 57

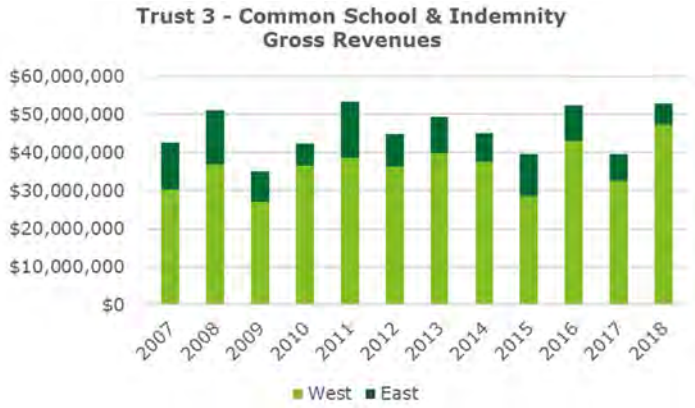
The following chart shows the average revenue per MBF removed for the Timber Asset Class. Note that the gross revenue and removed volume do not include revenue or volume from Forest Improvement Health and Treatment sales.[17]

[17] These types of timber sales operate through legislatively designated revolving accounts that allow the department to capture all costs from the proceeds of the timber sale. The volume from these sales are not reflected in the Trust Manager's revenue system. This volume is reported separately to the legislature.

FIGURE 58

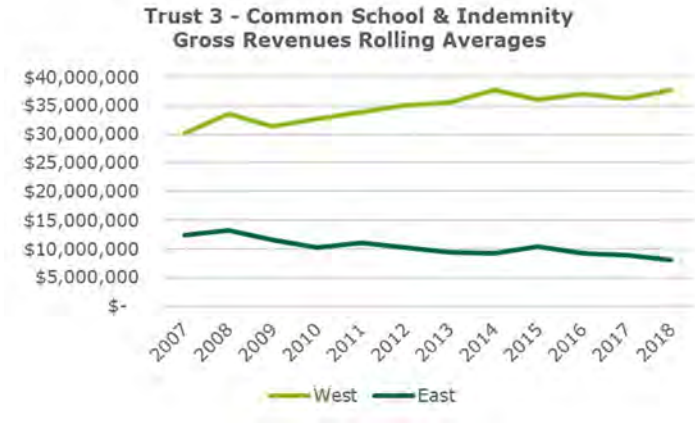
Common School and Indemnity Trust. The following chart displays the total reported gross revenue for the Common School and Indemnity Trust (before the operating cost percentage deduction) received from annual timber-related activities from 2007 to 2018.

FIGURE 59



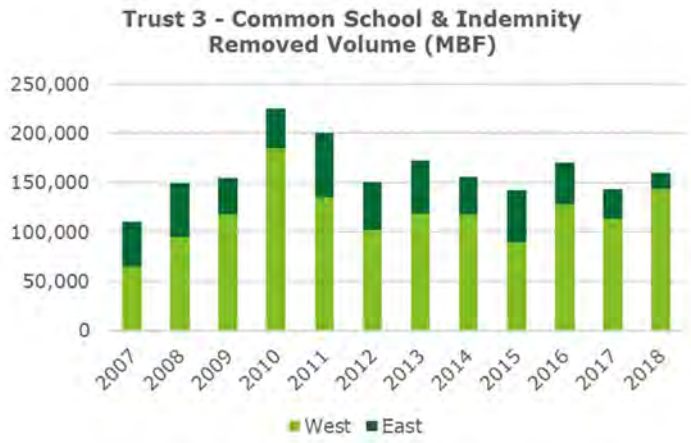
The following chart shows the rolling five-year average gross revenue for the West and East regions.

FIGURE 60



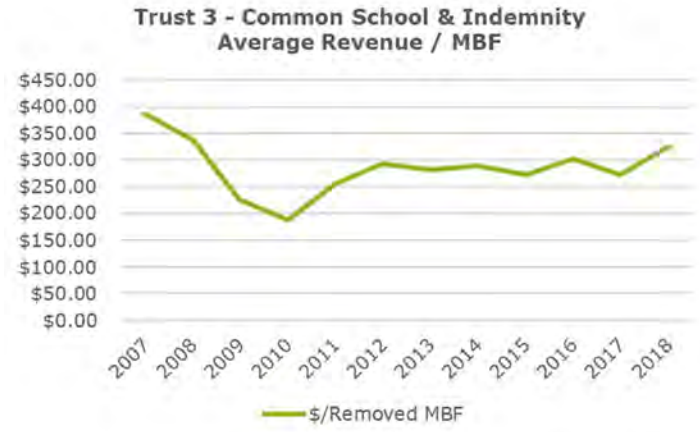
The next chart highlights the timber volume purchased and removed to source the revenue generated by the Common School and Indemnity Trust in the West and East regions. Note that the volume removed does not include volume from Forest Health and Forest Improvement Treatments.

FIGURE 61



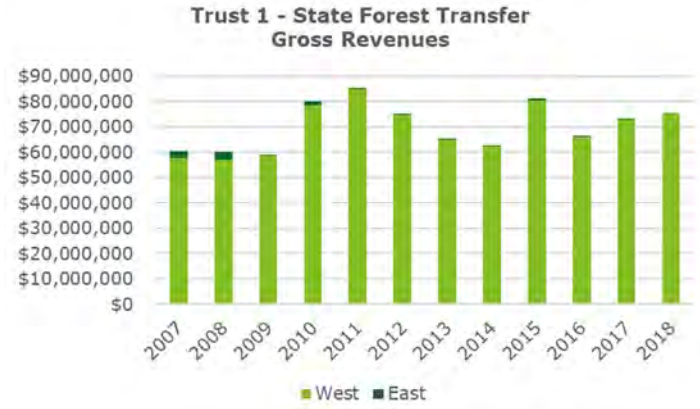
An additional chart displays the average revenue per MBF removed for the Common School and Indemnity Trust. Note that the gross revenue and removed volume do not include revenue or volume from Forest Health and Forest Improvement Treatment sales.

FIGURE 62



State Forest Transfer Trust. The following chart displays the total reported gross revenue for the State Forest Transfer Trust (before the operating cost percentage deduction) received from annual timber-related activities from 2007 to 2018.

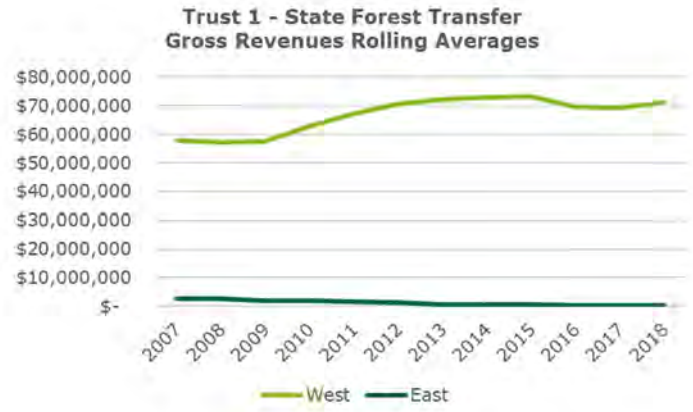
FIGURE 63



The reported annual gross revenue above has been divided to show portions attributed to areas in the West and East regions. As shown above, the majority of lands owned by the State Forest Transfer Trust are located in western Washington.

The following chart shows the rolling five-year average gross revenue for the West and East regions.

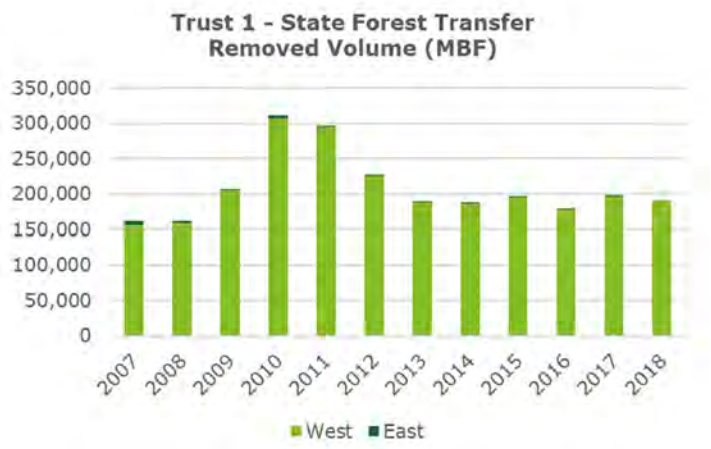
FIGURE 64



The bulk of timberland for the State Forest Transfer Trust is located in the West region. The gross revenue for the East has declined from over $2 million to nearly $200,000 over the past 12 fiscal years.

The following chart highlights the timber volume purchased and removed to source the revenue generated by the State Forest Transfers Trust between the West and East regions. Note that the volume removed does not include volume from Forest Health and Forest Improvement Treatments.

FIGURE 65



The following chart shows the average total revenue per MBF removed for the State Forest Transfers Trust. Note that the gross revenue and removed volume do not include revenue or volume from Forest Health and Forest Improvement Treatment sales.

FIGURE 66

OPERATING COST PERCENTAGE DEDUCTION

In the Timber Asset Class, all costs are paid from annual revenue. As gross proceeds are received, an operating cost percentage deduction is applied and paid to the Trust Manager. From the trust beneficiary's ownership position, there are no additional outflows of funds beyond the operating cost percentage deduction to operate and maintain the Timber Asset Class. The Trust Manager budgets for the actual costs and capital expenditures to maintain the Timber Asset Class and pays for these directly from the operating cost percentage deduction received during the year.

The operating cost percentage deduction is legislatively set and typically ranges between 25 percent and 31 percent of total gross revenues, depending on the management account associated with each trust ownership. Historical data reported in this analysis reflects actual blended rates deducted. We have used an estimated assumption of 28 percent for the operating cost percentage deduction of this asset class which has been applied in the direct capitalization method.

The actual costs incurred by the Trust Manager include direct operating costs to generate revenue in the current year, capital expenditures to generate revenue in future years, and costs required or necessary that will not directly generate revenue.

Operating Cost Percentage Deduction versus Direct Operating Expenses. The operating cost percentage deduction can be, and often is, different than actual operating expenses and capital expenditures incurred to operate and manage the Timber Asset Class. The operating cost percentage deduction may be less or greater than the actual operating expenses and capital expenditures for any one year.

When the total operating cost percentage deduction for all asset classes exceeds actual operating costs and capital expenditures for all asset classes, the excess is held in reserve for future years when the operating cost percentage deduction does not cover the actual costs. The reserve balances are reported by funds held in separate accounts—the Resource Management Cost Account, the Forest Development Account, and the Agriculture College Trust Management Account.

The Resource Management Cost Account in the state treasury is created and used solely for the purpose of defraying the costs and expenses incurred by the department in managing and administering state trust lands, state-owned aquatic lands, and the making and administering of leases, sales, contracts, licenses, permits, easements, and rights-of-way as authorized (RCW 79.64.020).

The Forest Development Account was created in the state treasury (RCW 79.64.100). Money placed in this account is first used for paying interest and principals on specific bonds issued by the department. Appropriations made by the legislature from the Forest Development Account to the department are for carrying out forest management activities on state forestlands and for reimbursements of expenditures from the Resource Management Cost Account in the management of state forestlands.

The Timber Asset Class has a third account, the Agriculture College Trust Management Account. This account does not retain an operating cost percentage deduction, but the Trust Manager receives a direct appropriation from the legislature to conduct management work. The Trust Beneficiary retains all gross revenue. Expenditures in the Timber Asset Class include funds provided by the Agriculture College Trust Management Account.

The reserve balances for all asset classes as of June 30, 2018 were approximately $12.6 million (Resource Management Cost Account) and nearly $4 million (Forest Development Account). Over the last 10 years, the Resource Management Cost Account reserves reached a high of more than $17 million at the end of FY 2014 and a low of $800,000 at the end of FY 2009. The Forest Development Account reserves reached a high of $24 million at the end of FY 2011 and a low of just under $4 million at the end of 2018. However, note that these are snapshots as of the end of fiscal years. In reality, the balances of the funds are constantly changing throughout each year with a much wider range. Reserves have been known to dip down to only a couple weeks of operating costs on a few occasions.

The following chart presents the dollar amounts of the historical operating cost percentage deductions from 2007 to 2018.[18] The operating cost percentage deduction is proportionate to the gross revenues produced by the asset class each year—it rises and falls as earnings for trusts rise and fall and may not reflect increases or decreases in the Trust Manager's actual costs.

FIGURE 67

ACTUAL COSTS

The following is a discussion of the actual costs incurred by the beneficiary trusts and paid by the Trust Manager from the funds received from the operating cost percentage deduction.

Direct Expenses. Currently, direct expenses include all costs directly related to managing the Timber Asset Class, including:

- Silviculture
- Seed orchards and planting
- Timber sale layout
- Projects and planning
- Administration of sold sales

Direct costs also include allocations of other costs for:

- Engineering support services
- Environmental analysis
- Training
- State lands infrastructure

[18] Data from the Trust Manager's DataMart MR12C report

The majority of total engineering support services costs incurred (80 percent) are allocated to the Timber Asset Class.

The table below shows that direct expenses are generally around $40 million per year for the Timber Asset Class.

FIGURE 68

Indirect Expenses. Indirect expenses include all allocated agency overhead costs for:

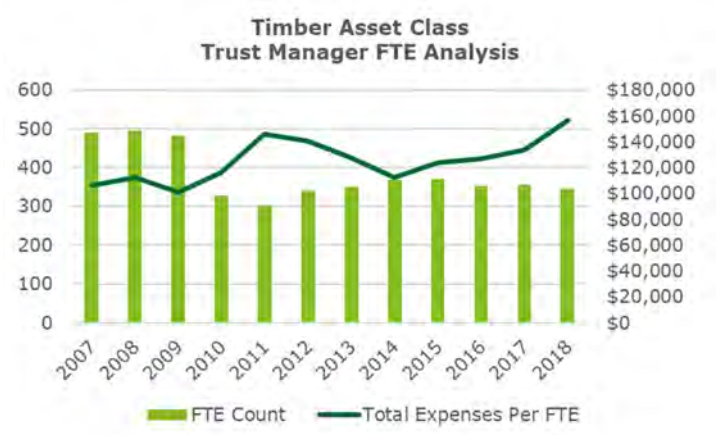
- Administrative and agency support
- Adjustments
- Legal services
- Strategic investments
- Other administrative payments

Total indirect expenses have been allocated to the different asset classes based on the amount of full-time employee (FTE) time logged toward each asset class. The Timber Asset Class receives the majority of allocated administrative costs (86 percent) due to the higher number of FTEs utilized in forestry. Indirect expenses can range from $7 million to $12 million each year. However, the amount reported in FY 2012 was much higher at approximately $17 million due to a large agency overhead expense made for strategic investments. The Trust Manager's accounting system does not account for indirect expenses in the East and West regions.

FIGURE 69

As seen in the following FTE analysis chart, the Trust Manager has averaged between 300 to 400 FTEs for the Timber Asset Class in recent years, with the lowest FTE counts following the initial years of the Great Recession. Total allocated expenses incurred by the Trust Manager have increased from $120,000 per FTE to nearly $160,000 per FTE in the past five years. These costs include all actual costs for the asset class—direct and indirect expenses which include not just salaries but benefits, overhead, etc.

FIGURE 70



Non-Net Acreage Expenses. As detailed previously, the Timber Asset Class acreage is described as gross acreage and net acreage, with the net acreage generating all of the revenue for the beneficiary trusts. However, the beneficiary trusts also incur expenses for the acreage that are restricted or limited from the net harvestable acreage. Examples of these expenses include costs for security, road maintenance and construction, easements, and access permits.

The Trust Manager's accounting system does not record costs to the level of detail required to distinguish between harvestable and restricted acres. The Trust Manager estimates that roughly 10 percent of total expenses are attributable to lands excluded from the net harvestable acreage.

NET CASH FLOW FROM 2014 TO 2018

Trust beneficiaries pay a portion of the gross revenue (i.e., operating cost percentage deduction) to the Trust Manager for operating expenses and capital expenditures. These costs include direct and indirect expenses. The cash flows net of the operating cost percentage deduction are then distributed to the appropriate funds by ownership.

The following table summarizes the net cash flows received from the Timber Asset Class and distributed to trust beneficiaries over the past five fiscal years. As can be seen, gross revenue for the trust beneficiaries ranged from $150 million to $174 million in the past five years, and the net cash flow received has ranged from $109 million to $125 million

FIGURE 71

Net Cash Flow to Trust Beneficiaries

	2014	2015	2016	2017	2018
Timber Asset Class Gross Revenues	$151,531,280	$161,186,660	$165,542,543	$154,088,758	$174,383,083
Less: Operating Cost Percentage Deduction	(42,082,937)	(43,741,383)	(47,910,451)	(45,166,312)	(49,633,129)
(Blended Rate based on revenue sources)	-27.77%	-27.14%	-28.94%	-29.31%	-28.46%
Net Revenue Distributed	**$109,448,344**	**$117,445,277**	**$117,632,092**	**$108,922,446**	**$124,749,955**
(Distribution Percentage)	72.23%	72.86%	71.06%	70.69%	71.54%

The net cash flows have also been presented for the Common School and Indemnity Trust and the State Forest Transfer Trust as these two trusts hold the largest ownerships in the Timber Asset Class.

Common School and Indemnity Trust. The following table summarizes the net cash flows for the beneficiaries of the Common School and Indemnity Trust.

FIGURE 72

Net Cash Flow to Common School & Indemnity Trust

	2014	2015	2016	2017	2018
Common School & Indemnity Gross Revenues	$45,091,737	$39,628,859	$52,236,326	$39,629,423	$52,936,191
Less: Operating Cost Percentage Deduction	(13,978,438)	(12,284,946)	(16,193,261)	(12,285,121)	(16,410,219)
	-31.00%	-31.00%	-31.00%	-31.00%	-31.00%
Net Revenue Distributed	**$31,113,298**	**$27,343,913**	**$36,043,065**	**$27,344,302**	**$36,525,972**
(Distribution Percentage)	69.00%	69.00%	69.00%	69.00%	69.00%

State Forest Transfer Trust. The following table summarizes the net cash flows for the beneficiaries of the State Forest Transfer Trust.

FIGURE 73

Net Cash Flow to State Forest Transfer Trust

	2014	2015	2016	2017	2018
State Forest Transfer Trust Gross Revenues	$62,663,804	$81,040,766	$65,959,407	$72,916,771	$75,454,587
Less: Operating Cost Percentage Deduction	(15,665,951)	(20,260,192)	(16,489,852)	(18,229,193)	(18,863,647)
	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%
Net Revenue Distributed	**$46,997,853**	**$60,780,575**	**$49,469,555**	**$54,687,578**	**$56,590,940**
(Distribution Percentage)	75.00%	75.00%	75.00%	75.00%	75.00%

Property Taxes and Zoning

The State of Washington is exempt from paying forest taxes.

FOREST TAXES

Forest tax is an excise tax that has existed for nearly 50 years. In 1971, the tax began when the state legislature excluded timber from ad valorem property taxation. Private timber owners are required to pay a 5 percent excise tax on the stumpage value of their timber when it is harvested, instead of paying annual property taxes on the trees.

As state municipalities are exempt from paying property taxes, forest taxes are not required to be paid for timber on state trust lands. However, in 1982, forest taxes were extended to timber harvested from state and federal lands, not only private lands. For timber harvested from public lands, owners are defined as the first person (other than the public entity) to acquire title or possessory interest in the timber. As such, buyers of beneficiary trust timber are required to pay taxes on the timber purchased.

Taxed amounts are usually split between the counties and the state general fund. Timber is taxed at 5 percent, with 4 percent retained by counties where the harvest occurred and 1 percent retained by the state general fund. For harvests that include riparian protection, the landowner is granted a total rate of 4.2 percent, with 4 percent retained by the county where the harvest occurred.[19]

ZONING

It is assumed that all timberlands adhere to the proper forest zoning regulations outlined in local general plans. If not fully compliant, it is assumed that each property is legally non-conforming to the proper zoning standards.

[19] Department of Revenue Washington State. (n.d.). Retrieved February 1, 2020, from https://dor.wa.gov/find-taxes-rates/other-taxes/forest-tax

Market Analysis

Prices for timber as a commodity are volatile and can swing greatly from year to year.

INDUSTRY OVERVIEW

The Timber Services Industry manages tracts of timberland and sells the commodity of standing timber to downstream paper, wood, and pulp product manufacturing industries. The majority of timber is utilized in residential construction markets downstream in the supply chain. As such, the robust growth in the US housing market has benefited the industry over the last five years. The increase in residential construction is largely due to mortgage rates remaining low and falling unemployment rates. Rises in housing starts have helped offset decreases in other markets currently challenged by importing competition or technological advancements, such as the wood product and paper manufacturing markets. From 2014 to 2019, industry revenue increased at an annual rate of 5.5 percent. Total revenue in the industry increased by approximately $2 billion in 2019.[20]

DELIVERED LOG PRICES

Log market conditions have fluctuated in the past decade. Average delivered log prices as reported by the Trust Manager have shown volatility. The following table shows average prices of delivered log prices each December since 2013 on a per million board feet basis. The table also shows the year-over-year (YoY) percent change in price.

FIGURE 74

Year	Avg $/MBF	YoY % change
Dec-13	$510	---
Dec-14	$591	16%
Dec-15	$446	-25%
Dec-16	$537	20%
Dec-17	$666	24%
Dec-18	$491	-26%

As seen above, strong swings in log prices ranging between 20 percent and 30 percent have occurred in different directions in any given year.[21]

IMAGE SHOWS A WESTERN HEMLOCK TREE
SOURCE: FOR.GOV.BC.CA

[20] McGinley, D. December 2018. Timber Services in the US. IBISWorld Industry Report 11311.
[21] Retrieved from https://www.dnr.wa.gov/programs-and-services/product-sales-and-leasing/timber-sales/timber-sale-querylog-prices

INDUSTRY SECTOR PERFORMANCE (NATIONAL OVERVIEW)

The rest of the market analysis section is based on information and data sourced from IBISWorld, a trusted industry research firm. IBISWorld defines the timber services industry as managing timber tracts for the purpose of selling standing timber. A timber tract is a parcel of land used for growing timber for harvesting on a long rotation cycle (more than 10 years). The industry sector is a national overview in the United States that includes the state of Washington.

According to the IBISWorld Industry Report published in the December 2018, the Timber Services Industry has a moderate level of capital intensity in line with the rest of the US forestry sector. The sector incorporates a significant degree of capital investment to improve employee productivity and reduce operating expenses.

The industry report does not include many details regarding operating expenses; however, it does provide revenue and operating income for Rayonier Inc., a real estate investment trust that is considered the nation's largest seller of raw timber. The following table highlights the revenue, operating income, and implied operating expenses for Rayonier Inc. over the last several years.

FIGURE 75

Year	Revenue ($ million)	Operating Income ($ million)	% Rev	Implied Expenses ($ million)	% Rev
2013	173.3	28.6	17%	144.7	83%
2014	181.8	29.6	16%	152.2	84%
2015	154.5	21.1	14%	133.4	86%
2016	147.8	46.3	31%	101.5	69%
2017	155.1	40.8	26%	114.3	74%
2018	186.7	44.6	24%	142.1	76%

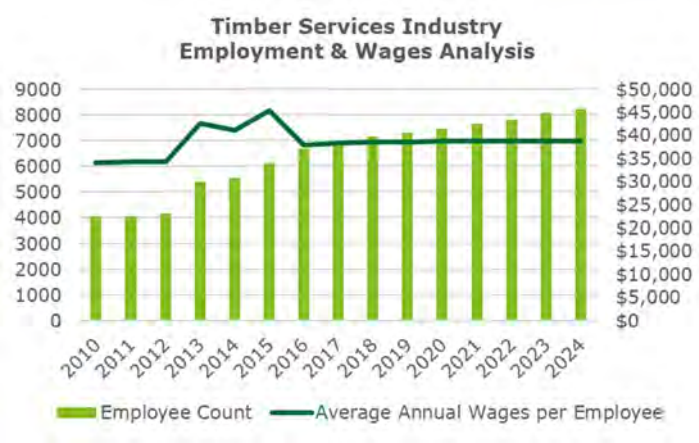
While these financials are not representative of industry averages, Rayonier Inc. competes with many larger companies and has a significant market share in the Timber Services Industry. The company returns operating income between 15 percent to 30 percent of revenue. This implies that operating expenses make up approximately 70 percent to 85 percent of revenue for the company.[22]

The industry report provides key data regarding employment and wages for the industry. Employment consists of the number of permanent, part-time, temporary, and seasonal employees, as well as working proprietors, partners, managers, and executives within the industry. Wages consist of the gross total wages and salaries of all employees in the industry, inclusive of the cost of benefits.

The chart below highlights the historical total employee counts in the Timber Services Industry and the amount of wages paid to those employees. The chart also displays the projected totals over the next five years. This figure is not to be compared to the FTE analysis presented in the Operating History section. This chart reflects only wages, salaries, and benefits per employee in the Timber Services Industry while the FTE analysis takes all costs for the asset class into consideration.

[22] McGinley, D. December 2018. Timber Services in the US. IBISWorld Industry Report 11311.

FIGURE 76



The number of employees in the industry increased substantially from approximately 4,058 in 2011 to 7,134 in 2018, implying a compound annual growth rate of 7.3 percent. The compound annual growth rate is defined as the annual rate of growth required for the beginning balance to grow to its ending balance. Annual average wages paid to employees have risen from approximately $34,000 in 2011 to nearly $39,000 in 2018.

Nationwide employment is forecasted to continue growing between 2 percent to 3 percent each year over the next five years. Total wages are anticipated to grow around the same rate over this time period.[23]

[23] McGinley, D. December 2018. Timber Services in the US. IBISWorld Industry Report 11311.

Methodology

The valuation methodology incorporates a combination of the income approach and the whole property value method inclusive of on-site timber.

METHODOLOGY OVERVIEW

Both the income approach (IA) and the whole property value method inclusive of on-site timber (WPV) are used to value the Timber Asset Class. The IA is the primary basis for the valuation of the asset class, while the WPV method is used as a secondary method.

Additionally, in the value reconciliation discussion, reported timber transactions (asset and enterprise transactions) are presented as a reasonableness test for comparison to the final value conclusion.

Definitions

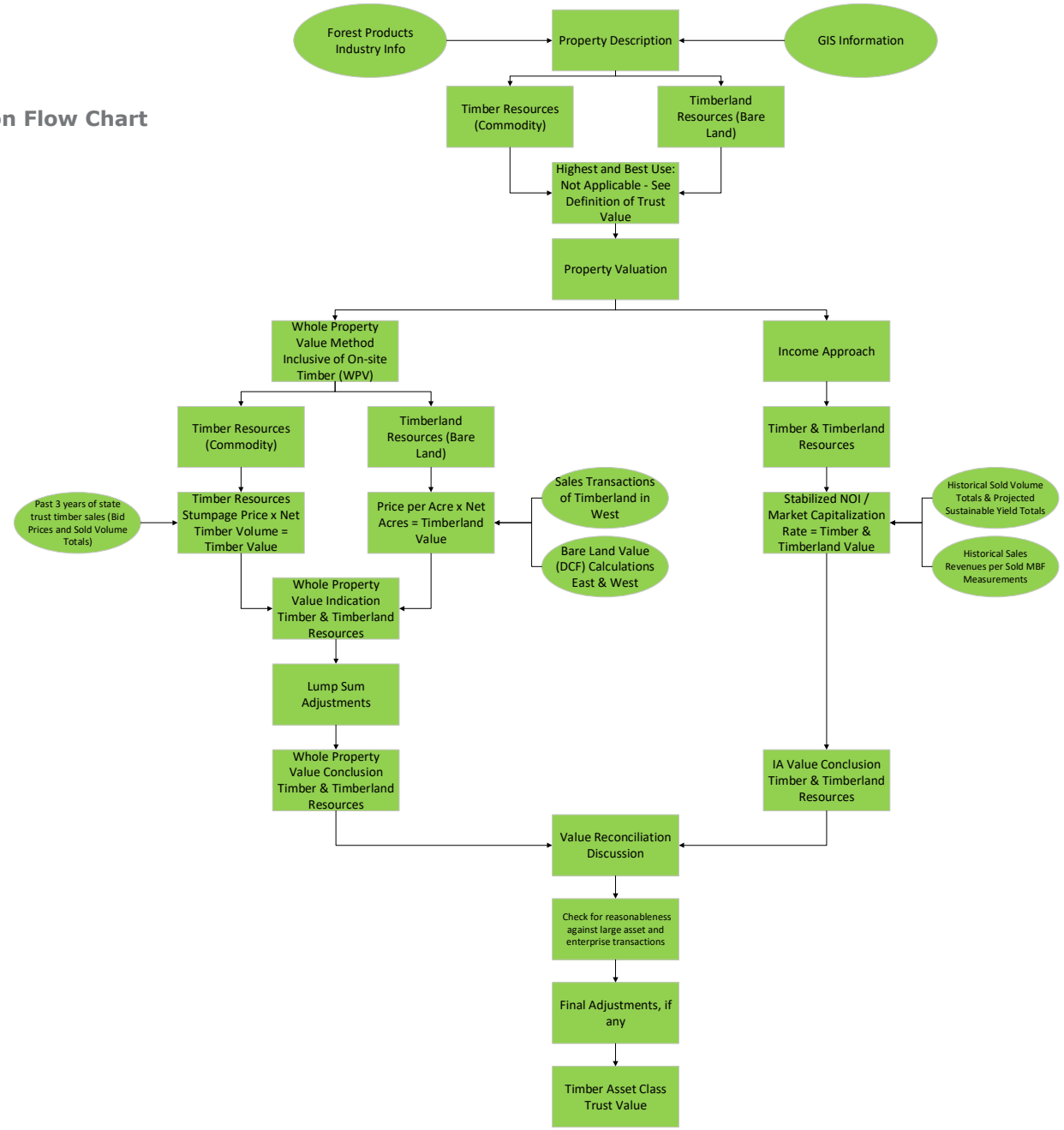
Many terms in the Timber Services Industry have different uses and meanings. It is imperative for readers of this report to understand the meanings associated with the terms used in the valuation analysis in this chapter. A list of terms and their meanings used in this chapter follows:

- **Delivered Log Price:** The value of the log when it arrives at the mill inclusive of all costs for timber (stumpage) harvesting. Specifically, the price captures costs for road construction, transportation, profit and risk.
- **Timber Asset Class:** The asset class of trust-owned lands that include the real property of both timber resources and timberland resources.
- **MBF:** MBF is a forestry term that means "1,000 board feet." M = Roman Numeral = 1000 and BF = board feet. It is common to report timber and log prices in $/MBF. The Trust Manager uses 'Board Feet, Scribner Scale'.
- **Stumpage Price:** The price of commercially valuable standing trees "on the stump." This is the value that the landowner/manager receives for selling the uncut trees.
- **Timber Resources:** Commercially valuable standing trees (commodity), regardless of age or condition. Also called "stumpage." In this study, references to timber or timber value are not intended to include the value of land on which the timber is situated.
- **Timberland Resources:** The land upon which timber or stumpage sits. Also referred to as bare land. In this study, references to timberland or timberland value are not intended to include the value, if any, of timber located on the land.
- **Trust Value:** The value of classes of assets managed by the Washington State Department of Natural Resources, which serves as the Trust Manager or Trust Management. Such assets are subject to specific laws, regulations, or management policies that restrict the use, marketability, or sale of the asset classes. Trust value is an expectation of continuing use as presently employed by Trust Management in its capacity as trust land manager. For further discussion, please reference Chapter 1.

The following page displays a valuation diagram that highlights the overall methodology.

FIGURE 77

Timber Asset Class Valuation Flow Chart



WHOLE PROPERTY VALUE METHOD INCLUSIVE OF ON-SITE TIMBER (WPV)

As described earlier, the WPV method is used to reflect the special nature of timber and timberland valuation. Timber, a commodity, is valued separately from timberland. The contribution of these two elements forms an indication of value for the Timber Asset Class.

The Trust Manager's records related to timber sale activity and independent appraisals obtained in the ordinary course of managing the assets are the principal source of market value information (i.e., comparable sales, actual sales information).

This valuation analysis only includes the net acreage that was described in detail earlier. As a reminder, the net acreage adjustment calculation accounts for a number of limitations and restrictions on timber harvest.

Timber Resources (Commodity) – WPV

Timber is valued by the market based upon its species, log quality, age, expected soil productivity, geographic region, site operability (determined by topography), and accessibility. Since timber is a commodity, buyers and sellers also factor in the distance to the market (typically the sawmills) because the greater the distance, the greater the cost to transport a heavy commodity. Implicitly, this also includes the risk associated with the ability to harvest in the associated political environment.

All of these factors contribute to the Stumpage Price, which is combined with the volume of timber within a stand. At its simplest, the value of a timber stand may be expressed as:

FIGURE 78

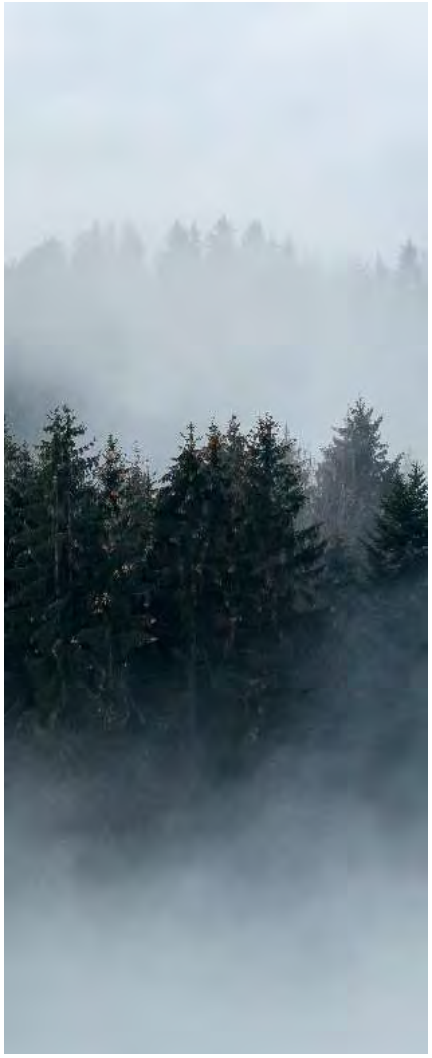
Stumpage Price (in $/MBF)
X Timber Volume (in MBF)
= Timber Value

This formula, however, is overly simple and does not identify underlying factors that affect the stumpage price, such as species, log quality, age, and costs of production.

For standing mature timber that is 60-69 years old or older, stumpage prices are multiplied by current volume levels (as of the date of value) to estimate sales revenue.

For less mature standing timber younger than 60 years old, stumpage prices are multiplied by volume levels that are projected to exist once the timber reaches an estimated harvest age of 60-69 years. The expected volume level relies upon volume growth rates exhibited in volume yield curves for inventory measured in the West region, as provided by the Trust Manager. For timber inventory in the East region, West region growth rates are discounted and utilized to project volume level. Such discounted growth rates reflect the inferior growing conditions in the East region. Research with industry specialists and analysis of the average volume of trust-owned forest lands at maturity (by species) are leveraged to determine the discount to apply to growth rates in the West region.

To calculate projected sales revenue for standing timber younger than 60 years old, the projected volume level at harvest age (i.e., between 60-69 years) is multiplied by the stumpage prices indicated by recent state trust timber sales. Finally, the projected sales revenue is discounted back to the present day to return the present value of standing timber that is younger than 60 years old.



Timberland Resources (Bare Land) – WPV

Timberland is valued on a per acre basis, with the soil's productivity or site index and topography given significant weight in this analysis. Timberland values tend to be higher in the West region than in the East region as land in the West region can generally produce more timber due to superior precipitation and growing conditions. Land value conclusions on a per acre basis are based on two considerations:

1. *Allocated Land Values:* The value of timber is extracted from the sales price from actual timberland transactions to reach the allocated value of the underlying land only. Note that none of these transactions are of the size and scale of the entire Timber Asset Class. Also note that the compiled timberland transactions are located in the West region and, as such, are only utilized to conclude on the prices per acre for the West region.
2. *Bare Land Values:* The discounted cash flow (DCF) method is used to calculate the residual value of theoretical land purchased with the intent to plant, grow, and sell commercial timber.

Consideration of Allocated Land Values

Actual transactions and appraisals obtained from the Trust Manager's records are used as comparables when determining land values, along with additional transactions provided by market participants.

The timber value is estimated and deducted from a transaction's overall sales price, and the remainder price is attributed to the underlying timberland. While different transactions contain property-specific influencers that affect the sales price, they provide a general range of prices to be expected per acre of timberland. The bottom end of the range includes prices for steeper land with inferior soil productivity, while the upper end of the range includes prices for level land with superior soil productivity.

Consideration of Bare Land Values

A bare land value analysis is also performed as an additional consideration when concluding on land values on a per acre basis. The bare land value calculations are utilized as a secondary approach to make price per acre conclusions for the West region (most reliance was placed on allocated land values from actual transaction data). Bare land value calculations are the only consideration used for price per acre conclusions made for the East region.

Specifically, the DCF method is used to calculate the residual value of theoretical land purchased with the intent to plant, grow, and sell commercial timber. Typical silviculture and management costs were surveyed and provided by the Trust Manager and applied as appropriate over the holding period of the DCF. The expected sales revenue in the targeted year of harvest is calculated by multiplying the projected volume level by the concluded stumpage price as no growth rate is applied to the current stumpage price. The growth rates utilized for volume growth align with the growth multiples used when valuing timber resources. The cash flows are discounted back to a net present value representative of how much a buyer would be willing to pay for the land.

Using both considerations described above, land value prices per acre are determined for each subgrouping of land in the West and East regions. The conclusions are then multiplied accordingly by the total acres in each subgrouping to calculate the value of bare land in each subgrouping. The combined values result in the total value attributable to timberland resources (i.e., bare land).

INCOME APPROACH (IA)

The IA utilizes the direct capitalization method, which capitalizes one year's income expectancy[24] at a market-derived capitalization rate to determine the combined value of timber and timberland resources in the Timber Asset Class.

Timber Asset Class – IA

The direct capitalization method captures the value of annual sales revenue received for timber purchased into perpetuity. One year's income expectancy is calculated by determining a typical gross sales revenue amount composed of two parts: (1) the stabilized volume level expected to be purchased and removed in a given year and (2) the anticipated sales price for the removed volume.

Historical amounts of harvested volume as well as reported forecasted volume levels are considered when concluding on the stabilized volume level.

When concluding on the anticipated sales revenue to be received for each MBF of volume, historical revenue is measured against the corresponding volume level removed (in MBF) in the same year. Payments that comprise gross revenues are paid right before the physical removal of the timber takes place. (e.g. If a buyer desires to remove 30 percent of timber from a timber stand won at an auction, the buyer must pay 30 percent of the agreed upon payment before the timber can be removed.)

Additionally, average stumpage prices on a $/MBF basis from individual sales of timber 40 years and older over the last three years are also considered.

Gross sales revenue is estimated by multiplying the concluded stabilized volume level (in MBF) by the concluded timber revenue (pricing) amount per MBF. An assumed stabilized operating cost percentage of 28 percent is then deducted to return the net income distributed to trust beneficiaries. The expected stabilized operating cost percentage deduction is based on historical deductions averaging near this blended rate.

The net income distributed to the trust beneficiaries is capitalized by a market-derived capitalization rate that returns the value indication of the timber resources. Further discussion regarding this rate can be found in the earlier chapter that focuses on rates of return.

Data and Data Sources

Data was compiled and analyzed from multiple data sources, including reputable industry publications that are widely known and utilized by owners, operators, investors, managers, lenders, and real estate appraisers within the Timber Services Industry. These data sources include and are not limited to the Pacific Northwest Timberland Investment Survey by Sizemore & Sizemore, Inc., as well as market data provided by S.A. Newman, an appraisal firm that specializes in providing appraisals and natural resource consulting services to the industry.

As mentioned earlier, the principal source of market value information is the Trust Manager's records, which include comparable sales, actual sales information, and volume yield growth curves.

[24] Projected income less expenses that are both subject to change but that have been adjusted to reflect equivalent stable property operations.

Extraordinary Assumptions

It is assumed that all timberlands adhere to the proper zoning regulations outlined in regional plans. If not fully compliant, it is assumed that each property is legally non-conforming to the proper zoning standards.

As previously discussed in the chapter regarding restrictions and burdens, the Trust Manager's ability to sell, exchange, or transfer state trust lands is limited by statute. For the purpose of this analysis, we assume that the ownership interest is non-transferable resulting in the land not being able to be sold.

We relied on information provided by the Trust Manager for all specific data regarding data files, leasing activities and financials, size and ownership information, etc. We assume that all information provided by the Trust Manager is accurate and sufficient for the purpose of this valuation.

Hypothetical Conditions

None noted.

Whole Property Value

The WPV method combines market data for timber and the underlying land.

INTRODUCTION

As described in the methodology section of this chapter, the whole property value method inclusive of on-site timber reflects the special nature of timber (i.e., commodity) and timberland (i.e., bare land) valuation. Timber is valued separately from timberland; the contributions of these two elements form a total indication of value for the Timber Asset Class.

Trust Manager data files have been the principal source of market and value information (comparable sales, actual sales information), based upon timber sale activity and independent appraisals which are obtained in the ordinary course of the management of assets and properties.

TIMBER RESOURCES VALUATION

Timber Subgroupings

For purposes of the timber resources valuation analysis, it is important to recognize that different species types and factors drive pricing; thus, timber inventory has been segregated into different subgroupings that indicate value, as listed in the following:

Species Type

- Douglas Fir
  - Includes Douglas Fir and Western Larch
- Hardwood
  - Includes Aspen, Bigleaf Maple, Birch, Black Cottonwood, Mixed Hardwood, Oregon Ash, Paper Birch, and Red Alder
- Whitewood
  - Includes Engelmann Spruce, Grand Fir, Lodgepole Pine, Mountain Hemlock, Noble Fir, Pacific Silver Fir, Ponderosa Pine, Sitka Spruce, Subalpine Fir, True Firs, Western Hemlock, Western White Pine, and Whitebark Pine
- Cedar
  - Includes Alaska Yellow Cedar and Western Red Cedar

Age

- 70+ years
- 60-69 years
- 50-59 years
- 40-49 years
- 30-39 years
- 20-29 years
- 10-19 years
- 0-9 years

Soil Productivity

- Site Classes I and II
- Site Class III
- Site Classes IV and V

Topography

- Cable
  - Terrain's slope is greater than 35 percent
- Shovel
  - Terrain's slope is less than or equal to 35 percent

Region

- Western Washington
- Eastern Washington

Age categories have been broken out into 10-year intervals for timber between 0 and 70 years old, plus a single category for timber more than 70 years old. Timber has been grouped by such ages for two reasons:

1. The reported average age of timber sold from trust lands between 2015 and 2018 was 64 years old. Based on conversations with market participants, this age is above the 40 to 50-year-old typical rotation age in the private sector for merchantable timber.

2. Volume yield curves for timber in the western Washington region, as provided by the Trust Manager, suggest that growth rates tend to slow after trees reach age 50, and then slow down significantly more after age 70, which implies that the optimal time to harvest is at some point younger than age 70.

It is assumed the harvest age is between 60-69 years old, and this assumption is used in the analysis projections, which reflects current practice on this ownership. Note that the customary harvest age on similarly situated private industrial forest land is younger.

Stumpage Prices per MBF – Timber Resources

To conclude on stumpage prices on a per MBF basis, trust-owned timber sales between 2015 and 2018 were compiled and reviewed. Specifically, the bid amounts paid for timber stumpage were allocated toward the species types that made up the package of volume purchased. The allocation is based on the delivered log retail prices for each species type and the percentage composition of each species type in the overall package sold.

These sales were segregated by age to conclude on average stumpage prices per MBF for different subgroupings of ages 60-69 and 70-plus. While the overall dataset of transactions is very large over the past three years, some subgroupings have fewer transactions. Due to sparse data for certain species in the East and Cable[25] subgroupings, stumpage prices per MBF for these subgroupings were concluded based on the average pricing from other subgroupings in which sales data is more prevalent.

For example, very few sales of stumpage from land designated as Cable with Site Classes IV or V occurred between 2015 and 2018. However, sales of stumpage from Cable land with Site Classes I through III are much more common. The stumpage price per MBF of timber from Cable land with Site Classes I through III is on average approximately 80 percent of the stumpage price per MBF of timber from Shovel land with the same site classes. As such, a 20 percent discount is applied to the stumpage prices of timber from Shovel land with Site Classes IV or V to obtain estimated stumpage pricing for timber from Cable land with the same site classes, but only designated as Cable.

[25] Terrain's slope is greater than 35 percent.

Further, as is common with any dataset with large populations, there are certain subgroupings that contain a wide range of prices per MBF recorded from different transactions. Many subgroupings include outliers where certain transactions record a very high price per MBF which can skew the overall averages of the subgrouping upward. To control for the upward skewing of outliers, price deductions were applied to the price per MBF of very volatile subgroupings with high outliers. To determine the volatility of subgroups with high outliers, the standard deviation was measured for each subgrouping. This results in the concluded stumpage prices being adjusted downward for the more volatile subgroupings to control for high outliers.

The concluded stumpage prices per MBF are highlighted in the following table:

FIGURE 79

Concluded Stumpage Price per MBF

Sub-Groups			Key Value Indicator					
		Age:	70+ Years			60 - 69 Years		
		Site Class:	I & II	III	IV & V	I & II	III	IV & V
Douglas Fir	West	Cable	$299	$287	$261	$270	$247	$164
		Shovel	$343	$340	$326	$338	$309	$205
	East	Cable	$207	$168	$156	$228	$212	$139
		Shovel	$258	$232	$195	$286	$265	$173
Hardwood	West	Cable	$334	$326	$267	$295	$229	$159
		Shovel	$376	$351	$334	$369	$286	$199
	East	Cable	$222	$189	$95	$249	$193	$135
		Shovel	$278	$236	$119	$311	$242	$168
Whitewood	West	Cable	$264	$260	$250	$228	$237	$157
		Shovel	$331	$332	$312	$329	$303	$196
	East	Cable	$157	$142	$134	$178	$162	$106
		Shovel	$197	$178	$167	$223	$203	$133
Cedar	West	Cable	$617	$625	$520	$543	$478	$337
		Shovel	$692	$687	$650	$679	$597	$421
	East	Cable	$396	$362	$344	$459	$401	$285
		Shovel	$495	$453	$430	$573	$501	$356

DCF Assumptions for Timber Younger than 60 Years

The average stumpage prices per MBF shown in the preceding table represent the pricing for timber ages 60-69 and 70-plus sold over the past three years after adjustments made for subgroups with upwardly skewed data. Anticipated volume levels have been projected forward to capture when timber currently younger than 60 years will reach the assumed harvest age of 60-69 years old.

The concluded stumpage prices per MBF are then applied to the projected volume for each subgrouping to calculate forecasted timber sales revenue which is then discounted back to the present using a discount rate to capture the present value of timber younger than 60 years.

For example, standing timber that currently falls between the ages of 20 and 29 years old will have a different volume level once it reaches ages 60 to 69 years old. The volume level will grow over the next 40 years due to the increasing size of the trees—in both diameter and height—over time. The prices for which those trees may sell will likely be similar in 40 years. As such, the concluded stumpage prices (per MBF) for timber ages 60 to 69 years old are then multiplied by the projected volume levels (in MBF) to calculate the forecasted sales revenue. Finally, the sales revenue is discounted back 40 years to return the net present value of standing timber ages 20 to 29 years old.

Stumpage Price Growth Rate

As depicted in the market analysis section, the average delivered log price is significantly volatile from year to year. It is not atypical for the price to swing more than 20 percent in either direction in a given year. As such, it is appropriate to use a conservative growth rate for the stumpage value in such an analysis.

Further, it is common industry practice to forecast little to no growth rate in pricing, and research indicates it would be appropriate to assume an annual growth rate between 0 percent and 0.5 percent. As such, we concluded to an annual growth rate of 0 percent for stumpage prices. This results in the concluded stumpage prices being applied to projected volume levels to determine forecasted sales revenues.

Discount Rate

This analysis utilizes a discount rate of 6 percent. For further discussion regarding the determination of this discount rate, please refer to the earlier chapter that discusses rates of return.

Volume Projections

Current Volume Totals

State trusts own approximately 2.1 million acres of timberlands containing approximately 42 million MBF in gross inventory. However, much of this timber is not harvestable. Approximately 331,923 acres (16.1 percent) contain long-term deferrals. Approximately 6,778 acres (0.3 percent) contain non-commercial timber species. Approximately 241,324 acres (11.7 percent) are restricted for RMZs. Another 236,322 acres (11.5 percent) are restricted for Uplands. This results in approximately 1.24 million acres (60 percent) that are harvestable, which can produce more than 17.4 million MBF in harvestable timber.

For purposes of this analysis, timber more than 70 years old is grouped together into one age grouping. Timber younger than the assumed harvest age of 60 to 69 years old is separated into 10-year groupings. Note that approximately 302,790 MBF of net harvestable volume that technically falls to the East region has been categorized as volume for the West region. This volume is located in Klickitat County, owned by the State Forest Transfer Trust, and lies on densely stocked land with favorable growing conditions and species similar to the western Washington region as the lower elevation of the Cascades in this region allow precipitation to reach further east. The total net harvestable timber levels in MBF standing on trust-owned lands as of the date of value (DOV) are outlined in the following tables:

FIGURE 80

Net Harvestable Volume in MBF (Year 0)

Sub-Groups			Key Value Indicator					
		Age:	70 Years +			60 - 69 Years		
		Site Class:	I & II	III	IV & V	I & II	III	IV & V
Douglas Fir	West	Cable	404,296	168,321	67,651	205,252	121,286	23,285
		Shovel	674,596	147,737	45,208	447,260	133,842	14,947
	East	Cable	174,575	342,428	268,119	54,182	57,152	43,179
		Shovel	289,165	442,845	322,324	148,778	101,720	56,384
Hardwood	West	Cable	18,143	13,942	14,806	16,897	16,221	8,945
		Shovel	37,542	34,240	22,295	47,039	44,848	19,575
	East	Cable	455	1,303	0	490	271	4
		Shovel	454	920	46	228	315	190
Whitewood	West	Cable	124,599	124,923	62,292	85,530	76,457	46,937
		Shovel	254,545	168,411	34,295	208,040	119,271	50,736
	East	Cable	23,511	131,980	99,734	5,614	22,794	22,278
		Shovel	126,242	302,061	200,023	44,272	80,917	59,814
Cedar	West	Cable	7,747	3,549	1,407	2,020	503	1,251
		Shovel	17,740	2,678	4,785	4,961	1,570	2,447
	East	Cable	15,599	4,167	561	821	651	988
		Shovel	38,406	20,763	2,579	5,554	4,131	2

FIGURE 81

Net Harvestable Volume in MBF (Year 0)

Sub-Groups			Key Value Indicator					
		Age:	50 - 59 Years			40 - 49 Years		
		Site Class:	I & II	III	IV & V	I & II	III	IV & V
Douglas Fir	West	Cable	263,249	193,294	41,910	169,433	115,976	60,909
		Shovel	632,171	215,920	38,694	867,073	184,848	52,171
	East	Cable	80,177	53,032	45,933	32,020	29,905	19,650
		Shovel	199,336	119,326	66,368	82,754	64,696	32,685
Hardwood	West	Cable	30,582	22,132	11,790	26,877	8,513	5,205
		Shovel	55,893	41,479	27,409	74,044	30,062	32,160
	East	Cable	0	0	0	48	184	0
		Shovel	59	2	0	1,242	1,202	0
Whitewood	West	Cable	141,582	66,964	50,284	92,459	34,870	40,011
		Shovel	291,819	90,787	41,903	253,364	78,670	35,357
	East	Cable	5,481	28,134	16,845	3,849	11,068	8,909
		Shovel	85,029	143,200	65,445	70,100	122,056	42,919
Cedar	West	Cable	1,775	542	674	96	75	378
		Shovel	2,528	4,395	3,415	8,697	908	1,127
	East	Cable	2,805	2,240	21	487	261	0
		Shovel	10,417	3,921	1,647	5,379	5,585	0

FIGURE 82

Net Harvestable Volume in MBF (Year 0)

Sub-Groups			Key Value Indicator					
		Age:	30 - 39 Years			20 - 29 Years		
		Site Class:	I & II	III	IV & V	I & II	III	IV & V
Douglas Fir	West	Cable	153,315	31,763	19,773	62,336	9,341	3,073
		Shovel	868,539	126,945	40,917	310,575	26,744	10,408
	East	Cable	8,668	12,304	5,080	1,248	3,464	2,766
		Shovel	22,252	11,309	6,126	4,337	7,046	4,125
Hardwood	West	Cable	11,328	4,123	2,922	5,926	1,834	109
		Shovel	63,480	12,133	10,915	40,842	11,462	1,070
	East	Cable	360	102	27	263	373	0
		Shovel	472	402	0	70	18	0
Whitewood	West	Cable	40,070	9,881	8,073	5,544	1,122	2,031
		Shovel	220,672	19,188	10,077	56,460	1,859	2,659
	East	Cable	876	5,676	3,829	1,515	2,776	2,218
		Shovel	16,304	19,725	14,400	5,278	6,593	2,760
Cedar	West	Cable	356	94	342	169	0	0
		Shovel	6,630	433	685	4,052	67	347
	East	Cable	4	135	0	0	118	55
		Shovel	1,896	1,544	0	154	151	440

FIGURE 83

Net Harvestable Volume in MBF (Year 0)

Sub-Groups			Key Value Indicator					
		Age:	10 - 19 Years			0 - 9 Years		
		Site Class:	I & II	III	IV & V	I & II	III	IV & V
Douglas Fir	West	Cable	46,039	12,793	2,564	85,162	33,426	9,480
		Shovel	192,330	49,129	9,398	354,983	81,601	19,884
	East	Cable	903	4,517	534	4,602	9,054	5,349
		Shovel	10,280	4,602	1,934	23,995	55,678	19,933
Hardwood	West	Cable	7,973	3,445	1,253	6,361	3,128	1,947
		Shovel	30,732	13,237	3,671	14,987	11,422	3,012
	East	Cable	0	0	0	0	3	0
		Shovel	0	0	0	0	9	0
Whitewood	West	Cable	3,966	5,002	804	13,438	10,973	8,529
		Shovel	20,492	14,304	3,093	63,101	41,763	12,685
	East	Cable	1,404	880	583	472	2,664	805
		Shovel	14,322	3,320	1,575	8,997	23,138	10,715
Cedar	West	Cable	226	63	148	1,142	77	0
		Shovel	2,778	1,045	1,409	1,525	395	977
	East	Cable	175	37	0	1,176	750	10
		Shovel	683	226	0	3,365	379	533

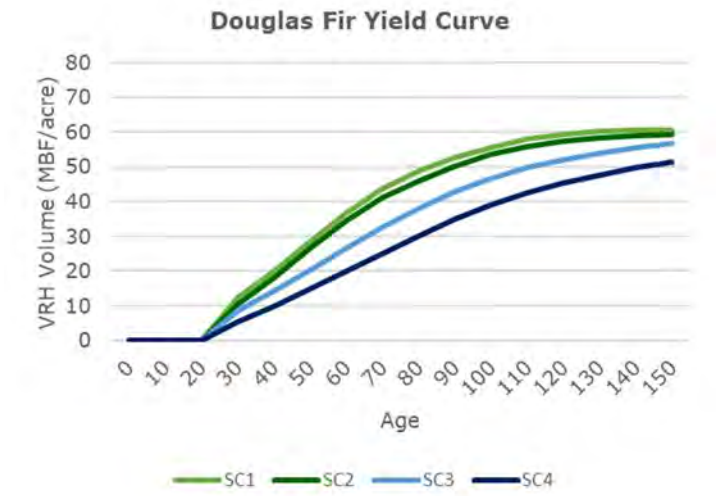
Volume Growth Rates

The current levels of standing volume for each of the subgroupings are projected to grow to the targeted age range of 60-69 years old by applying growth multiples sourced from yield curves (or volume curves) provided by the Trust Manager for the West region. Specifically, growth multiples were calculated by dividing the level of future volume (MBF per acre) at age 70 by the earlier levels of volume (MBF per acre) recorded at each 10-year period in the yield curve provided.

The Trust Manager provided data for stands that were developed and recorded after the introduction of HCP. As such, the growth rates recorded may be more conservative relative to those recorded in yield curves by private owners in which such restrictions do not exist.

An example of the yield curve for each site class (SC) of Douglas Fir species is shown in the following figure.

FIGURE 84



The yield curve reports an MBF per acre of 32.8 at age 70 for Site Class 3 in the West region. The curve also reports an MBF per acre of 14.2 at age 40 for Site Class 3 in the West region. The growth multiple in this example is approximately 2.31, which is calculated by dividing 32.8 by 14.2. The yield curve suggests that if 40-year-old Douglas Fir timber stood on a plot of Site Class 3 land in the West region today, it will grow to reach a volume by age 70 (i.e., 30 years from now) that is 2.31 times its current volume.

Note that the yield curves provided record volume levels of 0 at periods 2 and 3 (i.e., ages 10 and 20). In order to calculate growth multiples for timber with current ages found in these earlier age periods, a straight-line volume growth rate was assumed between age 0 and the volume level recorded at age 30.

As the Cedar species grouping only make up 1 percent of net harvestable volume, and yield curves for the Cedar species type are unavailable, the growth multiples for the Douglas Fir species grouping have also been utilized for the Cedar species grouping.

Conversations with market participants indicate that East region volume typically grows to be between 40 percent to 70 percent of West region volume. Further, as a general weighted-average growth assumption for all timber inventory in the East region, it was suggested that it would be appropriate to assume volume levels in the East region will be approximately 50 percent of volume levels in the West region. As such, a 50 percent discount has been applied to the rate of change in yield (on an MBF per acre basis) from the West region yield curve data to calculate growth multiples for timber growth in the East region. For example, West region yield curves show that the MBF per acre reported for Douglas Fir at Site Class 1 increased from 20 MBF to 43.6 MBF per acre between ages 40 to 70. This represents an increase in yield of 23.6 MBF per acre over the 30-year time span. The growth multiple for the East region has been calculated by solving for the multiple that would result in the rate of change in MBF per acre increasing by only 50 percent (in this case, the increase would be 11.8 MBF per acre over the same time period between ages 40 to 70).

As the growth multiples are ultimately applied to timber volume grouped within 10-year age ranges (e.g., 10-19 years old, 20-29 years old), they are calculated by taking the average of growth multiples for adjacent time periods. For example, the growth multiple for Douglas Fir in the West for Site Class 3 at age 30 is 3.86, and the growth multiple for Douglas Fir for Site Class 3 at age 40 is 2.31, then the average growth multiple applied to Douglas Fir volume with Site Class 3 soil in the West region with ages 30-39 is 3.08 (i.e., average of 3.86 and 2.31). The calculated growth multiples are shown in the following tables.

FIGURE 85

Volume Growth Multiples - West		Age Range					
Species Grouping	Site Class	0 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59
Douglas Fir & Cedar	I & II	11.22	8.41	4.67	2.99	1.89	1.37
Douglas Fir & Cedar	III	11.58	8.68	4.82	3.08	1.96	1.42
Douglas Fir & Cedar	IV & V	14.00	10.50	5.83	3.59	2.11	1.48
Hardwood	I & II	12.12	9.09	5.05	3.24	2.02	1.40
Hardwood	III	12.65	9.48	5.27	3.41	2.17	1.49
Hardwood	IV & V	16.03	12.02	6.68	4.19	2.46	1.60
Whitewood	I & II	12.45	9.34	5.19	3.29	2.02	1.42
Whitewood	III	13.20	9.90	5.50	3.47	2.12	1.47
Whitewood	IV & V	16.61	12.46	6.92	4.21	2.34	1.55

FIGURE 86

Volume Growth Multiples - East		Age Range					
Species Grouping	Site Class	0 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59
Douglas Fir & Cedar	I & II	6.11	4.71	2.84	1.99	1.44	1.18
Douglas Fir & Cedar	III	6.29	4.84	2.91	2.04	1.48	1.21
Douglas Fir & Cedar	IV & V	7.50	5.75	3.42	2.30	1.56	1.24
Hardwood	I & II	6.56	5.05	3.03	2.12	1.51	1.20
Hardwood	III	6.82	5.24	3.13	2.21	1.58	1.24
Hardwood	IV & V	8.51	6.51	3.84	2.59	1.73	1.30
Whitewood	I & II	6.73	5.17	3.09	2.14	1.51	1.21
Whitewood	III	7.10	5.45	3.25	2.24	1.56	1.23
Whitewood	IV & V	8.81	6.73	3.96	2.60	1.67	1.28

Projected Volume Totals

Current volume levels for timber younger than 60 years old are segregated into 10-year groupings and multiplied by the concluded growth multipliers previously presented to obtain projected volume levels corresponding to when the timber age reaches 60 to 69 years old. For example, a growth multiplier of 8.41 was applied to Douglas Fir timber in the West region with a site class of I or II and a current age of 10 to 19 years old to project the volume level in 50 years. The projected net harvestable volume levels in MBF for each of the 10-year groupings of younger timber are outlined in the following tables showing how much volume is to be expected once the trees reach the age of 60-69 years old:

FIGURE 87

Net Harvestable Volume Projected at Age 60-69 (MBF)

Sub-Groups			Key Value Indicator					
Projected Years:			10 Years			20 Years		
Age (Year 0):			50 - 59 Years			40 - 49 Years		
Site Class:			I & II	III	IV & V	I & II	III	IV & V
Douglas Fir	West	Cable	359,552	273,678	61,952	319,950	227,180	128,600
		Shovel	863,436	305,713	57,198	1,637,343	362,090	110,152
	East	Cable	94,842	64,059	56,916	46,242	44,243	30,568
		Shovel	235,798	144,138	82,238	119,512	95,713	50,847
Hardwood	West	Cable	42,875	32,914	18,904	54,215	18,443	12,821
		Shovel	78,359	61,688	43,949	149,359	65,125	79,227
	East	Cable	0	0	0	72	291	0
		Shovel	71	3	0	1,874	1,904	0
Whitewood	West	Cable	200,457	98,402	78,104	186,780	73,863	93,768
		Shovel	413,168	133,411	65,085	511,832	166,644	82,860
	East	Cable	6,621	34,738	21,504	5,812	17,256	14,893
		Shovel	102,708	176,815	83,548	105,857	190,302	71,751
Cedar	West	Cable	2,424	767	997	181	148	798
		Shovel	3,453	6,222	5,048	16,423	1,779	2,380
	East	Cable	3,318	2,706	26	704	386	0
		Shovel	12,322	4,736	2,040	7,769	8,263	0

FIGURE 88

Net Harvestable Volume Projected at Age 60-69 (MBF)

Sub-Groups			Key Value Indicator					
Projected Years:			30 Years			40 Years		
Age (Year 0):			30 - 39 Years			20 - 29 Years		
Site Class:			I & II	III	IV & V	I & II	III	IV & V
Douglas Fir	West	Cable	457,898	97,969	71,053	291,330	45,056	17,929
		Shovel	2,594,012	391,543	147,030	1,451,486	129,001	60,715
	East	Cable	17,278	25,126	11,667	3,541	10,087	9,449
		Shovel	44,355	23,094	14,069	12,304	20,518	14,094
Hardwood	West	Cable	36,650	14,071	12,233	29,931	9,662	730
		Shovel	205,372	41,402	45,689	206,298	60,398	7,145
	East	Cable	762	225	71	797	1,170	0
		Shovel	999	888	0	212	57	0
Whitewood	West	Cable	131,694	34,307	33,956	28,760	6,172	14,054
		Shovel	725,258	66,623	42,383	292,904	10,225	18,406
	East	Cable	1,877	12,691	9,966	4,687	9,021	8,784
		Shovel	34,944	44,106	37,482	16,329	21,428	10,930
Cedar	West	Cable	1,064	289	1,227	788	0	0
		Shovel	19,801	1,334	2,462	18,937	321	2,023
	East	Cable	8	275	0	0	343	186
		Shovel	3,779	3,153	0	437	440	1,505

FIGURE 89

Net Harvestable Volume Projected at Age 60-69 (MBF)

Sub-Groups			Key Value Indicator					
Projected Years:			50 Years			60 Years		
Age (Year 0):			10 - 19 Years			0 - 9 Years		
Site Class:			I & II	III	IV & V	I & II	III	IV & V
Douglas Fir	West	Cable	387,295	111,073	26,918	955,216	386,957	132,713
		Shovel	1,617,954	426,558	98,674	3,981,671	944,654	278,383
	East	Cable	4,248	21,867	3,071	28,108	56,933	40,118
		Shovel	48,381	22,281	11,118	146,565	350,119	149,500
Hardwood	West	Cable	72,490	32,671	15,061	77,107	39,559	31,210
		Shovel	279,415	125,546	44,130	181,679	144,447	48,270
	East	Cable	0	0	0	0	20	0
		Shovel	0	0	0	0	63	0
Whitewood	West	Cable	37,036	49,516	10,011	167,309	144,849	141,674
		Shovel	191,356	141,605	38,530	785,660	551,272	210,717
	East	Cable	7,255	4,796	3,924	3,176	18,918	7,092
		Shovel	74,029	18,093	10,600	60,508	164,280	94,350
Cedar	West	Cable	1,901	546	1,556	12,804	891	2
		Shovel	23,367	9,073	14,796	17,104	4,575	13,675
	East	Cable	822	181	0	7,182	4,719	75
		Shovel	3,214	1,095	0	20,557	2,381	3,997

Discounted Values

Gross Revenue

The concluded stumpage prices per MBF for timber between the ages of 60 and 69 years old are grown out at the annual rate of 0 percent for the same number of projected years until the younger timber reaches the age of 60 to 69 years old resulting in the same concluded stumpage prices being applied. Gross timber sales revenue is calculated by multiplying the concluded stumpage prices per MBF by the projected volume in MBF for each subgrouping.

Net Present Cash Flows

The gross revenue from timber sales are then discounted back to the date of value (DOV) at the selected annual discount rate. The valuation analysis includes all harvestable standing timber over the age of 60 to be sold for harvest at current stumpage prices as of the DOV. As such, revenue from these sales is not discounted.

The discounted values for each of the subgroupings are presented in the following tables:

FIGURE 90

Gross Sales Revenues Discounted to DOV

Sub-Groups			Key Value Indicator					
Number of Years Discounted:			0			0		
Age (Year 0):			70 Years +			60 - 69 Years		
Site Class:			I & II	III	IV & V	I & II	III	IV & V
Douglas Fir	West	Cable	$120,943,146	$48,352,854	$17,662,707	$55,485,957	$30,001,949	$3,817,731
		Shovel	$231,559,428	$50,159,087	$14,753,718	$151,135,172	$41,384,719	$3,063,361
	East	Cable	$36,078,745	$57,372,114	$41,726,011	$12,379,113	$12,129,694	$5,983,294
		Shovel	$74,700,643	$102,640,626	$62,703,051	$42,489,434	$26,985,675	$9,766,382
Hardwood	West	Cable	$6,053,098	$4,540,802	$3,952,568	$4,981,294	$3,713,071	$1,424,362
		Shovel	$14,128,278	$12,033,316	$7,439,876	$17,334,458	$12,832,291	$3,896,047
	East	Cable	$100,933	$245,699	$0	$122,192	$52,424	$494
		Shovel	$125,903	$216,871	$5,399	$71,053	$76,136	$31,919
Whitewood	West	Cable	$32,920,718	$32,437,146	$15,558,082	$19,538,511	$18,155,800	$7,360,764
		Shovel	$84,188,787	$55,857,875	$10,706,828	$68,487,158	$36,125,179	$9,945,636
	East	Cable	$3,700,945	$18,764,537	$13,363,733	$999,637	$3,703,647	$2,362,189
		Shovel	$24,840,557	$53,682,517	$33,502,315	$9,854,183	$16,434,425	$7,927,692
Cedar	West	Cable	$4,780,460	$2,217,674	$731,334	$1,096,490	$240,619	$421,337
		Shovel	$12,274,057	$1,838,704	$3,108,449	$3,365,827	$937,618	$1,030,368
	East	Cable	$6,182,444	$1,509,172	$193,034	$376,616	$260,960	$281,271
		Shovel	$19,027,396	$9,400,048	$1,108,813	$3,185,126	$2,071,064	$710

FIGURE 91

Gross Sales Revenues Discounted to DOV

Sub-Groups			Key Value Indicator					
Number of Years Discounted:			10			20		
Age (Year 0):			50 - 59 Years			40 - 49 Years		
Site Class:			I & II	III	IV & V	I & II	III	IV & V
Douglas Fir	West	Cable	$54,274,878	$37,802,449	$5,671,901	$26,968,720	$17,522,300	$6,574,443
		Shovel	$162,920,874	$52,784,123	$6,545,838	$172,515,363	$34,909,817	$7,039,132
	East	Cable	$12,099,684	$7,591,734	$4,403,963	$3,294,211	$2,927,811	$1,320,766
		Shovel	$37,602,977	$21,352,401	$7,954,120	$10,642,266	$7,917,424	$2,746,150
Hardwood	West	Cable	$7,057,970	$4,207,073	$1,680,776	$4,983,583	$1,316,350	$636,555
		Shovel	$16,124,097	$9,856,223	$4,884,489	$17,161,794	$5,810,293	$4,916,815
	East	Cable	$0	$0	$0	$5,617	$17,526	$0
		Shovel	$12,427	$367	$0	$182,019	$143,541	$0
Whitewood	West	Cable	$25,570,153	$13,047,999	$6,839,456	$13,304,080	$5,469,013	$4,585,046
		Shovel	$75,950,437	$22,563,426	$7,124,291	$52,537,806	$15,737,872	$5,064,615
	East	Cable	$658,348	$3,151,699	$1,273,220	$322,673	$874,220	$492,392
		Shovel	$12,765,384	$20,052,759	$6,183,321	$7,346,641	$12,051,430	$2,965,182
Cedar	West	Cable	$734,711	$204,719	$187,559	$30,666	$21,992	$83,803
		Shovel	$1,308,147	$2,075,687	$1,187,047	$3,474,621	$331,406	$312,517
	East	Cable	$850,016	$606,000	$4,150	$100,699	$48,326	$0
		Shovel	$3,945,603	$1,325,950	$405,465	$1,389,070	$1,291,772	$0

FIGURE 92

Gross Sales Revenues Discounted to DOV

Sub-Groups			Key Value Indicator					
Number of Years Discounted:			30			40		
Age (Year 0):			30 - 39 Years			20 - 29 Years		
Site Class:			I & II	III	IV & V	I & II	III	IV & V
Douglas Fir	West	Cable	$21,552,028	$4,219,406	$2,028,331	$7,656,774	$1,083,560	$285,789
		Shovel	$152,616,478	$21,079,106	$5,246,562	$47,685,184	$3,878,004	$1,209,769
	East	Cable	$687,308	$928,468	$281,486	$78,663	$208,128	$127,295
		Shovel	$2,205,510	$1,066,724	$424,295	$341,621	$529,201	$237,350
Hardwood	West	Cable	$1,881,222	$560,798	$339,149	$857,870	$215,030	$11,304
		Shovel	$13,176,904	$2,062,606	$1,583,309	$7,391,096	$1,680,162	$138,252
	East	Cable	$33,075	$7,593	$1,658	$19,311	$22,001	$0
		Shovel	$54,183	$37,383	$0	$6,432	$1,351	$0
Whitewood	West	Cable	$5,237,946	$1,418,416	$927,137	$638,734	$142,497	$214,272
		Shovel	$41,569,860	$3,513,355	$1,446,553	$9,374,585	$301,091	$350,783
	East	Cable	$58,184	$359,028	$183,984	$81,137	$142,501	$90,553
		Shovel	$1,354,199	$1,559,691	$864,954	$353,361	$423,119	$140,841
Cedar	West	Cable	$100,539	$24,049	$71,993	$41,560	$0	$0
		Shovel	$2,339,275	$138,794	$180,514	$1,249,212	$18,641	$82,823
	East	Cable	$630	$19,237	$0	$0	$13,373	$5,157
		Shovel	$377,272	$275,244	$0	$24,367	$21,429	$52,058

FIGURE 93

Gross Sales Revenues Discounted to DOV

Sub-Groups			Key Value Indicator					
Number of Years Discounted:			50			60		
Age (Year 0):			10 - 19 Years			0 - 9 Years		
Site Class:			I & II	III	IV & V	I & II	III	IV & V
Douglas Fir	West	Cable	$5,683,864	$1,491,609	$239,603	$7,827,899	$2,901,680	$659,623
		Shovel	$29,680,985	$7,160,347	$1,097,882	$40,786,721	$8,854,613	$1,729,557
	East	Cable	$52,688	$251,950	$23,104	$194,673	$366,297	$168,522
		Shovel	$750,107	$320,906	$104,548	$1,268,880	$2,815,736	$784,999
Hardwood	West	Cable	$1,160,173	$406,001	$130,187	$689,094	$274,503	$150,647
		Shovel	$5,589,899	$1,950,175	$476,836	$2,029,554	$1,252,918	$291,240
	East	Cable	$0	$0	$0	$0	$118	$0
		Shovel	$0	$0	$0	$0	$461	$0
Whitewood	West	Cable	$459,302	$638,341	$85,229	$1,158,612	$1,042,703	$673,513
		Shovel	$3,419,871	$2,328,407	$410,037	$7,840,522	$5,061,595	$1,252,176
	East	Cable	$70,134	$42,304	$22,587	$17,142	$93,180	$22,797
		Shovel	$894,532	$199,499	$76,269	$408,270	$1,011,455	$379,084
Cedar	West	Cable	$56,027	$14,169	$28,449	$210,685	$12,911	$23
		Shovel	$860,719	$294,243	$338,240	$351,817	$82,852	$174,562
	East	Cable	$20,467	$3,938	$0	$99,887	$57,374	$650
		Shovel	$100,044	$29,816	$0	$357,358	$36,184	$43,120

Timber Revenue – Eastern Washington Adjustment

Based on the previous analysis and discussions with the Trust Manager, it became apparent that the lower timber volume yield, poorer soil conditions, and longer travel distance to log markets associated with timber from the East region all lower the financial feasibility for commercial harvest of such lands. Moreover, in eastern Washington, restoration by artificial regeneration overall experiences higher seedling mortality once planted post-harvest than on corresponding lands in western Washington. As a result, most often the timber is harvested to leave sufficient commercial tree species to comply with the natural regeneration standards of WAC 224-34-020. The analyst team includes a forester who has indicated that this "leave tree" volume comprises approximately 20 percent of the average merchantable volume per acre on lands in the East region projected for near-term harvest. A related impact is a decrease in harvesting efficiency due to the need to identify and operate around these leave trees. The lesser need to artificially replant is a partial value offset. In this analysis, therefore, the Timber Asset Class in the East region includes a 20 percent value reduction adjustment for the indicated volume set aside.

The total values (rounded) for timber resources (commodity) are as follows:

FIGURE 94

Timber Resources (Commodity) - Whole Property Value Method			
		West	East
NPV of Gross Sales Revenue		$2,723,000,000	$942,000,000
Natural Regrowth Discount (East Side)	20%	$0	($188,400,000)
Timber Resources Value (Rounded)		$2,723,000,000	$754,000,000
$/Net Acre		$3,947	$1,370
Combined Timber Resources Value (Commodity)		**$3,477,000,000**	
$/Net Acre		**$2,804**	

TIMBERLAND RESOURCES VALUATION – WPV

Prices per Acre – Timberland Resources (Bare Land)

For the purposes of this valuation analysis, acres of trust-owned timberland have been segregated into different groupings that indicate underlying land value. Timberlands have been separated by soil productivity (i.e., site class), topography (i.e., Cable and Shovel), and region (i.e., East and West). Topography is determined by the percentage slope of the land. Acres of timberland with terrain greater than 35 percent slope are classified as Cable. Timberlands with terrain less than or equal to 35 percent slope are classified as Shovel.

As introduced in the methodology section, land value conclusions for timberland on a per acre basis were based on two considerations:

1. Analysis of allocated land value
2. DCF analysis of bare land value

Analysis of Allocated Land Value

Timberland value conclusions were partially based on actual transactions utilized as comparables in independent appraisals obtained in the ordinary course of management of assets and properties, along with additional transactions provided from market participants.

The timber value is estimated and deducted from a transaction's overall sales price, and the remainder price is attributed to the underlying timberland. While different transactions contain property-specific influencers that affect the sales price, they provide a general range of prices to be expected per acre of timberland. The bottom end of the range includes prices for steeper land with inferior soil productivity, while the upper end of the range includes prices for less steep land with superior soil productivity.

Just as the majority of state-owned timberlands lie on the western side of the Cascade mountain range (roughly 66 percent of gross acres), the majority of timberland transactions occur in the West region. Multiple sales transactions of timberlands located in the West region have been compiled for the period from January 2015 to July 2018. The total acreage of the transactions ranged between 50 acres to 3,800 acres, and the average transaction was approximately 550 acres. The transactions contain a wide range of implied values for the underlying land in the West region, ranging from $350 for low soil productivity and high-sloped terrain to $1,650 per acre for high soil productivity and low-sloped terrain. The implied prices per acre are shown below.

FIGURE 95

Allocated Land Value - Price per Acre

	Site Class:	I & II	III	IV & V
West	Cable	$850	$600	$350
	Shovel	$1,650	$1,200	$750

DCF Analysis of Bare Land Value

A bare land value analysis is also performed as an additional consideration when concluding to land values on a per acre basis. The bare land value calculations are utilized as a secondary approach to make price per acre conclusions for the West region, and they are the only consideration referenced for price per acre conclusions made for the East region.

Specifically, the DCF method is used to calculate the residual value of theoretical land purchased with the intent to plant, grow, and sell commercial timber. Typical silviculture and management costs were surveyed and provided by the Trust Manager and applied as appropriate over the holding period of the DCF. The expected sales revenue in the targeted year of harvest is calculated by multiplying the projected volume level by the concluded stumpage price. The growth rates utilized for volume growth align with the growth multiples concluded to in the valuation of timber resources. Cash flows are discounted back to a net present value representative of how much a buyer would be willing to pay for the land.

DCF for Bare Land Value

The DCF method was used to calculate the bare land value for a theoretical purchase of 1,000 acres of timberland in both the West and East regions, assuming the highest and best use of the land is to produce and sell timber for harvest. The future revenue and expenses applicable to the sites are discounted back to the present using a real discount rate.

A sensitivity analysis was performed to compare the use of the following assumptions applied to the DCF.

- Land Size Acquired: *1,000 acres*
- Species Type Intended to Grow: *Douglas Fir*
- Site Class: *I and II, III, and IV and V*
- Topography: *30 percent Cable and 70 percent Shovel*
- Harvest Year Targeted: *Sensitivity for year 40 and year 65*
- Current Stumpage Price per MBF for DCF: *Ranges from $180 for East Region land with Site Classes IV or V to $385 for West Region land with Site Classes I or II based on average stumpage prices calculated for timber 40 years old and older.*
- Stumpage Price Growth Rate: *0 percent annually*
- Discount Rate: *Sensitivity from 3 percent to 7 percent*
- Expense Growth Rate: *0 percent annually*

Gross Sales Revenue

Estimated revenue was based on anticipated stumpage prices per MBF multiplied by the projected volume level in MBF that can be sold at the targeted year of harvest. The same growth rates for volume growth estimated in valuing prior timber resources are utilized in the bare land value calculations.

Expenses

Expenses are made up of different planting and silviculture costs required to plant and grow timber. Expense costs have been applied to different years in the holding period that are most typical and appropriately based.

The following table presents the estimated costs on a per acre basis sourced from median silviculture activity costs as surveyed and provided by the Trust Manager. Research indicates that certain expenses will likely not be applied to every acre where timber is grown. It is typical for ground release and precommercial thinning activities to be applied to 20 percent and 30 percent of the total acreage, respectively.

Additionally, conversations with market participants have suggested that the costs for ground site preparation and ground release herbicide application should be weighted as 80 percent of surveyed aerial costs and 20 percent of ground costs. The reported expenses in the following table reflect the weighted amounts.

FIGURE 96

Silviculture Activity	Expense ($/Acre)	% of Total Area	Year of Term Forecasted
Ground Site Preparation	$80	100%	Year 0
Seedling Cost	$200	100%	Year 0
Planting Labor	$115	100%	Year 0
Ground Release Herbicide Application	$80	20%	Year 3
Pest Management	$18.75	100%	Year 0
Hand Release (Slashing)	$100	100%	Year 5
Pre-commercial Thinning	$150	30%	Year 15

Discount Rate

The annual Pacific Northwest Timberland Investment Survey (as of March 2019) by Sizemore and Sizemore, Inc. reports discount rates (or "rates of return") for the industry are within an average range of 4.8 percent to 8.0 percent, with central tendencies between 5.0 percent and 5.6 percent. As such, a discount rate of 5 percent is deemed appropriate as the center for the sensitivity analysis. The nature of timber investments involves long holding periods with the majority of revenue being received at the end of the holding period; thus, the DCF calculations are significantly sensitive to the discount rate used in the calculation. A sensitivity analysis that displays the land value when using discount rates of 3 percent, 5 percent, and 7 percent is provided.

Net Present Value

Revenue and expenses are discounted back to the present using a selected discount rate that results in a net present value (NPV) that represents the amount a potential buyer would be willing to pay for the land. The following table shows the sensitivity analysis for bare land values using a central discount rate (DR) of 5 percent and a 200 basis-point spread above and below the central rate. The results of the sensitivity analysis are displayed for illustrative purposes.

FIGURE 97

Species	Site Class	Region	Hold Period (Years)	DR	ASPGR*	NPV/acre	DR	ASPGR	NPV/acre	DR	ASPGR	NPV/acre
DF	I & II	West	40	3%	0.00%	$1,697.19	5%	0.00%	$510.69	7%	0.00%	($26.30)
DF	I & II	West	65	3%	0.00%	$1,646.33	5%	0.00%	$99.81	7%	0.00%	($330.39)
DF	III	West	40	3%	0.00%	$1,064.42	5%	0.00%	$217.49	7%	0.00%	($164.14)
DF	III	West	65	3%	0.00%	$1,059.93	5%	0.00%	($68.19)	7%	0.00%	($379.67)
DF	IV & V	West	40	3%	0.00%	$281.00	5%	0.00%	($145.51)	7%	0.00%	($334.80)
DF	IV & V	West	65	3%	0.00%	$342.76	5%	0.00%	($273.65)	7%	0.00%	($439.94)
DF	I & II	East	40	3%	0.00%	$91.50	5%	0.00%	($233.32)	7%	0.00%	($376.08)
DF	I & II	East	65	3%	0.00%	$77.08	5%	0.00%	($349.77)	7%	0.00%	($462.26)
DF	III	East	40	3%	0.00%	($59.80)	5%	0.00%	($303.43)	7%	0.00%	($409.04)
DF	III	East	65	3%	0.00%	($61.15)	5%	0.00%	($389.37)	7%	0.00%	($473.88)
DF	IV & V	East	40	3%	0.00%	($263.25)	5%	0.00%	($397.70)	7%	0.00%	($453.36)
DF	IV & V	East	65	3%	0.00%	($247.06)	5%	0.00%	($442.63)	7%	0.00%	($489.50)

*ASPGR = Annual Stumpage Price Growth Rate

The calculations returned significant differences in value when the discount rate is toggled. For example, if a stand of Douglas Fir timber grew for 40 years on a plot of land in the West with a Site Class of III, the analysis suggests the plot of land is worth nearly $218 per acre if the future revenue received once the timber is sold 40 years from now is discounted back with a 5 percent rate of return. However, if a 7 percent discount rate is used, the analysis returns a negative NPV of -$164 per acre, suggesting the investment would not break even and purchasing the land would not be financially feasible. However, if a rate of return of 3 percent is used, the analysis returns an NPV of $1,064 per acre, which is nearly $850 per acre higher than if a discount rate of 5 percent is used. The results of the sensitivity analysis demonstrate the significant impact the discount rate can have on timber projections.

Overall, the NPV of bare land ranges from approximately -$490 to $1,697 per acre, depending on the inputs. The very low end of the range represents the value of East region land with a Site Class of IV or V, assuming a 65-year hold and a 7 percent discount rate. The very high end of the range represents the value of West region land with a Site Class of I or II, assuming a 40-year hold and a 3 percent discount rate.

Conversations with market participants confirm that, realistically, a potential buyer in the private sector would target more than a 3 percent rate of return, probably closer to a 5 percent rate of return. The bare land value sensitivity shows that land in the West ranges from -$274 to $511 depending on the site class and holding term. The sensitivity analysis suggests that it would not be profitable to purchase land in the East region if targeting a 5 percent rate of return as all NPVs return negative.

Focusing on the center of the sensitivity analysis with a targeted rate of return of at least 5 percent, the following implied prices per acre for bare land were estimated.

FIGURE 98

Bare Land Value - Price per Acre

Site Class:		I & II	III	IV & V
West	Cable	$500	$250	$50
	Shovel	$700	$350	$100
East	Cable	$50	$25	$10
	Shovel	$100	$50	$25

It is noted that while the sensitivity analysis resulted in primarily negative bare land values for the East region, discussions with market participants acknowledge these results are common, but buyers and seller will typically attribute a nominal value to the bare land. This appears to be reasonable given a competent seller would not give away the land for free. The analysis confirms that timber productivity is very low in the East region.

Reconciliation of Considerations

Final price per acre value for timberland resources (i.e., bare land) were concluded to by reconciling the two different considerations detailed earlier.

For price per acre conclusions for land in the West region, primary weight was placed on the allocated land values resulting from actual transactions of timberland located in western Washington. Secondary weight was placed on the bare land value calculations for the West region. For final price per acre conclusions for land in the East region, the only estimates considered were those resulting from the bare land value calculations.

The following table shows the final land value conclusions resulting from reconciling the two different considerations. Note that zero value has been attributed to trust lands that are not harvestable.

FIGURE 99

Concluded Price per Acre (Harvestable Acres)

Site Class:		I & II	III	IV & V
West	Cable	$780	$530	$290
	Shovel	$1,460	$1,030	$620
East	Cable	$50	$25	$10
	Shovel	$100	$50	$25

Total Net Harvestable Area in Acres – Timberland Resources

Net harvestable acres of timberland have been grouped together based on the same indicators mentioned earlier.

Eastern Washington Klickitat Adjustment. As described earlier, approximately 13,000 net harvestable acres that technically fall in eastern Washington have been recategorized as lands in the western Washington region. The lands are in Klickitat County and owned by the State Forest Transfer Trust. These high-density lands experience favorable growing conditions similar to the West region as the lower Cascades allow precipitation to reach further east.

The adjusted net acreage for each subgrouping is highlighted below:

FIGURE 100

Total Net Harvestable Acres

Site Class:		I & II	III	IV & V	**Total**
West	Cable	99,896	49,961	32,180	**182,036**
	Shovel	369,747	100,023	38,046	**507,816**
East	Cable	26,096	71,440	61,181	**158,717**
	Shovel	91,232	182,670	117,691	**391,593**
Total:		**586,971**	**404,093**	**249,098**	**1,240,163**

Total Indicated Value – Timberland Resources

Total indicated values for timberland resources (i.e., bare land) have been calculated by multiplying the concluded prices per acre by the total acreage for each subgrouping. This results in an indicated value of zero for non-harvestable acres. The indicated values for harvestable acres are shown in the table below:

FIGURE 101

Total Indicated Value (Price per Acre X Quantity of Area in Acres)

Site Class:		I & II	III	IV & V	Total
West	Cable	$77,918,851	$26,479,205	$9,332,094	**$113,730,150**
	Shovel	$539,830,765	$103,023,218	$23,588,771	**$666,442,754**
East	Cable	$1,304,804	$1,785,999	$611,809	**$3,702,612**
	Shovel	$9,123,196	$9,133,509	$2,942,280	**$21,198,985**
Total:		**$628,177,617**	**$140,421,931**	**$36,474,953**	**$805,074,501**

The total value indications (rounded) for the bare land owned by the trusts are as follows:

FIGURE 102

Timberland Resources (Bare Land) - Whole Property Value Method

Resource Type	Value (Rounded)	$/Net Acre
Timberland Resources - West	$780,000,000	$1,131
Timberland Resources - East	$25,000,000	$45
Combined Timberland Resources (Bare Land)	**$805,000,000**	**$649**

TIMBER ASSET CLASS TRUST VALUE SUMMARY – WHOLE PROPERTY VALUE METHOD

Lump-Sum Adjustment. The ideal analysis would have been to locate large transactions that have similar geographical locations, physical attributes, and timber characteristics as the subject property. However, large sales transactions similar to the subject are rare, and they often involve elements of enterprise (i.e., business) value that contribute to the overall value of the transactions. These elements include plant, property, and equipment; assembled work force; customer relationships; monetary assets; and liabilities that limit a direct comparison to the subject.

In this analysis, the pricing for the timber resources is based on a public auction, which provides a right to harvest the timber for a limited period of time, which is typically two years. Further, the pricing reflects the financial benefit of only requiring a very small down payment for transaction costs, with the final payment deferred until the time the timber is harvested. As a result, the pricing for a real estate holding as large as the Timber Asset Class would be lower given all of the timber volume could not be harvested in such a short period of time and would require full payment.

It is helpful to keep in mind that the pricing used in the analysis is much like a retail price as it reflects sales of small amounts to be consumed quickly. The timber sale transactions are used as a point of reference, but the analyst recognizes the difficulty in applying these to the entire population. Specifically, the data for the timber sale transactions involve stands that typically range from 100 acres to 200 acres, but the net trust land population is 1.24 million acres. This is approximately a ratio of 1 to 8,267, which is a large difference. This adjustment is subjective. However, it's not uncommon to see large discounts when real estate is sold in a quick sale liquidation; these types of discounts can easily be in the range of 20 to 40 percent. Similar discounts are observed when market participants purchase large portfolios of real estate such as during the post-recession sales of bank owned residential home portfolios.

As a result, an additional adjustment is needed to account for the size, risk, time value of money, and other factors associated with this asset class. As such, a lump-sum adjustment has been estimated and applied to the preliminary value indication to account for the economic and physical differences between the valuation data and the total combined characteristics of the timber resources contained in the Timber Asset Class.

Lastly, this approach is not performed in isolation. The income approach is also used, and the final overall value is then compared to large reported transactions as a test of reasonableness.

The following table highlights the final adjustment and value indication conclusion for the Timber Asset Class using the WPV Method.

FIGURE 103

Timber Asset Class Trust Value Summary - Whole Property Value Method			
	Timber Resources	Timberland Resources	Combined Total
West Value (Rounded)	$2,723,000,000	$780,000,000	**$3,503,000,000**
$/Net Acre	$3,947	$1,131	**$5,078**
East Value (Rounded)	$754,000,000	$25,000,000	**$779,000,000**
$/Net Acre	$1,370	$45	**$1,415**
Total Value Indications	**$3,477,000,000**	**$805,000,000**	**$4,282,000,000**
$/Net Acre	**$2,804**	**$649**	**$3,453**
Lump Sum Adjustment @ 40%			
West	($1,089,200,000)	($312,000,000)	($1,401,200,000)
East	($301,600,000)	($10,000,000)	($311,600,000)
Total	**($1,390,800,000)**	**($322,000,000)**	**($1,712,800,000)**
West Value Conclusion	$1,633,800,000	$468,000,000	**$2,101,800,000**
$/Net Acre	$2,368	$678	**$3,046**
East Value Conclusion	$452,400,000	$15,000,000	**$467,400,000**
$/Net Acre	$822	$27	**$849**
WPV Trust Value Conclusion	**$2,086,200,000**	**$483,000,000**	**$2,569,200,000**
$/Net Acre	**$1,682**	**$389**	**$2,071**

INDIVIDUAL TRUST VALUE SUMMARY – WPV

The table below highlights the trust values for each individual trust. Specifically, the trust value concluded to using the WPV method is allocated to each individual trust based on the quantities of timber and timberland resources owned by each trust. Note that the State Forest Trust Lands in Klickitat County have been recognized under western totals. The table below displays the net harvestable volume and acreage totals for each trust. This allocation is used later in the final reconciliation.

FIGURE 104

Individual Trust Volume & Acre Quantities						
Trust	Net Harvestable Volume (MBF)			Net Harvestable Acres		
	West	East	Total	West	East	Total
Common School and Indemnity	4,006,239	4,451,033	**8,457,272**	237,891	462,310	**700,201**
State Forest Transfer	4,832,750	15,546	**4,848,296**	279,421	589	**280,010**
Capitol Grant	807,840	91,970	**899,810**	38,527	10,619	**49,146**
State Forest Purchase	753,270	1,305	**754,575**	44,660	59	**44,720**
Scientific School	510,058	112,516	**622,574**	26,402	9,646	**36,048**
Normal School	242,866	221,949	**464,816**	13,483	18,442	**31,926**
Agricultural School	235,886	225,105	**460,991**	12,856	23,153	**36,009**
CEP & RI	283,740	110,117	**393,857**	16,987	10,888	**27,875**
University Transferred	272,630	137,851	**410,481**	14,586	12,745	**27,330**
Escheat	32,934	8,568	**41,502**	2,011	1,329	**3,340**
University Original	31,759	2,300	**34,060**	2,042	530	**2,572**
Community College Forest Reserve	15,945	0	**15,945**	986	0	**986**
CEP & RI Transferred	0	0	**0**	0	0	**0**
Total	**12,025,916**	**5,378,261**	**17,404,178**	**689,852**	**550,310**	**1,240,163**

The following table shows the allocated trust values for each individual trust by volume and acreage.

FIGURE 105

Individual Trusts - Timber & Timberland Resources Values - Whole Property Value Method						
Trust	Timber Resources Values			Timberland Values		
	West	East	Total	West	East	Total
Common School and Indemnity	$544,273,977	$374,404,867	**$918,678,844**	$161,386,476	$12,601,351	**$173,987,827**
State Forest Transfer	$656,560,873	$1,307,714	**$657,868,587**	$189,561,085	$16,049	**$189,577,133**
Capitol Grant	$109,750,446	$7,736,185	**$117,486,631**	$26,136,859	$289,448	**$26,426,307**
State Forest Purchase	$102,336,689	$109,813	**$102,446,502**	$30,297,890	$1,616	**$30,299,506**
Scientific School	$69,294,720	$9,464,428	**$78,759,148**	$17,911,106	$262,928	**$18,174,034**
Normal School	$32,994,979	$18,669,582	**$51,664,561**	$9,146,970	$502,693	**$9,649,663**
Agricultural School	$32,046,684	$18,935,005	**$50,981,689**	$8,721,649	$631,094	**$9,352,743**
CEP & RI	$38,547,917	$9,262,640	**$47,810,557**	$11,524,330	$296,766	**$11,821,096**
University Transferred	$37,038,558	$11,595,537	**$48,634,095**	$9,894,938	$347,382	**$10,242,320**
Escheat	$4,474,247	$720,728	**$5,194,974**	$1,364,448	$36,216	**$1,400,664**
University Original	$4,314,708	$193,502	**$4,508,209**	$1,385,326	$14,457	**$1,399,783**
Community College Forest Reserve	$2,166,202	$0	**$2,166,202**	$668,922	$0	**$668,922**
CEP & RI Transferred	$0	$0	**$0**	$0	$0	**$0**
Total	**$1,633,800,000**	**$452,400,000**	**$2,086,200,000**	**$468,000,000**	**$15,000,000**	**$483,000,000**

The next table highlights the total trust values for each trust by East and West region, along with their corresponding percentage allocations.

FIGURE 106

Individual Trust Values - Whole Property Value Method				
Trust	Total Trust Value Resources			
	West	East	Total	%
Common School and Indemnity	$705,660,453	$387,006,219	**$1,092,666,671**	**42.53%**
State Forest Transfer	$846,121,958	$1,323,763	**$847,445,720**	**32.98%**
Capitol Grant	$135,887,306	$8,025,632	**$143,912,938**	**5.60%**
State Forest Purchase	$132,634,579	$111,430	**$132,746,009**	**5.17%**
Scientific School	$87,205,826	$9,727,356	**$96,933,182**	**3.77%**
Normal School	$42,141,949	$19,172,275	**$61,314,224**	**2.39%**
Agricultural School	$40,768,333	$19,566,099	**$60,334,432**	**2.35%**
CEP & RI	$50,072,247	$9,559,406	**$59,631,653**	**2.32%**
University Transferred	$46,933,497	$11,942,919	**$58,876,415**	**2.29%**
Escheat	$5,838,695	$756,943	**$6,595,638**	**0.26%**
University Original	$5,700,034	$207,959	**$5,907,993**	**0.23%**
Community College Forest Reserve	$2,835,125	$0	**$2,835,125**	**0.11%**
CEP & RI Transferred	$0	$0	**$0**	**0.00%**
Total	**$2,101,800,000**	**$467,400,000**	**$2,569,200,000**	**100%**

Income Approach

The direct capitalization method is the primary method used to value the Timber Asset Class.

TIMBER ASSET CLASS VALUATION – IA

The IA, which utilizes the direct capitalization method, is the primary approach used to value the Timber Asset Class. In the direct capitalization method, a stabilized stream of revenue and expenses for the asset class must be determined in order to capitalize the net cash flows received into perpetuity. The stabilized stream of revenue is calculated by multiplying a determined sales revenue per MBF rate by an estimated volume in MBF to be typically purchased and removed for harvest.

Stabilized Sales Revenue per MBF

To determine the sales revenue per MBF rate, historical performance for the past 12 years was analyzed. Specifically, timber sales revenue between 2007 and 2018 was measured over volume removed for harvest (in MBF) in each fiscal year. Note that the sales revenue and removed volume amounts do not include revenue or volume from Forest Health and Forest Improvement sales.[26] The measured sales revenue per MBF ranged from $230 to $382 depending on the year. The average over the 12 fiscal years was approximately $315 per MBF.

Additionally, individual timber sales between 2015 and 2018 were compiled and analyzed. The average prorated revenue per MBF from sales containing timber older than 40 years was $360 per MBF. As a result, the concluded stabilized sales revenue per MBF amount was $340.

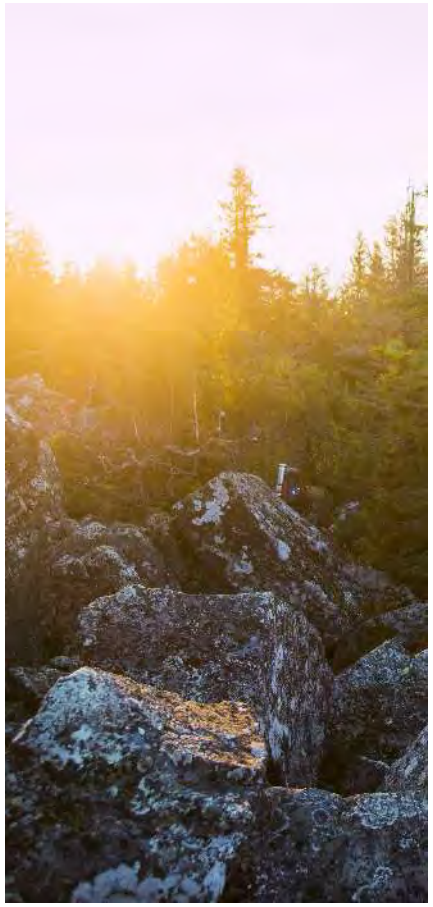
Stabilized Timber Volume Purchased and Removed in MBF

To determine a stabilized timber volume amount purchased and removed in MBF, both historical performance over the past 12 years as well as decadal projections of timber to harvest provided in sustainable yield forecasts from the Trust Manager were analyzed.

Net Acreage and Sustainable Harvest Model

Every 10 years, the Board of Natural Resources sets a level of timber harvest that the Trust Manager is required to target for sale. This process is called the sustainable harvest calculation and is required by statute and by department policy. Sustainable means harvesting timber "on a continuing basis without major prolonged curtailment or cessation of harvest."[27]

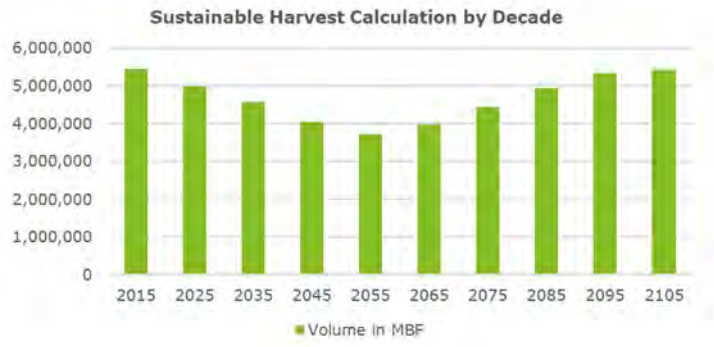
Sustainable harvest models help the department calculate the sustainable amount for each 10-year interval. The sustainable harvest level is expected to go up and down between calculations due to changes in the forest inventory, policies, and regulations.



[26] Forest Health and Forest Improvement Sales operate through legislatively designated revolving accounts that allow the department to capture all costs from the proceeds of the timber sale. The volume from these sales are not reflected in the Trust Manager's revenue system. This volume is reported separately to the legislature.
[27] (RCW 79.10.310)

The department's current planning decade for the sustainable harvest level on the Westside is 2015 through 2024, with the next planning decade from 2025 to 2034, and so on for the following planning decades. The following chart reveals the sustainable harvest level reported for each 10-year planning decade over the next century for trust lands.

FIGURE 107

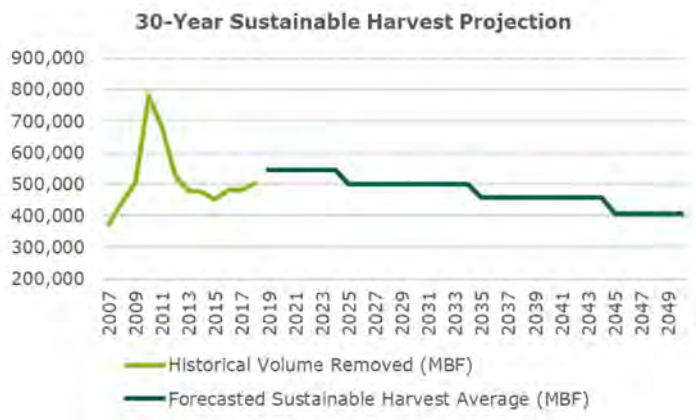


Anticipated Recession

Managing the growth for commercial timber is a cyclical process that spans many years. The amount of mature timber available for harvest is forecasted to decline over the next 40 years. The Trust Manager's sustainable harvest calculation for the decade between 2015 to 2024 is approximately 5,440,000[28] MBF, which implies an average annual amount of 544,000 MBF must be harvested over the decade to reach sustainability. This amount is projected to decrease to an annual average of approximately 498,000 MBF between 2025 to 2034 and so on until receding to an ultimate low annual average harvest of approximately 372,000 MBF starting in 2055. After this low, starting in 2065, the calculated volume of timber projected for sustainable harvest will begin to increase.[29]

Figure 108 presents reported historical volumes removed over the past 12 fiscal years, along with the average projected volumes to meet the decadal sustainable harvest calculations for the next 30 years for the entire state (both in western and eastern Washington).

FIGURE 108



The amount of purchased volume removed between 2007 and 2018 ranged from 374,506 MBF to 779,023 MBF per year, with an overall average of 514,474 MBF per year.

[28] This amount is based on the 2019 Board of Natural Resources Resolution setting the west side Sustainable Harvest Level at approximately 4,654,000 MBF for 2015-2024 and the 1996 Board of Natural Resources resolution still in effect setting the Sustainable Harvest Level for the east side of Washington at 786,000 MBF for each decade.
[29] These projected harvest levels are based on past board decisions and are subject to change.

The decadal sustainable harvest calculations are divided by 10 to show annual average harvest levels for each 10-year period. The averages display the continuing recession of mature timber available for harvest. The amounts over the next 30 years fall lower than the historical harvested average of 514,474 MBF, with 10-year averages dropping from 543,968 MBF per year to 404,040 MBF per year. The level annual equivalent over the next three decades is 501,180 MBF.

To account for the decline in the projected volume of harvested timber, this analysis determined that the annual volume to be purchased for harvest should be less than the historical average. The stabilized annual timber volume concluded to be purchased for harvest is 505,000 MBF.

Direct Capitalization

Gross timber sales revenue is calculated by multiplying the stabilized annual volume estimate (505,000 MBF) by the assumed sales revenue expected per MBF ($340).

Expenses are assumed to be 28 percent of the gross sales revenue and are paid to the Trust Manager for managing forest resources. This percentage was based on historical deductions averaging near this blended rate. Deducting the expense fee results in the trust net operating income being capitalized.

For the Timber Asset Class, the selected rate of return to capitalize the income is 6 percent. For further discussion regarding the determination of this capitalization rate, please refer to the earlier chapter of this report which discusses rates of return.

The income capitalized represents the combined value of both timber and timberland resources. The Timber Asset Class value concluded to using the IA is presented in the following table.

FIGURE 109

Direct Capitalization - Timber Asset Class		
Stabilized Volume Assumption (MBF)		505,000
Sales Revenue Assumption ($/MBF)		$340.00
Stabilized Gross Revenues		$171,700,000
Operating Cost % Deduction	28.00%	($48,076,000)
Revenue Distributed to Trusts		$123,624,000
Capitalization Rate		6.00%
Indicated Timber Asset Class Value		$2,060,400,000
Timber Asset Class Value (Rounded)		**$2,060,000,000**
Value per Net Harvestable Acre		**$1,661**

Common School and Indemnity Trust

A direct capitalization is also performed to determine the value attributable to the Common School and Indemnity Trust. This trust along with the State Forest Trust contain the majority ownership of this asset class. The total annual revenue for the trust is calculated using the same method as the Timber Asset Class; however, the stabilized volume assumption is lowered to the percentage of total annual purchased timber removed historically typical for this trust (i.e., approximately 33 percent of total volume removed).

The OCPD is changed to represent the true amount deducted for this trust beneficiary of 31 percent. The following table highlights the trust value for the Common School and Indemnity Trust concluded to using the IA.

FIGURE 110

Direct Capitalization - Common School & Indemnity Trust		
Stabilized Volume Assumption (MBF)		166,650
Sales Revenue Assumption ($/MBF)		$340.00
Stabilized Gross Revenues		$56,661,000
Operating Cost % Deduction	31.00%	($17,564,910)
Revenue Distributed to Trust		$39,096,090
Capitalization Rate		6.00%
Indicated Value		$651,601,500
Total Trust Value (Rounded)		**$651,600,000**
Value per Net Harvestable Acre		**$957**

As the majority of the net harvestable acreage (approximately 66 percent) owned by the Common School and Indemnity Trust lies in eastern Washington, an additional direct capitalization was included to show the value split between the East and West regions. The volume assumption of 166,650 MBF has also been split between the East and West regions based on average percentage splits of volume historically removed for this trust (i.e., approximately 72 percent for western Washington and 28 percent for eastern Washington).

For simplification, the sales revenue assumption has not been adjusted based on region, but the standard overall revenue assumption of $340 per MBF has been included. The following table displays the direct capitalization split between the East and West regions.

FIGURE 111

Direct Capitalization - Common School & Indemnity Trust (West vs. East)			
		West	East
Stabilized Volume Assumption (MBF)*		120,400	46,250
Sales Revenue Assumption ($/MBF)		$340.00	$340.00
Stabilized Gross Revenues (Allocated)		$40,936,000	$15,725,000
Operating Cost % Deduction	31.00%	($12,690,160)	($4,874,750)
Revenue Distributed to Trust		$28,245,840	$10,850,250
Capitalization Rate		6.00%	6.00%
Indicated Value		$470,764,000	$180,837,500
Net Harvestable Acres		237,891	462,310
Indicated Value per Net Harvestable Acre		$1,979	$391
Total Trust Value (Rounded)		**$470,800,000**	**$180,800,000**
Total Combined Trust Value (Rounded)		**$651,600,000**	
Combined Value per Net Harvestable Acre		**$957**	

*Volume Assumptions based on trust's historical percentage splits between West and East

State Forest Transfer Trust

An additional direct capitalization is performed to determine the value attributable to the State Forest Transfer Trust. This trust along with the Common School and Indemnity Trust contain the majority ownership of this asset class. The total annual revenue for the trust is calculated using the same method as the Timber Asset Class; however, the stabilized volume assumption is lowered to the percentage of total annual purchased timber removed historically typical for this trust (i.e., approximately 42 percent).

The OCPD is changed to represent the true amount deducted for this trust beneficiary of 25 percent. The following table highlights the trust value for the State Forest Transfer Trust concluded to using the IA.

FIGURE 112

Direct Capitalization - State Forest Transfer Trust		
Stabilized Volume Assumption (MBF)		212,100
Sales Revenue Assumption ($/MBF)		$340.00
Stabilized Gross Revenues		$72,114,000
Operating Cost % Deduction	25.00%	($18,028,500)
Revenue Distributed to Trust		$54,085,500
Capitalization Rate		6.00%
Indicated Value		$901,425,000
Total Trust Value (Rounded)		**$901,400,000**
Value per Net Harvestable Acre		**$3,220**

INDIVIDUAL TRUST VALUE SUMMARY – IA

The following table highlights the trust values for each individual trust. The following allocation is used in the final reconciliation. Specifically, the Common School and Indemnity Trust and State Forest Transfer Trust values (approximately $652 million and $901 million, respectively) have been deducted from the value of the Timber Asset Class concluded to using the IA ($2.06 billion). This results in a total of approximately $507 million to be allocated between the remaining smaller trusts.

The remaining value of $507 million has been allocated based on each remaining trust's historical average percentage of adjusted total removed volume. The total average removed volume level has been adjusted to exclude averages for the Common School and Indemnity Trust and State Forest Transfer Trust along with other miniscule amounts of trusts not in scope for this analysis.

Once the trust values are determined for each individual trust, they are further split between the East and West regions. This split is based on each individual trust's amount of volume and acreage harvestable in each region. This split has not been applied to the Common School and Indemnity Trust as independent direct capitalizations have already been utilized to obtain trust values by region for this trust. The following table displays the trust value for each trust along with the split amounts for the western and eastern Washington regions.

FIGURE 113

Individual Trust Values - Income Approach				
Trust	**Total Trust Value Resources**			
	West	**East**	**Total**	**%**
State Forest Transfer	$899,991,957	$1,408,043	**$901,400,000**	**43.76%**
Common School and Indemnity	$470,800,000	$180,800,000	**$651,600,000**	**31.63%**
Capitol Grant	$120,917,847	$7,141,522	**$128,059,369**	**6.22%**
Scientific School	$96,895,372	$10,808,174	**$107,703,546**	**5.23%**
Agricultural School	$43,839,093	$21,039,861	**$64,878,954**	**3.15%**
Charitable/Educational/Penal & Reformatory Institution	$49,741,593	$9,496,280	**$59,237,873**	**2.88%**
University Transferred	$39,621,523	$10,082,280	**$49,703,803**	**2.41%**
State Forest Purchase	$44,025,974	$36,987	**$44,062,961**	**2.14%**
Normal School	$30,263,273	$13,768,129	**$44,031,402**	**2.14%**
Community College Forest Reserve	$3,996,460	$0	**$3,996,460**	**0.19%**
Escheat	$2,600,534	$337,140	**$2,937,674**	**0.14%**
University Original	$2,303,904	$84,055	**$2,387,959**	**0.12%**
CEP & RI Transferred	$0	$0	**$0**	**0.00%**
Total	**$1,804,997,530**	**$255,002,470**	**$2,060,000,000**	**100%**

Reconciliation

The Income Approach has been given primary weight in the reconciliation.

TIMBER ASSET CLASS RECONCILED VALUE CONCLUSION

In reconciliation of the two approaches used to value the Timber Asset Class, primary weight was placed on the Income Approach as it directly encompasses the expected future benefits of the asset class under the existing limitations and restrictions discussed earlier. The table below highlights the reconciled value conclusion.

FIGURE 114

Timber Asset Class - Reconciliation	
Valuation Approach	**Value (Rounded)**
Gross Acres	2,056,510
Net Acres	1,240,163
Whole Property Value Method Conclusion	$2,569,200,000
Income Approach Conclusion	$2,060,000,000
Reconciled Timber Asset Class Trust Value (Rounded)	**$2,136,000,000**
Value / Gross Acre	**$1,039**
Value / Net Acre	**$1,722**

INDIVIDUAL TRUST RECONCILED VALUE SUMMARY

Reconciled trust values have been calculated for each trust by applying the reconciled weighting to the individual trust values allocated in the corresponding valuation approach. The following table reflects the reconciled values for each individual trust.

FIGURE 115

Individual Trust Values - Reconciled				
Trust	**Total Trust Value Resources**			
	West	**East**	**Total**	**%**
State Forest Transfer	$893,572,660	$1,376,796	**$894,949,456**	**41.89%**
Common School and Indemnity	$506,971,557	$208,907,901	**$715,879,458**	**33.51%**
Capitol Grant	$123,392,660	$7,177,152	**$130,569,811**	**6.11%**
Scientific School	$95,619,703	$10,504,106	**$106,123,809**	**4.97%**
Agricultural School	$43,459,272	$20,541,217	**$64,000,489**	**3.00%**
CEP & RI	$49,883,928	$9,379,008	**$59,262,936**	**2.77%**
State Forest Purchase	$57,424,019	$47,512	**$57,471,531**	**2.69%**
University Transferred	$40,794,158	$10,223,226	**$51,017,384**	**2.39%**
Normal School	$32,104,759	$14,384,371	**$46,489,130**	**2.18%**
Community College Forest Reserve	$3,829,379	$0	**$3,829,379**	**0.18%**
Escheat	$3,092,006	$394,776	**$3,486,782**	**0.16%**
University Original	$2,818,563	$101,272	**$2,919,835**	**0.14%**
CEP & RI Transferred	$0	$0	**$0**	**0.00%**
Total	**$1,852,962,664**	**$283,037,336**	**$2,136,000,000**	**100%**

REASONABLENESS CHECK

A check for reasonableness was conducted by comparing the final concluded value on a per acre basis against the transactions of large related assets and enterprises in the industry.

Overall, a list of nearly 70 transactions of mostly larger timber assets, properties, and enterprises was compiled and analyzed. The transactions occurred in the last 20 years and were located mostly in the United States and Canada. The number of timberland acres sold ranges from 300 acres to 650,000 acres, with overall transaction prices ranging from $163,000 to $8.4 billion.

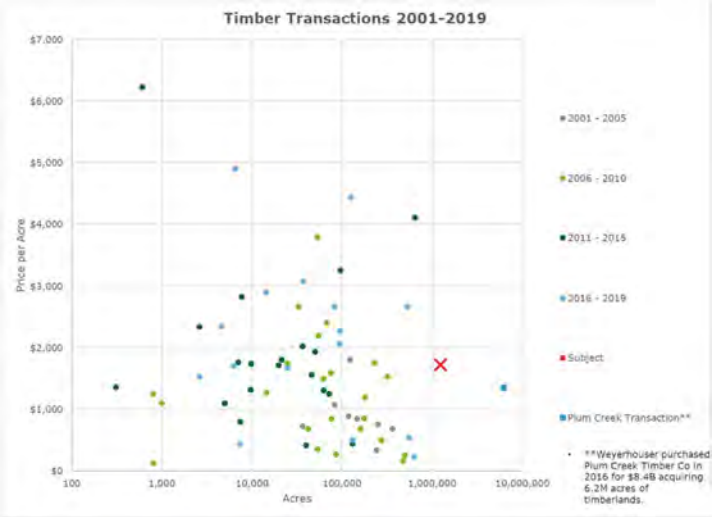
It is important to note that no adjustments have been made to the data. For example, some of the larger transactions involved an enterprise value that included businesses, buildings, equipment, recreational leased assets, and more. The potential impact of allocating or adjusting the price to the various components would have resulted in a lower value for the timberland portion.

One large transaction of recent note was the acquisition of Pope Resources by Rayonier Inc. In January of 2020, Rayonier Inc. announced that it entered into a definitive merger agreement wherein Rayonier will acquire Pope Resources for a value of $554 million. Pope Resources owns 125,000 acres of timberlands with the majority located in western Washington. The transaction represents a purchase price of $4,432 on a price per acre basis.[30]

Another large transaction of note is the acquisition of Plum Creek Timber Co. ("Plum Creek") in 2016 by Weyerhaeuser. Seattle-based Plum Creek owned approximately 6.2 million acres of timberlands located over 19 states at the time of purchase. Weyerhaeuser ultimately paid $8.4 billion to acquire Plum Creek. This equates to approximately $1,355 paid per acre of timberland acquired.[31]

The following chart displays the compiled list of large transactions. Specifically, the independent variable (x-axis) represents the total number of acres purchased and the dependent variable (y-axis) represents the price per acre paid.

FIGURE 116



Note: Red "X" indicates the value conclusion per net acre for the Timber Asset Class.

As shown above, the final value conclusion of $1,722 per net harvestable acre appears reasonable. While the subject and the Plum Creek transactions contain much larger amounts of acres than the rest of the transactions, the x-axis has been adjusted to be a logarithmic scale for presentation purposes.

[30] Rayonier to Acquire Pope Resources. (2020, January 15). Retrieved from https://www.businesswire.com/news/home/20200115005365/en/Rayonier-Acquire-Pope-Resources
[31] Monk, B. (2015, November 9). Weyerhaeuser, Plum Creek merge in $8.4 billion deal. Retrieved from https://www.bizjournals.com/seattle/blog/2015/11/weyerhaeuser-plum-creek-merge-to-form-one-of-the.html

Deloitte.

Image of a multi-tenant office building owned by state trusts located at 3350 Monte Villa Parkway Bothell, WA. *Source: CoStar*

Chapter 6
Commercial Real Estate Asset Class

Table of Contents

Executive Summary

Commercial real estate, as an asset class, consists of commercial properties subject to either ground leases or building/premises leases throughout the State of Washington. Each of these properties is leased to a third party or third parties. The table below provides a brief summary of the commercial real estate assets included within this sector and a portfolio conclusion on the Trust Value based on the following extraordinary assumptions.

We assume that all commercial real estate properties adhere to proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper regulations and development standards. As detailed in the introductory chapter, we assume that the ownership interest is non-transferable resulting in the land not being able to be sold. We relied upon information provided by the Trust Manager for all specific data regarding data files, leasing activities and financials, and size and ownership information. We assume the accuracy of all information provided is sufficient for the purposes of this valuation. We assume the qualities and conditions of the vacant spaces are below market grade as vacancies have persisted.

Importantly, the value appraised is the Trust Value, which is defined earlier in this report. This value type is applicable to all asset classes and subject to specific laws, regulations, or management policies that restrict the use, marketability, or sale of these asset classes.

Commercial Real Estate Asset Class Executive Summary	**Premises Leased Properties (Urban)**	**Ground Leases (Rural)**	**Ground Leases (Urban)**	**Total**
Leases	7	23	6	**36**
Acres	43	971	20	**1,034**
Stabilized Gross Revenues	$6,900,000	$1,200,000	$2,200,000	**$10,300,000**
Operating Cost 30% Deduct	($2,070,000)	($360,000)	($660,000)	**($3,090,000)**
Trust Net Operating Income	$4,830,000	$840,000	$1,540,000	**$7,210,000**
Capitalization Rate	7.50%	9.00%	7.00%	**7.53%**
Value Indication (Rounded)	$64,400,000	$9,300,000	$22,000,000	**$95,700,000**
Concluded Trust Value	**$64,400,000**	**$9,300,000**	**$22,000,000**	**$95,700,000**
Value per Lease	$9,200,000	$404,348	$3,666,667	**$2,658,333**
Value per Acre	$1,497,674	$9,578	$1,100,000	**$92,553**
Value per Gross Building Area SF (Improved Only)	$101			

Introduction

Commercial Real Estate Asset Class is located throughout the State of Washington, but it is mostly situated near urban locations.

INTRODUCTION

The Commercial Real Estate Asset Class is a small portion of the total acreage owned by the state trusts, but it represents an important opportunity to achieve portfolio diversification and potential for increased revenue. This asset class comprised 1,034 acres as of FY 2018.

It is helpful to keep in mind that land areas can be moved from one asset class to another asset class over time. For example, an area of the Timber Asset Class may be reclassified to the Commercial Real Estate Asset Class as its planned use changes to accommodate market conditions and opportunities.

As a general note, all dollar amounts reported in this chapter are nominal and have not been adjusted for inflation. Additionally, we note that all years referenced are fiscal years—not calendar years. The fiscal year for state trust lands begins on July 1 and ends on June 30.

Subgroups. For purposes of analysis and discussion, the Commercial Real Estate Asset Class has been divided into two subgroups:

- Premises leases (i.e., improved property leases)
- Ground leases

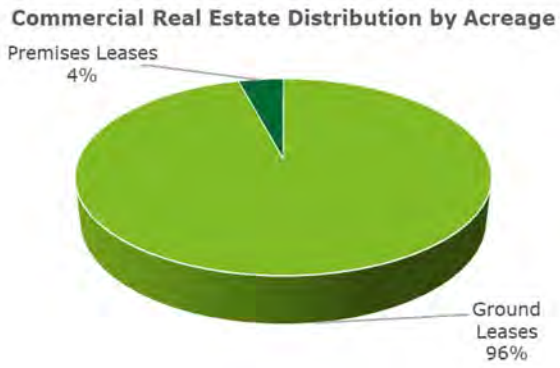
Based on acreage, most of the asset class is ground leased; however, most of the revenue comes from premises leases. The following chart highlights the acreage distribution for premises leases versus ground leases.

Commercial Real Estate Subgroup Acreage

FIGURE 1

Commercial Property Type	Lease Count	Acres
Ground Leases	29	991
Premises Leases	7	43
Totals	**36**	**1,034**

FIGURE 2



Commercial Real Estate

This asset class consists of commercial ground leases and premises leases. There are a variety of tenants across the asset class, including big box stores, single businesses, and small rural resorts.

The forecasted 2019 total gross revenue related to the Commercial Real Estate Asset Class is reportedly $10.2 million (rounded). The gross revenue from this asset class is reduced by a specific operating cost percentage deduction to account for management and operating expenses. The net cash flows from this asset class are distributed to the trust beneficiaries.

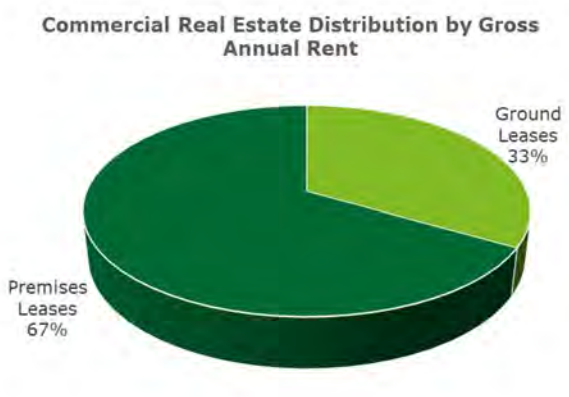
The following chart highlights the reported allocation of projected FY 2019 gross revenue (rounded) between premises leases and ground leases. As of the date of value, the Commercial Real Estate program had already calculated anticipated FY 2019 annual rents. As this represents the most recent and accurate data available at the date of value, anticipated FY 2019 gross revenue has been presented for each subgroup. All other asset classes are presented with FY 2018 actual gross revenues segregated by subgroup.

Commercial Real Estate Subgroup Revenue

FIGURE 3

Commercial Property Type	Lease Count	Gross Annual Rent (FY19 Projected)
Ground Leases	29	$3,400,000
Premises Leases	7	$6,800,000
Totals	**36**	**$10,200,000**

FIGURE 4



Premises Leases. With premises leases, the land and improvements are owned by the state of Washington and managed on behalf of trust beneficiaries, and both are leased to tenants. There are seven active premises leases on state trust lands that serve a variety of uses, including commercial warehouses, office buildings, and retail businesses. There is an office property (I-90 Lake Place Building B) that is currently vacant. If this building were leased, the total lease count would be eight for the premises leases subgroup. As described, the commercial real estate portfolio has vacant space, and our estimate of stabilized occupancy reflects a portfolio level occupancy. As such, no adjustment is made to account for differences in occupancy at the individual property level.

The improved real estate properties with premises leases are located in or near the larger urban Seattle/Tacoma metro area. Premises leased properties have an average land area of approximately five acres.

The majority of the premises leases are for single tenant properties with only one tenant in place. However, there is one multi-tenant office building located in Bothell, Washington and one multi-tenant retail building in Tacoma, Washington.

Ground Leases. With ground leases, the state of Washington owns the underlying land, but the building and site improvements are owned by lessees. Ground leases can also be used by tenants without any improvements for a variety of commercial uses. Typically, however, tenants lease the land and build improvements on the land. At lease expiration, the landlord often receives ownership of the improvements, and the asset may be moved to the premises leases subgroup. There are currently 29 state land trust sites with ground leases.

Ground leases are spread across 10 of the state's counties and are situated either in urban areas or rural and recreational areas. Ground leases are held on sites ranging from less than one acre to 200-plus acres of land. The average ground lease on state trust lands is for approximately 34 acres.

Commercial Real Estate Asset Class Ownership. The Trust Manager manages and operates state trust lands owned by the State of Washington for the benefit of designated trust beneficiaries. To be concise, this report uses the term "ownership" or "ownership interests" to describe the amount or percentage of gross revenue or land managed by the Trust Manager on behalf of specific trust beneficiaries, even though the land is owned by the State of Washington and not the trust beneficiaries.

The following charts present the trust ownership percentages based on acres and gross revenue received in FY 2018 for the Commercial Real Estate Asset Class.

Commercial Real Estate Asset Class Ownership Composition

FIGURE 5

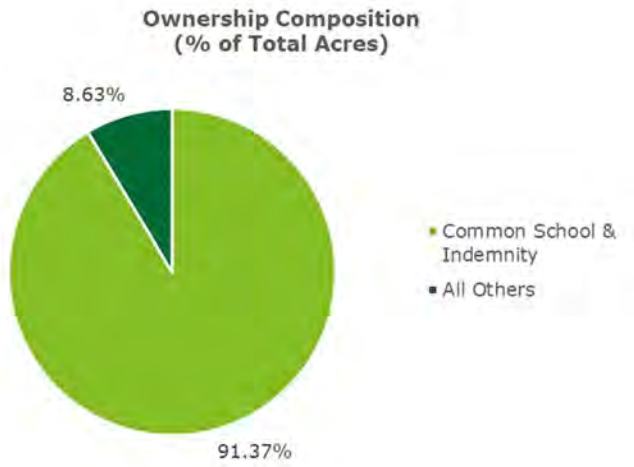
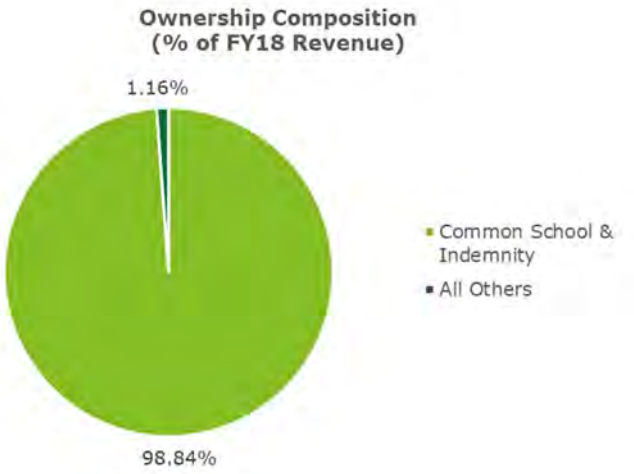


FIGURE 6



For the Commercial Real Estate Asset Class, the largest ownership share is held by the Common School and Indemnity Trust, which supports statewide public school construction and other designated programs. The beneficiary interests in state trust lands are the result of federal land grants to Washington at the time statehood was granted. The Common School and Indemnity Trust represents more than 90 percent of total acres and nearly 99 percent of FY 2018 revenue received from the Commercial Real Estate Asset Class.

A lack of commercial real estate land for the State Forest Transfer Trust is due to the preclusion of converting State Forest Transfer Trust land away from being managed for timber.

Physical Description

In FY 2018, the total gross acreage of the Commercial Real Estate Asset Class was approximately 1,034 gross acres spread throughout 12 counties.

FIGURE 7

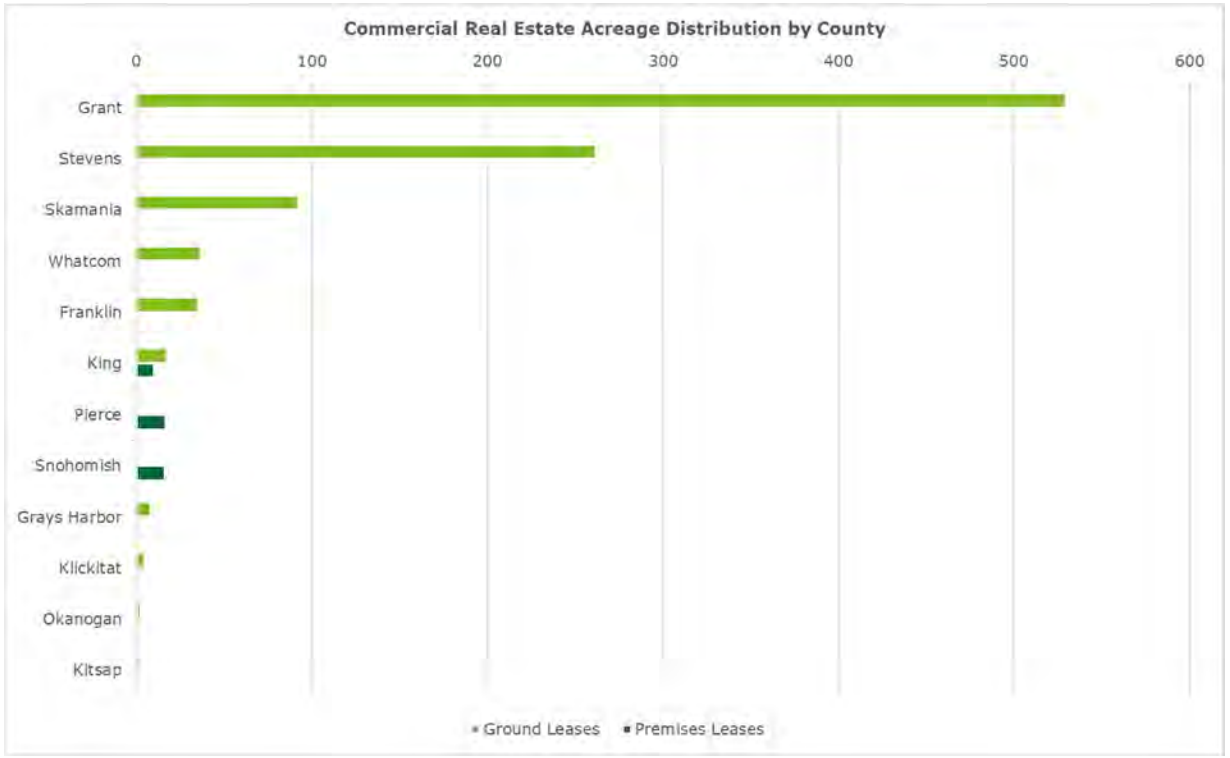


IMAGE SHOWS A 55,000 SQUARE FOOT MEDICAL OFFICE PROPERTY LOCATED AT I-90 LAKE PLACE IN ISSAQUAH, WASHINGTON (KING COUNTY). SOURCE: COSTAR

IMAGE SHOWS A 15,000 SQUARE FOOT RETAIL BUILDING LOCATED IN MUKILTEO, WASHINGTON (SNOHOMISH COUNTY), WHICH IS CURRENTLY LEASED TO WALGREENS. SOURCE: COSTAR

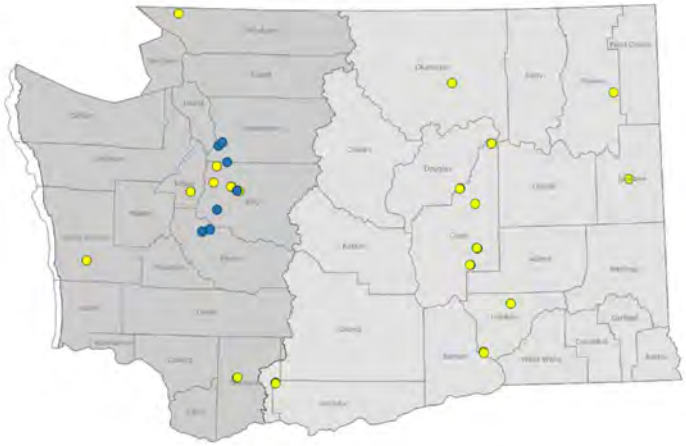
The following map highlights where leases (i.e., both premises leases and ground leases) in the Commercial Real Estate Asset Class are located across the state.

The following sequence of maps is presented to display the general area of lease locations only. These maps are sourced from the GIS database and are not meant to align with the exact lease and acreage totals provided by Trust Management for the Commercial Real Estate Asset Class.

In Figure 8, the blue dots represent premises leases and the yellow dots represent ground leases.

Map of All Commercial Real Estate Sites

FIGURE 8



Premises Leases. The seven premises leases include two retail spaces, a warehouse, a power center (i.e., retail park), and a single-tenant and two multi-tenant offices. Building improvements were built from 1984 to 2006 and range in size from 14,820 to 200,500 square feet. The largest is a 200,500 square foot (SF) distribution center in Everett, Washington, which is within Snohomish County.

Approximately 43 acres of state trust lands are used for premises leases, which can be found in King, Pierce, and Snohomish counties around the Seattle and Tacoma metro areas.

The expiration dates for a majority of premises leases range from 2024 through 2026, although two single tenant leases expire in 2061 and 2081 (with rights to cancel every five years), which are longer terms more similar to ground leases.

The following map highlights the premises lease locations in the northwest part of the state.

Map of Properties with Premises Leases

FIGURE 9

Map of Properties with Ground Leases

FIGURE 10

Ground Leases. There are approximately 991 acres of state trust lands used for ground leases. These leases are found throughout the state, although they are typically in more rural areas relative to the properties with premises leases. Expiration dates for the current leases in place occur between 2027 through 2069.

The majority of the acreage for ground leases is in Grant and Stevens counties. Nine ground leases comprising approximately 529 acres are found in Grant County, while one ground lease comprising approximately 262 acres (26 percent of the total ground lease acreage) is found in Stevens County.

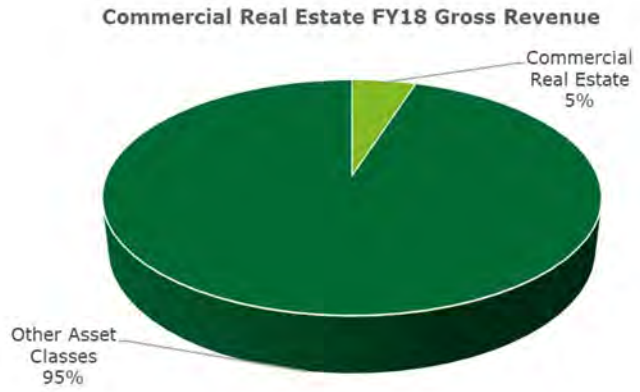
Information was not available regarding the improvements on ground lease properties, such as building size, age, and condition. This information is not recorded and tracked by the Trust Manager.

The following map highlights the ground lease locations.

Operational History

With approximately 1,034 acres (0.03 percent of all upland acreage owned by the state), the Commercial Real Estate Asset Class produces nearly 5 percent of the gross revenue for all of the asset classes.

FIGURE 11

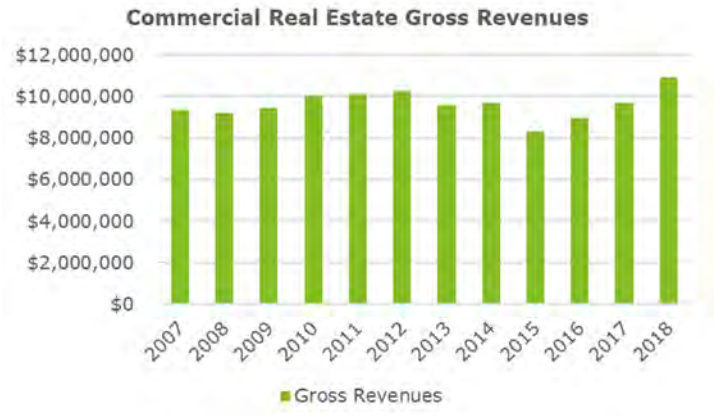


COMMERCIAL REAL ESTATE ASSET CLASS REVENUE FROM 2007 TO 2018

For the scope of this project, we analyzed the operational history of each asset class. Operating information has been provided to the analysts for the past 12 fiscal years. Revenue amounts were not adjusted for inflation and are presented in this report as nominal values, not real values.

The chart below displays the total gross revenue[1] (before the operating cost percentage deduction) received from commercial real estate leases from 2007 to 2018 in nominal (not real) values.

FIGURE 12

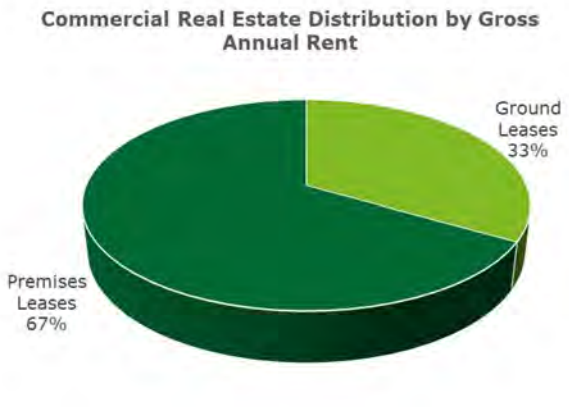


[1] Gross revenues exclude sub-sources 6, 3045, 4005, 5022, 5250, 6022, and 9088 as they are not included in reported operating cost percentage deduction totals.

The revenue above was not stacked to show the relative portions of ground leases versus premises leases because the Trust Manager's accounting system does not track historical revenue at the subgroup level.

However, we analyzed and categorized forecasted FY 2019 revenue (i.e., rental income) based on the relative portions of ground leases versus premises leases (i.e., improved property leases). The following chart highlights this distribution.

FIGURE 13



Premises Leases. Gross annual rents for premises leases are projected to total approximately $6.8 million in FY 2019, which comprises the majority of revenue received for this asset class.

The premises leases average approximately $971,000 in gross annual rent per contract, $158,000 per acre, and $10.70 per square foot.

The dollar per square foot calculation is determined by dividing gross rent by the square footage of the total gross building area, which includes the occupied square footage (534,129 SF) and vacant square footage (101,288 SF).

Ground Leases. Gross annual rents for ground leases are projected to total $3.4 million in FY 2019.

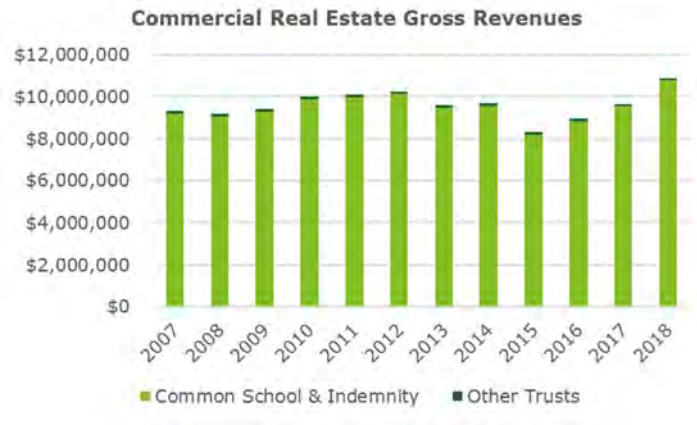
The ground leases average approximately $117,000 in gross annual rent per contract, or approximately $3,400 per acre.

The majority of ground lease revenue comes from ground leases in more urban areas of King County.

For FY 2019, the total revenue from five ground leases found in King County is projected to be approximately $2.1 million (63 percent of all ground lease rent). This revenue includes rent for commercial uses, such as office buildings, retail, supermarkets, and a veterinarian clinic.

Common School and Indemnity Trust. Since the Common School and Indemnity Trust has the largest ownership percentage for this asset class, we segregated the gross revenue received in each fiscal year to display the portion received by the Common School and Indemnity Trust versus the portion received by all other trusts. Note that the portions of revenue received for other trusts are miniscule for this asset class.

FIGURE 14



OPERATING COST PERCENTAGE DEDUCTION

In the Commercial Real Estate Asset Class, all costs are paid from annual revenue. As gross proceeds are received, an operating cost percentage deduction is applied and paid to the Trust Manager. From the trust beneficiary ownership position, there are no outflows of funds to operate and maintain the asset class; the Trust Manager budgets for actual costs and capital expenditures and pays these costs directly from the operating cost percentage deduction received during the year.

The operating cost percentage deduction is a percentage of gross revenues that is legislatively set. The percentage is typically between 25 percent and 31 percent of total gross revenue, depending on the management account associated with each trust ownership. Historical data reported in this analysis reflects actual blended rates deducted. We have used an estimated assumption of 30 percent for the operating cost percentage deduction of this asset class which has been applied in the direct capitalization method.

Note that most leases in the Commercial Real Estate Asset Class operate under a triple net lease structure in which tenants pay all operating costs and maintenance expenses.

Operating Cost Percentage Deduction versus Direct Operating Expenses. The operating cost percentage deduction is different than actual operating expenses and capital expenditures incurred to operate and manage the Commercial Real Estate Asset Class assets.

When the total operating cost percentage deduction for all asset classes exceeds actual operating costs and capital expenditures for the year, the excess is held in reserve for future years when the operating cost percentage deduction does not cover actual costs. The reserve balances are reported by fund and held in separate accounts—the Resource Management Cost Account, the Forest Development Account, and the Agriculture College Trust Management Account.

The Resource Management Cost Account in the state treasury is created and used solely for the purpose of defraying the costs and expenses incurred by the Trust Manager in managing and administering state trust lands, state-owned aquatic lands, and the making and administering of leases, sales, contracts, licenses, permits, easements, and rights of way as authorized (RCW 79.64.020).

The Forest Development Account was created in the state treasury (RCW 79.64.100). Money placed in this account is first used for paying interest and principals on specific bonds issued by the Trust Manager. Appropriations made by the legislature from the Forest Development Account to the Trust Manager are for carrying out forest management activities on state forestlands and for reimbursements of expenditures from the Resource Management Cost Account in the management of state forestlands.

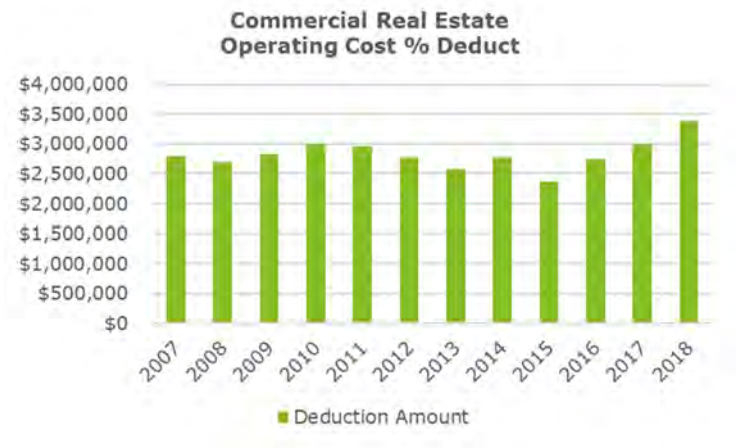
The third account is the Agriculture College Trust Management Account. This account does not retain an operating cost percentage deduction, but the Trust Manager receives a direct appropriation from the legislature to conduct management work. The Trust Beneficiary retains all gross revenue.

The reserve balances for all asset classes as of June 30, 2018 were approximately $12.6 million (Resource Management Cost Account) and nearly $4 million (Forest Development Account). Over the last 10 years, the Resource Management Cost Account reserves reached a high of more than $17 million at the end of FY 2014 and a low of $800,000 at the end of FY 2009. The Forest Development Account reserves reached a high of $24 million at the end of FY 2011 and a low of just under $4 million at the end of 2018.

However, note that these are snapshots as of the end of fiscal years. In reality, the balances of the funds are constantly changing throughout each year with a much wider range. Reserves have been known to dip down to only a couple weeks of operating costs on a few occasions.

The following chart presents the dollar amounts of the historical operating cost percentage deduction from 2007 to 2018. The operating cost percentage deduction is proportionate to the gross revenues produced by the asset class each year—it rises and falls as earnings for trusts rise and fall and may not reflect increases or decreases in the Trust Manager's actual costs. These dollar amounts include both portions of revenue distributed to the Trust Manager from commercial leases and incidental revenue from trespassing fines, non-federal conservation programs, Initial Incident Report (IIR) restitutions, power charges, and other assessments. The costs are not segregated by subgroup (i.e., premises leases versus ground leases) as the Trust Manager's accounting system does not track historical costs at the subgroup level.

FIGURE 15

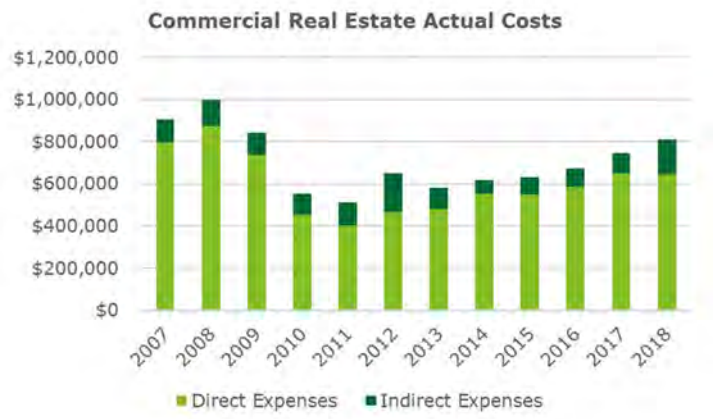


ACTUAL COSTS

The following is a discussion of the actual costs incurred by trust beneficiaries and paid by the Trust Manager from funds received as a result of the operating cost percentage deduction.

The following chart highlights the actual costs incurred by the Trust Manager, which are split between direct and indirect expenses.

FIGURE 16



Direct Expenses. Direct expenses include all costs directly related to managing commercial real estate properties, as well as allocations of general costs.

Currently, direct expenses include all costs directly related to:

- Property management
- Projects and planning

The allocations of general costs are related to:

- Uplands
  - Examples include environmental analysis, state lands training, and law enforcement
- Engineering and general services
  - Examples include resource mapping, surveying, and record keeping
- Infrastructure for state trust lands
  - Examples include infrastructure expenses with the key word "real estate."

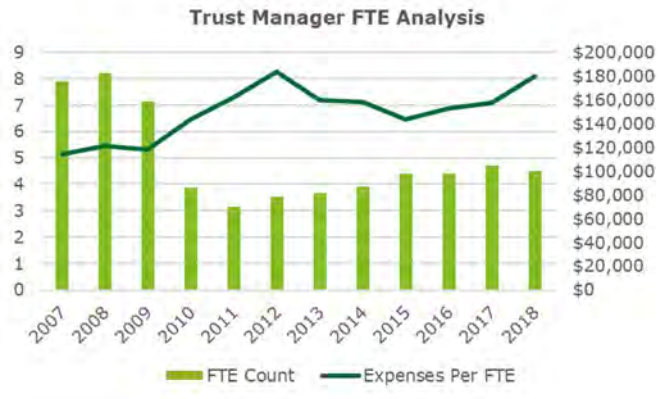
Note again that most leases in the Commercial Real Estate Asset Class operate under a triple net lease structure in which tenants pay all operating costs and capital expenditures. As such, direct expenses are normally minimal.

Indirect Expenses. Indirect expenses include all overhead costs allocated to the Trust Manager for:

- Administrative and agency support
- Adjustments
- Legal services
- Strategic investments
- Other administrative payments

As seen in the following full-time employee analysis, the Trust Manager typically retained between four and five full-time employees for the Commercial Real Estate Asset Class over the last four fiscal years. The total actual costs paid by the Trust Manager have ranged from $140,000 to $180,000 per full-time employee over that same period. These costs include all direct and indirect expenses, including salaries, as well as benefits and overhead.

FIGURE 17



NET CASH FLOW FROM 2014 TO 2018

The trust beneficiaries pay a portion of the gross revenue (i.e., operating cost percentage deduction) to the Trust Manager for operating expenses and capital expenditures. These costs include direct and indirect expenses. The cash flows net of the operating cost percentage deduction are then distributed to the appropriate trust beneficiary.

The following table summarizes the net cash flows distributed to trust beneficiaries over the past five fiscal years for this asset class. These operating cost percentage deduction amounts include both portions of revenue distributed to the Trust Manager from commercial leases and incidental revenue from trespassing fines, non-federal conservation programs, IIR restitutions, power charges, and other assessments. These cash flows indicate the Commercial Real Estate Asset Class provided trust beneficiaries with average net cash flows ranging from $5.9 million to $7.5 million per year.

FIGURE 18

	2014	2015	2016	2017	2018
Total Annual Gross Revenue	**$9,687,347**	**$8,315,189**	**$8,961,802**	**$9,665,572**	**$10,911,373**
Operating Cost % Deduct	($2,778,401)	($2,371,202)	($2,746,495)	($2,995,213)	($3,385,271)
% of Revenue	28.68%	28.52%	30.65%	30.99%	31.03%
Revenue Distributed to Trusts	**$6,908,947**	**$5,943,987**	**$6,215,307**	**$6,670,360**	**$7,526,102**
% of Revenue	**71.32%**	**71.48%**	**69.35%**	**69.01%**	**68.97%**

Note that some recent fiscal years may report an operating cost percentage deduction outside the anticipated range of 25 percent to 31 percent. The Trust Manager explained this is not uncommon as accounting adjustments usually take some time to fully implement.

Because all net cash flow funds are distributed to the trust beneficiaries, it is important to note that the Commercial Real Estate Asset Class is not able to hold cash funds to invest in upgrades, expansions, and transactional expenditures for typical commercial real estate items, such as upgrades, tenant improvements, and marketing.

Property Taxes and Zoning

The State of Washington is exempt from paying direct real property taxes; however, tenants are not.

PROPERTY TAXES

Property taxes are a local government's main source of revenue. Most localities tax private homes, land, and businesses based on the property's value.

Lands owned by the state are exempt from property tax obligations under the state constitution. However, because private lessees of state land receive the benefit of governmental services, the legislature imposes a leasehold excise tax on these private lessees under RCW 82.29A.

Leasehold excise tax is paid by the lessee to the Trust Manager when rent is paid, and the Trust Manager remits the payment to the Department of Revenue. Land that is not leased does not pay property taxes or leasehold excise tax. Generally, the leasehold excise tax on leased land is most often less than what property taxes would be for the same land.

Certain types of special taxes are still required to be paid by the Trust Manager, but they are generally limited and typically not associated with the assessed values of the real property. For example, the state is still required to pay a small amount to certain counties related to their surface water management practices.[2]

ZONING

Zoning classifications for different commercial real estate assets include commercial, business general, urban residential, and rural remote.

We assume that all commercial real estate properties adhere to the proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper zoning regulations and development standards.

[2] https://snohomishcountywa.gov/2003/SWM-Utility-Charges

Market Analysis

Commercial Real Estate Asset Class portfolio factors.

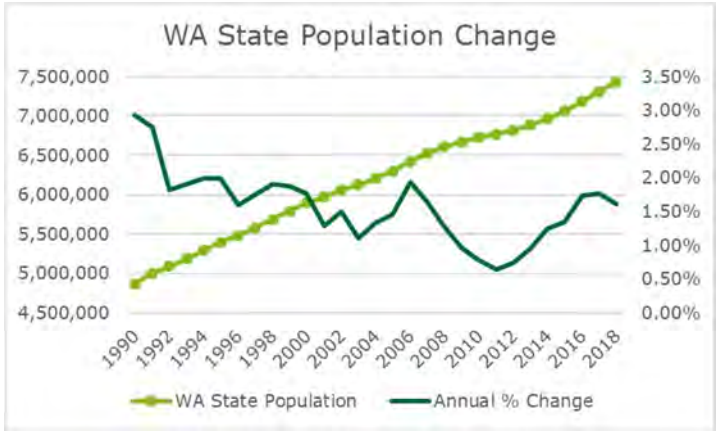
MARKET OVERVIEW

Historic and Current Demographic Trends

Washington State exhibited steady population growth from 1990 to 2018. The growth rate declined sharply near 2008, which is largely explained by the economic conditions of the time. In 2012, as the economy began to recover from the recession, the growth rate began to increase.

The state population totaled 7,427,570 in 2018, averaging 1.2 percent annual growth between 2008 and 2018. The overall population growth is forecasted to continue at a steady pace, with the population anticipated to rise above 9,000,000 by 2040.[3]

FIGURE 19



Overall Capitalization Rate Trends

An overall capitalization rate (OAR) is defined as the ratio of one year's net operating income provided by an asset to the value of the asset and is used to convert income into value when using the income capitalization approach.[4]

Since the 2008 recession, as property values continue to rise, overall capitalization rates for commercial real estate have generally decreased. Overall capitalization rates are the inverse of an income multiple, so lower overall capitalization rates result in higher values for the same net operating income that a property produces.

[3] State of Washington Forecast of the State Population, December 2018, forecasted by the Office of Financial Management.
[4] Definition sourced from the Sixth Edition of the Dictionary of Real Estate Appraisal.

Nationally, between 2017 and 2018, average overall capitalization rates for retail properties rose slightly, while average overall capitalization rates for office properties remained generally flat and average overall capitalization rates for industrial properties decreased steadily.[5]

According to the 2Q 2018 RERC report, the western region of the United States reported an average overall capitalization rate of 6.6 percent for suburban offices. The average overall capitalization rate for suburban offices located in the greater Seattle area was 6.1 percent, 50 basis points lower. Further, the Western United States had average overall capitalization rates of 6.2 percent for warehouses and 6.4 percent for neighborhood and community retail centers. The greater Seattle area reported 5.5 percent and 5.9 percent for warehouses and neighborhood and community retail centers, respectively.

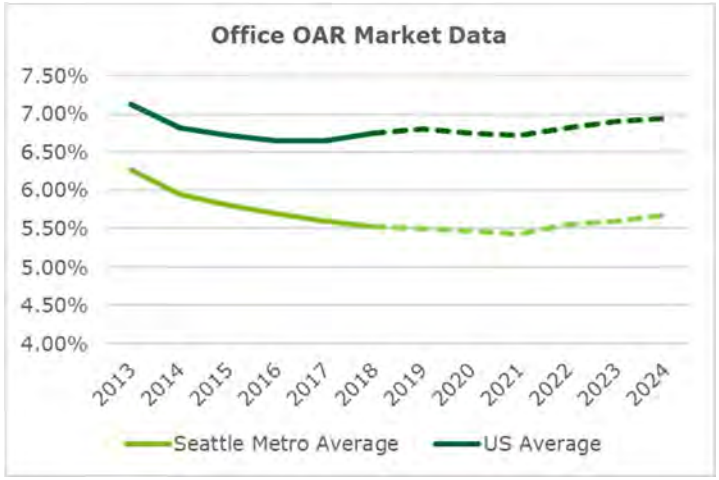
We also compiled sales transactions reported in the CoStar database for single tenancies with office, retail, and industrial uses. These transactions occurred two years prior to the valuation date and have similar age and size characteristics as commercial real estate assets owned by the trust beneficiaries. We found that the average overall capitalization rate for transactions found in rural areas throughout the state was nearly 8 percent, whereas the average overall capitalization rate for transactions located in the Seattle/Tacoma metro areas was only 6.27 percent.

Thus, in the state of Washington, average overall capitalization rates for rural transactions spread throughout the state tend to be higher than average overall capitalization rates for transactions in the state's more urban areas, such as the Seattle/Tacoma metro areas.

The following charts show overall capitalization rate trends in the greater Seattle metro area for office, retail, and industrial transactions sourced from the CoStar database. In general, the data indicates the Seattle metro real estate market is a healthy and strong performing market when compared to the overall national average. The charts clearly demonstrate that overall capitalization rates for the Seattle metro area are consistently lower than the national average. The charts include averages for the past five years and forecasts for the next five years.

Seattle Office Overall Capitalization Rate Trend Chart

FIGURE 20



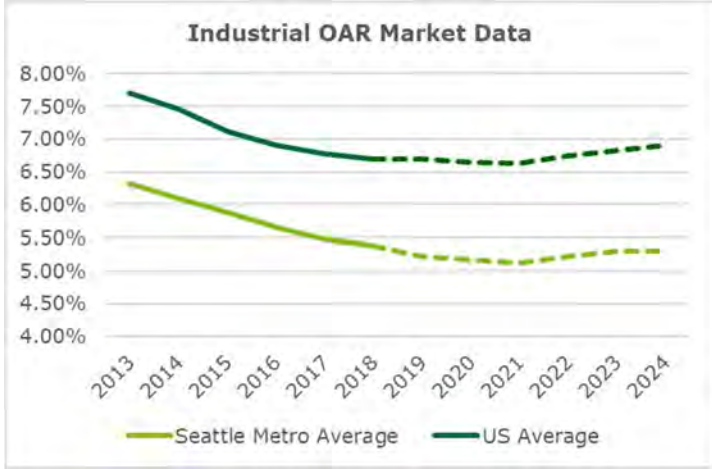
[5] PricewaterhouseCoopers (PwC) 2Q 2018 Investor Survey

Seattle Retail Overall Capitalization Rate Trend Chart

FIGURE 21

Seattle Industrial Overall Capitalization Rate Trend Chart

FIGURE 22



This rate data is provided as background information. For an in-depth discussion on ownership limitations, the impact on the rates used, and the impact on rates selected please see the earlier chapters in this report.

Methodology

The income approach was the portfolio valuation method selected for this study.

Additional transaction data compares the results of the income approach for properties under premises leases[6] to comparable sales data.

Methodology

The income approach is the basis for the valuation of this asset class (i.e., portfolio valuation) because the properties currently produce annual income and the receipt of future cash flow benefits is expected. As secondary support, sales data was used to evaluate improved property estimates for premises leases only.

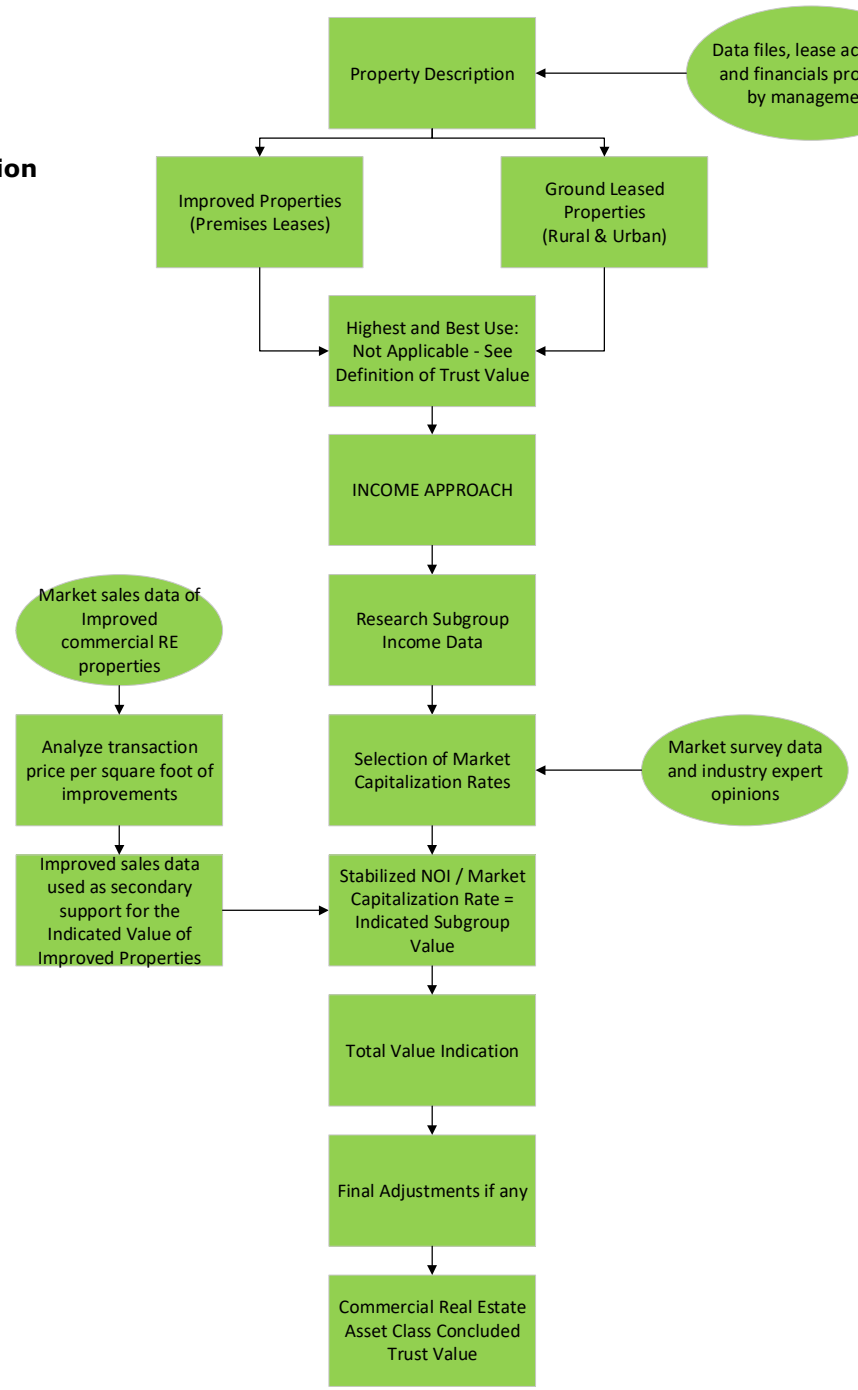
Transaction data for ground leases is limited; therefore, the data is not used to test the ground lease income approach. The Trust Manager's data files were the principal source of market and value information (i.e., annual gross lease revenue, direct and indirect expenses, and other financial information) and include lease activity obtained in the ordinary course of the management of assets.

Due to the nature of the cash flow stream this asset class produces through its negotiated leases, the income approach was the methodology utilized to evaluate the assets. Adequate amounts of market data existed to use the income approach.

[6] Comparable transaction data for ground lease properties was not readily available.

Commercial Real Estate Asset Class Valuation Flowchart

FIGURE 23



Data and Data Sources

Data was compiled and analyzed from multiple data sources. We obtained, read, and analyzed reputable industry publications that are widely known and utilized within the real estate industry by owners, operators, investors, managers, lenders, and appraisers of real estate. The main reports and databases used for this analysis include:

- PwC Real Estate Investor Survey (the "PwC Survey")
- IRR Viewpoint
- RERC Real Estate Report
- CoStar Market Report and Database
- RealtyRates.com Investor Survey

Data on sales with comparable overall capitalization rates was gathered from the CoStar database. PwC, IRR, and RERC reports were used for survey data on national and regional overall capitalization rates applicable to improved properties under premises leases. The RealtyRates.com Investor Survey was utilized for information regarding overall capitalization rates for ground leases.

Trust Value Analysis

As detailed earlier in this report, the value used in this report is Trust Value, which has substantially restricted limitations. We evaluated the trust ownership interest in the Commercial Real Estate Asset Class portfolio using the income approach because we believe it is the strongest indicator of Trust Value as it accounts for the limitations embedded within the Trust Value definition.

Income Approach

The income approach involves performing procedures that enable an appraiser to derive a value indication for an income-producing property by converting its anticipated benefits into property value using one of the following methods:

- *Discounted Cash Flow Method*: The annual cash flows for the holding period and the reversion are discounted at a specified yield rate. The discounted cash flow method was not used in this analysis.
- *Direct Capitalization Method*: One year's income expectancy is capitalized at a capitalization rate that reflects a specified income pattern, return on investment, and change in the value of the investment. The direct capitalization method was used in this analysis.

An Overall Capitalization Rate ("capitalization rate") is defined as a ratio of one year's net operating income provided by an asset to the value of the asset and is used to convert income into value in the application of the income capitalization approach.[7]

Given the leased nature of the land, which will result in stabilized annual income and cash flows into perpetuity, and ownership limitations that result in a lack of near-term reversion of the Commercial Real Estate Asset Class portfolio, the direct capitalization method is considered to be most relevant and has been utilized in this portfolio analysis.

[7] Definition sourced from the 6th Edition of the Dictionary of Real Estate Appraisal.

Extraordinary Assumptions

We assume that all commercial real estate properties adhere to the proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper regulations and development standards.

As detailed in the introductory chapter, the Trust Manager's ability to sell, exchange, or transfer state trust lands is limited by statute. For the purpose of this analysis, we assume that the ownership interest is non-transferable resulting in the land not being able to be sold.

We relied upon information provided by the Trust Manager for all specific data regarding data files, leasing activities and financials, and size and ownership information. We assume that all information provided is accurate and sufficient for purposes of this valuation.

We note that out of 635,417 square feet of improved properties with premises leases, approximately 101,288 square feet—16 percent of the portfolio—is vacant, including 23,000 square feet of space at the Creekview Building (vacant since 2014), 55,225 square feet of space at I-90 Lake Place Office Building B (vacant since 2015), and 23,063 square feet of space at the Boulevard Center (formerly OfficeMax, scheduled to be vacated in 2019).

We have not performed any sight inspections, and we assume the qualities and conditions of the vacant spaces are below market grade as these vacancies have persisted for several years. Further, the Trust Manager does not maintain a capital expenditure fund for marketing, leasing commissions, tenant improvements, and other items typically required to increase rental rates and/or occupancy. As a result, this analysis relies on the anticipated 2019 cash flow when determining a stabilized figure that represents future cash flows and assumes the stabilized revenue estimate to be an appropriate input for deriving the value indication.

Hypothetical Conditions

None noted.

Income Approach

The direct capitalization method is the approach used to estimate the Trust Value of the Commercial Real Estate Asset Class.

For the purposes of the portfolio valuation analysis in this report, the Commercial Real Estate Asset Class has been divided into subgroups:

- Premises leases
- Ground Leases
  - Rural
  - Urban

The ground leases subgroup has further been segregated for the valuation portion of this analysis due to the different level of risks inherent in rural and urban locations.

Urban ground leases are defined as ground leases found at any non-rural sites located in or around urban areas, including suburban locations.

ESTIMATED NET CASH FLOW

As highlighted in the "Operational History" section of this chapter, total gross revenue received from rent payments for the Commercial Real Estate Asset Class total approximately $10 million per year. We have estimated stabilized streams of revenue for the asset class based on analyzing historical averages and trends while acknowledging vacancies, anticipated FY 2019 income, and potential growth where applicable.

We have also estimated an expected stabilized operating cost percentage deduction of 30 percent based on historical deductions averaging near this blended rate.

In the following table, we segregated the stabilized gross revenue estimate of $10.3 million to each subgroup based on its revenue percentage allocation for anticipated FY 2019 gross revenue.

FIGURE 24

Commercial Real Estate Asset Class - Stabilized Income Summary				
	Premises Leases (Urban)	Ground Leases (Rural)	Ground Leases (Urban)	**Total**
Stabilized Gross Revenues	$6,900,000	$1,200,000	$2,200,000	**$10,300,000**
Operating Cost % Deduction	($2,070,000)	($360,000)	($660,000)	**($3,090,000)**
% of Revenues	30%	30%	30%	**30%**
Trust Net Operating Income	$4,830,000	$840,000	$1,540,000	**$7,210,000**

CAPITALIZATION RATE SELECTION

Premises Leased Properties. An overall capitalization rate of 7.5 percent has been selected to apply to the net cash flows of the properties in the premises leases subgroup. For further discussion regarding determining this capitalization rate, please reference the earlier chapter of this report that discusses rates of return.

Ground Leases. An overall capitalization rate of 9 percent has been selected to apply to the net cash flows of the properties in the ground leases subgroup found in rural locations, and an overall capitalization rate of 7 percent has been selected to apply to the net cash flows of the properties in the ground leases subgroup found in urban locations.

For further discussion about how these capitalization rates were determined, please reference the earlier chapter in this report that discusses rates of return.

DIRECT CAPITALIZATION

The capitalization rate is applied to the relevant portfolio revenue stream estimates, which have been stabilized for ground lease and premises lease properties, to derive a preliminary Trust Value indication for this asset class.

Premises Leases (Urban). The overall capitalization rate for premises leased properties is shown in the following table.

FIGURE 25

Direct Capitalization - Premises Leased Properties (Urban)		
Lease Count		7
Acres		43
Occupied Area		534,129
Vacant Area		101,288
Gross Building Area		635,417
Stabilized Gross Revenues		$6,900,000
Operating Cost % Deduction	30%	($2,070,000)
Trust Net Operating Income		$4,830,000
Capitalization Rate		7.50%
Indicated Value		$64,400,000
Value Indication (Rounded)		**$64,400,000**
Value per Acre		**$1,497,674**
Value per Gross Building Area SF		**$101**

The total value indication for premises leased properties is $64,400,000 (rounded), which equates to approximately $100 per square foot of improvements owned or $1,498,000 per acre.

Ground Leases. In the following table, the overall capitalization rates for ground leased properties are segregated by rural and urban locations:

Rural Locations. The total value indication for ground lease sites located in rural areas is $9,300,000 (rounded), which equates to an average of approximately $9,600 per rural acre.

FIGURE 26

Direct Capitalization - Ground Leases (Rural)		
Rural Ground Leases		
Lease Count - Rural		23
Acres - Rural		971
Stabilized Gross Revenues		$1,200,000
Operating Cost % Deduction	30%	($360,000)
Trust Net Operating Income		$840,000
Capitalization Rate		9.00%
Indicated Value		$9,333,333
Rural Value Indication (Rounded)		**$9,300,000**
Value per Acre		**$9,578**

Urban Locations. The total value indication for ground lease sites located in the Seattle/Tacoma metro areas is $22,000,000 (rounded), which equates to an average of approximately $1,100,000 per urban acre.

FIGURE 27

Direct Capitalization - Ground Leases (Urban)		
Urban Ground Leases		
Lease Count - Urban		6
Acres - Urban		20
Stabilized Gross Revenues		$2,200,000
Operating Cost % Deduction	30%	($660,000)
Trust Net Operating Income		$1,540,000
Capitalization Rate		7.00%
Indicated Value		$22,000,000
Urban Value Indication (Rounded)		**$22,000,000**
Value per Acre		**$1,100,000**

The combined value indication for the ground lease subgroup is $31,300,000 or approximately $31,600 per acre.

Income Approach Summary. The following table summarizes the total indicated values from each of the direct capitalization calculations.

FIGURE 28

Commercial Real Estate Income Approach Summary	
Total Lease Count	36
Total Acres	1,034
Premises Leased Properties (Urban)	$64,400,000
Ground Leases (Rural)	$9,300,000
Ground Leases (Urban)	$22,000,000
Trust Value Indication (Rounded)	**$95,700,000**
Value per Lease	**$2,658,333**
Value per Acre	**$92,553**

Improved Property Sales Data

Improved property sales data was used as secondary support for commercial real estate premises leases in the Commercial Real Estate Asset Class portfolio.

IMPROVED PROPERTY SALES DATA

The largest portion of revenue from the commercial real estate portfolio consists of improved property leases. As a test of reasonableness, the results of the improved property lease subgroup have been compared to transaction data. This is not a perfect comparison as the sales data reflects transactions without the limitations placed on state trust lands described earlier (e.g., inability to sell), but the data provides a broad overview and comparison of financial relationships based on income and value.

A comparison of ground lease assets was not performed due to limited transactions and the wide range of property types in this portion of the portfolio. Further, information regarding improvements (e.g., size, age) built on ground lease sites was not maintained by the Trust Manager, which further limited our ability to identify meaningful transactions.

There are seven active premises leases situated on approximately 31 acres. The total value indication for the improved properties is $64,400,000. This total has been allocated to each of the leases based on its respective gross annual rental revenue anticipated in FY 2019.

A total of 60 leased fee improved sale transactions were identified with retail, office, and industrial uses similar to those in the state trust lands portfolio. We have condensed the list to include 45 of the most recent and similar transactions.

The selected transactions represent office, retail, and industrial types that transacted from September 26, 2016 to June 1, 2018, and are spread throughout the Seattle/Tacoma metro areas. The transacted properties range in size from 11,880 square feet to 250,490 square feet. The overall capitalization rates range from 3.97 percent to 10 percent with an overall average of 6.63 percent.

Generally, leased commercial real estate investments are purchased and sold based on their ability to create income. Due to this, we have analyzed the transactions based on their income production. The transactions were plotted on the following graph to demonstrate the relationship between transaction price per square foot (depicted on the vertical axis or Y axis) and net operating income per square foot (depicted on the horizontal axis or X axis). A linear trend line was added to the transactions plus the allocated income approach indication for each of the estimates. This was compared against the concluded Trust Value for improved commercial properties owned by the trust beneficiaries.

In the following graph, the value indications for the subject portfolio's improved property leases fall near the trend line set by comparable market transactions.[8] Therefore, the market data supports the results of the income and value relationships demonstrated in the income approach prior to any final adjustments.

FIGURE 29

[8] The reader is reminded that the market transactions represent sales without the burdens and ownership limitations of the portfolio in the Commercial Real Estate Asset Class.

Value Conclusion

The concluded Trust Value of the Commercial Real Estate Asset Class is $95,700,000.

COMMERCIAL REAL ESTATE ASSET CLASS VALUE CONCLUSION

Using the income approach, the indicated value of the improved properties is supported by transactional data in the market. When combined with the indicated value of ground leased properties, the total represents the value indication for the Commercial Real Estate Asset Class.

This results in a concluded Trust Value of $95,700,000 for the asset class.

FIGURE 30

Commercial Real Estate Value Conclusion	
Total Lease Count	36
Total Acres	1,034
Premises Leased Properties (Urban)	$64,400,000
Ground Leases (Rural)	$9,300,000
Ground Leases (Urban)	$22,000,000
Trust Value Indication	$95,700,000
Concluded Trust Value (Rounded)	**$95,700,000**
Value per Lease	**$2,658,333**
Value per Acre	**$92,553**

INDIVIDUAL TRUST VALUES SUMMARY

The concluded Trust Value for the Commercial Real Estate Asset Class was calculated and allocated to each trust based on its share (i.e., percentage) of gross revenue for the asset class in FY 2018. The table below reflects the concluded Trust Value allocated to each trust.

FIGURE 31

Commercial Real Estate Individual Trust Values		
Trust	**Trust Value**	**%**
Common School and Indemnity	**$94,588,923**	**98.84%**
University Original	**$907,236**	**0.95%**
Charitable/Educational/Penal & Reformatory Institution	**$97,614**	**0.10%**
State Forest Purchase	**$46,893**	**0.05%**
Agricultural School	**$46,893**	**0.05%**
Capitol Grant	**$12,441**	**0.01%**
Total	**$95,700,000**	**100%**

Deloitte.

Source: WA STATE DNR

Chapter 7
Agricultural Resources Asset Class

Table of Contents

Executive Summary

The Agricultural Resources Asset Class consists of state trust lands leased to third parties for four types of agricultural purposes—Irrigated Annuals, Irrigated Perennials, Dryland, and Non-Production Land. The table below provides a brief summary of the Agricultural Resources Asset Class and a conclusion on the Trust Values for each subgroup and the whole asset class based on the following extraordinary assumptions.

We assume that all state trust lands leased for agricultural uses adhere to proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper regulations and standards. For the purpose of this analysis, we assume that the ownership interest is non-transferable resulting in the land not being able to be sold. We relied upon information provided by the Trust Manager for all specific data regarding data files, leasing activities and financials, and size and ownership information. We assume that the information provided is accurate and sufficient for the purpose of this valuation.

Importantly, the value appraised is the Trust Value, which is defined earlier in this report. This value type is applicable to all asset classes and subject to specific laws, regulations, or management policies that restrict the use, marketability, or sale of these asset classes.

Agricultural Resources Asset Class Executive Summary	**Irrigated Annuals**	**Irrigated Perennials**	**Dryland**	**Non-Production Land**	**Total**
Acres Leased [1]	30,889	18,571	107,389	80,787	**237,635**
Total Leases [2]	136	108	441	655	**800**
Stabilized Gross Revenues	$10,000,000	$8,500,000	$4,000,000	$1,000,000	**$23,500,000**
Operating Cost 29% Deduct	($2,900,000)	($2,465,000)	($1,160,000)	($290,000)	**($6,815,000)**
Trust Net Operating Income	$7,100,000	$6,035,000	$2,840,000	$710,000	**$16,685,000**
Capitalization Rate	7.00%	7.00%	7.00%	7.00%	**7.00%**
Value Indication (Rounded)	**$101,400,000**	**$86,200,000**	**$40,600,000**	**$10,100,000**	**$238,300,000**
Concluded Trust Value	**$101,400,000**	**$86,200,000**	**$40,600,000**	**$10,100,000**	**$238,300,000**
$/Acre	$3,284	$4,642	$378	$126	**$1,003**
$/Lease	$745,588	$798,148	$92,063	$15,420	**$297,875**

[1] Represents the total acreage in FY18 as provided by Trust Management.
[2] Represents all FY18 contracts with the subgroup's use type. The total of 800 does not double count leases with multiple subgroup revenue types reported.

Introduction

The Agricultural Resources Asset Class includes leased trust lands located mostly throughout eastern Washington.

INTODUCTION

The Agricultural Resources Asset Class consists of state trust lands leased for the production of agricultural commodities. The asset class involves agricultural leases, sharecropping agreements, and land improvements such as irrigation wells and systems.

Agricultural lands are typically located in areas with soil types, climate conditions, precipitation levels, and irrigation systems that are favorable for agricultural production. Although these areas are spread throughout the state, they are mostly concentrated on the east side of the Cascade mountain range. In FY 2018, a total of 237,635 acres of state trust lands were reportedly leased for agricultural purposes.

As of the date of value, there were 800 leases associated with the Agricultural Resources Asset Class. Approximately 275 of these leases were independent leases for a single agricultural use, while the other 525 leases were shared leases for at least two different agricultural or grazing uses.[1]

The Washington State Department of Natural Resources (the "Trust Manager" or "Trust Management") works with lessees to ensure they maintain productive and sustainable land use practices that protect public resources such as water, fish, and wildlife. As of the valuation date, the typical lease terms for dryland and irrigated uses was 10 years, although leases for vineyards and orchards are typically issued for longer terms of 25 years.

The Trust Manager uses public auctions to award new leases for agricultural purposes, or to award an existing lease that a lessee does not want to renew. Potential lessees must display sustainable agriculture and land management capabilities, as well as the financial resources to carry out intended farming operations. The Trust Manager requires potential lessees to have a minimum of two years of successful experience or formal education germane to the use for which the land will be leased.

When a lease is close to terminating, the Trust Manager advertises the lease for third-party interest. Qualified third parties can submit a bonus bid to try and secure the lease. If no bonus bid is received, DNR renegotiates the lease with the current lease holder.

The Agricultural Resources Asset Class typically generates more than $20 million in gross revenue every year for state trust land beneficiaries.

Agricultural Resources

More than 237,000 acres of state trust lands are used for agricultural purposes. Leases for agricultural purposes are awarded to applicants to optimize the short-term and long-term return to trust beneficiaries. For each lease, the Trust Manager considers such factors as crop options, soil types, and water availability. Rents are either collected as cash per acre, per unit (i.e., bin or ton); as a percentage of crop revenue; or as a combination of these two options.

[1] A single lease can include land designated for, and generating revenue from, multiple agricultural or grazing uses. For example, one lease can be for land used to grow wheat, as well as an orchard, and some areas may be used for grazing.

As a general note, all dollar amounts reported in this chapter are nominal and have not been adjusted for inflation. Additionally, we note that all years referenced are fiscal years—not calendar years. The fiscal year for state trust lands begins on July 1 and ends on June 30.

Subgroups. For the purposes of this portfolio valuation analysis, the Agricultural Resources Asset Class has been divided into four subgroups based on agricultural purposes—Irrigated Annuals, Irrigated Perennials, Dryland, and Non-Production Land. The subgroups are based on either asset management criteria, asset valuation criteria, or the availability of asset data needed for analytical purposes. We found the segregation of the Agricultural Resources Asset Class into these four subgroups to be appropriate.

The four subgroups in the Agricultural Resources Asset Class are as follows:

1. **Irrigated Annuals**
   a. Irrigated agricultural lands that support row crops.
   b. Harvested crops include wheat, barley, alfalfa, hay, potatoes, corn, beans, mint, and others.
2. **Irrigated Perennials**
   a. Irrigated agricultural lands that support long-term orchards and vineyards.
   b. Harvested crops include vineyard and orchard crops such as grapes, blueberries, apples, cherries, pears, and peaches.
3. **Dryland**
   a. Agricultural lands that are not irrigated.
   b. Harvested crops include winter wheat, spring wheat, barley, canola (i.e., oil seed), triticale, legumes, and hay.
4. **Non-Production Land**
   a. For the purpose of this valuation, non-production[2] land is considered agricultural land that is intentionally removed from active production for various reasons and for different periods of time. Land in this category receive rent paid to prevent the land from being used for agricultural purposes.
   b. Examples include land used for wildlife habitat protection and lands enrolled in the Conservation Reserve Program (CRP), a land conservation program administered by the US Farm Service Agency. The CRP provides annual rental payments to farmers for removing environmentally sensitive land from agricultural production and promoting plant species that improve environmental health and quality.[3] The Trust Manager allows lessees to enroll less productive lands in the CRP when doing so will earn more revenue for the trusts than continuing to farm the land, or when the soils need to be protected from erosion.

In FY 2018, there were reportedly 800 leases for agricultural uses on state trust lands that comprised approximately 237,635 acres. The leases and acres are summarized by subgroup in Figure 1 and Figure 2.

[2] This valuation did not include lands that have never been farmed or grazed because they lack the characteristics of productive land.
[3] https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/

Note that the lease count figures represent the total number of leases for each agricultural use. One lease contract can include multiple different uses. For example, the same lease contract can include revenue received for Irrigated Annuals as well as Dryland. Approximately 275 of these leases were independent leases for a single agricultural use, while the other 525 leases were shared leases for at least two agricultural uses.

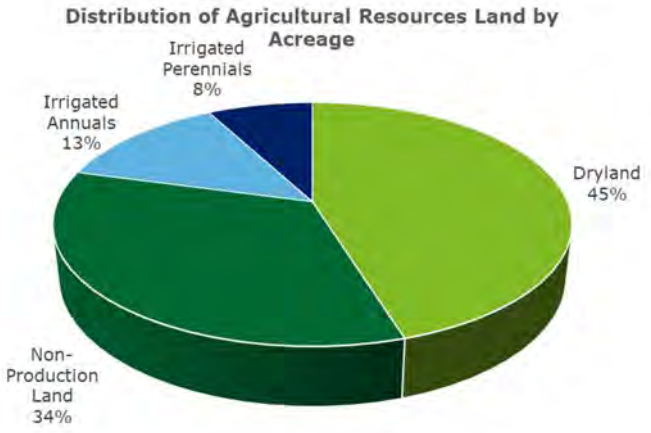
Agricultural Resources Subgroup Acreage

FIGURE 1

Agricultural Use	Lease Count*	Acres
Dryland	441	107,389
Non-Production Land	655	80,787
Irrigated Annuals	136	30,889
Irrigated Perennials	108	18,571
Totals	**800**	**237,635**

*Represents the number of leases with each agricultural use listed. The total of 800 does not double count leases with shared uses.

FIGURE 2



Dryland comprises the largest agricultural use by acreage with more than 107,000 leased acres. Land in the Irrigated Annual and Irrigated Perennial subgroups were converted from dryland irrigation or grazing uses. The conversion process started in 1970 with well drilling and acquisition of surface rights.

While the Dryland and Non-Production Land subgroups make up the majority of agricultural resources by acreage (79 percent), they produce only 23 percent of revenue received from the Agricultural Resources Asset Class.

The asset class brought in gross revenue of approximately $24.7 million in FY 2018. The following table and chart highlight the allocation of gross revenue (rounded) between different subgroup types.

Agricultural Resources Subgroup Revenue[4]

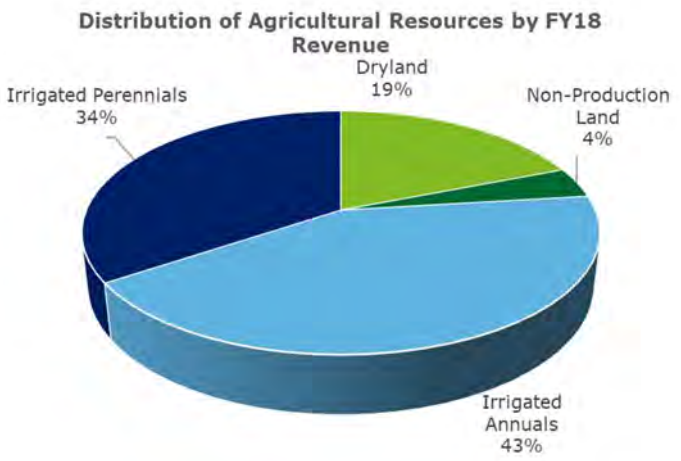
FIGURE 3

Agricultural Use	Lease Count*	Gross Revenue (FY18)
Dryland	441	$4,700,000
Non-Production Land	655	$1,000,000
Irrigated Annuals	136	$10,500,000
Irrigated Perennials	108	$8,500,000
Totals	**800**	**$24,700,000**

*Represents the number of leases with each agricultural use listed. The total of 800 does not double count leases with shared uses.

[4] Revenue from leases for Non-Production Land is received from federal conservation and wildlife protection agencies.

FIGURE 4



In FY 2018, the Irrigated Annuals and Irrigated Perennials subgroups brought in 77 percent of the combined gross revenue for the Agricultural Resources Asset Class—the majority of gross revenue for the asset class.

Agricultural Resources Asset Class Ownership. The Trust Manager manages and operates state trust lands owned by the State of Washington for the benefit of designated trust beneficiaries. To be concise, this report uses the term "ownership" or "ownership interests" to describe the amount or percentage of gross revenue or land managed by the Trust Manager on behalf of specific trust beneficiaries, even though the land is owned by the State of Washington and not the trust beneficiaries.

The following tables and charts present the trust beneficiaries' ownership interest in the Agricultural Resources Asset Class based on acreage and gross revenue for each subgroup.

Irrigated Annuals Ownership Composition

FIGURE 5

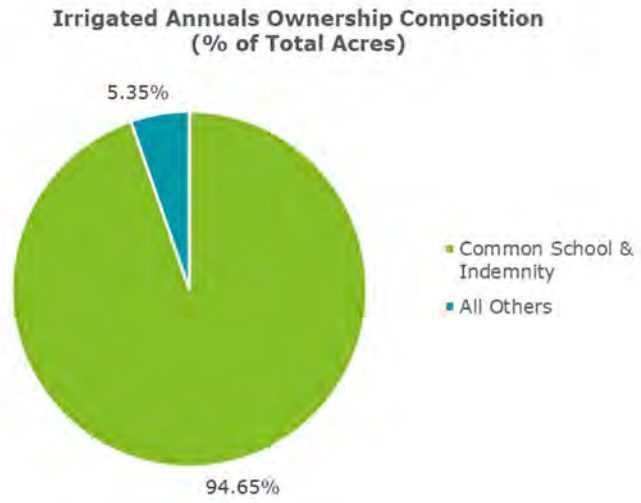
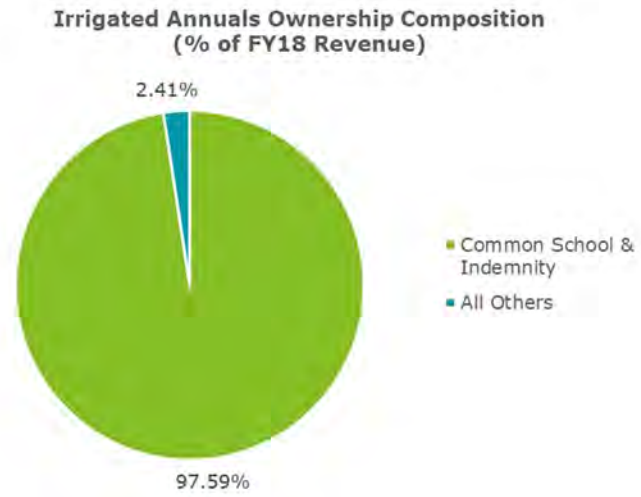


FIGURE 6



For the Irrigated Annuals subgroup, the largest ownership share is held by the Common School and Indemnity Trust, which supports statewide public school construction and other designated programs. The beneficiary ownership interests in these lands are the result of federal land grants to Washington at the time statehood was granted.

Irrigated Perennials Ownership Composition

FIGURE 7

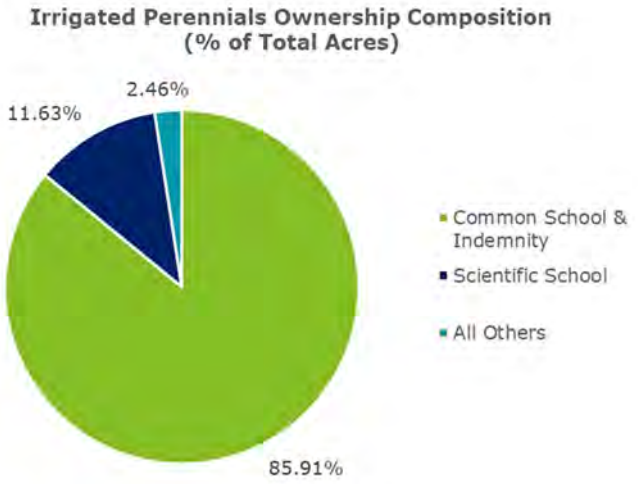
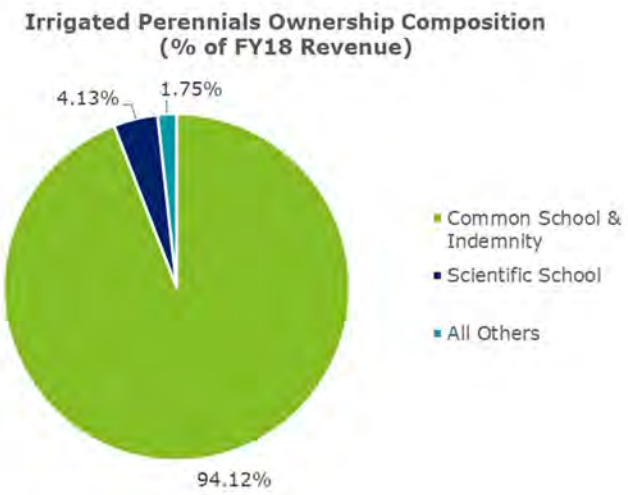


FIGURE 8



Similarly, the Common School and Indemnity Trust holds the largest share of the Irrigated Perennials subgroup by both revenue received and total acreage. The Scientific School Trust owns a small portion of revenue received and total acreage.

Dryland Ownership Composition

FIGURE 9

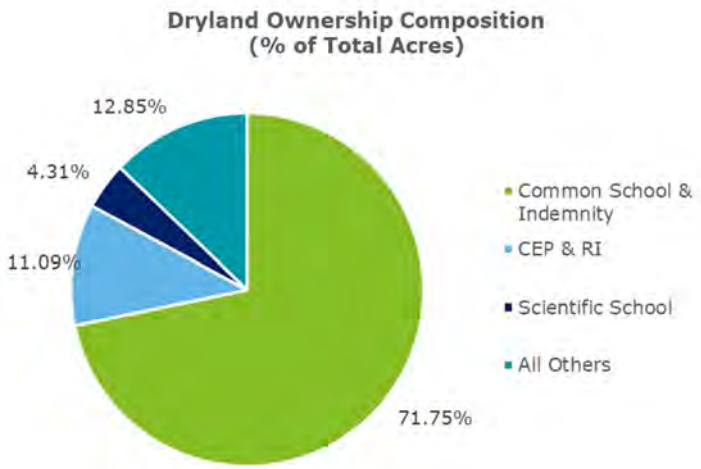
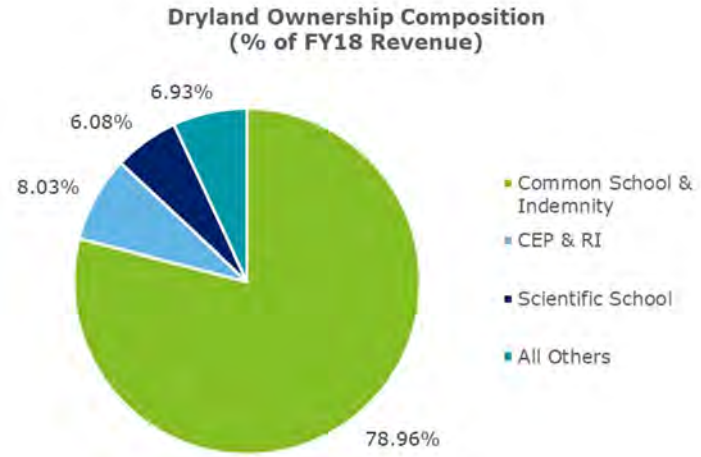


FIGURE 10



For the Dryland subgroup, the Charitable, Educational, Penal, and Reformatory Institution Trust (CEP & RI) and the Scientific School Trust own slightly larger ownership interests in this subgroup than most other trust beneficiaries, except the Common School and Indemnity Trust, which again owns the majority share.

Non-Production Land Ownership Composition

FIGURE 11

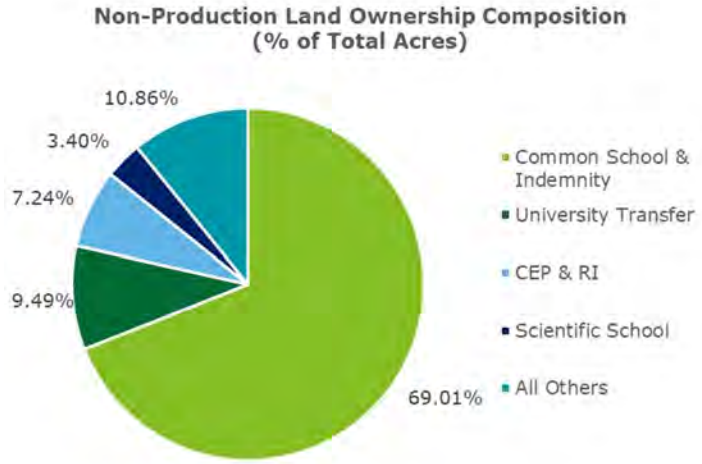
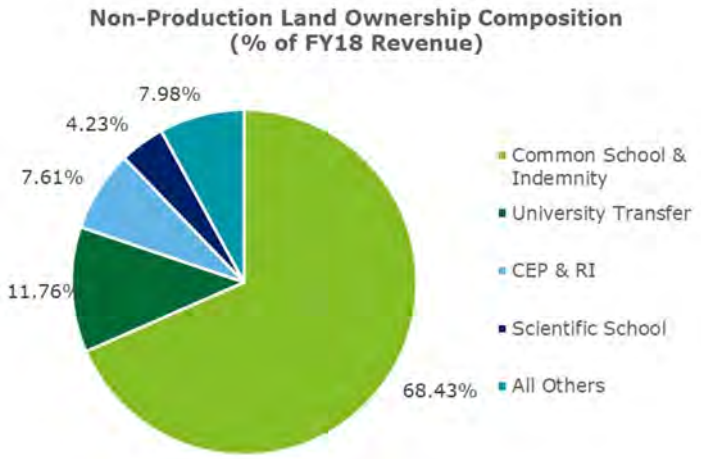


FIGURE 12



For the Non-Production Land subgroup, the Common School and Indemnity Trust again holds the majority ownership, followed by the University Transfer Trust, CEP & RI Trust, and Scientific School Trust. The remainder of trust beneficiaries hold minimal or no ownership interest in Non-Production Land.

Physical Description

In FY 2018, the total acreage of the Agricultural Resources Asset Class was approximately 237,000 acres.

FIGURE 13

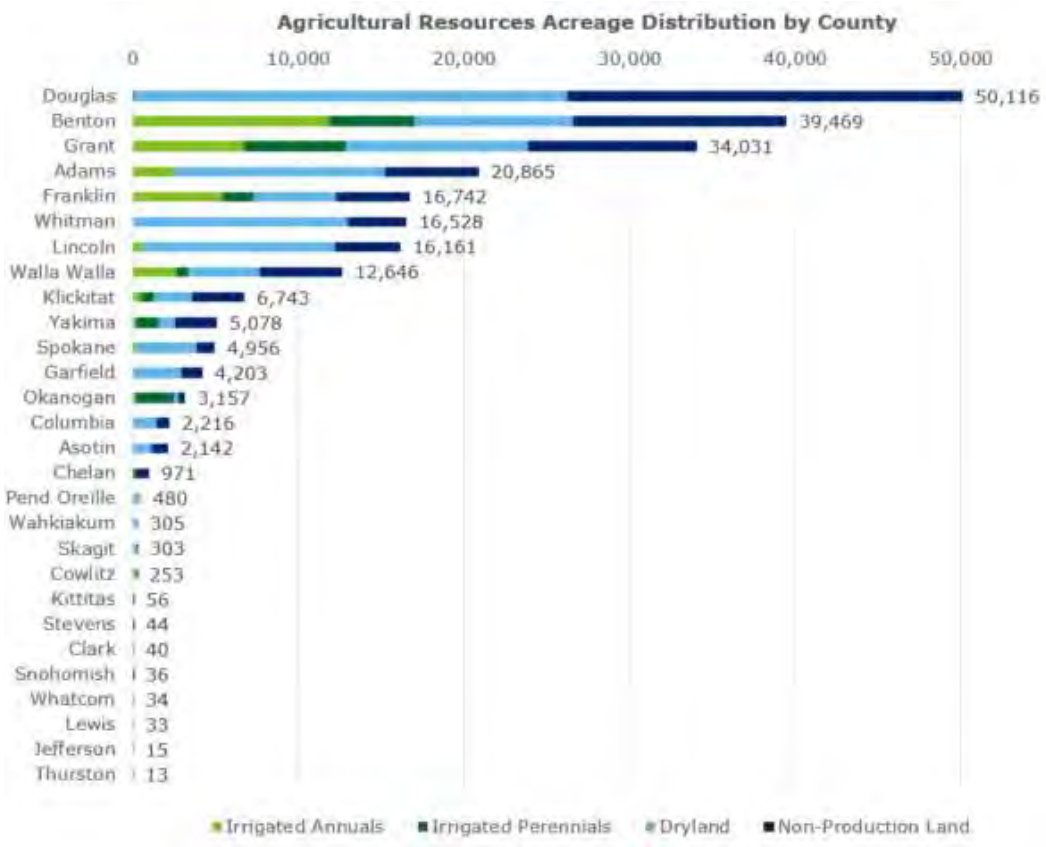


IMAGE SHOWS WHEAT BEING GROWN IN DRYLAND AREA. SOURCE: DNR.WA.GOV

IMAGE SHOWS AN APPLE ORCHARD. WASHINGTON IS THE NUMBER ONE PRODUCER OF APPLES IN THE COUNTRY. SOURCE: DNR.WA.GOV

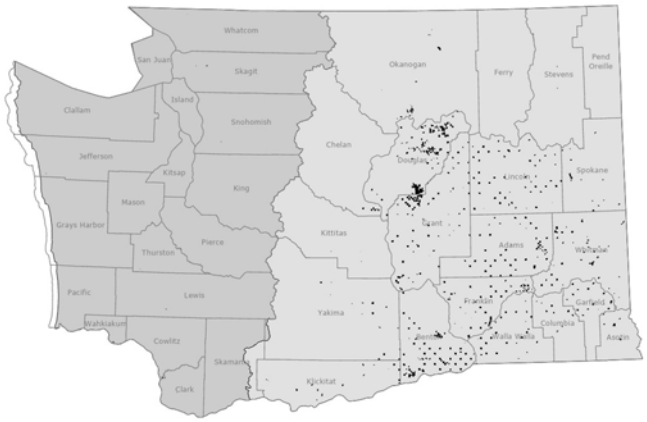
In FY 2018, there were more than 237,000 acres of state trust land leased for agricultural uses. The majority of these land leases are located throughout eastern Washington; however, a small number can be found west of the Cascades.

The top three counties with land leased for agricultural purposes were Douglas, Benton, and Grant counties, all of which are located in the southeast region of the state.

The following map highlights where all state trust lands leased for agricultural purposes are located. Leased lands in western Washington are small and less visible for all maps given the scale.

Map of Leased Agricultural Lands

FIGURE 14



Irrigated Annuals

State trust land leased for Irrigated Annual purposes totaled approximately 30,889 acres in FY 2018. These lands were mostly in Benton, Grant, and Franklin counties in the southeast region of the state. This region contains soil types and climate conditions favorable for growing crops.

In FY 2018, there were approximately 136 leases for Irrigated Annuals use, with 22 leases designated for Irrigated Annuals only, while the remaining 114 leases share more than one agricultural purpose.

The Trust Manager has been working to decrease the number of leases that include crop share agreements in which the tenant negotiates to pay all or a portion of rent with a share of the commodity being grown. For Irrigated Annuals, the number of leases with a known crop share agreement dropped from ten leases in FY 2007 to four leases in FY 2018.[5] Tenants who hold the remaining leases in the Irrigated Annuals subgroup pay cash rents.

Below is a map that highlights where state trust land leased for Irrigated Annual purposes are located around the state.

[5] This shift could be more dramatic than available data would suggest. From FY 2007 to FY 2018, the percentage of irrigated annual leases available in the archiving database, which assists in verification of rental structure, rose from 67% to 95%.

Map of Irrigated Annual Lands

FIGURE 15

Irrigated Perennials

State trust land leased for orchard and vineyard purposes totaled approximately 18,571 acres in FY 2018. These lands were mostly in Grant and Benton counties.

In FY 2018, there were approximately 108 leases for Irrigated Perennials use, with 26 leases designated for Irrigated Perennials only, while the remaining 82 leases share more than one agricultural purpose.

The number of leases with a known crop share agreement dropped from 60 in FY 2007 to 51 in FY 2018.[6] Tenants who hold the remaining leases in the Irrigated Perennials subgroup pay cash rent.

The following map highlights where state trust land leased for Irrigated Perennial purposes are located around the state.

Map of Irrigated Perennial Lands

FIGURE 16

Dryland

State trust land leased for dryland purposes totaled approximately 107,389 acres in FY 2018 and constitute the largest subgroup by acreage in the Agricultural Resources Asset Class. The lands were mostly in Douglas, Whitman, Adams, and Lincoln counties.

In FY 2018, there were approximately 441 leases for Dryland use, with 94 leases designated for Dryland only, while the remaining 347 leases share more than one agricultural or grazing purpose.

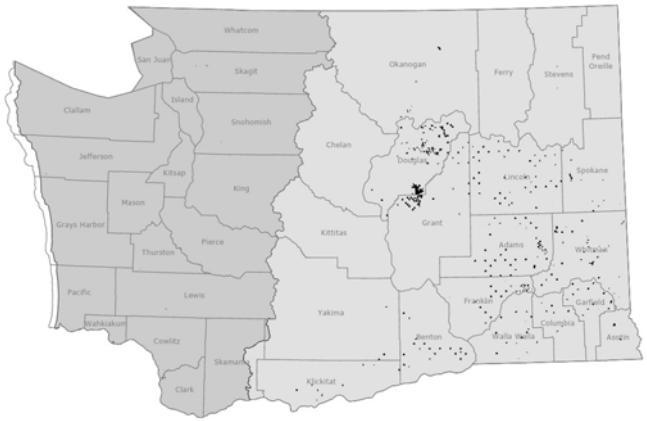
[6] This shift could be more dramatic than available data would suggest. From FY 2007 to FY 2018, the percentage of irrigated perennial leases available in the archiving database, which assists in verification of rental structure, rose from 62% to 85%.

The number of leases with a known crop share agreement has increased from 258 in FY 2007 to 270 in FY 2018.[7] The majority of leases for the Dryland subgroup (61 percent) still contain crop share agreements. Tenants who hold the remaining leases in the Dryland subgroup pay cash rents.

Below is a map that highlights where state trust land leased for Dryland purposes are located around the state.

Map of Dryland

FIGURE 17



Non-Production Land

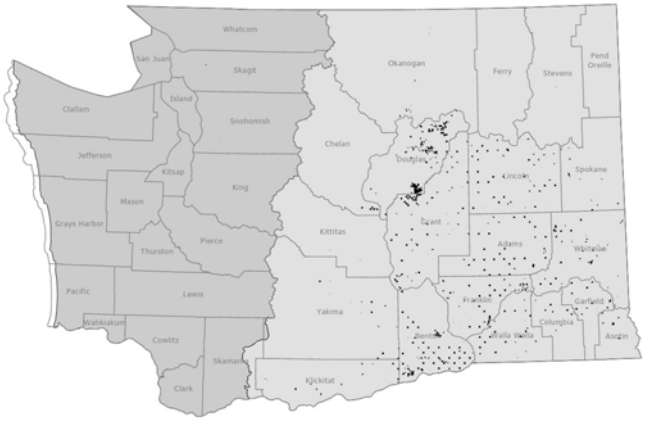
For state trust land designated as Non-Production Land, revenue comes from rent paid to prevent the land from being used for agricultural purposes. The amount received as rental revenue is minimal relative to the other subgroups.

In FY 2018, revenue was received for 80,787 acres of state trust land leased for Non-Production Land purposes. The lands were mostly in Douglas, Benton, and Grant counties.

Below is a map that highlights where Non-Production Land leases are located around the state.

Map of Non-Production Land

FIGURE 18

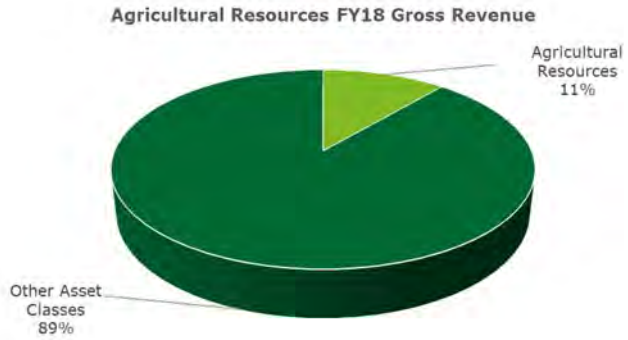


[7] From FY 2007 to FY 2018, the percentage of dryland leases available in the archiving database, which assists in verification of rental structure, rose from 81% to 90%.

Operational History

The Agricultural Resources Asset Class provides the second highest gross revenue on state trust land, behind the Timber Asset Class.

FIGURE 19

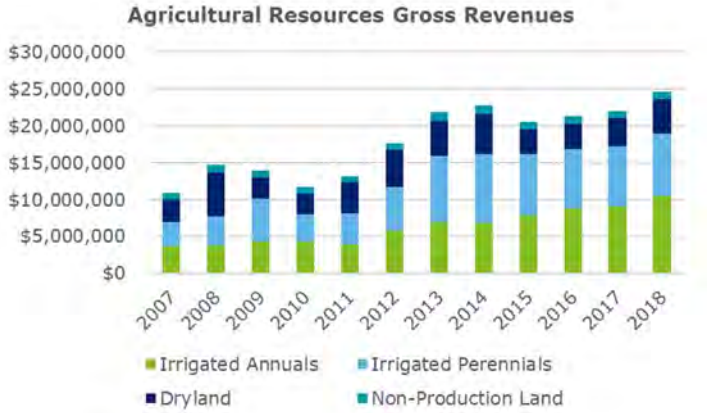


AGRICULTURAL RESOURCES ASSET CLASS REVENUE FROM 2007 TO 2018

For the scope of this project, we analyzed the operational history of each asset class. Operating information has been provided to the analysts for the past 12 fiscal years.

The chart below displays the total gross revenue[8] (before the operating cost percentage deduction) received from leases for agricultural purposes from 2007 to 2018 by subgroup.

FIGURE 20



The compound annual growth rate is defined as the annual rate of growth required for the beginning balance to grow to its ending balance. Gross revenue from leases for Irrigated Annuals and Irrigated Perennials displayed significant growth over the past 12 fiscal years. Gross revenue from leases for Irrigated Annuals grew at a compound annual growth rate of more than 10 percent, and gross revenue from leases for Irrigated Perennials grew at a compound annual growth rate of 9 percent.

Gross revenue for Dryland grew at a relatively slower pace with a compound annual growth rate of just 3.8 percent. Revenue brought in from Non-Production Land remained consistent at around $1 million dollars annually.

[8] Gross revenues exclude sub-sources 6, 3045, 4005, 5022, 5250, 6022, and 9088 as they are not included in reported operating cost percentage deduction totals.

Common School and Indemnity Trust. Since the Common School and Indemnity Trust has the largest ownership percentage for this asset class, we segregated the gross revenue received for each subgroup in each fiscal year to display the portion received by the Common School and Indemnity Trust versus the portion received by all other trusts.

FIGURE 21

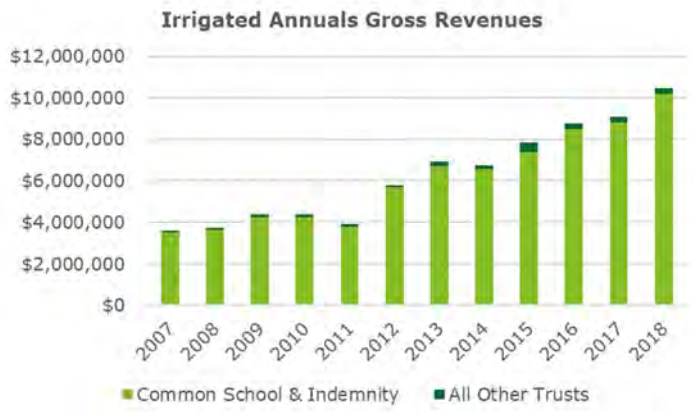


FIGURE 22

FIGURE 23

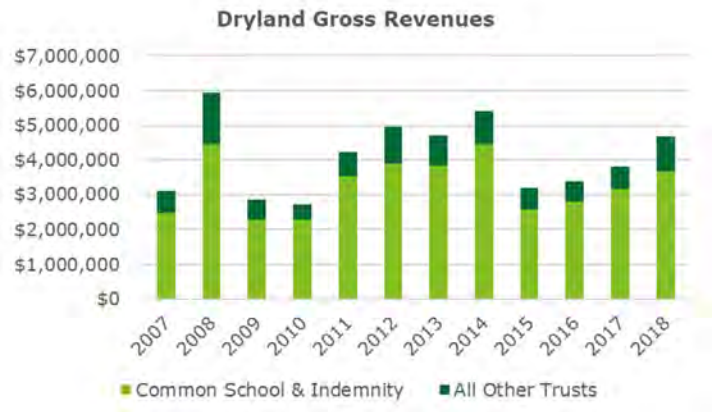
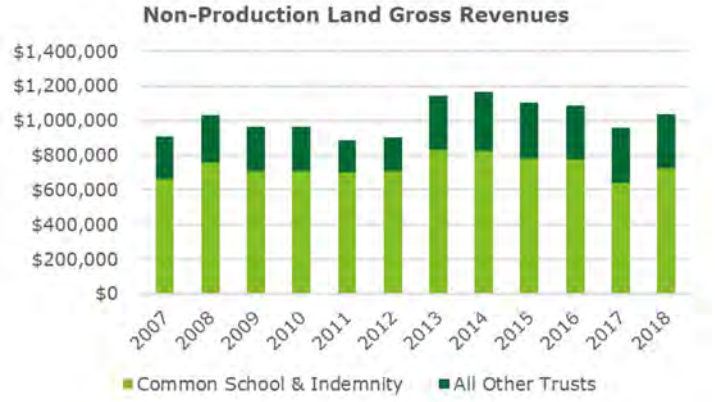


FIGURE 24



OPERATING COST PERCENTAGE DEDUCTION

As gross proceeds are received, an operating cost percentage deduction is applied and paid to the Trust Manager. From the trust beneficiary ownership position, there are no outflows of funds to operate and maintain the asset class; the Trust Manager budgets for actual costs and capital expenditures and pays these costs directly from gross proceeds received during the year.

The operating cost percentage deduction is legislatively set and typically ranges between 25 percent and 31 percent of total gross revenue, depending on the management account associated with each trust ownership of the land leased. Historical data reported in this analysis reflects actual blended rates deducted. We have used an estimated assumption of 29 percent for the operating cost percentage deduction of this asset class which has been applied in the direct capitalization method.

Operating Cost Percentage Deduction versus Direct Operating Expenses. The operating cost percentage deduction is different than actual operating expenses and capital expenditures incurred to operate and manage the Agricultural Resources Asset Class assets.

When the total operating cost percentage deduction for all asset classes exceeds actual operating costs and capital expenditures for the year, the excess is held in reserve for future years when the operating cost percentage deduction does not cover actual costs. The reserve balances are reported by fund and held in separate accounts—the Resource Management Cost Account, the Forest Development Account and the Agriculture College Trust Management Account.

The Resource Management Cost Account in the state treasury is created and used solely for the purpose of defraying the costs and expenses incurred by the Trust Manager in managing and administering state trust lands, state-owned aquatic lands, and the making and administering of leases, sales, contracts, licenses, permits, easements, and rights of way as authorized (RCW 79.64.020).

The Forest Development Account was created in the state treasury (RCW 79.64.100). Money placed in this account is first used for paying interest and principals on specific bonds issued by the Trust Manager. Appropriations made by the legislature from the Forest Development Account to the Trust Manager are for carrying out forest management activities on state forestlands and for reimbursements of expenditures from the Resource Management Cost Account in the management of state forestlands.

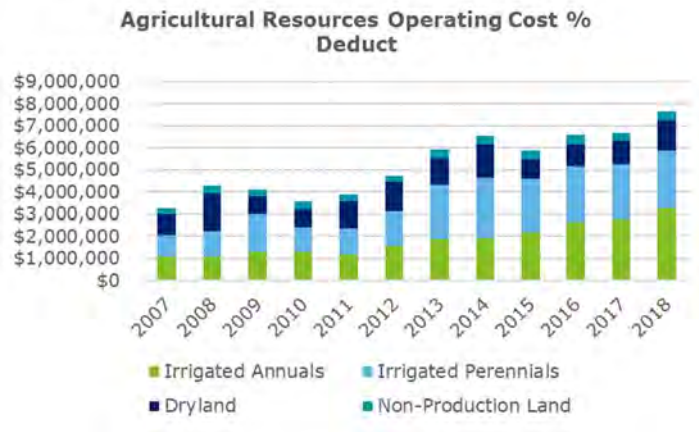
The third account is the Agriculture College Trust Management Account. This account does not retain an operating cost percentage deduction, but the Trust Manager receives a direct appropriation from the legislature to conduct management work. The Trust Beneficiary retains all gross revenue.

The reserve balances for all asset classes as of June 30, 2018 were approximately $12.6 million (Resource Management Cost Account) and nearly $4 million (Forest Development Account). Over the last 10 years, the Resource Management Cost Account reserves reached a high of more than $17 million at the end of FY 2014 and a low of $800,000 at the end of FY 2009. The Forest Development Account reserves reached a high of $24 million at the end of FY 2011 and a low of just under $4 million at the end of 2018.

However, note that these are snapshots as of the end of fiscal years. In reality, fund balances constantly change across a much wider range throughout each year. On a few occasions, reserves have dipped down to only a couple weeks of operating expenses.

The following chart presents the dollar amounts of the historical operating cost percentage deduction from 2007 to 2018 for the Agricultural Resources Asset Class. The operating cost percentage deduction is proportionate to the gross revenue produced by the asset class each year—it rises and falls along with trust earnings and may not reflect increases or decreases in the Trust Manager's actual costs. These dollar amounts include both portions of revenue distributed to the Trust Manager from agricultural contracts and incidental revenue from trespassing fines, non-federal conservation programs, Initial Incident Report (IIR) restitutions, power charges, and other assessments. Costs are segregated by subgroup in the following chart and reflect actual amounts deducted.

FIGURE 25



ACTUAL COSTS

The following is a discussion of the actual costs incurred by trust beneficiaries and paid by the Trust Manager from funds received as a result of the operating cost percentage deduction.

The following chart highlights the historical actual costs incurred by the Trust Manager, which are split between direct and indirect expenses. Another similar chart is also presented that excludes indirect expenses and displays only direct expenses divided by subgroup.

The Trust Manager's accounting system does not record costs at the subgroup level. For purposes of this report and based on discussions with the Trust Manager, we have estimated that 45 percent of costs are attributable to Dryland, 35 percent of costs are attributable to Irrigated Annuals, and the remaining 20 percent of costs are attributable to Irrigated Perennials. Costs directly tied to Non-Production Land, if any, are captured in the 45 percent of costs attributed to Dryland in the Trust Manager's accounting system.

FIGURE 26

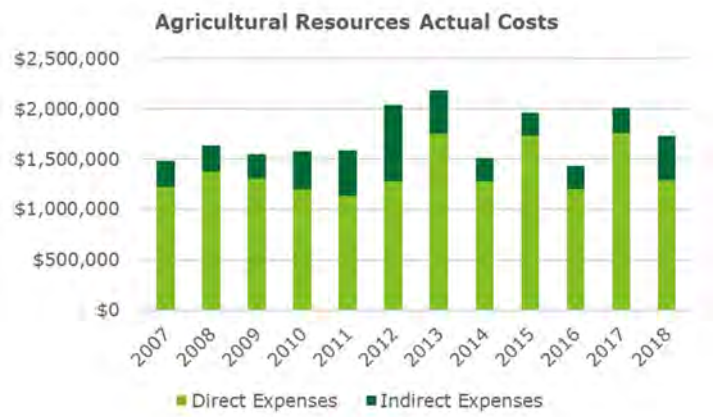
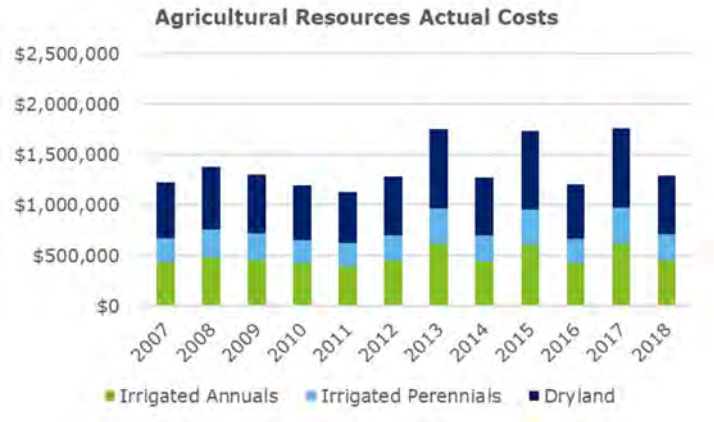


FIGURE 27



Direct Expenses. Direct expenses include all costs directly related to managing lands in the Agricultural Resources Asset Class as well as allocations of general costs.

Currently, direct expenses include all costs directly related to managing lands, including:

- Resource and leasing management
- Project, sales, and planning management

The allocations of general costs are related to:

- Uplands
  - Examples include environmental analysis, state lands training, and law enforcement
- Engineering and general services
  - Examples include resource mapping, surveying, and record keeping
- Infrastructure for state trust lands
  - Examples include agricultural irrigation and pipeline development costs

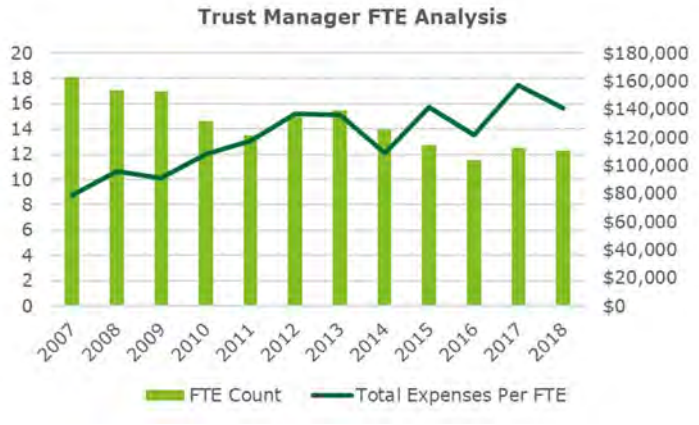
Indirect Expenses. Indirect expenses include all overhead costs allocated to the Trust Manager for:

- Administrative and agency support
- Adjustments
- Legal services
- Strategic investments
- Other administrative payments

In the Trust Manager's accounting system, expenses for grazing and agricultural resources share the same business center where costs are reported. To conduct a full-time employee analysis, costs for agricultural resources were segregated from costs for grazing resources based on allocated full-time employees. Additional splits allocated to the business center (i.e., general costs for uplands, engineering, general services, and state lands infrastructure) have also been segregated between agricultural resources and grazing resources based on allocated full-time employees.

As seen in the following full-time employee analysis, the Trust Manager typically retained approximately 12 full-time employees for the Agricultural Resources Asset Class over the last four fiscal years. The total actual costs paid by the Trust Manager have ranged from $110,000 to $160,000 per full-time employee over that same period. These costs include all direct and indirect expenses, including salaries, as well as benefits and overhead.

FIGURE 28



NET CASH FLOW FROM 2014 TO 2018

Trust beneficiaries pay a portion of the gross revenue (i.e., operating cost percentage deduction) to the Trust Manager for operating expenses and capital expenditures. These costs include direct and indirect expenses. The cash flows net of the operating cost percentage deduction are then distributed to the appropriate funds by ownership.

The following table summarizes the net cash flows distributed to trust beneficiaries over the past five fiscal years for this asset class. These operating cost percentage deduction amounts include both portions of revenue distributed to the Trust Manager from agricultural contracts and incidental revenue from trespassing fines, non-federal conservation programs, IIR restitutions, power charges, and other assessments. These cash flows indicate the Agricultural Resources Asset Class provides trust beneficiaries with $14 million to $17 million in net cash flows per year.

FIGURE 29

	2014	2015	2016	2017	2018
Total Annual Gross Revenue	**$22,797,682**	**$20,520,150**	**$21,308,782**	**$21,983,816**	**$24,645,595**
Operating Cost % Deduct	($6,558,175)	($5,858,276)	($6,585,066)	($6,691,403)	($7,660,420)
% of Revenue	28.77%	28.55%	30.90%	30.44%	31.08%
Revenues Distributed to Trusts	**$16,239,507**	**$14,661,874**	**$14,723,716**	**$15,292,413**	**$16,985,175**
% of Revenue	**71.23%**	**71.45%**	**69.10%**	**69.56%**	**68.92%**

Property Taxes and Zoning

The State of Washington is exempt from paying direct real property taxes for agricultural lands.

PROPERTY TAXES

Property taxes are a local government's main source of revenue. Most localities tax private homes, land, and business property based on the property's value.

Lands owned by the state are exempt from property tax obligations under the state constitution. However, because private lessees of state land receive the benefit of governmental services, the legislature imposes a leasehold excise tax on these private lessees under RCW 82.29A.

Leasehold excise tax is paid by the lessee to the Trust Manager when rent is paid, and the Trust Manager remits the payment to the Department of Revenue. Land that is not leased does not pay property taxes or leasehold excise tax. Generally, the leasehold excise tax on leased land is most often less than what property taxes would be for the same land.

ZONING

We assume that all leased sites in the Agricultural Resources Asset Class adhere to the proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper zoning regulations and development standards.

IMAGE SHOWS A WHEAT FIELD LOCATED ON STATE TRUST LANDS. SOURCE: WA DNR

Market Analysis

Washington is the second most diverse state for agricultural production.

MARKET OVERVIEW

Overview of Agriculture in Washington State

Washington state is the second most agricultural diverse state in the nation, after California. Washington grows more than 300 different types of crops across more than 39,000 farms. Grant and Yakima counties contribute the most to the state's agricultural economy with more than $3 billion in annual economic output combined.[9]

The top 10 commodities produced in the state include apples, milk, wheat, potatoes, cattle, hay, hops, cherries, grapes, and eggs.

Washington is the number one producer of apples in the country with production values exceeding $2 billion annually. The state's apple industry comprises nearly 70 percent of US production.[10]

The state is also the number one US producer of hops, spearmint oil, wrinkled seed peas, pears, and blueberries.

Washington is the number two US producer of potatoes, grapes (all varieties), nectarines, apricots, asparagus, onions, and raspberries.[11]

The state's agricultural production would be significantly affected if the ability to export was removed. Food and agricultural products worth billions of dollars are grown and raised in Washington and exported to people around the world.[12]

Washington's agricultural food exports are mainly shipped to Canada and countries in Asia, primarily Japan, China/Hong Kong, the Philippines, and South Korea.

Cash receipts for crops in the state of Washington have increased at a compound annual growth rate of 0.9% between 2011 and 2018.[13] We anticipate agricultural revenue growth in the state to continue at a similar pace.

Industry Sector Performance (National Overview)

The rest of the market analysis section is based on information and data sourced from IBISWorld, a trusted industry research firm. The industry sector discussed is the Agricultural, Forestry, Fishing and Hunting Industry Sector. This sector's largest revenue contributor is agricultural crops. The industry sector is a national overview in the United States that includes the state of Washington.

IBISWorld does not have specific sector research for the agricultural industry alone; instead it groups agriculture, forestry, fishing, and hunting into the same sector that includes:

- Farms that grow crops or raise livestock

[9] https://www.washingtonpolicy.org/publications/detail/agriculture-the-cornerstone-of-washingtons-economy
[10] https://agr.wa.gov/washington-agriculture
[11] https://agr.wa.gov/washington-agriculture
[12] https://www.washingtonpolicy.org/publications/detail/agriculture-the-cornerstone-of-washingtons-economy
[13] Data sourced from USDA ERS Farm Income and Wealth Statistics

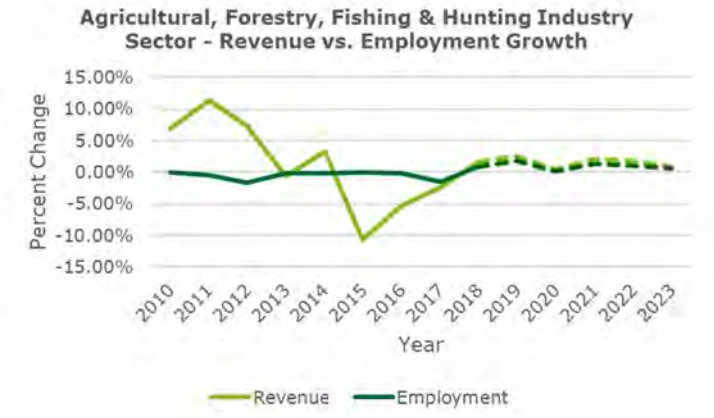
- Companies that specialize in forestry and agricultural support services
- Companies that provide land for hunting and fishing

This sector is one of the oldest in the nation. While it has a longstanding place in the economy, it is one of the more historically volatile sectors. Agricultural production can be affected by many unpredictable factors such as disease, pests, and droughts.

Per IBISWorld, this sector reported revenue of $418 billion across 2 million businesses nationwide in 2018. Approximately 49 percent of the sector products and services segmentation is comprised of crops.

The following chart displays historical and projected revenue and employment growth in the overall industry sector from 2010 to 2023.

FIGURE 30



Between 2013 and 2018, revenue growth in the sector decreased by an average annual growth rate of -2.8 percent nationwide. This is mainly due to severe droughts in 2012 that affected many states, primarily in the Midwest and Southwest. Overproduction of crops in the years following the drought led to significant price drops for nearly half of the products in this industry sector. However, growing health concerns and demand for organic and natural agricultural products are expected to boost revenue growth. The projected annual growth rate for the nationwide agriculture, forestry, fishing, and hunting sector between 2018 and 2023 is 1.5 percent.[14]

[14] Data sourced from "Agriculture, Forestry, Fishing, and Hunting Sector Report," IBISWorld, June 2018.

Methodology

The income approach was the valuation methodology selected for this study.

Methodology

The income approach was the basis for the valuation of this asset class. The Trust Manager's data files were the principal source of market and value information (i.e., annual gross lease revenue, direct and indirect expenses, and other financial information) and include lease activity obtained in the ordinary course of the management of assets.

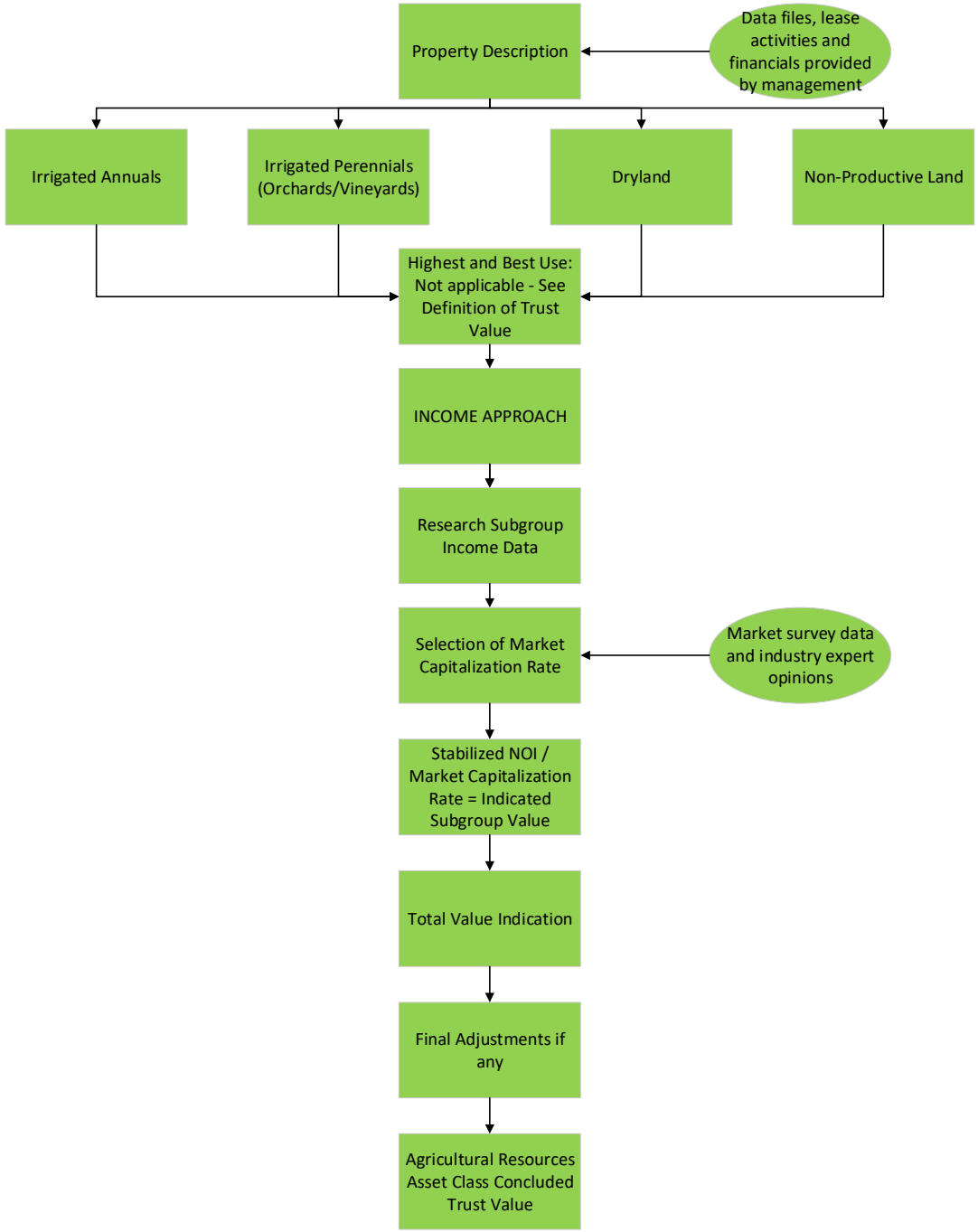
Due to the nature of the cash flow stream this asset class produces through its negotiated leases, the income approach was the methodology utilized. Adequate amounts of market data existed to use the income approach.

The flowchart that follows displays the steps taken in the valuation analysis for the Agricultural Resources Asset Class.

IMAGE SHOWS A GRAPE VINEYARD LOCATED ON STATE TRUST LANDS. SOURCE: WA DNR

FIGURE 31

Agricultural Resources Asset Class Valuation Flowchart



Trust Value Analysis

We evaluated the Trust Value of the Agricultural Resources Asset Class by using the methods described below:

Income Approach

The income approach involves a set of procedures through which an appraiser derives a value indication for an income-producing property by converting its anticipated benefits into property value using one of the following methods:

- *Discounted Cash Flow Method*: The annual cash flows for the holding period and the reversion are discounted at a specified yield rate. The discounted cash flow method was not used in this analysis.
- *Direct Capitalization Method*: One year's income expectancy is capitalized at a capitalization rate that reflects a specified income pattern, return on investment, and change in the value of the investment. The direct capitalization method was used in this analysis.

An overall capitalization rate is defined as a ratio of one year's net operating income provided by an asset to the value of the asset and is used to convert income into value when using the income capitalization approach.[15] Further discussion regarding this rate can be found in the earlier chapter that focuses on rates of return.

Given the leased nature and ownership limitations of the Agricultural Resources Asset Class, the direct capitalization method was considered to be the most relevant; thus, it was utilized in this analysis.

Extraordinary Assumptions

We assume that all land containing leases for agricultural uses adhere to the proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is non-conforming to the proper regulations and development standards.

As previously discussed in the chapter regarding restrictions and burdens, the Trust Manager's ability to sell, exchange, or transfer state trust lands is limited by statute. For the purpose of this analysis, we assume that the ownership interest is non-transferable resulting in the land not being able to be sold.

We relied upon information provided by the Trust Manager for all specific data regarding data files, leasing activities and financials, and size and ownership information. We assume that all information provided by the Trust Manager is accurate and sufficient for the purpose of this valuation.

Hypothetical Conditions

None noted.

[15] Definition sourced from the *Sixth Edition of the Dictionary of Real Estate Appraisal*.

Income Approach

The direct capitalization method was used to estimate the Trust Value of the Agricultural Resources Asset Class.

For the purposes of the valuation analysis in this report, the Agricultural Resources Asset Class has been divided into four subgroups:

- Irrigated Annuals
- Irrigated Perennials (i.e. orchards and vineyards)
- Dryland
- Non-Production Land

ESTIMATED NET CASH FLOW

As has been highlighted in the "Operational History" section of this chapter, total gross revenue received from rent payments for the Agricultural Resources Asset Class typically totals between $20 million to $25 million per year. We estimated stabilized streams of revenue for each subgroup in the asset class based on analyzing historical averages and trends while acknowledging volatility and potential growth where applicable.

Combined, the estimated stabilized gross revenue for the Agricultural Resources Asset Class totals $23.5 million.

We also estimated an expected stabilized operating cost percentage deduction of 29 percent based on historical deductions averaging near this blended rate. The following table summarizes the estimated income stream for each subgroup.

FIGURE 32

Agricultural Resources Asset Class - Stabilized Income Summary					
	Irrigated Annuals	Irrigated Perennials	Dryland	Non-Production Land	**Total**
Stabilized Gross Revenues	$10,000,000	$8,500,000	$4,000,000	$1,000,000	**$23,500,000**
Operating Cost % Deduction	($2,900,000)	($2,465,000)	($1,160,000)	($290,000)	**($6,815,000)**
% of Revenues	29%	29%	29%	29%	**29%**
Trust Net Operating Income	$7,100,000	$6,035,000	$2,840,000	$710,000	**$16,685,000**

CAPITALIZATION RATE SELECTION

An overall capitalization rate of 7 percent has been selected to apply to the net cash flows for each of the subgroups in the Agricultural Resources Asset Class. For further discussion regarding the determination of this capitalization rate, please refer to the earlier chapter that discusses rates of return.

DIRECT CAPITALIZATIONS

The overall capitalization rate was applied to the relevant stabilized revenue stream estimates for each subgroup to derive a preliminary Trust Value indication for this asset class. The direct capitalization calculations are presented for each subgroup.

Note that the leased acreage reported for each subgroup represents the total acreage in FY 2018, as provided by Trust Management.

Note that the total leases listed for each subgroup represent each lease contract in which the subgroup's agricultural use is reported. The totals listed include lease contracts for multiple agricultural uses as it is common for one contract to house multiple sources of revenue.

Irrigated Annuals. The total value indication for state trust land leased for Irrigated Annual purposes was $101,400,000 (rounded) for FY 2018, which equates to an average of approximately $3,300 per leased acre. The capitalization calculations for Irrigated Annuals are shown in the following table:

FIGURE 33

Direct Capitalization - Irrigated Annuals		
Acres Leased [1]		30,889
Total Leases [2]		136
Stabilized Gross Revenues		$10,000,000
Operating Cost % Deduction	29.00%	($2,900,000)
Revenue Distributed to Trusts		$7,100,000
Capitalization Rate		7.00%
Indicated Irrigated Annuals Value		$101,428,571
Irrigated Annuals Value (Rounded)		**$101,400,000**
Value per Acre		**$3,284**
Value per Lease		**$745,588**

[1] Represents the total acreage in FY18 as provided by Trust Management.
[2] Represents all FY18 contracts with the subgroup's use type. This total includes leases with multiple agricultural types reported.

Irrigated Perennials. The total value indication for state trust land with a leased use of Irrigated Perennial purposes was $86,200,000 (rounded) for FY 2018, which equates to an average of approximately $4,600 per leased acre. The capitalization calculations for Irrigated Perennials are shown in the following table:

FIGURE 34

Direct Capitalization - Irrigated Perennials		
Acres Leased [1]		18,571
Total Leases [2]		108
Stabilized Gross Revenues		$8,500,000
Operating Cost % Deduction	29.00%	($2,465,000)
Revenue Distributed to Trusts		$6,035,000
Capitalization Rate		7.00%
Indicated Irrigated Perennials Value		$86,214,286
Irrigated Perennials Value (Rounded)		**$86,200,000**
Value per Acre		**$4,642**
Value per Lease		**$798,148**

[1] Represents the total acreage in FY18 as provided by Trust Management.
[2] Represents all FY18 contracts with the subgroup's use type. This total includes leases with multiple agricultural types reported.

Dryland. The total value indication for state trust land leased for Dryland purposes was $40,600,000 (rounded) for FY 2018, which equates to an average of approximately $380 per leased acre. The capitalization calculations for Dryland are shown in the following table:

FIGURE 35

Direct Capitalization - Dryland		
Acres Leased [1]		107,389
Total Leases [2]		441
Stabilized Gross Revenues		$4,000,000
Operating Cost % Deduction	29.00%	($1,160,000)
Revenue Distributed to Trusts		$2,840,000
Capitalization Rate		7.00%
Indicated Drylands Value		$40,571,429
Drylands Value (Rounded)		**$40,600,000**
Value per Acre		**$378**
Value per Lease		**$92,063**

[1] Represents the total acreage in FY18 as provided by Trust Management.
[2] Represents all FY18 contracts with the subgroup's use type. This total includes leases with multiple agricultural types reported.

Non-Production Land. The total value indication for state trust lands used as Non-Production Land was $10,100,000 (rounded) for FY 2018, which equates to an average of approximately $130 per leased acre. The capitalization calculations for Non-Production Land are shown in the following table:

FIGURE 36

Direct Capitalization - Non-Production Land		
Acres Leased [1]		80,787
Total Leases [2]		655
Stabilized Gross Revenues		$1,000,000
Operating Cost % Deduction	29.00%	($290,000)
Revenue Distributed to Trusts		$710,000
Capitalization Rate		7.00%
Indicated Non-Production Lands Value		$10,142,857
Non-Production Lands Value (Rounded)		**$10,100,000**
Value per Acre		**$126**
Value per Lease		**$15,420**

[1] Represents the total acreage in FY18 as provided by Trust Management.
[2] Represents all FY18 contracts with the subgroup's use type. This total includes leases with multiple agricultural types reported.

Income Approach Summary. The following table combines the indicated values from the direct capitalization calculations for each subgroup into a total indicated value for the asset class.

Note that the total leases reported include each unique lease that contains an agricultural use. While many lease contracts share multiple revenue streams from different subgroup types, the lease contracts are only counted once. Eliminating the double counting of lease contracts with shared revenue types resulted in a total of 800 leases for agricultural purposes in FY 2018.

FIGURE 37

Agricultural Resources Income Approach Summary	
Acres Leased [1]	237,635
Total Leases [2]	800
Irrigated Annuals	$101,400,000
Irrigated Perennials	$86,200,000
Dryland	$40,600,000
Non-Production Land	$10,100,000
Total Value Indication (Rounded)	**$238,300,000**
Value per Acre	**$1,003**
Value per Lease	**$297,875**

[1] Represents the total acreage in FY18 as provided by Trust Management.
[2] Represents all unique leases with at least one agricultural use type. This total does not double count leases with multiple agricultural uses across different subgroups.

Value Conclusion

The concluded Trust Value of the Agricultural Resources Asset Class is $238,300,000.

AGRICULTURAL RESOURCES ASSET CLASS VALUE CONCLUSION

Using the income approach, the indicated values for each subgroup—Irrigated Annuals, Irrigated Perennials, Dryland, and Non-Production Land—were combined to represent the total value indication for the Agricultural Resources Asset Class.

This results in a concluded Trust Value of $238,300,000 for the asset class.

FIGURE 38

Agricultural Resources Asset Class Value Conclusion	
Acres Leased [1]	237,635
Total Leases [2]	800
Irrigated Annuals	$101,400,000
Irrigated Perennials	$86,200,000
Dryland	$40,600,000
Non-Production Land	$10,100,000
Total Value Indication (Rounded)	**$238,300,000**
Concluded Trust Value (Rounded)	**$238,300,000**
Value per Acre	**$1,003**
Value per Lease	**$297,875**

[1] Represents the total acreage in FY18 as provided by Trust Management.
[2] Represents all unique leases with at least one agricultural use type. This total does not double count leases with multiple agricultural uses across different subgroups.

INDIVIDUAL TRUST VALUES SUMMARY

The concluded Trust Value for state trust land in the Agricultural Resources Asset Class was calculated for each trust. Specifically, the concluded Trust Value for leased areas was allocated based on each individual trust's percentage of gross revenue for the asset class in FY 2018. The following table reflects the concluded value for each trust by subgroup.

FIGURE 39

Agricultural Resources Asset Class Individual Trust Values						
Trust	**Irrigated Annuals**	**Irrigated Perennials**	**Dryland**	**Non-Production Land**	**Trust Value**	**%**
Common School and Indemnity	$98,952,204	$81,127,130	$32,058,166	$6,911,430	**$219,048,930**	**91.92%**
Scientific School	$232,206	$3,560,922	$2,469,292	$427,129	**$6,689,549**	**2.81%**
CEP & RI	$2,028	$36,204	$3,260,992	$768,206	**$4,067,430**	**1.71%**
Agricultural School	$1,647,750	$1,134,392	$866,810	$298,354	**$3,947,306**	**1.66%**
University Transferred	$0	$0	$705,222	$1,187,558	**$1,892,780**	**0.79%**
Normal School	$565,812	$44,824	$533,078	$54,742	**$1,198,456**	**0.50%**
Capitol Grant	$0	$0	$404,376	$252,298	**$656,674**	**0.28%**
State Forest Transfer	$0	$296,528	$0	$0	**$296,528**	**0.12%**
Other [1]	$0	$0	$213,150	$0	**$213,150**	**0.09%**
University Original	$0	$0	$812	$200,283	**$201,095**	**0.08%**
Escheat	$0	$0	$88,102	$0	**$88,102**	**0.04%**
Total	**$101,400,000**	**$86,200,000**	**$40,600,000**	**$10,100,000**	**$238,300,000**	**100%**

[1] Other includes the collective miniscule amounts of Department of Social and Health Services and other trusts not in the scope of this project.

Deloitte.

Source: WA STATE DNR

Chapter 8

Grazing Resources Asset Class

Table of Contents

Executive Summary

The Grazing Resources Asset Class consists of state trust lands managed by the Washington Department of Natural Resources where cattle, sheep, and other livestock are allowed to forage vegetation for a set period of time under grazing leases and grazing permits. New grazing leases and permits are auctioned off in the public market. Existing grazing permits typically include lower rates than grazing leases. The table below summarizes the Trust Values for both subgroups based on the following extraordinary assumptions.

We assume that all lands with leases and permits for grazing use adhere to proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper regulations and standards. For the purpose of this analysis, we assume that the ownership interest is non-transferable resulting in the land not being able to be sold. We relied upon information provided by the Washington Department of Natural Resources for all specific data regarding data files, leasing activities and financials, and size and ownership information. We assume that the information provided is accurate and sufficient for the purpose of this valuation.

Importantly, the value appraised is Trust Value, which is defined earlier in this report. This value type is applicable to all of asset classes and subject to specific laws, regulations or management policies which restrict the use, marketability or sale of these asset classes.

Grazing Resources Asset Class Executive Summary			
	Grazing Leases	**Grazing Permits**	**Total**
Acres under Contract [1]	432,255	318,235	**750,490**
Total Contracts [2]	746	43	**789**
Stabilized Gross Revenue	$800,000	$250,000	**$1,050,000**
Operating Cost 30% Deduct	($240,000)	($75,000)	**($315,000)**
Trust Net Operating Income	$560,000	$175,000	**$735,000**
Capitalization Rate	7.00%	7.00%	**7.00%**
Value Indication (Rounded)	**$8,000,000**	**$2,500,000**	**$10,500,000**
Concluded Trust Value	**$8,000,000**	**$2,500,000**	**$10,500,000**
Value per Acre	**$18.51**	**$7.86**	**13.99**
Value per Contract	**$10,724**	**$58,140**	**$13,308**

[1] Represents the total acreage in FY18 as provided by Trust Management.
[2] Represents all leases and permits associated with a grazing use.

Introduction

The Grazing Resources Asset Class includes trust lands located mostly throughout central and eastern Washington leased and permitted for grazing use.

INTODUCTION

The Grazing Resources Asset Class consists of state trust lands leased and permitted for the purpose of grazing livestock. Grazing lands are also known as rangelands, meadows, pastures, and grazeable forestlands. Although grazing leases and permits are located throughout the state, most are located in the central and eastern portions of the state. The ground cover of grazing lands is primarily a mixture of grasses, grass-like plants, and shrubs suitable for animal forage.

Approximately 750,490 acres of state trust lands are reportedly under lease or permit for grazing use. Because of key differences between leases and permits (explained under the "Subgroups" portion of this section), these terms are not used interchangeably. For this chapter, "contracts" refers to leases and permits.

Grazing leases and permits allow livestock such as cattle and sheep to forage on specified areas of land for a set period of time. Lease terms for grazing can occur for up to, but not exceed, 10 years.[1]

As of the date of value, there were approximately 789 contracts (leases and permits) associated with the Grazing Resources Asset Class in FY 2018. Approximately 43 of these contracts were grazing permits and the remaining 746 were grazing leases.

Similar to the Agricultural Resources Asset Class, the Trust Manager's decisions to award grazing leases and permits depends heavily on the potential lessee's knowledge of grazing, management capabilities and qualifications, and financial abilities to carry out intended grazing uses.

In total, the Grazing Resources Asset Class typically generates around $1 million in gross revenue per year for state trust land beneficiaries.

As a general note, all dollar amounts reported in this chapter are nominal and have not been adjusted for inflation. Additionally, note that all years referenced are fiscal years—not calendar years. The fiscal year for state trust lands begins on July 1 and ends on June 30.

Subgroups. For the purposes of this portfolio valuation analysis, the Grazing Resources Asset Class has been divided into various subgroups (as appropriate) for analysis. The subgroups selected are based on either asset management criteria, asset valuation criteria, or the availability of asset data needed for the purpose of this analysis. We find the segregation of the Grazing Resources Asset Class into relevant subgroups is appropriate given the overall scope of the services.

Grazing Resources

More than 750,000 acres of state trust lands are under lease for grazing use. Grazing leases and grazing permits allow livestock such as cattle and sheep to forage vegetation on specified areas of land for a contractual period of time.

[1] Specified by state law RCW 79.13.060

As the Grazing Resources Asset Class is generally homogenous across the state, only the following two subgroups were selected for analytical purposes.

While the land use for grazing permits is identical to traditional grazing leases, grazing permits are segregated into a separate subgroup based on their unique nature of permittees and rental rates.

1. Grazing Leases

a. Specific parcels or parts of parcels of state trust lands that are leased to allow livestock to forage vegetation for a set period of time.
b. Rental rates for leases are largely determined by "animal unit months." An "animal unit" is equal to one cow and her nursing calf or their equivalent (WAC 332.20.030). An animal unit month is the amount of feed required to feed one animal unit for 30 days. A standard animal unit typically consumes around 780 pounds of air-dried forage (i.e. approximately 90 percent of the moisture removed) in a month.[2]
c. New grazing leases are offered per the auction process in RCW 79.13 and WAC 332.22. Grazing leases are issued for up to ten years (RCW79.13.060). When a lease is close to terminating, DNR advertises the lease for third-party interest. Qualified third parties can submit a bonus bid to try and secure the lease. If no bonus bid is received, DNR renegotiates the lease with the current lease holder. Grazing leases account for the majority of contracts negotiated for grazing purposes.

2. Grazing Permits

a. State trust lands that are permitted to allow livestock to forage vegetation for a set period of time. Most grazing permit ranges consist of a checkerboard ownership that includes state trust lands, private lands, tribal lands, and lands managed by the Washington Department of Fish and Wildlife and United States Forest Service. Grazing permits are typically adjacent to lands managed by the U.S Forest Service. Grazing permits are desirable due to their ability to feed a high number of animals in one specific area. Permits are limited to 600 animal units (WAC 332.20.180).
b. Rates for grazing permits are determined by animal unit months set by the formula in WAC 332.20.220. The rate is adjusted annually in relation to market prices for livestock in the previous year. Grazing permit rates are typically lower than grazing lease rents, except in years when cattle prices have been high.
c. New grazing permits are rare, but when available they are offered through public auction per WAC 332.20.210. Although grazing rates are set by WAC 332.20.220, potential permittees have the option to submit a bonus bid. The highest bonus bid of a qualified bidder is issued a temporary permit for five years. If the permittee satisfactorily meets the requirements of the permit, they are issued a preference permit (WAC 332.20.220). The preference permit is renewed every ten years as long as permit requirements are followed perpetually. As grazing permits are perpetual, lands associated with these permits rarely change hands.

[2]https://beef.unl.edu/cattleproduction/understandinganimalunitmonths

Both grazing leases and permits are typically located in either rangeland or mixed rangeland and grazeable forestland. For example, over half of the state trust lands leased for grazing are grazeable forestland, on which timber production is the primary use and grazing is considered secondary. Grazeable forestlands are managed under the Trust Manager's timber program and the grazing lease is administered through the agriculture program.

In FY 2018, there were reportedly 789 contracts with grazing uses for the entire asset class, which comprises approximately 750,490 acres. Figure 1 summarizes the contracts and acres by subgroup.

Note that the 746 grazing leases represent the total number of leases with the subgroup's use in FY 2018.

Grazing Resources Subgroup Acreage

FIGURE 1

Grazing Resources	Contract Count	Acres
Grazing Leases	746*	432,255
Grazing Permits	43	318,235
Totals	**789**	**750,490**

*Represents the number of leases associated with a grazing land use. Many leases share agricultural uses.

FIGURE 2

The Grazing Leases subgroup comprises the majority—58 percent—of total acres in this asset class, while the remaining 42 percent of total acres are contracted for grazing permits.

While grazing leases make up 59 percent of total acres in the asset class, they bring in roughly 3.3 times more revenue than grazing permits. In FY 2018, the Grazing Resources Asset Class produced total gross revenue of approximately $1 million.

The following table and chart highlight the allocation of gross FY 2018 revenue (rounded) between the different subgroup types.

Revenue from Grazing Resources Subgroup

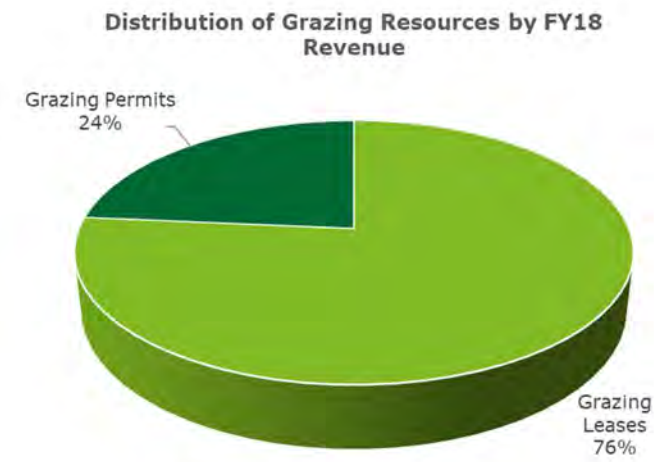
FIGURE 3

Grazing Resources	Contract Count	Gross Revenue (FY18)	Gross Revenue Per Acre
Grazing Leases	746*	$810,000	$1.87
Grazing Permits	43	$250,000	$0.79
Totals	**789**	**$1,060,000**	

*Represents the number of leases associated with a grazing land use. Many leases share agricultural uses.

FIGURE 4

FIGURE 5



Grazing leases comprised 76 percent of the total revenue received for this asset class in FY 2018. Grazing permits produced the remaining 24 percent of revenue.

Grazing Resources Asset Class Ownership. The Trust Manager manages and operates state trust lands owned by the State of Washington for the benefit of designated trust beneficiaries. To be concise, this report uses the term "ownership" or "ownership interests" to describe the amount or percentage of gross revenue or land managed by the Trust Manager on behalf of specific trust beneficiaries, even though the land is owned by the State of Washington and not the trust beneficiaries.

The following tables and charts present the trust ownership percentages based on acreage and FY 2018 gross revenue for each subgrouping.

Ownership Composition of Grazing Leases

FIGURE 6

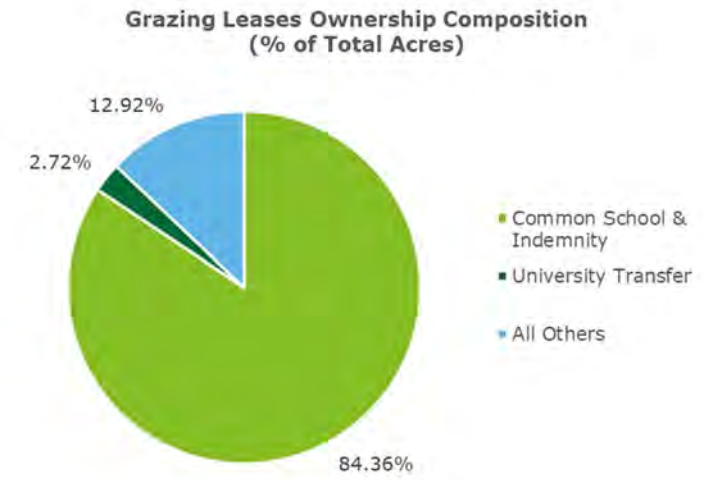
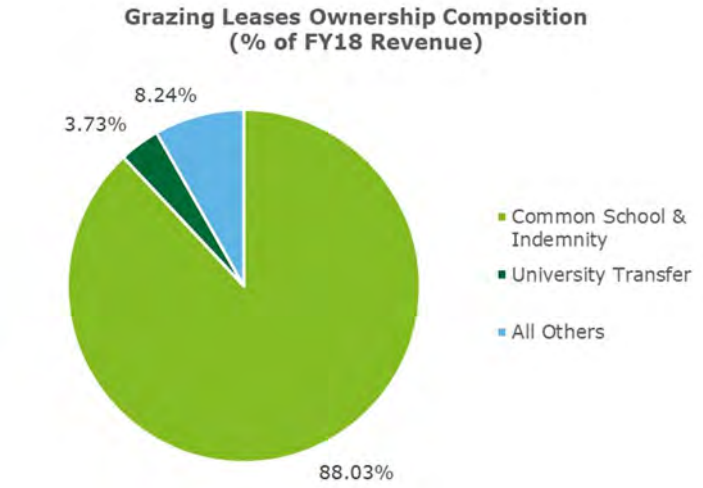


FIGURE 7



The majority of state trust lands used for the grazing leases subgroup support the Common School and Indemnity Trust, which supports public school construction statewide and other designated programs. The Beneficiary ownership interests in these lands are a result of federal land grants to Washington at the time statehood was granted.

Ownership Composition of Grazing Permits

FIGURE 8

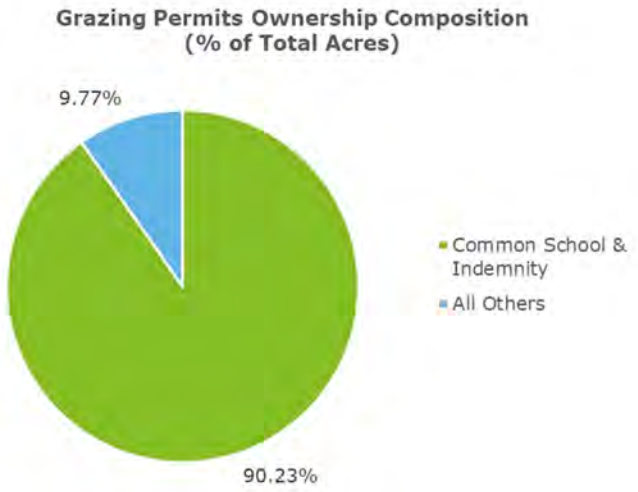
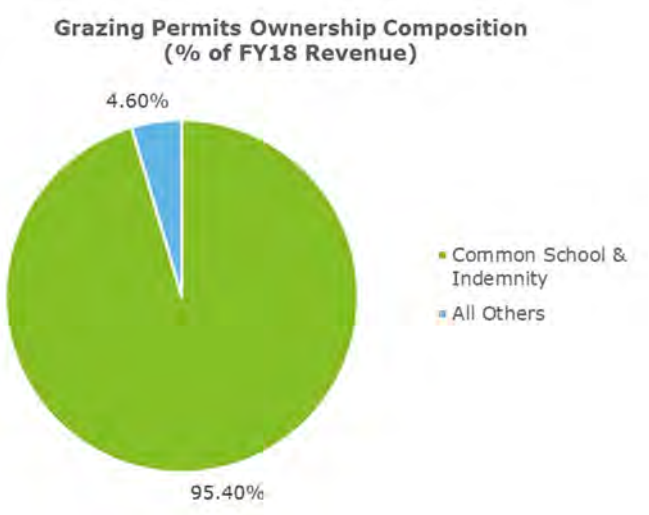


FIGURE 9



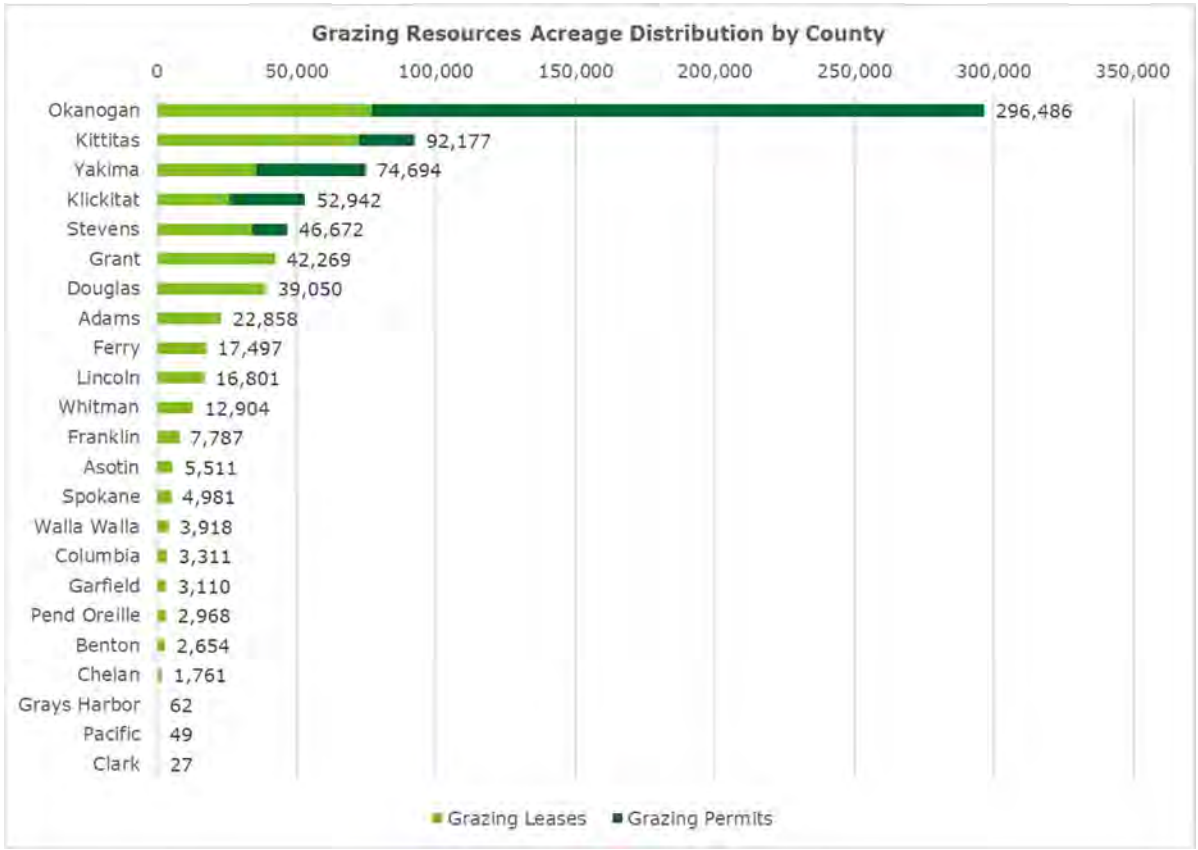
Similarly, the Common School and Indemnity Trust holds the largest ownership share of the grazing permit subgroup by both revenue received and total acreage.

All other trusts not listed in the ownership compositions have minimal or no ownership.

Physical Description

The total acreage of the Grazing Resources Asset Class is approximately 750,490 acres.

FIGURE 10



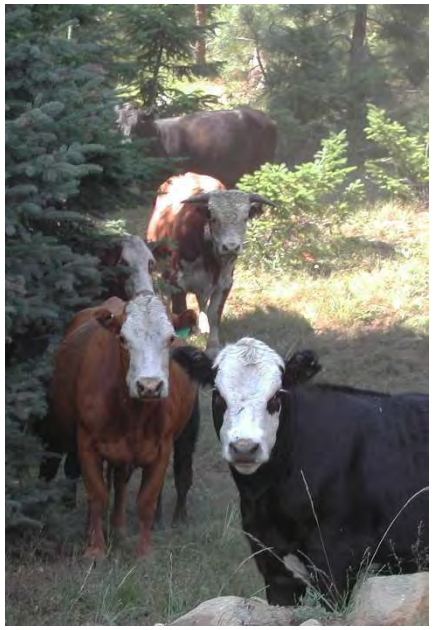


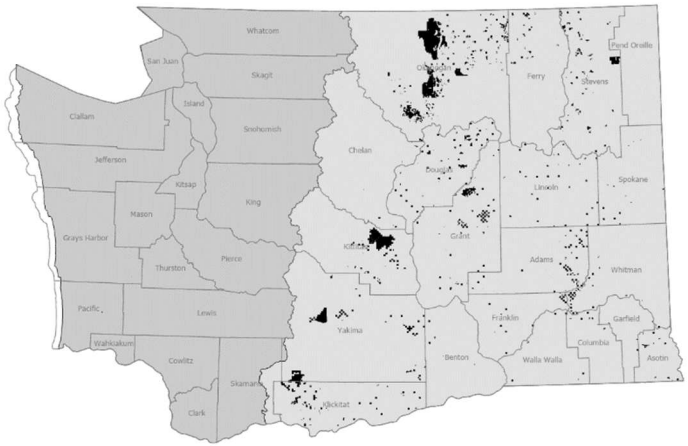
Image shows cattle foraging in the state of Washington. Source: WA STATE DNR

In FY 2018, there were more than 750,000 acres of state trust lands leased or permitted for grazing purposes. The top three counties in the state with land contracted for grazing purposes were Okanogan, Kittitas, and Yakima.

The following map primarily highlights where lands contracted for grazing purposes (i.e., both leases and permits) are positioned. Grazing lands in western Washington are small and less visible at this scale. As Trust Management's GIS database does not align with the FY 2018 acre totals, note that the maps are presented solely for visual support.

Map of All Grazing Leases and Grazing Permits

FIGURE 11



Grazing Leases.

In FY 2018, a total of 432,255 acres were used for grazing leases. The counties with the most grazing leases were Okanogan, Kittitas, and Grant, which are located in central Washington.

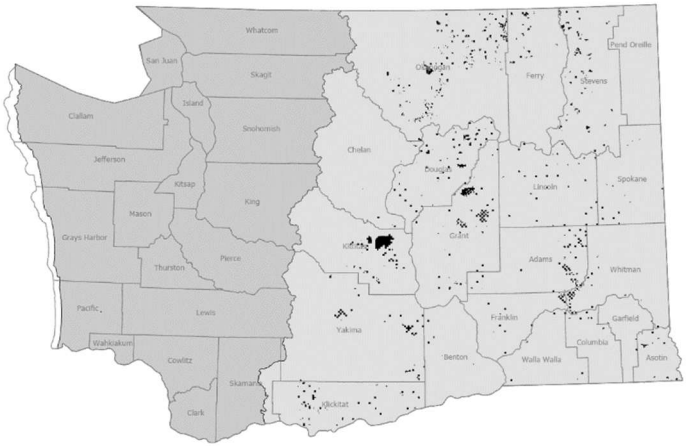
In FY 2018, a total of 746 leases reported revenue for the grazing leases subgroup.

As stated previously, most grazing occurs on rangeland or mixed rangeland and grazeable forestlands being managed for timber production. Some irrigated and dryland agriculture leases include acres that are not currently viable or available for dryland or irrigated farming; in these cases, grazing is an additional, permitted use under the agricultural lease.

The following map primarily highlights where grazing leases are located throughout the state. Leases in western Washington are small and less visible at this scale.

Map of Grazing Leases

FIGURE 12



Grazing Permits.

The grazing permits subgroup total 318,235 acres in FY 2018. Nearly 70 percent of these acres are located in Okanogan county.

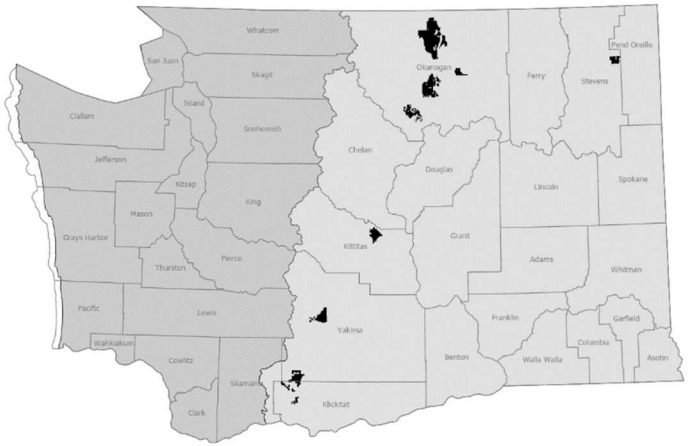
In FY 2018, revenue was reported from 43 grazing permits. Note that these grazing permits do not include other uses.

The physical characteristics of lands for grazing permits are similar to that of lands described for grazing leases.

The following map highlights where grazing permits are located throughout the state.

Map of Grazing Permits

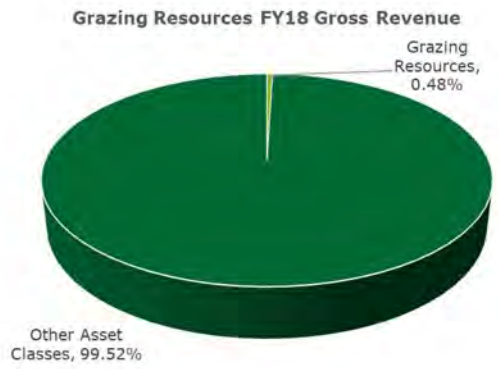
FIGURE 13



Operational History

The Grazing Resources Asset Class provides approximately 0.5 percent of the total gross revenue of all asset classes.

FIGURE 14



GRAZING RESOURCES ASSET CLASS REVENUE FROM 2007 TO 2018

For the scope of this project, we analyzed the operational history of each asset class. Operating information has been provided to the analysts for the past 12 fiscal years.

The chart below displays the total gross revenue[3] (before the operating cost percentage deduction) received from grazing leases and grazing permits from 2007 to 2018 by subgroup.

FIGURE 15

[3] Gross revenues exclude sub-sources 6, 3045, 4005, 5022, 5250, 6022, and 9088 as they are not included in reported operating cost percentage deduction totals.

Gross revenue for the grazing leases subgroup has increased over the past 12 fiscal years, with annual revenue rising from $500,000 to more than $800,000. Gross revenue for the subgroup has grown at a compound annual growth rate (CAGR) of 4.1 percent. The compound annual growth rate is defined as the annual rate of growth required for the beginning balance to grow to its ending balance.

Gross revenue for the grazing permits subgroup has remained mostly stagnant, with annual revenue hovering around $200,000 each year. Minimal changes have been made to rental fees for existing grazing permits over time, which may be the result of AUM rates that have changed little during this period.

Common School and Indemnity Trust. Since the Common School and Indemnity Trust has the largest ownership percentage for this asset class, we segregated the gross revenue received for each subgroup in each fiscal year to display the portion received by the Common School and Indemnity Trust versus the portion received by all other trusts.

FIGURE 16

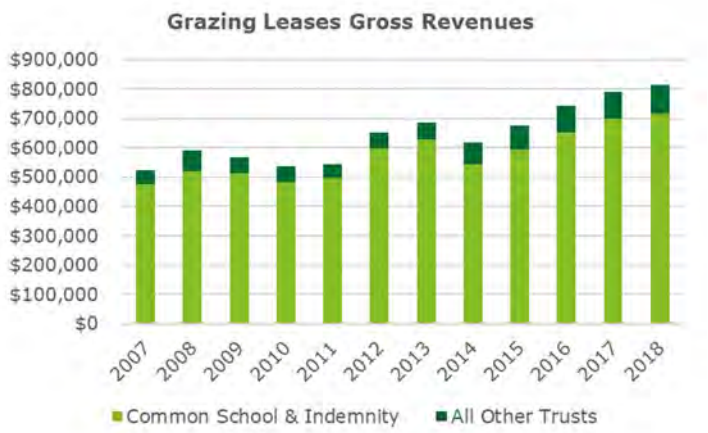
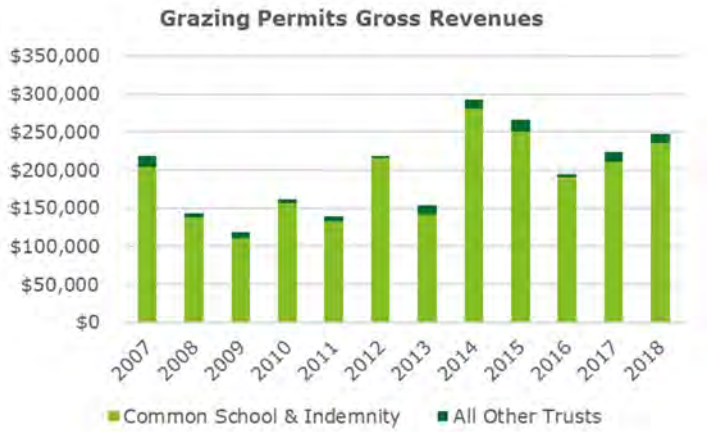


FIGURE 17



OPERATING COST PERCENTAGE DEDUCTION

As gross proceeds are received, an operating cost percentage deduction is applied and paid to the Trust Manager. From the trust beneficiary ownership position, there are no outflows of funds to operate and maintain the asset class; the Trust Manager budgets for actual costs and capital expenditures and pays these costs directly from the operating cost percentage deduction received during the year.

The operating cost percentage deduction is a percentage of gross revenues that is legislatively set. The percentage is typically between 25 percent and 31 percent of total gross revenue, depending on trust ownership type. Historical data reported in this analysis reflects actual blended rates deducted. We have used an estimated assumption of 30% for the operating cost percentage deduction of this asset class which has been applied in the direct capitalization method.

Operating Cost Percentage Deduction versus Direct Operating Expenses. The operating cost percentage deduction is different than actual operating expenses and capital expenditures incurred to operate and manage the Grazing Resources Asset Class assets.

When the total operating cost percentage deduction for all asset classes exceeds actual operating costs and capital expenditures for the year, the excess is held in reserve for future years when the operating cost percentage deduction does not cover actual costs. The reserve balances are reported by fund and held in separate accounts—the Resource Management Cost Account, the Forest Development Account and the Agriculture College Trust Management Account.

The Resource Management Cost Account in the state treasury is created and used solely for the purpose of defraying the costs and expenses incurred by the Trust Manager in managing and administering state trust lands, state-owned aquatic lands, and the making and administering of leases, sales, contracts, licenses, permits, easements, and rights of way as authorized (RCW 79.64.020).

The Forest Development Account was created in the state treasury (RCW 79.64.100). Money placed in this account is first used for paying interest and principals on specific bonds issued by the Trust Manager. Appropriations made by the legislature from the Forest Development Account to the Trust Manager are for carrying out forest management activities on state forestlands and for reimbursements of expenditures from the Resource Management Cost Account in the management of state forestlands.

The third account is the Agriculture College Trust Management Account. This account does not retain an operating cost percentage deduction, but the Trust Manager receives a direct appropriation from the legislature to conduct management work. The Trust Beneficiary retains all gross revenue.

The reserve balances for all asset classes as of June 30, 2018 were approximately $12.6 million (Resource Management Cost Account) and nearly $4 million (Forest Development Account). Over the last 10 years, the Resource Management Cost Account reserves reached a high of more than $17 million at the end of FY 2014 and a low of $800,000 at the end of FY 2009. The Forest Development Account reserves reached a high of $24 million at the end of FY 2011 and a low of just under $4 million at the end of 2018.

However, it is noted that these are snapshots as of the end of fiscal years. In reality, the balances of the funds are constantly changing throughout each year with a much wider range. Reserves have been known to dip down to only a couple weeks of operating costs on a few occasions.

The following chart presents the dollar amounts of the historical operating cost percentage deduction from 2007 to 2018. The operating cost percentage deduction is proportionate to the gross revenues produced by the asset class each year—it rises and falls as earnings for trusts rise and fall and may not reflect increases or decreases in the Trust Manager's actual costs. These dollar amounts include both portions of revenue distributed to the DNR from grazing contracts and incidental revenue from trespassing fines, non-federal conservation programs, Initial Incident Report (IIR) restitutions, power charges, and other assessments. The costs are segregated by subgroup in the following chart and reflect actual amounts historically deducted.

FIGURE 18

ACTUAL COSTS

The following is a discussion of the actual costs incurred by trust beneficiaries and paid by the Trust Manager from funds received as a result of the operating cost percentage deduction.

The following charts highlight the historical actual costs incurred by the Trust Manager, which are split between direct and indirect expenses. Note that Trust Management's accounting system does not record costs at the level of detail needed to differentiate between subgroups. However, the Trust Manager estimates that 60 percent of costs can be attributed to grazing leases and 40 percent of costs can be attributed to grazing permits. The following two charts display the actual costs as allocated 60/40 for each subgroup, which are segregated by direct and indirect costs.

FIGURE 19

FIGURE 20

Direct Expenses. Direct expenses include all costs directly related to managing lands for grazing leases and grazing permits, as well as allocations of general costs.

Currently, the direct expenses that include all costs directly related to managing lands with grazing uses, including:

- Resource and leasing management
- Project, sales, and planning costs

The allocations of general costs are related to:

- Uplands
  - Expenses include environmental analysis, state land training, and law enforcement
- Engineering and General Services

  Expenses include resource mapping, surveying, and record keeping costs

Indirect Expenses. Indirect expenses include all overhead costs allocated to the Trust Manager for:

- Administrative and agency support
- Adjustments
- Legal services
- Strategic investments
- Other administrative payments

In Trust Management's accounting system, costs for grazing and agricultural uses share the same business center where costs are reported.

Historically, the Grazing Resources Asset Class has struggled to be profitable. To demonstrate this, the following table presents the total revenue, net of total actual costs (all direct and indirect expenses allocated to the asset class), for the past five fiscal years.

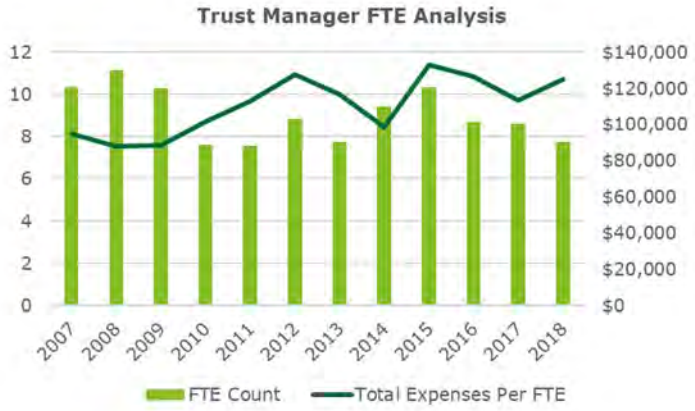
FIGURE 21

	2014	2015	2016	2017	2018
Total Annual Gross Revenue	**$912,720**	**$943,602**	**$936,635**	**$1,013,644**	**$1,060,399**
Direct Expenses	($764,585)	($1,022,125)	($907,719)	($752,576)	($682,000)
Indirect Expenses	($159,760)	($185,984)	($170,085)	($174,577)	($279,965)
Total Actual Costs	**($924,345)**	**($1,208,110)**	**($1,077,805)**	**($927,153)**	**($961,965)**
Net Cash Flow	**($11,625)**	**($264,507)**	**($141,170)**	**$86,490**	**$98,433**

We conducted a full-time employee analysis that segregated costs for grazing resources from costs for agricultural resources. Additional splits allocated to the business center (i.e., general costs for uplands, engineering, general services, and state land infrastructure) have also been segregated between the Grazing Resources Asset Class and the Agricultural Resources Asset Class based on allocated full-time employees.

As seen in the following analysis, in the last four years, the Grazing Resources Asset Class has seen the number of full-time employees decrease from more than 10 resources to less than 8 resources. Total actual costs paid by the Trust Manager averaged approximately $124,000 per full-time employee over the same period. These costs cover all direct and indirect expenses, which include salaries, as well as benefits and agency overhead associated with managing the assets.

FIGURE 22



NET CASH FLOW 2014 TO 2018

As described in the Operating Cost Percentage Deduction section, the trust beneficiaries pay a portion of the gross revenue (i.e., operating cost percentage deduction) to the Trust Manager for operating expenses and capital expenditures. These costs include direct and indirect expenses. The cash flows net of the operating cost percentage deduction are then distributed to the appropriate funds by ownership.

The following table summarizes the net cash flows distributed to trust beneficiaries over the past five fiscal years for this asset class. These operating cost percentage deduction amounts include both portions of revenue distributed to the Trust Manager from grazing contracts and incidental revenue from trespassing fines, non-federal conservation programs, IIR restitutions, power charges, and other assessments. For the period from 2014 to 2018, these cash flows indicate the Grazing Resources Asset Class provided trust beneficiaries with average net cash flows ranging from $638,000 to $726,000 per year.

FIGURE 23

	2014	2015	2016	2017	2018
Total Annual Gross Revenue	**$912,720**	**$943,602**	**$936,635**	**$1,013,644**	**$1,060,399**
Operating Cost % Deduct	($274,239)	($273,231)	($283,762)	($316,089)	($334,479)
% of Revenue	30.05%	28.96%	30.30%	31.18%	31.54%
Revenues Distributed to Trusts	**$638,481**	**$670,372**	**$652,873**	**$697,555**	**$725,920**
% of Revenue	**69.95%**	**71.04%**	**69.70%**	**68.82%**	**68.46%**

Property Taxes and Zoning

The State of Washington is exempt from paying direct real property taxes for grazing lands.

PROPERTY TAXES

Property taxes are a local government's main source of revenue. Most localities tax private homes, land, and businesses based on the property's value.

Lands owned by the state are exempt from property tax obligations under the state constitution. However, because private lessees of state land receive the benefit of governmental services, the legislature imposes a leasehold excise tax on these private lessees under RCW 82.29A.

Leasehold excise tax is paid by the lessee to the Trust Manager when rent is paid, and the Trust Manager remits the payment to the Department of Revenue. Land that is not leased does not pay property taxes or leasehold excise tax. Generally, the leasehold excise tax on leased land is most often less than what property taxes would be for the same land.

ZONING

We assume that all lands containing leases for grazing purposes adhere to the proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper zoning regulations and standards.

Market Analysis

Milk and cattle are two of the top 10 agricultural commodities produced in the State of Washington.

MARKET OVERVIEW

Overview of Grazing in Washington State

Washington State holds the title of the second most diverse agricultural producer in the nation—second only to California. The state produces many top commodities such as apples, wheat, potatoes, and hay, among others.

The number two commodity produced in the state is milk, which exceeds more than $1 billion annually in production value. Cattle is the fifth most valuable commodity produced in the state, with an annual production value totaling more than $650 million.[4]

Based on the 2018 US Department of Agriculture State Agriculture Overview, Washington cattle production inventory reached 1,180,000 head, including calves, in 2018, and sheep production inventory totaled 50,000 heads, including lambs, in 2018.[5]

Industry Sector Performance (National Overview)

The rest of the market analysis section is based on information and data sourced from IBISWorld, a trusted industry research firm. The industry sector discussed is the Agricultural, Forestry, Fishing and Hunting Industry Sector which includes a small portion for grazing. The industry sector is a national overview in the United States that includes the state of Washington.

IBISWorld groups agriculture, forestry, fishing and hunting into the same industry sector. Specifically, the sector includes farms that primarily grow crops or raise livestock, as well as companies that specialize in forestry and agricultural support services and companies that provide land for hunting and fishing.

The sector includes portions that comprise livestock and crops. These products compete with each other. As the total vegetable consumption per capita increases, meat consumption declines.

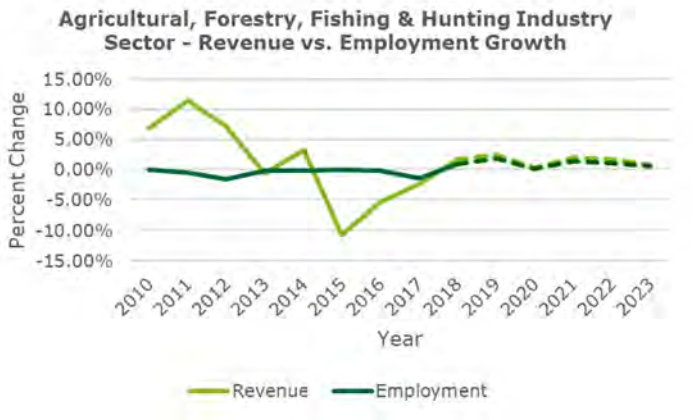
This sector is one of the oldest in the nation. While it has a longstanding place in the economy, it is one of the more historically volatile sectors. Crop and livestock production can be affected by many unpredictable factors, such as disease, pests, and drought.

The sector reported revenue of $418 billion across 2 million businesses nationwide in 2018. Approximately 40.9 percent of the sector's products and services segmentation comprises animals and animal products.

[4]https://agr.wa.gov/washington-agriculture
[5]https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=WASHINGTON

The following chart displays historical and projected revenue and employment growth in the overall industry sector between 2010 and 2023.

FIGURE 24



Between 2013 and 2018, revenue growth in the sector decreased by an average annual growth rate of approximately 2.8 percent nationwide. This is mainly due to severe droughts in 2012 that affected many states, primarily in the Midwest and Southwest. Over-production of crops in the years following the drought led to significant price drops for nearly half of the products and services in this industry sector on a national basis. However, it is important to note that while the State of Washington was not directly impacted by the drought, it was impacted in the following years due to the significant price drops.

Growing health concerns and demand for organic and natural agricultural products are expected to boost revenue growth for the sector, which could potentially mean a decline specific to revenue for livestock production. The projected annual growth rate for the nationwide agriculture, forestry, fishing, and hunting sector in aggregate between 2018 and 2023 is 1.5 percent.[6]

[6] *IBISWorld Agriculture, Forestry, Fishing and Hunting Sector Report*, June 2018.

Methodology

The valuation methodology selected is the Income Approach.

Methodology

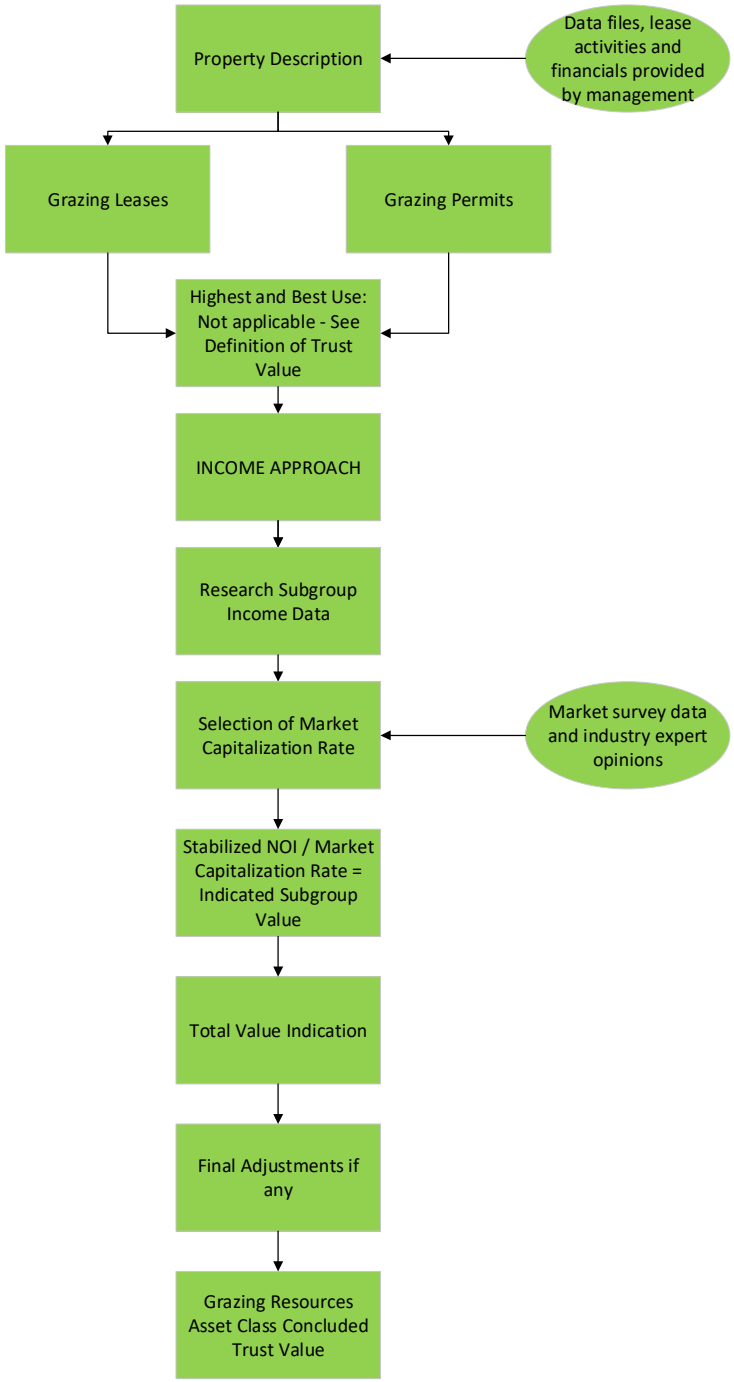
The income approach is the basis for the valuation of this asset class. The Trust Manager's data files were the principal source of market and value information (i.e., annual gross lease revenue, direct and indirect expenses, and other financial information) and include lease activity obtained in the ordinary course of the management of assets.

Due to the nature of the cash flow stream this asset class produces through its negotiated leases, the income approach is utilized as the methodology utilized. Adequate amounts of market data existed to use the income approach.

The flowchart that follows will display the steps taken in the valuation analysis of the Grazing Resources Asset Class.

Grazing Resources Asset Class Valuation Flowchart

FIGURE 25



Trust Value Analysis

We evaluated the trust retail value of the Grazing Resources Asset Class by using the approach described below:

Income Approach

The income approach involves performing procedures that enable an appraiser to derive a value indication for an income-producing property by converting its anticipated benefits into property value using one of the following methods:

- *Discounted Cash Flow Method*: The annual cash flows for the holding period and the reversion are discounted at a specified yield rate. The discounted cash flow method was not used in this analysis.

- *Direct Capitalization Method*: One year's income expectancy is capitalized at a capitalization rate that reflects a specified income pattern, return on investment, and change in the value of the investment. The direct capitalization method was used in this analysis.

An overall capitalization rate, or simply "capitalization rate," is defined as a ratio of one year's net operating income provided by an asset to the value of the asset and is used to convert income into value when using the income capitalization approach.[7] Further discussion regarding this rate can be found in the earlier chapter that focuses on rates of return.

Given the leased nature and ownership limitations of the Grazing Resources Asset Class, the direct capitalization method is considered to be most relevant and, thus, has been utilized in this portfolio analysis.

Extraordinary Assumptions

We assume that all lands containing leases with grazing uses adhere to the proper zoning regulations outlined in local general plans. If not fully compliant, we assume each property is legally non-conforming to the proper regulations and standards.

As previously discussed in the chapter regarding restrictions and burdens, the Trust Manager's ability to sell, exchange, or transfer state trust lands is limited by statute. For the purpose of this analysis, we assume that the ownership interest is non-transferable[8] resulting in the land not being able to be sold.

We relied on information provided by the Trust Manager for all specific data regarding data files, leasing activities, financial statements, size, and ownership information. We assume that all information provided by the Trust Manager is accurate and sufficient for the purpose of this valuation.

Hypothetical Conditions

None noted.

[7] Definition sourced from the *Sixth Edition of the Dictionary of Real Estate Appraisal*.
[8] State lands that are leased under RCW 79.13.370 "shall not be offered for sale, or sold, during the life of the lease, except upon application of the lessee." The Trust Manager includes an early termination clause in its grazing leases that provides for termination if the premises are included in a plan for higher and better use, sale, or exchange.

Income Approach

The direct capitalization method is used to estimate the Trust Value of the Grazing Resources Asset Class.

For the purposes of the valuation analyses in this report, the Grazing Resources Asset Class has been divided into two subgroups:

- Grazing leases
- Grazing permits

ESTIMATED NET CASH FLOWS

As highlighted in the "Operational History" section of this chapter, total gross revenue received from rent payments for the Grazing Resources Asset Class typically total about $1 million per year. We have estimated expected stabilized streams of revenue for each subgroup in the asset class based on analyzing historical averages and trends while acknowledging volatility and potential growth where applicable. Combined, the estimated stabilized gross revenues total $1,050,000 for the Grazing Resources Asset Class.

We have also estimated an expected stabilized operating cost percentage deduction of 30% based on historical deductions averaging near this blended rate. In the following table, we segregate the income streams based on the identified subgroupings.

FIGURE 26

Grazing Resources Asset Class - Stabilized Income Summary			
	Grazing Land Leases	Permit Ranges	**Total**
Stabilized Gross Revenues	$800,000	$250,000	**$1,050,000**
Operating Cost % Deduction	($240,000)	($75,000)	**($315,000)**
% of Revenues	30%	30%	**30%**
Trust Net Operating Income	$560,000	$175,000	**$735,000**

CAPITALIZATION RATE SELECTION

Grazing Leases and Grazing Permits.

An overall rate of 7 percent has been selected to apply to the net cash flows for both the grazing leases and grazing permits subgroups. For further discussion regarding determining this capitalization rate, please reference the earlier chapter of this report which discusses rates of return.

DIRECT CAPITALIZATIONS

The capitalization rate is next applied to the relevant stabilized revenue stream estimates for each subgroup to derive a preliminary Trust Value indication for each asset class. The direct capitalization calculations are presented for each subgroup.

Note that the acres leased and reported for each subgroup represent the total acreage in FY 2018, as provided by Trust Management.

Note that the contract count figure for grazing leases represents the total number of leases with the subgroup's use in FY 2018. It is not uncommon for leases with a grazing use to include agricultural uses. Specifically, many of these leases report minor amounts of revenue for non-production lands.

Grazing Leases. The total value indication for grazing leases is $8,000,000 (rounded), which equates to an average of approximately $18.50 per leased acre. Capitalization calculations for grazing leases are as follows:

FIGURE 27

Direct Capitalization - Grazing Leases		
Acres Leased [1]		432,255
Total Leases [2]		746
Stabilized Gross Revenues		$800,000
Operating Cost % Deduction	30.00%	($240,000)
Revenue Distributed to Trusts		$560,000
Capitalization Rate		7.00%
Indicated Grazing Land Leases Value		$8,000,000
Grazing Land Leases Value (Rounded)		**$8,000,000**
Value per Acre		**$18.51**
Value per Lease		**$10,724**

[1] Represents the total acreage in FY18 as provided by Trust Management.
[2] Represents all FY18 contracts with the subgroup's use type. This total includes leases with some minor agricultural revenues reported.

Grazing Permits. The total value indication for grazing permits is $2,500,000 (rounded), which equates to an average of approximately $7.90 per acre under permit. The Capitalization calculations for grazing permits are as follows:

FIGURE 28

Direct Capitalization - Grazing Permits		
Acres under Permit [1]		318,235
Total Permits		43
Stabilized Gross Revenues		$250,000
Operating Cost % Deduction	30.00%	($75,000)
Revenue Distributed to Trusts		$175,000
Capitalization Rate		7.00%
Indicated Permit Ranges Value		$2,500,000
Permit Ranges Value (Rounded)		**$2,500,000**
Value per Acre		**$7.86**
Value per Permit		**$58,140**

[1] Represents the total acreage in FY18 as provided by Trust Management.

Income Approach Summary. The following table combines the total indicated values from each of the direct capitalization calculations into a total indicated value for the asset class.

FIGURE 29

Grazing Resources Income Approach Summary	
Acres under Contract	750,490
Total Contracts [1]	789
Grazing Leases	$8,000,000
Grazing Permits	$2,500,000
Total Value Indication (Rounded)	**$10,500,000**
Value per Acre	**$13.99**
Value per Contract	**$13,308**

[1] Represents all leases and permits associated with a grazing use.

Value Conclusion

The concluded Trust Value of the Grazing Resources Asset Class is $10,500,000.

GRAZING RESOURCES ASSET CLASS VALUE CONCLUSION

Using the income approach, the indicated values for each of the subgroups—grazing leases and grazing permits—were combined to represent the total value indication for the Grazing Resources Asset Class.

This results in a concluded Trust Value of $10,500,000 for this asset class.

FIGURE 30

Grazing Resources Asset Class Value Conclusion	
Acres under Contract	750,490
Total Contracts [1]	789
Grazing Leases	$8,000,000
Grazing Permits	$2,500,000
Total Value Indication (Rounded)	**$10,500,000**
Concluded Trust Value (Rounded)	**$10,500,000**
Value per Acre	**$13.99**
Value per Contract	**$13,308**

[1] Represents all leases and permits associated with a grazing use.

INDIVIDUAL TRUST VALUES SUMMARY

The concluded Trust Value of the Grazing Resources Asset Class was calculated and allocated to each trust based on its share (i.e., percentage) of gross revenue for the asset class in FY 2018. The table below reflects the concluded share of the Trust Value designated for each trust for FY 2018, segregated by subgroup.

FIGURE 31

Grazing Resources Asset Class Individual Trust Values				
Trust	**Grazing Leases**	**Grazing Permits**	**Trust Value**	**%**
Common School and Indemnity	$7,042,560	$2,384,900	**$9,427,460**	**89.79%**
University Transferred	$298,000	$20,300	**$318,300**	**3.03%**
Other [1]	$191,680	$0	**$191,680**	**1.83%**
Agricultural School	$153,440	$14,375	**$167,815**	**1.60%**
CEP & RI	$129,920	$21,425	**$151,345**	**1.44%**
Normal School	$53,520	$17,425	**$70,945**	**0.68%**
Scientific School	$55,920	$5,225	**$61,145**	**0.58%**
State Forest Transfer	$16,720	$36,100	**$52,820**	**0.50%**
Capitol Grant	$40,480	$125	**$40,605**	**0.39%**
University Original	$14,160	$125	**$14,285**	**0.14%**
Escheat	$3,600	$0	**$3,600**	**0.03%**
Total	**$8,000,000**	**$2,500,000**	**$10,500,000**	**100%**

[1] Other includes the collective miniscule amounts of Department of Social and Health Services, Community Forest Trust and other trusts not in the scope of this project.

Deloitte.

Source: WA STATE DNR

Chapter 9

Communication Resources Asset Class

Table of Contents

Executive Summary

The Communication Resources Asset Class consists of various leases and lease types for communication infrastructure sites throughout the State of Washington. The table below provides a brief summary of the Communication Resources Asset Class and a conclusion on the Trust Value for each subgroup and the whole asset class based on the following extraordinary assumptions.

We assume that all communication sites on state trust lands adhere to proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper regulations and standards. For the purpose of this analysis, we assume that the ownership interest is non-transferable resulting in the land not being able to be sold. We relied upon information provided by the Trust Manager for all specific data regarding data files, leasing activities and financials, and size and ownership information. We assume the accuracy of all information provided is sufficient for the purposes of this valuation.

Importantly, the value appraised is Trust Value, which is defined earlier in this report. This value type is applicable to all asset classes and subject to specific laws, regulations, or management policies that restrict the use, marketability, or sale of these asset classes.

Communication Resources Asset Class Executive Summary			
	Radio/TV/Other Leases	**Cellular Leases**	**Total / Average**
Lease Count	362	60	422
Stabilized Gross Revenues	$3,500,000	$1,300,000	$4,800,000
Operating Cost 30% Deduct	($1,050,000)	($390,000)	($1,440,000)
Trust Net Operating Income	$2,450,000	$910,000	$3,360,000
Capitalization Rate	9.00%	6.50%	8.15%
Value Indication (Rounded)	**$27,200,000**	**$14,000,000**	**$41,200,000**
Concluded Trust Value	**$27,200,000**	**$14,000,000**	**$41,200,000**
Concluded Value per Lease	**$75,138**	**$233,333**	**$97,630**

Introduction

The Communication Resources Asset Class includes 103 wireless telecommunication sites with 422 lease agreements.

INTRODUCTION

Washington's state trust lands provide ideal locations for communication towers, particularly the hilltops and mountain tops located throughout many parts of the state.

State trust lands include more than 100 wireless telecommunication sites in diverse and prime locations to serve the large population centers of the Puget Sound lowlands, Spokane, and the Tri Cities. In addition, sites that provide ideal coverage for rural and urban populations are located across the state.

The Washington State Department of Natural Resources (the "Trust Manager" or "Trust Management") leases sites for new communication facilities and for co-locating within state trust land facilities. The 3 million acres of state trust lands offer many different types of opportunities for private and public entities to establish new communications sites and expand existing sites.[1]

This asset class consists of various leases and lease types for communication infrastructure sites. Generally, these sites are located on mountain tops or in areas with topographic relief that allow for unobstructed sight lines. These sites are used for microwave beams; emergency communication radio repeaters; private radio repeaters; and television (TV), radio, cellular, and digital telephone antennas. It is typical for multiple leases (i.e., contracts) to be negotiated for one mountain top site.

It is also common for a tower company to lease state land, construct and/or operate the communication tower on that land, and then lease space on the tower to wireless service providers. Since a percentage of the rent paid by subtenants is passed on to DNR, this type of lease often generates more revenue than other communication leases.

Conversations with the Trust Manager suggest that the communication sites program is striving to move less towards constructing and owning improvements on communication sites and more towards ground lease relationship only. Additionally, the program is striving to move from a rental structure dependent on fixed rates based on the height of improvements to a rental structure based on a percentage of revenue method.

Communication Resources

This asset class consists of various leases and lease types for communication infrastructure sites. Generally, these sites are located on mountain tops or areas with topographic relief that allows for unobstructed sight lines. These sites are used for microwave beams; emergency communication radio repeaters; private radio repeaters; and TV, radio, cellular, and digital telephone antennas.

[11]https://www.dnr.wa.gov/programs-and-services/product-sales-and-leasing/communications-towers

Of the large portfolio of state trust land assets owned by the state, the Communication Resources Asset Class represents the smallest in geographical size. As of FY 2018, the total acreage of the asset class comprised approximately 91 acres spread across 103 communication sites.

Approximately 68 communication sites (66 percent) are located west of the Cascade mountain range, and the remaining 35 sites (34 percent) are located east of the mountains.

As a general note, all dollar amounts reported in this chapter are nominal and have not been adjusted for inflation. Additionally, we note that all years referenced are fiscal years—not calendar years. The fiscal year for state trust lands begins on July 1 and ends on June 30.

Subgroups. Communication sites are typically located on mountain tops, prominent ridges or hills and transportation corridors used as sites for communication antennas. In general, state trust lands with communication sites are used for cellular communication, microwave, TV, and FM radio broadcasting.

For purposes of analysis and discussion, the Communication Resources Asset Class is divided into two subgroups:

1. Radio, TV, and Other Leases

a. Leases for radio, TV, or any other type of non-cellular communication or broadcasting use.
b. Rental rates for Radio, TV, and other non-cellular lease types are generally, though not always, lower than those negotiated for leases with cellular communication uses.

2. Cellular Leases

a. Leases for cellular communication usage, many of which include large wireless telecommunications carriers as tenants (i.e., Verizon, AT&T).
b. Typically, Cellular Leases attract higher lease payments due to the greater quantity of data that can be transferred and the larger number of recipients this transmission type can reach.
c. We acknowledge that areas of state trust lands are leased to tower companies who own/operate towers that may further be subleased to large wireless telecommunication carriers. However, these lease types have not been included in this subgroup as they are not direct to the carriers and sublease data is less available.

The majority of current leases are for general uses that fall into the Radio, TV, and Other Leases subgroup.

The total number of leases exceeds the total number of sites because multiple leases or contracts are often located at the same sites. The Trust Manager manages a total of 422 leases across 103 sites. In FY 2018, the Communication Resources Asset Class received revenue from a total of 362 different contracts. The Trust Manager confirmed that the remaining 60 contracts did not generate revenue in FY 2018 for one of the following reasons:

1. The contract closed or expired by FY 2018, with the last payment received in FY 2017 or earlier. The Trust Manager explained that data entry errors may result in incorrect lease end dates that extend past the actual expiration dates.
2. The contract expired in FY 2017 and was extended into FY 2018, but the first payment was not collected until FY 2019.

3. The contract is a perpetual, no-cost, or low-cost easement that DNR granted to a governmental entity in the past. DNR no longer grants these types of easements to governmental agencies.

The site and lease counts associated with revenue reported in FY 2018 have been summarized by subgroup in the following table:

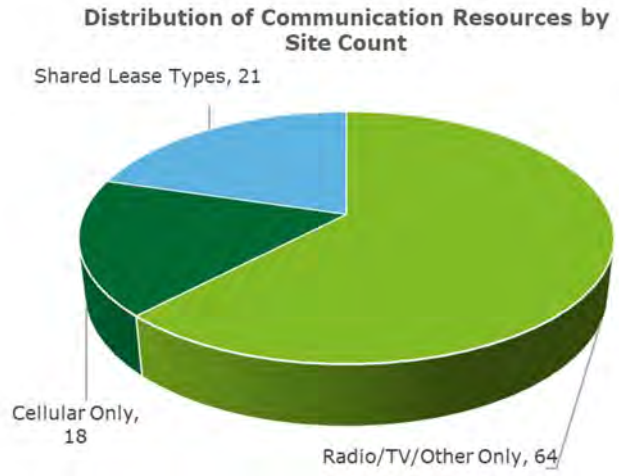
Communication Resources Subgroup Site Count

FIGURE 1

Communication Resources	Lease Count	Site Count*
Radio/TV/Other Leases	362	85
Cellular Leases	60	39
Totals	**422**	**103**

*Represents the number of sites with each lease type present. 21 sites share leases of both types resulting in 103 total sites.

FIGURE 2



Of the 103 sites associated with FY 2018 leases, the majority (64 sites) were leased for radio, TV, and other uses, 18 sites were leased for cellular use only, and 21 sites were leased for both cellular and radio, TV, and other uses.

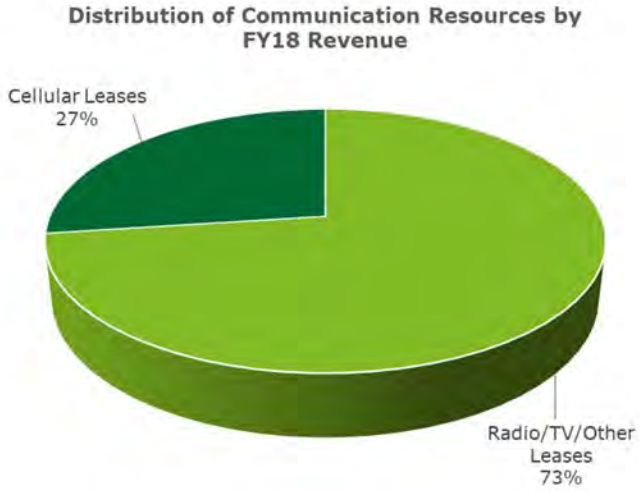
The following table and chart highlight the allocation of gross FY 2018 revenue (rounded) between subgroup types.

Communication Resources Subgroup Revenue

FIGURE 3

Communication Resources	Lease Count	Gross Revenue (FY18)
Radio/TV/Other Leases	362	$3,500,000
Cellular Leases	60	$1,300,000
Totals	**422**	**$4,800,000**

FIGURE 4

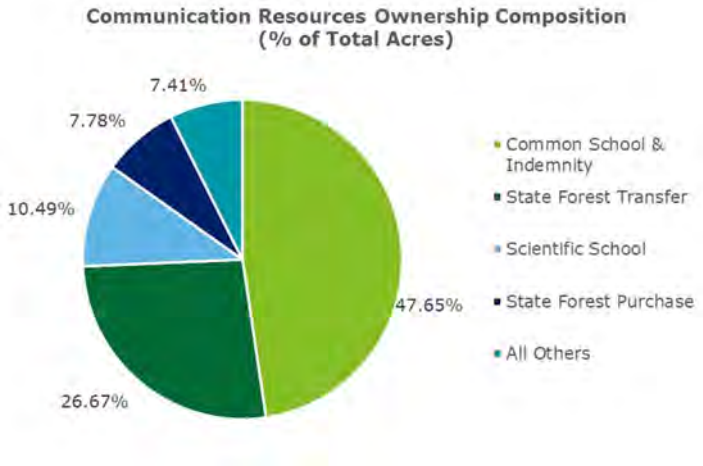


While cellular leases only comprise roughly 14 percent of the total lease count, they accounted for 27 percent of the gross revenue received in FY 2018. Leases for radio, TV, and other uses brought in the majority of gross revenue at 73 percent.

Communication Resources Asset Class Ownership. The Trust Manager manages and operates state trust lands owned by the State of Washington for the benefit of designated trust beneficiaries. To be concise, this report uses the term "ownership" or "ownership interests" to describe the amount or percentage of gross revenue or land managed by the Trust Manager on behalf of specific trust beneficiaries, even though the land is owned by the State of Washington and not the trust beneficiaries.

The following charts present the trust beneficiaries' ownership interest in the Communication Resources Asset Class based on acreage and gross revenue in FY 2018.

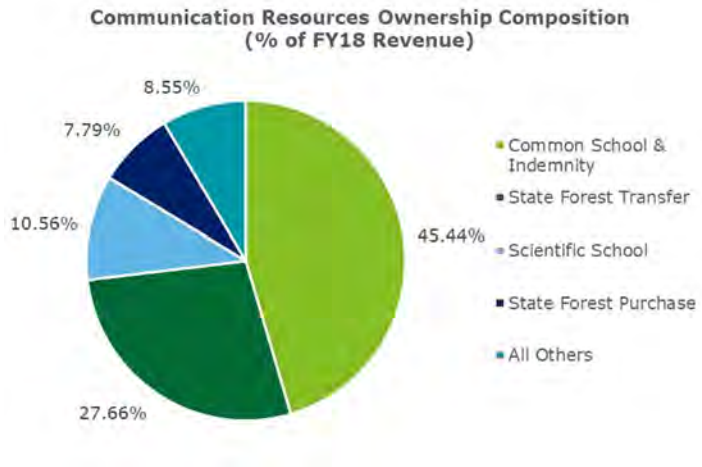
FIGURE 5



The largest ownership interest is held by the Common School and Indemnity Trust, which supports statewide public school (K-12) construction and other designated programs. The beneficiary ownership interest in state trust lands are the result of federal land grants to Washington at the time statehood was granted. The following chart highlights the acreage by ownership interest.

The following chart highlights the ownership interests by revenue received.

FIGURE 6



The second largest interest is held by the State Forest Transfer Trust, which received approximately 27.7 percent of FY 2018 gross revenue for this asset class. Next, the Scientific School Trust holds an interest in 10.5 percent of the total acreage and received a similar percentage of FY 2018 gross revenue. All other trusts hold little or no interest in the asset class.

Physical Description

In FY 2018, the total acreage of the Communication Resources Asset Class was approximately 91 acres across 103 sites in six management regions.

FIGURE 7

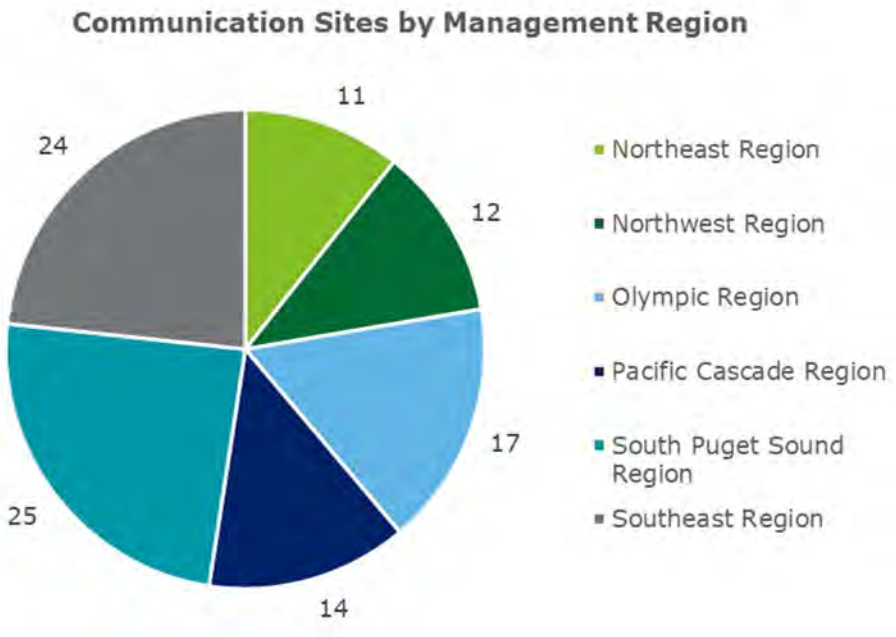


IMAGE SHOWS A COMMUNICATION TOWER LOCATED AT THE GOLD MOUNTAIN COMMUNICATION SITE ON STATE TRUST LANDS. SOURCE: WA STATE DNR

As shown in the previous figure, communication sites leased on state trust lands are spread throughout the six management regions of the state. The largest number of sites (25) are located in the South Puget Sound region which includes Olympia and most of the greater Seattle/Tacoma metro areas. Approximately 24 sites serve the Southeast region. The following map[2] outlines the boundaries of the six management regions in Washington as classified by the Trust Manager.

Map of Trust Management Regions

FIGURE 8

Generally, state trust lands leased for communication uses are elevated on mountain tops or located in areas with topographic relief that allows for unobstructed sight lines.

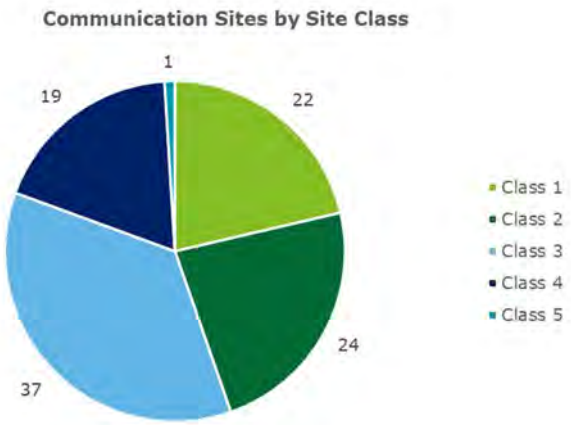
Based on population density, road access, topographic advantage, traffic density of serviced areas, and supply of comparable sites, the Trust Manager categorizes communication sites into five site classes. Following is a summary of each class:

- ***Class 1*:** A site that serves a high population density, brings communications to a broad geographic area, and/or has road access with commercial and standby power available.
- ***Class 2:*** A site that has the same physical attributes as a Class 1 site, except it does not serve a high population density or it has some limitations serving a broad geographic area.
- ***Class 3:*** A site with road access, but it serves a smaller population density or geographic area than Class 2 sites.
- ***Class 4:*** A remote site with limited road access, and power may or may not be available.
- ***Class 5:*** A site used only by county Emergency Management Services (EMS), for counties with fewer than 5,000 people.

[2] Map sourced from https://www.dnr.wa.gov/about/dnr-regions-and-districts

The following chart displays the 103 sites leased in the Communication Resources Asset Class separated by site class.

FIGURE 9

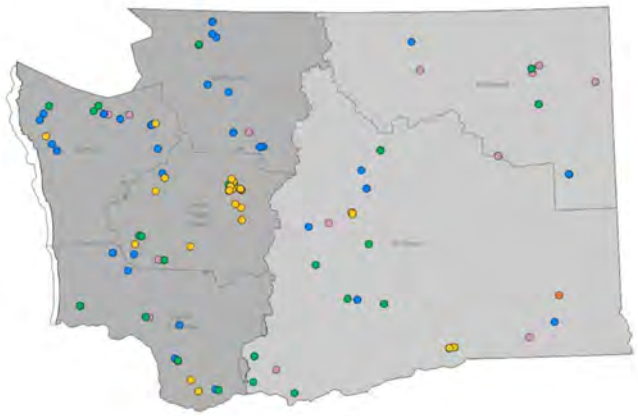


The following maps are presented to display the locations of communication sites by site class designation, as identified by color scheme:

- Class 1: *Orange*
- Class 2: *Green*
- Class 3: *Blue*
- Class 4: *Pink*
- Class 5: *Red*

All Communication Sites by Site Class Designation

FIGURE 10



Conversations with the Trust Manager revealed there is a continual process in place to convert actual records data into spatial files in the GIS database. As such, note that the number of sites shown on maps created in the GIS database do not tie directly to the counts obtained from the FY 2018 data provided by the Trust Manager.

The majority of trust-owned communication sites are categorized as Class 3 sites. In fact, 83 sites are categorized as Class 1, Class 2, or Class 3, which means approximately 81 percent of all communication sites are serviced by average or above average road access.

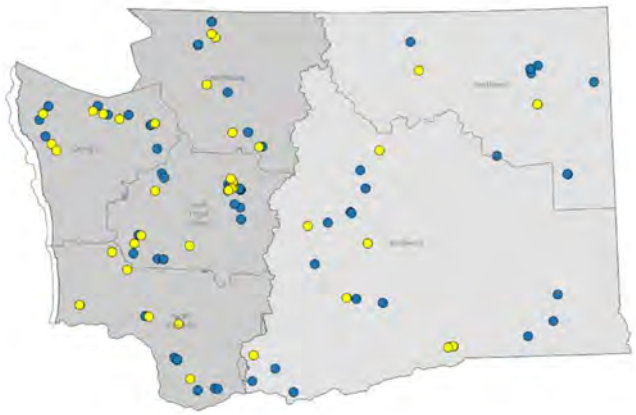
Of the 422 leases for communication sites on state trust lands in FY 2018, 395 were located at Class 1, Class 2, or Class 3 sites, while the remaining 27 leases were located at sites designated as Class 4 or Class 5.

The following sequence of maps are presented to display the location of communication sites designated by subgroup. While communication sites are spread throughout the state, the heaviest concentrations are in the northwest area near more populated areas. The highest number of leases are found in Clallam and King counties, with 49 leases and 48 leases, respectively.

In the following map, communication sites with Cellular Leases are identified by a light yellow dot, while sites with radio, TV, and all other non-cellular lease types are identified by blue dots.

Map of All Communication Sites by Lease Type

FIGURE 11



Radio, TV, and Other Leases

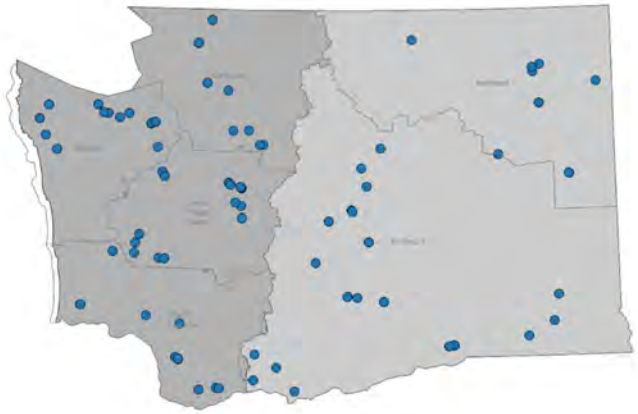
In FY 2018, the majority of the 361 leases for radio, TV, or other non-cellular uses were located at Class 1 or Class 2 communication sites. A more detailed split of the number of Radio, TV, and Other Leases by site class follows:

- Class 1 – 134 leases
- Class 2 – 128 leases
- Class 3 – 74 leases
- Class 4 – 23 leases
- Class 5 – 2 leases

The following map highlights sites where Radio, TV, and Other Leases are located throughout the state.

Map of Radio, TV, and Other Leases

FIGURE 12



Cellular Leases

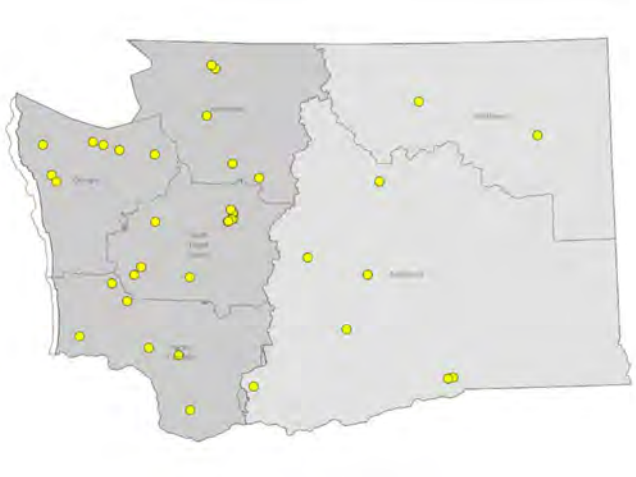
In FY 2018, the majority of the 52 leases for cellular uses were also located at Class 1 or Class 2 communication sites. A more detailed split of the number of Cellular Leases by site class follows:

- Class 1 – 21 leases
- Class 2 – 16 leases
- Class 3 – 22 leases
- Class 4 – 2 leases
- Class 5 – 0 leases

The following map highlights where sites with Cellular Leases are located throughout the state. Note that 21 sites with Cellular Leases share leases with the Radio, TV, and other subgroup.

Map of Cellular Leases

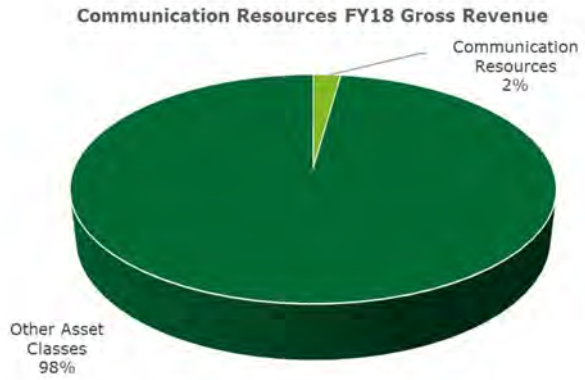
FIGURE 13



Operational History

The Communication Resources Asset Class generally produces more than $4.5 million in gross annual revenue.

FIGURE 14

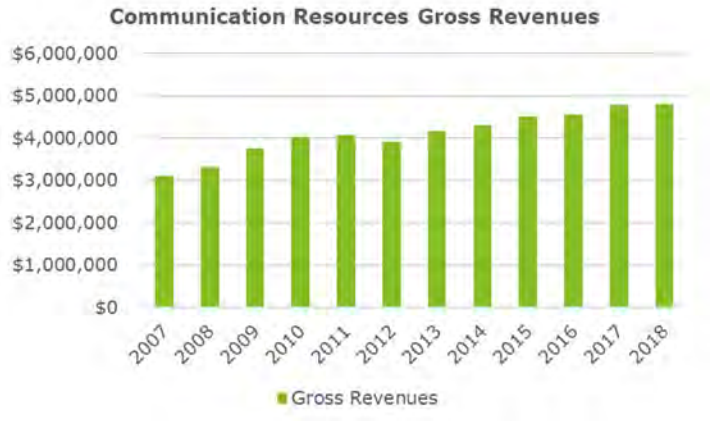


COMMUNICATION RESOURCES ASSET CLASS REVENUE 2007 TO 2018

For the scope of this project, we analyzed the operational history of each asset class. Operating information has been provided to the analysts for the past 12 fiscal years. Revenue amounts were not adjusted for inflation and are presented in this report in nominal values, not real values.

The chart below displays the total gross revenue[3] (before the operating cost percentage deduction) received from communication site leases from 2007 to 2018 in nominal (not real) values.

FIGURE 15



The revenue above was not stacked to show the relative portions of Cellular Leases versus Radio, TV, and Other Leases because the Trust Manager's accounting system does not track historical revenue to this level of detail.

However, we analyzed and categorized FY 2018 revenue based on the relative portions of Cellular Leases versus Radio, TV, and Other Leases. The following chart shows that Cellular Leases accounted for 27 percent of gross revenue.

[3] Gross revenues exclude sub-sources 6, 3045, 4005, 5022, 5250, 6022, and 9088 as they are not included in reported operating cost percentage deduction totals.

FIGURE 16

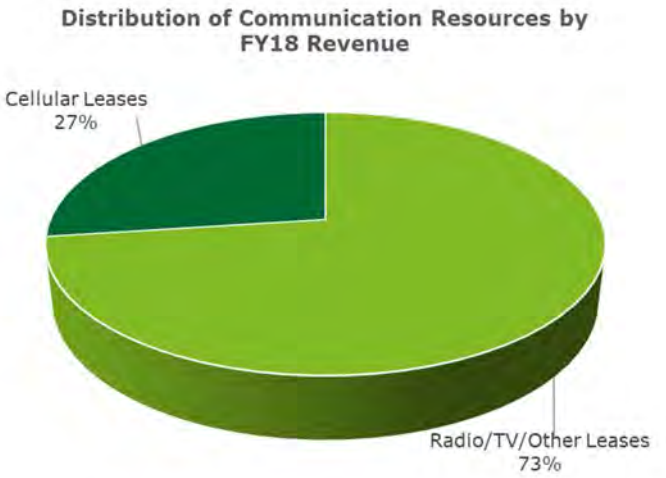
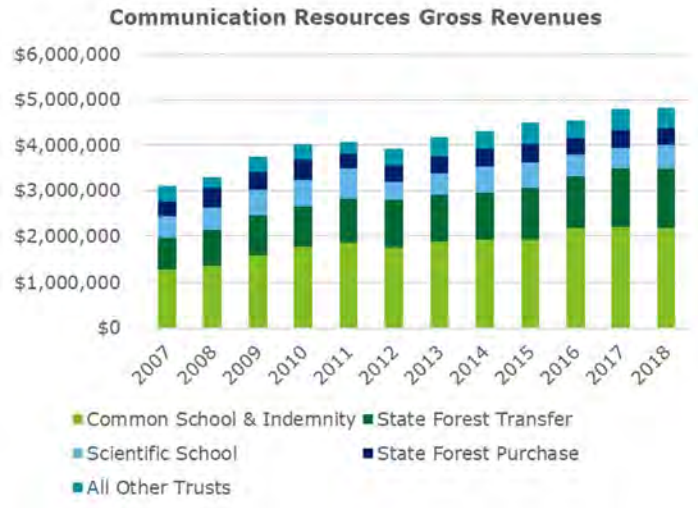


FIGURE 17



Gross revenue for the Communication Resources Asset Class grew from $3.1 million to $4.8 million between 2007 and 2018. This represents a compound annual growth rate of 4.07 percent. The compound annual growth rate is defined as the annual rate of growth required for the beginning balance to grow to its ending balance.

Ownership Composition. The following chart highlights the revenue received by trust beneficiaries with the largest ownership by percentage of revenue for this asset class.

OPERATING COST PERCENTAGE DEDUCTION

As gross proceeds are received, an operating cost percentage deduction is applied and paid to the Trust Manager. From the trust beneficiary ownership position, there are no outflows of funds to operate and maintain the asset class; the Trust Manager budgets for actual costs and capital expenditures and pays these costs directly from the operating cost percentage deduction received during the year.

The operating cost percentage deduction is legislatively set and typically ranges between 25 percent and 31 percent of total gross revenue, depending on the management account associated with each trust ownership. Historical data reported in this analysis reflects actual blended rates deducted. We have used an estimated assumption of 30 percent for the operating cost percentage deduction of this asset class which has been applied in the direct capitalization method.

Operating Cost Percentage Deduction versus Direct Operating Expenses. The operating cost percentage deduction is different than actual operating expenses and capital expenditures incurred to operate and manage the assets in the Communication Resources Asset Class.

When the total operating cost percentage deduction for all asset classes exceeds actual operating costs and capital expenditures for the year, the excess is held in reserve for future years when the operating cost percentage deduction does not cover actual costs. The reserve balances are reported by fund and held in separate accounts—the Resource Management Cost Account, Forest Development Account, and the Agriculture College Trust Management Account.

The Resource Management Cost Account is held in the State Treasury and created and used solely to defray the costs and expenses incurred by the Trust Manager to manage and administer state trust lands, including state-owned aquatic lands, as well as make and administer leases, sales, contracts, licenses, permits, easements, and rights of way as authorized (RCW 79.64.020).

The Forest Development Account was created by RCW 79.64.100, and it is held in the State Treasury. Primarily, the Forest Development Account is used to make interest and principal payments on bonds issued by the Trust Manager, but the state legislature may also appropriate funds from the account to enable the Trust Manager to carry out forest management activities on state forestlands or reimburse the Resource Management Cost Account for expenditures required to manage state forestlands.

The third account is the Agriculture College Trust Management Account. This account does not retain an operating cost percentage deduction, but the Trust Manager receives a direct appropriation from this account, as determined by the state legislature, to conduct management work. Trust beneficiaries retain all gross revenue.

The reserve balances for all asset classes as of June 30, 2018 were approximately $12.6 million (Resource Management Cost Account) and nearly $4 million (Forest Development Account). Over the last 10 years, the Resource Management Cost Account reserves reached a high of more than $17 million at the end of FY 2014 and a low of $800,000 at the end of FY 2009. The Forest Development Account reserves reached a high of $24 million at the end of FY 2011 and a low of just under $4 million at the end of 2018.

However, note that these are snapshots as of the end of fiscal years. In reality, fund balances constantly change across a much wider range throughout each year. On a few occasions, reserves have dipped down to only a couple weeks of operating expenses on a few occasions.

The following chart presents the dollar amounts of the historical operating cost percentage deduction from 2007 to 2018 for the Communication Resources Asset Class. The operating cost percentage deduction is proportionate to the gross revenue produced by the asset class each year—it rises and falls along with trust earnings and may not reflect increases or decreases in the Trust Manager's actual costs. These dollar amounts include both portions of revenue distributed to the Trust Manager from communication sites and incidental revenue from trespassing fines, non-federal conservation programs, Initial Incident Report (IIR) restitutions, power charges, and other assessments. The split expense amounts for each subgroup are not readily available within the current accounting system utilized by the Trust Manager.

FIGURE 18

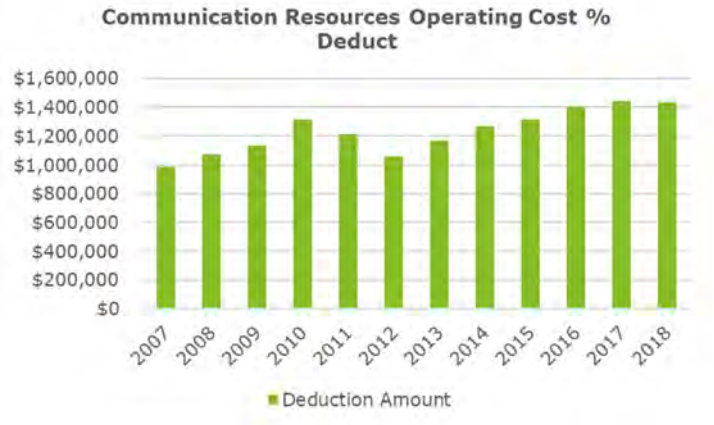
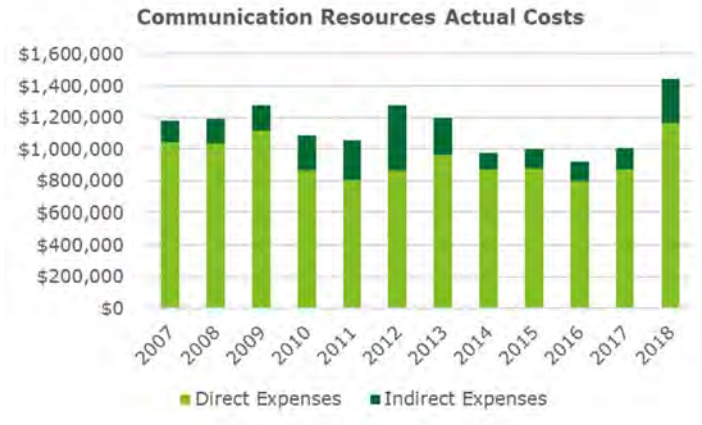


FIGURE 19



ACTUAL COSTS

The following is a discussion of the actual costs incurred by trust beneficiaries and paid by the Trust Manager from funds received as a result of the operating cost percentage deduction.

The following chart highlights the historical actual costs incurred by the Trust Manager, which are split between direct and indirect expenses. The Trust Manager's accounting system does not record costs at the subgroup level.

Direct Expenses. Direct expenses include all costs directly related to managing communication sites, as well as allocations of general costs.

Currently, direct expenses include all costs directly related to managing lands, including:

- Resource and leasing management
- Project, sales, and planning management

The allocations of general costs are related to:

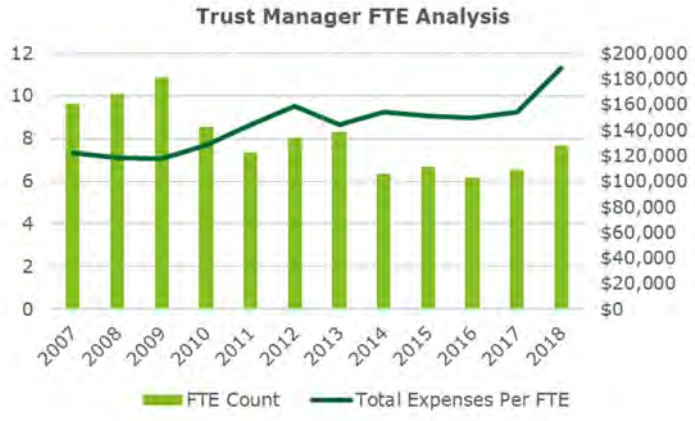
- Uplands
  - Examples include environmental analysis, state lands training, and law enforcement
- Engineering and general services
  - Examples include resource mapping, surveying, and record keeping
- Infrastructure for state trust lands
  - Examples include communication infrastructure costs

Indirect Expenses. Indirect expenses include all overhead costs allocated to the Trust Manager for:

- Administrative and agency support
- Adjustments
- Legal services
- Strategic investments
- Other administrative payments

As seen in the following full-time employee analysis, the Trust Manager typically retained approximately seven full-time employees for the Communication Resources Asset Class over the last four fiscal years. The total actual costs paid by the Trust Manager have ranged from $150,000 to $188,000 per full-time employee over that same period. These costs include all direct and indirect expenses, including salaries, as well as benefits and overhead.

FIGURE 20



NET CASH FLOW FROM 2014 TO 2018

Trust beneficiaries pay a portion of the gross revenue (i.e., operating cost percentage deduction) to the Trust Manager for operating expenses and capital expenditures. These costs include direct and indirect expenses. The cash flows net of the operating cost percentage deduction are then distributed to the appropriate funds by ownership.

The following table summarizes the net cash flows distributed to the trust beneficiaries over the past five fiscal years for this asset class. These dollar amounts include both portions of revenue distributed to the Trust Manager from communication sites and incidental revenue from trespassing fines, non-federal conservation programs, IIR restitutions, power charges, and other assessments. These cash flows indicate the Communication Resources Asset Class provides trust beneficiaries net cash flows with $3.0 million to $3.4 million per year.

FIGURE 21

	2014	2015	2016	2017	2018
Total Annual Gross Revenue	**$4,311,955**	**$4,502,407**	**$4,550,528**	**$4,792,742**	**$4,809,193**
Operating Cost % Deduct	($1,268,431)	($1,313,013)	($1,405,243)	($1,443,728)	($1,434,592)
% of Revenue	29.42%	29.16%	30.88%	30.12%	29.83%
Revenue Distributed to Trusts	**$3,043,524**	**$3,189,394**	**$3,145,284**	**$3,349,014**	**$3,374,601**
% of Revenue	**70.58%**	**70.84%**	**69.12%**	**69.88%**	**70.17%**

Property Taxes and Zoning

The State of Washington is exempt from paying direct real property taxes for communication sites; however, tenants are not.

PROPERTY TAXES

Property taxes are a local government's main source of revenue. Most localities tax private homes, land, and business property based on the property's value.

Lands owned by the state are exempt from property tax obligations under the state constitution. However, because private lessees of state land receive the benefit of governmental services, the legislature imposes a leasehold excise tax on these private lessees under RCW 82.29A.

Leasehold excise tax is paid by the lessee to the Trust Manager when rent is paid, and the Trust Manager remits the payment to the Department of Revenue. Land that is not leased does not pay property taxes or leasehold excise tax. Generally, the leasehold excise tax on leased land is most often less than what property taxes would be for the same land.

ZONING

We assume that all communication sites in the Communication Resources Asset Class adhere to the proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper zoning regulations and development standards.

IMAGE SHOWS THE JUMP OFF JOE COMMUNICATION SITE LOCATED ON STATE TRUST LANDS. SOURCE: WA STATE DNR

Market Analysis

The wireless telecommunications carriers, radio broadcasting companies, and TV broadcasting companies continue to grow, despite challenges.

COMMUNICATION RESOURCES MARKET OVERVIEW

The entire market analysis section is based on information and data sourced from IBISWorld, a trusted industry research firm. The different industry sectors discussed in the market overview are national overviews in the United States that include the state of Washington. The three relevant industry sectors discussed in this section are the Wireless Telecommunications Carriers Industry, Radio Broadcasting Industry, and TV Broadcasting Industry.

Wireless Telecommunications Carriers Industry Performance (National Overview)

According to IBISWorld, the wireless telecommunications carrier industry includes service providers that deliver cellular mobile phone, paging, wireless Internet, and wireless video services. The industry operates and maintains switching and transmission facilities to provide direct communications through the airwaves.

Over the past five years, there have been rapid developments in mobile devices. The number of households that only maintain wireless telephone connections has increased significantly during this period. Additionally, as technology transitions to fourth-generation wireless data services and the long-term evolution standard, the industry is changing to primarily deliver broadband connectivity.

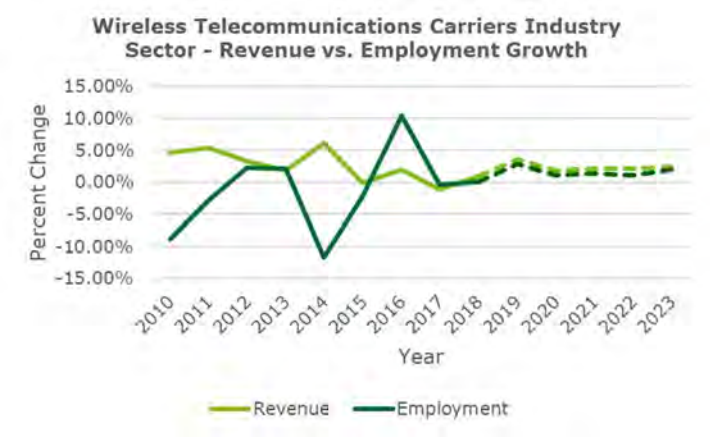
Revenue for the US wireless telecommunications carriers industry is projected to grow at an annualized rate of 3.2 percent to approximately $331 billion by 2024. This growth is fueled by the expansion of mobile devices that use data services and increases in the average revenue per user.

The major companies in this industry are AT&T Inc., Verizon Wireless, Deutsche Telekom, and Sprint Corporation. [4] Combined, these companies comprise approximately 67 percent of the industry's market share.

The following chart displays historical and projected revenue and employment growth in this industry between 2010 and 2023.

[4] Before Deutsche Telekom (T-Mobile) and Sprint merger in 2020.

FIGURE 22



Between 2009 and 2018, revenue growth in the sector increased by a compound annual growth rate of 2.5 percent, while employment decreased over this same period at an average annual rate of 1.4 percent. The projected nationwide annual growth rates between 2018 and 2023 are 2.4 percent for revenue and 1.65 percent for employment.[4]

Radio Broadcasting Industry Performance (National Overview)

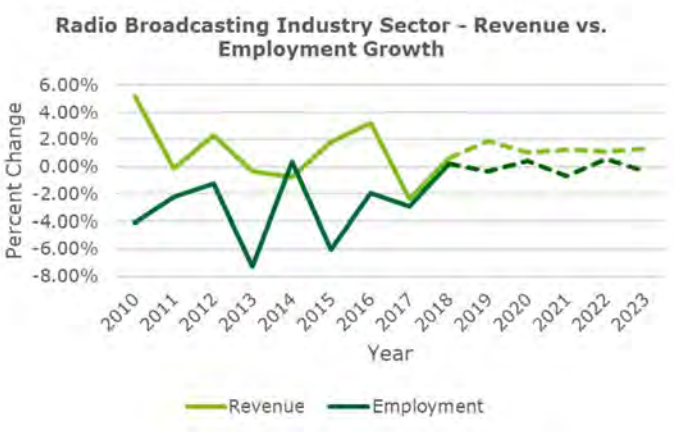
Additional national data were compiled and analyzed for the radio broadcasting industry. According to IBISWorld, this industry includes broadcasting stations, networks, and syndicates that transmit audio programming through AM, FM, and satellite radio channels.

Advertising is the main revenue stream for the radio broadcasting industry, but over the last five years, the industry has struggled to keep its audience and the advertising revenue the audience generates has plummeted. Consumers are moving away from radio in favor of digital media platforms. As a result, many companies are shifting their advertising budgets away from radio broadcasting and toward digital media platforms.

While struggling to stay relevant, the industry has been able to maintain its presence as satellite radio has been successful. The company with the highest percentage of market share in the industry is Sirius XM Radio Inc.

The following chart displays historical and projected revenue and employment growth in this industry sector between 2010 and 2023.

FIGURE 23



[4] Data sourced from "Wireless Telecommunications Industry Report," IBISWorld, July 2018.

Between 2009 and 2018, revenue growth in the sector increased by a compound annual growth rate of 1.05 percent to reach revenue of $20.2 billion in 2018. Employment decreased over this same period at an average of -2.83 percent annually. The projected nationwide annual growth rate between 2018 and 2023 is 1.32 percent annually for revenue and -0.08 percent annually for employment.[5]

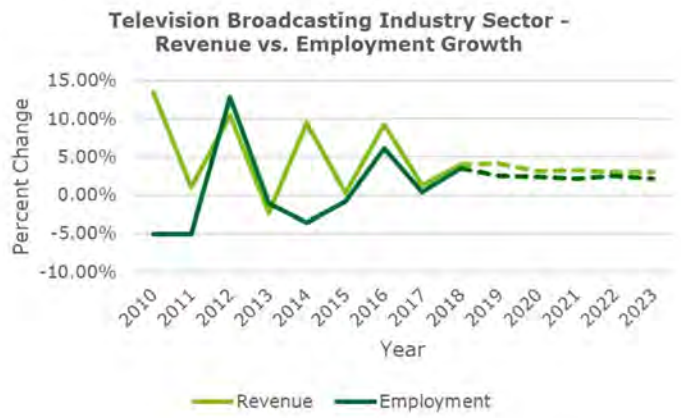
TV Broadcasting Industry Performance (National Overview)

Additional national data were compiled and analyzed for the TV broadcasting industry. According to IBISWorld, this industry includes TV broadcasters that operate studios and facilities that deliver audiovisual content to the public via over-the-air transmission. This industry excludes cable and satellite TV operators that only provide online content.

Over the past five years, the TV broadcasting industry has grown due to increases in overall advertising expenditures by companies, even though traditional TV viewership is in decline. The industry is expected to continue growing over the next five years, although competition for advertising dollars will remain fierce over this period and fluid consumer viewing habits will require adjustments by broadcasters.

The following chart displays historical and projected revenue and employment growth in this industry sector between 2010 and 2023.

FIGURE 24



Between 2009 and 2018, revenue growth in the sector increased by a compound annual growth rate of 5.05 percent to reach revenue of $61.1 billion in 2018. Employment remained fairly stagnant over this same period, only increasing at an average of 0.62 percent annually. The projected nationwide annual growth rate between 2018 and 2023 is 3.27 percent annually for revenue and 2.32 percent annually for employment.[6]

[5] Data sourced from "Radio Broadcasting Industry Report," IBISWorld, May 2018.
[6] Data sourced from "Television Broadcasting Industry Report," IBISWorld, August 2018.

Methodology

The income approach was the valuation methodology selected for this study.

Methodology

The income approach is the basis for the valuation of this asset class because the properties currently produce annual income through lease agreements and the receipt of future cash flows is expected.

The Trust Manager's data files were the principal source of market and value information (i.e., annual gross lease revenue, direct and indirect expenses, and other financial information) and include lease activity obtained in the ordinary course of the management of assets.

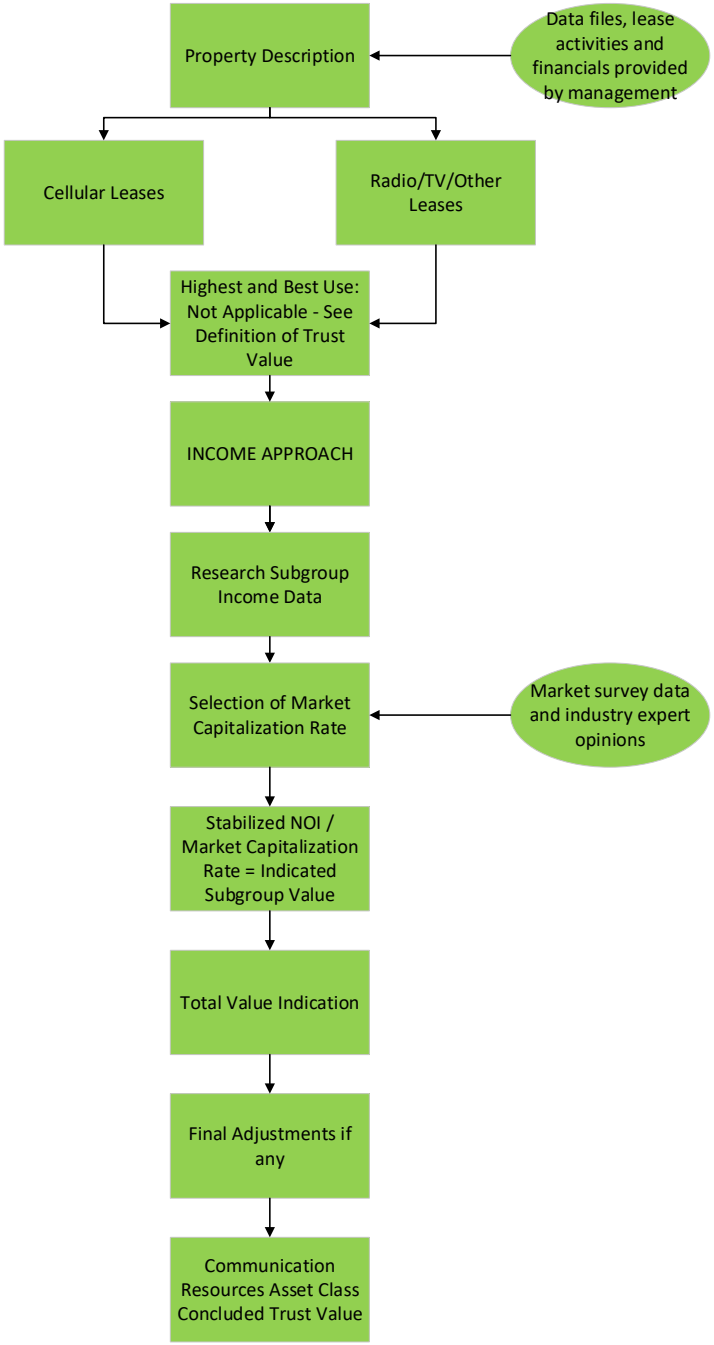
Due to the nature of the cash flow stream this asset class produces through its negotiated leases, the income approach was the methodology utilized. Adequate quantities of market data existed to use the income approach.

The flowchart that follows displays the steps taken in the valuation analysis for the Communication Resources Asset Class.

IMAGE SHOWS A COMMUNICATION TOWER LOCATED AT THE SUMMIT LAKE COMMUNICATION SITE ON STATE TRUST LANDS. SOURCE: WA STATE DNR

Communication Resources Asset Class Valuation Flowchart

FIGURE 25



Trust Value Analysis

We evaluated the Trust Value of the Communication Resources Asset Class by using the approach described below:

Income Approach

The income approach involves a set of procedures through which an appraiser derives a value indication for an income-producing property by converting its anticipated benefits (i.e., cash flows and reversion) into property value using one of the following methods:

- *Discounted Cash Flow Method*: The annual cash flows for the holding period and the reversion are discounted at a specified yield rate. The discounted cash flow method was not used in this analysis.
- *Direct Capitalization Method*: One year's income expectancy is capitalized at a capitalization rate that reflects a specified income pattern, return on investment, and change in the value of the investment. The direct capitalization method was used in this analysis.

An overall capitalization rate is defined as a ratio of one year's net operating income provided by an asset to the value of the asset and is used to convert income into value when using the income capitalization approach.[7] Further discussion regarding this rate can be found in the earlier chapter that focuses on rates of return.

The leased nature of the Communication Resources Asset Class results in stabilized annual income and cash flows into perpetuity. Since ownership limitations for this asset class result in a lack of near-term reversion of this asset class, the direct capitalization method is considered most relevant, and thus, it has been utilized in this analysis.

Extraordinary Assumptions

We assume that all communication sites on state trust lands adhere to the proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper regulations and development standards.

As previously discussed in the chapter regarding restrictions and burdens, the Trust Manager's ability to sell, exchange, or transfer state trust lands is limited by statute. For the purpose of this analysis, we assume that the ownership interest is non-transferable resulting in the land not being able to be sold.

We relied upon information provided by the Trust Manager for all specific data regarding data files, leasing activities and financials, and size and ownership information. We assume that all information provided by the Trust Manager is accurate and sufficient for the purpose of this valuation.

Hypothetical Conditions

None noted.

[7] Definition sourced from the *Sixth Edition of the Dictionary of Real Estate Appraisal*.

Income Approach

The direct capitalization method was used to estimate the Trust Value of the Communication Resources Asset Class.

For the purposes of the valuation analysis in this report, the Communication Resources Asset Class has been divided into two subgroups:

- Radio, TV, and Other Leases
- Cellular Leases

ESTIMATED NET CASH FLOW

As has been highlighted in the "Operational History" section of this chapter, total gross revenue received for leases contracted under the Communication Resources Asset Class total more than $4.5 million annually. We estimated a stabilized revenue for the asset class based on analyzing historical averages and trends while acknowledging volatility and potential growth where applicable.

We segregated the stabilized gross revenue estimate of $4.8 million for each subgroup based on each subgroup's revenue percentage allocation from FY 2018.

We also estimated an expected stabilized operating cost percentage deduction of 30 percent based on historical deductions averaging near this blended rate. The following table summarizes the estimated income stream for each subgroup.

FIGURE 26

Communication Resources Asset Class - Stabilized Income Summary			
	Radio/TV/Other Leases	Cellular Leases	**Total**
Stabilized Gross Revenues	$3,500,000	$1,300,000	**$4,800,000**
Operating Cost % Deduction	($1,050,000)	($390,000)	**($1,440,000)**
% of Revenues	30%	30%	**30%**
Trust Net Operating Income	$2,450,000	$910,000	**$3,360,000**

CAPITALIZATION RATE SELECTION

Conversations with market participants suggested that a lower rate of return would be appropriate for Cellular Leases as most rents in this subgroup are paid by large wireless telecommunications carriers (i.e., AT&T and Verizon) with high credit ratings and strong demand for this type of communication site.

A higher rate of return is required for leases with Radio, TV, and Other uses or leases with government uses. The majority of leases at state trust communication sites were found to have such uses.

A capitalization rate of 9 percent was selected and applied to the net cash flows for the Radio, TV, and Other Leases subgroup. A capitalization rate of 6.5 percent was selected and applied to the net cash flows for the Cellular Leases subgroup. For further discussion about how these capitalization rates were determined, please reference the earlier chapter of this report that focused on rates of return.

DIRECT CAPITALIZATIONS

The capitalization rate conclusions were then applied to the relevant stabilized revenue streams estimated for each subgroup to derive a preliminary Trust Value indication for this asset class. The direct capitalization calculations are presented for each subgroup.

Radio, TV, and Other Leases. The capitalization calculations for Radio, TV, and Other Leases are shown in the following table:

FIGURE 27

Direct Capitalization - Radio/TV/Other Leases		
Total Leases		362
Stabilized Gross Revenues		$3,500,000
Operating Cost % Deduction	30%	($1,050,000)
Revenue Distributed to Trusts		$2,450,000
Capitalization Rate		9.00%
Indicated Value		$27,222,222
Value Indication (Rounded)		**$27,200,000**
Value per Lease		**$75,138**

The value indication for Radio, TV, and Other Leases was $27,200,000 (rounded), which equates to an average of approximately $75,100 per lease.

Cellular Leases. The capitalization calculations for Cellular Leases are shown in the following table:

FIGURE 28

Direct Capitalization - Cellular Leases		
Total Leases		60
Stabilized Gross Revenues		$1,300,000
Operating Cost % Deduction	30%	($390,000)
Revenue Distributed to Trusts		$910,000
Capitalization Rate		6.50%
Indicated Value		$14,000,000
Value Indication (Rounded)		**$14,000,000**
Value per Lease		**$233,333**

The value indication for Cellular Leases was $14,000,000 (rounded), which equates to an average of approximately $233,300 per lease.

Income Approach Summary. The following table combines the total indicated values from the direct capitalization calculations for each subgroup into a total indicated value for the asset class.

FIGURE 29

Communication Resources Value Indication	
Lease Count	422
Radio/TV/Other Leases	$27,200,000
Cellular Leases	$14,000,000
Trust Value Indication (Rounded)	**$41,200,000**
Value Indication per Lease	**$97,630**

Value Conclusion

The concluded Trust Value of the Communication Resources Asset Class is $41,200,000.

COMMUNICATION RESOURCES ASSET CLASS VALUE CONCLUSION

Using the income approach, the indicated values for each subgroup—Cellular Leases and Radio, TV, and Other Leases—were combined to represent the total value indication for the Communication Resources Asset Class.

This results in a concluded Trust Value of $41,200,000 for the asset class.

FIGURE 30

Communication Resources Value Conclusion	
Lease Count	422
Radio/TV/Other Leases	$27,200,000
Cellular Leases	$14,000,000
Trust Value Indication	**$41,200,000**
Concluded Trust Value (Rounded)	**$41,200,000**
Trust Value per Lease	**$97,630**

INDIVIDUAL TRUST VALUES SUMMARY

The concluded Trust Value for the Communication Resources Asset Class was calculated for each trust. Specifically, the concluded Trust Value was allocated based on each individual trust's percentage of gross revenue for the asset class in FY 2018. The following table reflects the concluded value for each trust.

FIGURE 31

Communication Resources Individual Trust Values		
Trust	**Trust Value**	**%**
Common School and Indemnity	**$18,722,516**	**45.44%**
State Forest Transfer	**$11,393,860**	**27.66%**
Scientific School	**$4,350,308**	**10.56%**
State Forest Purchase	**$3,211,128**	**7.79%**
CEP & RI	**$1,479,080**	**3.59%**
Agricultural School	**$933,592**	**2.27%**
Capitol Grant	**$781,152**	**1.90%**
Other [1]	**$328,364**	**0.80%**
Total	**$41,200,000**	**100%**

[1] Other includes the Community Forest Trust, King County Pollution Control District, and other trust ownerships not in scope for this project.

Deloitte.

Source: WA STATE DNR

Chapter 10
Mining Resources Asset Class

Table of Contents

Executive Summary

The Mining Resources Asset Class consists of state trust lands with contracts for the extraction of minerals, sand, gravel, and rock or leases for the prospecting of new mining sources. The table below provides a brief summary of the Trust Value for the Mining Resources Asset Class based on the following extraordinary assumptions.

We assume that all lands with contracts and leases for mining uses adhere to proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper regulations and standards. For the purpose of this analysis, we assume that the ownership interest is non-transferable resulting in the land not being able to be sold. We relied upon information provided by the Trust Manager for all specific data regarding data files, contract and leasing activities, financials, and size and ownership information. We assume that the information provided is accurate and sufficient for the purpose of this valuation.

Importantly, the value appraised is the Trust Value, which is defined earlier in this report. This value type is applicable to all asset classes and subject to specific laws, regulations, and management policies that restrict the use, marketability, or sale of the asset classes.

Mining Resources Asset Class Executive Summary	**Surface & Subsurface Rights**	**Subsurface Rights Only**	**Total**
Contracts / Leases	39	2	**41**
Contracted / Leased Acres	5,684	185	**5,869**
Stabilized Gross Revenues	$1,896,000	$4,000	**$1,900,000**
Operating Cost 30% Deduct	($568,000)	($1,200)	**($570,000)**
Trust Net Operating Income	**$1,327,200**	**$2,800**	**$1,330,000**
Capitalization Rate	8.00%	8.00%	**8.00%**
Value Indication	**$16,600,000**	**$40,000**	**$16,640,000**
Concluded Trust Value (Rounded)	**$16,600,000**	**$40,000**	**$16,640,000**
Concluded Value per Contract / Lease	$425,641	$20,000	**$405,854**
Concluded Value per Acre	$2,921	$216	**$2,835**

Introduction

Leased and contracted sites in the Mining Resources Asset Class are largely situated within the northeast part of the state.

INTRODUCTION

In the portfolio of assets managed by the State of Washington Department of Natural Resources ("Trust Manager" or "Trust Management"), the Mining Resources Asset Class represents areas of state trust lands contracted for the extraction of minerals, rock, sand, gravel, hydrocarbons, and coal or under prospecting lease for potential new mining resources.

As of FY 2018, the Mining Resources Asset Class consisted of 5,869 total acres under lease or contract, the majority of which are located in the northeast part of the state. Spread across these locations are two types of sites with different rights under lease or contract:

- Sites with access to both surface and subsurface rights
- Sites with access to subsurface rights only

As of FY 2018, there are approximately 185 acres with contracts on lands with subsurface rights only and 5,684 acres with leases or agreement on lands with both surface and subsurface rights.

This asset class is limited to land not contained in other asset classes. The land in this asset class is only managed for its mining production or mining potential.

Note that the state retains nearly 800,000 acres of subsurface rights linked to surface lands not managed by the Trust Manager.

The Trust Manager offers several types of agreements in the Mining Resources Asset Class:

- Rock, sand, and gravel contracts
  - These are agreements for the removal of surface materials (rock, sand, and gravel)
  - Contracts for appraised value under $25k of material are "direct sales of valuable materials"
  - Contracts over appraised value of $25k are put up for public auction, and called "Agreement for the removal of rock, sand, and gravel"
  - These are high value contracts with smaller acreages
- Prospecting leases
  - These are leases that allow the lessee to evaluate the potential for subsurface materials that do not allow for commercial extraction of minerals, rock, sand, gravel, hydrocarbons, or coal, etc.
  - These are low value leases that can be for up to 640 acres for a total of no more than seven years
  - They generate little revenue for the amount of administrative oversights required but have the potential to yield valuable data and interpretation of mining resource potential.
  - These leases may also convert to mining contracts

Mining Resources

This asset class consists of areas leased and contracted for both surface and subsurface rights and areas leased for subsurface rights only. There are a variety of potential mining assets within the asset class, including sand, gravel, and rock; metallic and non-metallic minerals, rock direct sales, and mineral prospecting leases. In total, the Trust Manager has prospecting leases, contracts, or agreements on approximately 5,869 acres (3 percent of the lands with subsurface rights only).

- Mining contracts
  - These agreements are for the removal of subsurface materials not including rock, sand, gravel, hydrocarbons, or coal
  - These contracts provide a 5% royalty rate on the materials mined
  - Active mining is not required during the life of the contract. Contractor may also perform development work (exploration, testing, etc.) that would characterize the mining potential
- Oil & gas leases
  - These leases are for the extraction of subsurface oil, gas, and hydrocarbons
  - There are currently no leases of this type
- Coal option contracts
  - These leases are for the extraction of subsurface coal
  - There are currently no leases of this type

Typically, the Trust Manager considers contracts with companies with the mining experience and financial capability to fully explore and develop a property to production, which promotes strong financial returns for trust beneficiaries and supports the company's ability to follow relevant and environmental protection rules and regulations.[1]

There were 41 prospecting leases, contracts, and agreements associated with the Mining Resources Asset Class in FY 2018.

As a general note, all dollar amounts reported in this chapter are nominal and have not been adjusted for inflation. Additionally, note that all years referenced are fiscal years—not calendar years. The fiscal year for state trust lands begins on July 1 and ends on June 30.

Subgroups. For the purposes of this portfolio valuation analysis, the Mining Resources Asset Class has been divided into subgroups based on asset management criteria, asset valuation criteria, or the availability of asset data needed for analysis. We found the segregation of the Mining Resources Asset Class into these subgroups was appropriate given the overall scope of services.

The Mining Resources Asset Class is divided into two subgroups with the following definitions:

1. **Surface & Subsurface Rights**
   a. Trust lands leased or contracted for both surface and subsurface rights for a specified period of time. The Trust Manager had mining contracts, prospecting leases, removal agreements or direct sales on approximately 5,684 acres in FY 2018.
2. **Subsurface Rights Only**
   a. Trust lands only leased or contracted for subsurface rights for a specified period of time. Such contracts comprised a subsurface area of less than 185 acres in FY 2018.

Note that the state retains ownership to subsurface rights on approximately 793,046 additional acres in which the state doesn't have surface rights and that are not currently under lease or contract. The retention of subsurface rights is required by statute in the vast majority of land sales by the state and highly speculative as little or no specific information exists about the presence of subsurface minerals.

[1] https://www.dnr.wa.gov/programsservices/product-sales-and-leasing/mining-and-mineral-leases

Further, we acknowledge the possibility of a third subgroup wherein the Trust Manager enters into an agreement for the removal of aggregate on land whereon the State owns the surface rights but does not own the subsurface mineral rights. However, this potential third subgroup has not been included or further analyzed as the Trust Manager does not contain any such agreements as of the date of value.

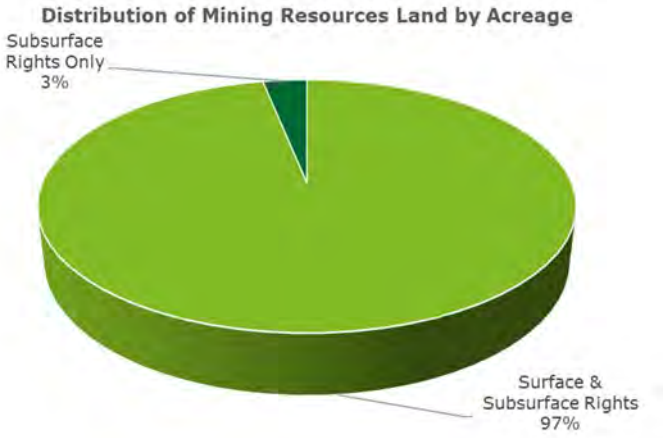
The segregation of agreements and the associated acreage by subgroup is presented in the following figures.

Mining Resources Subgroup Acreage

FIGURE 1

Mining Resources	Agreement Count	Acres
Surface & Subsurface Rights	39	5,684
Subsurface Rights Only	2	185
Totals	**41**	**5,869**

FIGURE 2



The vast majority of acreage in this asset class consists of lands leased or contracted for both surface and subsurface rights, although there are some acres leased for their subsurface rights only.

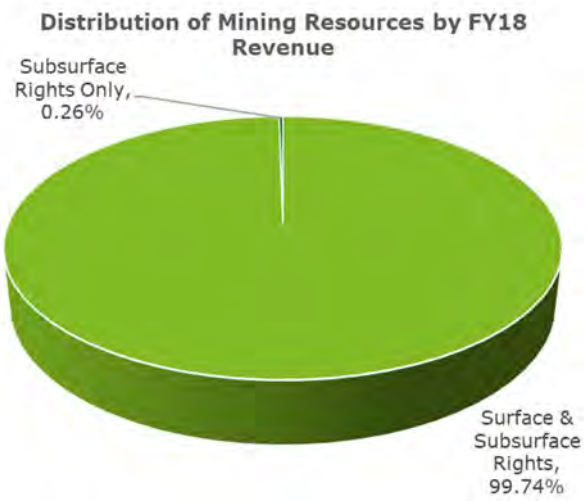
Contracts for subsurface rights only comprise 3 percent of the total acreage, and the revenue received from these contracts in FY 2018 is nominal as presented in the following charts. It is important to note that revenue from these contracts could change significantly if any one of the Trust Manager's mining contracts commences active mining. By statute though, a mining contractor can hold a contract for the 20-year duration of the contract and never mine, or the activity may be limited to exploration activity.

Mining Resources Subgroup Revenue

FIGURE 3

Mining Resources	Agreement Count	Gross Revenue (FY18)
Surface & Subsurface Rights	39	$1,556,000
Subsurface Rights Only	2	$4,000
Totals	**41**	**$1,560,000**

FIGURE 4



Several potential mining assets are included in the identified subgroups. As a whole, the mining assets allowed to be extracted under FY 2018 contracts and leases include:

1. Agreements for the sale of valuable materials with the appraised value over $25,000 such as sand, gravel, and rock
2. Mining contracts for metallic (e.g. gold, silver, zinc, copper) and non-metallic (e.g. silica, talc, clay, lime) minerals
3. Direct sales of rock, sand, and gravel for the appraised value of less than $25,000
4. Mineral prospecting leases a (no commercial extraction is allowed for commercial sale)

In FY 2007 there was a temporary surge in gross revenues. The State had a great many more prospecting leases and mining contracts than it does currently including exploratory searches for oil and gas resources. Since 2013, the state no longer has oil and gas leases because (a) little to no oil and gas resources were found and (b) the state's focus shifted to renewable energy.

The following table summarizes the contract/lease type and acre count associated with each commodity along with its FY 2018 gross revenue (rounded).

Mining Resources Commodity Summary by Subgroup

FIGURE 5

	Contracts / Leases	Acres	Gross Revenue (FY18)
Surface & Subsurface Rights			
Sand, Gravel, & Rock	11	833	$1,527,000
Minerals	5	749	$11,000
Rock Direct Sales	2	2	$12,000
Mineral Prospecting	21	4,100	$6,000
Subsurface Rights Only			
Minerals	2	185	$4,000
Combined Total	**41**	**5,869**	**$1,560,000**

For FY 2018, mineral prospecting leases comprised the highest lease count and acreage totals, but the majority of revenue was received for sand, gravel, and rock mining contracts and agreements. Mineral prospecting leases are not intended to be revenue-producing. They are intended to lead eventually to revenue production if exploration, data collection, and analysis reveal evidence of commercial mining resource potential, in which case the mineral prospecting lease has a preference right to request conversion to a mining contract (RCW 79.14.360).

Mining Resources Asset Class Ownership. The Trust Manager manages and operates state trust lands owned by the State of Washington for the benefit of designated trust beneficiaries. To be concise, this report uses the term "ownership" or "ownership interests" to describe the amount or percentage of gross revenue or land managed by the Trust Manager on behalf of specific trust

beneficiaries, even though the land is owned by the State of Washington and not the trust beneficiaries.

The Charitable, Educational, Penal, and Reformatory Institutions (CEP & RI) Transferred Trust has a minimal beneficiary interest in the lands of the Mining Resources Asset Class. However, in FY 2018, a single contract recorded approximately $1,266,000 in gross revenue, which is approximately 81 percent of the gross revenue for the entire asset class for that year.

The Common School and Indemnity Trust has the majority beneficiary interest in lands of this asset class. All other trusts not included in the following beneficiary interest composition charts have minimal or no ownership in the Mining Resources Asset Class.

Mining Resources Asset Class Ownership Composition

FIGURE 6

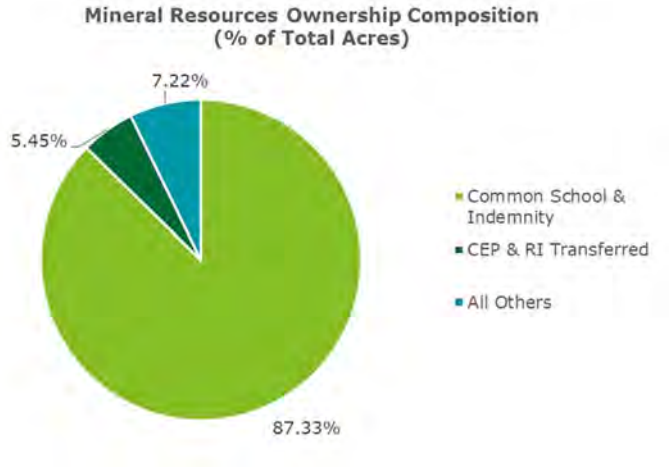
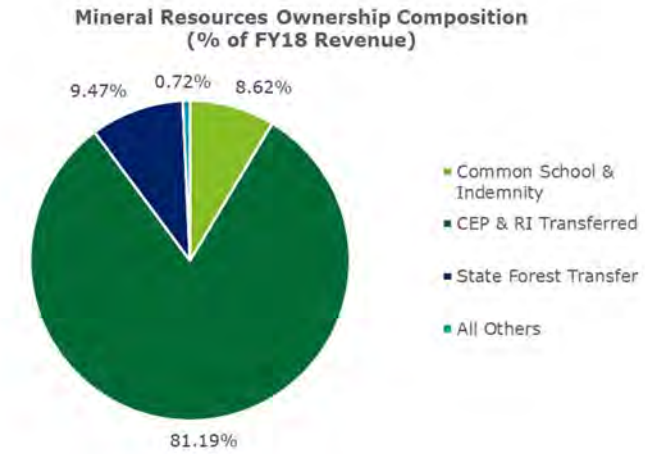


FIGURE 7



Physical Description

In FY 2018, the total acreage under agreement for the Mining Resources Asset Class was approximately 5,869 acres.

FIGURE 8

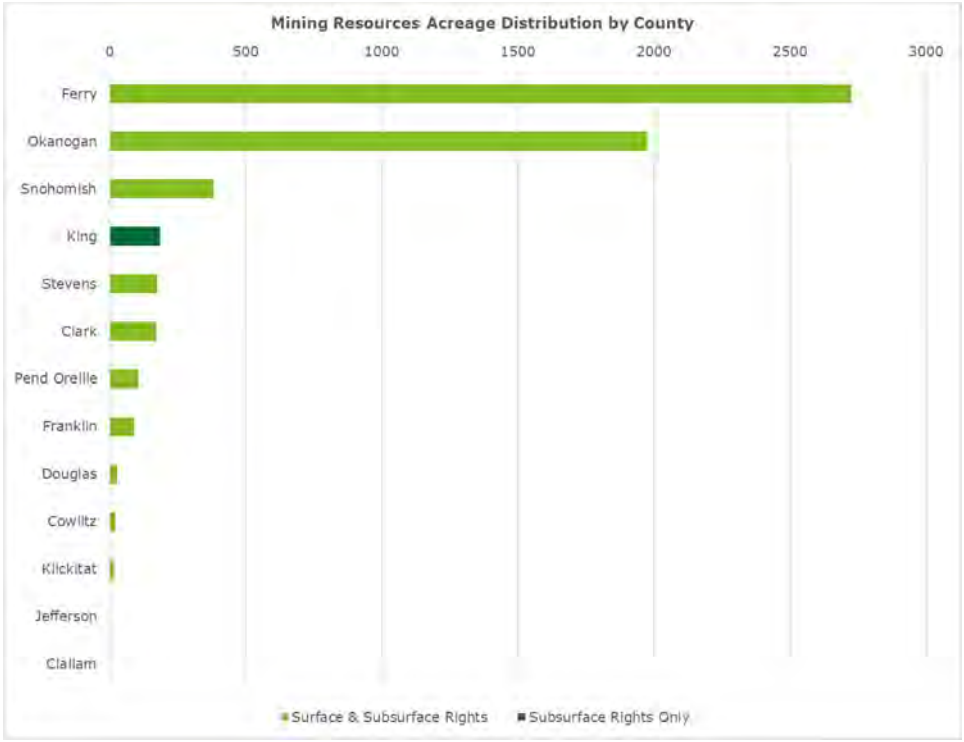


IMAGE SHOWS HIGH ROCK QUARRY IN WASHINGTON. SOURCE: WA STATE DEPARTMENT OF NATURAL RESOURCES

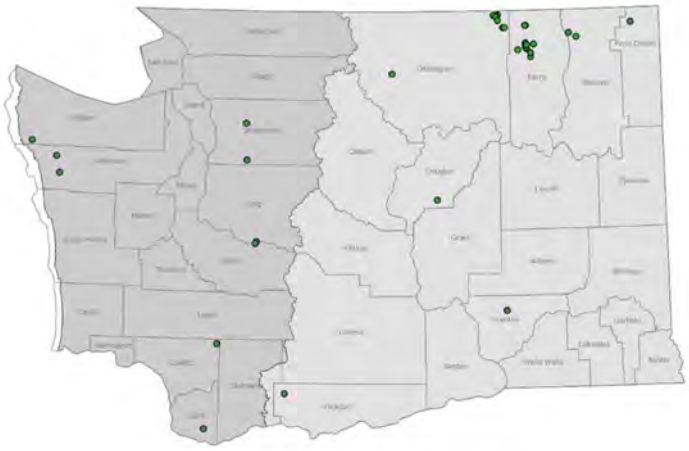
The majority of contracted and leased sites in the Mining Resources Asset Class are located in Ferry County and Okanogan County.

The following map highlights where sites in the Mining Resources Asset Class are located across the state.

The map is configured to represent general locations for sites in the Mining Asset Class for FY 2018 and is presented solely for illustrative purposes.

Mining Resources Asset Class Map of Contracted/Leased Areas

FIGURE 9



Surface and Subsurface Rights

In FY 2018, most of these were prospecting leases in the northeast portion of the state, with 12 leases in Ferry County and 14 leases in Okanogan County. Prospecting leases in the surface and subsurface rights subgroup ranged in size from 1 acre to 640 acres.

The majority of revenue was earned from 11 mining contracts comprising approximately 833 acres for sand, gravel, and rock commodities. Annual gross rent for these 11 mining contracts was approximately $1,527,000. Five additional contracts were for mining metallic and non-metallic minerals. The remaining revenue was from direct rock sales and mineral prospecting.

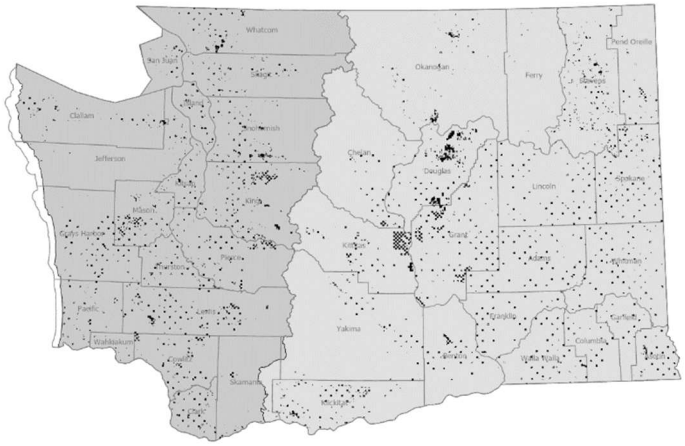
Subsurface Rights Only

There were two mining contracts in FY 2018 to access subsurface rights only. These contracts are both in King County and total 185 acres. Combined, the contracts generated gross rent of approximately $4,000 from mineral extraction (metallic and non-metallic) in FY 2018. Both contracts began in 2014 will continue until 2034.

The state retains ownership of subsurface mineral rights on approximately 793,231 acres that are not under lease or contract and not linked to surface lands managed by the Trust Manager. The following map presents trust lands with subsurface rights only

Subsurface Rights Only Map

FIGURE 10



Operational History

The Mining Resources Asset Class generally produces between $1 million and $2 million in gross annual revenue.

FIGURE 11

MINING RESOURCES ASSET CLASS REVENUE FROM 2007 TO 2018

For the scope of this project, we analyzed the operational history of each asset class. Operating information has been provided to the analysts for the past 12 fiscal years.

The chart below displays the total gross revenue[2] (before the operating cost percentage deduction) received from mining leases from 2007 to 2018. Revenue amounts were not adjusted for inflation and are presented in this report in nominal values, not real values.

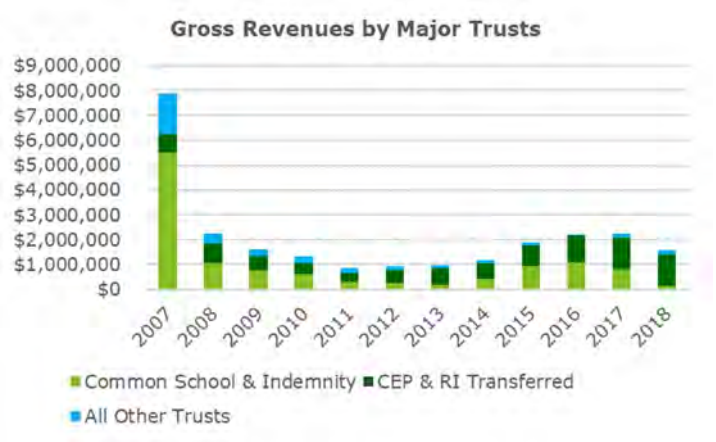
FIGURE 12

[2] Gross revenues exclude sub-sources 6, 3045, 4005, 5022, 5250, 6022, and 9088 as they are not included in reported operating cost percentage deduction totals.

Gross revenue significantly decreased between the 2007 and 2008 fiscal years. Per discussions with Trust Management, the change in revenue was due to a handful of reasons. Many leases initiated in 2006 and 2007 required the payment of large upfront bonuses which accounts for a large amount of revenue in 2007. Additionally, many of gas and oil prospecting leases were discontinued as little or no gas or oil was found. Since 2009, gross revenue for the Mining Resources Asset Class has fluctuated, but generally remained around $1 million to $2 million annually, with 2018 revenue near the average of the previous five years.

Gross Revenue by Trust Ownership. The Common School and Indemnity Trust and the CEP & RI Transferred Trust have the largest beneficiary interests in the land and revenue received in the Mining Resources Asset Class respectively. We broke out gross revenue by trust ownership in the following chart.

FIGURE 13



Between 2007 and 2018, the majority percentage of gross revenue received shifted from the Common School and Indemnity Trust to the CEP & RI Trust.

OPERATING COST PERCENTAGE DEDUCTION

As gross proceeds are received, an operating cost percentage deduction is applied and paid to the Trust Manager. From the trust beneficiary ownership position, there are no outflows of funds in operating and maintaining the asset class; the Trust Manager budgets for the actual costs and capital expenditures and pays these costs directly from the operating cost percentage deduction received during the year.

The operating cost percentage deduction is legislatively set and typically ranges between 25 percent and 31 percent of total gross revenue, depending on the management account associated with each trust ownership of the land leased. Historical data reported in this analysis reflects actual blended rates deducted. We have used an estimated assumption of 30 percent for the operating cost percentage deduction of this asset class which has been applied in the direct capitalization method.

Operating Cost Percentage Deduction versus Direct Operating Expenses. The operating cost percentage deduction is different than actual operating expenses and capital expenditures incurred to operate and manage the Mining Resources Asset Class assets.

When the total operating cost percentage deduction for all asset classes exceeds actual operating costs and capital expenditures for the year, the excess is held in reserve for future years when the operating cost percentage deduction does not cover actual costs. The reserve balances are reported by fund and held in separate accounts—the Resource Management Cost Account, the Forest Development Account and the Agriculture College Trust Management Account.

The Resource Management Cost Account in the state treasury is created and used solely for the purpose of defraying the costs and expenses incurred by the Trust Manager in managing and administering state trust lands, state-owned aquatic lands, and the making and administering of leases, sales, contracts, licenses, permits, easements, and rights-of-way as authorized.

The Forest Development Account was created in the state treasury (RCW 79.64.100). Money placed in this account is first used for paying interest and principals on specific bonds issued by the Trust Manager. Appropriations made by the legislature from the Forest Development Account to the Trust Manager are for carrying out forest management activities on state forestlands and for reimbursements of expenditures from the Resource Management Cost Account in the management of state forestlands.

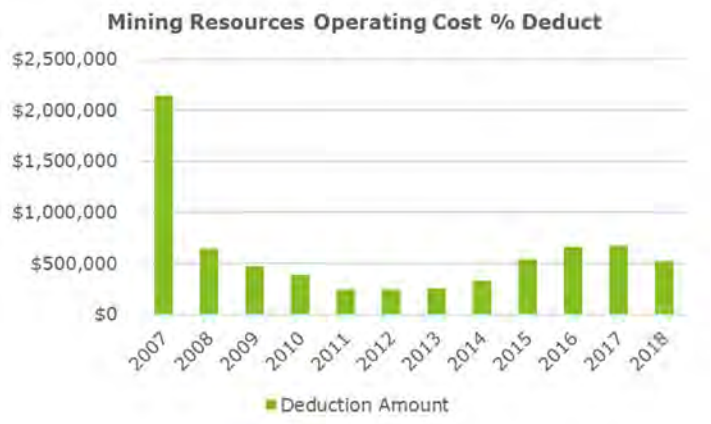
The third account is the Agriculture College Trust Management Account. This account does not retain an operating cost percentage deduction, but the Trust Manager receives a direct appropriation from the legislature to conduct management work. The Trust Beneficiary retains all gross revenue.

The reserve balances for all asset classes as of June 30, 2018 were approximately $12.6 million (Resource Management Cost Account) and nearly $4 million (Forest Development Account). Over the last 10 years, the Resource Management Cost Account reserves reached a high of more than $17 million at the end of FY 2014 and a low of $800,000 at the end of FY 2009. The Forest Development Account reserves reached a high of $24 million at the end of FY 2011 and a low of just under $4 million at the end of 2018.

However, note that these are snapshots as of the end of fiscal years. In reality, fund balances constantly change across a much wider range throughout each year. On a few occasions, reserves have dipped down to only a couple weeks of operating expenses.

The following chart presents the dollar amounts of the historical operating cost percentage deduction from 2007 to 2018 for the Mining Resources Asset Class. The operating cost percentage deduction is proportionate to the gross revenue produced by the asset class each year—it rises and falls along with trust earnings and may not reflect increases or decreases in the Trust Manager's actual costs. These dollar amounts include both portions of revenue distributed to the Trust Manager from mining contracts and leases and incidental revenue from trespassing fines, non-federal conservation programs, Initial Incident Report (IIR) restitutions, power charges, and other assessments.

FIGURE 14



ACTUAL COSTS

The following is a discussion of the actual costs incurred by trust beneficiaries and paid by the Trust Manager from funds received as a result of the operating cost percentage deduction.

The following chart highlights the historical actual costs incurred by the Trust Manager, which are split between direct and indirect expenses. The Trust Manager's accounting system does not record costs at the subgroup level.

FIGURE 15

Direct Expenses. Direct expenses include all costs directly related to managing lands in the Mining Resources Asset Class as well as allocations of general costs.

Currently, direct expenses include all costs directly related to managing lands, including:

- Resource and leasing management
- Project, sales, and planning management

The allocations of general costs are related to:

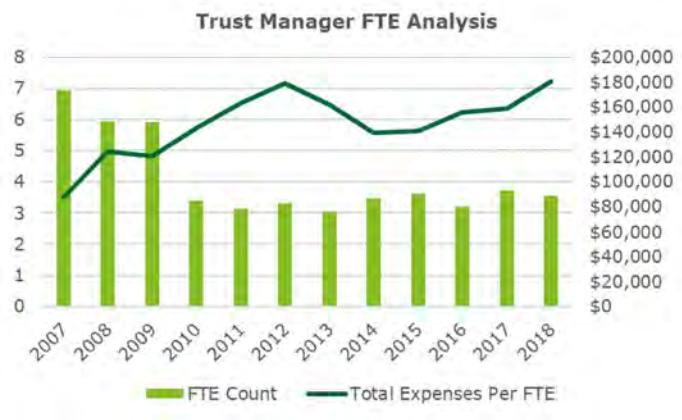
- Uplands
  - Examples include environmental analysis, state lands training, and law enforcement
- Engineering and general services
  - Examples include resource mapping, surveying, and record keeping

Indirect Expenses. Indirect expenses include all overhead costs allocated to the Trust Manager for:

- Administrative and agency support
- Adjustments
- Legal services
- Strategic investments
- Other administrative payments

As seen in the following full-time employee analysis, the Trust Manager typically retained between three and four full-time employees for the Mining Resources Asset Class over the last four fiscal years. The total actual costs paid by the Trust Manager have risen from $140,000 per full-time employee to $180,000 per full-time employee over that same period. These costs include all direct and indirect expenses, including salaries, as well as benefits and overhead.

FIGURE 16



NET CASH FLOW 2014 TO 2018

The trust beneficiaries pay a portion of the gross revenue (i.e., operating cost percentage deduction) to the Trust Manager for operating expenses and capital expenditures. These costs include direct and indirect expenses. The cash flows net of the operating cost percentage deduction are then distributed to the appropriate funds by ownership.

The following table summarizes the net cash flows distributed to trust beneficiaries over the past five fiscal years for this asset class. These operating cost percentage deduction amounts include both portions of revenue distributed to the Trust Manager from mining contracts and leases and incidental revenue from trespassing fines, non-federal conservation programs, IIR restitutions, power charges, and other assessments. These cash flows indicate the Mining Resources Asset Class provides trust beneficiaries with approximately $1,000,000 in net cash flows per year.

FIGURE 17

	2014	2015	2016	2017	2018
Total Annual Gross Revenue	**$1,161,423**	**$1,897,737**	**$2,207,403**	**$2,233,716**	**$1,561,113**
Operating Cost % Deduct	($326,413)	($538,345)	($660,466)	($674,489)	($520,076)
% of Revenue	28.10%	28.37%	29.92%	30.20%	33.31%
Revenue Distributed to Trusts	**$835,010**	**$1,359,392**	**$1,546,938**	**$1,559,228**	**$1,041,037**
% of Revenue	**71.90%**	**71.63%**	**70.08%**	**69.80%**	**66.69%**

Property Taxes and Zoning

The State of Washington is exempt from paying direct real property taxes.

PROPERTY TAXES

Property taxes are a local government's main source of revenue. Most localities tax private homes, land, and business property based on the property's value.

Lands owned by the state are exempt from property tax obligations under the state constitution. However, because private lessees of state land receive the benefit of governmental services, the legislature imposes a leasehold excise tax on these private lessees under RCW 82.29A.

Leasehold excise tax is paid by the lessee to the Trust Manager when rent is paid, and the Trust Manager remits the payment to the Department of Revenue. Land that is not leased does not pay property taxes or leasehold excise tax. Generally, the leasehold excise tax on leased land is most often less than what property taxes would be for the same land.

ZONING

We assume that all leased sites in the Mining Resources Asset Class adhere to the proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper zoning regulations and development standards.

Market Analysis

Mining in the United States has decreased in revenue over the past five years.

MARKET OVERVIEW

Industry Sector Performance (National Overview)

The entire market analysis section is based on information and data sourced from IBISWorld, a trusted industry research firm. The industry sector discussed in the market overview is a national overview in the United States that includes the state of Washington. The relevant industry sector is the mining industry.

In a broad sense, IBISWorld defines the mining industry sector as the extraction of minerals occurring naturally; solids, such as coal and ores; liquids, such as crude petroleum; and gases such as natural gas. The mining industry sector is defined by IBISWorld to also include quarrying, well operations, milling, and other preparations that occur at the mine site or as part of mining activity. Additionally, the exploration and development of land for mineral mining is included in this industry sector. Note that the current portfolio of the Mining Resources Asset Class does not as of the date of value include certain elements that comprise the mining industry sector as defined by IBISWorld.

The majority of sector revenue (81 percent) is generated by the subindustries of oil and gas extraction and oil and gas field services, and industry performance is closely tied to the oil and gas market. The world price of crude oil and natural gas have both fallen drastically over the past five years. As such, the mining industry has performed poorly over the past five years.

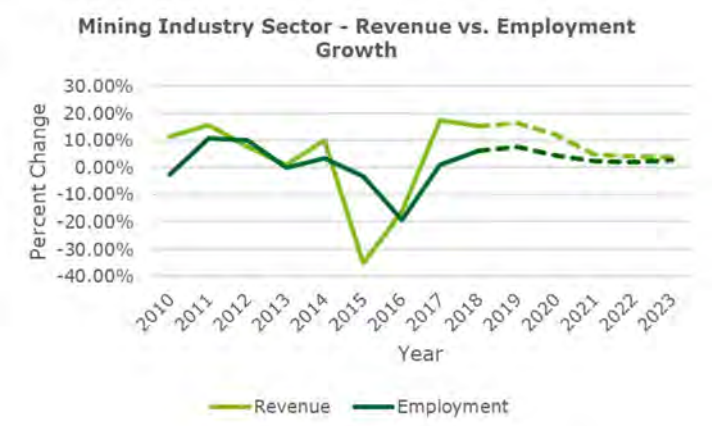
Further, coal prices have crashed over the past five years along with the price of steel, which is found downstream in the market. Metallic mining also experienced a reduction in demand and subsequently price.

While most subindustries have declined in revenue over the past five years, one segment has increased. The demand for aggregate (e.g., rock, gravel, and sand) has increased, resulting in increased revenue for this subindustry over the past five years.

As a whole, the mining industry sector reported revenue of $488 billion across 120,000 businesses nationwide in 2018.

The following chart displays historical and projected revenue and employment growth in this industry sector between 2010 and 2023.

FIGURE 18



In 2015, sector revenue dropped significantly due to decreases in oil and gas prices, but the sector began recovering in 2017. Between 2013 and 2018, sector revenue decreased by a compound average annual rate of -4.08 percent largely due to the performance of the oil and gas market.

World prices for crude oil and natural gas are expected to rise along with demand for non-metallic mining. As such, total nationwide industry revenue is anticipated to grow at an annual rate of 8.1 percent over the next five years to 2023.[3]

[3] All data sourced from "Mining Industry in the US – Market Research Report," IBISWorld, June 2018.

Methodology

The valuation methodology selected is the income approach.

Methodology

The income approach was the basis for the valuation of this asset class as it currently produces annual income through lease agreements and the receipt of future cash flows is expected to continue. The Trust Manager's data files were the principal source of market and value information (i.e., annual gross lease revenue, direct and indirect expenses, and other financial information) and include lease activity obtained in the ordinary course of the management of assets.

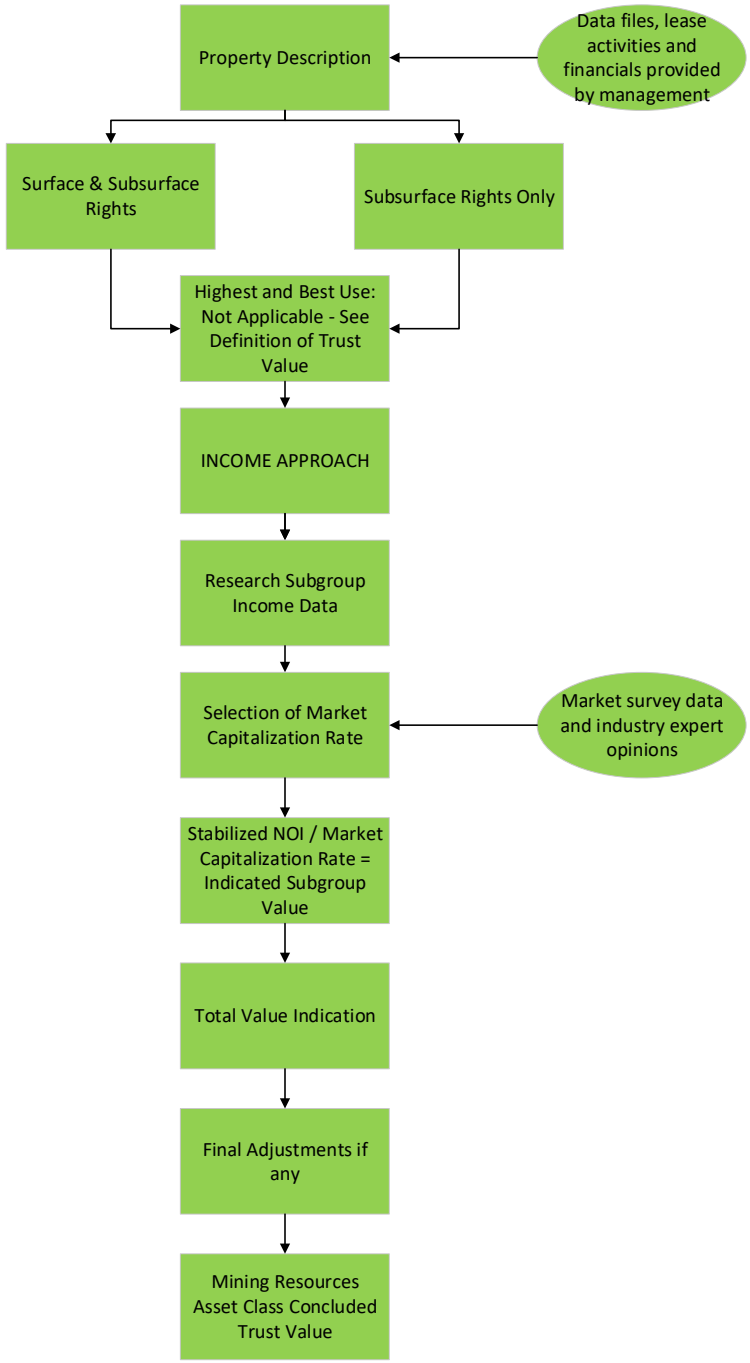
Due to the nature of the cash flow stream this asset class produces through its negotiated leases, the income approach was utilized as the primary methodology approach. Adequate amounts of market data existed to use the income approach.

The flowchart that follows displays the steps taken in the valuation analysis for the Mining Resources Asset Class.

IMAGE SHOWS A SITE WHERE SAND, GRAVEL AND ROCK IS HARVESTED IN CLARK COUNTY IN WASHINGTON. SOURCE: WA STATE DEPARTMENT OF NATURAL RESOURCES

Mining Resources Asset Class Valuation Flowchart

FIGURE 19



Trust Value Analysis

We evaluated the Trust Value of the Mining Resources Asset Class by using the approach described below:

Income Approach

The income approach involves a set of procedures through which an appraiser derives a value indication for an income-producing property by converting its anticipated benefits into property value using one of the following methods:

- *Discounted Cash Flow Method*: The annual cash flows for the holding period and the reversion are discounted at a specified yield rate. The discounted cash flow method was not used in this analysis.
- *Direct Capitalization Method*: One year's income expectancy is capitalized at a capitalization rate that reflects a specified income pattern, return on investment, and change in the value of the investment. The direct capitalization method was used in this analysis.

An overall capitalization rate is defined as a ratio of one year's net operating income provided by an asset to the value of the asset and is used to convert income into value when using the income capitalization approach.[4] Further discussion regarding this rate can be found in the earlier chapter that focuses on rates of return.

As no two mining rights are identical, it is often difficult to estimate the value of the mining rights through the sales comparison approach. Other factors that may affect an estimate include current and surrounding production and declining production curve and royalty rates. As such, the sales comparison approach was not utilized in our valuation analysis.

For additional state trust lands with subsurface rights only that are currently not leased, little or no specific information about the presence of valuable materials is known. Given the highly speculative nature of the value of these mining rights, this analysis assumes that there are no revenues associated with these additional lands in a stabilized year's cash flow. As such, no value has been attributed to the additional 793,046 acres of unleased lands with subsurface rights only.

Extraordinary Assumptions

Note that the state generally owns the subsurface rights under the lands in the other asset classes (e.g., Forest Resources, Agricultural Resources). The value, if any, of mining rights in other asset classes is captured in the Trust Value estimates for those asset classes based on the corresponding stabilized income estimate. The mining resources rights included in this asset class lie outside the other classes reviewed.

[4] Definition sourced from the *Sixth Edition of the Dictionary of Real Estate Appraisal*.

We assume that all lands containing leases or contracts for mining uses adhere to the proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper regulations and development standards.

As previously discussed in the chapter regarding restrictions and burdens, the Trust Manager's ability to sell, exchange, or transfer state trust lands is limited by statute. For the purpose of this analysis, we assume that the ownership interest is non-transferable resulting in the land not being able to be sold.

We relied upon information provided by the Trust Manager for all specific data regarding data files, leasing activities and financials, and size and ownership information. We assume that all information provided by the Trust Manager is sufficient for the purpose of this valuation.

Hypothetical Conditions

None noted.

Income Approach

The direct capitalization method was used to estimate the Trust Value of the Mining Resources Asset Class.

For the purposes of the portfolio valuation analysis in this report, the Mining Resources Asset Class has been divided into two subgroups:

- Surface and Subsurface Rights
- Subsurface Rights Only

ESTIMATED NET CASH FLOW

As highlighted in the "Operational History" section of this chapter, total gross revenue received from lease payments for the Mining Resources Asset Class typically total between $1 million to $2 million per year. We estimated stabilized streams of revenue for the asset class based on analyzing historical averages and trends while acknowledging volatility and potential growth where applicable.

We segregated a stabilized gross revenue estimate of $1.9 million to each subgroup. Given there are only two leases in the subsurface rights only subgroup, we allocated similar revenue received during FY 2018 ($4,000) to that subgroup. The remaining portion of the estimate ($1,896,000) was allocated to the surface and subsurface rights subgroup.

We also estimated an expected stabilized operating cost percentage deduction of 30 percent based on historical deductions averaging near this blended rate. The following table summarizes the estimated income stream for each subgroup.

FIGURE 20

Mining Resources Asset Class - Stabilized Income Summary			
	Surface & Subsurface Rights	Subsurface Rights Only	**Total**
Stabilized Gross Revenues	$1,896,000	$4,000	**$1,900,000**
Operating Cost % Deduction	($568,800)	($1,200)	**($570,000)**
% of Revenues	30%	30%	**30%**
Trust Net Operating Income	$1,327,200	$2,800	**$1,330,000**

CAPITALIZATION RATE SELECTION

An overall rate of 8 percent has been selected to apply to the net cash flows for both the surface and subsurface rights and the subsurface rights only subgroups. For further discussion regarding the determination of this capitalization rate, please refer to the earlier chapter that discusses rates of return.

DIRECT CAPITALIZATION

The overall capitalization rate was applied to the relevant stabilized revenue stream estimates for each subgroup to derive a preliminary Trust Value indication for this asset class. The direct capitalization calculations are presented for each subgroup.

Note that the FY 2018 agreement count represents the number of different leases and contracts associated with each subgroup type, and the FY 2018 acreage count for each subgroup is an approximate estimate based on data provided by Trust Management.

Surface and Subsurface Rights. The total value indication for agreements with both surface and subsurface rights was $16,600,000 (rounded) for FY 2018, which equates to an average of approximately $2,900 per acre. The capitalization calculation for the surface and subsurface rights subgroup is shown in the following table:

FIGURE 21

Direct Capitalization - Surface & Subsurface Rights		
Agreement Count		39
Acres under Agreement		5,684
Stabilized Gross Revenues		$1,896,000
Operating Cost % Deduction	30%	($568,800)
Revenue Distributed to Trusts		$1,327,200
Capitalization Rate		8.00%
Indicated Value		$16,590,000
Value Indication (Rounded)		**$16,600,000**
Value Indication per Acre		**$2,921**

Subsurface Rights Only. The total value indication for agreements with subsurface rights only was $40,000 (rounded) for FY 2018, which equates to an average of approximately $216 per acre. The capitalization calculation for the subsurface rights only subgroup is shown in the following table:

FIGURE 22

Direct Capitalization - Subsurface Rights Only		
Agreement Count		2
Acres under Agreement		185
Stabilized Gross Revenues		$4,000
Operating Cost % Deduction	30%	($1,200)
Revenue Distributed to Trusts		$2,800
Capitalization Rate		8.00%
Indicated Value		$35,000
Value Indication (Rounded)		**$40,000**
Value Indication per Acre		**$216**

ADDITIONAL SUBSURFACE RIGHTS OWNED

The state retains ownership of subsurface rights on approximately 793,231 acres of state trust lands where surface rights have been transferred to other parties. Currently, only 185 acres of state trust lands with subsurface rights, but no surface rights, are leased for the extraction of materials.

Given the highly speculative nature of the value of these mining rights as little or no specific information about the presence of valuable materials is known, this analysis assumes that there are no revenues associated with these additional lands in a stabilized year's cash flow. As such, no value has been attributed to the additional 793,046 acres of unleased lands with subsurface rights only.

Value Conclusion

The concluded Trust Value of the Mining Resources Asset Class is $16,640,000.

MINING RESOURCES ASSET CLASS VALUE CONCLUSION

Using the direct capitalization approach, the indicated values for each subgroup—the surface and subsurface rights subgroup and the subsurface rights only subgroup—were combined to represent the total value indication for the Mining Resources Asset Class.

This results in a concluded Trust Value of $16,640,000 for the asset class.

FIGURE 23

Mining Resources Asset Class Value Conclusion	
Agreement Count	41
Total Acres under Agreement	5,869
Additional Acres Owned with Subsurface Rights Only	793,046
Surface & Subsurface Rights	$16,600,000
Subsurface Rights Only	$40,000
Rounded Value Indication (Lands with Agreements)	**$16,640,000**
Indicated Value per Agreement	$405,854
Indicated Value per Acre	$2,835
Additional Lands with Subsurface Rights Only	$0
Rounded Value Indication (Additional Lands - No Agreements)	**$0**
Concluded Trust Value (Rounded)	**$16,640,000**

INDIVIDUAL TRUST VALUES SUMMARY

The concluded Trust Value for state trust lands in the Mining Resources Asset Class was calculated for each trust. Specifically, the concluded Trust Value was allocated based on each individual trust's percentage of gross revenue for the asset class in FY 2018. The following table reflects the concluded value for each trust.

FIGURE 24

Mining Resources Asset Class Individual Trust Values		
Trust	**Trust Value**	**%**
CEP & RI Transferred	**$13,510,515**	**81.19%**
State Forest Transfer	**$1,575,309**	**9.47%**
Common School and Indemnity	**$1,433,869**	**8.62%**
Capitol Grant	**$96,346**	**0.58%**
Agricultural School	**$23,962**	**0.14%**
Total	**$16,640,000**	**100%**

Deloitte.

Source: WA STATE DNR

Chapter 11

Other Resources Asset Class

Table of Contents

Executive Summary

The Other Resources Asset Class consists of state trust lands used for specialty leasing to generate green energy, as well as other miscellaneous revenue sources. Although we recognize solar and other green energy initiatives are being pursued, this analysis will primarily focus on wind energy. Other revenue streams include leases for special forest products; right-of-way access; and leases for special uses such as archery clubs, underground storage, and golf course related usage. The table below provides a brief summary of the Other Resources Asset Class and a conclusion on the Trust Values for each subgroup based on the following extraordinary assumptions.

We assume that all state trust lands containing leases for wind energy and other miscellaneous uses adhere to the proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper regulations and standards. As detailed in the introductory chapter, we assume that the ownership interest is non-transferable resulting in the land not being able to be sold. We relied upon information provided by the Trust Manager for all specific data regarding data files, leasing activities and financials, and size and ownership information. We assume the accuracy of all information provided is sufficient for purposes of this valuation.

Importantly, the value appraised is the Trust Value, which is defined earlier in this report. This value type is applicable to all asset classes and subject to specific laws, regulations, or management policies that restrict the use, marketability, or sale of these asset classes.

Other Resources Asset Class Executive Summary

	Wind Energy	Special Forest Products	Rights of Way	Special Uses	Total
Total Contracts [1]	20	50	106	182	**358**
Total Acres [2]	15,109	394,925	83,531	36,637	**530,202**
Stabilized Gross Revenue	$1,200,000	$550,000	$650,000	$800,000	$3,200,000
Operating Cost 30% Deduct	($360,000)	($165,000)	($195,000)	($240,000)	**($960,000)**
Trust Net Operating Income	$840,000	$385,000	$455,000	$560,000	**$2,240,000**
Capitalization Rate	11.00%	11.00%	11.00%	11.00%	**11.00%**
Value Indication (Rounded)	**$7,600,000**	**$3,500,000**	**$4,100,000**	**$5,100,000**	**$20,300,000**
Concluded Trust Value	**$7,600,000**	**$3,500,000**	**$4,100,000**	**$5,100,000**	**$20,300,000**
Value per Acre	**$503**	**$8.86**	**$49.08**	**$139.20**	**N/A [3]**
Value per Contract [4]	**$380,000**	**$70,000**	**$38,679**	**$28,022**	**N/A [3]**

[1] Special Forest Products and ROW contract units represent the number of FY18 contracts with revenues reported for the subgroup type.
[2] Special Forest Products and ROW acreages represent the number of acres associated with the revenues received in FY18. These lands are mostly non-exclusive.
[3] Not applicable as it would be inappropriate to measure the Trust Value on a combined per-lease or per-acre basis given the incongruent nature of the miscellaneous subgroups of this asset class.
[4] Value per contract amount does not accurately reflect the value per agreement type as contracts can represent different numbers and types of agreements.

Introduction

The Other Resources Asset Class combines revenues received from wind energy, special forest products, rights of way and other special uses for state trust lands.

INTODUCTION

The Other Resources Asset Class consists of state trust lands used for specialty leasing to generate green energy, as well as other miscellaneous revenue streams.

Specifically, the asset class includes the following types of revenue generators or subgroups: (1) agreements for green energy, particularly wind energy; (2) agreements for special forest products; (3) agreements for rights of way; and (4) agreements for special uses. Each of these revenue generators produce income for trust beneficiaries.

An agreement refers to any type of negotiation made between the Washington State Department of Natural resources (the "Trust Manager" or "Trust Management") and a prospective party interested in using/accessing the state lands under agreement. The term "lease" and "contract" have been generally used interchangeably and synonymous with "agreement" in previous chapters. However, due to the complexity of the types of agreements associated with the subgroups in this asset class, it is necessary to define each agreement type.

Agreement Types. There are multiple agreement types that are utilized for the different subgroups of this asset class. For the purposes of this chapter alone, the agreement types have been defined as follows.

Lease: An agreement between one party and the Trust Manager that grants a real property interest in a parcel of land, travels with the land for the term of the agreement, and guarantees exclusive use for the stated permitted use. Note that this does not guarantee exclusive use against lessees in other categories if the contract specifies that the Trust Manager can lease the land for other compatible purposes. For instance, a lease for a wind farm and a separate lease for a cattle grazing operation may spatially overlap although two wind leases could not overlap.

Easement: An agreement between one party and the Trust Manager to cross the property for a specific purpose. This is most commonly for access to adjacent parcels, railroads, and utility corridors. These agreements have the following properties: they stack on each other spatially so long as a subsequent use does not reasonably interfere with a prior use (e.g., different agreement holders will each have their own agreement, but the land is not exclusive to the holders), are almost impossible to revoke, and travel with the land when it is sold. Essentially, they are permanent encumbrances.

Permits: An agreement that is non-transferrable, revocable, and exists for a set period of time. In these ways they are like leases but are not an interest in real property. However, unlike leases, permits can "stack" spatially for the same uses and therefore guarantee no exclusivity whatsoever; neither against other permit holders nor against other compatible uses. Common sub-categories of permits are road-use permits, brush-picking permits, and land-use licenses for activities such as wildlife research.

Direct Sale: A one-time sale of material for a negotiated price.

Below is a list of the agreement types that are associated with each subgroup.

- Wind Energy:
  - Leases
- Special Forest Products:
  - Leases—use of an area by lessee for the harvesting of Special Forest Products for a set period of time
  - Individual permits—areas that are not under leases or direct sale contract that allow non-exclusive harvesting for permit purchasers
  - Direct sales—sales of material
- Rights of Way:
  - Easements—rights to use the lands but not exclusively, though others may not unreasonably interfere with easement holder's use. Often used for utilities, roads, residential access, etc. These can be considered permanent encumbrances as they accompany the land when sold.
  - Permits—permission to enter the land. These are not exclusive uses of the land and there is no guarantee the use will not be interfered with. These are most often used with short-term temporary access such as a road-use permit.
- Special Uses:
  - Leases—these cover authorized special uses of state trust lands that are not covered by the other asset classes (i.e., Agriculture, Grazing, Commercial Real Estate, etc.)
  - Permit/Licenses—used for shorter term or intermittent requests (e.g., land use license). These may be used for recreational uses or research licenses with the Department of Agriculture or Department of Ecology. There may not be a fee associated with the land use license depending on the nature of the use.

It is important to note that the term "exclusive" as used in this chapter refers to the land referenced in an agreement. Non-exclusive land can be accessed by multiple parties for the same use or separate uses. For example, some special forest products land can be accessed by multiple parties for the same use of gathering special forest products. Some land under wind energy leases are non-exclusive as the land overlaps with a separate grazing use.

As per the Trust Manager, there are approximately 530,202 acres of state trust lands associated with this asset class as of FY 2018. Some of the land is exclusive (mostly land in the special uses subgroup), but most of the land is non-exclusive and can be accessed by multiple holders of different agreements such as permitted lands in the special forest products subgroup and most lands associated with right-of-way access and wind energy.

Other Resources

Approximately 530,000 acres of state trust lands are under specialty lease for different purposes. This asset class consists of various agreement types for green energy and other miscellaneous revenue. Green energy includes leases for wind energy. Miscellaneous agreements include special forest products, right of way access, and leases for special uses such as archery clubs, underground storage, and golf course related usage.

To produce green energy, certain parts of state trust lands located in areas with significant wind power potential are leased to wind energy companies. The typical term for wind energy leases is between 30 to 40 years.

Historically, the Trust Manager had sought after opportunities for biomass, geothermal, and oil and gas energy harvesting. However, these programs are ultimately absent as of the date of value for this analysis.

The Trust Manager is interested in pursuing solar power generation on state trust lands, but as of the date of value for this analysis, there were currently no solar installations on state trust lands. However, conversations with the Trust Manager suggest solar energy will be a large focus in coming years. The Trust Manager is in the process of identifying lands with high solar energy capacity and potential lessees.

In FY 2018, approximately 358 contracts included revenues reported for wind energy, special forest products, rights of way, and any other types of special use.

The Other Resources Asset Class in total typically generates around $3 million combined in gross revenue every year for trust beneficiaries.

As a general note, all dollar amounts reported in this chapter are nominal and have not been adjusted for inflation. Additionally, we note that all years referenced are fiscal years—not calendar years. The fiscal year for state trust lands begins on July 1 and ends on June 30.

Subgroups. For the purposes of this portfolio valuation analysis, the Other Resources Asset Class has been divided into four subgroups. The subgroups are based on either asset management criteria, asset valuation criteria, or the availability of asset data needed for analysis. We found the segregation of the Other Resources Asset Class into relevant subgroups to be appropriate given the overall scope of services.

The four subgroups in the Other Resources Asset Class are as follows:

1. **Wind Energy**
    a. Revenue received from state trust lands that are leased for a set period of time for wind energy projects.
    b. State trust lands that are leased for wind energy are exclusive to the lessee, except where it is compatible with other uses such as grazing or agricultural use.
2. **Special Forest Products**
    a. Miscellaneous revenue earned from leases, direct sales, and permits for good-quality forest products collected from state trust lands by parties who intend to merchandise the products.
    b. Special forest products include leases and annual permits that give holders of agreements access to state trust lands on the west side of the Cascade mountain range that are located in areas managed for timber. Leased lands are exclusive to the lessee where others cannot access the lands for the specific use to gather special forest products. Lands under permits are not exclusive to any one party and can be accessed by multiple users at the same time.

c. Examples of special forest products include salal, evergreen huckleberry, fern (floral greens), boughs, mushrooms, firewood, tailhold anchors, etc.

3. Rights of Way

a. Miscellaneous revenue earned from easements and permits negotiated to obtain access to portions of state trust lands.
b. The majority of right-of-way lands are located within areas managed for timber. Right-of-way lands can be exclusive or not, depending on the usage. Road easements are non-exclusive and can provide access to the same land for multiple users. Other uses such as utility easements[1] are more exclusive by nature and can include land being used exclusively by the easement holder.

4. Special Uses

a. Miscellaneous revenue earned from fees paid for all other special uses of state trust lands. The most lucrative special use agreements in FY 2018 include uses such as wineries, recreational facilities, a prison, a forest ranger office, and school facilities.
b. Most lands for special uses are exclusive to the applicable holder of the agreement.
c. Other examples of special uses include correctional facilities, underground storage, an archery club, home sites, apiaries, and golf course related usage. Some correctional facilities do not pay rent due to an executive order as these are Charitable, Educational, Penal and Reformatory Institutions Trust lands with trust beneficiaries as lessees.

Contract Counts and Acreages. It was challenging to determine the number of agreements and acres for this asset class due to certain subgroups including hundreds to thousands of different agreements granting multiple parties non-exclusive access to large amounts of overlapping state trust lands. As such, we have decided for reasons of simplicity to report the contract counts for each subgroup in this chapter. Contracts are required to be used by the Trust Manager to make agreements valid and legally enforceable. Contracts are assigned a designated number and may represent only one agreement or multiple agreements. Contracts may or may not have revenue reported in a given fiscal year depending on the payment schedule negotiated for the agreement(s). In fiscal year 2018, there were reportedly 358 contracts associated with the Other Resources Asset Class. The following is a description of how the number of contracts was determined for each subgroup.

Wind energy agreements are independent leases that do not report revenues for other uses outside of wind energy. The only revenue reported on a wind energy lease will be associated with a wind energy use. There were 20 wind energy leases in FY 2018. Each lease is represented by a different contract. As such, there are 20 contracts for the wind energy subgroup.

[1] We note that there are other easements that are statutorily mandated to be granted that may or not generate revenue.

Special uses agreements include leases and permits or licenses. In FY 2018 there were 182 active contracts representing the different leases and permits negotiated for special uses. While only 173 of these contracts reported revenues in FY 2018, we are including all 182 contracts as the total more closely aligns with the acreage totaled for this subgroup.

The contracts for special uses and rights of way do not always include independent uses as revenue can be received for multiple uses across different asset classes. For example, the same contract could include miscellaneous revenue earned for a home site that is positioned on a larger piece of agricultural land that is leased for the purpose of growing an orchard. The entire land area is represented in one contract even though different revenue streams are received for the orchard use and the special use for the home site.

The Special Forest Products subgroup includes hundreds of agreements consisting of leases, permits and direct sales. The individual permits negotiated for special forest products are commonly bundled up into a single contract number. For example, one special forest products contract number with reported revenue may actually include 75 individual permits that grant the permit recipients access to the same 47,120 acres. In FY 2018, 50 contracts reported revenue for this subgroup. For simplicity, we are reporting 50 total contracts in this chapter while we acknowledge that there are many more agreements made for this subgroup that are associated with the subgroup's acreage total.

The Trust Manager estimates that there are more than 7,600 granted easements and active permits in the Rights of Way subgroup. Although they may be active, they may not contribute revenue in a given year due to the method of payment. Some contracts may require one-time payments for indefinite access, which were paid years ago. Other contracts may require a payment once every five years. Still other contracts may require payment for each individual use, but that individual use may not occur during a given fiscal year. Additionally, multiple agreement holders can obtain access to overlapping lands. There were 106 rights of way contracts that reported revenue in FY 2018. For simplicity, we are reporting 106 total contracts in this chapter while we acknowledge that there are many more agreements made for this subgroup that are associated with the subgroup's acreage total.

The subgroup contract count and acreage totals are summarized in the following table and chart.

Other Resources Subgroup Acreage

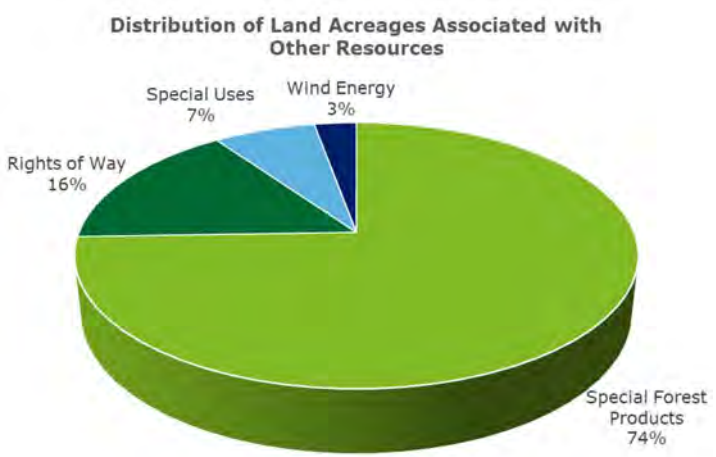
FIGURE 1

Other Resources	Contract Count [1]	Acres [2]
Special Forest Products	50	394,925
Rights of Way	106	83,531
Special Uses	182	36,637
Wind Energy	20	15,109
Totals	**358**	**530,203**

[1] Special Forest Products and ROW contract counts represent the number of contracts that reported revenue for that subgroup in FY18.

[2] Acres associated with Special Forest Products and ROW are generally non-exclusive lands found in areas managed for timber and can be accessed by holders of multiple agreements.

FIGURE 2



The majority of acreage in the above chart is associated with the Special Forest Products subgroup as wide ranges of timberlands are accessed to collect various good-quality forest products. This subgroup comprises 74 percent of the total acreage associated with revenue earned by the Other Resources Asset Class; however, the lands accessible under the Special Forest Products subgroup and the majority of lands involving right-of-way access are found in areas managed for timber.

Approximately, 7 percent of state trust lands associated with revenue earned by the Other Resources Asset Class are for the Special Uses subgroup and 3 percent are for the Wind Energy subgroup.

While the Wind Energy subgroup comprises less total acreage than state trust lands associated with revenue for other subgroups in this asset class, it provides the most revenue on an annual basis. The Wind Energy subgroup produced total gross revenue of approximately $1.2 million in FY 2018, which is 39 percent of the total revenue earned by the asset class in FY 2018.

The following table and chart highlight the allocation of FY 2018 gross revenue (rounded) between different subgroup types.

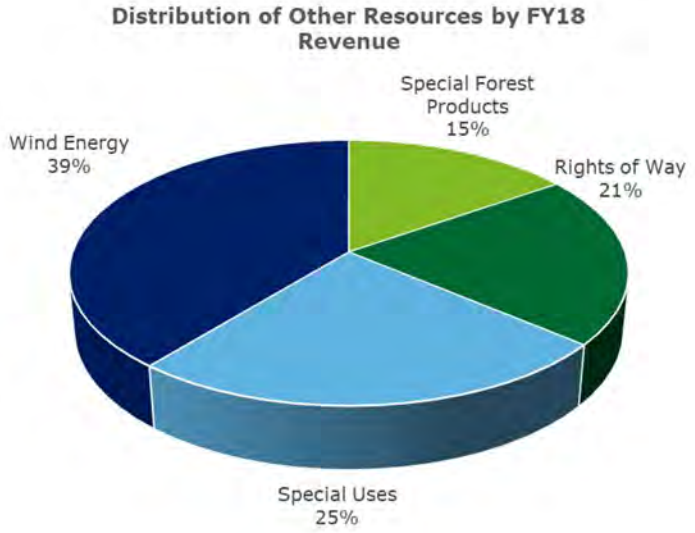
Other Resources Subgroup Revenue

FIGURE 3

Other Resources	Contract Count [1]	Gross Revenue (FY18)
Special Forest Products	50	$470,000
Rights of Way	106	$640,000
Special Uses	182	$760,000
Wind Energy	20	$1,200,000
Totals	**358**	**$3,070,000**

[1] Special Forest Products and ROW contract counts represent the number of contracts that reported revenue for that subgroup in FY18.

FIGURE 4



Other Resources Asset Class Ownership. The Trust Manager manages and operates state trust lands owned by the State of Washington for the benefit of designated trust beneficiaries. To be concise, this report uses the term "ownership" or "ownership interests" to describe the amount or percentage of gross revenue or land managed by the Trust Manager on behalf of specific trust beneficiaries, even though the land is owned by the State of Washington and not the trust beneficiaries.

The following charts present the trust beneficiaries' ownership interest in the Other Resources Asset Class based on acreage and gross revenue for each subgroup in FY 2018.

Wind Energy Ownership Composition

FIGURE 5

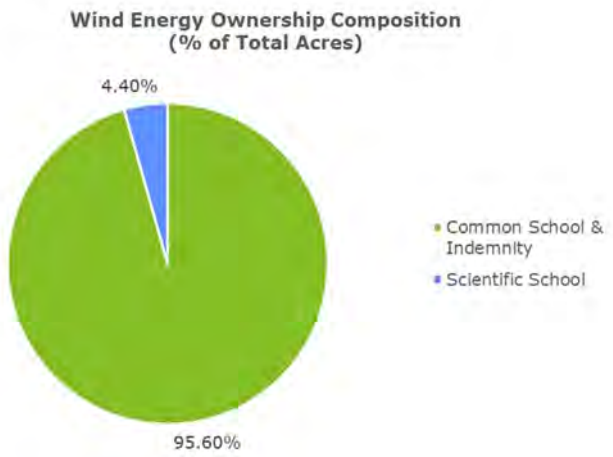
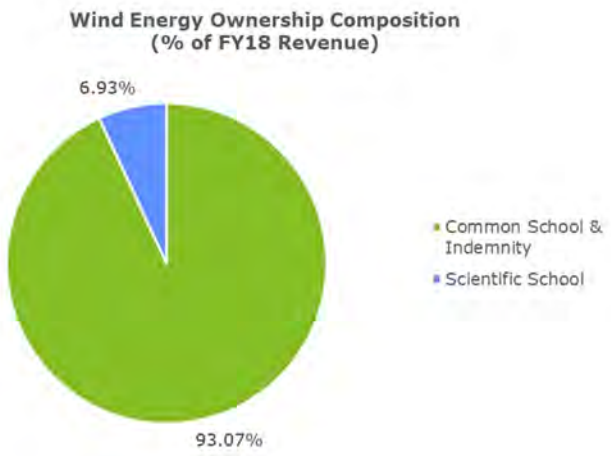


FIGURE 6



For the Wind Energy subgroup, the largest ownership interest is held by the Common School and Indemnity Trust, which supports statewide public school construction and other designated programs. The beneficiary ownership interest in these lands are the result of federal land grants to Washington at the time statehood was granted. The following charts highlight the acreage and revenue by ownership interest.

Special Forest Products Ownership Composition

FIGURE 7

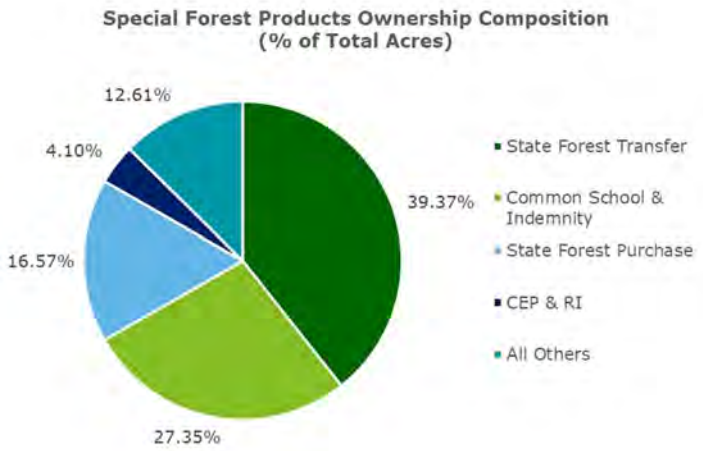
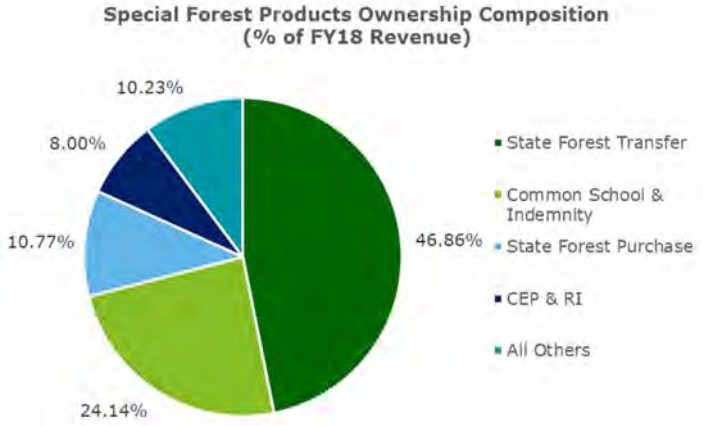


FIGURE 8



For the Special Forest Products subgroup, the State Forest Transfer Trust holds the largest interest in both revenue earned and gross acreage. The Common School & Indemnity Trust owns the second largest interest in this subgroup.

Rights of Way Ownership Composition

FIGURE 9

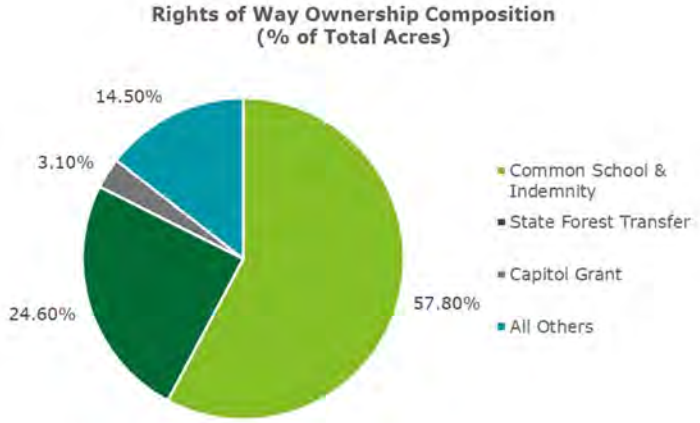
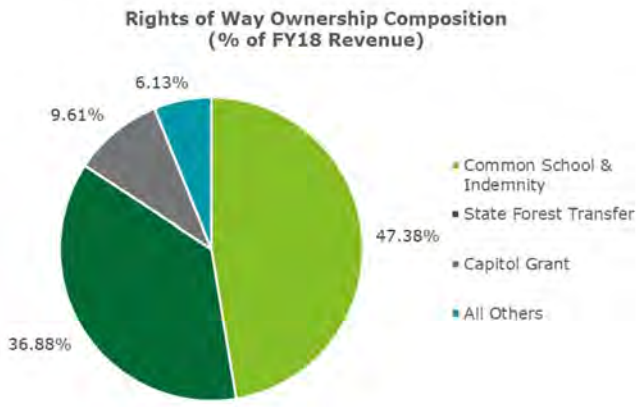


FIGURE 10



For the Rights of Way subgroup, the largest ownership interest in revenue earned is held by the Common School and Indemnity Trust, and the second largest ownership interest in revenue earned is held by the State Forest Transfer Trust.

Special Use Ownership Composition

FIGURE 11

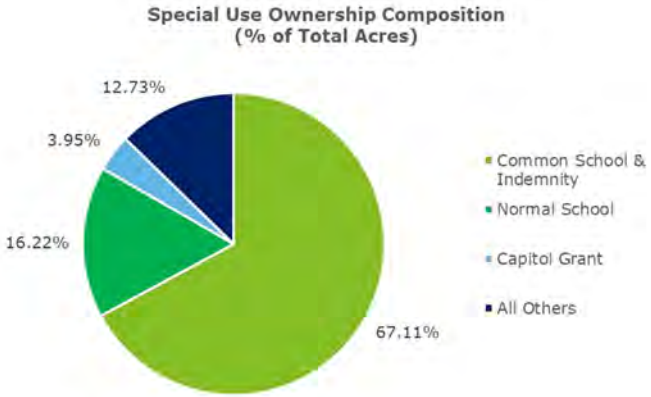
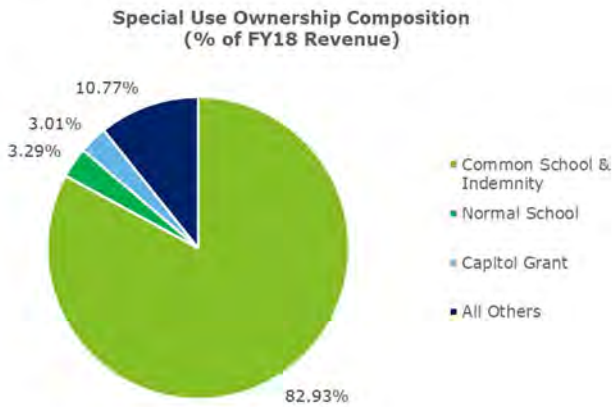


FIGURE 12



For the Special Use subgroup, the largest ownership interest in both revenue earned and gross acreage is held by the Common School and Indemnity Trust.

All other trusts not listed in the ownership compositions have minimal or no ownership interest in this asset class.

Physical Description

In FY 2018, the total gross acreage associated with the Other Resources Asset Class was approximately 530,202 acres.

FIGURE 13

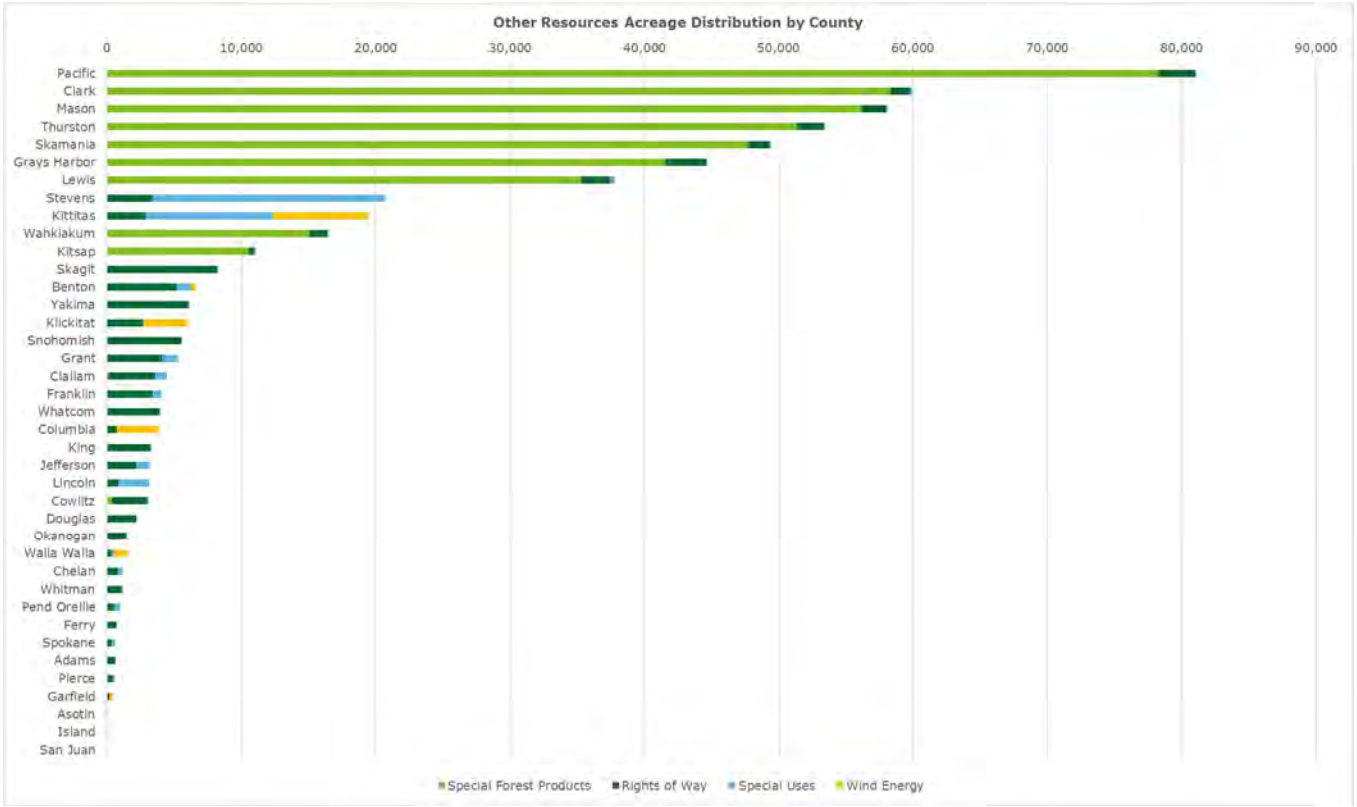


IMAGE SHOWS WIND TURBINES ON STATE-TRUST LANDS FOR PRODUCING ENERGY. SOURCE: WA STATE DNR

In FY 2018, there were approximately 530,202 acres of state trust lands associated with the Other Resources Asset Class. Note that the acres for the Special Forest Products subgroup (i.e., 394,925 acres) and the Rights of Way subgroup (i.e., 83,531 acres) largely fall into areas managed for timber and are mostly non-exclusive.

The following discussion provides more descriptions of the state trust lands associated with each subgroup in this asset class.

Wind Energy

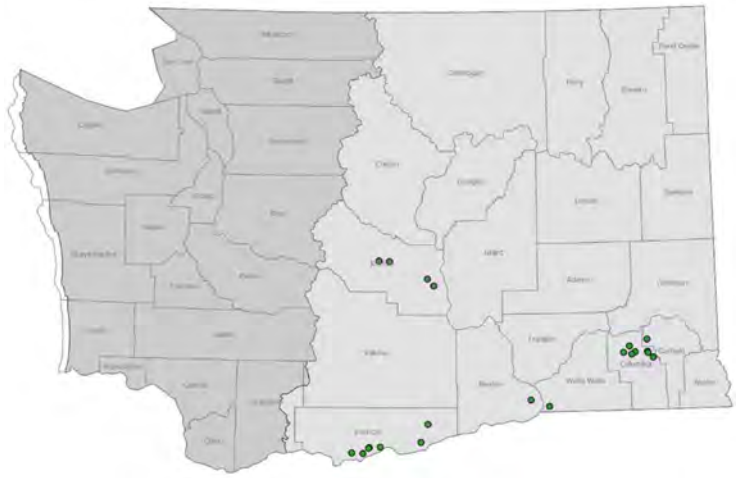
State trust lands leased for wind energy purposes totaled approximately 15,109 acres in FY 2018. Kittitas County had the most land leased for the Wind Energy subgroup. Kittitas County is located in central Washington and contains approximately 7,139 leased acres. The next two counties with the most land leased were Klickitat (i.e., 3,276 acres) and Columbia (i.e., 3,114 acres), which are located in south central and southeastern Washington, respectively.

The rest of the leased lands were located in southeastern Washington. Leased lands generally comprise vast, open, flat areas that have significant wind power potential. Some lands are located on elevated topography and are not always level.

The following map highlights the locations of wind energy leases throughout the state.

Map of Wind Energy Leases

FIGURE 14



Special Forest Products

Holders of special forest products agreements were given access to approximately 394,925 acres of state trust timberlands in FY 2018. The majority of these acres were in Pacific County and Clark County in western Washington.

As many of these acres are non-exclusive and are located in areas managed for timber, including a map of their locations was not deemed useful. Ultimately, all lands used by the Special Forest Products subgroup are located west of the Cascade mountain range where forests are thick and good-quality forest products are abundant.

Rights of Way

Right-of-way agreements granted holders access to approximately 83,531 acres of state trust lands in FY 2018. These acres are spread across the entire state, with the largest amount of acreage located in Skagit County and Yakima County.

Right-of-way lands are broadly categorized into two groups: (1) lands for road-use agreements and (2) lands for all other easements and permits.

Road-use agreements comprise the majority of usage for lands in this subgroup. Third parties pay to use state trust lands and infrastructure to access areas or adjacent properties that would otherwise be inaccessible. Road-use agreements are mostly non-exclusive and may be granted to multiple parties at a given time.

The other easement and permit uses commonly found in this subgroup are utility easements, licenses, and land access for recreational use. The nature of usage for utility easements tends to require the lands to be exclusive to the holder of the easement.

Since the majority of acres associated with fees paid for right-of-way access are for non-exclusive purposes and technically fall into areas managed for timber, including a map of these locations was not deemed useful. Ultimately, the lands associated with the Rights of Way subgroup are sprinkled throughout the entire state. There is no concentration in any given area as right-of-way agreements appear throughout the state on a case-by-case basis.

Special Uses

Special uses agreements include leases and permits for approximately 36,637 acres of state trust lands in FY 2018. Stevens County had the most land under agreement for the Special Uses subgroup.

Lands in the Special Uses subgroup generally comprise relatively smaller, individual plots located throughout the state.

However, there are some contracts associated with large acreages for research purposes. The Department of Fish and Wildlife in particular has multiple agreements to establish large areas for study across state trust lands. The most expansive research areas are positioned in western and north central Washington.

Given that the Special Uses subgroup comprises a heterogeneous group of agreements for which spatial extent and revenue generation are often inversely proportional, presentation of a statewide map may be misleading by overinflating the relative importance of the agreements with the largest acreages. As such, a statewide map was not deemed useful.

Operational History

The Other Resources Asset Class produces approximately 1.4 percent of the total gross revenue of all asset classes.

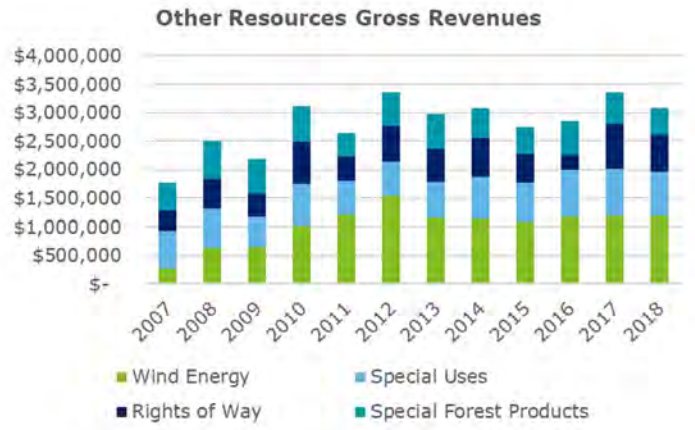
FIGURE 15

OTHER RESOURCES ASSET CLASS REVENUE FROM 2007 TO 2018

For the scope of this project, we analyzed the operational history of each asset class. Operating information has been provided to the analysts for the past 12 fiscal years.

The chart below displays the total gross revenue[2] (before the operating cost percentage deduction) received from payments in the Other Resources Asset Class from 2007 to 2018 by subgroup. Revenue amounts were not adjusted for inflation and are presented in this report in nominal values, not real values.

FIGURE 16



[2] Gross revenues exclude sub-sources 6, 3045, 4005, 5022, 5250, 6022, and 9088 as they are not included in reported operating cost percentage deduction totals.

Gross revenue for the Wind Energy subgroup grew over the past 12 fiscal years from $259,595 to approximately $1,198,873. This represents a compound annual growth rate of 14.92 percent. The compound annual growth rate is defined as the annual rate of growth required for the beginning balance to grow to its ending balance.

Gross revenue for the Special Forest Products, Rights of Way, and Special Uses subgroups remained mostly stable over past 12 fiscal years. The Special Uses subgroup remained stagnant, with annual revenue hovering around $700,000 to $800,000 each year. Revenue for the Special Forest Products subgroup was also stable and ranged from $450,000 to $600,000 each year. The Rights of Way subgroup was slightly less stable and fluctuated more than the other subgroups over the past 12 fiscal years from $265,000 to $788,000. The rolling average for this subgroup was $500,000 and $600,000 in annual revenue.[3]

Ownership Composition. The Common School and Indemnity Trust comprises the largest ownership percentage by revenue for the Wind Energy, Rights of Way, and Special Uses subgroups. The State Forest Transfer Trust comprises the largest ownership percentage by revenue for the Special Forest Products subgroup and a significant portion of the Rights of Way subgroup.

As such, we segregated the gross revenue earned by each subgroup in each fiscal year to display the portion received by the Common School and Indemnity Trust and the State Forest Transfer Trust, where applicable. The portions received by the remaining trusts have also been segregated.

FIGURE 17

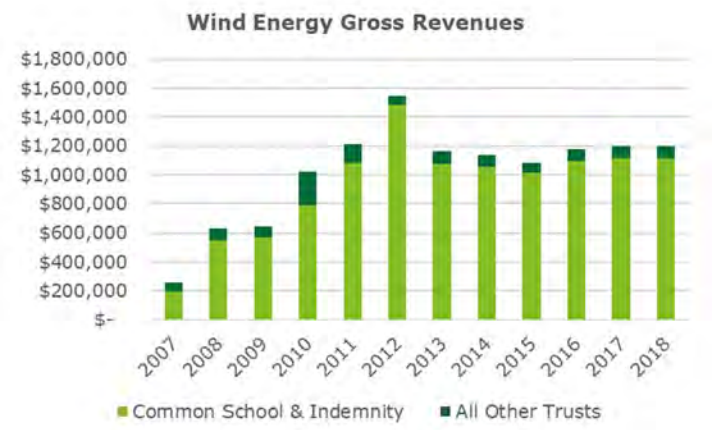
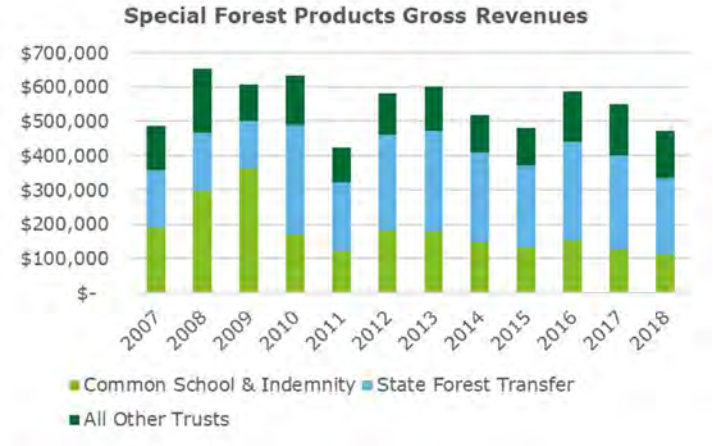


FIGURE 18



[3] Note that in FY 2016 the gross revenue was under $300,000 due to the exclusion of a one-time legal settlement fee paid related to Rights of Way Contract Number C8200092813. Conversations with the Trust Manager resulted in the removal of the one-time amount from both gross revenue and the net revenue received by the Trust Manager.

FIGURE 19

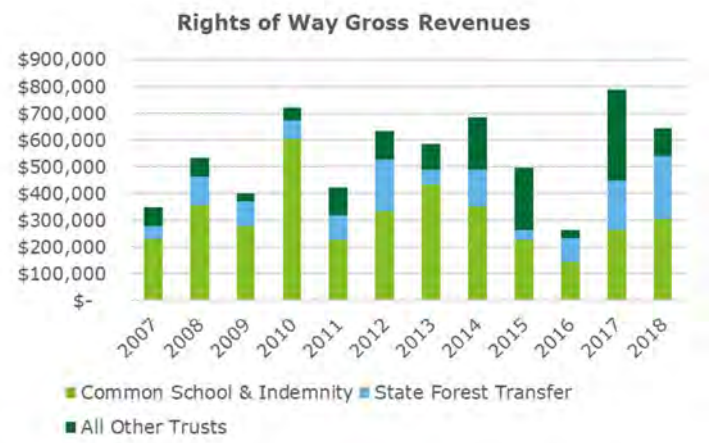
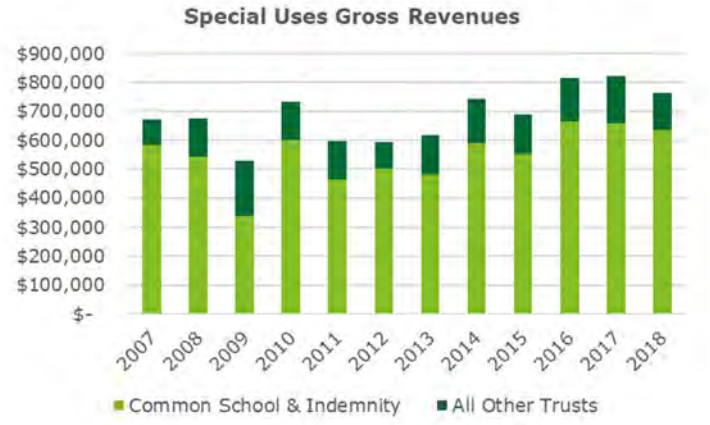


FIGURE 20



OPERATING COST PERCENTAGE DEDUCTION

As gross proceeds are received, an operating cost percentage deduction is applied and paid to the Trust Manager. From the trust beneficiary ownership position, there are no outflows of funds to operate and maintain the asset class; the Trust Manager budgets for the actual costs and capital expenditures and pays these costs directly from the operating cost percentage deduction received during the year.

The operating cost percentage deduction is legislatively set and typically ranges between 25 percent and 31 percent of total gross revenue, depending on the management account associated with each trust ownership. Historical data reported in this analysis reflects actual blended rates deducted. We have used an estimated assumption of 30 percent for the operating cost percentage deduction of this asset class which has been applied in the direct capitalization method.

Operating Cost Percentage Deduction versus Direct Operating Expenses. The operating cost percentage deduction is different than actual operating expenses and capital expenditures incurred to operate and manage the assets in the Other Resources Asset Class.

When the total operating cost percentage deduction for all asset classes exceeds actual operating costs and capital expenditures for the year, the excess is held in reserve for future years when the operating cost percentage deduction does not cover the actual costs. The reserve balances are reported by fund and held in separate accounts—the Resource Management Cost Account, the Forest Development Account, and the Agriculture College Trust Management Account.

The Resource Management Cost Account is held in the State Treasury and created and used solely to defray the costs and expenses incurred by the Trust Manager to manage and administer state trust lands, state-owned aquatic lands, as well as the making and administering of leases, sales, contracts, licenses, permits, easements, and rights of way as authorized (RCW 79.64.020).

The Forest Development Account was created by RCW 79.64.100, and it is held in the State Treasury. Primarily, the Forest Development Account is used to make interest and principal payments on bonds issued by the Trust Manager, but the state legislature may also appropriate funds from the account to enable the Trust Manager to carry out forest management activities on state forestlands or reimburse the Resource Management Cost Account for expenditures required to manage state forestlands.

The third account is the Agriculture College Trust Management Account. This account does not retain an operating cost percentage deduction, but the Trust Manager receives a direct appropriation from the legislature to conduct management work. Trust beneficiaries retain all gross revenue.

The reserve balances for all asset classes as of June 30, 2018 were approximately $12.6 million (Resource Management Cost Account) and nearly $4 million (Forest Development Account). Over the last 10 years, the Resource Management Cost Account reserves reached a high of more than $17 million at the end of FY 2014 and a low of $800,000 at the end of FY 2009. The Forest Development Account reserves reached a high of $24 million at the end of FY 2011 and a low of just under $4 million at the end of 2018.

However, note that these are snapshots as of the end of fiscal years. In reality, fund balances constantly change across a much wider range throughout each year. On a few occasions, reserves have dipped down to only a couple weeks of operating expenses on a few occasions.

The following chart presents the dollar amounts of the historical operating cost percentage deduction from 2007 to 2018 for the Other Resources Asset Class. The operating cost percentage deduction is proportionate to the gross revenue produced by the asset class each year—it rises and falls along with trust earnings and may not reflect increases or decreases in the Trust Manager's actual costs. These dollar amounts include both portions of revenue distributed to the Trust Manager from the Other Resources Asset Class and incidental revenue from trespassing fines, non-federal conservation programs, Initial Incident Report (IIR) restitutions, power charges, and other assessments. The costs have been segregated by subgroup.

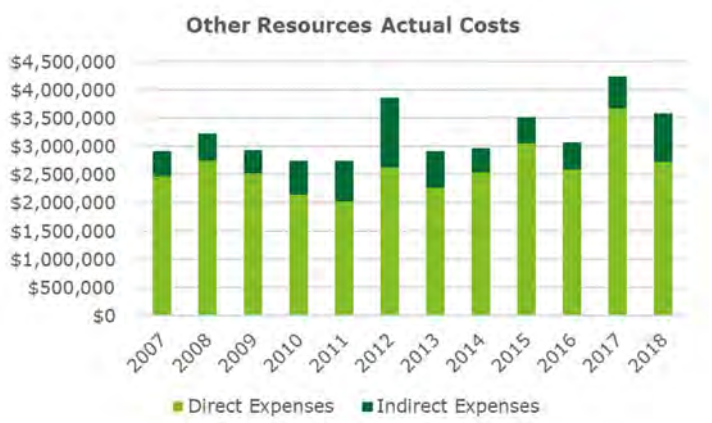
FIGURE 21

ACTUAL COSTS

The following is a discussion of the actual costs incurred by trust beneficiaries and paid by the Trust Manager from the funds received as a result of the operating cost percentage deduction.

The following chart highlights the historical actual costs incurred by the Trust Manager, which are split between direct and indirect expenses. The Trust Manager's accounting system does not record costs at the subgroup level.

FIGURE 22



Direct Expenses. Direct expenses include all costs directly related to managing state trust lands for Wind Energy, Rights of Way, and Special Uses, as well as general costs for weed control and allocations of general costs.

Currently, direct expenses include all costs directly related to managing lands, including:

- Resource and leasing management
- Project, sales, and planning management

The allocations of general costs are related to:

- Uplands
  - Examples include environmental analysis, state lands training, and law enforcement
- Engineering and general services
  - Examples include resource mapping, surveying, and record keeping
- Infrastructure for state trust lands
  - Examples include infrastructure costs related to lands in the Rights of Way subgroup

Indirect Expenses. Indirect expenses include all overhead costs allocated to the Trust Manager for:

- Administrative and agency support
- Adjustments
- Legal services
- Strategic investments
- Other administrative payments

A full-time employee analysis was conducted that involved dividing all actual costs by the number of full-time employees for each fiscal year. The full-time employee count was obtained by combining the number of full-time employees in the "Special/Energy," "ROW Grant," and "ROW Acquire Split" cost accounts from financial data provided by the Trust Manager. These cost accounts cover the Wind Energy, Special Uses, and Rights of Way subgroups.

As seen in the following full-time employee analysis, the Trust Manager typically retained approximately 20 full-time employees for the Other Resources Asset Class over the last four fiscal years. The total actual costs paid by the Trust Manager have averaged approximately $175,000 per full-time employee over that same period. These costs include all direct and indirect expenses, including salaries, as well as benefits and overhead.

FIGURE 23

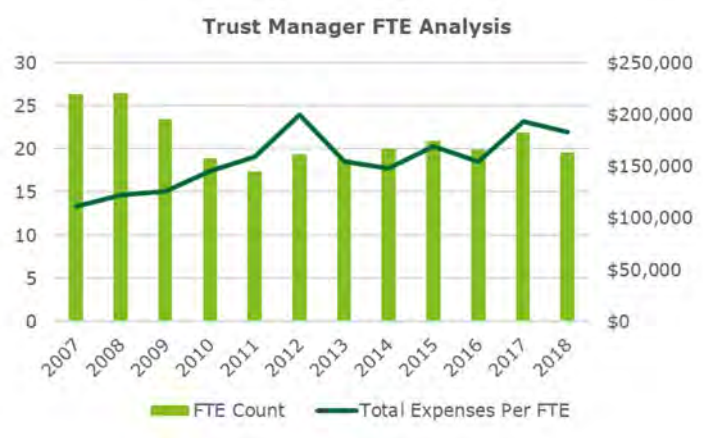


FIGURE 24

Subgroups Combined	2014	2015	2016	2017	2018
Total Annual Gross Revenue	**$3,083,150**	**$2,751,371**	**$2,846,992**	**$3,358,410**	**$3,079,134**
Operating Cost % Deduct	($894,411)	($763,963)	($870,590)	($1,040,749)	($974,306)
% of Revenue	29.01%	27.77%	30.58%	30.99%	31.64%
Revenues Distributed to Trusts	**$2,188,739**	**$1,987,408**	**$1,976,401**	**$2,317,661**	**$2,104,829**
% of Revenue	**70.99%**	**72.23%**	**69.42%**	**69.01%**	**68.36%**

NET CASH FLOW FROM 2014 TO 2018

Trust beneficiaries pay a portion of the gross revenue (i.e., operating cost percentage deduction) to the Trust Manager for operating expenses and capital expenditures. These costs include direct and indirect expenses. The cash flows net of the operating cost percentage deduction are then distributed to the appropriate funds by ownership.

The following table summarizes the net cash flows distributed to trust beneficiaries over the past five fiscal years for this asset class (all subgroups combined). These cash flows indicate the Other Resources Asset Class earns approximately $3 million in gross revenue per year and provides trust beneficiaries with $2 million in net cash flows per year.

Property Taxes and Zoning

The State of Washington is exempt from paying direct real property taxes for lands associated with the Other Resources Asset Class.

PROPERTY TAXES

Property taxes are a local government's main source of revenue. Most localities tax private homes, land, and business property based on the property's value.

Lands owned by the state are exempt from property tax obligations under the state constitution. However, because private lessees of state land receive the benefit of governmental services, the legislature imposes a leasehold excise tax on these private lessees under RCW 82.29A.

Leasehold excise tax is paid by the lessee to the Trust Manager when rent is paid, and the Trust Manager remits the payment to the Department of Revenue. Land that is not leased does not pay property taxes or leasehold excise tax. Generally, the leasehold excise tax on leased land is most often less than what property taxes would be for the same land.

ZONING

We assume that all lands leased for Wind Energy use or any other miscellaneous or special use adhere to the proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper zoning regulations and development standards.

IMAGE SHOWS WIND TURBINES ON STATE-TRUST LANDS. SOURCE: WA STATE DNR

Market Analysis

A brief market analysis of Wind Energy in the United States.

WIND ENERGY MARKET OVERVIEW

Washington state's first wind project was developed in 2001 with a continuation of wind resources being developed in the state ever since. As of 2019, there are over 1,700 wind turbines constructed throughout the state with the capacity of 3,100 megawatts. As such, wind energy is the state's second largest contributor to renewable generation after hydroelectric power.

As half of the state's land area is forested, the main source of biomass to fuel generating electricity is wood and wood waste. However, despite the large biomass resource in Washington, wind energy produces four times as much of the state's electricity generation as biomass.[4]

The remaining portion of the market analysis section is based on information and data sourced from IBISWorld, a trusted industry research firm. The industry sector discussed in the market overview is a national overview in the United States that includes the state of Washington. The industry sector relative to the Other Resources Asset Class and discussed in this section is the Wind Power Industry.

Industry Sector Performance (National Overview)

According to IBISWorld, the Wind Power industry generates revenue from owning and operating wind farms that produce energy, which is sold to downstream customers.

Growing concerns about the rising levels of greenhouse gas emissions have allowed renewable energy sources such as solar and wind power to gain more attention. The United States currently holds more than 52,000 wind turbines.

The federal production tax credit is a government incentive that pays industry operators per unit of energy sold. This incentive along with other growing support and government assistance have transformed Wind Power into a competitive energy source. As a result, the net power generation from wind turbines continues to increase, and revenue from the Wind Power industry has increased at an annual rate of 10.5 percent over the past five years.

Customer demand for electricity drives the price of electrical power. Federal tax credits can make wind power cost competitive with other energy generating technologies. As demand for wind power increases, the price for wind power will increase in tandem.

[4]https://www.eia.gov/state/analysis.php?sid=WA#:~:text=More%20than%201%2C700%20wind%20turbines,nation's%20net%20generation%20from%20biomass.

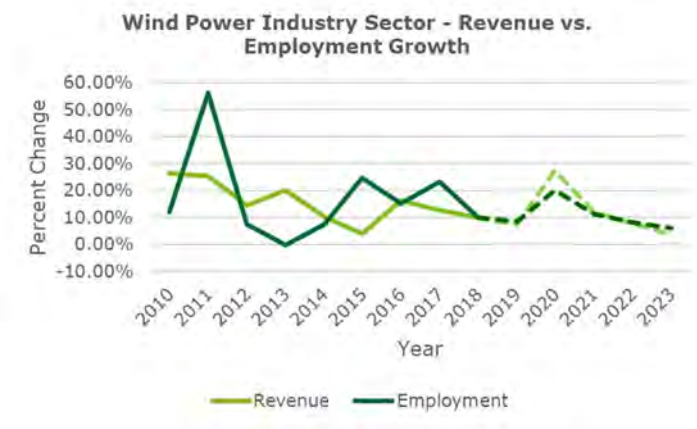
The US Department of Energy reported that year-end wind power capacity rose from 59,973 megawatts in 2013 to an anticipated 99,590 megawatts by the end of 2018, producing almost 10 percent of the nation's energy generating capacity in 2018.[5]

Over the next five years, the Wind Power industry is expected to experience generally favorable market conditions as demand for electricity and a focus on green energy continue to grow. Many states are expected to release renewable energy targets to reach energy independence within a certain number of years.

Nationwide, the sector reported revenue of $11.6 billion across 360 businesses in 2018.

The following chart displays historical and projected revenue and employment growth in the national Wind Power Industry sector between 2010 and 2023.

FIGURE 25



The industry has historically exhibited strong growth. Between 2013 and 2018, revenue growth in the Wind Power sector increased by a compound annual growth rate of 10.5 percent and employment in the sector increased by a compound annual growth rate of 15.7 percent.

Both revenue and employment in the industry are expected to grow at strong rates over the next five years. Revenue and employment are anticipated to grow at a compound annual growth rate of more than 10 percent nationwide between 2018 to 2023. Stronger economic activity combined with a focus on energy independence and reducing greenhouse gas emissions will contribute to this growth over the next five years. [6]

[5] Data sourced from "Wind Power in the US Sector Report," IBISWorld, September 2018.
[6] All data sourced from "Wind Power in the US Sector Report," IBISWorld, September 2018.

Methodology

The income approach is the valuation methodology selected for this study.

Methodology

The income approach is the basis for the valuation of this asset class. The Trust Manager's data files were the principal source of market and value information (i.e., annual gross lease revenue, direct and indirect expenses, and other financial information) and include lease activity obtained in the ordinary course of the management of assets.

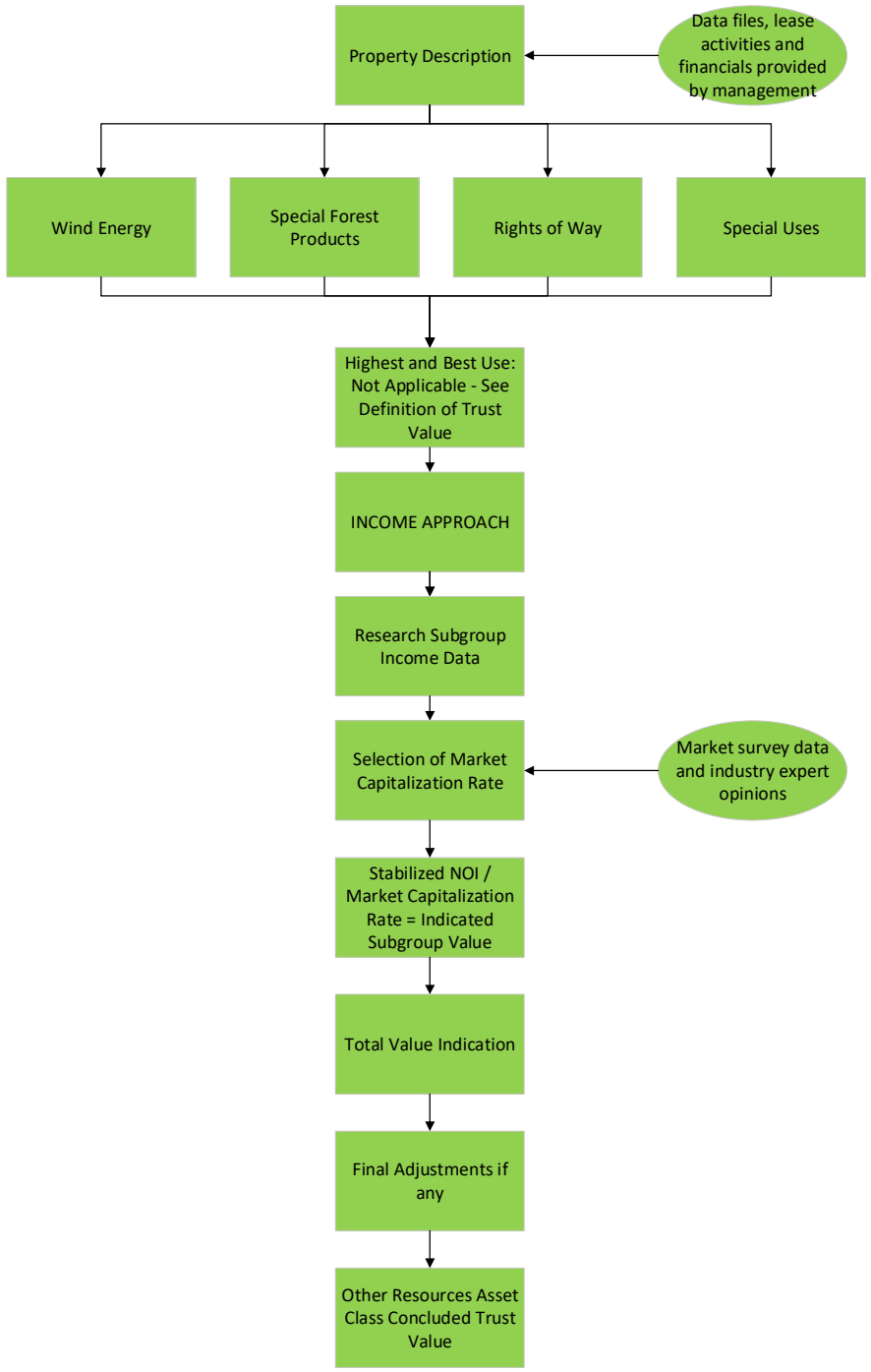
Due to the nature of the cash flow stream this asset class produces through its negotiated leases, the income approach is the methodology utilized. Adequate amounts of market data existed to use the income approach.

The flowchart that follows displays the steps taken in the valuation analysis for the Other Resources Asset Class.

IMAGE SHOWS STATE TRUST LAND USED FOR BOTH WIND ENERGY AND AGRICULTURE USES
SOURCE: WA STATE DNR

Other Resources Asset Class Valuation Flowchart

FIGURE 26



Trust Value Analysis

We evaluated the Trust Value of the Other Resources Asset Class by using the approach described below:

Income Approach

The income approach involves a set of procedures through which an appraiser derives a value indication for an income-producing property by converting its anticipated benefits (i.e., cash flows and reversion) into property value using one of the following methods:

- *Discounted Cash Flow Method*: The annual cash flows for the holding period and the reversion are discounted at a specified yield rate. The discounted cash flow method was not used in this analysis.
- *Direct Capitalization Method*: One year's income expectancy is capitalized at a capitalization rate that reflects a specified income pattern, return on investment, and change in the value of the investment. The direct capitalization method was used in this analysis.

An overall capitalization rate is defined as a ratio of one year's net operating income provided by an asset to the value of the asset and is used to convert income into value when using the income capitalization approach.[7] Further discussion regarding this rate can be found in the earlier chapter that focused on rates of return.

Given the leased nature and ownership limitations of the Other Resources Asset Class, the direct capitalization method is considered to be most relevant, and thus, it has been utilized in this portfolio analysis.

Extraordinary Assumptions

We assume that all state trust lands with leases for Wind Energy use and any other miscellaneous or special use adhere to the proper zoning regulations outlined in local general plans. If not fully compliant, we assume that each property is legally non-conforming to the proper regulations and development standards.

As previously discussed in the chapter regarding restrictions and burdens, the Trust Manager's ability to sell, exchange, or transfer state trust lands is limited by statute. For the purpose of this analysis, we assume that the ownership interest is non-transferable resulting in the land not being able to be sold.

We relied upon information provided by the Trust Manager for all specific data regarding data files, leasing activities and financials, and size and ownership information. We assume that all information provided by the Trust Manager is accurate and sufficient for the purpose of this valuation.

Hypothetical Conditions

None noted.

[7] Definition sourced from the *Sixth Edition of the Dictionary of Real Estate Appraisal*.

Income Approach

The direct capitalization method was used to estimate the Trust Value of the Other Resources Asset Class.

For the purposes of the valuation analyses in this report, the Other Resources Asset Class has been divided into four subgroups:

- Wind Energy
- Special Forest Products
- Rights of Way
- Special Uses

ESTIMATED NET CASH FLOW

As has been highlighted in the "Operational History" section of this chapter, total gross revenue received from rent and other payments for the Other Resources Asset Class typically totals around $3 million in combined revenue for the year, and trust beneficiaries typically receive about $2 million in net cash flows per year from this asset class. We estimated stabilized streams of revenue for each subgroup in the asset class based on analyzing historical averages and trends while acknowledging volatility and potential growth where applicable.

In the following table, we segregated the stabilized income stream for each subgroup, as well as estimated an expected stabilized operating cost percentage deduction of 30 percent based on historical deductions averaging near this blended rate.

FIGURE 27

Other Resources Asset Class - Stabilized Income Summary

	Wind Energy	Special Forest Products	Rights of Way	Special Uses	**Total**
Stabilized Gross Revenue	$1,200,000	$550,000	$650,000	$800,000	**$3,200,000**
Operating Cost % Deduction	($360,000)	($165,000)	($195,000)	($240,000)	**($960,000)**
% of Revenues	30%	30%	30%	30%	**30%**
Trust Net Operating Income	$840,000	$385,000	$455,000	$560,000	**$2,240,000**

CAPITALIZATION RATE SELECTION

An overall capitalization rate of 11 percent has been selected to apply to the net cash flows for each of the subgroups in the Other Resources Asset Class. For further discussion regarding the determination of this capitalization rate, please refer to the earlier chapter that discussed rates of return.

DIRECT CAPITALIZATIONS

The overall capitalization rate was applied to the relevant stabilized revenue streams estimated for each subgroup to derive a preliminary Trust Value indication for this asset class. The direct capitalization calculations are presented for each subgroup.

The relevant revenue streams include the stabilized annual gross revenue estimates for each subgroup minus an operating cost percentage deduction assumption of 30 percent. The resulting net operating income was then capitalized by the applicable overall capitalization rate conclusion.

Note that the acreage listed represents the total acreage associated with each subgroup in FY 2018, as provided by Trust Management.

Also note that contract counts for the Special Forest Products and Rights of Way subgroups represent the number of contracts that reported revenue in FY 2018.

Further, please note that the value has been measured per the contract count as it has been defined earlier in this chapter for each subgroup. We acknowledge that the value per contract does not accurately reflect the value per actual agreement amount as many agreements can be bundled into one contract. Also, the value per contract does not differentiate between the many different types of agreements that are included in each subgroup. This basis of measurement is included to show the total value of the subgroup measured per recorded contract only.

Wind Energy. The total value indication for the Wind Energy subgroup was $7,600,000 (rounded), which equates to approximately $380,000 per contract and $500 per acre. The capitalization calculation for the Wind Energy subgroup is shown in the following table:

FIGURE 28

Direct Capitalization - Wind Energy		
Contract Count		20
Associated Acres		15,109
Stabilized Gross Revenues		$1,200,000
Operating Cost % Deduction	30%	($360,000)
Trust Net Operating Income		$840,000
Capitalization Rate		11.00%
Indicated Value		$7,636,364
Value Indication (Rounded)		**$7,600,000**
Value Indication per Contract		**$380,000**
Value Indication per Acre		**$503**

Special Forest Products. The total value indication for the Special Forest Products subgroup was $3,500,000 (rounded), which equates to approximately $70,000 per contract and $8.90 per acre. The capitalization calculation for the Special Forest Products subgroup is shown in the following table:

FIGURE 29

Direct Capitalization - Special Forest Products		
Contract Count [1]		50
Associated Acres [2]		394,925
Stabilized Gross Revenues		$550,000
Operating Cost % Deduction	30%	($165,000)
Trust Net Operating Income		$385,000
Capitalization Rate		11.00%
Indicated Value		$3,500,000
Value Indication (Rounded)		**$3,500,000**
Value Indication per Contract		**$70,000**
Value Indication per Acre		**$8.86**

[1] Represents the number of FY18 contracts with revenues reported for the subgroup type.
[2] Represents the number of acres associated with the subgroup in FY18.

Rights of Way. The total value indication for the Rights of Way subgroup was $4,100,000 (rounded), which equates to approximately $38,700 per contract and $49.10 per acre. The capitalization calculation for the Rights of Way subgroup is shown in the following table:

FIGURE 30

Direct Capitalization - Rights of Way		
Contract Count [1]		106
Associated Acres [2]		83,531
Stabilized Gross Revenues		$650,000
Operating Cost % Deduction	30%	($195,000)
Trust Net Operating Income		$455,000
Capitalization Rate		11.00%
Indicated Value		$4,136,364
Value Indication (Rounded)		**$4,100,000**
Value Indication per Contract		**$38,679**
Value Indication per Acre		**$49.08**

[1] Represents the number of FY18 contracts with revenues reported for the subgroup type.
[2] Represents the number of acres associated with the subgroup in FY18.

Special Uses. The total value indication for the Special Uses subgroup was $5,100,000 (rounded), which equates to approximately $28,000 per contract and $139.20 per acre. The capitalization calculation for the Special Uses subgroup is shown in the following table:

FIGURE 31

Direct Capitalization - Special Uses		
Contract Count		182
Associated Acres		36,637
Stabilized Gross Revenues		$800,000
Operating Cost % Deduction	30%	($240,000)
Trust Net Operating Income		$560,000
Capitalization Rate		11.00%
Indicated Value		$5,090,909
Value Indication (Rounded)		**$5,100,000**
Value Indication per Contract		**$28,022**
Value Indication per Acre		**$139.20**

Income Approach Summary. The following table combines the indicated values from the direct capitalization calculations for each subgroup into a total indicated value for the asset class.

Note that the total contracts and acres are not reported at the asset class level. It would not be appropriate to measure the Trust Value indication on a combined per-contract or per-acre basis given the incongruent nature of the miscellaneous subgroups in this asset class.

FIGURE 32

Other Resources Asset Class - Value Indication	
Wind Energy	$7,600,000
Special Forest Products	$3,500,000
Rights of Way	$4,100,000
Special Uses	$5,100,000
Total Trust Value Indication	**$20,300,000**

Value Conclusion

The concluded Trust Value of the Other Resources Asset Class is $20,300,000.

OTHER RESOURCES ASSET CLASS VALUE CONCLUSION

Using the income approach, the indicated values for each subgroup—Wind Energy, Special Forest Products, Rights of Way, and Special Uses—were combined to represent the total value indication for the Other Resources Asset Class.

This resulted in a concluded Trust Value of $20,300,000 for the asset class.

FIGURE 33

Other Resources Asset Class - Value Conclusion	
Wind Energy	$7,600,000
Special Forest Products	$3,500,000
Rights of Way	$4,100,000
Special Uses	$5,100,000
Total Trust Value Indication	**$20,300,000**
Concluded Trust Value	**$20,300,000**

INDIVIDUAL TRUST VALUES SUMMARY

The concluded Trust Value for state trust lands in the Other Resources Asset Class was calculated for each trust. Specifically, the concluded Trust Value was allocated based on each individual trust's percentage of gross revenue for the asset class in FY 2018. The following table reflects the concluded value for each trust by subgroup.

FIGURE 34

Other Resources Asset Class Individual Trust Values						
Trust	**Wind Energy**	**Special Forest Products**	**Rights of Way**	**Special Uses**	**Trust Value**	**%**
Common School and Indemnity	$7,073,396	$845,040	$1,932,494	$4,229,328	**$14,080,258**	**69.36%**
State Forest Transfer	$0	$1,640,065	$1,491,867	$151,878	**$3,283,810**	**16.18%**
Scientific School	$526,604	$133,875	$162,524	$19,737	**$842,740**	**4.15%**
Capitol Grant	$0	$85,365	$393,928	$153,306	**$632,599**	**3.12%**
State Forest Purchase	$0	$376,775	$30,914	$102,816	**$510,505**	**2.51%**
CEP & RI	$0	$279,930	$16,646	$50,847	**$347,423**	**1.71%**
Other [1]	$0	$0	$40,549	$177,582	**$218,131**	**1.07%**
Normal School	$0	$20,685	$0	$167,892	**$188,577**	**0.93%**
University Transferred	$0	$88,935	$30,996	$21,726	**$141,657**	**0.70%**
Agricultural School	$0	$5,635	$0	$24,888	**$30,523**	**0.15%**
University Original	$0	$16,135	$0	$0	**$16,135**	**0.08%**
Escheat	$0	$7,560	$82	$0	**$7,642**	**0.04%**
Total	**$7,600,000**	**$3,500,000**	**$4,100,000**	**$5,100,000**	**$20,300,000**	**100%**

[1] Other includes the Department of Social and Health Services and other trusts not in scope which received minuscule amounts of revenue in FY18.

Deloitte.

Skagit Bald Eagle Natural Area Preserve *Source: WA STATE DNR*

Chapter 12
Observations and Recommendations

Observations and Recommendations

INTODUCTION

Deloitte Transactions and Business Analytics, LLC was retained by the Washington State Department of Natural Resources to conduct the Trust Land Performance Assessment. The team assembled to execute the study also includes individuals that participated in the prior study in 1996 (also prepared by Deloitte). As such, the perspective that the team brings to the current engagement is influenced by the experience and observations during the prior study compared to the current study. The following are general observations from then (1996) and now (2018).

- Total trust land revenue in 1996 was approximately $204 million, and total revenue in 2018 has increased to approximately $218 million.
- Actual Trust Manager operating expenses for the Forest Development and Resource Management Cost Accounts have increased from $50 million in 1996 to $62 million in 2018.
- The population of the State of Washington has grown from 5.51 million in 1996 to 7.53 million in 2018, an increase of 36%.
- The 1996 median household income in Washington was under $37,000 and has increased to $79,726 in 2018.
- The 1996 median home price Washington was under $150,000 and grew to $362,100 in 2018.
- Common School trust revenue helps fund the School Construction Assistance Program (SCAP) administered by Washington State Office of Superintendent of Public Instruction. Over the past 24 years, the SCAP program has grown considerably, while Common School revenue has not. For example, in 1995-1997, the Common School Construction Account[1] (CSCA) contributed approximately 73% (~$265 million) of the total $364.97 million in SCAP funds for that biennium. In 2017-2019, CSCA contributed approximately 27% (~$259 million) to SCAP, which had grown to $947.17 million.
- The cost to construct a primary school in 2003 was $125 per square foot and has increased to $226 per square foot in 2018.
- The 1996 study and the 2018 study focus on trust land value and rates of return, but the importance of this focus may be misplaced. This focus has not led to change and improvements needed to generate more net cash flow to the beneficiaries.

[1] Common School trust revenue contributes approximately $122 million per biennium to the CSCA. The common school construction account is utilized by the School Construction Assistance Program (SCAP), which helps pay for K-12 school construction projects and is administered by the Office of Superintendent of Public Instruction (email correspondence with OSPI 9/2020).

- Recognition of environmental constraints on the trust land portfolio has increased between 1996 and 2018, leading to reductions in land areas available for timber harvest.

- Economic pressure to continue to increase the distributions to trust beneficiaries has also grown in response to population growth statewide, as well as ever-present fiscal pressures on local government and public education.

- Timber, a commodity, was the main source of revenue in 1996 and remains the main source of revenue from the trust land portfolio in 2018. Accordingly, the volatility of cash flows to beneficiaries was high in 1996 and continues to be in 2018.

The past twenty-two years has seen remarkable change in the State of Washington, including its population, economic base and promise of the future. Meanwhile, the overall productivity of the trust land operations and financial results have been largely static. The trends present today are expected to continue into the future, and they will likely intensify the pressure and challenges in managing the trust land portfolio in order to meet the needs of the trust beneficiaries and the operation of the trust lands owned by the State of Washington.

This final chapter the Trust Lands Performance Assessment includes a set of recommendations and observations the engagement team gathered throughout the course of the project. The recommendations and observations on the following pages are structured in a way that describes the topic, highlights the impact on the Trust Manager, and provides a recommended action item. There are many that impact the overall organization which are provided first and are followed by asset class specific recommendations and observations.

OVERALL OBSERVATION

Topic: Net Cash Flow Priority vs Rates of Return

Description: In the prior 1996 study and the current TLPA study, the focus has been on rates of return. For example, the RFP associated with this study requested the following metrics based on the budget proviso, which are reported in this assessment:

Net Operating Income (NOI)/Trust Value - This metric reports a commonly used relationship of income to value. For example, the timber asset class has a net operating income of $123,624,000 and an estimated trust value of $2,136,000,000, which results in a ratio of income to value of 5.79% (See Figure 1). This metric is commonly used to assess the cash-on-cash return of an investment before any consideration any debt payments (i.e., financial leverage, which there are none in this case). The same ratio is reported for all asset classes in the valuation, which are consistent with the rate of return analysis and discussion presented in an earlier (rate of return) chapter. In addition, Deloitte used an income approach to develop the trust value estimates for each asset class by dividing revenue by a direct capitalization rate. The NOI ratio is also consistent with these trust value estimates because the NOI ratios use the same inputs.

Gross Income/Trust Value – Using the timber asset class again, this metric uses the gross income of $171,700,000 and the trust value of $2,136,000,000, which results in a ratio of gross income to trust value of 8.04% (See Figure 1). This metric is not tracked and reported in investor surveys. While the inverse of this relationship is an income multiplier, a gross income multiplier is not readily used by market participants for the asset classes included in this report.

FIGURE 1

Asset Class	NOI/Trust Value	Gross Income/Trust Value
Commercial RE	7.53%	10.76%
Communication Sites	8.16%	11.65%
Mining	7.99%	11.42%
Agricultural	7.00%	9.86%
Grazing	7.00%	10.00%
Timber	5.79%	8.04%
Other Resources	11.03%	15.76%
Total	**6.07%**	**8.46%**

Comparison of rates of return among various investments is used by investors as a diagnostic to evaluate investments. This information is most often used for the following:

- Investment Performance: to make buy-sell decisions related to existing or new alternative investments.
- Fund/Asset Manager Performance: to make decisions to keep or replace to fund or asset manager.

Impact of Issue: Rate of return has only very limited utility for the TLPA asset classes. This is because (i) of the restrictions on sale of the assets, (ii) the revenue distribution requirements and (iii) the fact that the Trust Manager cannot be replaced. As a result of these limitations, the Trust Manager's ability to act is limited. As detailed in the earlier chapter regarding restrictions and limitations, restrictions on the ability to sell or liquidate an entire investment in an asset class and reinvest in alternative investments limits the usefulness of rate of return information as a management tool at the entire portfolio level. Further, the inability to replace the Trust Manager diminishes the relevance of rate of return.

Recommendation: The Trust Manager and trust beneficiaries should focus on net cash flow to the beneficiaries as the preferred metric of performance and management competence. This includes increasing net cash flow and reducing net cash flow volatility.

Asset Classes Most Impacted: *All*

GENERAL ITEMS

1. Topic: Accounting and Reporting System

Description: DNR currently manages a $200 million revenue operation. Nonetheless, as a government entity, the Trust Manager does not have nor use an accounting system or chart of accounts that a for-profit enterprise would use to understand the financial performance of each of their assets. Key areas the accounting system (package) would have is financial accounting, management (cost) accounting, operations (sales, production planning, etc.), and real estate management. If a private enterprise-like accounting system were to be implemented, the Trust Manager would improve its ability to manage all of its assets more efficiently and profitably, if it used a chart of accounts that included elements typically tracked by private companies.

Impact of Issue: The trust lands are operating business enterprises that are managed to create net profit (cash flow) for the trust beneficiaries. The benefit of accounting system enhancements would be (i) the ability to measure profitability consistently and in a similar manner as private market peers and (ii) periodic conventional profit and loss statements that would enable the Trust Manager to make prompt decisions in order to improve cash flow to the beneficiaries.

As an example, the ability to track asset class specific operations would allow greater decision-making ability to determine if additional investment is appropriate to a particular asset class. Further, the use of chart of accounts and an enterprise accounting system would provide greater period-to-period comparability with private market peers.

Recommendation: The Trust Manager should acquire and use an accounting and financial reporting system that is consistent with that of a for-profit business enterprise, in addition to fulfilling its obligations as an organization agency of the State of Washington. The accounting system should enable the Trust Manager to provide financial statements by asset class. Further, the accounting system should enable detailed job costing, budgeting and tracking of actual performance. The chart of accounts should be consistent with the reporting for a for-profit enterprise.

In this manner, the Trust Manager would have the tools to implement cost benefit analyses for activities and to avoid activities that do not provide a net positive cash flow or enhance existing positive cash flows. If implemented, this recommendation will require the use of a consultant with accounting expertise to identify the additional accounting and reporting needs for the Trust Manager and then to implement the new system.

Asset Classes Most Impacted: All asset classes

2. ***Topic: Asset Class Financial Statements Are Inadequate***

Description: Currently, the Trust Manager publishes an annual report that is consistent with governmental reporting standards used by Washington State. The annual report, however, is not a set of financial statements (income statement, balance sheet, statement of cash flows, etc.) and do not provide the level of detail and disclosure that is suitable for a for-profit enterprise, nor is the existing annual report audited.

Impact of Issue: Financial statements provide the results of operations, financial position, and cash flows of an organization in a consistent manner over reporting periods. Appropriate financial statements will enable the various stakeholders to monitor the current operations, accumulative results of operations, make comparisons to other similar entities or departments, understand the relationship of fixed assets employed for a particular asset class against industry norms, and other business drivers.

Recommendation: The Trust Manager should implement an updated and focused enterprise accounting system to produce comprehensive financial statements for land trust operations. The financial statements should at least include a balance sheet, an income statement, a statement of changes in equity, and a cash flow statement. At a minimum, separate financial statements should be produced for each of the major asset classes, but a combined set may be reasonable for the smaller asset classes.

Given the trust lands are managed for-profit, the standards for financial statements that are consistent with private industry may be appropriate, as opposed to governmental accounting standards. Changing the accounting function or providing dual reporting may mean that additional professionals need to be added to the payroll, but this would make the operational structure similar to private, for profit peers.

Asset Classes Most Impacted: All asset classes

3. Topic: Property (Lease) Management System

Description: The Trust Manager has a lease management system that is insufficient for managing leases. A similarly situated for-profit enterprise would use a lease management system.

Impact of Issue: Management of the trust lands involves oversight and management of thousands of leases of multiple lease or permit types. The current lease data management system does not adequately track and report lease details commensurate with for-profit professional real property lease management systems do, including data points such as options, annual increases, lease expiration reports, property physical details (property size, property type, land use, equipment included/excluded, tenant improvements, etc.) and, outstanding tenant improvement liabilities. Such systems can typically create cash flow forecasts, account receivable reports plus detailed property operation budgets. Further, the current system cannot track prospective lease opportunities, beginning with the lease negotiation process, nor can it synchronize with an accounting system to create property level profit and loss statements or asset class profit and loss statements.

Recommendation: According to the Trust Manager, efforts to improve existing lease systems have been implemented and we believe that they need to continue. A renewed effort to appropriately track and actively manage the leases in place through all portfolios with improved systems should continue.

Asset Classes Most Impacted: *Timber, Commercial, Agriculture, Mining*

4. Topic: Cost Accounting – Asset Management

Description: While financial statements ensure adequate financial information is disclosed externally, job costing and related cost accounting systems are different than GAAP financial reporting. They focus on providing executives with relevant data surrounding property and department operations to allow internal managers to make the best-informed decisions about business operations based on profitability and net cash flow. The Trust Manager's job costing system and accounting system make it difficult to ascertain which properties and activities employed to a particular property are most profitable and which are not profitable at all.

Impact of Issue: The inability to assess which properties and/or harvesting jobs are achieving the greatest returns to the Trust Manager provides challenges to managing the returns. For example, it makes it difficult to judge if there are other non-economic reasons to keep lands available to harvest on the East side (recreation purposes, other interest groups, etc.) in the timber asset class.

Recommendation: The Trust Manager should work to put in place a job costing accounting system to track where time is spent and allocate expenses to specific properties and/or harvesting opportunities. Furthermore, to follow on the example noted previously, due to the slower growing and remote characteristics of the East side timber lands, if a job cost accounting system were in place, they may not be profitable and management could make an informed judgment whether to harvest the East side..

Asset Classes Most Impacted: *All asset classes*

5. Topic: Actual Expenses vs Operating Cost Percentage Deduction

Description: Currently, a percentage of revenue is held back and remitted to the Trust Manager to pay for the costs related to operations and management of the trust lands. This "Operating Cost Percentage Deduction", or management rate, is not well-correlated to reflect actual costs and/or liabilities. For some assets, the management fee or cost is much lower than the actual costs and liabilities. In this case, revenues from other assets and funding sources may be used to pay for the costs related to that asset class. For other assets, the management fee or cost is much higher than the actual costs and liabilities, resulting in lesser revenue distributed to the beneficiaries.

Impact of Issue: In some cases, profitable asset classes or activities are subsidizing unprofitable asset classes or activities. For example, the Commercial Real Estate asset class has typically incurred an Operating Cost Percentage Deduction of 31% for ground lease assets and improved property leased assets. Nationally, commercial real estate is widely managed by independent commercial real estate firms. For example, a simple telephone interview of real estate brokers in the state of Washington indicated the following rates for property management:

- Ground Lease Assets: 2% to 3% of gross revenue
- Improved Property Leases: 4% to 6% of gross revenue

Property management services provided include regular site visits to confirm allowable uses by the tenants, monitoring of age and condition, coordinating leasing activities, inventory of the existing improvements (square footage, mechanical systems, tenant allowances, etc.), preparation of monthly profit and loss reports, budgeting and variance reports, accounts receivable status reports, leasing status reports, etc.

These private property management services appear to be more comprehensive than currently provided by the Trust Manager, yet the independent property management cost is substantially lower than the current Operating Cost Percentage Deduction. It appears that the excess amount (actual Operating Cost Percentage Deduction less private-market property management fees) received by the Trust Manager is likely subsidizing other asset classes and activities.

There are examples where this is apparently the case. For example, the following assets (listed in the tables below) are managed by third-party real estate managers. It should be noted that in some cases the property management fee is paid by the tenant (Creekview Building and Boulevard Center noted in the table below), yet the Operating Cost Percentage Deduction amount is withheld and paid to the Trust Manager.

Trust Assets Managed by Third-Party Brokers

FIGURE 2

Asset	Broker Management Fee Structure	Mgmt Fee Paid 2017	Mgmt Fee Paid 2018	Mgmt Fee Paid 2019	Current Vacancy %	Notes
Creekview Building	3,5% of base monthly rent collected, with $1,000/mo. minimum fee.	$12,647.00	$13,474.00	$12,152.00	50%	PM fee is a pass-through per tenant leases
Boulevard Center	Fixed - $2,500/mo.	$30,000.00	$30,000.00	$30,000.00	19%	PM fee is a pass-through per tenant leases
I-90 Lake Place, Bldg B	Fixed $2,500/mo. with annual CPI adjustments commencing Year 3.	$30,000.00	$30,000.00	$32,126.00	100%	

The three assets in Figure 2 can provide an example where actual costs would increase the net cash flow to the trust beneficiaries. Using Creekside Building as a proxy, Figure 3 compares third-party management fee to the Operating Cost Percentage Deduction.

FIGURE 3

Creekview Building	Mgmt Fee Paid 2017	Mgmt Fee Paid 2018	Mgmt Fee Paid 2019	Comments
Management Fee - Actual	$12,647	$13,474	$12,152	Paid by tenant - No cost to beneficiaries
Management Fee %	3.50%	3.50%	3.50%	PM fee is a pass-through per tenant leases
Total Revenue (Gross up = Mgmt Fee/Mgmt %)	$361,343	$384,971	$347,200	
Operating Cost Percentage Deduction	31%	31%	31%	
Amount Remitted to Trust Manager	$112,016	$119,341	$107,632	Cost to Beneficiaries

In this particular case, using actual management fee would result a $90,000 increase in net cash flow available to the trust beneficiaries; this is 8.8 times higher.

A high-level comparison of the Operating Cost Percentage Deduction (OCPD) amounts received by the Trust Manager to actual expenditures (amount allocated to each asset class) creates additional questions regarding the methods and consistency between reporting periods. As can be seen in Figure 4, it would appear that some asset classes are not increasing net cash flow in the reported period of time.

FIGURE 4

Asset Class	FY18 Gross Revenue	FY18 OCPD $	FY18 Actual Expenses	OCPD Minus Actual Expenses
Commercial RE	$10,911,373	$3,385,271	$808,960	$2,576,311
Communication Sites	$4,809,193	$1,434,592	$1,442,007	($7,414)
Mining	$1,561,113	$520,076	$641,435	($121,359)
Agricultural	$24,645,595	$7,660,420	$1,732,328	$5,928,092
Grazing	$1,060,399	$334,479	$961,965	($627,486)
Timber	$174,383,083	$49,633,129	$53,934,126	($4,300,997)
Other Resources	$3,079,134	$974,306	$3,599,890	($2,625,584)
Total	**$220,449,890**	**$63,942,273**	**$63,120,711**	**$821,562**

In other cases, asset classes are incurring liabilities, for example deferred maintenance or investment, due to the insufficiency of funds provided by the Operating Cost Percentage Deduction. Another example increases in labor and other costs, have diminished the ability of the Trust Manager to make necessary silvicultural investments or tenant improvements which would be customary in operating the properties to maximize returns. This has resulted in the delay or elimination of essential treatments, such as those to improve stand growth rates and timber quality that would increase the overall value of those stands at the end of their rotation.

Similarly, in the case of Communication Sites, the Operating Cost Percentage Deduction has been insufficient to pay for maintenance of towers and associated facilities. Industry standard for covering costs for communication sites is in the range of 60-80%, as compared with the Operating Cost Percentage Deduction, which is 25-31%. Because of this, the Trust Manager has been unable to fund maintenance of the communication sites and facilities adequately, leaving them in a suboptimal condition. Due to this dilemma, the Trust Manager is moved more towards cost-reduction strategies, such as focusing on ground leases, versus revenue-growth opportunities.

Recommendation: Use actual costs instead of the Operating Cost Percentage Deduction. Actual costs would work with the other recommendations regarding using a for-profit accounting system and analyzing and identifying unprofitable activities and asset classes. For example, an actual cost budget could be established on a rolling five-year basis to account for general cost trends and budgeting for large expenditures that may be required.

Asset Classes Most Impacted: *All*

6. Topic: Peer Assessment – Public Entities and Private Operating Companies

Description: The Trust Manager does not have any peer assessments scheduled to evaluate performance. Peers, as defined for this purpose, would be other states with trust land obligations. In addition, the Trust Manager does not have any peer assessments scheduled to evaluate performance. If the decision is made to implement a for-profit accounting system and financial statements, peers, as defined for this purpose, could also include other public/private entities with similar operations.

Benchmarking

Like the Washington Trust Manager, states like Oregon, Idaho, and Montana do not publish detailed financial information regarding operating expense nor the method of accounting for these costs. Some show net revenue only, while others show gross revenue. Further the financial reports present costs as a single line item without detail. As a result, benchmarking against other states with similar trust land operations is not really meaningful, if the comparability of the data cannot be confirmed. Further, at present, comparing the Washington trust land to private market participants is not as reliable as it could be, given the difference in financial reporting detail and methodology.

Impact of Issue: Without a peer assessment, it is difficult for beneficiaries and other governmental agencies to evaluate performance of the Trust Manager versus similarly situated public entities with similar responsibilities.

Recommendation: Consider preparation of reciprocal biannual peer assessments with other state trust land managers. This would require an agreement between the parties as to the level of detail and how financial data is reported, as well as expenditure of the costs associated with preparation.

7. Topic: Data Management

Description: The Trust Manager's lease management systems currently tracks land and revenues at varying scales and level of specificity, depending upon which asset class, data type, and data system is under consideration. For example, leases may be labeled as belonging to a certain asset class based upon their predominant usage (e.g., "a dryland agriculture lease"), and yet contain a variety of revenue streams one would typically associate with other asset classes, such as wildlife habitat or grazing. Since Trust Manager's data addresses these types of examples differently, inconsistent results can be produced from the system in place.

Impact of Issue: The complexity of the current lease management system makes it very difficult to answer basic questions about the Trust Manager's lease management and portfolio performance in a consistent and efficient manner.

As an example, it is difficult to quickly and simply answer questions on leases regarding how many acres are included within a particular lease and/or what are the revenues associated with a particular lease.

Recommendation: The Trust Manager should work to identify the questions that are foremost priority for operating staff to answer, and structure any replacement data systems or enhancements around answering these questions. The replacement or enhanced systems should also prioritize integration among each discrete component: real estate, financials, lease management, and GIS. Finally, it will be essential for the Trust Manager to conduct training on the new system to ensure that all users follow a consistent approach for answering business-essential questions.

Asset Classes Most Impacted: Timber, Commercial, Agriculture, and Grazing

8. Topic: Lack of Access to Capital for Investments

Description: The Trust Manager is unable to accumulate a capital base to make significant investments such as to develop property and or invest into new properties or other alternative investments. This is due, in part, to the fixed percentage (Operating Cost Percentage Deduction) that often does not pay adequately for all of the costs associated with many asset classes, including timber, and therefore does not provide the Trust Manager with an adequate reserve for continued investment in the asset class.

It may also result from the path of revenue related to the permanent funds on federal trusts and the lack of permanent funds for statutory trusts. For federally granted trusts, when individual parcels or non-renewable resources are sold, the royalties go into the permanent fund. Once cash is invested into the permanent fund, the Trust Manager does not have access to funds for asset management purposes or continuing investment in the asset classes. For statutory trusts, there is no permanent fund.

Impact of Issue: The retention of cash or access to capital via debt by the Trust Manager is integral to the manager's ability to provide a suitable and competitive investment return and to maximize cash flows. Management is unable to make strategic investment decisions because it cannot retain cash and provide new development opportunities. It is difficult to increase the returns available without continuing investment in the asset class.

Recommendation: The Trust Manager should be able to retain capital from earnings to continue to reinvest in the asset classes, and therefore better manage assets by reinvesting in properties already owned or new opportunities. This will allow the Trust Manager to operate the asset classes more like a typical asset manager and make appropriate investments to ensure cash returns are maximized throughout the asset life cycle.

Asset Classes Most Impacted: *All*

9. Topic: Divided Governance of Assets

Description: Currently the land assets are governed by the Board of Natural Resources, while the Permanent Funds (equities) are managed under Washington State Investment Board.

Impact of Issue: The majority of the land assets managed by the Trust Manager are of a low risk/low return nature, for example the timber land asset. Some of Trust Manager asset classes, such as commercial, are in the medium risk/return category but are current small in terms of the overall portfolio. Based on a review of Washington State Investment Board (WSIB) management practices, the cash manager does not invest the cash in any high-risk/high-return asset classes once they have the cash in hand than is achieved by the Trust Manager. The cash is typically placed into short-term cash low risk/return equivalent investments. This results in a non-diversified portfolio that does not fulfill its potential value.

Recommendation: We recommend that the Trustee manage all of the trust assets collectively, including the land assets and the equities within the permanent funds, under one governing body. This would allow the appropriate diversification of these assets to optimize risk and return. For example, timber and commercial are low risk categories, commercial is medium risk. A portfolio should diversify these risks. Once managed collectively, it is likely that the more cash-oriented assets could be invested in higher-risk funds to balance the overall portfolio.

10. Topic: Inconsistent Revenue Distribution

Description: Trust beneficiaries are receiving unreliable revenue.

Impact of Issue: Beneficiaries, particularly local governments like counties or taxing districts, are unable to predict when they will receive trust land funding, sometimes putting essential services, such as emergency response, at risk.

Recommendation: The Trustee should consider formation of a voluntary permanent fund to allow beneficiaries to retain cash in a similar manner as other state agencies (Idaho, Montana, etc.) to invest in properties, retain cash and manage cash-flow.

11. Topic: Commercial Real Estate (Transitional Land)

Description: The Trust Manager has a transitional land program that identifies land that is transitioning from a prior use (timber, agriculture, etc.) to a more profitable use (commercial, agriculture, etc.) However, it is difficult to ascertain how this process is tracked, monitored, and where these designated lands are located.

A new asset class for these "Transitional Lands" should be established to allow for more proactive activities surrounding these lands. Furthermore, enhancements to an updated land inventory system could assist both the Trust Manager and private and/or public developers to identify these transitional lands and their more valuable and productive alternative uses.

Impact of Issue: These transitional lands are being managed by the Trust Manager because cities historically have taken some of this land and downzoned it or utilized it for recreation or similarly less productive purposes and uses versus residential or commercial development. While this produces a public benefit, it is not consistent with the Trust Manager's duties to the trust beneficiaries to maximize returns as the reduction in zoning impacts the value. These actions and activities may adversely affect the potential cash flow distributions beneficiaries.

Recommendation: An evaluation should be completed of the benefits and costs of establishing Transitional Lands as a separate asset class. Also consider conducting an assessment of all existing statutes and/or regulations that inhibit the Trust Manager's ability to transact commercial real estate and seek revision so that they are more aligned with modern commercial market practices.

Further, the Trust Manager should consider updating policy guidelines to actively move these Transitional Lands into land uses that produce higher net income for the trust beneficiaries. This may warrant creation of an advisory council or expert team to assess and monitor an expanded commercial land program in the belief a majority of these transitional lands will be utilized for commercial purposes (housing, retail, or other uses). This new advisory council should be allowed to authorize modifications to an "auction only" bidding process and allow for negotiated sales. Finally, the Trust Manager should continue to improve existing or new databases allowing both private and public developers to evaluate and monitor these lands in the transitional category. This is likely a satisfactory method for publicizing the availability of transitional land for private development and creating a more agile and quick process for managing commercial properties.

Asset Classes Most Impacted: *All*

12. Topic: Recreational Trails on Trust Manager Lands

Description: In spite of RCW 79.10.120, which provides that if multiple uses (i.e., recreation) are not compatible with the financial obligations in the management of trust land they may be permitted only if there is compensation from such uses satisfying the financial obligations, it is our understanding that recreational trails can interfere with the ability of the Trust Manager to move transitional land or potential commercial lands towards reuse and new development.

Impact of Issue: The ability to develop land by a future user could be impacted by recreational trails. Delays and/or difficulties in managing land uses, especially of adjacent or nearby properties, impact potential cash flow distributions. This may reduce the net cash flow potential of these lands to the beneficiaries.

Recommendation: The board should consider developing additional policy guidance to the Trust Manager for the establishment, alteration and use of recreational trails and facilities on trust lands. In general, the Trust Manager should actively monitor recreation trails on transition lands due to the potential impacts on land value for these lands. In addition, proposals concerning trail establishment, modification, relocation, or termination should be reviewed and revised, so as not to impair net income generating potential in reuse or redevelopment. Finally, the Trust Manager should be able to ask the Trustee for adequate funds to manage recreation to ensure compatibility with trust management obligations.

Asset Classes Most Impacted: *All*

13. Topic: Provide Reliable Cash Flow to Beneficiaries

Description: At present, the Trust Manager manages trust lands based in part upon their "trust domicile" – i.e., which of thirteen different trusts is entitled to the net income generated by lands associated with that trust. The work completed for this Trust Lands Performance Assessments suggests that consideration should be given to a process that would collapse all of the separate trusts into a single trust for management and administration purposes.

Impact of Issue: It is clear that a significant management and administrative effort is made annually to both manage the trust land assets (land management) and to administer them (asset management) in their separate trust structures. Maintaining the separate trusts may result in duplicative administrative activities and costs and that these costs reduce the net income available for distribution to the beneficiaries. It may also be possible that maintenance of the separate trusts results in land and asset management decisions that are suboptimal and impair operations and net income.

Recommendation: We recommend that the Trustee undertake a specific study of the costs and benefits of collapsing the several different trusts into a single land trust management and administrative structure, evaluating, among other elements, the impact upon land and resource management, revenues and operating expenses and administrative and overhead staffing. Following completion of the study, the Trust Manager should prepare a plan or program for the implementation of the findings of the trust consolidation study, including recommendations for legislation, regulatory action, policy changes, and associated stakeholder involvement and public communications.

14. Topic: Use of Debt to Smooth Distribution of Trust Net Income

Description: Because of the natural resource commodity (primarily timber) that drives net income for distribution to trust beneficiaries varies based on market conditions, trust beneficiaries must deal with the variation in distribution from year to year incidental to the use of those proceeds. For example, variation in distributions to higher income has to be accounted for in the funding streams for educational facilities (higher reserve amounts or additional credit support) and counties have to accommodate this variation in their annual operating budgets, or if applied to capital expenditures, in higher reserves, slower funding, or both.

The US capital markets have become quite adept at creating stable funding structures based upon variable dollar inputs. The techniques are used very widely, particularly in consumer finance products such as mortgages, consumer loans and other forms of consumer finance. Similarly, these techniques have been used for commercial mortgages and commercial lending. All of these programs share common elements of irregular income streams (such as rents, incomes or loan payments) entering into a trust that then issues a note or security that pays regular amounts to a third party or a related party. As applied to the trust beneficiaries, the variable net annual income from trust land operation would be pledged to a trust or intermediary in return for a stable annual income for a period of years.

Impact of Issue: From our work on the TLPA, we are left with the strong impression that variability in the net income from trust land operation is at the heart of the frustrations of beneficiaries with the Trust Manager. We believe that any formation of multiyear stabilization of net income may reduce beneficiary frustration and improve relations between the Trust Manager and the trust beneficiaries.

It is important to remind the reader that this use of debt to smooth distributions carries a material cost associated with the program, and the cost of this program is not clear at this time. Much as a borrower pays interest to a bank that provides a loan, this program would have a true net cost to the beneficiaries, in the form of interest expense, setting aside of financial reserves and deferral of income. What is much less clear at this writing, however, is the value or worth of the stability of income distribution to the beneficiaries.

Recommendation: We recommend that the Trustee explore the establishment of a program to borrow money to distribute beneficiaries evenly over a period of time, in order to level out the cash flow to the beneficiaries. Such a program may involve working with the state treasurer's office and the Washington State Investment Board. We believe that the detailed work evaluating the feasibility and net cost of such a program will be largely done by investment banking firms with established relationships with the State. We envision that as many as three investment banking firms may be engaged to evaluate the feasibility and cost of such a program. Once the results of those studies are received by DNR, the agency can expose the results of feasibility and cost to beneficiaries to gauge the interest in and impact of such a program. If the program appears to be of interest to beneficiaries, the agency can then identify the legislative and regulatory changes necessary to allow implementation. It is possible, we think, that the benefits of income stability may well be worth the program cost to trust beneficiaries.

ASSET CLASS: TIMBER

T1. Topic: Land Management Assessment

Description: As currently structured, the Trust Manager is unable to break this asset into smaller units to evaluate those that generate income from those that do not for measurement and performance assessment.

Impact of Issue: The inability to assess which lands are producing more income than others hampers the ability to make well informed management decisions to maximize revenues for each of the trust beneficiaries.

Recommendation: The Trust Manager should work to put in place a system to track land revenues and expenses to assess effectiveness of management of income producing land resources versus non-income producing land resources.

T2. Topic: Data Extraction System – Timber Appraisals

Description: The Trust Manager currently collects an array of data related to past and future timber sales, including (but not limited to) anticipated volume, retail pricing to be assumed achieved, road and bridge construction costs, clear costs, logging costs, and others. However, the data is not located in one system and is only retained in the individual appraisal files. Therefore, for example, when evaluating the prior sales of timber, in order to understand volumes, retail pricing assumed and achieved, and logging costs, individual appraisals need to be individually reviewed and extracted to a database. The data is not currently gathered. The data is prepared in evaluating the auction initial bid amounts and provided in both internal appraisals and externally completed appraisals.

Impact of Issue: The inability to evaluate the retail values and average logging costs for each bid makes it more difficult to identify what factors may be causing bids to either exceed minimums significantly or, conversely, to not achieve minimum bids.

Recommendation: The Trust Manager should work to put in place a single system to track all elements relating to the financials of a particular property, including the retail values of timber, logging cost, extraction cost, development costs, and other pertinent information. This should be collected both from internal appraisals and externally prepared appraisals. Furthermore, any data that is provided actual costs incurred by winning bidders to harvest the timber should also be collected and tracked.

T3. Topic: Harvest Model Application

Description: Ideally, it is better to harvest more in favorable market conditions and harvest less under unfavorable market conditions. However, timing the market in this manner presents the problem of reliably distributing revenue to beneficiaries over time. For example, during the periods where the Trust Manager does not sell, it is not distributing revenue to the beneficiaries.

Impact of Issue: The inability to distribute income in other manners can result in suboptimal harvesting decisions.

Recommendation: The Trust Manager should use any tools available to optimize selling during favorable market conditions. However, the Trust Manager's ability to implement this recommendation and avoid any impacts to the distribution of trust beneficiary revenue would be greatly enhanced by other mechanisms to ensure reliable income is provided to beneficiaries, such as implementing general recommendation #14, "Use Debt to Smooth the Distribution of Trust Net Income."

T4. Topic: Rotational Cycle

Description: There are three categories of harvestable acres on the trust land base: riparian management zones, uplands, and general ecological management (GEM) lands. The first two categories encompass acres that are harvestable but restricted to either thinnings or longer rotations due to HCP commitments to manage for salmonid, NSO or murrelet habitat, or hydrologic maturity. GEM lands are not restricted, and yet the average age of harvest is typically older than private industry. In evaluating the typical harvest rotational age, it would appear private industry would use 40 to 50 years. The Trust Manager both has policy direction to optimize harvest rotations to ensure maximum revenue and is on a path toward implementing similar rotation lengths on GEM lands. However, significant acreages of GEM stands older than 40 to 50 years remain on the landscape.

Impact of Issue: The higher harvest rotational age likely impacts cash flows.

Recommendation: The Trust Manager should continue to strive to harvest stands on GEM lands so that it may enacting a shorter harvest rotational cycle to allow the Trust Manager to increase yields.

T5. Topic: Approach to Harvesting Decisions

Description: The Restriction chapter describes how 40% of the available land portfolio in the timber asset class is either not or only partially harvestable. This was due to a decision made by the Trust Manager to negotiate a Habitat Conservation Plan to obtain an incidental take permit, in order to ensure that a land base containing a larger percentage of older forests would comply with the Endangered Species Act and provide operational certainty to its beneficiaries.

Impact of Issue: Some industry competitors suspect that the acres needed to mitigate for the incidental take in the HCP may result in lower net incomes and returns compared to private industry's compliance with Forest Practices.

Recommendation: Work with the beneficiaries, stakeholders and, as necessary, the legislature to conduct a cost/benefit study to evaluate the protections in place for trust lands under the State Lands Habitat Conservation Plan with other approaches to Endangered Species compliance on a similar land base, in terms of age class range and proportions of the land base in those age classes.

T6. Topic: TIMO Management Model Project

Description: The Trust Manager manages all trust timberlands in a uniform manner. This management and oversight regime is routinely criticized by trust beneficiaries as being ineffective and costly, resulting in less net income for distribution than trust beneficiaries believe is possible.

Impact of Issue: The dissatisfaction of the beneficiaries and the continuing allegation that the Trust Manager is less efficient than private industry peers give rise to conflict between the Trust Manager and beneficiaries. The conflict may empower other stakeholders to the disadvantage of both the Trust Manager and beneficiaries.

Recommendation: The Trustee should work with the beneficiaries, stakeholders and Trust Manager to design, fund and implement a study to compare the services provided by the Trust Manager to the services provided by a TIMO. Those services may include (but are not limited to) forest management and timber sales for purposes of establishing revenues, income, and returns on a similar land base in terms of age class range and proportions of the land base in those age classes.

ASSET CLASS: COMMERCIAL REAL ESTATE

C1. Topic: Asset Management Function

Description: From a review of the information available, it appears the current asset management practices are not actively managing the commercial properties adequately. Asset management should involve the active management of preservation and growth monitoring of capital needs at a property, tenants, lease rollovers, and other responsibilities. However, under Trust Manager's stewardship, there is at least one improved property that has been vacant since 2014. This asset must be managed more actively to reduce the likelihood of buildings going year after year without tenancy.

Impact of Issue: The inability to actively manage the assets impacts the rental rates achieved and ultimate cash flow achieved from the commercial properties.

Recommendation: The board should evaluate the best way to ensure active management of trust assets. We are aware that certain functions, like property management, are already in place. Perhaps addition of an asset manager to the list of outsourced activities should be considered.

ASSET CLASS: COMMUNICATION RESOURCES

CC1. Topic: Record Keeping

Description: The Trust Manager currently does not have record of what improvements are included at each communication site, who owns the improvements (Trust Manager vs. lessee), as well as (over a given period of time) what the allowed and used communication type is; as an example, a contract for a site being utilized for radio transmissions between 2015 and 2018 was modified to TV transmissions in 2018 with no way to update the records in the database.

Impact of Issue: The inability to properly record and manage uses of communication sites can result in uses that are impermissible per the lease agreement in place.

Recommendation: The Trust Manager should work to put in place a software system to properly manage the communication sites and associated leases.

ASSET CLASS: GRAZING

G1. Topic: Rental Rate Determination

Description: The Trust Manager currently establishes rent annually for grazing permits on an AUM basis – Animal Unit Months – consistent with the formula in WAC 332-20-220. This should be evaluated periodically to ensure it is keeping pace with grazing leases on state and private lands. Grazing leases also use AUM's to establish rent. Currently rent is determined using a five-year rolling average of the National Agricultural Statistics Service (NASS) report AUM values for Washington.

Impact of Issue: Revenues may be captured in an incorrect manner if permit fees are not modified regularly along with evolving industry standards.

Recommendation: We recommend that the Trustee undertake a study, on a periodic basis, to compare the Trust Manager's agreements (including but not limited to leases, both initial and renewal terms, permits, and fees) with private and federal equivalents in order to confirm that the grazing program is earning revenue that is market based and standard with how private industry operates

CONCLUSION

The recommendations in this section are based upon our study, and many are consistent with the recommendations that have been provided to the Trust Manager in other past studies completed by or provided to the Trust Manager; these prior studies are outlined in the summary in Appendix C. We also recognize that many of the recommendations in this TLPA analysis are consistent with observations and recommendations completed by Deloitte in the 1996 study.

At this point, it is important that management actions be taken by the Trust Manager to be as effective as possible in producing net income for the beneficiaries. The trust manager needs to be allowed to be more active in improving and diversifying trust land revenue streams through improved effectiveness.

The reader should remember that the ownership and operation of trust lands are unique. Ownership of the trust lands resides with the State of Washington, while the net income benefits of the trust land portfolio lie with a group of defined beneficiaries. Neither the State nor the beneficiaries of the trust lands have complete discretion and control of the management of the land portfolio and its operating net income. Both are also subject to the federal and state statutes and regulations that influence land management, as well as the oversight of the lands through the Board of Natural Resources.

Notwithstanding the ownership of the land portfolio, the duties of the state to its defined beneficiaries and the overlay of applicable federal and state laws, regulation and policy, among the highest duties of the trust manager is the production of net income for distribution to the beneficiaries and the maintenance of intergenerational equity among beneficiaries. We believe that in order to better manage the trust land portfolio and produce net income, efforts to make the business operations of the land portfolio more efficient must continue. With over $200 million in annual revenue and with a mandate to produce a profit for the beneficiaries, the trust lands are a business enterprise and they should be managed in a business-like manner. We believe this is possible, but it may require ongoing review and potential change to the existing framework of applicable laws, regulations and policies governing the Trust Manager and the trust lands within the land portfolio.

The approach to trust land operations and management needs to continue to move towards greater business and beneficiary-oriented practices, with a strong emphasis on the dollar productivity of the land portfolio. We acknowledge that because the land portfolio is a public asset and not a private asset, certain management options and practices must continue, and that these practices will or may result in reduced or less productive operations than if the trust lands were privately held. Trust beneficiaries must also recognize that they are not the owners of the trust lands but only a beneficiary of its operating net income. Ultimately, the management and operations of the trust land portfolio is a complex balance that seeks to provide the best possible long-term stewardship of the land portfolio asset, while providing an effective distribution of net income to its defined beneficiaries. We believe that a continued focus on entrepreneurship and business-like management of the land portfolio and using the best practices of private industry wherever possible is in the best interest of good asset stewardship as well as meeting the on-going and ever-changing needs of the defined beneficiaries of the trust land portfolio.

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Little Pend Oreille National Area Preserve *Source: WA STATE DNR*

Appendix A

Restrictions upon the Sale of Trust Lands

Restrictions upon the Sale of Trust Lands

The sale of State Trust Lands addressed in this Trust Land Performance Assessment (TLPA) are restricted. The following is a brief summary of the legal restrictions on both federally granted trust lands and state forestlands.

Federally granted lands were established by the Washington Enabling Act, 25 Stat. 676 (1889) and the Washington Constitution, Article XVI. In particular, Article XVI, Section 2 requires that sales occur at public auction and Section 4 limits the parcel size of any sale of federally granted land to 160 acres.

The Revised Code of Washington (RCW), Chapter RCW 79.11 establishes statutory requirements for the sale of federally granted lands, including RCW 79.11.010 which sets forth the maximum acreage for any single sale at 160 acres with no minimum acre size, and RCW 79.11.090 which states "all sales of land under this chapter shall be at public auction, to the highest bidder…".

RCW 79.11 contains a variety of other provisions related to the sale of federally granted land, including appraisals, sale notice and auction procedures, provisions for a contract for sale, including installment sales.

State forestlands (State Forest Transfer and Purchase trusts) are forever reserved from sale under RCW 79.22.050.

In several chapters of this report, reference is made to the valuation impact of these provisions on the Trust Value conclusions of this analysis. The purpose of this discussion is to describe in greater detail why the restrictions upon sale have a valuation impact and influence the findings of value, return, and our evaluation of the management of the trust lands under analysis.

THE ABILITY TO SELL IS ONE OF THE PRIMARY ATTRIBUTES OF A REAL ESTATE INVESTMENT

Fee simple ownership of real property is often analogized to a "bundle of sticks," in which each of the several rights in real property is a single "stick" (i.e., a specific ability to do something with the real property under review or evaluation). For example, the ability to convey use of the property by a lease or rental agreement is one of those rights held by the property owner.

The right to sell real property is one of the most basic rights in real property, held by the property owner. "Fee simple" means that the owner of the property holds all or almost all of the property rights, including the right to sell the property, without restriction. It is also appropriate to acknowledge that the rights held by the fee simple property owner are exclusive—they do not have to be shared with any third party, public or private. If that owner chooses to sell the property, the proceeds from the sale of the property are enjoyed exclusively by the former owner—subject, obviously, to the obligation to pay any fees or taxes resulting from the sale.

If real property cannot be sold, it stands to reason that the "bundle of sticks" (i.e., the rights and privileges of ownership) is fewer than if the property could be sold. It also stands to reason that the value of that property that cannot be sold is likely lower, because the owner's ability to enjoy all of the rights of property ownership is less. How much lower? It is somewhat difficult to say—based on the use of comparable sales—because properties with such a restriction cannot be sold. We can, however, use income-based analysis of the property in order to form an opinion about the impact on the value of a restriction upon sale.

As it pertains to the trust lands evaluated in this TLPA, the restrictions upon sale are relevant precisely because the TLPA analysis seeks to value the entirety of the upland trust land portfolio—at about 2.9 million acres. It is because of the parcel size restriction in the Washington State Constitution and RCW 79.11.010 (160 acres) for the federally granted lands and the reservation from sale of the state forest lands, that we must include the impact of these restrictions upon sale. Simply put, state forest lands cannot be sold and for the federally granted trust lands that can be sold, the acreage limit is so small in comparison to the size of the entire holding, that the investment[1] in the trust land portfolio, in large part or in whole, effectively cannot be sold.

For example, with over 2.2 million acres of federally granted trust lands[2] land across the several asset classes, it would take more than 13,750 separate transactions of 160-acre parcels in order to sell the federally granted trust land portfolio. It is not functional for a land asset or, for that matter, any type of asset, to have to execute thousands and thousands of transactions to liquidate the holding. The inability to sell the lands in a manner commensurate with the scale of the holding is, in effect, a prohibition upon the sale of the lands, and must be taken into account in any valuation analysis.

MATERIALITY—THE SCALE OF THE PARCEL SIZE LIMITATION UPON SALE OF FEDERALLY GRANTED TRUST LANDS

In the preceding discussion we make clear the effect of the statutory restriction of parcel size (permitted to be sold) in the context of the larger holding. It should be clear to the reader that, on its face, the size restriction makes the complexity of selling the entire holding so ineffective as to functionally be a limitation upon the sale of the property. It would take years to accomplish such a liquidation, with the time value of money devaluing the proceeds, and the incremental nature of the sales would severely limit any functional reinvestment of the proceeds of sale into any other type of asset.

A second, and equally important, impact of the parcel size restriction is that it causes the proceeds of sale to be very small (conceptually each sale representing only 0.007% of the combined trust land inventory—about $76 for every $1,000,000 of asset value, that the financial impact of any sale or group of sales to be *financially immaterial*. While there is no single standard for financial materiality, estimates of material amounts typically range from 1% or 2% to not more than 5%. Using the lower standard, we could say that a minimally material sale size would be at

[1] For the purposes of this assessment, trust lands are considered an investment. In actuality, the federal government transferred the federal granted lands to the state to support the named beneficiary institutions instead of cash. The state forestlands were acquired by the county at foreclosure sales for nonpayment of taxes, then transferred to the state, or acquired by the department consistent with RCW 79.22.020.

[2] *There are over 600,000 acres of state forestlands in the portfolio that are reserved from sale under RCW 79.22.050

least 22,000 acres (1% X 2,200,000 acres); we would still have to complete 137 transactions at 160 acres each to complete a sale that even the most conservative observers would consider material.

From a portfolio investment perspective, we believe that the minimum transaction size that most professional portfolio managers would regard as "sufficiently large" to constitute functional liquidity of the trust land portfolio would be about 25% of the portfolio (either in acreage or in value). Therefore, we believe that in order for a professional portfolio manager to conclude that a Trust Value adjustment was not necessary, the portfolio manager would have to be able to sell as much as 25% of the portfolio at any point in the life of the portfolio.

Notwithstanding the adverse impact on the portfolio Trust Value of the parcel size restriction under the Washington State Constitution and RCW 79.11.010, we find that the financial implications of the physical sale size restriction (i.e., the inability to transact in dollar amounts that represent a material share of the portfolio's value) is adverse and warrants an adjustment to the Trust Value conclusion.

MEASUREMENT OF THE IMPACT UPON VALUE

Income property—also known as "investment property"—generates net income from (usually) rental operations. The net operating income remaining at the end of a month or year contributes to the return on an of investment. Usually, investment property is held for a period of years, and then is sold at a market price to a third party.

At the time of sale, the sales price (net of costs of sale) is then available (in dollars) to provide both a return *of* capital, and a return *on* capital. Therefore, we can see that the net income from property operations during the holding period, and the net sales proceeds at the time of sale of the investment property represent a return of the original investment and, potentially, a return on the original investment.

As we consider the restrictions upon sale of the Washington State Constitution, RCW 79.11.010, and RCW 79.22.050 we can also say that the inability to sell land or sell land in financially meaningful amounts limits the ability of the trust beneficiaries to enjoy the return *on* and the return *of* their investment. Simply put, if one cannot sell enough of the assets in a portfolio to have a financially material impact on return, the portfolio is worth less than a comparable portfolio without such a restriction.

We noted above that since there are no or very few sales of properties whose sale is restricted, we cannot rely upon a direct comparison of properties with and without such restrictions in order to estimate the market value or Trust Value impact. We can, however, use income-based analysis to isolate a change in value between an unrestricted and a restricted income property, and we can use that difference as a working estimate or proxy for the value impact of the restriction.

The following is a sample calculation from our earlier example of an income property with a purchase price of $1,000,000 and a year-one net operating income of $75,000. Net operating income is expected to rise at 2.5% per year over the 10-year investment holding period. At the end of the holding period, we expect that the property can be sold at an 8% capitalization rate, with 2% cost of sale. The following are the expected cash flows from net operating income and from sale of the property at the end of year 10:

Year		Property Purchase	Operating Income	Net Sale Proceeds	Total Cash by Year
0	Property Purchase	$ (1,000,000)			$ (1,000,000)
1	Net Operating Income		$ 75,000		$ 75,000
2	Net Operating Income		$ 76,875		$ 76,875
3	Net Operating Income		$ 78,797		$ 78,797
4	Net Operating Income		$ 80,767		$ 80,767
5	Net Operating Income		$ 82,786		$ 82,786
6	Net Operating Income		$ 84,856		$ 84,856
7	Net Operating Income		$ 86,977		$ 86,977
8	Net Operating Income		$ 89,151		$ 89,151
9	Net Operating Income		$ 91,380		$ 91,380
10	Net Operating Income & Sale		$ 93,665	$ 1,147,580	$ 1,241,245
				Internal Rate of Return	9.22%

In the investment cash flow statement above, we see the increase in net operating income, and the sale of the property at the end of year 10, with a sales price of $1,171,000, and 2% costs of sale ($23,420). We also see the calculated internal rate of return (also known as a discount rate) of 9.22%. Therefore, we can say that the total return from this investment is 9.22%. We also note the capitalization rate, which, at the time of purchase or investment was 7.5% ($75,000/$1,000,000) and we have assumed a capitalization rate of 8% at the time of sale.

At the total return rate of 9.22%, the net present value of cash flows in perpetuity is $813,831, suggesting that the present value of the reversion is $186,169 ($1,000,000 – 813,831). A simple view of the value of the investment with a sale restriction is that the value of the income property (that one must keep forever) is $813,831, or about 81.4% of the market value without the sale restriction. In this very simple view of the discount, we could say that the discount is 18.6% for the inability to sell this property.

The above illustrates two attributes of the restriction upon sale: 1) why the maximum adjustment might be 18.6%, and 2) that the adjustment to price or value clearly takes into account more than the simple net present values of the cash flows. In the example above—if an investor was interested only in the rate of return and did not care about the illiquid nature of the investment, the investor would pay $1,000,000 for the investment. We could also say in this scenario, that there is no discount for the restrictions upon sale. The reality is, however, that investors do care about liquidity and they require an adjustment if a sale is restricted. Insofar as real estate is concerned, it is already considered a "less liquid" investment when compared to corporate stocks or bonds. Here, we are talking about real estate as an illiquid asset—one that cannot be sold—yet we lack a firm basis for adjustment. The cost of the inability to sell cannot be measured solely by the illiquid asset; it must be measured in the context of the inability to move that value into another, presumably better-performing, asset.

Such an analysis is beyond the scope of this analysis, but we are confident that a range of adjustment wherein the adjustment lies in a range of 10% to 20%—meaning that the upper limit of the adjustment is set by the difference between the relevant capitalization rate and the total return rate (also called a discount rate or internal rate of return). For example, in our timberland valuation analysis, we have indications of a spread between capitalization rate (income return) of 4.62% and total return of 6.89%—a spread of 2.27% or 227 basis points. This spread would imply a discount for the restrictions upon sale of 32.9%. The greater the spread between capitalization rate and total return rate, the greater the discount associated with the restriction upon sale.

TREATMENT IN THIS TRUST LAND PERFORMANCE ASSESSMENT

In this TLPA, we have made an adjustment for the restrictions upon sale. The adjustment for this influence is as suggested above, based upon an income analysis, wherein we use the total return rate and use that rate in net income capitalization. The resulting indication of capital value is our Trust Value estimate, and it incorporates the adjustment for restriction upon sale.

Using the example above, our Trust Value analysis capitalizes stabilized net income at the total return rate:

$75,000/.0922 = $813,831. This is the Trust Value of the asset that cannot be sold. If the asset could be sold, we would use the market capitalization rate of 7.5% ($75,000/.075 = $1,000,000). Stated earlier, this is a discount of 18.62%.

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Source: WA STATE DNR

Appendix B

Trust Manager Background

Trust Manager Background

TRUST MANAGER (STATE OF WASHINGTON DEPARTMENT OF NATURAL RESOURCES) BACKGROUND

In 1957, several state agencies, boards and commissions were consolidated to create the Washington State Department of Natural Resources ("Trust Manager" or "DNR"). DNR was established to serve, in part, as the manager and operator of state trust lands. The majority of state trust lands managed by DNR are forested lands; however, DNR additionally manages trust lands for agriculture and grazing, commercial real estate, and other uses such as communication sites. DNR also is the steward of the state's aquatic lands and natural areas. In total, DNR cares for more than 5 million acres of state-owned lands. DNR also acts as the primary wildfire control agency in Washington and administers several regulatory programs for the state.

Over half the acres managed by DNR are state trust lands which provide substantial amounts of revenue to trust beneficiaries and benefit the residents of Washington. State trust lands provide the needed funds to construct and maintain the state's public schools, universities, prisons, and state office buildings. Other state trust lands help subsidize hospitals, fire departments, and other public services.

DNR maintains the primary goal of trust revenue production, but also provides additional benefits. State trust lands provide recreational opportunities, clean water, wildlife habitat, commodities, and a large number of job opportunities.

Board of Natural Resources.[1]

The Board of Natural Resources sets policies to guide how DNR manages Washington state's lands and resources. The board was formed when DNR was created in 1957.

The Board has several responsibilities to

- approve trust land timber sales,
- approve sales, exchanges, or purchases of trust lands, and
- establish the sustainable harvest level for forested trust lands.

The board also serves in three other roles:

1. *Harbor Line Commission*: Establishes or relocates harbor lines to define boundaries for commerce and navigation in the state's navigable waters.
2. *Board of Appraisers*: Carries out the Washington State Constitution's requirement that no lands granted to the state for educational purposes be sold except to the highest bidder at public auction unless improvements have been established by a Board of Appraisers.

[1] https://www.dnr.wa.gov/about/boards-and-councils/board-natural-resources

3. *Board of Geographic Names*: Hears and considers recommendations from the Committee on Geographic Names for naming lakes, mountains, streams, places, towns, and other geographic features within the state.

Below is a list of the members of the Board of Natural Resources for the state of Washington.

- **Hilary Franz** – Chair of the Board, Commissioner of Public Lands
- **Bill Peach** - Vice-Chair of the Board, Clallam County Commissioner
- **Chris Reykdal** – Washington State Superintendent of Public Instruction
- **Andre-Denis G. Wright** – Dean of the College of Agricultural, Human & Natural Resource Sciences
- **Jim Cahill** – Senior Budget Assistant to the Governor for Natural Resources
- **Dan Brown** – Director of School of Environmental and Forest Services, College of the Environment University of Washington

Management Structure.

DNR and its approximately 1,500 employees is led by the Commissioner of Public Lands, an elected official. The Commissioner directs the management of state-owned lands, supervises DNR's wildfire protection on millions of acres of state and private forest lands, and chairs the Board of Natural Resources and the Forest Practices Board. Reporting directly to the Commissioner is the Director of Tribal Liaisons, the Chief of Staff and the Chief Operating Officer.

The Chief of Staff primarily oversees staff responsible for external communication:

- The Communications Director, who heads DNR's Communications and Outreach Group;
- The Special Assistant;
- The Senior Advisor, who supervises the Policy Director and the External Affairs and Community Engagement Director; and
- The Legislative Director, who heads the Legislative and External Affairs team. This team's services include issue and bill advocacy on behalf of DNR to the legislature, Governor's office and other stakeholder groups; issue and bill tracking; guidance on preparing legislative testimony; assistance on coordinating legislative tours; coalition building; legislative correspondence; submission of legislative reports; and reporting of lobbying activity to the Washington State Public Disclosure Commission.

The Chief Operating Officer oversees staff responsible for the day-to-day operation of the agency:

- The Director of Employee Experience, who supervises the Human Resources Division Manager;
- The Safety Manager;
- The Wildland Fire Liaison;
- The Chief Law Enforcement Officer;
- The State Geologist (who oversees the Washington Geological Survey);
- Region managers; and
- Deputy supervisors

DNR has five deputy supervisors, each of whom manages one or more divisions. Following is a list of each deputy supervisor and a description of the division(s) they manage.

1. **Deputy Supervisor of State Uplands**

   - **Forest Resources:** This division manages working forests on forested state trust lands to provide sustainable revenue and quality habitat, clean water, and other public resources. This division calculates the sustainable harvest level; manages forest inventory, GIS and timber sale data; writes policies and procedures; conducts ecological research; provides silvicultural expertise to DNR's regions; and grows millions of seedlings. This division also ensures DNR remains in compliance with the *State Trust Lands Habitat Conversation Plan*.
   - **Product Sales and Leasing:** The Product Sales program supports all phases of timber harvesting in DNR's regions, from sales planning and presales layout to public auction and contract compliance. The Leasing and Management program oversees leases for communication sites; alternative energy; mining, rock sand, and gravel; special uses; agriculture and grazing; and commercial real estate, as well as rights-of-way easements.
   - **Conservation, Recreation, and Transactions:** This division is responsible for buying, selling, and exchanging land; managing natural areas, which includes identifying and nominating areas for protection; and managing recreation across state trust lands.
   - **Engineering and General Services:** This division provides a wide range of construction, equipment, radio, facilities, and custodial support for DNR's operations. It is responsible for surveys and photogrammetry and forest roads, and also houses the Title and Records office.

2. **Deputy Supervisor for Aquatics**

   - The Aquatics Division is responsible for ensuring protection of habitat and fostering public access and water dependent activities on state-owned aquatic lands, which are navigable lakes, rivers, streams, and marine waters, such as Puget Sound. This division is also responsible for generating income from the use of these lands consistent with these goals. Income received is used to manage and restore aquatic ecosystems.

3. **State Forester/Deputy Supervisor for Wildfire and Forest Health and Resiliency**

   - The Forest Health Division works in partnership with state and federal agencies, tribes, and private and commercial landowners to make forests across the state healthier and more resilient. This division provides services related to urban and community forestry, forest health monitoring, tree care advice and assistance, prescribed fire, the Good Neighbor Authority initiative, and community wildfire preparedness.
   - The Wildfire Division is Washington State's largest on-call fire department, fighting fires on more than 13 million acres of private and state-owned forest lands. They also provide fire weather forecasts and fire precaution levels, maintain firefighting equipment, and conduct training.

4. Deputy Supervisor for Forest Practices

- The Forest Practices Division regulates forestry activity on all non-federal, non-tribal forestlands through the administration of rules developed by the Forest Practices Board. These rules protect public resources by setting standards for logging, road construction, and other work on about 12 million acres of state and private forestlands.

5. Deputy Supervisor for Administration

- The Deputy Supervisor for Administration oversees the Information Technology Division, as well as the Office of Finance, Budget, and Economics.

Regional Structure.

DNR has six regions: Pacific Cascade, Northeast, Northwest, Olympic, South Puget Sound, and Southeast. Each region has a region manager who supervises assistant region managers. Although management structure can vary from one region to the next, at a minimum each region will have assistant region managers who are responsible for state uplands, business and operations, wildfire, and forest practices.

Staff.

DNR relies on a diverse staff of engineers, geologists, biologists, foresters, cartographers, hydrologists, soil scientists, economists, and others. The three divisions responsible for managing the asset classes included in this report are the Forest Resources, Product Sales and Leasing, and Conversation, Recreation, and Transactions divisions. Combined, these divisions currently have 132 full time employees.

The following figure shows average salaries and average tenure with DNR.

Position	Number of staff	Average salary	Average tenure
Administrative assistant	<5	58,260	23
Analyst, fiscal and management	<5	59,400	12
Assistant managers	18	90,784	13
Cartographer	<5	79,548	34
Contracts specialist	<5	48,996	2
Customer service specialist	<5	45,504	16
Electronic media specialist	<5	54,108	4
Environmental planner or specialist	6	77,798	7
Farmer	<5	44,532	20
Field staff, including field technicians, natural resource workers, scientific technicians, and plant technicians	8	41,745	7
Forest check cruiser	<5	69,342	34
Human resources consultant	<5	78,408	6
Information technology professions including data management, business analysis, project management, application development, and computer modeling	15	94,933	10
Managers	<5	112,932	12
Maintenance mechanic	<5	59,688	20
Natural resource scientist	21	72,791	10
Natural resource specialist	25	65,164	12
Parks planner	<5	74,292	6
Property and acquisitions specialist	17	68,945	15
Warehouse operator	<5	46,644	17

The following figure shows the education levels attained for each position. Note that totals do not sum to 100 percent as educational information was not available for all staff.

Position	Highest Education Level Attained					
	% High School	% Some college	% Associate, vocational, or business degree	% BA or BS	% MA or MS	% Ph.D.
Administrative assistant	100%					
Analyst, fiscal and management	25%			75%		
Assistant managers		22%		33%	22%	5%
Cartographer				100%		
Contracts specialist				100%		
Customer service specialist	100%					
Electronic media specialist		100%				
Environmental planner or specialist				33%	50%	
Farmer	50%					
Field staff, including field technicians, natural resource workers, scientific technicians, and plant technicians	13%		13%			
Forest check cruiser				50%	50%	
Human resources consultant						100%
Information technology professions including data management, business analysis, project management, application development, and computer modeling	7%			13%	33%	13%
Managers				33%	67%	
Maintenance mechanic	100%					
Natural resource scientist				24%	48%	24%
Natural resource specialist	8%	12%	12%	40%	8%	
Parks planner				67%		
Property and acquisitions specialist	12%	29%	6%	35%		
Warehouse operator	100%					

Deloitte.

Mount Si Natural Resources Conservation Area *Source: WA STATE DNR*

Appendix C
Past Recommendations

Past Recommendations

SUMMARY OF PAST RECOMMENDATIONS MADE TO THE TRUST MANAGER

Over the past two decades, the Washington State Department of Natural Resources ("Trust Manager", "DNR" or "Department") has had substantial business reviews completed for the state lands business lines. These reviews typically have highlighted constraints to the business and in some cases have outlined recommendations. The following narrative presents the constraints highlighted in the major studies, the suggested recommendations, and information regarding whether or not that recommendation was implemented as available.

Report to the Legislature, Transition Lands Program (1981)

Constraints: This report inventoried transition lands and developed three new categories, urban 10, rural, and special use. This report focused on 'urban 10' lands, which were expected to be converted to commercial, residential, or industrial use within 10 years. The lands were primarily Common School and some were State Forest Transfer. Roughly 75 percent were only appropriate for residential development.

Recommendations: The following highlight the findings and suggestions associated with this report.

- Urban 10 lands are typically sold by federal agencies and private companies and are nearly impossible to lease for residential use.
- The parcels would be unlikely to be exchanged for timberlands.
- Outright selling of the urban 10 lands would result in the money going into the Permanent Fund which has a lower earning capacity.
- The Board of Natural Resources should adopt a policy that encourages exchanging them through a revolving account in which the proceeds could be used to buy replacement lands that could be leased.
- Lands shouldn't be sold all at once; rather they should be sold under optimal market conditions.
- Certain properties, decided on a parcel by parcel basis, should have marginal investments for planning, zoning, platting, and off-site infrastructure to increase returns

Report Outcome: DNR developed a policy that was approved by the Board of Natural Resources (Transition Lands Policy 1984) and built a Commercial Real Estate program. DNR subsequently authored an Asset Stewardship Plan 1998.

Forest Board Transfer Lands, Report 96-5 (1996)

Constraints: This report was completed by the State of Washington Joint Legislative Audit and Review Committee to assess the policies and economic elements of DNR's management of Forest Board Transfer Lands. This included an assessment of specific issues related to reconveyance of transfer lands back to the counties and an examination of the potential repurchase of timber cutting rights that had been transferred from forest board lands to the federal grant lands.

Recommendations: This report included a review of the 1996 Deloitte and Touche Economic Analysis and several recommendations for statutory or operational changes. Key relevant recommendations include:

- Legislative change to the FDA fund where interest earning would accrue back to the fund and distribution to the beneficiaries rather than the general fund. This would be consistent with the RMCA fund.
- DNR should look at shortening the harvest rotation to 40-50 years and increase economic value of timber. Revenue generated from increase in harvest could be reinvested on behalf of future beneficiaries, maintaining intergenerational equity.
- The legislature should consider imposing various conditions related to the reconveyance of transfer lands back to the counties, including setting time limits to choose reconveyance, the distribution of revenue from reconveyance, setting limitations on the use of the land, and maintaining public access.

Report Outcome*: The Board adopted the Policy for Sustainable Forests in 2006. Within that broader framework are policies on economic performance, sustainability, and general silviculture strategies. In addition, the statutes governing reconveyance of transfer lands back to the counties have been updated in 2003 and 2004 and address the factors listed above.*

Timber Efficiency Study prepared for State of Washington Department of Natural Resources (1996)

***Constraints*:** This report was prepared by Mason, Bruce & Girard, Inc. to provide recommendations for improving the efficiency of DNR's timber sale program.

Recommendations: This report provided recommendations and several aspects of the timber sale program. Key recommendations include:

- Test and select a commercially available timber sale cruise programs that contractors must use.
- DNR should modifying the sustainable harvest level, rather than once a decade, consider doing two a year and create region-based planning teams with and advisory group.
- Ask the Board to approve an annual sale program rather than individual sales and set monthly sale targets and streamline document preparation strategies.
- Increase ability to market sales for quick sale by developing procedures for board approval of sales without full Board meetings, or potentially increasing dollar amount of sales that do not need board approval or eliminating Board approval.

- Switch from lump sum to scaled sales and from stumpage to delivered log sales to increase timber income but give regions and districts authority to decide.

Report Outcome*: The board has authorized the department to re-appraise the minimum bid values for sales approved by the board prior to auction, authorized the department to appraise and auction sales with values less than $250,000, and the department worked with the legislature to create a Contract Harvest program to offer delivered log sales in addition to lump sum and scale sales.*

Options for Increasing Revenues to the Trusts: Comparison of Returns from Investing in Real Property and in Permanent Funds (2003)

Constraints: The main question addressed in this report focuses on how to increase the amount of revenues distributed to the Trusts.

Recommendations**:** The following recommendations represent the potential suggestions highlighted in the report. Notes in italics reflect additional narrative as available describing whether or not the recommendation was implemented and the reasoning.

- Funding be made available to determine the current value of all trust assets.
    - Valuation be used as a base for trust asset performance.
    - Valuations serve as a basis for measurement, guidance, and performance of asset diversification plans for each trust.
    - Department should update the valuations periodically, once every two to four years.
- Funding be made available to evaluate the economic, social, and environmental returns to citizens of the state from the multiple use benefits of state trust lands that occur collaterally to the returns to the financial beneficiaries.
- Develop a prudent asset diversification plan for each trust that will increase expected financial returns while reducing risk.
    - The Department and beneficiaries should develop diversification goals and strategies to present to the Board of Natural Resources.
    - Develop a tracking mechanism to monitor these diversification plans for approval by the Board of Natural Resources.
    - The Board of Natural Resources should insure that all trusts are treated equitably in the diversification plans and that no asset should be disposed of or acquired unless to do so is in the best interest of the effected trust(s).
- Evaluate the constitutional mandate which restricts the size limit for land sales to 160 acres to determine whether this limit or any other acreage limit unnecessarily restricts appropriate diversification of the trust assets; or whether this or other size limits protect the trusts from diminution as a result of large parcel discounts on sales.
    - *This has not been implemented due to reluctance to open up the state constitution.*

- Engage in a multiparty facilitated land exchange and grouped land transactions to accelerate the rate of diversification and reduce cost where to do so is in the best interest of effected trusts.
    - *This has been partially implemented as there were several large exchanges of land in the mid-2000's. DNR continues to look at exchanges and sales.*
- Funding made available to investigate a wide array of potential future markets for trust assets that could increase revenues included but not limited to:
    - Markets for carbon credits.
        - *Carbon markets have been evaluated several times and are determined to not be in the best interest of the trusts.*
    - Development of transition and urban trust lands independently or as a joint venture.
        - *This continues to occur albeit at a slow pace*
    - Authorize the department to enter the field of value-added wood processing such as sort yards and wood processing.
        - *The contract harvest program has been created to mirror sort yards from the landing which has been a positive program for the department. However, the program is limited to 20 percent of the total volume by statute.*
    - Develop alternative renewable energy sources such as wind generation.
        - *The department actively began pursuing wind energy development in the 2000's resulting in millions of dollars in revenue and is currently pursuing solar opportunities.*

State Trust Lands Management: An Evaluation of Effectiveness and Efficiency (2004)

***Constraints*:** The main constraint highlighted in this report questions the effectiveness and efficiency in the Department's managing of state trust lands and if reasonably stable cash flows of income are being provided to the trust accounts through economic cycles.

***Recommendations*:** The following recommendations represent the potential suggestions highlighted in the document. Notes in italics reflect additional narrative as available describing whether or not the recommendation was implemented and the reasoning.

- Increase the management fee by 5% to 8% to meet the Sustainable Harvest Calculation (2004)
    - *This was not implemented*.
- Examine the mixes of timber being marketed as well as the nature of the competition.
    - *This was implemented. The Product Sales group routinely evaluates product mix with sale combinations and market conditions.*
- Plan to bring more volume to market during high times and less during low times.
    - *This is partially implemented. Constraints from stakeholders, policy, or economic conditions can limit this ability. Additionally, the Sustainable Harvest Calculation sets the appropriate volume of timber through a planning decade.*

- Evaluate the niche market for the Red Cedar and Red Alder timber species types.
    - *This was implemented. DNR is invested in alder research cooperatives.*
- Engage in a sustained effort to benchmark both forest measurement and total cost to ascertain if costs can be reduced.
    - Compare unit costs as a percentage of gross revenue.
    - Include a zero-budgeting approach.
    - Evaluate benchmark data for production and environmental compliance costs found within public/private sectors.
    - Include benchmark comparisons in annual reports made by the Department.
        - *Several bench marking efforts have occurred. Typically, these types of projects lose energy as comparison to private sector companies is difficult relative to DNR policy and stakeholder constraints.*
- Convene a broad-based task for reviewing DNR field procedures for the purpose of reducing cost and improving revenue, including private forestry practices.
    - *Convening with an external review committee has occurred several times in the last three decades (e.g., 1996, 2004, 2015). At times this can be useful; however, there is a large amount of work to educate external groups with the amount of detail required to make fair recommendations.*
- Identify one or two additional independent forecasting services to help forecast the longer-term timber prices for the region.
    - *This has been implemented. The Budget and Economics office and Product Sales use several forecasting subscriptions to assist with internal forecasting.*
- Aggressively pursue asset reposition and asset diversification.
    - Increase non-timber revenue through exchange or sale of small/isolated parcels.
        - *Several large exchanges in the mid 2000's. DNR continues to look at exchanges and sales. Additionally, a strong push to increase agriculture revenues occurred in the late 2000's.*
    - Develop a multi-year plan with clear goals.
    - Plan should include an internal organization that is solely dedicated to asset repositioning and funded at levels substantially in excess of current levels.
- Explore partnerships/joint ventures in land development in order to increase revenue. Coordinate with local, state and federal economic development councils to reduce costs.
    - *This has been partially implemented. The commercial lands program actively works with counties and planning districts where DNR parcels can be zoned appropriately to maximize potential return.*
- Seek to streamline the processes for all land transactions.
    - *Some elements have been streamlined, but many of the statutory or constitutional constraints remain.*

- Seek legislative authority for:
    - Non-appropriated status for accounts into which revenue from trust land transactions is deposited for reinvestment.
    - Significantly higher appropriation authority to accommodate revenue from trust land transactions
- Markets for wind power, mitigation banking, communication sites, and carbon sequestration should be aggressively pursued, alone or through public/private partnerships or public/private/nonprofit avenues with a developed multi-year plan.
    - *This has been partially implemented as DNR actively pursued wind energy development in the 2000's resulting in millions of dollars of revenue. Additional opportunities are assessed as they come along such as solar opportunities.*
- A number of RCWs and WACS create excessive cost and it is recommended that the Department analyze cost of certain legal requirements and recommend legislative changes.
    - *Many of the constraints recognized remain today*.

A Review of the Department of Natural Resources Commercial Lands Program (2006)

***Constraints*:** The following is a list of specific constraints made in this report which focuses on the Commercial Lands Program (CLP).

- Initial proceeds available to the CLP are fully dependent upon determination of underperforming land/property holdings across the overall DNR portfolio.
- The land bank is only allowed to hold a limited amount of land at any one time. RCW 79.66 limits land bank to 1,500 acres.
- The state constitution limits the size of land sales to a maximum of 160 acres. This constrains packaging of larger land parcels that might be more attractive for certain transactions.
- The state legislature's limits associated with the CLP's ability to purchase constrain the CLP both in the number and size of transactions it can pursue over the course of its planning period.
- The state requires state-owned land to be sold only through public auction. This is in sharp contrast to industry standards or negotiated real estate transactions.
- The CLP and agriculture diversification are too small and create a marginal diversification impact.
- There is a lack of adequate funding for a fluid/nimble process to operate due to policy legal constraints.

Recommendations: The following recommendations represent the potential suggestions highlighted in the document. Notes in italics reflect additional narrative as available describing whether or not the recommendation was implemented and the reasoning.

- CLP and agriculture components should be larger (10 percent each at a minimum level of increase). Increase in this magnitude would impact a pattern of revenue and require dedicated governance structures and investment platforms to manage the assets.
- Enhance the CLP by developing a more discretionary governance platform for the CLP. The CLP is not designed as an explicit investment program; rather, DNR operates in its decision-making process to manage the CLP portfolio. It is critical that the CLP is supported by a decision-making process that is as nimble as possible. The concept is to create an investment approach that is more investment advisory in nature. Create governance specific to the CLP; DNR decision makers delegate budget. Operational, transactional decision to CLP; DNR retains authority to approve/revise. CLP investment policies; senior CLP staff develop objectives and strategies; transaction size limits delegate to CLP (i.e. under $15 million).
    - *This proposal did not move forward.*
- Potential alternatives to the program were recommended including:
    - Loosening certain statutory constraints that limit the CLP investment activities which would allow the CLP to be nimble.
        - *The CLP was deemed to be managed professionally and reasonably set against the numerous constraints and unique mandates. No constraints changed.*
    - Calculating total returns for the CLP portfolio consistent with National Council of Real Estate Investment Fiduciaries (NCREIF) standards. This benchmarking tool allows comparison to regional incomes and agency net operating income. Allows valuation that provides important strategic signals about whether certain holdings should be held or sold.
        - *Nothing implemented at the time. The cost to implement this alternative outweighs the potential benefit to the program.*

- Ensuring that all property management functions are executed by independent third parties which ensures there is not a conflict of interest between the staff who should be investment management staff and delivering property management services on its properties on behalf of the beneficiaries.
    - *Three properties currently have third party management agreements. The program likes single tenant, long-term deals where possible. The program may implement third party management agreements for other commercial assets as necessary.*
- Develop a CLP continuity plan which creates specialized or junior level positions for staff akin to the private sector.
- Transition the CLP to external parties—either private market investment advisor or utilizing the State Investment Board expertise.
    - *This was not implemented. The 2006 report noted its approach would require significant statutory and policy changes to allow for efficient implementation otherwise external managers would face the same challenges as department staff.*

Study 5: An Assessment of the Expected Rate of Return from State Granted Lands Based on Separate Findings Contained in the Future of Washington Forests Report (2007)

***Constraints*:** This study compared different approaches for calculating the expected rate of return on state trust lands. It noted that land and timber values change over time and periodic reassessments are important. The study also remarked that state trust lands have a lower rate of return than industrial acres since they are managed differently, with multiple objectives; and for that reason, tend to have higher rotation ages and more standing volume per acre. The challenge is to define the ecological and social criteria that can be used to measure the success in meeting these complex and seemingly conflicting lands management objectives.

Recommendations: Establish monetary values for environmental and social gains that would be in excess of those gained by similar, private landowner.

Report Outcome*: Unless we find a market for these externalities, not possible for trust manager to charge public for social values.*

Potential School Sites State Trust Land Study (2008)

Constraints: This study identified high-growth school districts, state trust lands that could be suitable for school sites in those districts, and options for helping school districts acquire state trust lands for school sites.

Recommendations: The Work Group identified 90 suitable tax parcels in 24 high-growth school districts, of which 14 school districts indicated interest. Ideas included:

- DNR could purchase private lands with trust land replacement accounts and lease the land to the districts (though only with forestland threatened by conversion).
- A school district could purchase land but not the timber. DNR could harvest the timber and the proceeds would go to the beneficiary. Either the school district or DNR would need to bear the costs of the appraisal and transactions, which might require additional funds for the school district.
- DNR is required by RCW 43.17.400 to notify legislative authorities (which DNR interprets to include school districts) of intent to dispose of lands at least 60 days prior to entering into a disposal agreement. DNR could discuss with school districts earlier than 60 days, which would give school districts more time to consider.

Report Outcome*: DNR has transferred some parcels highlighted in this study to schools since this study completed. Most recently, DNR transferred a parcel to the Camas school district in 2016. DNR works closely with school districts across the state, and in many instances disposes of land to districts to help with growing demand—including those that were highlighted in the study and in other places as well. DNR will continue to work with both urban and rural school districts, where applicable and legal, to meet the growing demand.*

The Potential Implications of the Washington Department of Natural Resources Switching from Crop Share to Cash Leasing of Farmland (2011)

***Constraints*:** The main question addressed in this report is how the Department could benefit by switching all agricultural leasing to be negotiated on a cash rent basis as opposed to crop share:

***Recommendations*:** The economists from Washington State University evaluated the best type of contracting mechanisms for agricultural leasing that DNR could use to increase the long-term benefits to the trusts. Advantages and disadvantages were found for both crop share and cash rents; however, the recommendation was made to transition all crop share contracting to cash rent leases as the advantages of switching to cash leases outweigh the disadvantages.

Report Outcome*: DNR has made some progress implementing this recommendation as the total number of leases with crop share agreements has decreased for Irrigated Annual and Irrigated Perennial agriculture leases. However, the number of Dryland agriculture leases with crop share agreements has increased over the years.*

State Trust Land Inventory Evaluation, Report to the Legislature (2014)

Constraints: This report provided history and context of the Trust Land Transfer (TLT) Program, as well as the outcomes over the 25 years prior to the report. TLT Program was initiated as a tool for the legislature, through DNR, to address the trust land management needs of the Common School Trusts, including transferring out under-performing lands and replacing them with lands with higher income producing potential. This study used computer modeling to estimate what lands might be eligible for the TLT program for the next 30 years.

Recommendations: The report proposed the following recommendations:

1. The TLT Program should continue as long as it serves a useful tool in DNR's trust asset management.
2. The TLT Program should continue periodic review to monitor and assess continued value, utility, and effectiveness.
3. The program should be codified to increase predictability and manageability. Because it is governed through biennial capital budget bills, program goals and criteria have changed over time, making planning difficult. Codification would facilitate more effective use of the TLT Program as an asset management tool.

Report Outcome*: TLT is a valuable tool that has been utilized for over 30 years to help reposition Trust lands, while also achieving conservation outcomes and adding parks and open space around the state—including some of our state's most treasured areas. However, in recent years there has been increased scrutiny on TLT by beneficiaries, stakeholders, and legislators. It is vital to develop TLT 2.0 so that DNR can continue the great work started back in 1989.*

Deloitte.

Loomis Natural Resources Conservation Area *Source: WA STATE DNR*

Appendix D

State Forestland Trust Values by County

State Forestland Trust Values by County

STATE FORESTLAND TRUST VALUES ALLOCATED BY COUNTY

The Trust Lands Performance Assessment ("TLPA") also estimates the current trust value of trust lands for each trust beneficiary, including the separate beneficiaries of state lands as defined in RCW 79.02.010, and the beneficiaries of state forestlands as specified in chapter 79.22 RCW. Each valuation chapter of this report allocates the concluded trust value for each asset class to the separate trust beneficiaries. However, the state forestland trusts (i.e. State Forest Transfer Trust and State Forest Purchase Trust) should be further allocated to the county beneficiaries. This appendix presents the allocation of the state forestland trusts to the proper county beneficiaries for each asset class.

The concluded trust values for the State Forest Transfer and State Forest Purchase Trusts have been allocated to each applicable county. The allocation is based on the pro rata share of historical revenue attributed to each county from state forestland between the fiscal years 2014 to 2018.

The following figure shows the acreage totals for each county[1] with acres designated to the State Forest Purchase Trust or State Forest Transfer Trust.

FIGURE 1

State Forestland Acreage Totals			
County	State Forest Purchase	State Forest Transfer	**Total**
CLALLAM	93,052	242	**93,293**
SKAGIT	84,628	2	**84,630**
SNOHOMISH	62,463	1,681	**64,144**
THURSTON	20,024	23,531	**43,554**
LEWIS	39,994	3,068	**43,063**
SKAMANIA	38,092	4,461	**42,553**
GRAYS HARBOR	2,315	29,033	**31,348**
CLARK	26,502	3,850	**30,352**
WHATCOM	29,240	996	**30,236**
MASON	28,344	562	**28,905**
PACIFIC	15,063	8,163	**23,226**
KING	22,907	0	**22,907**
KLICKITAT	20,371	41	**20,412**
JEFFERSON	14,688	16	**14,704**
WAHKIAKUM	12,612	0	**12,612**
PIERCE	8,880	3,341	**12,221**
COWLITZ	11,080	275	**11,356**
KITSAP	7,559	79	**7,638**
STEVENS	160	41	**201**
OKANOGAN	42	0	**42**
KITTITAS	0	3	**3**
Total	**538,015**	**79,384**	**617,399**

The state forestland trust values have been allocated to each county as applicable for each of the asset classes. The trust values for each county have been rounded to denote a general estimate of allocated value.

[1] The State Forest Purchase Trust and the State Forest Transfer Trust do not contain any acres in the following counties: Adams, Asotin, Benton, Chelan, Columbia, Douglas, Ferry, Franklin, Garfield, Grant, Island, Lincoln, Pend Oreille, San Juan, Spokane, Walla Walla, Whitman and Yakima.

Timber Asset Class

The overall reconciled trust value for the Timber Asset Class is $2,136,000,000. The trust value allocated to the State Forest Purchase Trust is $57,471,531 and the trust value allocated to the State Forest Transfer Trust is $894,949,456.

FIGURE 2

Timber Asset Class	Value	%
Total Trust Value	$2,136,000,000	
State Forest Purchase Trust Value	$57,471,531	2.69%
State Forest Transfer Trust Value	$894,949,456	41.90%
Total State Forest Trusts Value	**$952,420,987**	**44.59%**

This combines for a total value of approximately $952,420,987 for state forestlands that should be allocated to the individual counties. The allocation is presented in the following table.

FIGURE 3

Timber Asset Class		
County	**Allocated Value**	**%**
SKAGIT	$159,646,000	16.76%
SNOHOMISH	$122,371,000	12.85%
CLALLAM	$95,632,000	10.04%
LEWIS	$93,835,000	9.85%
CLARK	$88,826,000	9.33%
MASON	$75,243,000	7.90%
THURSTON	$64,539,000	6.78%
WHATCOM	$46,157,000	4.85%
GRAYS HARBOR	$38,378,000	4.03%
COWLITZ	$32,421,000	3.40%
JEFFERSON	$24,140,000	2.53%
KING	$23,391,000	2.46%
WAHKIAKUM	$22,929,000	2.41%
PACIFIC	$22,668,000	2.38%
SKAMANIA	$20,866,000	2.19%
KITSAP	$11,751,000	1.23%
PIERCE	$7,045,000	0.74%
KLICKITAT	$2,579,000	0.27%
STEVENS	$5,000	0.00%
Total	**$952,422,000**	**100.00%**

Commercial Real Estate Asset Class

The overall reconciled trust value for the Commercial Real Estate Asset Class is $95,700,000. The trust value allocated to the State Forest Purchase Trust is $46,893.

FIGURE 4

Commercial Real Estate Asset Class	Value	%
Total Trust Value	$95,700,000	
State Forest Purchase Trust Value	$46,893	0.05%
State Forest Transfer Trust Value	$0	0.00%
Total State Forest Trusts Value	**$46,893**	**0.05%**

This results in a total value of approximately $46,893 for state forestlands that should be allocated to the individual counties. The allocation is presented in the following table.

FIGURE 5

Commercial Real Estate Asset Class		
County	**Allocated Value**	**%**
SKAMANIA	$44,000	93.80%
CLALLAM	$3,000	6.20%
Total	**$47,000**	**100.00%**

Agricultural Resources Asset Class

The overall reconciled trust value for the Agricultural Resources Asset Class is $238,300,000. This is the combined amount of the values designated to each subgroup of the asset class. The Irrigated Annuals subgroup total value is $101,400,000. The Irrigated Perennials subgroup total value is $86,200,000. The Dryland subgroup total is $40,600,000. The Non-Production Land subgroup total is $10,100,000.

Irrigated Annuals. The trust value for the Irrigated Annuals subgroup does not have any amount allocated to the State Forest Transfer Trust or State Forest Purchase Trust.

Irrigated Perennials. The trust value allocated to the State Forest Transfer Trust is $296,528.

FIGURE 6

Irrigated Perennials	Value	%
Total Trust Value	$86,200,000	
State Forest Purchase Trust Value	$0	0.00%
State Forest Transfer Trust Value	$296,528	0.34%
Total State Forest Trusts Value	**$296,528**	**0.34%**

This results in a total value of approximately $296,528 for state forestlands that should be allocated to the individual counties. The allocation is presented in the following table.

FIGURE 7

Irrigated Perennials		
County	**Allocated Value**	**%**
KLICKITAT	$297,000	100.00%
Total	**$297,000**	**100.00%**

Dryland. The trust value for the Dryland subgroup does not have any amount allocated to the State Forest Transfer Trust or State Forest Purchase Trust.

Non-Production Land. The trust value for the Dryland subgroup does not have any amount allocated to the State Forest Transfer Trust or State Forest Purchase Trust.

Grazing Resources Asset Class

The overall reconciled trust value for the Grazing Resources Asset Class is $10,500,000. This is the combined amount of the values designated to each subgroup of the asset class. The Grazing Leases subgroup total value is $8,000,000. The Grazing Permits subgroup total value is $2,500,000.

Grazing Leases. The trust value allocated to the State Forest Transfer Trust is $16,720.

FIGURE 8

Grazing Leases	Value	%
Total Trust Value	$8,000,000	
State Forest Purchase Trust Value	$0	0.00%
State Forest Transfer Trust Value	$16,720	0.21%
Total State Forest Trusts Value	**$16,720**	**0.21%**

This results in a total value of approximately $16,720 for state forestlands that should be allocated to the individual counties. The allocation is presented in the following table.

FIGURE 9

Grazing Leases		
County	**Allocated Value**	**%**
KLICKITAT	$17,000	100.00%
Total	**$17,000**	**100.00%**

Grazing Permits. The trust value allocated to the State Forest Transfer Trust is $36,100.

FIGURE 10

Grazing Permits	Value	%
Total Trust Value	$2,500,000	
State Forest Purchase Trust Value	$0	0.00%
State Forest Transfer Trust Value	$36,100	1.44%
Total State Forest Trusts Value	**$36,100**	**1.44%**

This results in a total value of approximately $36,100 for state forestlands that should be allocated to the individual counties. The allocation is presented in the following table.

FIGURE 11

Grazing Permits		
County	**Allocated Value**	**%**
KLICKITAT	$36,000	99.52%
OKANOGAN	$200	0.48%
Total	**$36,200**	**100.00%**

Communication Resources Asset Class

The overall reconciled trust value for the Communication Resources Asset Class is $41,200,000. The trust value allocated to the State Forest Purchase Trust is $3,211,128. The trust value allocated to the State Forest Transfer Trust is $11,393,860.

FIGURE 12

Communication Resources Asset Class	Value	%
Total Trust Value	$41,200,000	
State Forest Purchase Trust Value	$3,211,128	7.79%
State Forest Transfer Trust Value	$11,393,860	27.66%
Total State Forest Trusts Value	**$14,604,988**	**35.45%**

This results in a total value of approximately $14,604,988 for state forestlands that should be allocated to the individual counties. The allocation is presented in the following table.

FIGURE 13

Communication Resources Asset Class		
County	**Allocated Value**	**%**
CLALLAM	$3,570,000	24.45%
THURSTON	$2,765,000	18.93%
CLARK	$1,569,000	10.74%
STEVENS	$1,083,000	7.42%
SNOHOMISH	$1,077,000	7.37%
WHATCOM	$1,023,000	7.00%
SKAGIT	$981,000	6.72%
KITSAP	$875,000	5.99%
KING	$546,000	3.74%
COWLITZ	$421,000	2.88%
SKAMANIA	$294,000	2.01%
JEFFERSON	$213,000	1.46%
MASON	$187,000	1.28%
Total	**$14,604,000**	**100.00%**

Mining Resources Asset Class

The overall reconciled trust value for the Mining Resources Asset Class is $16,640,000. The trust value allocated to the State Forest Transfer Trust is $1,575,309.

FIGURE 14

Mining Resources Asset Class	Value	%
Total Trust Value	$16,640,000	
State Forest Purchase Trust Value	$0	0.00%
State Forest Transfer Trust Value	$1,575,309	9.47%
Total State Forest Trusts Value	**$1,575,309**	**9.47%**

This results in a total value of approximately $1,575,309 for state forestlands that should be allocated to the individual counties. The allocation is presented in the following table.

FIGURE 15

Mining Resources		
County	**Allocated Value**	**%**
SNOHOMISH	$1,555,000	98.68%
CLALLAM	$21,000	1.32%
Total	**$1,576,000**	**100.00%**

Other Resources Asset Class

The overall reconciled trust value for the Other Resources Asset Class is $20,300,000. This is the combined amount of the values designated to each subgroup of the asset class. The Wind Energy subgroup total value is $7,600,000. The Special Forest Products subgroup total value is $3,500,000. The Rights of Way subgroup total is $4,100,000. The Special Uses subgroup total is $5,100,000.

Wind Energy. The trust value for the Wind Energy subgroup does not have any amount allocated to the State Forest Transfer Trust or State Forest Purchase Trust.

Special Forest Products. The trust value allocated to the State Forest Purchase Trust is $376,775. The trust value allocated to the State Forest Transfer Trust is $1,640,065.

FIGURE 16

Special Forest Products	Value	%
Total Trust Value	$3,500,000	
State Forest Purchase Trust Value	$376,775	10.77%
State Forest Transfer Trust Value	$1,640,065	46.86%
Total State Forest Trusts Value	**$2,016,840**	**57.62%**

This results in a total value of approximately $2,016,840 for state forestlands that should be allocated to the individual counties. The allocation is presented in the following table.

FIGURE 17

Special Forest Products		
County	**Allocated Value**	**%**
MASON	$1,088,000	53.94%
THURSTON	$455,000	22.56%
KITSAP	$254,000	12.59%
CLALLAM	$66,000	3.27%
GRAYS HARBOR	$49,000	2.43%
PACIFIC	$23,000	1.14%
KING	$22,000	1.09%
CLARK	$22,000	1.09%
COWLITZ	$14,000	0.69%
WAHKIAKUM	$10,000	0.50%
SKAMANIA	$10,000	0.50%
LEWIS	$4,000	0.20%
Total	**$2,017,000**	**100.00%**

Rights of Way. The trust value allocated to the State Forest Purchase Trust is $30,914. The trust value allocated to the State Forest Transfer Trust is $1,491,867.

FIGURE 18

Rights of Way	Value	%
Total Trust Value	$4,100,000	
State Forest Purchase Trust Value	$30,914	0.75%
State Forest Transfer Trust Value	$1,491,867	36.39%
Total State Forest Trusts Value	**$1,522,781**	**37.14%**

This results in a total value of approximately $1,522,781 for state forestlands that should be allocated to the individual counties. The allocation is presented in the following table.

FIGURE 19

Rights of Way		
County	**Allocated Value**	**%**
CLALLAM	$447,000	29.37%
SNOHOMISH	$434,000	28.52%
KING	$169,000	11.11%
SKAMANIA	$95,000	6.24%
JEFFERSON	$93,000	6.11%
SKAGIT	$85,000	5.59%
PACIFIC	$39,000	2.56%
LEWIS	$39,000	2.56%
WHATCOM	$39,000	2.56%
CLARK	$32,000	2.10%
MASON	$17,000	1.12%
COWLITZ	$14,000	0.92%
THURSTON	$10,000	0.66%
WAHKIAKUM	$6,000	0.39%
KLICKITAT	$1,000	0.07%
KITSAP	$1,000	0.07%
GRAYS HARBOR	$800	0.05%
Total	**$1,521,800**	**100.00%**

Special Uses. The trust value allocated to the State Forest Purchase Trust is $102,816. The trust value allocated to the State Forest Transfer Trust is $151,878.

FIGURE 20

Special Uses	Value	%
Total Trust Value	$5,100,000	
State Forest Purchase Trust Value	$102,816	2.02%
State Forest Transfer Trust Value	$151,878	2.98%
Total State Forest Trusts Value	**$254,694**	**4.99%**

This results in a total value of approximately $254,694 for state forestlands that should be allocated to the individual counties. The allocation is presented in the following table.

FIGURE 21

Special Uses		
County	**Allocated Value**	**%**
CLALLAM	$80,000	31.35%
MASON	$62,000	24.29%
THURSTON	$58,000	22.73%
KING	$23,000	9.01%
JEFFERSON	$13,000	5.09%
SKAGIT	$8,000	3.13%
PACIFIC	$6,000	2.35%
SNOHOMISH	$3,000	1.18%
SKAMANIA	$900	0.35%
WHATCOM	$700	0.27%
COWLITZ	$600	0.24%
Total	**$255,200**	**100.00%**

Deloitte.

Source: WA STATE DNR

Appendix E
Bibliography

Bibliography

Becker-Wold, Janet, Sally Haskins, and James Van Heuit. "Asset Allocation and Governance Review for the Idaho Board of Land Commissioners." *Callan Associates.* November 2014.

Boulder Group. *Net Lease Market Report*. 2019.

Bradley, Gordon, Ara Erickson, Alicia Robbins, Gina Smith, Lindsay Malone, Luke Rogers, and Michelle Connor. *Future of Washington's Forest and Forest Industries Study 4: Forest Land Conversion in Washington State*. University of Washington's College of Forest Resources. July 2007

Brady, Michael, Richard Shumway, and Karina Gallardo. Review of *The Potential Implications of the Washington Department of Natural Resources Switching from Crop Share to Cash Leasing of Farmland*. Washington State University School of Economics. 2011.

Business Wire. "Rayonier to Acquire Pope Resources." January 15, 2020. Retrieved from https://www.businesswire.com/news/home/20200115005365/en/Rayonier-Acquire-Pope-Resources.

CBS News. "Who Should be in Charge of America's Ancient Forests: Industry or Environmentalists?" September 21, 2019. Retrieved from https://www.cbsnews.com/news/eye-on-earth-the-debate-over-pacific-northwest-forests.

Chong, Florence, and Christopher O'Dea. "Forestry: Carbon Capture." *IPE Real Assets*. May/June 2018. Retrieved from https://realassets.ipe.com/forestry-carbon-capture/10024564.article.

Concrete School District, et al v State of Washington, et al, Complaint, paragraph 8, p. 5.

Conservation Northwest, et al, v. Commission of Public Lands, Complaint, paragraph 7, p. 3.

Cook, Philip S., Greg Alward, and Dennis R. Becker. "Endowment Lands Contributions to Idaho's Economy." *University of Idaho College of Natural Resources*. December 2018.

Culp, Laurenzi, Tuell, and Berry. "State Trust Lands in the West: Fiduciary Duty in a Changing Landscape." *Lincoln institute of Land Policy*. 2013.

Deloitte and Touche. *Trust Land Economic Analysis*. June 1996.

Fixsen, Rachel. "Sampension Makes First Direct Forestry Move With Oregon Deal." *IPE Real Assets*. May 8, 2019. Retrieved from https://realassets.ipe.com/news/sampension-makes-first-direct-forestry-move-with-oregon-deal-corrected/10031063.article.

Harris, A. B., C. N. Singleton, & T. J. Straka. "Land Value Differentials Resulting from Variability between the Sales Comparison and Income Approaches in Timberland Valuation." *The Appraisal Journal*. Summer 2018.

IBISWorld. *Agriculture, Forestry, Fishing, and Hunting Sector Report*. June 2018.

IBISWorld. *Mining Industry in the US Industry Report*. June 2018.

IBISWorld. *Radio Broadcasting Industry Report*. May 2018.

IBISWorld. *Television Broadcasting Industry Report*. August 2018.

IBISWorld. *Timber Services in the US Industry Report*. December 2018.

IBISWorld. *Wind Power in the US Sector Report*. September 2018.

IBISWorld. *Wireless Telecommunications Industry Report*. July 2018.

Idaho Endowment Fund. *Idaho Statement of Investment Policy*. 2018.

Idaho Strategic Energy Alliance. *Carbon Issues Task Force Report*. 2010.

Integra Realty Resources (IRR), *IRR Viewpoint 2018 Report*. IRR, 2018.

"Intergenerational Equity." 2019. Retrieved from https://en.wikipedia.org/wiki/Intergenerational equity.

James W. Sewall Company. *Sewall Investor Survey Winter-Spring 2019.* 2019.

Jenkins, Karla H. "Understanding AUMs (Animal Unit Months)." The University of Nebraska-Lincoln. Retrieved from https://beef.unl.edu/cattleproduction/understandinganimalunitmonths.

Millennium Ecosystem Assessment. "Overview of Millennium Ecosystem Assessment." Retrieved from https://www.millenniumassessment.org/en/About.html.

Monk, B. "Weyerhaeuser, Plum Creek Merge in $8.4 Billion Deal." *The Business Journals,* November 9, 2015. Retrieved from https://www.bizjournals.com/seattle/blog/2015/11/weyerhaeuser-plum-creek-merge-to-form-one-of-the.html.

Murphey, Casey. "Charts Suggest Timber and Forestry Stocks Set to Drop." *Investopedia*. August 15, 2019. Retrieved from https://www.investopedia.com/news/charts-suggest-timber-and-forestry-stocks-set-drop/.

National Council of Real Estate Investment Fiduciaries. *The NCREIF Farmland Index Second Quarter 2019*. NCREIF, 2019.

National Council of Real Estate Investment Fiduciaries. *The NCREIF Timberland Index Second Quarter 2019*. NCREIF, 2019.

Ocker, Kenny. "Pipeline Project Delivers Water to Dry Parcels, New Money for Schools." *Washington State Department of Natural Resources*, May 21, 2019. https://www.dnr.wa.gov/news/pipeline-project-delivers-water-dry-parcels-new-money-schools.

Office of Management and Budget. "Discount Rates." *Circular A-4*. September 2003.

Office of Financial Management, *State of Washington Forecast of the State Population*, December 2018.

Oregon Department of Forestry. *2019-2021 Legislatively Adopted Budget*. 2018.

Peterson, Jon. "OCERS Lowers Real Assets Allocation as it Winds Down Timber Investments." *IPE Real Assets*. April 4, 2019. Retrieved from https://realassets.ipe.com/news/ocers-lowers-real-assets-allocation-as-it-winds-down-timber-investments/10030499.article.

Pricewaterhouse Coopers (PwC). *PwC Real Estate Investor Survey Second Quarter 2018*, PwC, 2018.

Pricewaterhouse Coopers (PwC). *PwC Real Estate Investor Survey Third Quarter 2019*, PwC, 2019.

Quinton, Sophie. "Communities Want Trees Thinned. Timber Companies Want Contracts. So What's the Problem?" *Stateline*. October 24, 2018. Retrieved from https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2018/10/24.

Real Estate Research Corporation (RERC). *RERC Second Quarter 2018 Report*. RERC, 2018.

RealtyRates.com. *Investor Survey Second Quarter 2018 Report.* 2018.

S&P Capital IQ Database. *Screening Report of Paper and Forest Products Merger/Acquisitions between 1999 and 2019 in US and Canada*. October 2019.

Sizemore & Sizemore, Inc. *Pacific Northwest Timberland Investment Survey Results*. March 2019.

Skagit County, et al v. State of Washington, et al, Complaint, Section 4.3, p.19.

Snohomish County Washington. "SWM Utility Charges." Retrieved from https://snohomishcountywa.gov/2003/SWM-Utility-Charges.

Sonoran Institute and the Lincoln Institute of Land Policy. *Collaborative Planning on State Trust Lands: A University of Michigan Study for the State Trust Lands Partnership Project.* 2005.

The Appraisal Institute. *Understanding the Appraisal.* 2013.

The Appraisal Institute. *The Dictionary of Real Estate Appraisal, 6th Edition*. 2015.

The CoStar Database. *Report of Office, Retail and Industrial Average OAR's from 2013 to 2024*. CoStar, 2019.

The CoStar Database. *Sales Report of Office, Retail and Industrial transactions in the Seattle Metro between August 2016 and June 2018*, CoStar, 2019.

TIAA Center for Farmland Research, The University of Illinois, 2019.

Tower Capital Advisors. "Cellular Site Lease Market Data: Cellular Tower Lease Trends." October 2019. Retrieved from https://www.towercapadvisors.com/cell-site-lease-market-data.

United States Department of Agriculture. "2019 State Agriculture Overview - Washington." 2019. Retrieved from https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=WASHINGTON.

United States Department of Agriculture. "Conservation Reserve Program." Retrieved from https://www.washingtonpolicy.org/publications/detail/agriculture-the-cornerstone-of-washingtons-economy.

United States Department of Agriculture. "Land Values 2018 Summary." *USDA National Agricultural Statistics Service*. August 2018.

United States Energy Information Administration. "Washington State Profile and Energy Estimates." Last Updated December 19, 2019. Retrieved from https://www.eia.gov/state/analysis.php?sid=WA.

Washington Conservation Voters and Washington Environmental Council. *State of Our Forests and Public Lands: An Evaluation of Public Lands Commissioner Hilary Franz's Results*. 2018.

Washington State Board of Natural Resources. *Resolution 1560*. December 2019.

Washington State Department of Agriculture. "Agriculture: A Cornerstone of Washington's Economy." Retrieved from agr.wa.gov/washington-agriculture.

Washington State Department of Natural Resources. *Alternatives for the Establishment of a Sustainable Harvest Level FEIS*. October 2019.

Washington State Department of Natural Resources. *2018 Annual Report*. 2018.

Washington State Department of Natural Resources. *Commercial Real Estate Urban & Transition Lands Portfolio Packet*. 2019.

Washington State Department of Natural Resources. *Communication Sites on Washington State Trust Lands: Lease Rent Schedule July 2017 through June 2018*. April 2017.

Washington State Department of Natural Resources. "Communication Towers." Retrieved from https://www.dnr.wa.gov/programs-and-services/product-sales-and-leasing/communications-towers.

Washington State Department of Natural Resources. *DataMart MR12 Report*. 2019.

Washington State Department of Natural Resources. "DNR Regions and Districts." Retrieved from https://www.dnr.wa.gov/about/dnr-regions-and-districts.

Washington State Department of Natural Resources Granted Lands. Review of *Future of Washington's Forest and Forest Industries Study 5*, 2007.

Washington State Department of Natural Resources. "Mining and Mineral Leases." Retrieved from https://www.dnr.wa.gov/programsservices/product-sales-and-leasing/mining-and-mineral-leases.

Washington State Department of Natural Resources. *Options for Increasing Revenues to the Trusts: Comparison of Returns from Investing in Real Property and in Permanent Funds*. January 2003.

Washington State Department of Natural Resources. *Policy for Sustainable Forests*. December 2006.

Washington State Department of Natural Resources. *Standard Silviculture Activity Dates and Costs for Pacific Cascade Region: LRM Guidance Document.* September 2019.

Washington State Department of Natural Resources. *Strategic Plan for the Department of Natural Resources 2009-2011 Biennium*. 2008.

Washington State Department of Natural Resources. "Timber Sale Query/Log Prices." Retrieved from https://www.dnr.wa.gov/programs-and-services/product-sales-and-leasing/timber-sales/timber-sale-querylog-prices.

Washington State Department of Natural Resources. *Transition Lands Policy Plan*. 1988.

Washington State Department of Revenue. "Forest Tax." Retrieved from https://dor.wa.gov/find-taxes-rates/other-taxes/forest-tax.

Washington State Investment. *Commercial Real Estate Returns Fourth Quarter 2019.* 2019.

Washington Superior Court, Case No. 20-2-00187-2 SEA.

Appendix C. Non-Market Environmental Benefits and Values

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TRUST LAND PERFORMANCE ASSESSMENT
NON-MARKET ENVIRONMENTAL BENEFITS AND VALUES

Forward

TRUST LAND PERFORMANCE ASSESSMENT
Non-Market Environmental Benefits and Values

In March 2018, the Washington State legislature adopted Engrossed Substitute Senate Bill (ESSB) 6095, a supplemental capital budget. Section 7015 of the bill mandates the preparation of a study that became known as the Trust Land Performance Assessment (TLPA).

On February 19, 2019, Deloitte Transactions and Business Analytics LLP entered into a contract (Contract reference number 93-098343) with the State of Washington Department of Natural Resources (the "Client" or "Trust Manager") to conduct the TLPA.

A major component of the TLPA involves assessing the public interest value of asset classes across state trust lands and forestlands managed by the Client (the "study site"). This includes estimating the value of ecosystem services and recreational benefits for asset classes that produce these benefits.

To most effectively fulfill its obligations, Deloitte Transactions and Business Analytics LLP asked the Client if it could subcontract the public interest value component of the study to Earth Economics ("Earth Economics," "we," "our," or "us"), a nonprofit organization.

The Client approved this arrangement, and on May 13, 2019, Deloitte Transactions and Business Analytics LLP entered into a subcontractor agreement with Earth Economics whose principal office is located at 107 N. Tacoma Avenue, Tacoma, WA 98403. This Earth Economics report fulfills this requirement of the TLPA.

Deloitte Transactions and Business Analytics LLP
****

The Earth Economics report begins on the following page.

Trust Land Performance Assessment: Non-Market Environmental Benefits and Values

September 30, 2020

Authors: Ken Cousins, Johnny Mojica, Trygve Madsen, Corrine Armistead, Angela Fletcher

Suggested Citation: *K. Cousins, Mojica, J., Madsen, T., Armistead, C., Fletcher, A. 2020. Trust Land Performance Assessment: Non-Market Environmental Benefits and Values. Earth Economics. Tacoma, WA.*

The authors are responsible for the content of this report.

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Table of Contents

Introduction

People rely on the abundance of goods and services provided by nature, often without realizing it. These benefits should be identified and quantified to ensure they are included in decision-making processes so communities can mitigate risk, increase resilience, and protect their natural capital wealth.

Because ecosystems are living systems, natural assets are often more resilient and less costly to maintain than built infrastructure. Without functional natural systems, many of the benefits that nature provides at no cost must be replaced by built infrastructure, which will incur construction and maintenance costs and eventually require replacement. Acknowledging the economic value of nature often shows nature-based solutions to be more cost effective than built infrastructure, while raising awareness of the long-term connections between people and these natural assets. When nature and its beneficial functions are not quantified, they are effectively valued at zero in the decision-making process. Understanding these values is critical to making informed land-use decisions.

This report presents an estimate of the total annual non-market economic value generated by the trust lands in Washington State. Non-market values describe benefits that are realized by communities, but which are not bought and sold in markets. These benefits do not have observable market prices and are often measured by revealed or stated preference methods. This differs from capital values presented elsewhere in this report that are defined by market prices for goods such as timber and food crops.

In order to describe these non-market values in dollar terms, this report focuses on economic values that are estimated using an ecosystem services framework. The following sections detail the steps involved in this valuation:

- The first section explains ecosystem service valuation by defining ecosystem services, outlining the history of the ecosystem service valuation discipline, providing recent evidence of ecosystem service valuation results that influence state and federal policies, and explaining how ecosystem service valuation estimates fit in with other values provided by the Trust Land Performance Assessment. The roles spatial data and the benefit transfer method play in connecting observed land cover to ecosystem services and monetary estimates are also highlighted.
- The second section presents methods and results specific to the estimation of all ecosystem services except recreation and carbon storage, which have their own source data and methods. Estimating these ecosystem service valuations is based on the transfer of select non-market data from other study sites to the subject state trust lands. Robust explanations of land cover classes, the groups of ecosystems within those classes, and the spatial attributes that differentiate them are central to this section.

- The third section focuses on recreation as an ecosystem service. Estimating its economic benefit requires a different method than the other ecosystem services, and so it is presented separately. This method is based on estimated recreational participation and the consumer surplus of each activity.
- The fourth section focuses on the carbon storage ecosystem service. Estimating the value of this service also requires a method that is distinct from other ecosystem services, as well as a different accounting framework, and so it is presented separately.

A PRIMER ON ECOSYSTEM SERVICES

What are Ecosystem Services?

Forests, watersheds, mountains, and shorelines represent natural capital assets. These assets contain multiple ecosystems that perform a variety of ecosystem functions. These functions, in turn, provide beneficial services that enrich the human experience.

Ecosystem services—breathable air, drinkable water, fertile soils, recreational opportunities, disaster resilience—are critical to human survival and the basis of all other economic activity.

In recent decades, considerable progress has been made in systematically linking functioning ecosystems and the benefits they provide with human well-being. The framework used in this report is based on well-known typologies that identify 21 ecosystem services across four categories (see Table 1).[1,2,3,4] These ecosystem service categories, which are commonly used in the field of ecological economics, are defined as follows:

- *Provisioning goods and services* provide physical materials and energy that vary by the ecosystems that produce them. For example, mushrooms grow in forests, and it is common for people to gather wild foods and other materials for personal use rather than for sale in the marketplace.
- *Regulating services* affect the balance of material and energy cycles, as well as populations of plant and animal species. Functional ecosystems maintain water quality, limit soil erosion, regulate climate, and keep wildlife populations and diseases in check.
- *Supporting services* include the habitat and refugia for both plant and animal species. These services provide physical environments suitable for species to survive and thrive.
- *Information services* support meaningful human interactions with nature. These include spiritually significant places and species, environments for outdoor recreation, and opportunities for scientific research and education.

Table 1. Definition of Ecosystem Services Used in This Report

Category	Ecosystem Service	Economic Benefit to People
Provisioning	Energy and Raw Materials	Can include fuel, fiber, fertilizer, minerals, and energy
	Food	Can include livestock, crops, fish, game, and/or produce
	Medicinal Resources	Can include traditional medicines, pharmaceuticals, and/or assay organisms
	Ornamental Resources	Resources for clothing, jewelry, handicrafts, worship, and decoration
	Water Storage	Amount of surface or groundwater held and its capacity to reliably supply water
Regulating	Air Quality	Ability to create and maintain clean, breathable air
	Biological Control	Pest and/or disease control
	Climate Stability	Ability to support a stable climate at global and local levels
	Disaster Risk Reduction	Ability to prevent and mitigate natural disasters, including flood, fire, drought, etc.
	Genetic Transfer	Dispersal of genetic material via wind, insects, birds, etc.
	Soil Formation	Soil creation for agricultural and/or ecosystem integrity
	Soil Quality	Soil quality improvement due to decomposition and pollutant removal
	Soil Retention	Ability to retain arable land, slope stability, and coastal integrity
	Water Quality	Water quality improvement due to decomposition and pollutant removal
	Water Conveyance	Ability to provide natural irrigation, drainage, supply, flow, and use of water
	Navigation	Ability to maintain necessary water depth for recreational and commercial vessels
Supporting	Habitat	Ability to maintain genetic and biological diversity, and to promote species growth
Information	Aesthetic Information	Enjoyment and appreciation of nature through the senses (e.g., sight, sound)
	Cultural Value	Use of nature in art, symbols, architecture, and religious/spiritual purposes
	Science and Education	Use of natural systems for education and scientific research
	Recreation and Tourism	Can include hiking, boating, travel, camping, and more

History of Ecosystem Service Valuation

The concept of ecosystem services has appeared in published literature since the late 1970s. The concept began to gain traction with the 1997 publication of the book *Nature's Services: Societal Dependence on Natural Ecosystems*,[5] and a paper estimating the global contribution of ecosystem services published the following year in the journal *Nature*.[6] These two works sparked an explosion of research and interest in ecosystem services.[7]

Since then, considerable progress has been made in systematically linking functioning ecosystems with human well-being. The work of academics and global initiatives have marked key advancements in this task.[2,3,4] These studies laid the groundwork for a conceptual framework for valuing natural capital and ecosystem goods and services.

Among the first to present a conceptual framework and typology for describing, classifying, and valuing ecosystem functions, goods, and services in a consistent manner were de Groot et al. in 2002.[2] Recognizing the need for a standardized valuation framework, they began translating the complexity of ecological structures and processes into a limited set of ecosystem functions and subsequently identified how these functions provide people with valuable goods and services.

Around this time, an international coalition of more than 1,360 scientists and experts from the United Nations Environmental Program, the World Bank, and the World Resources Institute assessed the effects of ecosystem change on human well-being. Key goals were to better understand the interactions between ecological and social systems and develop a knowledge base of concepts and methods that would improve the ability to "…assess options that can enhance the contribution of ecosystems to human well-being."[3] This study produced the landmark Millennium Ecosystem Assessment, which classified ecosystem services into four broad categories according to how they benefit humans: supporting, provisioning, regulating, and cultural services.

These conceptual frameworks provided the impetus for several subsequent initiatives and programs, most notably the Economics of Ecosystems and Biodiversity.[4] This global initiative is characterized by a practical approach that helps shift the ecosystem service framework from the theoretical to the applied realm. The Economics of Ecosystems and Biodiversity targets practitioners and helps them recognize and incorporate ecosystems into decision making by offering a structured approach to valuation.

METHODS USED IN THIS REPORT

This report analyzes the economic value—measured in dollars—of the ecosystem of goods and services provided by state trust lands. The non-market value of the bulk of ecosystem services—except carbon storage and recreation[8]—are measured using a valuation approach that combines geospatial analysis with the benefit transfer method.

Identifying Ecosystems and Spatial Relationships

To value ecosystem services, it is first necessary to understand the types and extent of ecosystems present on state trust lands. Additional geographic context, such as spatial relationships between ecosystems and patterns of human use, also supports the valuation. Geographic information system (GIS) data is used throughout this assessment as an input for the valuation. If available, this report relied upon data sets from the Washington Department of Natural Resources (the "Trust Manager"), which were supplemented by publicly available data from other agencies within Washington State and the federal government when necessary.

Geospatial data enables the assessment of large study areas, with spatially referenced ecosystem extents used to understand various proximity metrics and relationships that refine valuation estimates. Additionally, GIS data conveys spatial patterns of human activities, particularly recreation, which demonstrates the distribution of outdoor recreational use within state trust lands and serves as an input for valuing recreation as an ecosystem service. Geospatial data supports each component of this assessment, as an understanding of the natural capital and human activities present within a landscape is essential in valuing its ecosystem services.

The Benefit Transfer Method

The benefit transfer method takes estimates from different study sites and applies them to the site of interest—in this case, the state trust lands. One familiar application of the benefit transfer method is a property assessment in which the estimated value of taxable property is determined by comparing the features of the property (e.g., number of bedrooms, lot size, view, recent remodel) with prices of similar properties in similar markets. As a means of indirectly estimating the value of ecological goods and services,[9] the benefit transfer method can generate a wide range of reasonable value estimates for a fraction of the time and money required to collect site-specific data in the field. This methodology is widely used in the field of ecosystem service valuation.

The search for transferable values focuses on primary studies with comparable land cover classifications (e.g., wetland, forest, grassland) within the study area. Any primary studies deemed to have incompatible assumptions or land cover types are excluded. Individual primary study values are adjusted and standardized for units of measure, inflation, and land cover classification to generate an "apples-to-apples" comparison.

HOW DO ECOSYSTEM SERVICES FIT INTO THE TRUST LAND PERFORMANCE ASSESSMENT?

Ecosystem services are critical to human well-being, but investment and planning decisions that affect natural systems have not traditionally incorporated these benefits into their cost-benefit calculus. The language of budgets, costs, and return on investment is only beginning to incorporate these benefits into decision making, but the effect has been significant.

The values of ecosystem services have the power to change policy. The inclusion of these values in decision making is gaining significant traction at the federal policy level as the understanding of the value of natural capital—and how to measure it—improves. In 2013, the Federal Emergency Management Agency (FEMA) announced a landmark policy change that allows ecosystem services to be included in the formal benefit-cost analysis process for flood risk mitigation projects.[10] Incorporating the values of ecosystem services into FEMA benefit-cost calculations signals a fundamental shift in the way that FEMA understands the value of natural lands. This change unlocks a wide array of mitigation projects that qualify for FEMA funding, helping communities across the United States increase their resilience. FEMA is leading the way at the federal level by recognizing the non-market contributions of different land covers; these economic data speak loudly and have sparked a paradigm shift in federal disaster mitigation strategy.

Ecosystem services provide real economic value, but this value is rarely reflected in traditional markets. Estimating the economic value of ecosystem services in dollars allows such services to be included in benefit-cost analyses and provides decision makers with more complete information on the costs and benefits of a given project.

Failing to account for these values means that high-dollar decisions are made using incomplete information, reducing the certainty that selected projects actually represent the most efficient use of public funds.

Public servants—whether at the local, state, or federal level—who are tasked with allocating taxpayer dollars to their highest and best use should want to make their decisions about which projects to invest in using the most complete information available. A decision that is made without accounting for the non-market values generated by natural lands can lead to inefficient investments.

The methods used in this report are limited by gaps in the valuation literature. Reliance on secondary data necessarily limits this effort to the published literature. This means this report does not estimate the value of every ecosystem service or recreational activity; only a subset of all benefits provided by the state trust lands are able to be quantified and monetized. Therefore, the values presented in this report should be treated as underestimates. Nevertheless, this exercise is an important starting point for including ecosystem goods and services in decision making.

Ecosystem Service Values on State Trust Lands

DATA AND METHODS

Asset Class Boundaries

This assessment summarizes the values of ecosystem services according to the trust land asset classes: Forested Asset Class, Cultivated Asset Class, Grazing Asset Class, and Other Asset Class. This delineation of state trust lands is used for two reasons. First, reporting ecosystem services values by asset class aligns with other chapters of the TLPA. Additionally, the availability of baseline ecological data differs between asset classes, primarily due to the Trust Manager creating and maintaining an inventory for forested portions of the trust land portfolio.

The Forested Asset Class includes lands within the state trust lands portfolio that are managed at least in part for forestry (i.e., timber production) activities. The Cultivated Asset Class and Grazing Asset Class are defined by current trust leases. The Other Asset Class used in this assessment comprises all remaining trust land holdings, which may have a variety of uses from communication leases to commercial buildings to educational facilities. Appendix B details the data sources and processes used to assign state trust lands to their respective asset classes.

Base Land Cover

The ecosystem services valued in this section are assessed using a land cover-based approach. While the Trust Manager manages the trust lands according to their main use (e.g., Forested Asset Class, Cultivated Asset Class), most of these asset classes include land cover types that are not associated with these uses. For example, wetlands are found in all asset classes, but are not directly associated with a specific end use. The ecosystems present on state trust lands form the basis by which nature's services are understood. For example, wetlands efficiently remove sediment and pollutants from water and provide habitat that may differ from surrounding forest or grassland. The GIS data was used to calculate the area of each ecosystem—or land cover—type present within state trust lands, as on-the-ground data collection was neither feasible nor necessary for an assessment of this scale.

A combination of Trust Manager-supplied and publicly available data sets from state and federal government agencies create a detailed picture of ecosystems present within each asset class. As mentioned above, data quality and availability differ by asset class, resulting in varying levels of resolution, of which the coarsest data are derived from the National Land Cover Database at a 30-meter resolution. Data sources and aggregation methods are briefly described below for each asset class. All sources, data hierarchy, and modifications are detailed in Appendix B.

Forested Asset Class
For consistency across the TLPA, spatial data provided by the Trust Manager is used to delineate land cover within the Forested Asset Class. Lands used for forestry are well-inventoried and monitored by the Trust Manager, and these findings are combined into a large forest inventory data layer. This inventory is used in conjunction with additional Trust Manager-supplied data specifying wetland, stream, and standing water extents on forestry land from both observed and modeled sources. The resulting aggregated land cover data details forest, wetland, freshwater, and barren land (e.g., roads) areas within the Forested Asset Class (see Appendix B for data set details).

Cultivated Asset Class
Land cover within the Cultivated Asset Class is primarily based on the Washington Department of Agriculture's 2018 crop layer, which is aggregated for annual and perennial crops. This represents a snapshot in time based on current lease and crop status. The coverage of cultivated land on state trust lands shifts from year to year and season to season as leases are issued or expire and leaseholders engage in crop rotation practices. Remaining areas within the Cultivated Asset Class boundary, but not under agricultural production, are characterized using the National Land Cover Database.

Grazing Asset Class
The National Land Cover Database categorizes land cover types within the Grazing Asset Class. This inventory is used in conjunction with boundaries available from the Trust Manager, making the data from the National Land Cover Database the best available spatial data for ecosystem types. This assessment assumes that grazing activities occur on pasture, grassland, and shrub/scrub ecosystems. To reflect the values of ecosystem services derived from active grazing lands, a rangelands ecosystem type is delineated, which comprises pasture, grassland, and shrub/scrub land cover types.

Other Asset Class
Other Asset Class encompasses a range of land uses and ecosystem types. Like the Grazing Asset Class, data from the National Land Cover Database is used to determine acreages of land cover types within this designation.

Spatial Attributes

Landscape-specific factors and relationships can affect the type and magnitude of ecosystem services produced by natural ecosystems. Applying spatial attributes to base ecosystem types (i.e., forests, grasses, wetlands, rangeland, and cultivated land) helps account for this variation in ecosystem service valuation.

This assessment considers a range of spatial attributes based on available valuation literature. The subset of attributes included in Table 2 represents characteristics found to differentiate the provision or value of ecosystem services produced by a particular ecosystem type, based on applicable valuation studies. The inclusion of spatial attributes generally increases accuracy, as each attribute narrows estimates to those that more directly reflect the extent of specific ecosystem services or their value.

Table 2. Descriptions of Spatial Attributes

Land Cover Type	Attribute	Asset Class	Data Source	Description
Forests	Evergreen	Forested	WA Dept. of Natural Resources Forest Inventory	Evergreen attribute from forest inventory data
Forests	Riparian	Forested	WA Dept. of Natural Resources Forest Inventory	Variable width buffers around wet areas defined by the Trust Manager
Forests	Upland	Forested	WA Dept. of Natural Resources Forest Inventory	Where riparian classification is available, upland are all forested areas not considered riparian
Forests	Adjacent to interstate highways	Forested Cultivated Grazing Other	WA DOT State Highways	Within a one acre buffer around interstates outside of urban growth boundaries
Wetlands	Proximity to major coastlines	Forested Cultivated Grazing Other	WA DOT Major Shorelines of Washington State	Within a one-mile buffer from the coast of the Pacific Ocean or Puget Sound
Forests Grasses Wetlands	Proximity to urban areas	Forested Cultivated Grazing Other	WA Dept. of Ecology Urban Growth Boundaries	Within a one-mile buffer of urban growth areas
Grasses Wetlands	Agriculture border	Forested Grazing Other	Land cover data	Within a one acre buffer of cultivated crops

Land cover types that provide *in situ* services (e.g., biological control, soil retention) are limited to a one-acre buffer (208.7 ft^2), based on research suggesting that the maximum effectiveness of these ecosystem functions is generally achieved within 200 feet.[11,12,13] Other ecosystem services (e.g., aesthetics, water capture) tend to be valued at somewhat greater distances. For these, one-mile buffers—an arbitrary (but arguably conservative) distance—are chosen to delimit these ecosystem services and their associated land cover types.

Other spatial attributes were defined based on the scope of the source valuation studies (e.g., wetlands near urban areas). For instance, while wetlands likely provide aesthetic value regardless of location, estimates of this value are currently only available for those wetlands proximate to urban areas.

Different spatial attributes are calculated for each asset class based on data availability, with the intention of maintaining consistency with the Trust Manager's spatial databases. Table 2 provides an overview of each attribute and the asset class and land cover combinations to which they are applied.

Benefit Transfer of Ecosystem Service Values

The benefit transfer method is used to estimate the ecosystem service values provided by the state trust lands. Values are derived from Earth Economics' proprietary Ecosystem Service Valuation Toolkit, an extensive repository of peer-reviewed primary studies, government reports, and gray literature that measure the non-market values of ecosystem services. To be accepted into the Ecosystem Service Valuation Toolkit, studies must use methods and techniques broadly accepted by environmental and natural resource economists, as well as pass an additional two-stage internal review for quality and logical consistency.

Earth Economics considers several criteria when selecting appropriate primary study values to apply to the state trust lands. In terms of land cover, studies specific to Washington State are prioritized. However, because that valuation literature is somewhat limited, studies for Oregon, northern California, and adjacent Canadian provinces are also included because of their relative geographic and climactic similarity to Washington. This results in a data set broadly representative of the state trust lands. Unfortunately, local valuation estimates for wetlands, which are highly valuable providers of ecosystem services, are not available. To ensure the contributions of wetlands are incorporated into the valuation, two global-scale meta-analyses of ecosystem services provided by wetlands are included. These global studies include Pacific Northwest wetlands, but regional values are not separately reported.

If multiple studies are identified that estimate the value of the same ecosystem service, these are reviewed once again for methodological quality. If the values are based on both revealed and stated preferences, the latter are rejected as these are sometimes considered less reliable. Finally, all outlying value estimates are reviewed for reasonableness.

As a final step, all ecosystem service values are then standardized to 2018 US dollars using inflation factors from the Bureau of Labor Statistics Consumer Price Index. Appendix C lists the studies used for benefit transfer estimates.

Table 3 summarizes the land cover, spatial attribute, and ecosystem service combinations for which valuation studies were identified. Recreation is valued separately (see the section titled "Recreation as an Ecosystem Service"), as is carbon storage (see the section titled "Carbon Storage as an Ecosystem Service"). Aside from these, the valuation literature supports valuation of one to four ecosystem services for each combination. Appropriate valuation studies were not found for six of the 21 ecosystem services. It is important to remember that the absence of any particular land cover ecosystem service value does not necessarily mean that these ecosystems do not produce these services, and it does not indicate that such services are not valuable. Many ecosystem services that clearly have economic value have not been valued in this report due to the lack of primary peer-reviewed data. For example, shrubland provides wildlife habitats, recreational opportunities, carbon sequestration, and other services; however, there are few valuation studies of ecosystem services in shrubland, so this analysis may show a lower total ecosystem service value for shrublands.

Readers should exercise caution when comparing total ecosystem service values across land cover types, as differences in value estimates could stem from missing information, rather than genuine differences in ecosystem service provisioning. This lack of available information underscores the need for investment in local primary valuations. See Appendix A for a detailed discussion on study limitations.

This report focuses on non-market ecosystem benefits. Although provisioning services such as food are often sold in markets, this report isolates the aspects of this service not captured by markets. This includes activities such as subsistence gathering (e.g. mushroom foraging) and producer surplus.

All ecosystem service values for each land cover and spatial attribute are summed to provide an estimated value of the total dollars per acre per year, which is then multiplied by the extent of the relevant land cover and spatial attribute combination. The result is a value that represents the annual flow of non-market ecosystem services provided for each land cover type in context. These values are then summed across all land cover types to produce the annual value of ecosystem services provided by the state trust lands.

Table 3. Valuation Literature of Land Cover Attributes and Ecosystem Service Combinations

Ecosystem Service	AG (ANNUALS)	AG (PERENNIALS)	FORESTS (RIPARIAN)	FORESTS (UPLAND)	FORESTS (RIPARIAN, EVERGREEN)	FORESTS (RIPARIAN, NON-EVERGREEN)	FORESTS (RURAL)	FORESTS (URBAN)	FORESTS (HWYS)	GRASSES (AG BORDER)	RANGELAND (ALL)	SHRUBS (URBAN)	WETLANDS (ALL)	WETLANDS (AG BORDER)	WETLANDS (COASTAL)	WETLANDS (NON-AG BORDER)	WETLANDS (NON-AG BORDER, NON-COASTAL)	WETLANDS (URBAN)
Food											•							
Medicinal Species																		
Ornamental Species																		
Energy and Raw Materials													•					
Water Storage													•					
Air Quality								•	•									
Biological Control	•									•								
Climate Stability																		
Disaster Risk Reduction										•		•		•		•		
Pollination and Seed Dispersal	•	•																
Soil Formation																		
Soil Quality																		
Soil Retention	•			•	•	•				•								
Water Quality				•										•		•		
Water Capture, Conveyance, Supply							•	•						•		•		
Navigation																		
Habitat and Refugia			•					•						•	•		•	
Aesthetic Information																		•
Cultural Value	•												•					
Recreation and Tourism																		
Science and Education																		

Key

• Combination valued in data set

Black dots indicate at least one peer-reviewed article was identified that enumerates the financial value of the ecosystem service produced on each land cover type. Blanks cells indicate only the absence of appropriate valuation studies and should not be interpreted as an absence of actual value.

RESULTS

To simplify, the land cover and spatial attributes in this section were combined into general land cover types—cultivated, forests, grasses, rangelands, and wetlands—and then broken out by asset class (see Table 4). The extents are not necessarily additive within asset classes (e.g., riparian forests include both riparian evergreen and non-evergreen forests). Each land cover type and attribute has been matched to either:

- Specific ecosystem services (e.g., air quality benefits adjacent to emitting sources, such as highways)
- Variations in the value of those services (e.g., water quality benefits are greater for wetlands adjacent to cultivated land)
- Specific characteristics identified in the original valuation study (e.g., there are studies of the aesthetic value of wetlands in urban areas, but not in rural areas)

The average total ecosystem service value by land cover type is presented in Table 5 and Table 6 (see Appendix C for more detailed results). Not surprisingly, the most substantial contribution within each asset class is associated with its primary purpose—forests provide the most value in the Forested Asset Class, annual and perennial crops provide the most value in the Cultivated Asset Class, and rangeland cover provides the most value in the Grazing Asset Class. As suggested earlier, wetlands are important within all asset classes. Overall, while forest lands represent 73 percent of all state trust lands, they provide 88 percent of the non-market ecosystem service value shown in Table 6. These benefits accrue each year, unless and until the reference ecosystems change, either through large environmental disruptions (e.g., climate change) or land use (e.g., urban development). These estimates represent the non-market benefits of the portion of ecosystem services for which acceptable studies could be identified. This means that these are conservative estimates of the true value of each ecosystem service. Moreover, these estimates do not include estimates for the value of recreation or climate stability (e.g., carbon storage), as these are each addressed separately in subsequent sections of this report.

Upon examining the individual ecosystem services within each asset class, nearly three-quarters of the non-market ecosystem service value for the Forested Asset Class (see Table 7) comes from water capture, conveyance, and supply. As might be expected, pollination services are most important in the Cultivated Asset Class, providing over half the annual non-market value produced within that asset class. Similarly, food—in the form of plants for grazing and browsing—provides the most value in the Grazing Asset Class, at nearly half the annual non-market contribution. For the Other Asset Class, disaster risk reduction; water quality; and water capture, conveyance, and supply all substantially contribute to the value produced within the asset class.

Again, due to gaps in the valuation literature, these estimates are necessarily lower than the estimate for the full range of ecosystem services provided by the state trust lands. For instance, woodpeckers and other birds are known to predate on mountain pine beetles (a concern in the Ponderosa pine forests of Eastern Washington), but no suitable study valuing this contribution could be found. Similarly, while scrubland (a component of the rangeland land cover) has substantial value as a habitat, its value could not be assessed based on the current literature. The relative paucity of Washington-specific primary valuation studies means that many ecosystem services known or predicted to be produced by land cover on state trust lands are not captured in this valuation.

Table 4. Spatial Extent of Land Cover Types and Attributes (Acres)

	Asset Class			
Land Cover	**Forested**	**Cultivated**	**Grazing**	**Other**
Ag (Annuals)	—	184,133	2,248	1,534
Ag (Perennials)	—	17,856	—	—
Forests (Riparian)	185,231	—	—	—
Forests (Upland)	1,882,635	—	—	—
Forests (Riparian, Evergreen)	136,214	—	—	—
Forests (Riparian, Non-Evergreen)	49,017	—	—	—
Forests (Rural)	2,045,108	2,982	16,864	20,265
Forests (Urban)	22,758	1	—	104
Forests (Adjacent to Highways)	90	227	269	264
Grasses (Bordering Cultivated Land)	—	3,804	893	464
Grasses (Urban)	—	447	306	779
Rangeland (All)	—	91,974	335,635	89,806
Wetlands (All)	13,293	755	2,991	4,533
Wetlands (Bordering Cultivated Land)	37	146	89	16
Wetlands (Coastal)	250	13	—	88
Wetlands (Not Bordering Cultivated Land)	13,256	609	2,902	4,517
Wetlands (Not Bordering Cultivated Land or Coasts)	13,006	596	2,902	4,429
Wetlands (Urban)	577	23	17	321

Table 5. Total Annual Average Value for all Ecosystem Services Included in this Analysis, by Land Cover and Attribute (2018 $)

Land Cover (Attribute)	Ecosystem Service Valued	Total $/acre/year
Agriculture (Annuals)	Cultural Value Biological Control Pollination and Seed Dispersal	$3
Agriculture (Perennials)	Pollination and Seed Dispersal	$2,821
Forests (Riparian, All)	Habitat	$0.08
Forests (Upland, All)	Soil Retention Water Quality	$138
Forests (Riparian, Evergreen)	Soil Retention	$3.09
Forests (Riparian, Non-Evergreen)	Soil Retention	$1
Forests (Evergreen)	Aesthetic Information Cultural Value Food (Mushrooms) Habitat Science and Education	$47
Forests (Rural)	Water Capture, Conveyance, Supply	$428
Forests (Urban)	Air Quality Habitat Water Capture, Conveyance, Supply	$1,721
Forests (Highways)	Air Quality	$523
Grasses (Agricultural Border)	Biological Control Disaster Risk Reduction Soil Retention	$5,229
Rangeland (All)	Food (Forage)	$61
Wetlands (All)	Cultural Value Energy and Raw Materials Water Storage	$124
Wetlands (Agricultural Border)	Disaster Risk Reduction Habitat Water Capture, Conveyance, Supply Water Quality	$29,206
Wetlands (Coastal)	Habitat	$423
Wetlands (Non-Agricultural Border)	Disaster Risk Reduction Water Capture, Conveyance, Supply Water Quality	$3,423
Wetlands (Non-Agricultural Border, Non-Coastal)	Habitat	$188
Wetlands (Urban)	Aesthetic Information	$10,595

Table 6. Annual Ecosystem Service Value, Average by Land Cover and Asset Class (2018 $ in thousands)

	Asset Class				
Land Cover	**Forested**	**Cultivated**	**Grazing**	**Other**	**Total**
Cultivated	—	$50,830	$6	$4	**$50,840**
Forests	$1,174,873	$1,397	$7,359	$8,991	**$1,192,620**
Grasses	—	$19,893	$4,670	$2,426	**$26,989**
Rangelands	—	$5,628	$20,538	$5,495	**$31,662**
Wetlands	$56,766	$6,803	$13,629	$20,761	**$97,960**
Total	**$1,231,639**	**$84,551**	**$46,202**	**$37,678**	**$1,400,071**
Acreage	2,170,070	301,807	366,240	124,969	**2,963,086**
% of State Trust Lands	73.2%	10.2%	12.4%	4.2%	
% of Annual Ecosystem Service Valuation	88.0%	6.0%	3.3%	2.7%	

Note: Totals may vary due to the effects of rounding.

Table 7. Annual Ecosystem Service Value, Average by Ecosystem Service and Asset Class (2018 $ in thousands)

	Asset Class			
Ecosystem Service	**Forested**	**Cultivated**	**Grazing**	**Other**
Food Provisioning	—	$5,628	$20,538	$5,495
Energy and Raw Materials	$810	$46	$182	$276
Water Storage	$335	$19	$75	$114
Air Quality	$11,942	$119	$141	$192
Biological Control	—	$1,860	$283	$148
Disaster Risk Reduction	$19,555	$16,807	$8,169	$8,557
Pollination and Genetic Dispersal	—	$51,020	$8	$5
Soil Retention	$10,677	$2,369	$760	$393
Water Quality	$273,499	$1,493	$5,458	$8,162
Water Capture, Conveyance, Supply	$890,774	$1,491	$7,752	$9,468
Habitat	$17,431	$3,390	$2,540	$1,293
Aesthetic Information	$6,113	$244	$180	$3,401
Cultural Value	$503	$65	$114	$172
Total	**$1,231,639**	**$84,551**	**$46,202**	**$37,678**

Note: Totals may vary due to the effects of rounding.

Recreation as an Ecosystem Service

Outdoor recreation is one of the greatest ecosystem service benefits provided by natural lands. In this case, outdoor recreation as an ecosystem service is a measure of the value that participants receive from engaging in outdoor activities. The measure of this value is called consumer surplus, which is estimated through the value that recreationists place on their experiences above what they paid for those experiences. For instance, if an angler is willing to pay $90 for a day of fly fishing at Merrill Lake, but only incurred $35 in expenses, he will receive $55 in surplus benefits. No market transactions are required to gain consumer surplus. Consumer surplus is used as a measure of social welfare and can be useful in indicating the importance of community resources, such as a park.

It is important to note that economic benefits are different from economic contributions. Whereas economic benefits measure consumer surplus, the economic contributions of outdoor recreation measure the economic effects stemming from expenditures on outdoor recreation. The economic contributions of outdoor recreation begin when anglers, hunters, and backpackers head to the forests and spend money in local communities. These expenditures support salaries, businesses, and local and state tax revenue.

Economic contribution analyses can be useful in determining the relative size of an industry in comparison to the larger economy. In Washington, outdoor recreation is a powerful economic driver; in 2017, a report by the Outdoor Industry Association estimated that $26.2 billion was spent on outdoor recreation trips and equipment each year in the state.[14]

While reports show the spending effects associated with recreation on state trust lands are significant,[14] this analysis focuses on the public economic benefits provided by these lands.

DATA AND METHODS

The annual economic benefit of recreation is calculated in several steps. First, the number of recreation days occurring on state trust lands is estimated for a set of activities, including hiking, mountain biking, hunting, and angling. Typically, this involves collecting use data from land managers; the Trust Manager does not consistently track recreational use on state trust lands. However, a small portion of recreation sites do collect primary use data through trail counters, garbage can collections, toilet pump-out frequencies, and road counters. This recreational use data was collected directly from regional recreation managers in the Department of Natural Resources.

Knowing that the data collected only represents a very small subset of all recreation occurring on state trust lands and that much of the data was collected only at high-use sites, an estimate was made based on the extent to which the given data reflects the true level of participation on state trust lands. These estimates are generated for each activity type and are used to extrapolate from the given data to generate an estimate of total recreational use. See Appendix D for details on how data coverage for each recreational activity is estimated.

For each of the recreational activities, consumer surplus values per recreation day are determined using the Recreational Use Values Database,[15] an extensive repository of consumer surplus values categorized by unique attributes such as activity, region, and land management type. The database is maintained by researchers at Oregon State University and is used by public agencies and non-profits around the country to assess the recreational benefits of public lands.

Finally, the total value of outdoor recreation was calculated by multiplying the total participants in each activity group by the average consumer surplus per day.

RESULTS

Outdoor Recreation Participation on State Trust Lands

State trust lands receive millions of visitors every year, although no definitive estimate of total recreation participation has previously been generated. While this analysis is unable to precisely determine the total number of recreation days on these lands, the high-level estimates developed by extrapolating available data offer a path for the Trust Manager to better understand the recreational assets that exist on its lands and identify additional data collection needs that could aid in more refined participation estimates.

This analysis collects the available recreation participation data provided by the Trust Manager (see the column "Reported Recreation Days" in Table 8). To estimate the full extent of the use of state trust lands for recreation, Table 8 provides an estimate of the coverage of the data for each recreational activity.

For instance, data from the Washington Department of Fish and Wildlife's Harvest Reports was used to estimate the number of hunting days that occurred on state trust lands. Since all take in Washington must be reported, this data is assumed to represent 100 percent coverage for this recreational activity. A counterexample is seen for hiking. Only a small subset of the trust's trails record trail counter data; therefore, the coverage of the data is relatively thin for this recreational activity. This data is assumed to represent only 15 percent of total hiking activity, while the remainder is left unaccounted for at recreation sites without trail counters.

To account for this gap in hiking data coverage, website traffic from DNR.WA.GOV specific to individual recreation sites (e.g., the Tiger Mountain State Forest webpage) was analyzed and paired with use estimates gathered from trail and car counters to determine the relative popularity of recreation sites. It is then possible to compare the website traffic to actual visitation, creating ratios that can be used as proxies and applied to other recreation sites that lack visitation data. Essentially, this approach scales the visitation estimates based on web traffic. Using these coverage estimates across the different recreational activity categories, a basic but defensible estimate of total recreation participation was calculated. A full accounting of the estimated data coverage for each activity is found in Appendix D.

Table 8. Estimated Recreational Use of State Trust Lands

Activity	Reported Recreation Days	Estimated Data Coverage	Estimated Total Recreation Days
Camping (Developed)	32,300	6.6%	489,394
Fishing	0	0%	1,000,000*
Hang Gliding and Paragliding	3,000	100%	3,000
Hiking	1,172,653	15%	7,817,687
Horseback Riding and Pack Stock	0	0%	286,368*
Hunting (Bighorn Sheep)	11	100%	11
Hunting (General Season)	456,147	100%	456,147
Hunting (Individual Hunts)	55,199	100%	55,199
Hunting (Moose)	354	100%	354
Hunting (Small Game)	173,044	100%	173,044
Hunting (Special Hunts)	56,142	100%	56,142
Mountain Biking	16,794	5.6%	299,893
OHV (4x4)	2,047	4%	51,175
OHV (ATV)	1,292	4%	32,300
OHV (Motorcycle)	3,437	4%	85,925
OHV (Other)	322	4%	8,050
Picnicking	13,800	1.75%	788,571
Rock Climbing	0	0%	81,486*
Shooting	19,500	10%	195,000
Snow Sports	0	0%	390,102*
Wildlife Watching	184,002	100%	184,002
Total	**2,190,044**		**12,453,850**

* See Appendix D for estimation methodology.

Economic Value of Outdoor Recreational Activities

Localized, activity-specific recreational use values were used to estimate the economic benefit (i.e., consumer surplus) provided by outdoor recreation. The values presented in Table 9 represent the average consumer surplus per person, per activity day. The range presented in the Recreational Use Values Database is large (e.g., hiking has a low value of $5 per day and a high value of $450 per day), but the collection of studies contained within the range "… include a mix of recreation sites with different qualities and characteristics, and the use of average values is typically most appropriate at this level of analysis."[15]

Economic Value of Outdoor Recreation on State Trust Lands

Using the participation estimates collected from regional recreation managers—2.1 million days—and the economic values from the Recreational Use Values Database, the estimated consumer surplus of outdoor recreation is $180 million per year. This value omits recreation that is known to occur, but not actively tracked. To more accurately estimate recreational participation, it is necessary to correct for the low coverage of these data. Using the previously generated data coverage estimates, it is possible to make this correction. Often, participation is tracked but data coverage is low, which is corrected by scaling the given participation estimates according to how well each data point captures true recreational participation. This is done by dividing the given estimate by the estimated percentage of data coverage.

Table 9. Average Economic Value (Consumer Surplus) of Recreation Benefits per Day (2018 $)

Activity	$/Day
Hiking	$87.89
Mountain Biking	$90.26
Camping (Developed)	$37.06
OHV	$52.19
Hunting	$80.55
Other Recreation (Flight, Horseback Riding, Climbing, Snow Sports)	$67.64
Picnicking	$49.17
Shooting	$67.25
Fishing	$74.42
Wildlife Watching	$62.57

Using this method to account for untracked recreation days, the estimated annual visits per year to state trust lands grows to 12.5 million visitations that provide nearly $1 billion in consumer surplus to recreational users. Comparing these estimates against those generated from existing data coverage reveals the importance of accounting for the gap in data coverage or risk undercounting both visitation and economic benefits. Focusing only on tracked recreation (i.e., 2.1 million visit days) captures less than 20 percent of the estimated total participation (i.e., 12.5 million visit days), which is calculated by scaling the data coverage gap using website traffic. The same is true for economic value: focusing only on tracked recreation yields a figure ($180 million) that is less than 20 percent of the economic value of recreation provided by state trust lands ($1 billion).

This analysis finds that a large portion of the recreational benefit generated by state trust lands is attributable to hiking, largely because the Trust Manager manages some of the state's most popular hiking locations, including Rattlesnake Ridge, Mount Si, and Capitol State Forest. Hiking is estimated to provide a benefit of $687 million annually. Hunting also drives a large share of total estimated value—nearly $60 million—which is tracked by the Washington Department of Fish and Wildlife. Finally, this analysis also finds that wildlife watching is a significant recreational activity, providing $11.5 million in annual economic benefits.

While hiking, hunting, and wildlife watching are tracked in some areas, many recreation activities have negligible data available. Fishing, for instance, could not be spatially tied to state trust lands, yet many anglers either pass through or choose to fish on water bodies located on these lands. As discussed in Appendix D, Washington has an estimated 11 million angler days per year, and it is known that 33 percent of anglers in Washington have reported fishing on state trust lands at least once in the past year, but the frequency is unknown. Attributing the 11 million days to the state trust lands is difficult, which makes an accurate estimation of these benefits a challenge. Due to the popularity of fishing in Washington and the wealth of opportunities for fishing on state trust lands, a placeholder estimate of 1 million user days was adopted until this estimate can be refined.

For some activities, no estimate for total recreation days was recorded by the Trust Manager, such as free-flight (e.g., hang gliding, paragliding), horseback riding, rock climbing, and snow sports. Millions of recreation days for these activities occur in Washington, and a portion of these are known to occur on state trust lands. This finding comes from analyzing the Statewide Comprehensive Outdoor Recreation Plan, which asks survey respondents if they participated in a given activity, and if so, what type of land management agency oversaw the recreation site (e.g., national forests, Washington State Department of Natural Resources, state parks).

This estimation underscores the importance of tracking the number of recreational user days to enable accurate estimates of economic benefits, an understanding of which can lead to more informed land management choices. Increasing the extent of the data coverage by tracking more recreation participation across activities would improve the accuracy of this estimate. Despite the uncertainties in the data, estimating a low value for the economic benefits of recreation on state trust lands is preferred to not estimating the value at all, for it is undoubtedly substantial.

Table 10. Economic Value of Outdoor Recreation on State Trust Lands (2018 $)

Activity	Reported Recreation Days	Estimated Data Coverage	Estimated Total Recreation Days	Consumer Surplus per Day	Estimated Value (in thousands)
Camping (Developed)	32,300	6.6%	489,394	$37.06	$18,137
Fishing	0	0%	1,000,000*	$74.42	$74,420
Hang Gliding and Paragliding	3,000	100%	3,000	$67.64	$203
Hiking	1,172,653	15%	7,817,687	$87.89	$687,097
Horseback Riding and Pack Stock	0	0%	286,368*	$67.64	$19,370
Hunting (Bighorn Sheep)	11	100%	11	$80.55	$1
Hunting (General Season)	456,147	100%	456,147	$80.55	$36,743
Hunting (Individual Hunts)	55,199	100%	55,199	$80.55	$4,446
Hunting (Moose)	354	100%	354	$80.55	$28
Hunting (Small Game)	173,044	100%	173,044	$80.55	$13,939
Hunting (Special Hunts)	56,142	100%	56,142	$80.55	$4,522
Mountain Biking	16,794	5.6%	299,893	$90.26	$27,068
OHV (4x4)	2,047	4%	51,175	$52.19	$2,671
OHV (ATV)	1,292	4%	32,300	$52.19	$1,686
OHV (Motorcycle)	3,437	4%	85,925	$52.19	$4,484
OHV (Other)	322	4%	8,050	$52.19	$420
Picnicking	13,800	1.75%	788,571	$49.17	$38,774
Rock Climbing	0	0%	81,486*	$67.64	$5,512
Shooting	19,500	10%	195,000	$67.25	$13,114
Snow Sports	0	0%	390,102*	$67.64	$26,386
Wildlife Watching	184,002	100%	184,002	$62.57	$11,513
Total	**2,190,044**		**12,453,850**		**$990,534**

* See Appendix D for estimation methodology. *Note: Totals may vary due to the effects of rounding.*

Carbon Storage as an Ecosystem Service

Increases in the proportion of heat-trapping gasses—primarily carbon dioxide and methane—within the Earth's atmosphere are affecting the climate and inflicting significant economic costs on communities around the world, including Washington State.[16,17] Severe precipitation, droughts, and temperature extremes—even wildfires—are growing in severity and frequency.[18] The cost of climate-related disasters in the United States from 1980 to 2017 totaled more than $1.1 trillion.[19] Climate impacts in Washington State are expected to increase in severity as the climate warms. The state already experiences multiple climate-related impacts, including damage to human health, industrial productivity, and property; reduced agricultural, seafood, and timber production; reduced hydropower generation; and increased shoreline erosion.[20] The importance of factors capable of limiting climate change are likely to grow over time.

Each growing season, trees, shrubs, grasses, and wetlands remove carbon from the atmosphere and sequester it as biomass, thus contributing to climate stability. In other words, sequestration is the ongoing conversion of atmospheric carbon to stored carbon, which may have benefits beyond contributing to climate stability (e.g., soil organic matter affects soil pH, moisture, and structure). While both sequestration rates and storage can be measured separately, the availability of primary carbon storage estimates for forests in the Forested Asset Class makes it possible to develop more focused storage valuation estimates for those lands. To maintain consistency across analyses, the climate stability ecosystem service of other land cover types—and forests outside of the Forested Asset Class—are also assessed in terms of carbon storage.

Calculating the value of stored or sequestered carbon is slightly different than a traditional benefit transfer. Instead of scaling per-area monetary values, the first step is to determine the carbon stored per acre. These storage estimates are then scaled by the extent of each land cover type, and the total carbon stored by a given land cover type within the study is assigned a carbon price.

There are many ways of assigning a price to carbon, including exchange values (e.g., market prices, emissions permit auctions) and Pigouvian taxes (e.g., carbon taxes). These mechanisms vary widely in their implementation depending on national and institutional context, but it is generally recognized that most tend to underestimate the marginal impact of emissions, which is the damage caused by each unit of carbon emitted. A more comprehensive approach—one adopted by the Washington State Department of Commerce—is to identify the full range of carbon impacts on society in the past, present, and future.[21] This "social cost of carbon" recognizes that deferring reductions in atmospheric carbon increases future impacts—in other words, the social cost of carbon grows over time. It increases because each additional unit of carbon emissions is expected to have higher and higher impacts, as ecosystems become increasingly stressed.

Because of this, the value of interpreting carbon storage as an "annual social cost of carbon dividend" is problematic—the longer emission limits are delayed, the greater the social cost of carbon becomes.

This report uses the 2015 social cost of carbon estimate of $130.76 per metric ton of carbon (in 2018 US dollars).[22] While the source study for this estimate also concludes the real (i.e., inflation-neutral) social cost of carbon is expected to increase 3 percent each year through 2050, this 2015 estimate has only been adjusted for inflation, not the anticipated rise in real costs. It is thus a conservative estimate of the true social cost of carbon.

The Trust Manager provided the carbon storage estimates for forested land cover within the Forested Asset Class. The climate stability ecosystem service is valued directly from these estimates. Carbon storage on forested lands in other asset classes—and all other land cover types across all asset classes—is estimated based on generalized biophysical storage values found in the relevant literature (see Appendix C). All per-acre carbon storage values (including forested land cover within Forested Asset Class) are multiplied by the extent of each land cover type in acres, and again by the social cost of carbon.

RESULTS

The average amount of carbon stored on each acre of forest within the Forested Asset Class is shown in Table 12. These averages by resource region include both above (i.e., standing trees) and below ground (i.e., root mass) carbon for both living and dead trees. Multiplying the sum of these per-acre averages by the extent of forest cover within each region of the Forested Asset Class reveals roughly similar carbon storage values across regions, although the greater extent of forest lands west of the Cascade Range means that most of this carbon storage value is found there.

For forests outside of the Forested Asset Class and all other land cover types across all asset classes, generalized carbon storage rates (in metric tons of carbon per acre) are applied (see Appendix E for sources). These are then scaled by the extent of each land cover type in each asset class and multiplied by the social cost of carbon for each metric ton of carbon (see Table 11). Because the climate stability benefits provided by forests within the Forested Asset Class have already been addressed, they were omitted here. However, both above- and below-ground carbon storage estimates for forested areas within other asset classes are included here.

Combining these estimates reveals that forests within the Forested Asset Class provide more than 90 percent of the climate stability ecosystem service value across all state trust lands; virtually all of that value across all forests, regardless of asset class. Annual and perennial crops provide the majority of climate stability value within the Cultivated Asset Class, and similarly, rangelands are a major factor in the Grazing Asset Class. Carbon storage in the Other Asset Class is evenly divided between forests and rangelands. Most of the climate stability provided by wetlands is found within the Forested Asset Class, and the largest climate stability value provided by grasses occurs within the Other Asset Class.

These are conservative estimates. The resolution of most land cover data is limited to 30 meters, meaning variations in land cover smaller than 30 x 30 meters may not be captured. Moreover, the social cost of carbon applied here is lower than other available social cost of carbon values and reflects the 2015 value, which has only been adjusted for inflation and does not account the expected 3 percent per year increase in the real social cost of carbon.

Table 11. Combined Social Cost of Carbon Storage (2018 $ in thousands)

	Asset Class				
Land Cover	**Forested**	**Cultivated**	**Grazing**	**Other**	**Total**
Cultivated	$0	$477,030	$5,309	$3,623	$485,962
Forests	$16,485,738	$28,056	$158,611	$191,577	$16,863,982
Grasses	$0	$1,097	$751	$1,911	$3,759
Rangelands	$0	$225,648	$823,443	$220,329	$1,269,421
Wetlands	$73,168	$4,156	$16,463	$24,951	$118,737
Total	**$16,558,906**	**$735,986**	**$1,004,577**	**$442,390**	**$18,741,860**

Note: Totals may vary due to the effects of rounding.

Table 12. Carbon Storage in Forests of the Forested Asset Class by Trust Manager Administrative Units (Average Metric Ton Carbon per Acre, Acreage, and Social Cost)

	West				East	
	Northwest	**Olympic**	**Pacific Cascades**	**South Puget Sound**	**Northeast**	**Southeast**
Live Trees						
Above Ground	54.29	67.44	57.88	59.54	19.97	27.81
Below Ground	11.26	13.79	12.33	12.87	3.84	5.52
Dead Trees						
Above Ground	2.99	5.15	3.57	2.04	2.20	1.88
Below Ground	0.88	1.55	1.02	0.60	0.53	0.49
Subtotal	**69.42**	**87.94**	**74.81**	**75.05**	**26.54**	**35.70**
Forested Asset Class Acres	316,814	349,070	397,668	287,831	387,202	329,310
Social Cost of Carbon (2018 $ in thousands)	$2,876,037	$4,013,928	$3,890,112	$2,824,800	$1,343,600	$1,537,251
Social Cost of Carbon Regional Subtotal ($ in thousands)		**$13,604,887**			**$2,880,851**	
Social Cost of Carbon Total ($ in thousands)			**$16,485,738**			

Note: Totals may vary due to the effects of rounding.

Conclusion

This report identified non-market ecosystem service benefits of state trust lands and provided conservative estimates for the economic value of these benefits. In total, these lands provide $1 billion per year of recreation value and $1.4 billion per year in other non-market ecosystem goods and services. Additionally, the current standing stock of carbon on state trust lands is worth $19 billion in carbon storage benefits, though this is not an annual benefit. These benefits accrue to users of state trust lands and to those in Washington State living upstream and downstream from them. The values presented in this report reveal the breadth and magnitude of the non-market economic benefits provided by state trust lands. Despite constraints due to gaps in the data, these results provide a broad sense of the economic importance of these lands.

Understanding the scale and importance of these non-market benefits—even in broad strokes—helps support shared goals, sustainable funding mechanisms for management, and better decision making. Natural lands provide goods and services that people need to survive. Without healthy natural capital, many of these ecosystem services that are provided at no cost by nature would cease to exist. Once lost, these services must be replaced with costly human-made capital, which is often less resilient and requires ongoing maintenance and replacement. When natural capital is lost, the economic goods and services it naturally provides also disappear.

Appendix A. Ecosystem Service Valuation Limitations

Valuation exercises have limitations, yet these limitations should not detract from the core finding that ecosystems produce significant economic value for society. Like any economic analysis, the benefit transfer method has strengths and weaknesses. Some arguments against benefit transfer include:

- Every ecosystem is unique; per-acre values derived from another location may be of limited relevance to the ecosystems under analysis.
- Even within a single ecosystem, the value per acre depends on the size of the ecosystem. In most cases, as the size decreases, the per-acre value is expected to increase, and vice versa. (In technical terms, the marginal cost per acre is generally expected to increase as the quantity supplied decreases; a single average value is not the same as a range of marginal values).
- Gathering all the information needed to estimate the specific value for every ecosystem within the study area is not currently feasible. Therefore, the full value of all the open water, habitat, shrubland, grassland, etc., in a large geographic area cannot yet be ascertained. In technical terms, far too few data points are available to construct a realistic demand curve or estimate a demand function.
- The prior studies upon which calculations are based encompass a wide variety of time periods, geographic areas, investigators, and analytic methods. Many of them provide a range of estimated values rather than single-point estimates. The present study preserves this variance; no studies were removed from the database because their estimated values were deemed too high or too low. This approach is similar to determining an asking price for a piece of land based on the prices of comparable parcels: Even though the property being sold is unique, realtors and lenders feel justified in following this procedure to the extent of publicizing a single asking price rather than a price range.
- The study by Costanza et al.[23] of the value of all of the world's ecosystems has been criticized for estimating market values at a global scale. This critique is less persuasive if one recognizes the purpose of valuation at this scale, which is more analogous to national income accounting than to estimating exchange values.[24]

This report and supplementary appendices display study results in a way that allows one to appreciate the range of values and their distribution, and the final estimates are not precise. However, they are much better estimates than the alternative of assuming that ecosystem services have zero value or, alternatively, assuming they have infinite value. Pragmatically, in estimating the value of ecosystem services, it would be better to be approximately right than precisely wrong.

Appendix B. Spatial Data Sources and Methods

ASSET CLASS GEOGRAPHIC BOUNDARIES

This section details the data sources and hierarchy used to define the spatial extent of the four asset classes used in this assessment.

Forested Asset Class

The Forested Asset Class comprises state trust lands where forestry activities are either the primary use or one of multiple uses. This encompasses both forest stands themselves as well as other already existing ecosystems (e.g., streams and wetlands) and human-created land covers (e.g., roads) necessary to manage these lands. A shape file supplied by the Trust Manager called "dnr_forested_land" was used to determine the Forested Asset Class boundary. This layer is located within the Trust Manager's geodatabase overlay_index, a working directory associated with the creation of temporary outputs in the process of aggregating water bodies within forested areas. This Asset Class boundary includes forested acres, wetlands, streams, and roads considered part of the body of land used for forestry.

Cultivated Asset Class

The Cultivated Asset Class denotes lands primarily designated for agricultural activities, as the Trust Manager leases a portion of state trust lands for agricultural production. The boundary of the Cultivated Asset Class was primarily determined by digitized leasehold boundaries supplied by the Trust Manager. These represent active agricultural leases that denote primary land use, not necessarily current land cover. Within these lease boundaries, leaseholders may manage a variety of land covers in addition to active crop production. As a result, and as seen within the other asset classes, a range of land covers are present within the Cultivated Asset Class boundary beyond simply annual and perennial crops.

There was some uncertainty as to whether the digitized lease boundaries supplied by the Trust Manager provided full coverage of agricultural lands, so the Washington Department of Agriculture 2018 crop distribution data layer was used to supplement lease boundaries and capture the full extent of the Cultivated Asset Class. Within the trust land boundary and excluding all land already identified in the Forested Asset Class, current agricultural areas (as defined using the 2018 crop distribution data layer) not already denoted by the agricultural lease boundaries were added to capture potential gaps in the digitized lease data and generate the final Cultivated Asset Class boundary.

Grazing Asset Class

Similar to the Cultivated Asset Class, the Grazing Asset Class was delineated based on current grazing lease boundaries within state trust lands. Priority was given to Forested Asset Class and Cultivated Asset Class, meaning that the Grazing Asset Class only encompasses land areas outside of the previously defined Forested Asset Class and Cultivated Asset Class. Any grazing leases that overlap with the Forested Asset Class were excluded from the definition of the Grazing Asset Class boundary.

Other Asset Class

After classifying the Forested Asset Class, Cultivated Asset Class, and Grazing Asset Class, the remaining areas within the trust land boundaries were combined into the Other Asset Class. This category comprises a number of different land uses and special permits.

LAND COVER AGGREGATION METHODS

Details of data and data processing required to aggregate ecosystem types for each asset class are presented below.

Forested Asset Class

Within the Forested Asset Class boundary, multiple data sets were used to categorize land cover, including data on forest inventory and two different water feature data sets that were provided by the Trust Manager. The Trust Manager-provided data was relied upon for consistency with other Trust Manager efforts.

First, water attributes including wetland types were found using two Trust Manager-supplied layers: wet_areas and synthetic streams. Wet_areas is characterized as a combination of: a layer based on the US Fish and Wildlife Service National Wetlands Inventory (fp_wet); a layer that captures assessed or known forested and non-forested wetlands on state trust lands (lk_slk_wetland); and a layer of water bodies that include features such as lakes, wet areas, reservoirs, impoundments, glaciers, islands, and dams (wbhydro). The US Fish and Wildlife Service National Wetlands Inventory is a public resource that provides information on the characteristics of US wetlands. For this study, data provided by lk_slk_wetlands layer was excluded because there is no current validation requirement for visually assessed wetlands and water bodies, meaning data can be entered but not reviewed for accuracy. For all other data within the wet_areas layer, features were classified as either herbaceous wetlands, woody wetlands, or freshwater.

Below is a list of attributes associated with each data layer included in wet_areas and how they were classified. Only water features within the trust land boundaries were used.

- wbhydro: marsh classified as herbaceous wetland and inundation classified as freshwater
- lk_slk_wetland: state land knowledge wetlands excluded from study
- fp_wet: Type A wetlands and Type B wetlands both classified as woody wetlands and non-forested wetlands were classified as herbaceous wetlands

These water and wetland data were further modified to include synthetic streams data, also provided by the Trust Manager. Using synthetic stream data provides more detail of the water features within the Forested Asset Class because the layers above focus on waterbodies and wetlands, not flowing surface water (e.g., rivers, streams). From the attributes of the synthetic stream layer, Type 3 streams were selected. Type 1-3 streams are considered fish bearing and are assumed to be used by a "significant number of fish species" as defined by the Trust Manager.[25] The synthetic streams layer did not include Type 1 or 2 streams. From these selected streams, a 10-foot buffer was created based on the average width of Type 3 streams as assessed, calculated, gauged, judged, and surveyed using imagery validation. Areas of overlap between the buffered streams classified as fresh water and the wet areas layer were determined. Fresh water features took priority and replaced the wet areas data if both existed. Finally, the two layers were combined to create one water feature layer that includes woody wetlands, herbaceous wetlands, and freshwater attributes.

The inventory layer, supplied by the Trust Manager, was used to determine the remaining land cover within the Forested Asset Class boundary. This layer included a forested and non-forested classification. Land that was classified as forested was further classified by conifer, hardwood, and mixed forest types. Non-forested land was classified as roads or barren land as defined by the Trust Manager (metadata: forest inventory).

To ensure each area of land was classified by only one land cover category (e.g., forest, wetland) the areas of overlap in the water features and forest inventory data sets were determined. Water features took priority and replaced the inventory data if both existed. Then the two layers were combined to create one layer that includes all Forested Asset Class land cover classifications. Acres of each land cover category were calculated using this layer.

Cultivated Asset Class

Land cover for land within the Cultivated Asset Class boundary was found using the National Land Cover Database and modified using the Washington Department of Agriculture crop distribution data layer. To ensure each area of land was classified by only one land cover category, the areas of overlap between the crop features and data sets from the National Land Cover Database were determined. Crop features took priority and replaced the data from the National Land Cover Database, if both existed. Then the two layers were combined. Attributes from the crop distribution data layer enable a more detailed view of the different types of crops within the boundary, and data from the National Land Cover Database categorized the remaining land within the Cultivated Asset Class boundary.

Grazing Asset Class

Land cover within the Grazing Asset Class boundary was categorized using data from the National Land Cover Database. Grazing is expected to occur on rangelands, grasslands, and shrublands within the Grazing Asset Class, which were combined to represent the extent of grazing lands. Acres of each land cover category were calculated within the Grazing Asset Class boundary.

Other Asset Class

Land cover within the Other Asset Class boundary was categorized using data from the National Land Cover Database. Acres of each land cover category were calculated within the Other Asset Class boundary.

Appendix C. Ecosystem Services Valuation Sources and Detailed Tables

The lowest and highest ecosystem service values reveal a range of values provided by estimates within one or more studies. Primary studies often provide a range of values that reflect statistical uncertainty or the breadth of features being studied. To recognize this variability and uncertainty, both high and low dollar per acre values are included in this appendix, if available, for each value provided in this report.

APPENDIX C-1. SOURCES FOR ECOSYSTEM SERVICE VALUES

Anielski, M., Wilson, S. J. 2005. Counting Canada's Natural Capital: Assessing the Real Value of Canada's Boreal Ecosystems.

Beyers, W. B. 2002. Evaluation of Blanchard Mountain Social, Ecological & Financial Values. Washington State Department of Natural Resources.

Brander, L. M., Brouwer, R., Wagtendonk, A. 2013. Economic valuation of regulating services provided by wetlands in agricultural landscapes: A meta-analysis. Ecological Engineering 56: 89-96.

Brander, L. M., Florax, R. J., Vermaat, J. E. 2006. The Empirics of Wetland Valuation: A Comprehensive Summary and a Meta-Analysis of the Literature. Environmental and Resource Economics 33(2): 223-250.

Bulte, E. H., van Kooten, G. C. 1999. How much primary coastal temperate rain forest should society retain? Carbon uptake, recreation, and other values. Canadian Journal of Soil Science 29(1): 1879-1890.

Clucas, B., Rabotyagov, S., Marzluff, J. M. 2015. How much is that birdie in my backyard? A cross-continental economic valuation of native urban songbirds. Urban Ecosystems 18(1): 251-266.

Dias, V., Belcher, K. 2015. Value and provision of ecosystem services from prairie wetlands: A choice experiment approach. Ecosystem Services 15: 35-44.

EcoAg Partners 2011. Farm of the Future: Working lands for ecosystem services.

Ehlers, T., Hobby, T. 2010. The chanterelle mushroom harvest on northern Vancouver Island, British Columbia: Factors relating to successful commercial development. BC Journal of Ecosystems and Management 11(1-2): 72-83.

Erckmann, J. 2000. Cedar River Watershed Habitat Conservation Plan. City of Seattle.

Gregory, R., Wellman, K. F. 2001. Bringing stakeholder values into environmental policy choices: a community-based estuary case study. Ecological Economics 39: 37-52.

Ingraham, M. W., Fostera, S. 2008. The value of ecosystem services provided by the US National Wildlife Refuge System in the contiguous US Ecological Economics 67: 608-618.

Knowler, D. J., MacGregor, B. W., Bradford, M. J., Peterman, R. M. 2003. Valuing freshwater salmon habitat on the west coast of Canada. Journal of Environmental Management 69(1): 261-273.

Mahan, B. L. 1997. Valuing urban wetlands: a property pricing approach. United States Army Corps of Engineers (USACE).

McPherson, E. G., Scott, K. I., Simpson, R. D. 1998. Estimating cost effectiveness of residential yard trees for improving air quality in Sacramento, California, using existing models. Atmospheric Environment 31(1): 75-84.

McPherson, E. G., Simpson, J. R., Peper, P. J., Xiao, Q. 1999. Benefit-Cost Analysis of Modesto's Municipal Urban Forest. Journal of Arboriculture 25(5): 235-248.

Moore, R. G., McCarl, B. A. 1987. Off-Site Costs of Soil Erosion: A Case Study in the Willamette Valley. McCarl, Bruce A. (ed.) Western Journal of Agricultural Economics 12(1): 42-49.

Morandin, L. A., Long, R. F., Kremen, C. 2016. Pest Control and Pollination Cost-Benefit Analysis of Hedgerow Restoration in a Simplified Agricultural Landscape. Journal of Economic Entomology 109(3): 1020-1027.

Nowak, D. J., Hoehn, E., Crane, D. E., Stevens, C., Walton, T. 2007. Assessing Urban Forest Effects and Values. United States Forest Service (USFS).

Rein, F. A. 1999. An economic analysis of vegetative buffer strip implementation. Case study: Elkhorn Slough, Monterey Bay, California. Coastal Zone Management Journal 27(4): 377-390.

Shaw, M. R., Pendleton, L. H., Cameron, D. R., Morris, B., Bratman, G., Bachelet, D., Klausmeyer, K., MacKenzie, J., Conklin, D., Lenihan, J., Haunreiter, E., Daly, C. 2009. The Impact of Climate Change on California's Ecosystem Services. California Climate Change Center.

Stevens, T. H., Hoshide, A. K., Drummond, F. A. 2015. Willingness to pay for native pollination of blueberries: A conjoint analysis. International Journal of Agricultural Marketing 2(4): 68-77.

Streiner, C., Loomis, J. B. 1995. Estimating the Benefits of Urban Stream Restoration Using the Hedonic Price Method. Rivers 5(4): 267-278.

Walls, T. 2011. Appendix C: Salmon Productivity Calculations for Smith Island Restoration Project. Snohomish County Public Works.

Wobbrock, N., Zimring, M., Aylward, B., Kruse, S., Edelson, D., Podolak, K. 2015. Estimating the Water Supply Benefits from Forest Restoration in the Northern Sierra Nevada. The Nature Conservancy.

Woodward, R., Wui, Y. 2001. The economic value of wetland services: a meta-analysis. Ecological Economics 37(2): 257-270.

Yuan, Y., Boyle, K. J., You, W. 2015. Sample Selection, Individual Heterogeneity, and Regional Heterogeneity in Valuing Farmland Conservation Easements. Land Economics 91(4): 627-649.

APPENDIX C-2. ECOSYSTEM SERVICE VALUE RANGES

Table 13. Value Ranges of Total Annual Ecosystem Services per Acre, by Land Cover and Attribute (2018 $)

Land Cover (Attribute)	Ecosystem Services Valued	Range
Agriculture (Annuals)	Cultural Value Biological Control Pollination and Seed Dispersal	$2.47 to $2.55
Agriculture (Perennials)	Pollination and Seed Dispersal	$2,302 to $3,340
Forests (Riparian, All)	Habitat	$0.04 to $0.12
Forests (Upland, All)	Soil Retention Water Quality	$138
Forests (Riparian, Evergreen)	Soil Retention	$0.76 to $5.43
Forests (Riparian, Non-Evergreen)	Soil Retention	$0.76
Forests (Evergreen)	Aesthetic Information Cultural Value Food (Mushrooms) Habitat Science and Education	$34 to $61
Forests (Rural)	Water Capture, Conveyance, Supply	$245 to $611
Forests (Urban)	Air Quality Habitat Water Capture, Conveyance, Supply	$1,052 to $2,488
Forests (Highways)	Air Quality	$32 to $1,112
Grasses (Agriculture Border)	Biological Control Disaster Risk Reduction Soil Retention	$4,587 to $5,872
Rangelands (All)	Food (Forage)	$15 to $107
Wetlands (All)	Cultural Value Energy and Raw Materials Water Storage	$43 to $266
Wetlands (Agricultural Border)	Disaster Risk Reduction Habitat Water Capture, Conveyance, Supply Water Quality	$28,510 to $30,002
Wetlands (Coastal)	Habitat	$283 to $491
Wetlands (Non-Agricultural Border)	Disaster Risk Reduction Water Capture, Conveyance, Supply Water Quality	$34 to $11,992
Wetlands (Non-Agricultural Border, Non-Coastal)	Habitat	$0.14 to $520
Wetlands (Urban)	Aesthetic Information	$10,595

Table 14. Annual Ecosystem Service Value, Range by Land Cover and Asset Class (2018 $ in thousands)

	Asset Class				
Land Cover	**Forested**	**Cultivated**	**Grazing**	**Other**	**Total**
Cultivated	—	$41,554 to $60,107	$5.5 to $5.7	$3.8 to $3.9	$41,563 to $60,117
Forests	$785,696 to $1,566,296	$740 to $2,076	$4,147 to $10,598	$5,090 to $12,928	$795,673 to $1,591,898
Grasses	—	$17,449 to $22,337	$4,096 to $5,244	$2,128 to $2,725	$23,673 to $30,306
Rangelands	—	$1,407 to $9,849	$5,135 to $35,941	$1,374 to $9,617	$7,916 to $55,407
Wetlands	$8,262 to $176,616	$4,463 to $12,445	$2,945 to $39,957	$4,231 to $61,603	$19,901 to $290,621
Total	$793,958 to $1,742,913	$65,612 to $106,813	$16,328 to $91,746	$12,827 to $86,877	$888,725 to $2,028,349
Acreage	2,170,070	301,807	366,240	124,969	2,963,086
% of State Trust Lands	73.2%	10.2%	12.4%	4.2%	
% of Annual Ecosystem Service Valuation	85.9% to 89.3%	5.3% to 7.4%	1.8% to 4.5%	1.4% to 4.3%	

Table 15. Annual Ecosystem Service Value, Range by Ecosystem Service and Asset Class (2018 $ in thousands)

	Asset Class			
Ecosystem Service	**Forested**	**Cultivated**	**Grazing**	**Other**
Food Provisioning	—	$1,407 to $9,849	$5,135 to $35,941	$1,374 to $9,617
Energy and Raw Materials	$162 to $2,268	$9 to $129	$36 to $510	$55 to $773
Water Storage	$335	$19	$75	$114
Air Quality	$735 to $25,396	$7 to $253	$9 to $299	$12 to $409
Biological Control	—	$1,860	$283	$148
Disaster Risk Reduction	$347 to $56,426	$15,924 to $18,501	$3,964 to $16,241	$2,012 to $21,121
Pollination and Genetic Dispersal	—	$41,751 to $60,289	$8	$5
Soil Retention	$10,359 to $10,995	($75) to $4,813	$186 to $1,334	$95 to $691
Water Quality	$249,901 to $342,644	$409 to $4,670	$292 to $20,596	$121 to $31,723
Water Capture, Conveyance, Supply	$510,994 to $1,276,027	$748 to $2,501	$4,148 to $12,563	$5,017 to $15,784
Habitat	$14,944 to $21,769	$3,276 to $3,589	$1,995 to $3,503	$448 to $2,768
Aesthetic Information	$6,113	$244	$180	$3,401
Cultural Value	$68 to $939	$33 to $98	$16 to $212	$23 to $321
Total	**$793,958 to $1,742,913**	**$65,612 to $106,813**	**$16,328 to $91,746**	**$12,827 to $86,877**

Note that some land cover types or land-use practices produce negative externalities (also known as disservices). This is clearly the case for erosion, especially when soils are regularly disturbed by cultivation. For lower value estimates, this results in a loss of $75,000 in the Cultivated Asset Class for soil retention (see Table 15).

Appendix D. Recreation Sources and Methods

This appendix details the data collection approach for each recreational activity and how the estimated data coverage was calculated.

Camping (Developed)

The Trust Manager manages 80 campgrounds across the state, including campgrounds that can only be accessed by boat, such as the Pelican Beach or Cypress Head campgrounds on Cypress Island. When monitoring campground use, many land managers track use through camping reservations and fees. However, because these campgrounds are available on a first come, first served basis, and there is no cost beyond the Discover Pass, monitoring campground use is difficult. In the data collection process, only Capitol State Forest was able to provide monitored data on campground use, at which recreation managers estimated 32,300 recreation days per year.

According to the State of Washington 2017 Assessment of Outdoor Recreation Demand Report, there are approximately 1.7 million developed camping participants in Washington.[26] This report found that 29 percent of camping participants visited a trust property at least once to participate in camping, resulting in a minimum of 490,017 days of camping at state trust lands. Therefore, Capitol State Forest accounts for approximately 7 percent of reported days per year.

Fishing

The 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation estimates that there were 13,449,000 days of fishing in Washington State.[27] National data from 2016 shows that while the total number of anglers in the United States has increased, the days of fishing have decreased.[28] This trend seems to follow fishing license sales data from the Washington Department of Fish and Wildlife, which shows annual permits decreasing from 2016 to 2018 (albeit an extremely small sample size), and single day permit sales increasing over this same time period.[29] This could indicate that while there are more anglers, the number of days fishing per angler is down. Assuming Washington State's participation in fishing is parallel to national rates, it is estimated there are 11,143,000 days of fishing in Washington State.

Due to lack of data, it was not possible to assign fishing days to state trust lands, although according to the State of Washington 2017 Assessment of Outdoor Recreation Demand Report, 32 percent of freshwater participants and 17 percent of saltwater participants visited state trust lands at least once to participate in fishing.[26] Because an unknown frequency of visitation is associated with these days, it is conservatively estimated that 1,000,000 fishing days occur on or are accessed through state trust lands per year.

Hang Gliding and Paragliding

According to the State of Washington 2017 Assessment of Outdoor Recreation Demand Report, 100,000 days of hang gliding, sky diving, or paragliding occur in Washington State every year.[26] The demand report also states that 3 percent of these days occur on state trust lands, such as Tiger Mountain State Forest's Poo Poo Point, Blanchard Forest's Samish Overlook, or the Chelan Butte Sky Park. It is therefore estimated that 3,000 hang gliding and paragliding activity days occur on state trust lands per year.

Hiking

The Trust Manager manages some of the most popular hiking trails in the United States, including Rattlesnake Ridge, Mailbox Peak, Mount Si, and Blanchard Forest's Oyster Dome, to name a few. Data on hiking days was available from the Snoqualmie Corridor and Capitol Forest, as well as limited data from the Olympic Peninsula Forest. Reported hiking days for these recreation areas totaled 1.17 million days. Website traffic provided by the Trust Manager showed that the webpages for the recreation sites that had data accounted for approximately 15 percent of all unique recreation-site webpage views.[30] This estimate is likely an underestimate of total use to these areas, and in total use to the state, due to the fact that these areas receive higher repeat visitors, who are less likely to revisit the webpage. Assuming data coverage of 15 percent, state trust lands provide 7.8 million days of hiking per year.

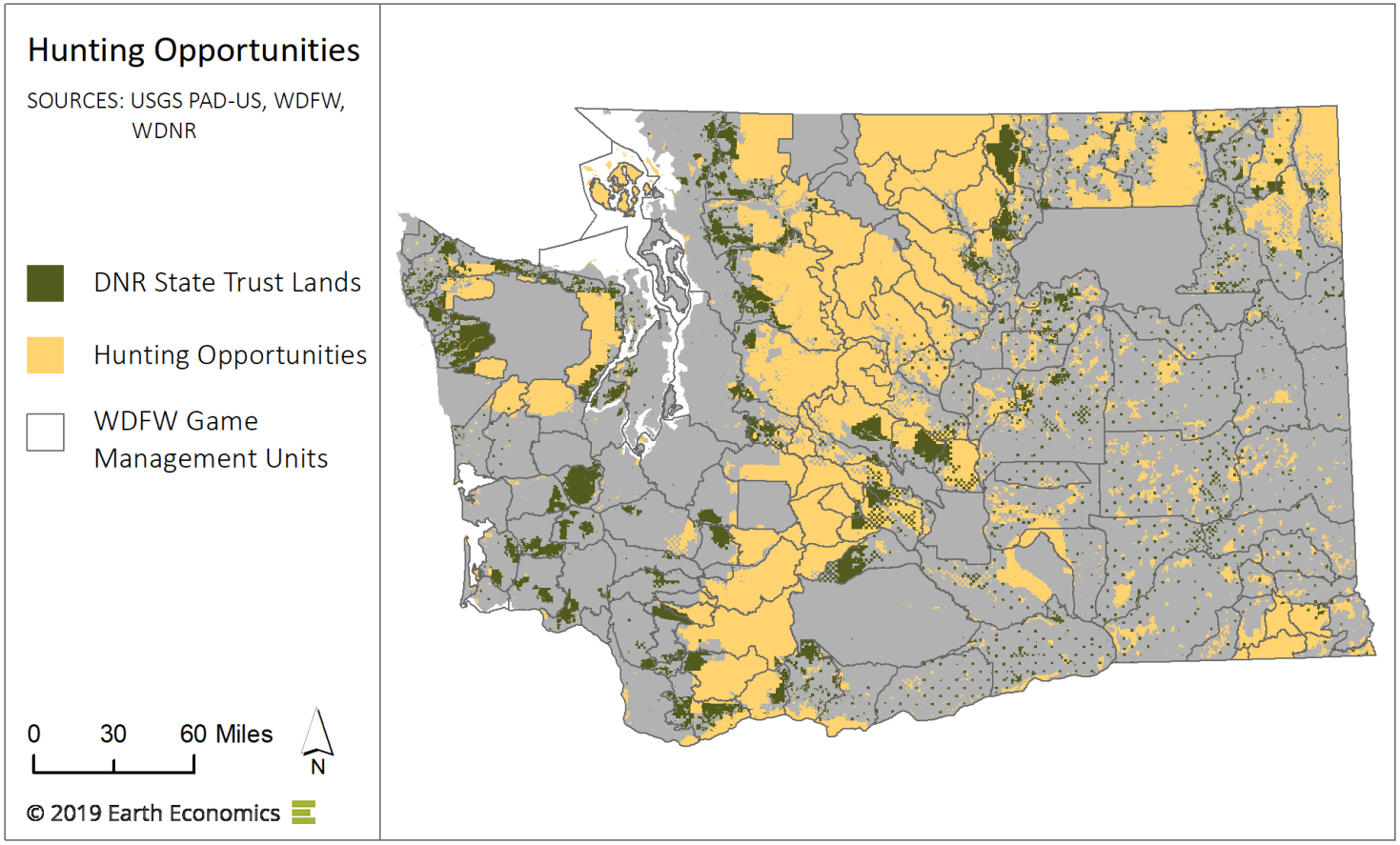
Horseback Riding and Pack Stock

According to the State of Washington 2017 Assessment of Outdoor Recreation Demand Report, approximately 4 percent of Washingtonians participated in horseback and stock activities on "Mountain or forest trails," with 15 mean user days per participant.[26] From this, it can be estimated that there were 4.3 million recreation days on forested trails. An unknown amount of these days occurred at Trust Manager-operated facilities, but 26 percent of surveyed participants did visit Trust Manager-operated facilities at least once for horseback and pack stock recreation. Therefore, at a minimum, there are 286,368 days of horseback riding and pack stock recreation occurring on state trust lands per year.

Hunting

Hunting data was collected from the Washington Department of Fish and Wildlife's Game Harvest Reports, which track all hunting harvests. Species recorded as hunted include elk, deer, turkey, cougar, black bear, small game, and furbearers. Each harvest is associated with a days per harvest metric and spatially assigned to a game management unit. To assign these to state trust lands, available hunting opportunities were identified in Washington State from the Bureau of Land Management, US Forest Service, Washington State Department of Fish and Wildlife, Washington Department of Natural Resources, and Private Lands Hunting Opportunities (Figure 1). Game management units were then overlaid. Next, the percentage of state trust lands out of all available hunting areas for each game management unit was calculated, as well as data from game allocated from Harvest Reports.[31] The analysis assumes a consistent harvest throughout the game management unit, and does not consider hot spots or unreachable areas within. The percentage of state trust lands within each game management unit's available hunting lands was then applied to the harvests for each game management unit to arrive at total hunting days for each game management unit. All game management units were then totaled to achieve a statewide total of 740,897 hunting days occurring on state trust lands per year.

FIGURE 1. HUNTING OPPORTUNITY AREAS IN WASHINGTON STATE AND ON STATE TRUST LANDS



Mountain Biking

Mountain biking occurs at many locations throughout state trust lands, but data was only collected for Capitol Forest and Reiter Foothills. Capitol Forest had an estimated 15,000 recreation days in 2018, based on vehicle counts at trail parking lots. Data for Reiter Foothills was estimated through an extrapolation of compliant and non-compliant Discover Pass reports from the parking lot, which were broken out by recreational activity. It was estimated that Reiter Foothills had 1,794 recreation days. A total of 16,794 mountain biking recreation days were reported for state trust lands.

Estimated coverage for this data is based on an analysis of the State of Washington 2017 Assessment of Outdoor Recreation Demand Report, which found that 28 percent of Washingtonians participated in bicycling—a total of 2.1 million participants.[26] The survey found that 14 percent of respondents visited state trust lands at least once to participate in bicycling (assumed to be mountain biking). Therefore, it is estimated that there are at least 299,888 days of mountain biking occurring on state trust lands every year, and current data coverage is only 5.6 percent. This estimate is extremely conservative, as the survey reports Washingtonians who mountain biked on natural or dirt trails had a mean annual activity rate of 18 days per year; although it is not clear how many of these days occurred on state trust lands.

Off-Highway Vehicle (OHV)

OHV data was only available for Reiter Foothills Forest and was based on extrapolation of compliant and non-compliant Discover Pass reports from the parking lot, which were broken out by recreational activity. It was estimated that Reiter Foothills had 7,098 OHV recreation days.

According to the State of Washington 2017 Assessment of Outdoor Recreation Demand Report, there are approximately 500,000 OHV participants in Washington.[26] The demand report estimated that 35 percent of OHV respondents visited a trust property at least once to participate in OHV activities, resulting in a minimum of 177,450 days across all OHV categories. Therefore, Reiter Foothills accounted for only 1.75 percent of OHV days on state trust lands.

Picnicking

Picnicking data was only available for Capitol State Forest and was based on the use of day-use camping facilities. It was estimated that Capitol State Forest had 13,800 picnicking recreation days in 2018.

According to the State of Washington 2017 Assessment of Outdoor Recreation Demand Report, there are approximately 4.4 million leisure participants in Washington who are assumed to be picnickers.[26] This report estimated that 18 percent of leisure respondents visited a trust property at least once to participate in leisure activities in 2017, resulting in a minimum of 789,875 days of leisure activities on state trust lands in 2017.

Rock Climbing

No rock climbing data was recorded for state trust lands. However, according to the State of Washington 2017 Assessment of Outdoor Recreation Demand Report, there are approximately 281,000 rock climbing participants in Washington.[26] This report found that 29 percent of climbing and mountaineering respondents visited a trust property at least once to participate in climbing, resulting in a minimum of 81,486 days of climbing on state trust lands in 2017.

Shooting

Recreational target-shooting data was only available for Capitol State Forest, and was based on direct reports of participation. It was estimated that Capitol Forest had 19,500 recreation days in 2018.

According to the State of Washington 2017 Assessment of Outdoor Recreation Demand Report, there are approximately 1.4 million target-shooting participants in Washington.[26] The demand report found that 13 percent of target-shooting respondents visited a trust property at least once to participate in target shooting in 2017, resulting in a minimum of 185,932 days of target shooting on trust properties. Therefore, Capitol State Forest accounted for approximately 10.5 percent of all target shooting days on state trust lands in 2017.

Snow Sports

No snow activity data was recorded for state trust lands. However, according to the State of Washington 2017 Assessment of Outdoor Recreation Demand Report, there are approximately 2.3 million snow sports participants in Washington.[26] The demand report found that 17 percent of snow sports respondents visited a trust property at least once to participate in climbing in 2017, resulting in a minimum of 390,102 days of snow-based play on state trust lands in 2017.

Wildlife Watching

Wildlife watching is one of the most popular activities in Washington, accounting for an estimated 6.3 million away-from-home wildlife watching days. Wildlife watching is tracked through the US Census and spatially assigned through crowdsourced wildlife-watching data, which enables this value estimate.

To determine the number of wildlife watching days occurring on state trust lands, crowd-sourced wildlife watching data was downloaded from the US Geological Survey (USGS) BISON Database,[32] which maps species sightings across the United States and is a useful tool in spatially allocating wildlife viewing.

First, sightings on medium- and high-intensity developed lands were removed from the data set to limit the search to natural areas, as seen in Figure 2. The search was limited to natural areas to account for away-from-home wildlife watching only. Next, state trust lands were applied as a layer to the map (Figure 3).

Finally, the percentage of sightings that occurred on state trust lands versus the rest of the state was calculated (Figure 4). Using the USGS BISON Database, it was found that 2.9 percent of wildlife sightings occur on state trust lands in 2019. This percentage was then applied to all away-from-home wildlife watching days in Washington. In total, it was estimated that 184,002 wildlife watching days occurred on state trust lands in 2019.

FIGURE 2. AWAY-FROM-HOME WILDLIFE VIEWING AREAS

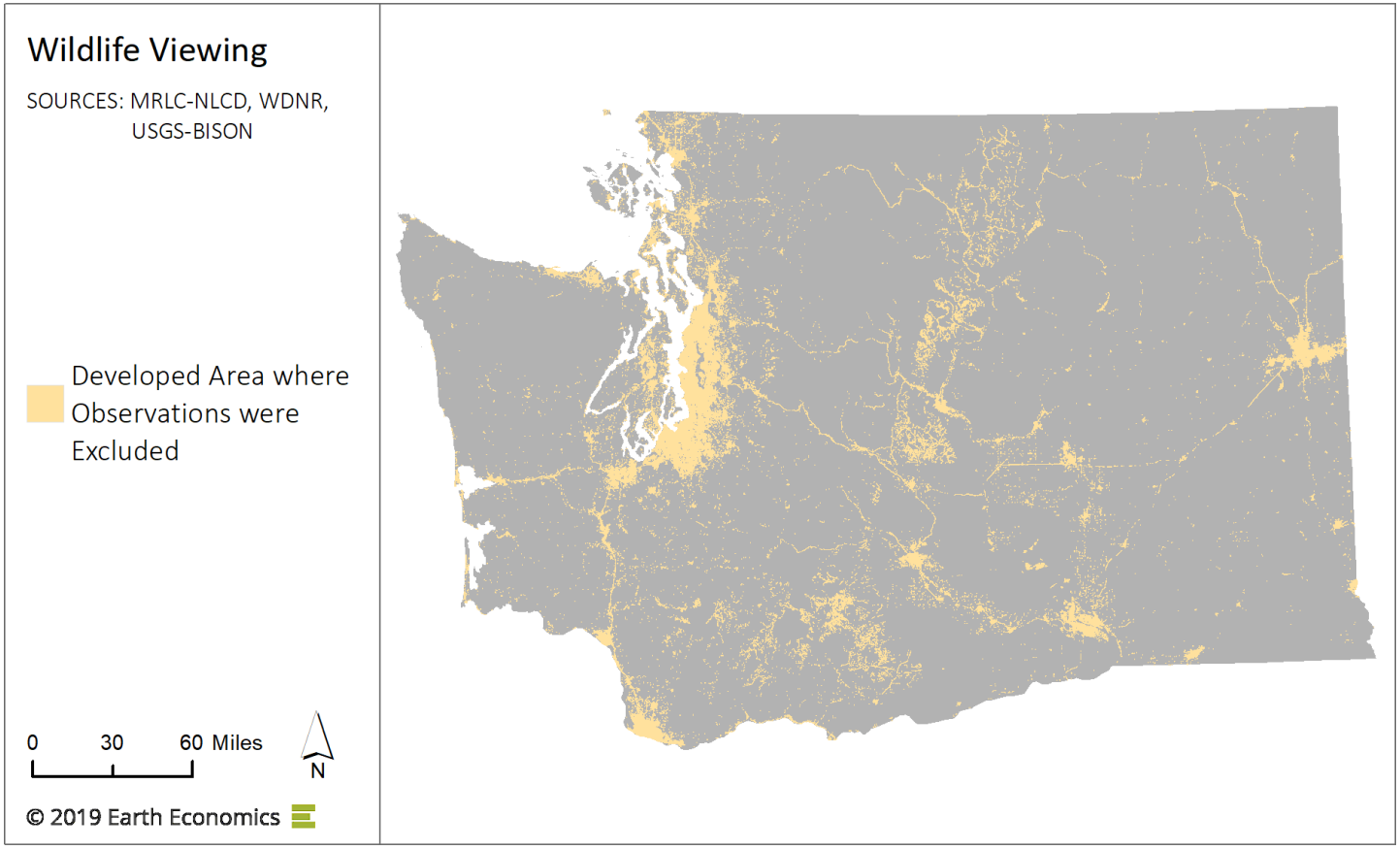


FIGURE 3. AWAY-FROM-HOME WILDLIFE VIEWING OPPORTUNITIES ON STATE TRUST LANDS

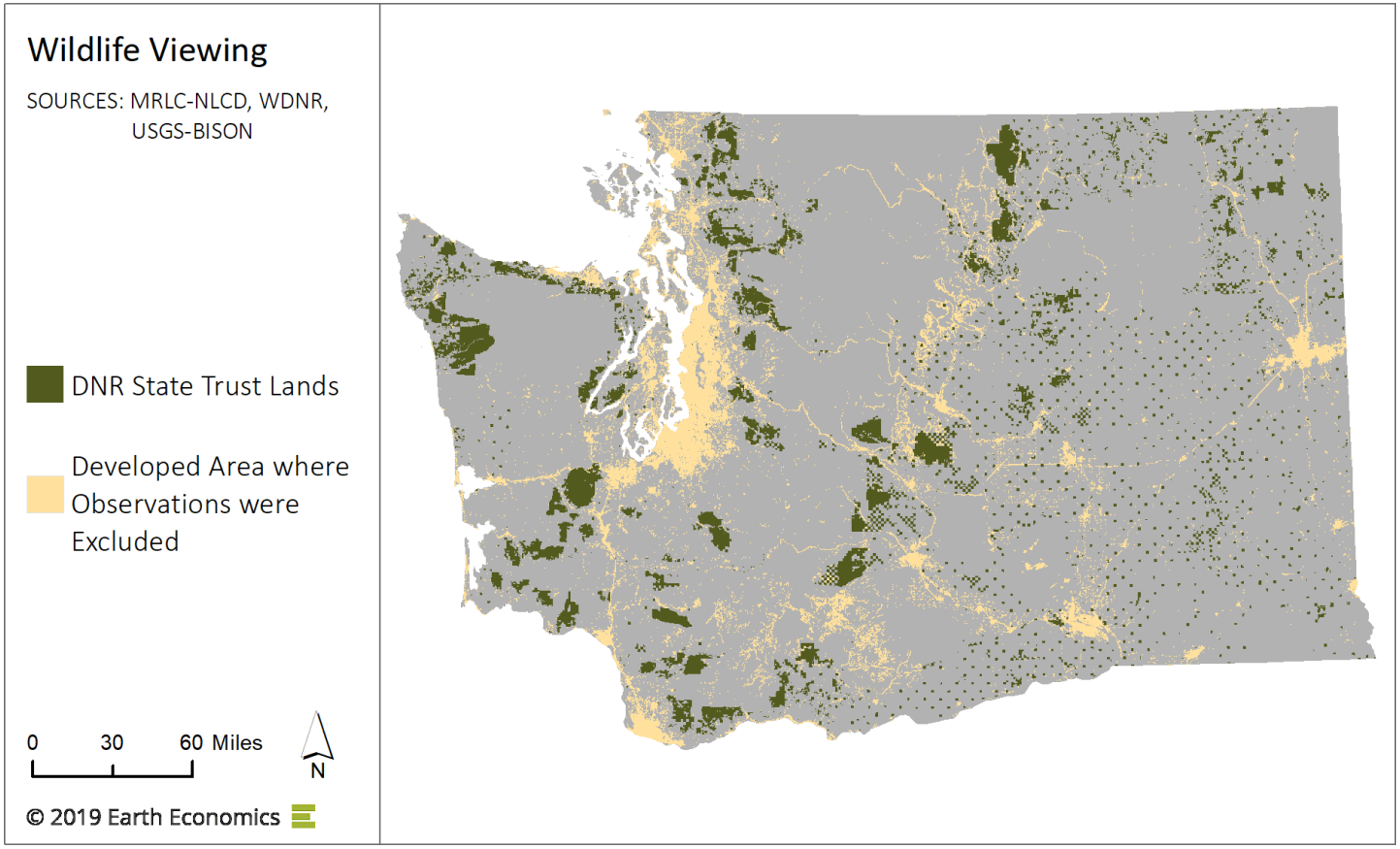
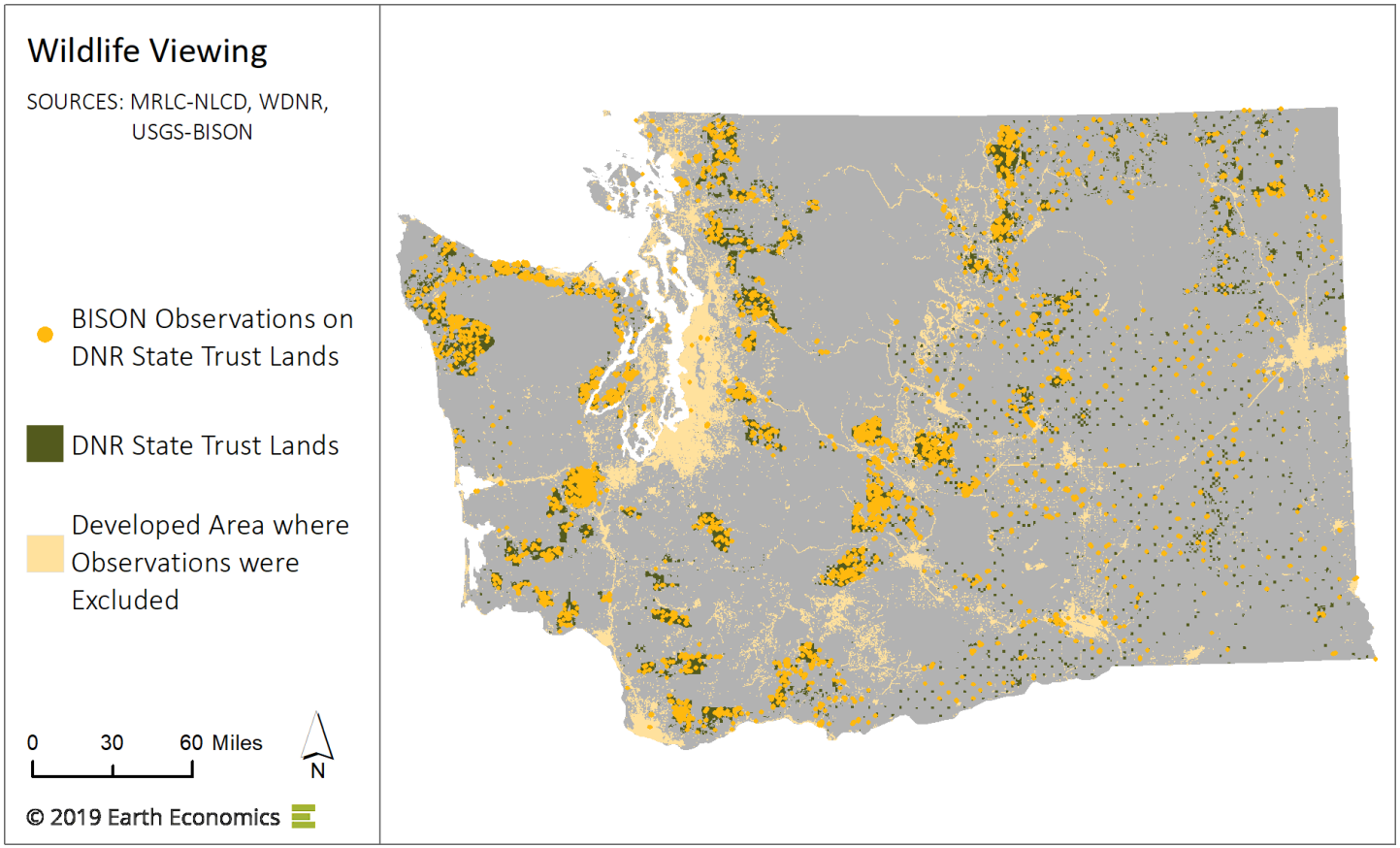


FIGURE 4. USGS BISON DATABASE SIGHTINGS ON TRUST LANDS



Appendix E. Carbon Valuation Sources

Christensen, G.A., Gray, A.N., Kuegler, O., Siemann, D. Washington Forest Ecosystem Carbon Inventory: 2002-2016. Unpublished manuscript.

Crooks, S., Rybczyk, J., O'Connell, K., Devier, D.L., Poppe, K., Emmett-Mattox, S. 2014. Coastal blue carbon opportunity assessment for the Snohomish Estuary: The Climate Benefits of Estuary Restoration. Report by Environmental Science Associates, Western Washington University, EarthCorps, and Restore America's Estuaries.

Liu, S., Liu, J., Young, C.J., Werner, J.M., Wu, Y., Li, Z., Dahal, D., Oeding, J., Schmidt, G., Sohl, T.L., Hawbaker, T.J., Sleeter, B.M. 2012. Chapter 5: Baseline carbon storage, carbon sequestration, and greenhouse-gas fluxes in terrestrial ecosystems of the western United States. Baseline and projected future carbon storage and greenhouse-gas fluxes in ecosystems of the western United States. In: Zhu, Z. and Reed, B.C., eds. USGS Professional Paper 1797.

Nordhaus, W.D. 2017. Revisiting the social cost of carbon. Proceedings of the National Academy of Sciences 201609244.

Works Cited

[1] Daly, H., Farley, J. 2004. Ecological Economics: Principles and Applications. Island Press.

[2] De Groot, R., Wilson, M., Boumans, R. 2002. A typology for the classification, description and valuation of ecosystem functions, goods and services. Ecological Economics 41(3): 393-408.

[3] Millennium Ecosystem Assessment. 2003. Ecosystems and Human Well-being: A Framework for Assessment. Island Press.

[4] Pascual, U., Muradian, R., Brander, L., Gómez-Baggethun, E., Martín-López, B., Verma, M., ... , Farley, J. 2010. The economics of valuing ecosystem services and biodiversity. The economics of ecosystems and biodiversity: ecological and economic foundations: 183-256.

[5] Daily, G. 1997. Nature's Services: Societal Dependence on Natural Ecosystems. Island Press.

[6] Costanza, R., d'Arge, R., de Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R., Paruelo, J., Raskin, R., Sutton, P., van den Belt, M. 1997. The value of the world's ecosystem services and natural capital. Nature 387: 253-260.

[7] Costanza, R., de Groot, R., Braat, L., Kubiszewski, I., Fioramonti, L., Sutton, P., Farber, S., Grasso, M. 2017. Twenty years of ecosystem services: How far have we come and how far do we still need to go? Ecosystem Services 28: 1-16.

[8] Carbon storage and recreation are unique ecosystem services that require unique methodologies for estimating their non-market values; these have separate sections explaining their valuations.

[9] Rosenberger, R.S., Loomis, J.B. 2003. Benefit Transfer. In: A Primer on Nonmarket Valuation (eds. Champ, P.A., Boyle, K.J., Brown, T.C.). Springer, pp. 445–482.

[10] Federal Emergency Management Agency (FEMA). 2013. Consideration of Environmental Benefits in the Evaluation of Acquisition Projects under the Hazard Mitigation Assistance (HMA) Programs, FEMA Mitigation Policy FP-108-024-01. Retrieved from https://www.fema.gov/media-library-data/20130726-1920-25045-4319/environmental_benefits_policy_june_18_2013_mitigation_policy_fp_108_024_01.pdf on 10.18.19.

[11] Belt, K., Groffman, P., Newbold, D., Hession, C., Noe, G., Okay, J., Southerland, M., Speiran, G., Staver, K., Hairston-Strang, A., Weller, D., Wise, D. 2014. Recommendations of the Expert Panel to Reassess Removal Rates for Riparian Forest and Grass Buffers Best Management Practices. Forestry Workgroup, Chesapeake Bay Program.

[12] Sweeney, B.W., Newbold, J.D. 2014. Streamside Forest Buffer Width Needed to Protect Stream Water Quality, Habitat, and Organisms: A Literature Review. Journal of the American Water Resources Association 50, 560–584.

[13] Foltz Jordan, S., Lee-Mader, E., Hopwood, J., Heidel-Baker, T., Cruz, J.K., Borders, B., Gill, K., Adamson, N.L., Vaughan, M. 2015. Beneficial Insect Habitat: Assessment Form and Guide, Conservation Biological Control - Farms and Agricultural Landscapes. Xerces Society for Invertebrate Conservation, Portland, OR.

[14] Outdoor Industry Association. 2017. The Outdoor Recreation Economy. Washington. Retrieved from https://outdoorindustry.org/state/washington/.

[15] Rosenberger, R.S., White, E.M., Kline, J.D., Cvitanovich, C. 2017. Recreation economic values for estimating outdoor recreation economic benefits from the National Forest System. Gen. Tech. Rep. PNWGTR-957. US Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

[16] Halofsky, J.S., Donato, D.C., Franklin, J.F., Halofsky, J.E., Peterson, D.L., Harvey, B.J. 2018. The nature of the beast: examining climate adaptation options in forests with stand-replacing fire regimes. Ecosphere 9.

[17] Mauger, G.S., Kennard, H.M. 2017. Integrating Climate Resilience in Flood Risk Management: A Work plan for the Washington Silver Jackets (Report prepared for FEMA). Climate Impacts Group, University of Washington, Seattle.

[18] IPCC. 2018. Global Warming of 1.5 degrees C. United Nations Intergovernmental Panel on Climate Change.

[19] Wuebbles, D.J., Fahey, D.W., Hibbard, K.A., DeAngelo, B., Doherty, S., Hayhoe, K., Horton, R., Kossin, J.P., Taylor, P.C., Waple, A.M., Weaver, C.P. 2017. Executive summary, in: Climate Science Special Report: Fourth National Climate Assessment, Volume I. US Global Change Research Program, Washington, DC, pp. 12–34.

[20] Snover, A.K., Mauger, G.S., Whitely Binder, L.C., Krosby, M., Tohver, I. 2013. Climate Change Impacts and Adaptation in Washington State: Technical Summaries for Decision Makers. State of Knowledge Report prepared for the Washington State Department of Ecology.

[21] Washington State Department of Commerce. 2014. The Social Cost of Carbon: Washington State Energy Office Recommendation for Standardizing the Social Cost of Carbon When Used for Public Decision-Making Processes. Washington State Department of Commerce, Olympia, WA.

[22] Nordhaus, W.D. 2017. Revisiting the social cost of carbon. PNAS 114, 1518–1523.

[23] Costanza, R., d'Arge, R., de Groot, R., Farber, S., Grasso, M., Hannon, B., …. van den Belt, M. 1997. The value of the world's ecosystem services and natural capital. Nature 387: 253–260.

[24] Howarth, R., Farber, S. 2002. Accounting for the Value of Ecosystem Services. Ecological Economics 41(3): 421–429.

[25] Bigley, R.E., Deisenhofer, F.U. 2006. 2006 Implementation Procedures for the Habitat Conservation Plan Riparian Forest Restoration Strategy. DNR Scientific Support Section, Olympia, Washington.

[26] Jostad, J., Schultz, J., Chase, M. 2017. State of Washington 2017 Assessment of Outdoor Recreation Demand Report. Eastern Washington University.

[27] US Department of the Interior, US Fish and Wildlife Service, and US Department of Commerce, US Census Bureau. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

[28] US Department of the Interior, US Fish and Wildlife Service, and US Department of Commerce, US Census Bureau. 2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

[29] Washington Department of Fish and Wildlife. 2019. Fishing License Sales Data. Public Records Request "Deliverable: BTU22864."

[30] Washington Department of Natural Resources. 2019. Personal communication with Hilary Browning.

[31] Washington Department of Fish and Wildlife. 2018. Game harvest reports. Retrieved from https://wdfw.wa.gov/hunting/management/game-harvest#2017-harvest.

[32] US Geological Survey. 2019. USGS Biodiversity Information Serving Our Nation (BISON). Retrieved from https://bison.usgs.gov on 08.01.19.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Appendix D. Trust Lands Performance Assessment Budget Proviso Language

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(1) The Department of Natural Resources must conduct an asset valuation of state lands and state forestlands held in trust and managed by the department. The analysis required in subsections (3) and (4) of this section may be provided through contracted services.

(2) The department must describe all trust lands, by trust, including timber lands, agricultural lands, commercial lands, and other lands, and identify revenues from leases or other sources for those lands. The department must briefly describe the income from these trust lands, and potential enhancements to income, including intergenerational income, from the asset bases of these trusts.

(3) The analysis must estimate the current fair market value of these lands for each trust beneficiary, including the separate beneficiaries of state lands as defined in RCW 79.02.010, and the beneficiaries of state forestlands as specified in chapter 79.22 RCW. The estimation of current fair market values must specify the values by the various asset classes including, but not limited to, the following asset classes: Timber lands; irrigated agriculture; dryland agriculture, including grazing lands; commercial real estate; mining; and other income production. The analysis must also estimate the value of ecosystem services and recreation benefits for asset classes that produce these benefits. The legislature encourages the department and its contractors to develop methods and tools to allow tracking of the estimated fair market values over time.

(4) For each of the different asset classes and for each of the various trusts, the analysis must calculate the average annual gross and net income as a percentage of estimated current asset value.

(5) The department must provide a progress report to the legislature by December 1, 2018. A follow up progress report is expected to be provided by December 1, 2019, and may include any initial ideas. The final report is expected to be submitted by June 30, 2020, and must include options to: (a) Improve the net rates of return on different classes of assets; (b) Increase the reliability of, and enhance if possible, revenue for trust beneficiaries; and (c) Present and explain factors that either (i) define, (ii) constrict, or (iii) define and constrict the department's management practices and revenue production. The factors to be considered include, but are not limited to, statutory, constitutional, operational, and social factors.