

# Summary of Natural and Working Lands Carbon Inventories and Incentive Programs in Washington

Report to the Washington State Legislature  
In response to ESHB 1109 Sec 308(24) passed in 2019

Washington Department of Natural Resources  
December 1, 2020



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In 2019, the Legislature directed DNR to form a Natural and Working Lands Carbon Sequestration Advisory Group (CSAG) to explore aspects of carbon sequestration on natural and working lands (ESHB 1109 Sec 308(24)).

By December 1, 2020 DNR must submit a report that:

- Summarizes the results of the inventories.
- Assesses actions that may improve the efficiency and effectiveness of carbon inventory activities, and
- Outlines any barriers, including costs, to the use of voluntary, incentive-based carbon reducing or sequestering programs.

## Summary of Carbon Inventories

### Forest ecosystem

Forests cover 22 million acres of Washington state, which is approximately 48 percent of the state's total area (Christensen et al 2020). DNR contracted with the U.S. Forest Service Pacific Northwest Research Station Forest Inventory and Analysis Program (Forest Service Agreement No. 18-CO-11261979-066) to assess Washington's statewide forest ecosystem carbon stock, flux and trend information for the period of 2002-2016. USFS published a report in October 2020 that documents the results of this forest ecosystem carbon inventory.

### Results

The USFS Forest Inventory and Analysis report indicates that ***Washington's forests are a net sink of greenhouse gases from the atmosphere.***

As of the 2007-2016 reporting period, Washington's statewide rate of carbon sequestration from all forest ecosystem pools across all ownerships is  $16.1 \pm 8.6$  million metric tons CO<sub>2</sub>e per year, excluding net CO<sub>2</sub>e contributions from other sources such as harvested wood products, land moving to and from a forested condition, and non-CO<sub>2</sub> greenhouse gas emissions from wildfire.

Changes in land-use between forest and non-forest land condition are estimated to have a net loss of  $2.17 \pm 1.6$  MMT CO<sub>2</sub>e per year. The loss of carbon through live tree mortality in stands that experienced fire in Washington is estimated to be  $-4.9 \pm 1.3$  MMT CO<sub>2</sub>e per year. Most of that loss occurred on National Forest lands.

After accounting for land-use changes and non-CO<sub>2</sub> greenhouse gas emissions (methane and nitrous oxide) from wildfire, ***the 2016 statewide rate of carbon sequestration on all forest land is  $13.7 \pm 8.6$  MMT CO<sub>2</sub>e per year.***

Across Washington's forests, 63 percent of the CO<sub>2</sub>e being sequestered each year is taken up by the National Forests ( $10.2 \pm 2.1$  MMT CO<sub>2</sub>e per year). Forest land managed by non-corporate private owners are sequestering carbon at a rate of  $4.0 \pm 2.8$  MMT CO<sub>2</sub>e per year ( $0.9 \pm 0.6$  MT CO<sub>2</sub>e/ac/yr).

Statewide flux varies significantly by geography. Counties west of the Cascade divide account for 93% of Washington's annual forest carbon sequestration from all pools ( $15.0 \pm 8.2$  MMT CO<sub>2</sub>e per year and  $1.3 \pm 0.7$  MT CO<sub>2</sub>e/ac/yr). In contrast, there is a net decrease of carbon in the live tree pool in the eastern county forests at a rate of  $1.1 \pm 2.4$  MMT CO<sub>2</sub>e per year ( $0.1 \pm 0.2$  MT CO<sub>2</sub>e/ac/yr). On a per acre basis,

forests in west side counties currently store an average of  $146.2 \pm 2.2$  MT C/ac while eastside counties currently store an average of  $94.9 \pm 1.2$  MT C/ac.

#### Actions that may improve efficiency and effectiveness

While the data in the USFS report is robust, there may be need for greater precision in some regions, ownerships, and forest types, especially where the confidence interval is wide, carbon management is a priority, or where it is not currently possible to statistically determine if flux is positive or negative.

Options to improve inventory precision include:

1. Improving data collection methods (increase the number of plots; increase the frequency of measurement; improve estimation of non-sampled plots; increase use of remote sensing; and improve tracking of dead and down wood)<sup>1</sup>, and
2. Improvements to data compilation (update tree biomass equations; and increase consistency in carbon reporting across platforms).

#### Harvested wood products

DNR contracted with the USFS to conduct a statewide assessment of harvested wood products (HWP) carbon stocks and flux. Once a tree is harvested, the wood products manufactured from parts of that tree also play an important role in storing carbon over both the life of products during their use, as well as after the products are discarded.

#### Results

The USFS report indicates that ***HWP in Washington, including products in use and products in solid waste disposal sites, are currently a net sink of greenhouse gases from the atmosphere.*** The cumulative carbon stock in Washington HWP since 1906, including the stock currently in use or stored in solid waste disposal sites, is 353.6 million metric tons carbon (MMT C). In 2018, the estimated HWP carbon stock is approximately 219.59 MMT carbon for products in use, 134.05 MMT carbon for products in solid waste disposal sites, and approximately 353.64 MMT carbon for both HWP pools.

***In 2018 the statewide rate of accumulation of carbon in HWP pools was approximately 7.5 MMT CO<sub>2</sub>e per year.*** Of this flux amount, 7.1 MMT CO<sub>2</sub>e was an increase in the amount of carbon stored in solid waste disposal sites and 0.4 MMT CO<sub>2</sub>e was an increase in the amount of carbon stored in products in use.

#### Actions that may improve efficiency and effectiveness

In general, the production approach used in this study is broadly accepted as an effective approach for estimating statewide stock and flux. However, two improvements to the model inputs could help improve the accuracy and precision of results. These are:

1. **Conduct multi-state assessments to increase understanding of the impact of product exports.** Continued engagement with the USFS efforts currently underway that are coordinating state

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<sup>1</sup> Increasing the number of plots (spatial intensification) would enable more precise estimates for particular categories of interest, for example specific forest types, landowners, and regions. It would also increase precision for all the inventory estimates. Spatial intensification is already being employed in Washington on National Forest lands outside of designated Wilderness. Increasing the frequency of plot measurement (temporal intensification) would help detect changes in forest carbon faster due to the quickening pace of climate change, wildfire, human activities or other causes. The current federal cost (field, data management, analysis, and overhead combined) is approximately \$1,500 per plot measurement.

partners in Washington, Oregon, and California to conduct a multi-state assessment of regional carbon stock and flux for forest ecosystems and HWP, which holds potential to improve information associated with product exports and other aspects of carbon estimates.

2. **Gather information on sawmill energy use and emissions.** This information could contribute to improved understanding of actual or potential avoided emissions from utilization of wood products at the statewide scale, as well as help identify energy efficiency improvements for facilities. The wood products manufacturing sector is already a leader in the use of renewable bioenergy to power operations, with 65 percent or more of operations being powered by renewable sources (US EPA 2007). A sawmill and energy use and emissions study for Washington could build on existing information such as sawmill emissions reported to the Department of Ecology for facilities emitting over 10,000 MT CO<sub>2</sub>e per year as well as emissions factors and fuel energy content information available from the US Energy Information Administration and EPA.

### Cropland and grassland soils

The definitions of cropland and grassland are based on the US Department of Agriculture National Resources Inventory (NRI), which is a national statistical survey of land use and natural resource conditions and trends on non-federal lands. They are also documented in EPA's National Greenhouse Gas Inventory.

**Cropland** includes “areas used for the production of adapted crops for harvest... [including] land in row crops or close-grown crops and also other cultivated cropland, for example, hayland or pastureland that is in a rotation with row or close-grown crops.”

**Grassland** includes areas in which “plant cover is composed principally of grasses, grass-like plants (i.e., sedges and rushes), forbs, or shrubs suitable for grazing and browsing, and includes both pastures and native rangelands” (US EPA 2020).

As of 2015, croplands in Washington covered 3.03 million acres and grasslands covered 3.65 million acres of the state. Together, these two land uses made up approximately 15 percent of the state's total area.<sup>2</sup>

### Results

The carbon results in this section are presented for four different categories of annual net flux from soil carbon stock changes for mineral soils and organic soils<sup>3</sup>:

1. Cropland remaining cropland,
2. Land converted to cropland
3. Grassland remaining grassland, and
4. Land converted to grassland.

For cropland remaining cropland, mineral soils were a net sink of CO<sub>2</sub>e sequestering 0.76 MMT CO<sub>2</sub>e in 1990 and 0.48 MMT CO<sub>2</sub>e in the most recent reported year of 2015. Organic soils over the same period

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<sup>2</sup> Between 1990 and 2015 the area of cropland in the state declined by 4.7 percent from 3.18 million acres to 3.03 million acres, and the area of grassland declined by 0.7 percent from 3.67 million acres to 3.65 million acres.

<sup>3</sup> Per the NGHGI definitions, cropland or grassland remaining in the same land use/cover category are those lands that have been in the same category for a period of at least 20 years.

were a source of CO<sub>2</sub>e, producing 0.29 MMT CO<sub>2</sub>e in 1990 and 0.11 MMT CO<sub>2</sub>e in 2015. ***Taken together, mineral and organic soils for cropland remaining cropland were a net sink of CO<sub>2</sub>e in 2015 sequestering 0.36 MMT CO<sub>2</sub>e.***

Mineral soils and organic soils for land converted to cropland served as a net source of CO<sub>2</sub>e for the period 1990 to 2015, including producing a total of 0.33 MMT CO<sub>2</sub>e in 2015 for both soil types combined. ***For both soil types across all croplands in 2015, Washington had annual net sequestration of 0.03 MMT CO<sub>2</sub>e.***

For grassland remaining grassland, net flux for mineral and organic soils combined in 1990 was close to zero, with mineral soils serving as a net sink sequestering 0.21 MMT CO<sub>2</sub>e and organic soils nearly balancing that by serving as a net source producing 0.20 MMT CO<sub>2</sub>e. ***By 2015, net flux for both mineral and organic soils combined to create a net source producing 0.32 MMT CO<sub>2</sub>e.***

Land converted to grassland has shown a steadier trend with mineral soils serving as a consistent sink and organic soils providing a small but steady source. In 2015, mineral and organic soils together for land converted to grassland served as a net sink sequestering 0.20 MMT CO<sub>2</sub>e. ***For both soil types across all grasslands in 2015, Washington had an annual net source of 0.12 MMT CO<sub>2</sub>e.***

These results highlight that mineral and organic soils can have different effects on carbon flux. In all four land use or land use change categories listed above, organic soils serve as a net source of CO<sub>2</sub>e. These soils form under inundated conditions and can have upwards of 12 to 20 percent or more carbon content. When organic soils are drained for crop production or other uses, it can create a net source of carbon flux to the atmosphere over long periods of time (US EPA 2020).

#### Actions that may improve efficiency and effectiveness

US EPA (2020) lists certain planned improvements for cropland and grassland soil carbon flux estimates in the NGHGI, some of which may be relevant to Washington for future statewide carbon inventories. These include use of new survey data from the USDA-NRCS Conservation Effects Assessment Project survey and use of updated information from the USDA National Resources Inventory. There are also planned improvements to the DayCent model, which is used to create carbon flux estimates from the estimates in land use and land management acreage, including improved assessment of temperature effects on plant production (US EPA 2020).

In addition, the statewide estimates provided to DNR by CSU do not differentiate between carbon flux in soils east and west of the Cascade Mountains. Yorgey et al (in publication) highlight that more comprehensive and systematic data on cropland soils west of the Cascades is a clear research need and points to the need for improved information on effects of future climatic changes on cropland management strategies.

#### Wildfire emissions

Wildfire emissions have the potential to contribute to global GHG concentrations. In 2019 through ESHB 1109 Sec 308(24), the Legislature directed DNR to conduct carbon inventories, including wildfire emissions estimates. DNR used this opportunity to develop an emissions estimation approach that will have greater consistency and reliability for annual wildfire emissions estimates and that will cover all burned areas including forests, grassland, and cropland.

In 2020, through ESSHB 2311, the Legislature directed DNR to begin producing statewide wildfire emissions estimates on an annual basis as part of reporting requirements under RCW 70A.45. The methodology and initial results presented below are intended to satisfy these requirements.

## Results

Over the five-year period from 2014 to 2018, DNR estimates that Washington wildfires produced a total of 39.2 MMT CO<sub>2</sub>e from wildfires that burned a total of 2.7 million acres in the state. This is equivalent to **average emissions of 7.85 MMT CO<sub>2</sub>e per year across an average of more than 500,000 acres per year.**

The largest single year of emissions was the historic 2015 wildfire season in which wildfire contributed 17.98 MMT CO<sub>2</sub>e of emissions from fires across more than 1,000,000 acres. Across this five-year timespan, the intensity of greenhouse gas emissions from wildfire on a per acre basis varied from 2.9 metric tons CO<sub>2</sub>e per acre to a high in 2017 of 28.5 metric tons CO<sub>2</sub>e per acre.

<i>Estimated Wildfire Carbon Emissions 2014-2018</i>					
<b>Year</b>	<b>Total wildfire emissions (metric tons CO<sub>2</sub>e)</b>	<b>Forest acreage burned</b>	<b>Non-forest acreage burned</b>	<b>Total acres burned in Washington State</b>	<b>Metric tons CO<sub>2</sub>e per acre burned</b>
<b>2014</b>	3,950,000	133,699	300,388	434,087	9.1
<b>2015</b>	17,980,000	596,970	533,655	1,130,625	15.9
<b>2016</b>	890,000	17,967	286,562	304,529	2.9
<b>2017</b>	11,480,000	219,233	183,029	402,262	28.5
<b>2018</b>	4,950,000	115,496	284,145	399,641	12.4
<b>Mean</b>	<b>7,850,000</b>	<b>216,673</b>	<b>317,556</b>	<b>534,229</b>	<b>14.7</b>

In comparison to these results, the USFS forest ecosystem carbon study indicates that the net flux of carbon through live tree mortality in stands that experienced fire in Washington is  $-4.9 \pm 1.3$  MMT CO<sub>2</sub>e per year.

The difference between this USFS acreage estimate and the DNR acreage estimate of more than 500,000 acres per year is primarily a function of two factors. First, the DNR study includes non-forest areas such as grassland and rangeland, which are not included in the USFS estimate, and represent anywhere from 46 percent to 94 percent of the area burned. Second, years captured in the FIA (2007-2016 reporting period) and DNR studies (2014-2018) only partially overlap, with the DNR time period encompassing larger fire years than the reporting period for the USFS FIA analysis. While a less important reason than the inclusion of non-forest areas, this difference in reporting periods also contributes to the difference in average annual emissions between the two analyses.<sup>4</sup>

<sup>4</sup> DNR's focus on emissions is in response to the Legislature's request for this specific information. DNR cautions readers from interpreting these wildfire emissions estimates in isolation without the additional context of information beyond tree mortality – namely, forest growth and NWL Carbon Inventories and Incentives – Report to Washington Legislature Dec. 1, 2020 Page 7 of 36

A key distinction between the USFS FIA study and the DNR study is that the DNR study includes emissions but does not include growth and sequestration happening on the same lands where fire has occurred.

Fire, including wildfire and forest health treatments using prescribed fire, is one of many processes that affect carbon sequestration and emissions over time. The USFS report provides this context and notes that the estimate of carbon loss in stands that experienced fire is factored into the overall estimate that forest ecosystems in Washington are currently net carbon sinks sequestering  $13.7 \pm 8.6$  MMT CO<sub>2</sub>e per year.

#### Actions that may improve efficiency and effectiveness

DNR used the best available data and relied on experts to inform our decisions, but there are additional steps that could be taken to improve these results. For example, when describing pre-fire conditions, DNR only utilized 2012 and 2017 GNN data because these two years are readily available. However, a slightly more robust approach would be to use annual GNN data for each fire year (e.g., 2015 GNN data for 2015 fires).

Assuming forested GNN data is continuously produced, this more robust approach would greatly increase the amount of time needed to relate GNN data to fuelbeds, and is something we may slowly implement as time and funding permits. A more substantial change would be to estimate the forest structure burned and remaining using remotely-sensed data that describe forest structure, such as light detection and ranging (LiDAR), digital aerial photography, or similar products, rather than satellite imagery. Such a change in methodology would require a greater increase in funding to collect plot data and to develop the relationship between field-measured burn severity and LiDAR or photography metrics.

Other improvements include updating the non-forested map with newer imagery and inventory plots, and assessing how well the forested burn severity thresholds work in the non-forested environment. In addition to improving severity estimates, LiDAR or digital aerial photography data could also improve forested fuelbed emission factors by providing more precise estimates of canopy cover loss and other structural changes resulting from fires in specific vegetation types.

If completed, both changes to severity and improved fuelbed emission factors would improve overall emission estimates.

#### Settlement trees, wetlands, and other lands

This year, for the first time ever, USFS published state-by-state estimates of carbon flux from urban trees (Domke et al 2020). Settlements are defined as development of more than one quarter of an acre and include residential, commercial, industrial, and other developed land uses. This can include developed uses such as transportation corridors within other land uses such as forestland or cropland, as well as open space such as parks, cemeteries, and golf courses.

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development associated with changes in sequestration in forest ecosystem carbon pools such as aboveground live trees, standing dead trees, downed wood, and soils.



Carbon stored and sequestered in urban trees in settlement areas in a state is a function of three factors:

1. The number of acres of land classified as settlements,
2. The percent tree cover in these settlements, and
3. The carbon sequestration density per unit of tree cover (US EPA 2020).

In addition to carbon flux in urban trees, flux estimates in the EPA NGHGI include flux from organic soils for settlement land remaining settlements and other land converted to settlements.<sup>5</sup> The following table shows carbon flux results for urban trees in settlements, adapted from Domke et al (2020).<sup>6</sup>

*Net flux from settlement trees in settlements remaining settlements in Washington (MMT CO<sub>2</sub>e) (adapted from Domke et al 2020)*

Net flux	1990	2005	2014	2015	2016	2017	2018
MMT CO <sub>2</sub> e	2.2	2.6	2.8	2.9	2.8	2.8	2.8

The NGHGI defines wetlands as lands that are saturated or covered in water for all or part of the year, including lakes, reservoirs, and rivers (US EPA 2020). According to IPCC guidance, this can also include coastal wetlands such as tidal marshes and seagrass meadows (IPCC 2014). Statewide estimates for flux and stock for wetlands are not currently available for Washington.

However, studies have occurred in Washington to evaluate the potential of wetland carbon storage and sequestration. One assessment of restoration sites in the Snohomish estuary measured sequestration rates ranging from 1.3 to 5.2 MT CO<sub>2</sub>e per acre per year (Crooks et al 2014).<sup>7</sup> ***Washington should consider estimating statewide wetlands carbon flux so that wetlands information can be included in future statewide compilations of natural and working lands carbon inventories.***<sup>8</sup>

The land type of Other Lands includes areas that are predominantly rock and ice and IPCC guidance states that estimates of carbon stock change on other lands can be omitted from GHG inventories given that these areas have little to no biomass or soil carbon (IPCC 2006). Sequestration potential on other lands is distinct from geologic sequestration of CO<sub>2</sub> in rock formations, which is not considered in LULUCF carbon inventories.

Geologic sequestration has important potential to complement sequestration in natural and working lands, and DNR is currently exploring geologic sequestration opportunities as a member of the Carbon Utilization and Storage Partnership for the Western US.

<sup>5</sup> Organic soils form under inundated conditions and can have upwards of 12 to 20 percent carbon content. When these soils are drained for development carbon flux to the atmosphere can occur over long periods of time.

<sup>6</sup> Estimates for carbon flux from organic soils in settlements are not included on a state-by-state basis in this most recent USFS report and are therefore not reported here.

<sup>7</sup> This rate of sequestration does not include estimates of emissions of CH<sub>4</sub> nor does it include an estimate of the avoided CH<sub>4</sub> or N<sub>2</sub>O emissions from prevention of drainage on the restoration sites.

<sup>8</sup> At the statewide level, one potential approach for estimating wetlands carbon flux would be using information from the National Wetlands Inventory database to determine wetland acreage for the state and then applying average or site specific values for wetlands by wetland type and acreage. New York State Energy and Research Development Authority produced a report earlier this year documenting the application of this approach (NYSERDA 2020).

## Barriers for carbon-specific incentive programs

This section describes barriers to the use of carbon-specific programs including carbon offsets and certain cost-share programs, grant programs, and incentives for harvested wood products. The following table summarizes barriers identified. A more full review of barrier by incentive type is included in Appendix F.

Incentive type	Barriers Identified for Carbon-Specific Programs
Carbon offsets	<p>Offsets in general</p> <ul style="list-style-type: none"> <li>• Technical complexity</li> <li>• Low carbon price relative to high transaction costs</li> </ul> <p>Specific to reforestation offset projects:</p> <ul style="list-style-type: none"> <li>• Limited options for up front (ex ante) crediting</li> <li>• Funding for ongoing maintenance</li> </ul> <p>Specific to avoided conversion and forest management offset projects:</p> <ul style="list-style-type: none"> <li>• Time commitment for some project types (100+ years)</li> <li>• Viable project size of at least several thousand acres</li> <li>• Difficulty of aggregating multiple landowners into a single project</li> <li>• California ARB invalidation rule</li> <li>• Limited flexibility in natural forest management rules</li> </ul>
Practice cost-share	<ul style="list-style-type: none"> <li>• Limited landowner payment amounts relative to landowner activity costs</li> <li>• Limited program funding relative to demand</li> <li>• Lack of technical assistance to help landowners access and use programs</li> <li>• Difficult payment procedures</li> <li>• Lack of training for technical assistance providers in forest carbon management techniques and tools</li> <li>• Limited landowner outreach and education about new programs</li> <li>• Limited understanding within agencies about how to implement, particularly for programs with newer carbon elements such as CSP</li> <li>• Need for third party non-federal match funding for implementation</li> <li>• Need for third party non-federal funding to supplement for lack of adequate federal technical assistance</li> </ul>
Grants for easement or acquisition	<ul style="list-style-type: none"> <li>• Limited program funding relative to demand</li> <li>• Term-easements via Healthy Forests Reserve Program are new and lack funding</li> <li>• WWRP forestland category is newer and only represents a small portion of RCO WWRP funding</li> </ul>
Harvested wood products	<ul style="list-style-type: none"> <li>• Multiple steps to translate programs into landowner incentives</li> <li>• Variable wood sourcing requirements among building certification programs</li> <li>• Limited technical assistance linking architects/builders to landowners</li> </ul>

## Barriers for non-carbon specific incentive programs

This section describes barriers common to non-carbon specific programs including cost-share, annual rental payments, grants, public debt finance, TDR markets, tax incentives, forest certification, and incentives for harvested wood products. Cost-share and annual rental payments share similar barriers. Many of the other incentive types have unique barriers identified specific to the challenges of that individual set of programs. The following table summarizes barriers identified for non-carbon specific programs. A more full review of barrier by incentive type is included in Appendix G.

Incentive type	Barriers Identified for Non-Carbon Specific Programs
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Practice cost-share and annual rental payments	<ul style="list-style-type: none"> <li>• Limited landowner payment amounts</li> <li>• Limited funding for ongoing maintenance</li> <li>• Limited program funding relative to demand</li> <li>• Limited technical assistance</li> <li>• Difficult payment or reimbursement procedures</li> <li>• Lack of training for technical assistance providers</li> <li>• Limited landowner outreach and education about new programs</li> <li>• Limited understanding within agencies about how to implement</li> <li>• Limitations on landowner activities imposed by contract terms (annual rental payments)</li> </ul>
Grants for easement or acquisition	<ul style="list-style-type: none"> <li>• Limited program funding relative to demand</li> <li>• Limited local political support for implementing state-enabled program</li> </ul>
Public debt finance	<ul style="list-style-type: none"> <li>• Limited eligible entities</li> <li>• Need for funding for debt service</li> </ul>
TDR markets	<ul style="list-style-type: none"> <li>• Limitations on RCO and USDA grant funds for TDR</li> <li>• Limited local political support for implementing state-enabled program</li> <li>• Lack of technical assistance and administrative capacity for complex program design</li> </ul>
Tax incentives	<ul style="list-style-type: none"> <li>• Lack of technical capacity for local implementation</li> <li>• Limited local political support for implementing state-enabled program</li> </ul>
Forest certification	<ul style="list-style-type: none"> <li>• Inconsistency in market access or market premium</li> </ul>
Harvested wood products	<ul style="list-style-type: none"> <li>• Limited program funding relative to demand</li> <li>• Limited technical assistance linking architects/builders to landowners</li> <li>• Technical complexity</li> </ul>

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## Appendix A: Text of 2019 Budget Proviso

From Final FY 2019-2021 Budget: ENGROSSED SUBSTITUTE HOUSE BILL 1109, April 28, 2019

Sec. 308 (Pages 238-9)

(24)(a) \$250,000 of the general fund—state appropriation for fiscal year 2020 and \$125,000 of the general fund—state appropriation for fiscal year 2021 are provided solely for the following activities:

(i) Conducting carbon inventories to build on existing efforts to understand carbon stocks, flux, trends, emissions, and sequestration across Washington's natural and working lands, including harvested wood products, wildfire emissions, land management activities, and sawmill energy use and emissions. Where feasible, the department shall use available existing data and information to conduct this inventory and analysis. For the purposes of this section, natural and working land types include forests, croplands, rangelands, wetlands, grasslands, aquatic lands, and urban green space.

(ii) Compiling and providing access to information on existing opportunities for carbon compensation services and other incentive based carbon reducing programs to assist owners of private and other nonstate owned or managed forestland interested in voluntarily engaging in carbon markets.

(b) By December 1, 2020, the department must submit a report to the appropriate committees of the legislature summarizing the results of the inventories required under this section, and assessing actions that may improve the efficiency and effectiveness of carbon inventory activities on natural and working lands, including carbon sequestration in harvested forest products. The department must also describe any barriers, including costs, to the use of voluntary, incentive-based carbon reducing or sequestering programs. The department may also include recommendations for additional work or legislation that may be advisable resulting from the advisory group created in this subsection as part of this report.

(c) The department must form a natural and working lands carbon sequestration advisory group to help guide the activities provided in this section. The advisory group must be composed of a balance of representatives reflecting the diverse interests and expertise involved on the subject of carbon sequestration on natural and working lands.

## Appendix B-1: CSAG Members, Affiliations, and Incubator Team Participation

Name	Affiliation	Inventory IT	Incentives IT
Patti Case	Green Diamond		✓
Cody Desautel	Colville Tribes		
David Diaz	University of Washington	✓	
Joseph Donnegan	US Forest Service	✓	
Ara Erickson	Weyerhaeuser	✓	
Kathleen Farley Wolf	King County		✓
Indroneil Ganguly	University of Washington		
John Henrikson	Wild Thyme Tree Farm		✓
Theodore Holt	The Nature Conservancy	✓	
Joe Kane	Nisqually Land Trust		
Cherie Kearney	Columbia Land Trust		✓
Mo McBroom	The Nature Conservancy		
Mark McPherson	City Forest Credits		✓
Gary Morishima	Quinault Indian Nation		
John-O Niles (alternate)	Salesforce		
Julius Pasay	The Climate Trust	✓	
Lisa Remlinger	Washington Environmental Council		
Steve Rigdon	Yakama Tribe	✓	
Max Scher	Salesforce		
Reed Schuler	Governor's office		
Edie Sonne Hall	Three Trees Consulting	✓	
Jason Spadaro	SDS Lumber		
Skip Swenson	Forterra		✓
Bill Turner	Sierra Pacific Industries		✓
Mike Warjone	Port Blakely		
Andrea Watts	Wildcat Creek Tree Farm	✓	
Max Webster (alternate)	Washington Environmental Council		✓
Elizabeth Willmott	Microsoft		
Mark Wishnie	BTG Pactual Timberland Investment Group		

## Appendix B-2: CSAG Charter

The 2019 Washington State Legislature passed ESBH 1109, which includes a budget proviso 1) directing the Washington State Department of Natural Resources to conduct specific activities related to carbon sequestration on natural and working lands. These activities include formation of a Natural and Working Lands Carbon Sequestration Advisory Group to assist DNR with a report back to the Legislature by December 1, 2020. This charter establishes the purpose and roles for this advisory group.

### **2019 Legislative Charge to DNR (SHB 1109)**

In 2019, the Legislature passed a budget proviso as a part of the state operating budget that directed DNR to undertake the following activities:

- Conduct carbon inventories to build on existing efforts to understand carbon stocks, flux, trends, emissions, and sequestration across Washington’s natural and working lands, including harvested wood products, wildfire emissions, land management activities, and sawmill energy use and emissions; and
- Compile and provide access to information on existing opportunities for carbon compensation services and other incentive-based carbon reducing programs to assist owners of private and other nonstate owned or managed forestland interested in voluntarily engaging in carbon markets.

The Legislature specified that, where feasible, the department shall use available existing data and information to conduct this inventory and analysis. The Legislature also specified that for the purposes of this proviso, natural and working land types include forests, croplands, rangelands, wetlands, grasslands, aquatic lands, and urban green space.

The proviso requires that by December 1, 2020, the department must submit a report to the appropriate committees of the Legislature:

- Summarizing the results of the inventories required under this section;
- Assessing actions that may improve the efficiency and effectiveness of carbon inventory activities on natural and working lands, including carbon sequestration in harvested forest products; and
- Describing any barriers, including costs, to the use of voluntary, incentive-based carbon reducing or sequestering programs.

Finally, the proviso requires that the department must form a natural and working lands carbon sequestration advisory group to help guide the activities provided in this section. The advisory group must be composed of a balance of representatives reflecting the diverse interests and expertise involved on the subject of carbon sequestration on natural and working lands. In its report, the department may also include recommendations for additional work or legislation that may be advisable resulting from the advisory group.

The department notes that “the inventories required under this section” include harvested wood products, wildfire emissions, land management activities, and sawmill energy use and emissions, all of which are inventories with relevance to the forest sector. The department also notes that the funding received for this proviso of \$375,000 is sufficient to conduct these initial forest-related inventories, and

to support facilitation for the work group. This level of funding is not sufficient to conduct new inventories outside this list specified by the legislature.

The department further notes that the legislature defines natural and working land types to include not only forests but also croplands, rangelands, wetlands, grasslands, aquatic lands, and urban green space. In light of this broad definition, the department acknowledges its intent to include in its final report to the legislature a summary of information currently available on inventories for this full range of natural and working land types.

**Purpose of Work Group**

The purpose of the Natural and Working Lands Carbon Sequestration Advisory Group (Advisory Group) is to provide advice and guidance regarding DNR’s efforts to report back to the Legislature in the following areas specified in the budget proviso:

1. What are the results of carbon inventories required through the proviso?
2. What could be done to improve the efficiency and effectiveness of carbon inventories?
3. What are the existing opportunities for carbon compensation services and other incentive-based carbon reducing programs for forest landowners and managers who voluntarily engage in carbon markets?
4. What barriers exist, including costs, to the use of these services or programs?
5. Are there any recommendations for additional work or legislation that may be advisable resulting from the advisory group?

**Roles and Responsibilities of Advisory Group Members**

- Advise DNR on development of deliverables required by the Legislature.
- Review and help interpret results of deliverables.
- Assist DNR in creating linkages with other stakeholders outside the advisory group.
- Identify additional resources, including analyses, datasets, and experts for DNR to draw on as needed.
- Actively participate in five Advisory Group meetings. Meetings will likely be held in February, April, June, September, and October 2020.
- Work collaboratively with other CSAG members to develop recommendations for specific topics related to carbon sequestration in small groups between Advisory Group meetings.

**Anticipated 2020 Timeline**

Meeting #1	February 12	Discuss inventories and incentives
Meeting #2	May 8	Discuss inventories and incentives
Meeting #3	July 9 (tentative)	Discuss inventories and incentives
Small groups meet between meetings #3 and #4 to develop recommendations		
Meeting #4	Sept. 18 (tentative)	Vet recommendations
Meeting #5	Oct. 12 (tentative)	Finalize recommendations



## Appendix C: Full Lists of Carbon Sequestering Incentive Programs

The following lists summarize information on incentive-based carbon sequestering programs.

### Overview of carbon sequestering programs

Existing incentive programs currently provide a variety of opportunities for forest landowners in Washington to maintain or enhance carbon storage and sequestration. These programs range from carbon offset markets, which engage forest landowners in selling credits to companies or individuals to compensate for carbon emissions elsewhere, to more indirect incentives such as US Department of Agriculture cost-share programs that support forest stewardship actions such as tree planting or writing a forest management plan. This report uses three different categorizations as a framework for reviewing programs.

The first categorization in the program list is between programs that include carbon sequestration as an explicit stated purpose (carbon-specific) and programs that do not include carbon sequestration as a stated purpose but still have the potential to provide an incentive to landowners for carbon sequestration (non-carbon specific). *The CSAG recommended this distinction in communicating project findings through this report in part due to a recognition that carbon-specific and non-carbon specific programs face different types of barriers.*

The second categorization of incentive programs in this report is the use of four categories to group carbon incentive programs according to the actions that landowners take to achieve carbon sequestration and storage.<sup>9</sup>

The four categories, which were termed “carbon nexus” for this project, include:

- **Reforestation/afforestation** – Programs that support landowners in sequestering carbon through the creation or re-establishment of forests via planting, natural regeneration, and related activities.
- **Avoided conversion** – Programs that support landowners in conserving forests with a high likelihood of carbon loss due to conversion to other uses such as agriculture or development. Some programs also conserve standing stock of forest biomass to allow its continued expansion into the future.
- **Forest management** – Programs that support landowners in sequestering additional carbon or minimizing carbon loss through increasing productivity, improving forest health and vigor, reducing harvest impact, maintaining high stocking, increasing rotation age, or other management actions.
- **Harvested wood products** – Programs that support landowners in producing wood products and storing carbon in the built environment. Programs may also support substitution of wood products for more fossil-carbon-intensive building products.

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<sup>9</sup> The first three of these carbon nexus categories mirror common categories used in carbon offset protocols. These categories in offset protocols are helpful because there are different rules and procedures needed for a project that stores additional carbon through avoided conversion from forestland to other uses as compared to a project that stores additional carbon through reforestation of a currently un-forested area. In the categorization of carbon incentives for this report, we extend the use of these categories beyond carbon offset protocols to capture the full range of incentives on our list.

The “incentive type” is the third key category used for this report, and is also the category that is most important for understanding barriers to incentive programs. The incentive type describes the mechanism through which funding or other resources are made available to the landowner. Some incentive types, such as carbon offsets, only appear as carbon-specific programs. Other incentive types, such as practice cost-share, exist as both carbon-specific and non-carbon specific programs. The following table summarizes the carbon nexus and incentive types for landowners engaging in carbon-specific and non-carbon specific programs in Washington.

Carbon nexus	Carbon-specific incentive types	Non-carbon specific incentive types
Reforestation /afforestation	Carbon offset Practice cost-share	Annual rental payment Practice cost-share
Avoided conversion	Carbon offset Grants for easement, acquisition, or restoration	Grants for easement, acquisition, or restoration Transfer of Development Rights (TDR) markets Public debt finance for acquisition or easement Tax incentives
Forest management	Carbon offset Practice cost-share	Forest certification Practice cost-share
Harvested wood products	Building certification Promotion Technical assistance	Grants for market development Tax incentives Technical assistance Building codes and certification

### Carbon-specific programs

Name/Link	Carbon nexus	Incentive type	Brief Description
<a href="#">1T.org (in development)</a>	Reforestation; avoided conversion	Market transaction	Offers new platform for implementing the US component of the Trillion Tree movement launched by World Economic Forum.
<a href="#">American Carbon Registry (ACR) methodology - Afforestation and reforestation of degraded lands</a>	Reforestation	Market for carbon offsets	Focuses on degraded lands. Similar to CA compliance protocol for reforestation. Includes private, tribal, and non-federal public lands.
<a href="#">American Carbon Registry (ACR) methodology - improved forest management</a>	Forest management	Market for carbon offsets	Credits practices that reduce emissions compared to a forest management scenario focused on maximizing net present value (NPV) of timber. Allows aggregation.
<a href="#">American Carbon Registry (ACR) methodology - REDD (avoided conversion)</a>	Avoided conversion	Market for carbon offsets	Focuses on measures to stop deforestation on forest lands that are legally authorized and documented to be converted to non-forest land, and enhancing carbon stocks of forests in project area.
<a href="#">Architecture 2030 – Carbon Smart Materials Palette</a>	Harvested Wood Products	Technical assistance	Provides an online database of sustainable design principles, strategies, tools and resources for embodied carbon reduction.

<a href="#">California Air Resources Board (CARB) Compliance Market Forestry Protocol - avoided conversion category</a>	Avoided conversion	Market for carbon offsets	Focuses on preventing the conversion to a non-forest uses via conservation easement or transfer to public ownership, excluding federal ownership. Allows aggregation.
<a href="#">California Air Resources Board (CARB) Compliance Market Forestry Protocol - improved forest management category</a>	Forest management	Market for carbon offsets	Credits landowner practices including extension of rotation, reduced impact logging, thinning diseased or suppressed trees to increase net-growth, improving harvest or production efficiency, and shifting from shorter- to longer lived wood products.
<a href="#">California Air Resources Board (CARB) Compliance Market Forestry Protocol - reforestation category</a>	Reforestation	Market for carbon offsets	Focuses on reforesting land that has less than 10% canopy cover for at least 10 years prior, or that has been significantly disturbed.
<a href="#">Carbon leadership forum at UW</a>	Harvested Wood Products	Promotion	Provides information sharing and network for a coalition of architects, engineers, contractors, material suppliers, building owners and policymakers focused on strategies to decarbonize the built environment.
<a href="#">City Forest Credits - Tree Preservation Protocol</a>	Avoided conversion	Market for carbon offsets	Includes two protocols (40 years and 100 years) for conserving tree canopy and greenspaces in rapidly growing metro areas. Designed for private land and land being acquired by public agencies.
<a href="#">City Forest Credits - Tree Planting Protocol</a>	Reforestation	Market for carbon offsets	Credits urban tree planting projects that are not legally required to be planted by any law or ordinance and are voluntary and additional.
<a href="#">Climate Action Reserve (CAR) - Forest Protocol V5.0</a>	Forest management; avoided conversion	Market for carbon offsets	Allows improved forest management and avoided conversion project types. Includes accounting for net changes in standing live trees, standing dead trees, and harvested wood products, as well as certain emissions.
<a href="#">Climate Action Reserve (CAR) methodology - avoided conversion</a>	Avoided conversion	Market for carbon offsets	Credits carbon sequestered and stored in forests and wood products. Requires that no more than 40 percent of forested stands can be in age classes less than 20 years of age.
<a href="#">Climate Action Reserve (CAR) methodology - reforestation</a>	Reforestation	Market for carbon offsets	Focuses on reforesting land that has less than 10% canopy cover for at least 10 years prior, or that has been significantly disturbed.

<a href="#">Climate Action Reserve (CAR) Climate Forward methodology</a>	Reforestation	Market for carbon offsets	Allows for up front payment and forecasted mitigation units (FMUs) for carbon reduction benefits that will occur in the future due to reforestation actions initiated by the project.
<a href="#">Conservation Stewardship Program (CSP) USDA</a>	Reforestation; forest management	Cost-share; technical assistance	Provides payments for practices at approved rates including reforestation practices, sustainable forest management practices, and soil health practices, as well as new practice codes that directly relate to forest carbon management.
<a href="#">Evergreen Carbon Capture Program</a>	Reforestation	Grant for easement or restoration agreements	Funds local tree planting projects on conserved lands.
<a href="#">Forestland Preservation Program - Washington Wildlife and Recreation Program (WWRP)</a>	Avoided conversion	Grants for easements	Funds conservation easements to maintain continued timber production and enhance or restore ecological features. Allows compensation for less-than-fee-title real property rights, such as carbon credits.
<a href="#">Green Globes</a>	Harvested Wood Products	Building certification	Consists of an online assessment protocol, rating system, and guidance for green building design, operation and management.
<a href="#">Healthy Forests Reserve Program (HFRP) USDA</a>	Avoided conversion	Grant for easement or restoration agreements	Provides landowners with 10-year restoration agreements and 30-year or permanent easements for specific conservation actions including increasing carbon storage.
<a href="#">Jurisdictional and Nested REDD+ (JNR) offset framework</a>	Forest management; Avoided conversion; reforestation	Market for carbon offsets	Provides offset framework designed for compatibility with mechanisms such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSA) of the International Civil Aviation Organization's (ICAO).
<a href="#">Living Building Challenge certification program</a>	Harvested Wood Products	Building certification	Promotes advanced measurement of sustainability in the built environment through a building certification program.
<a href="#">Regional Conservation Partnership Program (RCPP) USDA</a>	Reforestation; forest management	Cost-share; technical assistance	Offers partnerships between local entities and federal Natural Resources Conservation Service (NRCS) to co-invest in targeted issues and/or geographies. Utilizes NRCS Environmental Quality Incentives Program and other cost-share programs.
<a href="#">Sustainable Farms and Fields Grant Program - Washington</a>	Reforestation	Annual rental payment;	Supports farmers and producers in enhancing soil health through carbon farming and regenerative agriculture.

		Cost-share; Technical assistance	
<a href="#">US Green Building Council Leadership in Energy and Environmental Design Standard (LEED)</a>	Harvested Wood Products	Building certification	Promotes and supports carbon friendly buildings through the worlds most widely used green building rating system.
<a href="#">Verified Carbon Standard (VCS) methodology - Avoided Ecosystem Conversion, v3.0</a>	Avoided conversion	Market for carbon offsets	Credits activities that prevent conversion of forest to non-forest. Differentiates between baseline types based on type of ecosystem, agent of conversion, drivers of conversion, and progression of conversion
<a href="#">Verified Carbon Standard (VCS) methodology - Improved Forest Management in Temperate and Boreal Forests (LtPF)</a>	Forest management	Market for carbon offsets	Credits GHG emission reductions generated by improving forest management and preventing logging in temperate and boreal forests.
<a href="#">Verified Carbon Standard (VCS) methodology - reduced impact logging</a>	Forest management	Market for carbon offsets	Focuses on reducing emissions through reduced impact logging practices such as: improved log bucking, directional felling, skid trail planning, noncable winching, pre-harvest inventorying to improve harvest planning, and reducing the size of log landings.
<a href="#">Verified Carbon Standard (VCS) methodology - VM0003 Methodology for Improved Forest Management through Extension of Rotation Age, v1.2</a>	Forest management	Market for carbon offsets	Credits GHG emission reductions and removals generated from improving forest management practices to increase the carbon stock on land by extending the rotation age of a forest or patch of forest before harvesting.

## Non-carbon specific programs

Name/Link	Carbon nexus	Incentive type	Brief Description
<a href="#">American Tree Farm System (ATFS) forest certification</a>	Forest management	Certification of forest management	Offers certification for non-industrial family forests centered around development and implementation of forest stewardship plans.
<a href="#">Arbor Day Foundation Community Canopy Program</a>	Reforestation	Cost-share; technical assistance	Offers companies, cities, states, and nonprofit organizations a turnkey approach to providing trees to customers, employees, or their community.
<a href="#">ASHRAE 189.1 model code</a>	Harvested Wood Products	Building codes and certification	Consists of a model code that contains minimum requirements for increasing the environmental and health performance of building sites and structures.
<a href="#">B &amp; O Preferential Tax Rates for forest products sector - Washington</a>	Harvested Wood Products	Tax incentive	Provides a preferential business and occupation (B&O) tax rate for a number of different timber industry-related activities, including cutting trees, turning timber into timber products
<a href="#">Clean Water State Revolving Loan Fund (US EPA)</a>	Avoided conversion	Public debt finance for acquisition	Offers below market-rate loans (i.e. under 2.5%) for watershed protection and grey infrastructure. Fund rules were changed in 2017 to allow for forest watershed acquisition.
<a href="#">Community Forest and Open Space Program (USFS)</a>	Avoided conversion	Grant for acquisition	Supports full fee title acquisition of forest land for community forests offering timber and non-timber forest products, public access, recreational opportunities, protection of water and habitat, and other community benefits.
<a href="#">Conservation Futures Program - Washington</a>	Avoided conversion	Grant for easement or acquisition	Provides authority for local governments (counties and other local jurisdictions) to raise funds from property taxation for open space preservation through purchase of easements or development rights, or outright acquisition.
<a href="#">Conservation Reserve Enhancement Program (CREP) USDA</a>	Reforestation	Annual rental payment; technical assistance	Provides per acre payments and technical assistance for riparian buffer design and installation.
<a href="#">Conservation Reserve Program (CRP) USDA</a>	Reforestation	Annual rental payment	Pays a yearly rental payment in exchange for farmers removing environmentally sensitive land from agricultural production and planting species that will improve environmental quality.

<a href="#">Critical Habitat Category - Washington Wildlife and Recreation Program (WWRP)</a>	Avoided conversion	Grants for acquisition	Supports conservation projects to acquire and develop habitat for threatened and endangered species. Can include active forest management as pathway to achieving conservation goals.
<a href="#">Current use taxation, designated forestland and designated timberland - Washington</a>	Avoided conversion	Tax incentive	Offer a property tax reduction to landowners to voluntarily preserve open space, farmland or forestland on their property.
<a href="#">Current use taxation, Public Benefit Rating System (PBRs) - Washington</a>	Avoided conversion	Tax incentive	Offers landowner tax savings based on points for actions such as protecting buffers, preserving habitat, or protecting groundwater.
<a href="#">DNR Urban and Community Forestry Program</a>	Reforestation; forest management	Cost-share; technical assistance	State program providing technical, educational and financial assistance to Washington's cities and towns, counties, tribal governments, non-profit organizations, and educational institutions regarding planting and sustainin trees.
<a href="#">Emergency Forest Restoration Program (EFRP) USDA</a>	Reforestation	Cost-share	Helps small non-industrial landowners facing severe tree mortality from insects, drought, and wildfire by providing up to 75 percent of the cost to implement practices such as debris removal and site prep.
<a href="#">Enhanced Aquatic Resources Requirements tax credit (EARR) - Washington</a>	forest management	Tax incentive	Offers a tax credit to landowners with a forest practices application that includes riparian area, wetland, or steep or unstable slope from which the landowner is limited from harvesting timber.
<a href="#">Environmental Quality Incentives Program (EQIP) USDA</a>	Reforestation; forest management	Cost-share; technical assistance	Offers landowner payments for reforestation or forest management practices such as brush management, forest stand improvement, writing a Rx fire mgmt. plan, fuel breaks, treating woody residues, and fire breaks.
<a href="#">Estuary and Salmon Restoration Program (ESRP) - Washington RCO</a>	Avoided conversion	Grant for restoration and acquisition; technical assistance	Provides grants and technical assistance to private landowners, land trusts, and agencies for projects that restore and conserve near-shore areas in Puget Sound.
<a href="#">Excise Tax - deferral of property taxes until harvested - Washington</a>	Harvested Wood Products	Tax incentive	Provides a real estate excise tax (REET) exemption for sales of standing timber (but not land) to be cut within 30 months of the sale.



<a href="#">Floodplains by design</a>	Reforestation	Grant for restoration and acquisition	Provides competitive grants for large-scale, multiple-benefit floodplain restoration projects around the state
<a href="#">Forest health protection (FHP) USFS</a>	Forest management	Technical assistance	Supports DNR in providing technical information, advice, and related assistance to small forest owners to maintain a healthy forest.
<a href="#">Forest Legacy Program (FLP) USFS</a>	Avoided conversion	Grant for easement or acquisition	Provides grants to protect working forests under threat of conversion to non-forest uses, most commonly through the use of conservation easements.
<a href="#">Forestry Riparian Easement Program (FREP) - DNR</a>	Avoided conversion	Grant for easement or acquisition	Reimburses landowners for a minimum of 50 percent of the timber value of required leave trees for fish habitat; applies to trees adjacent to streams, wetlands, seeps, or unstable slopes.
<a href="#">Forest Stewardship Council (FSC) forest management and chain of custody certification</a>	Forest management	Certification of forest management	Offers voluntary certification for landowners through a comprehensive forest management standard based in the principles of ecological forestry.
<a href="#">Forest stewardship program (FSP) - USFS</a>	Forest management	Cost-share; technical assistance	Provides advice and assistance to help non-industrial private forest owners manage their lands including outreach and education, technical assistance, incentives payments, recognition, backyard forest stewardship, and special projects.
<a href="#">Four to one program (King County)</a>	Avoided conversion	Land use and zoning	Conserves open space by allowing willing land owners to add twenty percent of the land to the urban growth area and the remaining eighty percent permanently added to the King County Open Space System
<a href="#">International Green Construction Code</a>	Harvested Wood Products	Building codes and certification	Offers a model code that provides minimum requirements to safeguard the environment, public health, safety and general welfare.
<a href="#">Master Planned Resorts - Washington</a>	Avoided conversion	Land use and zoning	Allows counties to permit master planned resorts outside of urban growth areas which can include a land conservation element.
<a href="#">NAHB ICC 700 National Green Building Standard™</a>	Harvested Wood Products	Building codes and certification	Provides architects, builders and developers with a flexible above-code program to design and construct homes and apartments that are sustainable, cost-effective and geographically appropriate.



<a href="#">Natural Areas Category - Washington Wildlife and Recreation Program (WWRP)</a>	Avoided conversion	Grants for restoration and acquisition	Supports projects that protect the highest quality ecosystems and plant communities remaining in Washington state, often including rare plant or animal species and critical wildlife habitat.
<a href="#">Renewable Energy Credits – Biomass Energy - Washington</a>	Harvested Wood Products	Tax incentive	Provides an incentive for biomass energy by allowing electric utilities to meet their renewable energy obligations with energy from renewable projects or renewable energy credits (RECs) which can be generated with wood-fueled electricity production.
<a href="#">Riparian Protection Program - Washington Wildlife and Recreation Program (WWRP)</a>	Avoided conversion	Grants for acquisition and restoration	Supports acquisition and restoration of riparian areas and the development of stewardship plans, and provides funds for acquisition of lease extensions under the Conservation Reserve Enhancement Program.
<a href="#">Rivers and Habitat Open Space Program (RHOSP) - DNR</a>	Avoided conversion	Grants for easement	Funds conservation easements for 1) forestland habitat critical for state-listed threatened or endangered species and 2) a type of river habitat called unconfined channel migration zones (CMZ).
<a href="#">Rural cluster provisions - Washington</a>	Avoided conversion	Land use and zoning	Enables counties to include clustered residential development at levels consistent with the preservation of rural character.
<a href="#">Sales Tax Exemption for hog fuel used in biomass operations RCW 82.08.956</a>	Harvested Wood Products	Tax incentive	Provides sales tax exemption for hog fuel used to generate electricity, steam, heat or biofuel.
<a href="#">Salmon Recovery and Puget Sound Acquisition and Restoration (PSAR)</a>	Avoided conversion	Grant for restoration and acquisition	Supports projects that recover salmon and protect and recover salmon habitat in Puget Sound including restoration, acquisition, and planning projects.
<a href="#">Sustainable Forestry Initiative (SFI) forest management and chain of custody certification</a>	Forest management	Certification of forest management	Offers voluntary certification for landowners through a standard based on 13 Principles, 15 Objectives, 37 Performance Measures and 101 Indicators.
<a href="#">Transfer of Development Rights - County and City programs</a>	Avoided conversion	Market for development rights	Enables rural landowners such as farm and forestland to sell development rights to private developers who are able to build more compactly in designated partner cities and unincorporated urban areas.

<a href="#">Urban Wildlife Category - Washington Wildlife and Recreation Program (WWRP)</a>	Avoided conversion	Grant for easement or acquisition	Protects important fish and wildlife habitat within five miles of densely populated areas through native plantings, re-vegetation, and upland stewardship.
<a href="#">USDA Forest Service Wood Innovation Grants</a>	Harvested Wood Products	Grants for research	Provides grants to support traditional wood utilization projects, expand wood energy markets, and promote using wood as a construction material in commercial buildings.
<a href="#">Use Tax exemption on extracted biomass fuel used in same operation RCW 82.12.0263</a>	Harvested Wood Products	Tax incentive	Exempts the use of biomass fuel by the forest products sector from a use tax.
<a href="#">Use Tax exemption on hog fuel and other wood waste used to produce electricity RCW 82.12.956</a>	Harvested Wood Products	Tax incentive	Exempts the use of hog fuel and wood waste used to produce electricity from a use tax.
<a href="#">WA Community Forest Program</a>	Avoided conversion; reforestation; forest management	Grant for acquisition or restoration	Provides funding to help communities protect and enhance their surrounding forest lands by acquiring land and developing collaborative models of community-based forest management and use.
<a href="#">WoodWorks</a>	Harvested Wood Products	Technical assistance	Provides education and free technical support related to the design, engineering and construction of commercial and multi-family wood buildings in the U.S.

## Appendix D: Calculating Wildfire Emissions

Calculating emissions from wildfires begins with spatially identifying fire perimeters for a given year using data produced by DNR's Wildfire Division. These boundaries are used to map wildfire severity within each fire using satellite imagery. Springtime imagery is used to assess change from the previous year, and is typically available by mid- to late-July. As such, while DNR fire perimeters are available relatively quickly, the earliest date for obtaining emissions estimates is late summer or early fall the following year (e.g. Fall 2020 for 2019 fires).

Wildfire severity is calculated annually in Google Earth Engine based on pre- and post-fire Landsat satellite imagery averaged over the spring season (April 1 – June 30).<sup>10</sup> Pre-fire imagery is obtained the year prior to the fire year, and post-fire imagery is from the year following the fire. Severity is calculated at the 30m pixel scale as the Relative differenced Normalized Burn Ratio (RdNBR), a measure of vegetation change, with an offset to minimize variations in severity among individual fires.

DNR creates locally-calibrated fire severity maps of low, mixed, and high severity fire based on RdNBR values. Classification is done based on thresholds provided by Saba Saberi and Brian Harvey (University of Washington). Thresholds were determined by collecting data on basal area mortality from plots across Washington and Oregon, and determining the RdNBR values that correspond with various mortality levels. Low, mixed, and high severity areas indicate <25%, 25-75%, and >75% basal area mortality, respectively. Thresholds were created separately for the eastern and western sides of the state.

DNR identified pre-fire forested vegetation structure using Gradient Nearest Neighbor (GNN) data. The GNN mapping approach uses a combination of satellite imagery and field plots to develop a consistent, wall-to-wall map of vegetation structure across all forest-capable lands. Developed by the Pacific Northwest Research Station, GNN maps are currently the only maps that cover all forested lands across ownerships and are commonly used in the peer-reviewed literature in the region. DNR used two versions of GNN (2012 and 2017) to capture vegetation structure pre-fire for different fire seasons. DNR used GNN vegetation type and age class attributes to create a table with all possible combinations of vegetation type (species codes) and age class that burned in a given year and severity class.

For non-forested lands, DNR used a layer developed by the Institute for Natural Resources at Oregon State. This non-forested layer follows the same methodology as the GNN approach noted above and spans all arid lands in Oregon and Washington. Rather than forest structure, the non-forested layer estimates the cover of various herbaceous, native, and non-native species. Unlike the forested GNN data, this layer was derived from satellite imagery acquired in the year 2000.

Both the forested vegetation type and age classes, and the non-forested cover information, were then translated to specific fuelbeds, based on expert knowledge (S. Prichard (UW) and R. Ottmar (USFS)). DNR used fuelbeds to estimate fire emissions using the model Consume (Prichard et al. 2006), developed by the Pacific Northwest Research Station. Emission factors in Consume are specific for each fuelbed and fire severity. Emission factors were then multiplied by area burned in each fuelbed/severity combination and summarized for each fire season.

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<sup>10</sup> Following the protocol in Parks et al. (2018).

## Appendix E: Carbon Program Incentive Types

**Carbon offsets** are a payment mechanism through which forest landowners reduce emissions or increase sequestration in order to compensate for (“offset”) emissions by another entity such as a company, organization, or individual. Offsets are one of the few types of landowner incentive programs in Washington that are driven by markets instead of public or private grants, payments, or subsidies. Offsets can occur through voluntary markets or compliance markets:

- Voluntary markets are those in which the purchaser is not required to reduce emissions and is purchasing offsets voluntarily as a strategy to meet, for instance, a company’s voluntarily established carbon reduction target.
- Compliance markets are markets in which the purchaser is a regulated entity that is required to meet a certain amount of emissions reduction, and as a part of that entity’s required emissions reduction actions, they purchase offsets from a landowner.

The compliance offset market in Washington is currently driven by California’s cap-and-trade program. This program allows regulated entities in California to meet a share of their mandated emission reductions through offset purchases. Starting in 2021, this share will be reduced to 4 percent, and in addition, only half of this 4 percent will be allowed to come from outside the state of California. There are three California offset transactions worth noting:

- **BP’s purchase of 13 million credits from the Confederated Tribes of the Colville Reservation** in a transaction valued at over \$100 million. The project, which covers more than 450,000 acres, used the California Air Resources Board (CARB) compliance market forestry protocol for improved forest management.
- **The Spokane Tribe of Indians recently registered a similar project using the same protocol for 1.4 million credits.** Projects under this protocol can generate credits through landowner activities such as extended rotations, reduced impact logging, conversion of low-productivity forests to high productivity forests, and thinning diseased or suppressed trees to increase net-growth.
- **Microsoft and the Nisqually Land Trust also used the same California compliance protocol,** but the transaction itself was a voluntary purchase by Microsoft.

The Climate Action Reserve (CAR), American Carbon Registry (ACR), and Verified Carbon Standard (Verra) are three prominent sets of protocols for voluntary purchasers and forest landowners. Seattle-based startup City Forest Credits also offers project protocols for urban and rural tree planting and tree preservation projects around the country. Research for this report documented several examples of voluntary offset projects planned, underway, or completed by landowners in Washington using third-party protocols and verification such as CAR, ACR, and Verra. These projects consist primarily of reforestation and forest management and cover a total of more than 10,000 acres. At the global scale, voluntary offset markets have transacted a cumulative total of \$5.5 billion in offset sales through 2019 (Forest Trends 2020).

**Practice cost-share** incentives include carbon-specific and non-carbon specific programs that fund specific landowner practices. The most widely used cost-share programs are US Department of Agriculture Natural Resources Conservation Service (NRCS) programs for agricultural producers and small forest landowners. The NRCS Conservation Stewardship Program (CSP) and the NRCS Regional

Conservation Partnership Program (RCPP) are the two federal cost-share programs documented in research for this project that offer cost-share payments to small forest landowners specifically toward the outcome of enhancing carbon storage and sequestration.

Forest management and reforestation practices supported by these programs include site preparation, timber stand improvement, tree/shrub establishment, and silvopasture establishment. Data gathered from NRCS for this project documented support for more than 35 projects for small forest landowners by these two programs in Washington from 2009-2019.

An additional carbon-specific cost-share program in Washington is the newly authorized and currently under-development Washington Sustainable Farms and Fields Program.

Non-carbon specific cost-share programs include federal programs such as the Environmental Quality Incentives Program (EQIP) and the Forest Stewardship Program, which is a cooperative effort between USFS and DNR. EQIP is the largest and most significant of these programs in terms of funding provided to small forest landowners. Data gathered from NRCS for this project documented that between 2009 and 2019, small forest landowners in Washington have received EQIP payments of more than \$11 million for over 3,000 forest management and reforestation projects such as timber stand improvements, site preparation, tree/shrub establishment, and riparian forest buffers.

**Annual rental payment** programs are similar to cost-share in that they involve periodic payments to landowners, mostly through federal or state funding. However, unlike cost-share programs, which fund landowner practices, annual rental payments seek to fund specific conservation outcomes and may involve rental contracts lasting 10 years or longer. For instance, the Conservation Reserve Enhancement Program provides payments for riparian buffers for farmers, with the amount of the payment calculated as a function of soil type and enrolled restoration activities. The only carbon-specific annual rental payment program documented for this report is Washington's new Sustainable Farms and Fields Program, the authorizing legislation for which includes a provision to allow for payments for successfully delivered carbon storage or reduction (RCW 89.08.615).

**Grants for easements, acquisition, or restoration** include a wide range of local, state, and federal carbon-specific and non-carbon specific programs. The three programs categorized for this report as carbon-specific grant programs are the Washington Wildlife and Recreation Program (WWRP) Forestland Preservation Program, the federal NRCS Healthy Forests Reserve Program (HFRP), and Forterra's Evergreen Carbon Capture program.

In 2016, the Legislature added a forestland category to WWRP for the primary purpose of acquiring and preserving opportunities for timber production. Project proponents can earn points in their application by demonstrating an estimate of carbon storage. Carbon credits that support prolonging the life of the timber stand are one of the permitted uses on forests funded through the program. Funds may be used for some limited restoration activities including actions that would increase carbon storage capacity.

HFRP provides landowners with multi-year restoration agreements or permanent easements for specific conservation actions including increasing carbon storage.

Forterra's program functions similar to a voluntary offset in allowing companies and individuals to mitigate their carbon footprint by funding tree planting, with one distinction being that the program

does not offer third party verification. The program has completed nearly 100 tree planting projects on public and private lands.

Non-carbon specific grant programs include county conservation futures programs, WWRP conservation programs, the Forest Riparian Easement Program, and federal programs such as the Forest Legacy Program and the Community Forest and Open Space Program. While not specifically focused on carbon storage and sequestration, these programs help landowners achieve carbon objectives through avoided conversion of forestland to other uses, reforestation projects, and habitat protection and restoration.

Other forest landowner incentive types for non-carbon specific programs include **transfer of development rights** (TDR) markets, **public debt finance** for acquisition, **forest certification**, and **tax incentives**.

- TDR markets are a voluntary, incentive-based approach to protect forests and other natural and working lands by enabling the sale of development rights from rural areas into more compact development in urban areas.
- Public debt finance includes the use of low interest loans through programs such as the Clean Water State Revolving Loan Fund to protect forests from conversion to other uses.
- Forest certification schemes are voluntary third party programs that provide incentives for landowners by enabling products to receive recognition in the marketplace. Major certification schemes include Forest Stewardship Council, Sustainable Forestry Initiative, and American Tree Farm System.
- Tax incentives include programs such as King County's Public Benefit Rating System, which provides tax savings to landowners in exchange for actions to protect streams, wetlands, habitat, and other values.

Similar to other non-carbon specific programs, these programs do not explicitly focus on carbon but still help landowners achieve carbon outcomes.

**Harvested wood products** programs have the ability to complement reforestation/afforestation, avoided conversion, and forest management programs for landowners by providing incentives through the marketplace for wood products. The most common type of program identified through this project as a carbon-specific harvested wood products incentive program is **green building certification systems**. The US Green Building Council Leadership in Energy and Environmental Design (LEED) rating system is the most widely used green building rating system in the world and includes rating programs that specifically recognize buildings with net zero carbon emissions and low embodied emissions within building materials. Other green building certification systems with carbon-specific parameters include the Living Building Challenge and Green Globes.

Other carbon-specific harvested wood product incentive program types include **promotion programs** and **technical assistance**. These include the Carbon Leadership Forum at the University of Washington, which is a coalition of architects, engineers, contractors, material suppliers, building owners and policymakers focused on strategies to decarbonize the built environment, and Architecture 2030 Carbon Smart Materials Palette, which is an online databased of sustainable design principles, strategies, and tools to help building projects reduce embodied carbon emissions.

Non-carbon specific incentive programs related to harvested wood products include **grants for market development, tax incentives, technical assistance, and building codes and certification**. These programs function as incentives for carbon sequestration and storage in wood products by facilitating market access, reducing tax burdens, and otherwise promoting and facilitating the use of wood in the built environment.

The US Forest Service Wood Innovations Grant program supports traditional wood utilization projects, expands wood energy markets, and promotes using wood as a construction material in commercial buildings. The program has funded 19 projects in Washington related to wood-based bioenergy and wood-based construction and related market development.

Tax incentives for harvested wood products in Washington include a real estate excise tax exemption, preferential business and occupation (B&O) tax rates for the forest products sector, and certain sales and use tax exemptions. Building code and certification incentives include a directive from the Washington Legislature through Senate Bill 5450 in 2018 to adopt rules for the use of mass timber products in residential and commercial building construction, and model building codes such as the International Green Construction Code and ASHRAE 189.1. WoodWorks is an example of a technical assistance incentive program which provides education and free technical support related to the design, engineering and construction of commercial and multi-family wood buildings in the US.

There are numerous incentive-based carbon sequestering programs that exist but are not included in the list because they do not fit the definition of programs requested by the legislature. For instance, various local city programs provide assistance to urban property owners in planting trees including Trees for Seattle, Spokane Urban Forestry Neighborhood Tree Program, and Grit City Trees (Tacoma). The list of incentives does not include these programs because the direction from the Legislature was to compile information on programs available to private and non-state owners of forestland, and private urban residential lots are not considered forestland. That said, the list does include projects that provide urban forestry assistance to local governments to steward municipally-owned urban forests such as DNR's Urban and Community Forestry Program.

The list also does not include programs that provide support or enable projects exclusively for state lands, such as the Trust Land Transfer program, but it does include programs for which state agencies are one type of eligible entity alongside other non-state owners of forestland, such as various Washington Wildlife and Recreation Program grant programs. The list also excludes some offset protocols that could technically be applied in Washington or US, but are designed more for international projects, such as the VCS Community, Climate, and Biodiversity offset standard. However, the incentives list does include the global Jurisdictional Nested REDD (JNR) offset protocol even though no projects have occurred in the US. JNR offsets may be relevant to Washington and the US as demand is generated for offsets related to international aviation.

## Appendix F: Full Review of Carbon-Specific Incentive Program Barriers

One delineation to use in understanding barriers to carbon-specific incentive programs is the difference between carbon offsets and other incentive types. The unique nature of offsets is driven by the need for rigorous assurances to the purchaser of an offset credit that the reduction they are purchasing is real, permanent, quantifiable, verifiable, additional, and enforceable. Carbon offsets need this level of rigor because the purchaser, whether through a compliance or voluntary market, is typically counting the offset as a reduction in place of continuing to emit greenhouse gasses through other activities. The tradeoff is that this need for rigorous assurances can lead to technical complexity and high costs for landowners seeking to participate in offset markets. If the price of the carbon offset is not high enough to cover the costs associated with rigorous protocols and technical complexity, the result can be barriers that limit participation by landowners.

For landowners taking the initial step of assessing the feasibility of selling carbon offsets, the variety and **technical complexity** of forest carbon offset standards and protocols can serve as a barrier. The list of programs and protocols in Appendix C documents several different offset standards, such as:

- Verified Carbon Standard
- American Carbon Registry
- Climate Action Reserve
- California Air Resources Board

Each of these standards offer different protocols for different landowner actions such as reforestation, avoided conversion or forest management. Evaluating the detailed sets of instructions in these protocols to determine the tradeoffs for a landowner in terms of costs, length of commitment, management restrictions, and other requirements can be a challenging process, particularly for small forest landowners. Carbon project developers can help with or lead this evaluation if a landowner does not have the capacity, knowledge, or interest in conducting the evaluation themselves, but outsourcing project feasibility to a project developer comes with additional costs.

Once a landowner chooses to enter the offset project development and implementation process, additional barriers can emerge.

California Air Resources Board (CARB) protocols for improved forest management (IFM) projects provide examples of the technical complexity and costs for Washington forest landowners that can be associated with carbon offset projects, particularly compliance offsets.

For example:

- **Invalidation** is a process that allows CARB to invalidate credits up to eight years *after* issuance. The risk of invalidation is one reason that offsets trade at a discount to allowance prices, lowering potential returns to landowners.
- **Sequential sampling** is the only way verifiers are allowed to conduct a quality assessment of forest inventories under the CARB IFM protocol and means that a certain number of plots must be re-measured in a particular order by the project verifier. This rigid process can necessitate repeating fieldwork, which leads to expensive inventory measurements and is an overall driver of high costs.



In the project verification process, CARB conducts its own:

- **Detailed verification review** of projects, in addition to the required use of a third party verifier and an independent project registry, which adds to project costs.
- **Required long-term monitoring** that employs the use of re-inventory and site visit verifications employing sequential sampling every six years leading to expensive long term monitoring costs. The CARB IFM protocol includes certain forest practices rules based on California law including the stipulation that even age harvests cannot exceed 40 acres for CARB IFM projects, which presents additional costs for landowners in Washington for which standard business practices involve the use of larger harvest areas allowable under Washington law.

CARB compliance market protocols are the most rigorous, but voluntary market protocols can pose challenges for landowners as well.

For instance, a number of offset protocols include **deed restrictions** or **lengthy time commitments**, which can serve as a perceived risk or opportunity cost for landowners not wishing to foreclose future options for their property.

The **risk of reversal** also exists as a barrier to landowner participation in various carbon offset standards and protocols. When a landowner enrolls in an offset project, there is typically a commitment to sequester and store carbon for a certain period of time. If this commitment is not met and the carbon storage declines (reversal), whether intentionally or unintentionally, there can be penalties for the landowner, usually in the form of paying off the volume of carbon in the project that has reversed. The risk of these penalties or the uncertainty around the conditions under which they might occur can dissuade landowners from participating.

Barriers for offset projects can also vary by carbon nexus and the action a landowner takes to generate credits. For example, reforestation projects can face a delay between the time when planting occurs and the time when trees grow enough to start generating credits to sell. This means a gap between the time when a landowner incurs the cost of reforestation and when the landowner is able to recoup those costs. Some protocols are beginning to allow for upfront (ex ante) crediting to address this issue, but, for example, the CARB reforestation protocol does not.

For avoided conversion projects, project proponents can face the challenge of demonstrating the conversion would occur or likely occur in the absence of the offset project. The VCS avoided ecosystem conversion protocol, for instance, requires the use of a survey in which respondents predict imminent conversion in the project area.

The strength of **demand for credits** and the corresponding **price of credits** can serve as barrier when demand and prices are weak and may serve to counteract many of the technical complexities and costs listed above when demand and prices are strong. This relationship between cost and price is one reason that the generally high cost of developing offset projects means that most of the project examples that have occurred in Washington are large in size (e.g., in the tens and hundreds of thousands of acres for projects with the Spokane Tribe and the Confederated Tribes of the Colville Reservation, respectively). Larger projects bring economies of scale that reduce the per-credit costs and provide sufficient revenue to cover total costs. Depending on stocking and other factors, the **minimum viable size** for a landowner

to develop a compliance forest management offset project at current prices in Washington could be a few thousand acres or more.

#### Other carbon-specific program barriers

In contrast to offsets, other types of carbon-specific incentives, such as practice cost-share and grants for easements or acquisition, offer a different set of tradeoffs between rigorous assurances and flexibility for landowners in program implementation. This different set of tradeoffs has implications for barriers, including costs that may exist for the use of these programs by landowners as well as the technical assistance provision that may be required for landowner access to be effective.

CSP added enhancements for carbon in 2016. The RCPP project on carbon markets in Washington was launched the same year but did not utilize CSP. In comparison, EQIP payments have been an established opportunity for landowners for more than two decades and are supported by existing agency infrastructure and programming. As a result, the full infrastructure needed to support these carbon-specific programs may not yet exist.

A current barrier to all of these CSP enhancements in Washington is that **the state NRCS office has yet to initiate the 2018 Farm Bill CSP with non-industrial forest owners**. RCPP is a flexible program that can concentrate funding to a specific geography and resource concern, yet the program requires a strong administrative intermediary and effective landowner outreach and engagement strategy to make the funding achieve its desired outcomes on the ground. In general, NRCS payments also function on a cost reimbursable basis and the payment process can be administratively burdensome for forest consultants and landowners to access. Lastly, the payment amounts landowners may receive from cost-share programs may not be enough to truly incentivize long-term behavior change.

The two programs categorized for this report as carbon-specific grant programs are the Washington Wildlife and Recreation Program (WWRP) Forestland Preservation Program and the federal NRCS Healthy Forests Reserve Program (HFRP). Both programs are relatively new to Washington. The Forestland Preservation Program is a new addition to the WWRP grant program portfolio as of 2016.

Since then, WWRP has funded five projects on 1,018 acres of working forests in the state. The program receives one percent of WWRP funding and projects are limited to \$500,000 each in funding. One of the apparent barriers to the use of this program by landowners is the **limited funding available**, which has led to limited participation in initial program cycles. Other barriers, such as **the ability to only fund easements rather than fee acquisitions**, may also be a factor.

HFRP is a federal program made available to small forest owners in the state through RCPP projects including the Southwest Washington Small Forestlands Conservation Partnership, the Yakima Integrated Plan Toppenish to Teanaway RCPP project, and the Greater Spokane Watershed RCPP. While HFRP does offer an option for payments specifically for the purpose of enhancing carbon sequestration, these RCPP projects are primarily focused on other objectives such as habitat protection and watershed restoration. This creates a potential barrier to the use of HFRP as a carbon-specific incentive through RCPP in Washington. The overall newness of the program also affects landowner awareness and interest in participating.

For incentives related to harvested wood products, the research for this report identified three incentive types and sets of programs with an explicit focus on carbon. This includes green building certification

systems, promotion programs, and technical assistance. Unlike reforestation, avoided conversion, and forest management incentives, the carbon-specific incentives related to harvested wood products are generally further removed from forest landowners. For instance, the LEED green building program, which includes a module that focuses on low embodied emissions in building materials, provides points in green building certification toward the use of certified wood. For a forest landowner, this has the potential to provide an incentive through improved market access or potential premiums for logs. However, these potential incentives are more indirect for a landowner than a transaction in which a funder or offset buyer directly pays a landowner to conduct a specific activity such as reforestation. Given the focus of the request from the Legislature on an incentive program list for forest landowners, as well as barriers to the use of these programs, this report noted the indirect nature of these harvested wood products incentives as a barrier. However, in the discussion below on barriers for non-carbon specific programs, this report highlights that several of the non-carbon specific incentives related to harvested wood products do function as more direct incentives for landowners, such as tax incentives. These incentives do not currently have an explicit focus on carbon storage or sequestration but do help provide beneficial carbon outcomes.

## Appendix G: Full Review of Non- Carbon-Specific Incentive Program Barriers

Federal cost-share and annual rental payment programs that are not carbon-specific programs share similar barriers to the federal programs that do have carbon-specific program elements and which are described above. These cost-share programs often focus on non-industrial private forestland owners, and many barriers to participation stem from the inherent challenge of engaging these small-scale landowners in complex federal programs. The USDA Environmental Quality Incentives Program, whether it is being used for activities that promote carbon sequestration or other values such as habitat restoration, productivity enhancements, or water quality, can face implementation challenges such as **limited technical assistance availability** to help landowners plan and implement practices. EQIP also can provide a challenge for landowner participation due to the **complexity of reimbursement procedures**, which involve multiple steps for landowners and offer varying reimbursement rates depending on the practices applied to a landowner's forest. Many programs, such as DNR's Urban and Community Forestry Program, the USDA Emergency Forest Restoration Program, and USDA EQIP face the barrier of **limited program funding relative to demand** for landowner services or incentive payments.

Several non-carbon programs face the barrier of **limited political support for implementing state-enabled programs**. Washington has several programs that are authorized at a state level for local governments to implement such as Conservation Futures programs, Transfer of Development Rights programs, or Public Benefit Rating System tax-incentive programs. Several successful examples of program implementation exist around the state, but only certain counties have elected to establish programs, which creates a barrier to landowner participation in local jurisdictions where these programs have not been established.

A key barrier for multiple grant programs for acquisition, easement, or restoration is **limited program funding relative to demand**. Two programs administered by DNR – the Forest Riparian Easement Program and the Rivers and Habitat Open Space Program – consistently have higher demand from project proponents that can be supported by funding in a particular year. Similarly, federal programs such as the USFS Forest Legacy Program and the USFS Community Forest and Open Space Program have highly competitive national solicitations in which applications exceed funding capacity for eligible projects.

One difference between the carbon-focused and non-carbon focused programs for harvested wood products is that several non-carbon focused programs documented for this project offer direct incentives to landowners. For instance, the preferential B&O tax rate for the forest products sector reduces costs for qualifying landowners, which can serve as an incentive to retain land in forestry instead of converting to other uses. Additional tax incentives provide similar direct benefits such as use tax exemptions for biomass fuel or hog fuel. Barriers to other non-carbon focused harvested wood products programs include **limited program funding** for programs such as the US Forest Service Wood Innovation Grants and the indirect incentive to landowners provided by green building codes and certification programs.



# **Carbon Sequestration Advisory Group Report**

November 20, 2020





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## Introduction

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The carbon sequestration potential of natural and working lands can play a significant role in addressing climate change by reducing atmospheric greenhouse gas (GHG) concentrations (IPCC 2019, UNEP 2017). Natural and working lands address GHG concentrations by sequestering carbon in leaves, stems, and roots through photosynthesis and then by storing that carbon in live and dead biomass and in soils. Harvested wood products contribute by storing carbon in materials such as lumber and plywood.

The Washington State Department of Natural Resources (DNR) formed the Carbon Sequestration Advisory Group (CSAG) in November 2019 to guide DNR's work in 1) conducting carbon inventories and 2) compiling and providing access to information on existing incentive-based carbon sequestering programs for Washington landowners, as outlined in the Engrossed Substitute House Bill 1109 (ESHB 1109 Sec 308(24)) proviso (see Appendix B-1 for the exact proviso text). The CSAG is composed of a balance of representatives who characterize the diverse interests and expertise involved in the subject of carbon sequestration on natural and working lands. (See Appendix B-2 for a list of CSAG members and their affiliation and Appendix B-3 for CSAG member responses to this report.)

The CSAG held the first of five meetings in February 2020 and met roughly every other month until October 2020. Over the course of the eight months, the CSAG worked to provide advice, guidance, and recommendations to DNR in the agency's work to answer five questions, as outlined in the CSAG charter (see Appendix B-4 for the CSAG charter):

1. What are the results of carbon inventories required through the proviso?
2. What could be done to improve the efficiency and effectiveness of carbon inventories?
3. What are the existing opportunities for carbon compensation services and other incentive-based carbon reducing programs for forest landowners and managers?
4. What barriers exist, including costs, to the use of these services or programs?

5. Are there any recommendations for additional work or legislation that may be advisable resulting from the advisory group?

To answer these questions, the CSAG received presentations on the development of and results from carbon inventories and voluntary, incentive-based carbon sequestering programs (hereafter referred to as incentive-based programs) in Washington. During meetings, the CSAG collaborated through both plenary discussion and small group discussion to provide DNR information and feedback to improve the inventories under development, identify topics that require further investigation, and highlight opportunities for the CSAG to contribute meaningful recommendations for consideration by state policymakers. It is important to note that, overall, the CSAG's work was focused on carbon storage as it relates to Washington's forestlands and specific forest products, which is more specific than the natural and working lands definition in the proviso (which includes croplands, rangelands, wetlands, etc.). Meeting summaries document themes from these discussions and each meeting summary was reviewed and approved by the CSAG. Comprehensive meeting summaries are posted on the CSAG website and the main body of the summaries are appended to this report (see Appendix B-4).

Between Meetings 2, 3, and 4, two small groups called Incubator Teams (ITs) met to discuss specific topics identified at the CSAG meetings, advance conversations for the CSAG as a whole, and focus the CSAG recommendation process (Appendix B-2 indicates the CSAG members who participated in the ITs):

- The **Inventories IT** focused on improvements to carbon inventories; and
- The **Incentives IT** focused on addressing barriers to incentive-based programs.

## Background on CSAG and This Report

The purpose of this CSAG report is to communicate the advisory group's findings, advice, and recommendations to DNR to be included in the agency's report to the Washington State Legislature. The CSAG report is an attachment to DNR's December 2020 report to the Legislature, Natural and Working Lands Carbon Inventories and Incentives in Washington, which provides more in-depth information about the state's carbon inventory results and information on incentive-based programs. The CSAG report was completed prior to completion of DNR's report and CSAG members did not review the contents of DNR's report prior to its completion and submittal to the Legislature. Many of the CSAG's deliberations focused on strategies to ensure policy makers have access to relevant and clear information for decision-making. For example, the CSAG provided input on methodologies during DNR's development of inventories and feedback about interpreting results that the CSAG anticipates will be incorporated into the forthcoming and future inventory reports. Furthermore, many of the CSAG recommendations focus on providing tools to assess and/or compile information about program efficacy for policy makers.

This report's format follows the legislative proviso and has separate sections on carbon inventories and incentive-based programs. The CSAG recognizes that inventories, models, and monitoring are fundamental tools to help understand conditions at a snapshot in time. In addition, the performance measures of incentive programs can be enhanced or helped by having a complete picture of the carbon sequestration trends and current status provided by inventories. The questions policymakers have about incentive programs can also help inform how to approach inventories, models, and monitoring. The CSAG's recommendations on incentives and inventories, though separate in this report, are complementary.



The backdrop for the work of the CSAG amplified the timeliness and importance of the CSAG's work and sharpened its deliberations.

- Recent 2019-20 Washington legislation underscores the importance of carbon sequestration on natural and working lands. For example, Engrossed Second Substitute House Bill 2311 (ESSBH 2311), which the Legislature passed in 2020, amends state greenhouse gas emission limits and states “the policy of [Washington is] to promote the removal of excess carbon from the atmosphere through carbon sequestration activities...to meet the state’s greenhouse gas emissions reduction targets.”
- The state’s budget forecast will likely present challenges in prioritizing investments during the 2021 legislative session, especially given the strain presented by the COVID-19 pandemic. The CSAG avoided making sweeping statements regarding funding needs and considered economic realities in deliberations and development of recommendations. As a result, this report is largely silent on funding amounts. However, the CSAG recognizes that implementing the recommendations requires resources and new funding commitments in future years and supports state funding requests to implement CSAG recommendations.
- The CSAG demonstrated that groups with diverse representation grounded in data-driven conversations with a clear scope and expectations can productively engage on the topic of natural and working lands carbon sequestration and landowner incentive programs. The CSAG deliberations, simply put, reflect ‘next steps’ Washington can pursue as part of the forest sector’s contribution to a broader and more inclusive state-wide carbon conversation.

# Carbon Inventories – Findings and Recommendations

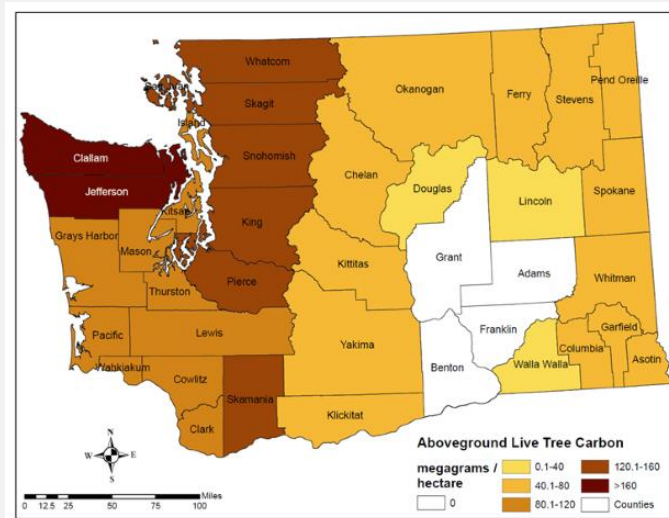
## Information Shared with the CSAG

DNR, as part of its response to the legislative proviso, was responsible for developing and compiling the inventories the CSAG reviewed. The CSAG received five presentations and/or reports on Washington carbon inventories as outlined in Table 1 below (links to the presentations are in the first column). The inventory information provided to the CSAG included forest ecosystem carbon inventory methodology and Washington results from US Forest Service – Forest Inventory and Analysis (USFS-FIA); harvested wood products (HWP) carbon inventory methodology and preliminary Washington results from USFS; and estimated carbon emissions from wildfires in Washington from DNR. The CSAG provided extensive feedback to DNR during the presentations of the inventories regarding improvements to the inputs, framing and presentation of results and improvements to future inventory approaches. CSAG member-approved meeting minutes reflecting a synthesis of the feedback can be found in Appendix B-5.

**Table 1: Carbon Inventory Presentations/Information**

Presentation or Report	Presenter or Source of Report	Date Shared	Brief Description of Presentation
<u><a href="#">Overview of FIA and forest ecosystem carbon inventory methods</a></u>	USFS-FIA	Meeting 1 12 February 2020	<p><b>FIA measures forested lands with field plots on a ten-year cycle. Presentation describes overall methods, plot design, and program history.</b></p> <p>Excerpts from CSAG Meeting Summary (Full Set of Meeting Summaries in Appendix B-5)</p> <ul style="list-style-type: none"> <li>FIA provides high-level data but doesn't address questions for landowners who want to know information relevant to their land. More detailed inventory data could be a valuable resource for them.</li> <li>Plot types include corporate and non-corporate as types of private plots but don't specify management type. A small family tree farm could be an example of a corporate or non-corporate plot, depending on the ownership structure, and a land trust is an example of a non-corporate plot.</li> <li>Remote sensing is used to support stratification (wherein FIA measures all the plots and groups them to reduce the sampling error).</li> <li>Dynamic factors or rare events are difficult to capture on the plots, e.g., a fire needs to be large-scale to be represented. If there is a large disturbance year, FIA can't necessarily capture the event in its measurements. However, FIA is looking at Image-based Change Estimation (ICE) which uses National Aerial Imagery Program (NAIP) to categorize plots every two years and look at change.</li> <li>If denied access to a plot, FIA will try for up to three years to get access. Ten years later, they will try again. FIA does not use another plot, but it keeps track of which plots are not sampled. <ul style="list-style-type: none"> <li>FIA compensates for denied access in post-stratification.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• FIA reports focus on status and trends, but do not provide projections (although FIA data are often used in projections).</li> <li>• How easily FIA can staff up: Given that it's difficult to hire at a federal level right now, if a state wants to invest in increasing the number of plots or frequency of measurements, it's easiest to partner with FIA and hire state employees; it would likely take a year to fully ramp up. There is also a question of whether there is an adequate labor pool for the field work.</li> <li>• Standard errors (SE) are low in terms of carbon stock measurements; they increase for carbon flux measurements.</li> </ul>		
<p><b><u>WA forest ecosystem carbon inventory results</u></b></p>	<p><b>USFS-FIA</b></p>	<p><b>Meeting 1 12 February 2020</b></p>	<p><b>Presentation summarizes total 2007-16 WA forest land carbon stocks and flux (estimates of change) by pool (live trees, dead trees, etc.), landowner (private, USFS, DNR, etc.), and region.</b></p>
<p>Excerpts from CSAG Meeting Summary and Worksheets (Full Set of Meeting Summaries in Appendix B-5 and Notes from breakouts on the CSAG Website)</p> <p>In two breakout groups the CSAG shared their initial impressions of the results, conversations that CSAG needs to have in the future. While in breakouts CSAG members shared observations from three figures from the preliminary findings in the WA Forest Ecosystem Carbon Inventory results:</p> <ul style="list-style-type: none"> <li>• Washington carbon stocks and flux on forest land by region. (See Figure 1)</li> <li>• Washington carbon stocks and flux on forest land by region and pool. (See Figure 2 and Figure 3)</li> </ul>			



**Carbon Stocks and Flux on Forest Land by Western/Eastern Region**

Western Region

Total stocks: 1,763 MMT (SE: 20.6 MMT)  
C Stocks/ac: 146.2 MMT

CO<sub>2</sub>e Flux: 15.0 MMT/yr (SE: 4.2 MMT/yr)  
Flux/ac: 1.26 MT/yr

Eastern Region

Total stocks: 955 MMT (SE: 13.9 MMT)  
C Stocks/ac: 94.4 MMT

CO<sub>2</sub>e Flux: 1.1 MMT/yr (SE: 1.3 MMT/yr)  
Flux/ac: 0.11 MT/yr

Figure 1 Carbon Stocks and Flux on Forest Land By Region

Western Washington			Eastern Washington		
Forest Carbon Pools	Total Carbon (MMT)	Per Ac (MT)	Forest Carbon Pools	Total Carbon (MMT)	Per Ac (MT)
Live Trees	792.7	65.7	Live Trees	290.9	28.9
Standing Dead	55.8	4.6	Standing Dead	46.8	4.6
Understory Veg	15.3	1.3	Understory Veg	12.9	1.3
Down Woody Debris	101.7	8.4	Down Woody Debris	48.1	4.8
Forest Floor	75.8	6.3	Forest Floor	53.1	5.3
Soil Organic C	721.9	59.9	Soil Organic C	502.9	50.0
<b>All Pools</b>	<b>1,763.3</b>	<b>146.2</b>	<b>All Pools</b>	<b>954.8</b>	<b>94.4</b>

Figure 2 Forest Carbon Stocks by Region and Pool: 2007-16

Western Washington			Eastern Washington		
	Net flux (CO <sub>2</sub> e)			Net flux (CO <sub>2</sub> e)	
	Total (MMT/yr)	Per Ac (MT/yr)		Total (MMT/yr)	Per Ac (MT/yr)
Forest Carbon Pool			Forest Carbon Pool		
Live Trees	16.3	1.37	Live Trees	-1.2	-0.12
Standing Dead	0.7	0.06	Standing Dead	3.3	0.33
Understory Veg	-0.21	-0.01	Understory Veg	0.1	0.01
Down Woody Debris	-5.5	-0.46	Down Woody Debris	-1.4	-0.13
Forest Floor	0.4	0.04	Forest Floor	-0.2	-0.02
Roots	3.3	0.28	Roots	0.4	0.04
Soil	-0.1	-0.01	Soil	<-0.1	<0.01
<b>Net flux All Pools</b>	<b>15.0</b>	<b>1.26</b>	<b>Net flux All Pools</b>	<b>1.1</b>	<b>0.11</b>

Figure 3 Annual Carbon Flux (CO<sub>2</sub>e) by Region and Pool: 2002-06 to 2012-16

**HWP inventory methods**

**USFS Meeting 2 8 May 2020 USFS uses the IPCC production method (includes all HWP produced from timber harvested in the area and exports but excludes imports) to calculate HWP carbon stocks and flux.**

Excerpts from CSAG Meeting Summary (Full Set of Meeting Summaries in Appendix B-5)

- *Life Cycle Analysis vs HWP stocks and flux:* Washington DNR’s approach to creating a carbon inventory of harvested wood products is not the same as a life cycle analysis (LCA). DNR is using this HWP analysis approach in order to be consistent with recent inventories in California and Oregon, and for consistency with international reporting standards for carbon stocks and fluxes. Washington already gathers certain components of an LCA through the GHG emissions inventory that the state Department of Ecology is required to perform every two years. That said, there are still numerous gaps in data availability for LCAs.
- *Salvage harvest:* Salvage harvests and the carbon from these harvests would be included in the HWP estimates in the same way as carbon from other harvests.
- *Recycling:* Factoring in recycling that happens in a different country is a national-level challenge for HWP analyses.
- *Landfill methane:* The question of how to factor in landfill management or recovering methane emissions is being explored at the national scale. Non-carbon emissions have changed over time and are regionally specific, so relying on national trends may not be appropriate. There’s a data opportunity for time series information at the state level.
- *Washington-specific data, support from CSAG:* In order to get the best results, improve sensitivity analysis, and reduce uncertainty, USFS welcomes input from CSAG members on what information is available for use in the HWP model at each phase such as primary product ratios, conversion factors, end-use ratios, and the fate of wood in landfills.
- *Storage projections:* Projections are an interesting data point to consider; it connects the land today with the wood products pool that will occur in the future. Projections are not within the USFS HWP scope for this project.

	<ul style="list-style-type: none"> <li>• <i>Regional variability in the state:</i> USFS has an opportunity to recognize the interest in the LCA community and building community in information to differentiate regional variability in wood supply. Also, note that if USFS does look to provide info on regional variability, county-level data may not create an accurate picture because HWP do not stay within county boundaries; wood supply boundaries should be considered instead.</li> <li>• <i>Substitution:</i> The substitution impact of harvested wood products (increased/decreased emissions attributable to the use of wood products rather than alternative materials) is not included in the scope of the USFS HWP assessment.</li> </ul>		
<u>WA HWP carbon inventory preliminary results</u>	<b>USFS</b>	<b>Meeting 3 9 July 2020</b>	<b>Presentation includes preliminary results for WA HWP carbon stocks and flux and explains how it relates to the FIA forest ecosystem results.</b>
<p>Excerpts from CSAG Meeting Summary (Full Set of Meeting Summaries in Appendix B-5)</p> <ul style="list-style-type: none"> <li>• <i>Clear interpretation of results.</i> Decision makers will be challenged with competing interests and needs so they need a clear, concise message about what the inventory results can and cannot tell us - the ‘so what’ aspect of inventories. Graphs, charts, or other graphics can help. So can highlighting numbers for which there is high certainty and confidence. Another idea was to display results like a ‘nutrition label.’</li> <li>• <i>Sensitivity of results.</i> Understanding the sensitivity of the HWP and forest ecosystem results to various inputs could improve understanding of the results and also indicate the type of incentives, actions, or policies that could make the most difference for carbon.</li> <li>• <i>Variation by geography and ownership.</i> While it is important to keep results and interpretation clear and simple, results should also include enough nuance and detail to describe important trends and changes in carbon dynamics by region (east/west, ecoregion, etc.) and by ownership. Understanding these variations can help to fine tune incentives and recommendations.</li> <li>• <i>Projections and scenarios.</i> The current inventories are carbon accounting tools and are based on measurements and modeling of past results. Building on this, policy makers are likely to ask for decision-making tools to guide decisions on the types of incentives that would be most beneficial. Projections and scenario development could help us understand what is likely to happen under various policies or other changes. Projections and scenarios can also help identify potential unintended consequences and who the winners and losers may be with any given inventory improvement strategy or policy intervention.</li> <li>• <i>Improvements to technical inventory methods.</i> Multiple potential improvements to technical inventory methods were suggested for exploration including intensifying the FIA plot grid in Washington, utilizing remote sensing in additional ways, and improving measurements about the disposition of products.</li> </ul>			
<u>Estimate of WA wildfire carbon emissions (2014-18)</u>	<b>DNR, with support from University of Washington</b>	<b>Meeting 3 9 July 2020</b>	<b>Document estimates total acres burned in Washington and total wildfire emissions (metric tons CO2e) for five years between 2014 and 2018.</b>
<p>Excerpts from CSAG Meeting Summary (Full Set of Meeting Summaries in Appendix B-5)</p>			

	<ul style="list-style-type: none"><li>• <i>Wildfires</i>: Emissions estimates from wildfires are calculated through a variety of reports. Wildfire emissions are reported on a national scale, including CO2 and non-CO2 emissions. Wildfire emissions are also captured in stock changes in the forest ecosystem estimates presented by USFS at CSAG meeting #1.</li></ul>
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# CSAG Findings and Recommendations to Improve Carbon Inventories

## Inventories Recommendation 1

The CSAG finds that the suite of draft inventory results provides high-level insights on carbon storage and sequestration in Washington forest lands. That said, to maximize the usefulness of inventories, the CSAG recognizes the need for clear and concise messaging to policymakers and decision makers about inventory results. The messaging might include graphs, charts, or other graphics to help highlight areas of high certainty and confidence, and to communicate the meaning or importance of trends.

The CSAG recommends that DNR lead the development of a template (aka 'nutrition label') that could be used to communicate inventory results to policy makers in an easy-to-digest format but is granular enough to reflect the nuanced information needed for accurate interpretation. The CSAG recommends that, at a minimum, future inventory reports should:

- Provide summary information (including graphics);
- Provide a clear description of the carbon flow between live trees, mortality, harvest, standing dead wood, and downed woody debris and how that relates to carbon flux and change in carbon pools;
- Provide a clear description of the harvested wood products in use and solid waste disposal site pools to explain that carbon stocks in these pools are a function of harvests over the past 100 years.
- Wherever possible, summarize changes in the inventory over time by attributing changes in carbon stocks—particularly carbon losses—to specific drivers (e.g., wildfire, insect, harvest, development to non-forest, etc.).
- Convey the inventory results in non-technical terms to identify alternatives where carbon stocks and fluxes could be affected by policies and incentives seeking desired carbon outcomes;

## Inventories Recommendation 2

The CSAG finds that the inventories describe high-level trends and changes in carbon dynamics by geography (east/west, ecoregion, etc.) and by ownership. CSAG also recognizes that while it is important to keep results and interpretation clear and simple, results should also include enough nuance and detail about variation by geography and ownership to help to fine-tune incentives and programs.

The CSAG recommends that the Legislature direct DNR to build on and enhance existing inventory information and link this inventory information with incentives tools and resources to inform new targeted assistance or investments. Combined with modeling the effectiveness of incentives on carbon sequestration, this effort should show policymakers the areas where carbon impacts can be improved as identified by the inventory, the range of potential incentives, who they best incentivize, where they're most applicable, and their potential impact on carbon flux. Although CSAG worked primarily with forest ecosystem and harvested wood products inventories, this recommendation applies to all carbon inventories for natural and working lands in Washington.



### Inventories Recommendation 3

The CSAG finds that the current inventories are carbon accounting tools and are based on measurements and modeling of past results. Building on this, policymakers are likely to ask for decision-making tools to guide decisions on the types of incentives that would be most beneficial. CSAG finds that projections and scenario development will be necessary to understand the likely outcomes under various policies or other changes. Projections and scenarios can also help identify potential unintended social, economic, and ecological consequences. Furthermore, understanding the sensitivity of stocks, fluxes, and projections to various policy and management interventions could improve understanding of which policies could be most effective for carbon and other values such as resilience to wildfire.

The CSAG recommends that DNR, USFS, and other partners incorporate sensitivity analyses into inventories and projections of stocks and flux to improve understanding of the effects and outcomes of policies and to determine where investments will result in the greatest desired outcomes. The CSAG also recommends conducting sensitivity analyses to inform where to intensify or otherwise improve inventory activities, such as increasing FIA plot spatial and temporal intensity.

Additionally, the USFS Pacific Northwest Research Station's Carbon Dynamics Research Initiative has a working group exploring land management and policy scenarios for modeling, including harvested wood products. The CSAG recommends that WA DNR continue to participate in this initiative and work with USFS, and other partners to support and advance these and other carbon modeling efforts. This includes in the near-term working to identify research expertise needed to support running the models.

### Inventories Recommendation 4

The CSAG finds that there are many potential improvements to technical inventory methods, including intensifying the FIA plot grid in Washington, utilizing remote sensing in additional ways, improving measurements and sampling to better determine the disposition of harvested wood products, and improving the ability of researchers to integrate data sets.

The CSAG recommends that the DNR and partners work to:

- Identify ways remote sensing can be acquired and applied to enhance accuracy, reduce errors, and increase frequency in estimates of carbon stocks and fluxes. e.g., the potential for Digital Aerial Photogrammetry to help increase the accuracy and effectiveness of FIA and other inventories.
- Ensure that raw data and data-derived products from the collection and processing of remote sensing and inventory data are openly accessible and well-documented. Models built to consume or predict data should also be designed to be transparent and reproducible.
- Develop pathways for integrating inventory databases (e.g., FIA, stand exams, watershed inventories) with geographic information systems and modeling programs (e.g., Forest Vegetation Simulator (FVS), Canadian Carbon Budget Model) at various state institutions and universities. Moreover, there is also an increased need to refine existing modeling parameters, which can be done by using repeat sampling of inventory data.

## Inventories Recommendation 5

The CSAG finds that the forest ecosystem carbon and HWP inventories do not address the issue of product substitution. The CSAG believes that product substitution is an important opportunity worthy of exploration and additional inquiry as state of Washington works to achieve its carbon sequestration goals. The CSAG recommends that the state further explore the possible carbon and other social and environmental impacts associated with greater utilization of wood in construction and other applications, including the storage of carbon in harvested wood products; substitution in place of more carbon-intensive alternative materials (also referred to as substitution for “higher-embodied carbon materials”); end-of-life impacts; and impacts on forest carbon stock and sequestration. CSAG also recommends exploring the data and decision support tools that should be collected to better inform policy decisions.

# Voluntary Incentive-based Carbon Sequestering Programs

## Information Shared with the CSAG

Beginning at Meeting 2, the CSAG reviewed and helped to refine a compilation of information on existing opportunities for carbon compensation services and other incentive-based carbon-reducing or sequestering programs for landowners who are interested in voluntarily engaging in them. The information was provided by American Forests (a national nonprofit conservation organization) in a spreadsheet that captures information about incentive-based programs and opportunities that are available to Washington landowners, including

- Funding sources;
- Relationship to carbon, e.g., avoided conversion, forest management, etc.;
- Incentive type, e.g., grant, market, tax incentive, cost-share, etc.;
- Landowner type(s) served, e.g., private, tribal, local government, etc.; and
- Barriers to landowner participation.

The CSAG provided extensive feedback to DNR and American Forests during the compilation of the incentive-based programs, including: advising DNR on what kind of information would be useful to compile; suggestions on programs to include in the compilation; extensive feedback on the qualitative attributes compiled about each program; and the barriers to use of each program. The final spreadsheet (appended to the DNR report) and the CSAG meeting minutes (see Appendix B-4) reflect these contributions.

## CSAG Findings and Recommendations for Incentive-based Programs

The CSAG recognizes that no single solution or incentive program exists to accommodate the variety of land types and landowners. Moreover, the CSAG recognizes there are multiple pathways for forest carbon sequestration or storage that play important roles in the carbon sequestration strategy for owners of private and other nonstate owned or managed forestland. These pathways have the potential to work together and complement each other at both a project level and across the landscape.

### Incentives Recommendation 1

Avoided conversion describes the loss of forestland to deforestation or development to other land uses. The CSAG finds that maintaining productive natural and working forest lands of all types (forests owned and managed by both large and small private forest landowners as well as forests managed by public agencies and tribes) is important to support both carbon sequestration and a sector of Washington's economy. Unfortunately, forest lands around the state are threatened by conversion to other uses. The forthcoming forest ecosystem carbon report for Washington from USFS shows the conversion of forest land to other uses over the 2007-16 reporting period caused a net loss of  $2.2 \pm 1.6$  million metric tons of carbon dioxide equivalent per year. In considering how to address the threat of forest land conversion, CSAG members recognize that there are unique barriers for different landowner types and landscapes.

For example, small forest landowners may lack the resources or knowledge needed to understand incentive opportunities, evaluate the costs and benefits of programs, or apply for support. Larger landowners, such as timber investment management organizations, may face barriers due to the limited availability of programs that provide carbon incentives at a scale that is relevant to their business model.

As a next step, the CSAG recommends that the state advance avoided conversion strategies (including state programs or state-enabled programs that exist at the local level) that target these and other barriers in order to make meaningful progress on the pressing issue of forestland conversion. Examples that the CSAG discussed include but are not limited to landowner assistance programs, conservation acquisition and easement programs, planning and other policies which create incentives and remove barriers to assure forests are not converted to non-forest uses.

## Incentives Recommendation 2

The CSAG finds that DNR's list of incentive-based programs developed by American Forests is a useful resource that provides a record of the broad array of opportunities available to Washington landowners to steward their forests and produce harvested wood products in ways that store and sequester carbon. The CSAG believes there are many opportunities to improve access for landowners to existing programs and improve carbon outcomes by clearly identifying and investing in aspects of existing programs that promote carbon sequestration and storage. In addition to improved access to existing programs, and enhanced outcomes from existing programs, the CSAG believes that an important next area of inquiry is whether the existing programs are likely to produce the carbon storage and sequestration sought by the state.

The CSAG recommends the following:

- The state should provide resources to support existing networks and organizations, including DNR, in helping landowners implement or participate in incentive-based programs.
- DNR and other state agencies should assess existing incentive-based programs and look for changes or investments that improve the incentives for carbon storage and sequestration. This assessment should explore existing and potential opportunities for landowners to stack or combine incentives from multiple programs.
- DNR should conduct a 'gap analysis' on existing programs to identify where changes to existing programs would create a more effective carbon nexus and where inadequacies and room for improvement warrant exploration of new programs.

## Incentives Recommendation 3

The CSAG finds that forest carbon offset projects, whether through voluntary markets, or through compliance cap and trade offset programs in other states, can offer a tool in the carbon sequestration toolbox – earning revenue for landowners while at the same time helping individuals and organizations, both in-state and out-of-state, offset their carbon footprint by storing and sequestering carbon. CSAG recognizes that offsets are a unique mechanism that needs rigorous quality assurances because the purchaser of an offset is typically counting that offset as a reduction in place of continuing to emit greenhouse gasses through other activities. In part due to the need for these assurances, offset projects can be complex and challenging for landowners. There are many different sets of rules (protocols) that

projects can use. The price can vary among markets and buyers. Some barriers are beyond the scope of what can be accomplished in Washington. For example, the California compliance market offset project participant faces the potential cost for invalidation of credits, the high cost of project development, and requirement to adopt California Forest Practices Rules or equivalent. These all serve as barriers for Washington landowners. Addressing these barriers and uncertainties for offset projects by increasing flexibility and accessibility could increase project registration, which could benefit landowners and increase sequestration. Increasing flexibility to address barriers such as high project development costs, invalidation, and project aggregation challenges could likely be addressed without risking changes to the credibility and accuracy of offset quantification.

The CSAG recommends that the state develop and pursue strategies to increase flexibility and accessibility for Washington landowners seeking to participate in forest carbon offset projects. Examples of increasing flexibility and accessibility may include, but are not limited to, addressing barriers such as high cost of carbon projects, invalidation, reversals, and project aggregation challenges.

## Appendix B-1: Proviso in ESHB 1109

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**1FY 2019-2021 Budget: ENGROSSED SUBSTITUTE HOUSE BILL 1109, April 28, 2019**

Sec. 308(Pages 238-9)

(24)(a) \$250,000 of the general fund—state appropriation for fiscal year 2020 and \$125,000 of the general fund—state appropriation for fiscal year 2021 are provided solely for the following activities:

(i) Conducting carbon inventories to build on existing efforts to understand carbon stocks, flux, trends, emissions, and sequestration across Washington's natural and working lands, including harvested wood products, wildfire emissions, land management activities, and sawmill energy use and emissions. Where feasible, the department shall use available existing data and information to conduct this inventory and analysis. For the purposes of this section, natural and working land types include forests, croplands, rangelands, wetlands, grasslands, aquatic lands, and urban green space.

(ii) Compiling and providing access to information on existing opportunities for carbon compensation services and other incentive-based carbon reducing programs to assist owners of private and other nonstate owned or managed forestland interested in voluntarily engaging in carbon markets.

(b) By December 1, 2020, the department must submit a report to the appropriate committees of the legislature summarizing the results of the inventories required under this section, and assessing actions that may improve the efficiency and effectiveness of carbon inventory activities on natural and working lands, including carbon sequestration in harvested forest products. The department must also describe any barriers, including costs, to the use of voluntary, incentive-based carbon reducing or sequestering programs. The department may also include recommendations for additional work or legislation that may be advisable resulting from the advisory group created in this subsection as part of this report.

(c) The department must form a natural and working lands carbon sequestration advisory group to help guide the activities provided in this section. The advisory group must be composed of a balance of representatives reflecting the diverse interests and expertise involved on the subject of carbon sequestration on natural and working lands.

## Appendix B-2: CSAG Members, Affiliations, and IT Participation

Name	Affiliation	Inventory IT	Incentives IT
Patti Case	Green Diamond Resource Company		✓
Cody Desautel	Colville Tribes		
David Diaz	University of Washington	✓	
Joseph Donnegan	US Forest Service	✓	
Ara Erickson	Weyerhaeuser	✓	
Kathleen Farley Wolf	King County		✓
Indroneil Ganguly	University of Washington		
John Henrikson	Wild Thyme Tree Farm		✓
Theodore Holt *	The Nature Conservancy	✓	
Joe Kane*	Nisqually Land Trust		
Cherie Kearney	Columbia Land Trust		✓
Mo McBroom *	The Nature Conservancy		
Mark McPherson	City Forest Credits		✓
Gary Morishima	Quinault Indian Nation		
John-O Niles	Salesforce		
Julius Pasay	The Climate Trust	✓	
Lisa Remlinger *	Washington Environmental Council		
Steve Rigdon	Yakama Tribe	✓	
Max Scher *	Salesforce		
Reed Schuler *	Office of Governor Inslee		
Edie Sonne Hall	Three Trees Consulting	✓	
Jason Spadaro	SDS Lumber		
Skip Swenson	Forterra		✓
Bill Turner	Sierra Pacific Industries		✓
Mike Warjone	Port Blakely		
Andrea Watts	Wildcat Creek Tree Farm	✓	
Max Webster	Washington Environmental Council		✓
Elizabeth Willmott *	Microsoft		
Mark Wishnie	BTG Pactual Timberland Investment Group		
Lenny Young (CSAG Chair)	Washington Department of Natural Resources		

\* CSAG members with an asterisk by their name were only able to participate in a portion of the meetings and were not part of the report's finalization process.

## Appendix B-3: CSAG Support for CSAG Report

A final draft of the CSAG report was distributed to all CSAG members to review in October 2020. All 23 CSAG members who were part of the report’s finalization process responded to the final draft. Of those responses, all members agreed that the CSAG Report accurately reflects the group’s deliberations. A few members provided additional comments as follows:

Name and Affiliation	Additional Comments
Patti Case, Green Diamond Resource Company	Thank you for the addition to the report reflecting the fact that CSAG members have not seen the DNR report; however, that reference does not quite clear up my concern that readers of the CSAG report may believe the DNR report reflects the CSAG’s inventory recommendations. Since we have not seen the report, we are unable to assume this. The final report includes a reference to RCW 70.235.020, which amends the state greenhouse gas emissions limits. A second relevant bill passed in the 2020 legislature, RCW 70A.45.090, also references RCW 70.235.020 and further finds that “it is the policy of the state to support the contributions of all working forests and the synergistic forest products sector to the state’s climate response.” RCW 70A.45.090 should also be added as it was discussed during CSAG deliberations as an important policy backdrop for recognition of embodied carbon in harvested wood products.
Ara Erickson, Weyerhaeuser	While I agree the report represents our deliberations, I believe it is lacking much of the rich discussion we had when we reviewed the inventories. Combined with the fact that CSAG members did not have an opportunity to read or review the DNR report (drafts or final), I am submitting my agreement with a caveat. With the CSAG report lacking the detailed interpretation of the inventory finding and not being able to see these interpretations in the DNR report, I’m uncertain if some of the key findings will be included in the report to the legislature. One example is that when we reviewed the flux (or change) of carbon levels over time, we saw that private and public managed forests in Washington state are the largest consumers of atmospheric carbon (compared to unmanaged forests experiencing high rates of disease and mortality). Additionally, we discussed with the full CSAG that areas with strong markets for forest products matched areas experiencing healthy carbon sequestration; this is a critical takeaway that I would have liked to see in the report.
Kathleen Farley Wolf, King County	Incentives IT Recommendation 3 needs further clarification, including a discussion of which barriers are possible to address through action in WA state.
Indroneil Ganguly, University of Washington	The discussion summaries presented in Table 1 (Carbon Inventory Presentations/Information) of the CSAG Report are intended to highlight the ways these studies could be improved in the future, which resulted in an apparent critical tone of this section. However, the reader should note that CSAG overwhelmingly acknowledged the value of these reports. These reports, produced by USFS-FIA, are of immense value to the scientific and other stakeholders communities in the region.
Gary Morishima, Quinault Indian Nation	I raised a number of issues and concerns that I felt were important were for CSAG to address and provided related materials to facilitators and DNR staff, including the lack of attention to the urgent need to reduce atmospheric accumulation of greenhouse gases, questions regarding the efficacy of voluntary forest carbon offsets, inadequate opportunity to substantively engage in group discussions, and need for information to provide context and perspective. However, constraints and limitations of the process did not permit CSAG deliberation. A memo summarizing major concerns is attached to this response should additional information or clarification be needed. [See below.]



<p>Edie Sonne Hall, Three Trees Consulting</p>	<p>Thanks for the opportunity to participate in the CSAG. This comment is more of a clarification than a misrepresentation. In regards to the sentence on page 4, "The CSAG report was completed prior to completion of DNR's report and CSAG members did not review the contents of DNR's report prior to its completion and submittal to the Legislature." I want to clarify that the CSAG did not see any of the DNR's report, not just a final version (e.g. 'prior to completion'). We spent a lot of time making sure that we all understood the inventory findings. I have every confidence DNR will be able to communicate, for example, the important difference between stock and flux, why there may be differences in forest growth and mortality both across regions and ownership types, and the fact that the method used to calculate HWP carbon storage is based on both past and current harvest levels, but I have not seen the report.</p>
<p>Jason Spadaro, SDS Lumber</p>	<p>First, I want to underscore that I agree that the CSAG report accurately represents the deliberations of the CSAG meetings, and thank DNR and Ross Strategic for their leadership. Because CSAG participants will not have an opportunity to review the DNR report (see explanation on page 4), I have not seen any written interpretation of inventory findings. In addition, the meeting summaries, while comprehensive, did not capture some of the insights that the CSAG experts derived from the inventory presentations.</p> <p>A key take-away from the Washington inventory presentation was the following: The key inventory metric when discussing carbon sequestration is flux, or the amount of change in the carbon level over time. We know that healthy, fast growing forests sequester carbon at a much higher rate than diseased or dying forests. Not surprisingly, the inventory showed that the managed forests in our state are the largest consumers of atmospheric carbon. Unmanaged forests, in particular in eastern Washington, which have the highest levels of disease and mortality, are often emitting more than they are sequestering. Further, areas with healthy timber markets also showed healthy sequestration, showing that forests can deliver atmospheric carbon reductions in products and forests simultaneously.</p> <p>Second, I note on page 5 a new paragraph referencing Engrossed Second Substitute House Bill 2311, which amends the state greenhouse gas emissions limits (RCW 70.235.020). While I understand that there are no additional changes that can be made to the CSAG report, if I had seen this language in a previous version I would have suggested adding reference to the second relevant bill passed in the 2020 legislature, RCW 70A.45.090, which also references RCW 70.235.020 and further finds that "it is the policy of the state to support the contributions of all working forests and the synergistic forest products sector to the state's climate response." RCW 70A.45.090 was discussed during CSAG deliberations as an important policy backdrop for recognition of embodied carbon in harvested wood products.</p>
<p>Mike Warjone, Port Blakely</p>	<p>If Greenhouse gas bills are to be referenced in specifically, as they are in the final version, we should include RCW 70A.45.090 as discussed in the meetings.</p>



# Quinault Indian Nation

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October 25, 2020

Shelby Thomas  
Research Associate  
Ross Strategic  
1325 4<sup>th</sup> Ave, Suite 1600  
Seattle WA 98101

Re: CSAG Report

Shelby,

Thank you for assistance in helping to organize CSAG and producing its report. Unfortunately, the choices on the fillable PDF form do not enable me to convey my comments regarding CSAG's report. The phrasing of Option 2(b) "CSAG deliberations are missing from the report, including: "is only limited to the CSAG deliberations and does not allow me to express seminal issues and concerns with the CSAG Report and process.

The purpose of this note is to formally convey major concerns for the record.

1. **Proviso in the authorizing statute and the CSAG Charter.** The narrow focus of CSAG on forest carbon sequestration did not allow CSAG to consider the central and far more urgent question that should be addressed: *"How can Washington State's working lands reduce the atmospheric accumulation of greenhouse gases (GHG)?"* There are far more significant, effective, and efficient and ways to sequester carbon than forests which can take decades to realize and fraught with uncertainties and risks from climate change, drought, insects, disease, and wildfire. Alternatives that deserve investigation include: revision of agricultural practices, blue carbon, carbon capture and geologic storage, reduction of GHG emissions, materials substitution, decarbonization, and improving energy efficiency.
2. **Questions regarding the effectiveness of voluntary forest carbon trading systems.** CSAG did not undertake deliberations regarding to determine whether carbon offsets, credits, or trading systems actually reduce accumulation of GHGs, preserve forests, or address issues relating to environmental justice and equity caused by the redistribution and reallocation of costs and benefits. Like other "nature-based" solutions<sup>1</sup>, forest carbon offset systems must be properly designed, implemented, administered, and enforced to have a chance to be an

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<sup>1</sup> Defined by the International Union for the Conservation of Nature as *"actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits"*

effective “win-win” tool to help contend with climate change. CSAG was not provide with guidelines for nature based solutions which have been developed and are readily available.<sup>2</sup> Despite the marketing hype and their political appeal, there have been numerous studies documenting fraudulent accounting and questioning claims regarding the legitimacy of forest carbon credit trading systems, including those established under the California Air Resources Board, the Clean Development Mechanism, the “Trillion Trees” campaign, REDD+, Bonn Challenge, New York Declaration on Forests. For example, in a May 7, 2019 “POLICY BRIEF: The California Air Resources Board’s U.S. Forest offset protocol underestimates leakage”, Barbara Haya, PhD, Research Fellow, Center for Environmental Public Policy, University of California, Berkeley, found

*“Analysis of projects generating 80% of total offset credits issued by the California Air Resources Board’s (ARB) U.S. Forest offset protocol finds that 82% of these credits likely do not represent true emissions reductions due to the protocol’s use of lenient leakage accounting methods. The U.S. Forest protocol has generated 80% of the offset credits in California’s cap-and-trade program. The total quantity of emissions allowed because of this over-crediting equals approximately 80 million tons of CO<sub>2</sub>, which is one third of the total expected effect of California’s cap-and-trade program during 2021 to 2030 (ARB 2017)”*

Nor do forest carbon credits ensure forest preservation. In a May 22, 2019 article on forest carbon and forest preservation published in ProPublica, entitled “An Even More Inconvenient Truth: Why Carbon Credits for Forest Preservation May be Worse Than Nothing”, Lisa Song reported:

*“In case after case, I found that carbon credits hadn’t offset the amount of pollution they were supposed to, or they had brought gains that were quickly reversed or that couldn’t be accurately measured to begin with. Ultimately, the polluters got a guilt-free pass to keep emitting CO<sub>2</sub>, but the forest preservation that was supposed to balance the ledger either never came or didn’t last.”*

Song’s story was not without controversy. But even critical reactions such as the Environmental Defense Fund’s May 23, 2019 article admitted:

*“Many projects are not adequately monitored, or supported by a policy framework, political will, or the force of law for carbon crediting. As the story finds, there is evidence of many projects that claim they’re protecting forest and sell carbon credits, but in the end don’t actually protect the forest. Or of projects that protect a piece of forest here, while somebody slashes and burns over there – so those credits aren’t really reducing emissions. Of course these scenarios are the opposite of stopping climate change: the*

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<sup>2</sup> For example, see R. Parajuli et.al. “An Introduction to Forest Carbon Offset Markets”, by the North Carolina Extension Service. July 15, 2019; Griscom, B. W., et al. (2017). Natural climate solutions. Proceedings of the National Academy of Sciences, 114 (44), 11645-11650; and E. Beasley et.al. GUIDE TO INCLUDING NATURE IN NATIONALLY DETERMINED CONTRIBUTIONS A checklist of information and accounting approaches for natural climate solutions. Produced by Conservation International, Nature4Climate, The Nature Conservancy, Environmental Defense Fund, National Wildlife Federation, Land Use and Climate Initiative, Climate Advisers, and Wildlife Conservation Society. September 2019.

*polluter goes on polluting and the offset that was supposed to compensate for the pollution pollutes too.”<sup>3</sup>*

Because of the response, Song and ProPublica issued a further rejoinder:<sup>4</sup>

*“When ProPublica published an investigation last week about the persistent problems of carbon credits linked to tropical forest preservation, supporters of the system vehemently disputed whether this meant these initiatives have been, and are likely to continue to be, failures.*

*These initiatives — known as REDD, or Reducing Emissions From Deforestation and Forest Degradation — allow polluters to offset a portion of their carbon emissions by paying to preserve trees that would otherwise have been cut down (some also reward preservation without giving others permission to pollute). In concept, at least, REDD offers an elegant, win-win solution for slowing climate change, preserving fragile ecosystems without sacrificing economic prosperity.*

*But our story — based on firsthand observation of the world’s most renowned REDD program in the Brazilian state of Acre, interviews with dozens of scientists and a review of thousands of pages of studies, technical documents and other literature — presented evidence that, in actuality, such ventures have a poor record of delivering the emissions reductions and forest preservation they promise.”*

3. **Inadequate opportunity to deliberate.** Time constraints coupled with the necessity for CSAG to use virtual meeting platforms due to COVID-19 restrictions, prevented substantive deliberation regarding several important factors, such as: (a) the importance of understanding how different characteristics affect the ability of forests to sequester carbon. There are significant differences in how plantations, naturally regenerated forests, species composition, and density store forests influence carbon storage and emissions (forests emit volatile organic compounds, notably terpenes and isoprenes); (b) the need for active management to reduce risks from water stress, insects, disease, and wildfire; (c) requirements for harvesting, transportation, and processing infrastructure to enable landowners to benefit from maintaining working forests on the landscape; (d) impacts of taxation on forest land tenure and maintaining forests across multiple generations of owners; (e) challenges of capturing benefits from environmental services such as water quality and flows, soil conservation, fish and wildlife habitat, and recreational opportunities and values from non-timber forest products; (f) evaluating the complexity of rules and protocols employed by various carbon trading systems, particularly, how permanence, leakage, additionality, risk buffers, and costs and complexities of verification, measurement, reporting, and auditing affect landowner benefits.
4. **More information needed to provide context and perspective.** Information important to understand the potential significant role that Washington’s working lands could play in

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<sup>3</sup> Steve Schwartzman (Senior Director, Tropical Forest Policy) and Christina McCain (Director, Latin America). , “What ProPublica’s forest carbon credits story still gets wrong – and right (with update)”. <http://blogs.edf.org/climate411/2019/05/23/what-propublicas-forest-carbon-credits-story-gets-wrong-and-right/>

<sup>4</sup> Lisa Song. “These 4 Arguments Can’t Overcome the Facts About Carbon Offsets for Forest Preservation.” May 31, 2019. <https://www.propublica.org/article/these-4-arguments-cant-overcome-the-facts-about-carbon-offsets-for-forest-preservation>.

addressing GHG emissions and meeting the State’s climate goals was not provided. Nor was the need to integrate CSAG with other actions being undertaken (e.g., Washington’s Forest Action Plan, 20-Year Forest Health Strategic Plan, the Sustainable Farm Bill).

More than half of Washington State (22 million acres) is forested, but 44% is managed by the Federal Government and subject to legislative and administrative requirements and policies that affect the ability to manage those lands for carbon sequestration. The 215,000 small forestland owners collectively manage 6.5 million acres of land face significantly different challenges than private or public forestland owners.

The term “flux” is employed extensively and without adequate discipline in the report; I am concerned that CSAG could well not have an adequate understanding or appreciation of what the term means or how it is to be applied. “Carbon flux” concerns the rate of exchange of carbon between four reservoirs or pools: the lithosphere (earth crust), hydrosphere (water), atmosphere (air), and biosphere (organisms). It is not measured with accuracy, but rather estimated with substantial uncertainty and involves multi-scale and attribute accounting complexities that are not well described or acknowledged in the CSAG Report (see Appendix D, Carbon Measurement Approaches and Accounting Frameworks, Second State of the Carbon Cycle Report, US Global Change Research Program; and “Carbon Accounting” produced by Forest Research, <https://www.forestresearch.gov.uk/research/forestry-and-climate-change-mitigation/carbon-accounting/>).

Sincerely,

A handwritten signature in blue ink, appearing to read "Gary S. Morishima". The signature is fluid and cursive, with a large initial "G" and "M".

Gary S. Morishima  
Technical Advisor

## Appendix B-4: CSAG Charter

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The 2019 Washington State Legislature passed ESBH 1109, which includes a budget proviso (see Appendix 1) directing the Washington State Department of Natural Resources to conduct specific activities related to carbon sequestration on natural and working lands. These activities include formation of a Natural and Working Lands Carbon Sequestration Advisory Group to assist DNR with a report back to the Legislature by December 1, 2020. This charter establishes the purpose and roles for this advisory group.

### 2019 Legislative Charge to DNR (SHB 1109)

In 2019, the Legislature passed a budget proviso as a part of the state operating budget that directed DNR to undertake the following activities:

- Conduct carbon inventories to build on existing efforts to understand carbon stocks, flux, trends, emissions, and sequestration across Washington’s natural and working lands, including harvested wood products, wildfire emissions, land management activities, and sawmill energy use and emissions; and
- Compile and provide access to information on existing opportunities for carbon compensation services and other incentive-based carbon reducing programs to assist owners of private and other nonstate owned or managed forestland interested in voluntarily engaging in carbon markets.

The Legislature specified that, where feasible, the department shall use available existing data and information to conduct this inventory and analysis. The Legislature also specified that for the purposes of this proviso, natural and working land types include forests, croplands, rangelands, wetlands, grasslands, aquatic lands, and urban green space.

The proviso requires that by December 1, 2020, the department must submit a report to the appropriate committees of the Legislature:

- Summarizing the results of the inventories required under this section;
- Assessing actions that may improve the efficiency and effectiveness of carbon inventory activities on natural and working lands, including carbon sequestration in harvested forest products; and
- Describing any barriers, including costs, to the use of voluntary, incentive-based carbon reducing or sequestering programs.

Finally, the proviso requires that the department must form a natural and working lands carbon sequestration advisory group to help guide the activities provided in this section. The advisory group must be composed of a balance of representatives reflecting the diverse interests and expertise involved on the subject of carbon sequestration on natural and working lands. In its report, the department may also include recommendations for additional work or legislation that may be advisable resulting from the advisory group.

The department notes that “the inventories required under this section” include harvested wood products, wildfire emissions, land management activities, and sawmill energy use and emissions, all of

which are inventories with relevance to the forest sector. The department also notes that the funding received for this proviso of \$375,000 is sufficient to conduct these initial forest-related inventories, and to support facilitation for the work group. This level of funding is not sufficient to conduct new inventories outside this list specified by the legislature.

The department further notes that the legislature defines natural and working land types to include not only forests but also croplands, rangelands, wetlands, grasslands, aquatic lands, and urban green space. In light of this broad definition, the department acknowledges its intent to include in its final report to the legislature a summary of information currently available on inventories for this full range of natural and working land types.

### Purpose of Work Group

The purpose of the Natural and Working Lands Carbon Sequestration Advisory Group (Advisory Group) is to provide advice and guidance regarding DNR’s efforts to report back to the Legislature in the following areas specified in the budget proviso:

1. What are the results of carbon inventories required through the proviso?
2. What could be done to improve the efficiency and effectiveness of carbon inventories?
3. What are the existing opportunities for carbon compensation services and other incentive-based carbon reducing programs for forest landowners and managers who voluntarily engage in carbon markets?
4. What barriers exist, including costs, to the use of these services or programs?
5. Are there any recommendations for additional work or legislation that may be advisable resulting from the advisory group?

### Roles and Responsibilities of Advisory Group Members

- Advise DNR on development of deliverables required by the Legislature.
- Review and help interpret results of deliverables.
- Assist DNR in creating linkages with other stakeholders outside the advisory group.
- Identify additional resources, including analyses, datasets, and experts for DNR to draw on as needed.
- Actively participate in five Advisory Group meetings. Meetings will likely be held in February, April, June, September, and October 2020.
- Work collaboratively with other CSAG members to develop recommendations for specific topics related to carbon sequestration in small groups between Advisory Group meetings.

### Anticipated 2020 Timeline

<b>Meeting #1</b>	February 12	Discuss inventories and incentives
<b>Meeting #2</b>	May 8	Discuss inventories and incentives
<b>Meeting #3</b>	July 9 (tentative)	Discuss inventories and incentives
<i>Small groups meet between meetings #3 and #4 to develop recommendations</i>		
<b>Meeting #4</b>	Sept. 18 (tentative)	Vet recommendations
<b>Meeting #5</b>	Oct. 12 (tentative)	Finalize recommendations

## Appendix B-5: CSAG Meeting Summaries

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The CSAG's process and much of the context for its recommendations can be found in the meeting summaries, which were approved by each CSAG member. The appended summaries do not include referenced appendices or substantive meeting chat transcripts for those meetings held virtually. Click on the links below to view the entire summary, along with their respective appendices:

- [Meeting 1](#), February 12, 2020
- [Meeting 2](#), May 8, 2020
- [Meeting 3](#), July 9, 2020
- [Meeting 4](#), September 18, 2020
- [Meeting 5](#), October 12, 2020



# Carbon Sequestration Advisory Group

## Meeting 1 Summary

### MEETING INFORMATION

**Date:** February 12, 2020  
**Time:** 8:30am – 3:30pm  
**Location:** Lacey Community Center: 6729 Pacific Ave. SE, Olympia, WA 98503

#### 9:00 AM: Opening remarks and introductions

- Welcome from Hilary Franz, Commissioner of Public Lands
- CSAG Members in attendance (listed alphabetically by last name):

Patti Case, Green Diamond	Cody Desautel, Colville Tribes (remote)
David Diaz, University of Washington	Joseph Donnegan, US Forest Service
Ara Erickson, Weyerhaeuser	Kathleen Farley Wolf, King County
Indroneil Ganguly, University of Washington	John Henrikson, Wild Thyme Tree Farm
Joe Kane, Nisqually Land Trust	Cherie Kearney, Columbia Land Trust
Mo McBroom, The Nature Conservancy	Mark McPherson, City Forest Credits
Gary Morishima, Quinault Indian Nation	Julius Pasay, The Climate Trust
Lisa Remlinger, Washington Environmental Council	Steve Rigdon, Yakama Tribe
Max Scher, Salesforce (remote)	Reed Schuler, Gov. Inslee’s Office
Edie Sonne Hall, Three Trees Consulting	Jason Spadero, SDS Lumber
Skip Swenson, Forterra	Bill Turner, Sierra Pacific Industries
Mike Warjone, Port Blakely	Andrea Watts, Wildcat Tree Farm
Liz Willmott, Microsoft (remote)	Mark Wishnie, The Nature Conservancy (remote)
Lenny Young, DNR (CSAG Chair)	

- CSAG Staff:

Dan Stonington, DNR	Shelby Thomas, Ross Strategic
Rob Willis, Ross Strategic	

- Other Attendees:

Glenn Christensen, USFS Forest Inventory Analysis (presenter)	Matt Comisky (observer)
Olaf Kuegler, USFS Forest Inventory Analysis	

#### 9:35 AM: Review legislative proviso and CSAG purpose, outcomes, roles, and responsibilities

- Lenny Young provided a copy of the budget proviso (ESHB 1109.SL, pp 238-239) that directs DNR to convene the CSAG and describes what DNR must accomplish with the \$375,000 operating budget appropriation.
- The proviso is attached (see Appendix A) and also is available on the [CSAG website](#).

- The CSAG went through the proviso line-by-line; Lenny addressed questions and comments that came up and the group resolved questions of scope and purpose. Discussion themes included:
  - CSAG’s focus: CSAG will primarily advise on inventories and incentives relating to forest lands and forest products. At CSAG's second meeting on May 8, the group will resolve the extent to which to address carbon sequestration on other natural and working lands listed in the proviso (croplands, rangelands, wetlands, grasslands, aquatic lands, or urban green space).
  - CSAG’s role in DNR’s final report to legislature: There are two reports – the CSAG report to DNR, and the DNR report to the legislature. The CSAG Final Report will be appended to DNR’s report to the legislature. CSAG members will not review DNR's report, but it will be distributed to CSAG members at the same time DNR submits it to the legislature.
  - Definition of “nonstate”: Nonstate means all lands that are not owned by Washington.
  - Focus of incentives discussion: 24(a)(ii) has a more narrow focus (“owners of ... forestland interested in voluntarily engaging in carbon markets”) than 24(b), in which the proviso language creates broader opportunities for discussion and thinking on programs such as voluntary markets, compliance markets, or incentives such as EQIP.
  - When CSAG will discuss harvested wood products: HWP inventory methodology will be presented in Meeting 2 and the results will be discussed in Meeting 3.
- CSAG members reviewed and accepted CSAG outcomes, process for completing final report, and preliminary report content (see Appendix D).

### 10:15 AM: Review CSAG charter, schedule, timeline, and ground rules

- CSAG accepted the charter with the following clarifications and/or amendments:
  - Proviso clarifications as described above.
  - Modify CSAG purpose #3 to (additions in italics): What are the existing opportunities for carbon compensation services and other incentive-based carbon reducing programs for forest landowners *and managers* who *voluntarily* engage in carbon markets?
  - Any incentive-based carbon sequestration program would be for landowners and managers who *voluntarily* engage.
- The revised charter is available on the [CSAG website](#).
- No questions or comments on CSAG schedule or timeline.
- Discussion themes about ground rules included:
  - Open public meetings: CSAG meetings are open for the public to attend, but not participate. CSAG will not take public testimony. Meeting notes and materials will be posted on the website. CSAG meetings will not be recorded.
  - DNR will provide via email detailed expectations for CSAG members around public meetings requirements.
  - “Proxy” vs. “alternate”: Because the CSAG is not a voting body, it is more appropriate to use the word “alternate” when referring to a person who may attend meetings on a CSAG member’s behalf.
- The CSAG reviewed and accepted the timeline (Appendix B), ground rules (Appendix C), and other relevant information regarding CSAG operations (Appendix D).

## 11:00 AM: 15-minute break

## 11:15 AM: Presentation 1: USFS Forest Inventory and Analysis (FIA) and Forest Inventory Methods

- Glenn Christensen presented information about the national FIA program, how data are collected and used, its role in the Pacific Northwest and Washington, and how it approaches forest carbon assessments and reporting. Glenn answered questions throughout the presentation.
- Presentation 1 slides are available on the [CSAG website](#).
- Discussion and question themes included:
  - Plot data:
    - Data are available to landowners.
      - Inventory as a barrier to incentives: FIA provides high-level data but doesn't address questions for landowners who want to know information relevant to their land. More detailed inventory data could be a valuable resource for them.
    - Plot types include corporate and non-corporate as types of private plots but don't specify management type. A small family tree farm could be an example of a corporate or non-corporate plot, depending on the ownership structure, and a land trust is an example of a non-corporate plot.
    - Remote sensing is used to support stratification (wherein FIA measures all the plots and groups them to reduce the sampling error).
    - Plots in riparian zones can be classified as such.
    - Plots are measured at the same time every year (summer).
    - Dynamic factors or rare events are difficult to capture on the plots, e.g., a fire needs to be large-scale to be represented. If there is a large disturbance year, FIA can't necessarily capture the event in its measurements. However, FIA is looking at Image-based Change Estimation (ICE) which uses National Aerial Imagery Program (NAIP) to categorize plots every two years and look at change.
    - If denied access to a plot, FIA will try for up to three years to get access. Ten years later, they will try again. FIA does not use another plot, but it keeps track of which plots are not sampled.
      - FIA compensates for denied access in post-stratification.
  - FIA reports focus on status and trends, but do not provide projections (although FIA data are often used in projections).
  - How easily FIA can staff up: Given that it's difficult to hire at a federal level right now, if a state wants to invest in increasing the number of plots or frequency of measurements, it's easiest to partner with FIA and hire state employees; it would likely take a year to fully ramp up. There is also a question of whether there is an adequate labor pool for the field work.
  - National remote sensing work: Biomass research is happening at a national level; it uses local FIA data to train satellite instruments.
    - USFS Rocky Mountain is going to customize biomass maps down to the stand level (Rocky Mountain Research Station, Oakridge Laboratory).
  - Standard errors (SE) are low in terms of carbon stock measurements; they increase for carbon flux measurements.

### 12:30 PM: 30-minute lunch break

### 1:15 PM: Presentation 2: Washington's Forest Ecosystem Carbon Inventory

- Glenn Christensen presented information about FIA's forest ecosystem carbon inventory methods and terms, Washington's forest ecosystem carbon inventory results (stocks and flux) by region and ownership, and FIA next steps. Glenn answered questions throughout the presentation.
- Presentation 2 slides are available on the [CSAG website](#).
- Discussion and question themes included:
  - Downed woody debris does not include piles because they are so variable.
  - All 22 million acres of forest in Washington are included in carbon stock numbers.
  - The model for soils may show a lower standard error for carbon flux than really exists, given that the model was not originally designed to show flux.
  - The bars on the annual change per acre graph (slide 21) are surprisingly similar.
  - It's difficult to compare live tree and dead tree data because they're the most dynamic. It's easier to compare a single pool.
  - "Growth" includes trees that have grown past one inch in diameter.
  - Net growth is volume at time 2 minus volume at time 1.
  - The data go through 2016 and do not capture wildfires since then.

### 2:15 PM: Break-out groups

- CSAG members and staff numbered off to form two groups: one group stayed in the main room with Rob and the remote participants, and the other group went into a separate room with Shelby to discuss:
  - Initial impressions of Glenn's second presentation.
  - Conversations that CSAG needs to have in the future.
  - Washington carbon stocks and flux on forest land by region.
  - Washington carbon stocks and flux on forest land by region and pool.
- Break-out group worksheets and photos of facilitator notes are available on the [CSAG website](#).

### 3:15 PM: Regroup and next steps

- CSAG regrouped to cover next steps and logistics for Meeting 2.
  - Meeting 2 will be on May 8, 2020.
  - The agenda for Meeting 2 will be distributed two weeks prior to the meeting.
  - CSAG members should expect updated calendar invites for remaining meetings.
  - A draft Meeting 1 Summary will be posted on the CSAG website by March 2. CSAG will discuss any needed changes and approve a final meeting summary at the group's second meeting on May 8.

### 3:30 PM: Adjourn

# Carbon Sequestration Advisory Group

## Meeting 2 Summary

### MEETING INFORMATION

**Date:** May 8, 2020  
**Time:** 9:00am – 2:00pm  
**Location:** Zoom virtual meeting

#### 9:00 AM: Opening remarks and introductions

- Welcome from Lenny Young
- Throughout the meeting, CSAG members were encouraged to use the Zoom virtual meeting chat box to ask questions and make comments. The group chat transcript is included at the end of this summary.
- CSAG Members in attendance (listed alphabetically by last name):

Patti Case, Green Diamond	Cody Desautel, Colville Tribes
David Diaz, University of Washington	Joseph Donnegan, US Forest Service
Ara Erickson, Weyerhaeuser	Kathleen Farley Wolf, King County
Indroneil Ganguly, University of Washington	John Henrikson, Wild Thyme Tree Farm
Joe Kane, Nisqually Land Trust	Cherie Kearney, Columbia Land Trust
Mo McBroom, The Nature Conservancy	Mark McPherson, City Forest Credits
Gary Morishima, Quinault Indian Nation	John-O Niles, Salesforce (alternate for Max Scher)
Julius Pasay, The Climate Trust	Steve Rigdon, Yakama Tribe
Edie Sonne Hall, Three Trees Consulting	Jason Spadero, SDS Lumber
Skip Swenson, Forterra	Bill Turner, Sierra Pacific Industries
Mike Warjone, Port Blakely	Andrea Watts, Wildcat Tree Farm
Max Webster, Washington Environmental Council (alternate for Lisa Remlinger)	Mark Wishnie, BTG Pactual
Lenny Young, DNR (CSAG Chair)	

- CSAG Staff:

Dan Siemann, DNR	Dan Stonington, DNR
Shelby Thomas, Ross Strategic	Rob Willis, Ross Strategic

- Other Attendees:

Mike Anderson, The Wilderness Society	Glen Christensen, USFS-FIA
Brian Cochrane, SCC	Grant Domke, USFS (presenter)
Ben Donatelle, RCO	John Hagan, Maine Climate Table
Heath Heikkila, AFRC	Brian Kittler, American Forests (presenter)
Mike Nichols, USFS (presenter)	Representative Bill Ramos, 5 <sup>th</sup> Legislative District

### 9:30 AM: Presentation 1: Overview of Washington's Harvested Wood Products Assessment

- Grant Domke, USFS, presented the methods used to determine carbon stocks and fluxes associated with harvested wood products.
- The presentation slides are available on the [CSAG website](#).
- Discussion themes and topics addressed in questions and answer session:
  - *Life Cycle Analysis vs HWP stocks and flux*: Washington DNR's approach to creating a carbon inventory of harvested wood products is not the same as a life cycle analysis (LCA). DNR is using this HWP analysis approach in order to be consistent with recent inventories in California and Oregon, and for consistency with international reporting standards for carbon stocks and fluxes. The State of Washington already gathers certain components of an LCA through the GHG emissions inventory that the state Department of Ecology is required to perform every two years. That said, there are still numerous gaps in data availability for LCAs.
  - *Wildfires*: Emissions estimates from wildfires are calculated through a variety of reports. Wildfire emissions are reported on a national scale, including CO<sub>2</sub> and non-CO<sub>2</sub> emissions. Wildfire emissions are also captured in stock changes in the forest ecosystem estimates presented by USFS at CSAG meeting #1. In addition, DNR is refining the agency's more detailed model for annual wildfire emissions estimates as part of the carbon budget proviso, and will have results to share with the group at future CSAG meetings.
  - *Salvage harvest*: Salvage harvests and the carbon from these harvests would be included in the HWP estimates in the same way as carbon from other harvests.
  - *Recycling*: Factoring in recycling that happens in a different country is a national-level challenge for HWP analyses.
  - *Production Method*: This project uses the IPCC Production method which has also been adopted by US EPA and used in recent analyses by California and Oregon. For the most part, there's not much controversy with the production approach at the state level. The controversy that does exist has been around biomass and concern that wood emissions from biomass are not captured in the inventory. If wood is cut in the US and then burned for energy in England, then England is utilizing that wood and the US is paying the emissions price. There are also some related questions about substitution effects.
  - *Landfill methane*: The question of how to factor in landfill management or recovering methane emissions is being explored at the national scale. Non-carbon emissions have changed over time and are regionally specific, so relying on national trends may not be appropriate. There's a data opportunity for time series information at the state level.
  - *Washington-specific data, support from CSAG*: In order to get the best results, improve sensitivity analysis, and reduce uncertainty, USFS welcomes input from CSAG members on what information is available for use in the HWP model at each phase such as primary product ratios, conversion factors, end-use ratios, and the fate of wood in landfills.
  - *Storage projections*: Projections are an interesting data point to consider; it connects the land today with the wood products pool that will occur in the future. Projections are not within the USFS HWP scope for this project.



- *Regional variability in the state*: USFS has an opportunity to recognize the interest in the LCA community and building community in information to differentiate regional variability in wood supply. Also, note that if USFS does look to provide info on regional variability, county-level data may not create an accurate picture because HWP do not stay within county boundaries; wood supply boundaries should be considered instead.
- *Substitution*: The substitution impact of harvested wood products (increased/decreased emissions attributable to the use of wood products rather than alternative materials) is not included in the scope of the USFS HWP assessment.
- *NASA carbon info*: CSAG should look at the Carbon Monitoring System by NASA

**10:45 AM: 10-minute break**

**10:55 AM: Presentation 2: Forest Carbon Incentives in Washington**

- Brian Kittler, American Forests, presented an initial compilation of information on existing opportunities for carbon compensation services and other incentive-based carbon reducing programs for landowners who are interested in voluntarily engaging in carbon markets.
- The presentation slides are available on the [CSAG website](#).
- Topics addressed in question and answer session:
  - *Number of WA projects*: The information on the number of projects/acres under each program is specific to Washington state.
  - *Forest health*: The incentives list includes DNR, NRCS, and other programs related to cost-share for thinning for fire resiliency or other forest health objectives.
  - *Application info for landowners*: For the next version of the spreadsheet, there's information being compiled about how to apply to the various listed programs, such as contact information, application procedures, and amounts of funding available.
  - *Landowner types*: The next version of the spreadsheet will specify landowner types (industrial, family forest, NGO, tribes, etc.) that are accessing the different types of incentives/funding.
  - *Incentives for wood products*: American Forests would benefit from discussion among CSAG on the question of whether incentives for the use of wood building products should be identified (if existing) and considered as having carbon nexus.
  - *Sequestration potential*: The incentives list and CSAG discussion should focus more on sequestration potential and the contribution we are making to global GHG reductions. Which programs really move the needle in terms of additional sequestration? It would be helpful to put our state in the global context of the role that our state and lands can play.
  - *Washington Wildlife and Recreation Program*: The incentives list does include WWRP grants and projects but was filtered to exclude projects with less than 95% forest cover.
  - *Multi-purpose programs vs carbon explicit programs*: The incentives list is not currently organized to identify whether more generalized forest stewardship, conservation, and protection programs are more or less effective or accessible than carbon-explicit programs.
- The CSAG split into four breakout groups (facilitated by Dan Stonington, Dan Siemann, Lenny Young, and Rob Willis) to discuss what jumped out to them about the incentive types. After 20 minutes, the groups reconvened to share the results of their conversation. Breakout group notes are available on the [CSAG website](#).

### **12:20 PM: 30-minute lunch break**

### **12:50 PM: Introduce Incubator Teams and Round-table Discussion**

- Lenny opened the round-table discussion by explaining that this time is designed to provide CSAG members with an open-ended opportunity to share their perspectives:
  - An opening comment highlighted that the CSAG's dialogue is important and timely, given the Legislature passed a net zero bill acknowledging the role of sequestration and also passed the forest products and climate bill. At the same time, there is an opportunity to get sequestration considered in the state energy policy. There should be robust engagement around these opportunities so that the net zero conversation in the state reflects the perspectives of CSAG.
- Facilitators shifted the conversation to introduce Incubator Teams to CSAG, which sparked discussion around what an appropriate and effective Incubator Team process would look like. CSAG members discussed topics including approach, scope, organization, workload, and representation. Ultimately, the CSAG decided:
  - There will be two Incubator Teams:
    - Actions to improve carbon inventories
    - Barriers to the use of incentive-based carbon reducing programs
  - The Incubator Teams will have a divide-and-conquer approach to take advantage of limited time and allow the CSAG to tackle several topics within their teams (including how HWP fits in).
  - Membership will be balanced and reflect the perspectives of the CSAG as a whole.

### **2:15 PM: Next steps**

- CSAG regrouped to cover next steps and logistics for Meeting 3.
  - Meeting 3 will be on July 9, 2020. Anticipated meeting topics include:
    - Results from HWP
    - Follow up on Incentives spreadsheet
    - Discuss CSAG's policy interface
    - Wildfire emissions
    - Non-forest ecosystems
  - The agenda for Meeting 3 will be distributed two weeks prior to the meeting.
  - A draft Meeting 2 Summary will be distributed within ten business days. CSAG will discuss any needed changes and approve a final meeting summary at the group's third meeting.
  - All materials will be posted online on the CSAG website.

### **2:30 PM: Adjourn**

# Carbon Sequestration Advisory Group

## Meeting 3 Summary

### MEETING INFORMATION

**Date:** July 9, 2020  
**Time:** 9:00am – 3:00pm  
**Location:** Zoom virtual meeting

#### 9:00 AM: Opening remarks and introductions

- Welcome from Lenny Young
- CSAG Members in attendance (listed alphabetically by last name):

Patti Case, Green Diamond	David Diaz, University of Washington
Joseph Donnegan, US Forest Service	Ara Erickson, Weyerhaeuser
Kathleen Farley Wolf, King County	Indroneil Ganguly, University of Washington
John Henrikson, Wild Thyme Tree Farm	Theo Holt, The Nature Conservancy
Cherie Kearney, Columbia Land Trust	Mark McPherson, City Forest Credits
Gary Morishima, Quinault Indian Nation	John-O Niles, Salesforce (alternate for Max Scher)
Julius Pasay, The Climate Trust	Steve Rigdon, Yakama Tribe
Edie Sonne Hall, Three Trees Consulting	Jason Spadero, SDS Lumber
Skip Swenson, Forterra	Bill Turner, Sierra Pacific Industries
Mike Warjone, Port Blakely	Max Webster, Washington Environmental Council (alternate for Lisa Remlinger)
Mark Wishnie, BTG Pactual	Lenny Young, DNR (CSAG Chair)

- CSAG Staff:

Dan Siemann, DNR	Dan Stonington, DNR
Shelby Thomas, Ross Strategic	Rob Willis, Ross Strategic

- Other Attendees:

Mike Anderson, The Wilderness Society	Glenn Christensen, USFS-FIA (presenter)
Brian Cochrane, SCC	Grant Domke, USFS (presenter)
Ben Donatelle, RCO	Andrew Gray, USDA
Alison Halpern, SCC	Heath Heikkila, AFRC
Brian Kittler, American Forests (presenter)	Mike Nichols, USFS (presenter)
Gail Sandlin, WA Dept. of Ecology	Andrew Yost, Oregon Dept. of Forestry

## 9:20 AM: CSAG Context and Discussion

CSAG members responded to a discussion prompt: How might events that have transpired since our first meeting, including current circumstances with COVID-19 and Washington's response to it, affect the CSAG's process in fulfilling its proviso? Discussion themes and comments included:

- Resources to address carbon sequestration may be more limited due to financial constraints and the attention COVID-19 requires.
- Since the COVID-19 health crisis began, there has been a huge flow of people from urban to rural communities. Avoiding conversion of working lands to other uses may be increasingly important.
- CSAG needs to be strategic and focus on areas where a real difference can be made in a short amount of time. CSAG should focus on ensuring that incentives are accessible, scalable, and tailored to situations in which they can be most successful.
- Because state funding may be limited, market forces are even more critical to consider – How can the market help CSAG reach its goals?
- There is an opportunity to tie our work into moving toward a Green Recovery and articulate how sustainable green jobs with the right incentives can help us emerge from our multiple crises. There is also the context of historical injustices and the need to lift up diverse communities in a recovery that considers the environmental, social, economic, and spiritual health of our lands and people for today's generations and many into the future.
- CSAG should stay anchored in our original charge from the legislature and strive for unbiased and comprehensive understanding, as well as outcomes and next steps that are relevant and easy for legislators and others to understand.
- There is the context of new state emissions reduction goals from the Legislature, which also recognized a priority to increase carbon sequestration.

## 9:35 AM: Carbon Inventories Work Session

- Inventory Incubator Team (IT) members shared their takeaways from the IT meetings between CSAG meetings 2 and 3. The takeaways included:
  - *Add interpretation.* The HWP and forest ecosystem data can be confusing and IT members encouraged more interpretation of what the data mean.
  - *Relate to incentives discussion.* Potential incentives could inform what questions should be asked of the inventory data; CSAG can think about questions that relate to potential incentives that exist or need to be created.
  - *Consider existing policies and levers.* CSAG should think about how inventories are geared toward activities, policies, and levers that already exist when developing recommendations.
- Presentation 1: Harvested Wood Products Assessment for Washington – Preliminary Results
  - Mike Nichols, USFS, and Grant Domke, USFS, presented preliminary carbon inventory results associated with harvested wood products (HWP) in Washington. Glenn Christensen, USFS-FIA, compared the HWP results with the forest ecosystem carbon inventory results he shared at Meeting 1.
  - The presentation slides are available on the [CSAG website](#).
  - The question and answer session addressed:

- Captured emissions from landfills are not included in HWP results (they would be in a landfill assessment); USFS does not have a way to track methane produced by wood products and how much of that methane gets captured for reuse.
- The model accounts for recycling, which is included in ‘recaptured.’
- The change in the standing dead carbon pool between FIA periods and the decrease in down woody debris may be a legacy of what was there prior to these FIA measurements.
- The soil and forest floor estimates are modeled and are the same size as the standard error; FIA is not as confident in these estimates and there’s a lot we don’t know about soil carbon.
- The HWP model’s production approach accounts for where the harvested trees for HWP are grown, not where the HWP are manufactured.
- Changes in the HWP pool reflect the transfer of new wood from the forest entering the cumulative HWP pool. A year in which the ‘products in use’ category of HWP is negative does not indicate that there is an emission from the forest in that year.

### 10:45 AM: 15-minute Break

### 11:00 AM: Carbon Inventories Work Session, cont’d

- Breakout Groups
  - The CSAG broke into three breakout groups (facilitated by Dan Siemann, Dan Stonington, and Rob Willis) to discuss two questions:
    - What observations do you have about the forest ecosystem and HWP inventory results?
    - What questions do you anticipate policy makers asking about these results?
  - The breakout group notes are available on the [CSAG website](#).
  - Themes that emerged from the three groups and the discussion that followed included:
    - *Clear interpretation of results.* Decision makers will be challenged with competing interests and needs so they need a clear, concise message about what the inventory results can and cannot tell us - the ‘so what’ aspect of inventories. Graphs, charts, or other graphics can help. So can highlighting numbers for which there is high certainty and confidence. Another idea was to display results like a ‘nutrition label.’
    - *Sensitivity of results.* Understanding the sensitivity of the HWP and forest ecosystem results to various inputs could improve understanding of the results and also indicate the type of incentives, actions, or policies that could make the most difference for carbon.
    - *Variation by geography and ownership.* While it is important to keep results and interpretation clear and simple, results should also include enough nuance and detail to describe important trends and changes in carbon dynamics by region (east/west, ecoregion, etc) and by ownership. Understanding these variations can help to fine tune incentives and recommendations.
    - *Projections and scenarios.* The current inventories are carbon accounting tools and are based on measurements and modeling of past results. Building on this, policy makers are likely to ask for decision-making tools to guide decisions on the types of incentives that would be most beneficial. Projections and scenario development could help us understand what is likely to happen under various policies or other

changes. Projections and scenarios can also help identify potential unintended consequences and who the winners and losers may be with any given inventory improvement strategy or policy intervention.

- *Improvements to technical inventory methods.* Multiple potential improvements to technical inventory methods were suggested for exploration including intensifying the FIA plot grid in Washington, utilizing remote sensing in additional ways, and improving measurements about the disposition of products.

### 12:15 PM: 30-minute Lunch Break

### 12:45 PM: Barriers to Incentive-based Programs Work Session

- Brian Kittler, American Forests, presented an updated spreadsheet that separates incentive-based programs with and without an explicit carbon focus and identifies both common and specific barriers for the programs. The presentation included two preliminary recommendations developed by the Incentives IT:
  1. Support further analysis to identify useful information in addition to program barriers; and
  2. Turn the list into a resource for landowners.
- The CSAG discussed general reflections on common barriers as well as the two preliminary recommendations as a full group.
  - General reflections on common barriers included:
    - It would be worth distinguishing between barriers for programs that are pay for performance incentives as opposed to offset incentives or cost-share incentives.
    - The spreadsheet focuses on landowners and so it currently omits barriers for HWP such as public opposition to zoning codes that would allow more density in urban areas. This is a timely topic given the current context of trying to address historical disparities resulting from restrictive or exclusionary zoning.
    - The state could take action to address barriers to some incentive programs, but if there is a local implementation element as well, there may be additional barriers at the local level that also need to be addressed.
    - For CA market compliance offsets in Washington, three factors have served as barriers: a fear of invalidation of credits, the high cost of sequential sampling, and the clearcut size limit of 40 acres. Addressing these could increase adoption. Put another way, landowners need increased flexibility and increased accessibility to make offset projects work better for WA forests.
  - Discussion themes around the first recommendation included:
    - Further analysis should emphasize finding the tools that are working and identifying how we can improve, bolster, and fund them. Further analysis should go beyond a list of the barriers and ask what we can achieve and whether we are moving the needle.
    - Project examples will help put a finer point on what works and what doesn't.
    - Further analysis can identify how to create a mix of tools and resources for diverse user groups and diverse landowners.
    - A potential recommendation could be for the state to set up its own crediting system, standards, and registry. This could help create demand for carbon by adapting a system to fit the Washington context.
    - Setting up a new crediting system and registry is a complicated undertaking and there may be better options to pursue. These might include: increasing social license of managing forests; using innovative zoning tools to conserve resource

lands but still allow some development in areas less valuable for natural resources; increasing carbon storage on forest land; preventing losses to mortality and fire; providing incentives for silvicultural practices that increase sequestration; or creating incentives for wood substitution in building materials.

- Discussion themes around the second recommendation included:
  - This recommendation has a bureaucratic aspect to it. We should consider the social and political barriers that landowners face. Landowners often access resources through relationships.
  - Landowners are also finding information online more than ever before. We should consider whether we can make this incentive program list available online so that landowners can query what is applicable to them. Other examples of tools include American Forest Foundation's Wood Camp, and an online tool that Forterra is beta testing with partners in the Chehalis Basin: [http://stg.forterra-chehalis.testcrafting.com/v5\\_0.html](http://stg.forterra-chehalis.testcrafting.com/v5_0.html)
  - The list may be better suited as a resource for intermediaries (e.g., industry associations or technical assistance providers) rather than landowners.
  - The list will be valuable for all types of landowners because they all face barriers.

### 2:05 PM: 15-minute Break

### 2:20 PM: Round Table Discussion

CSAG members discussed Incubator Team work to be done between Meetings 3 and 4. Ultimately, the group decided the two initial ITs focused on carbon inventories and barriers to incentive-based programs should continue and two additional ITs focused on wildfire emissions and non-forest ecosystems should form. Topics raised during the discussion included:

- The need to develop a final report relatively soon (by early November) and the benefits of dividing tasks and getting work done are worth the extra time. ITs were helpful and make space for bigger steps forward.
- Moving forward should not focus on additional work "massaging data" and should instead focus on framing questions to get to desired outcomes.
- The CSAG report content should be focused on the needs of the Legislature; it needs to synthesize the information, highlight the importance, and bring forward recommendations.
- The new ITs need to have specific tasks and a clear picture of how the information is going to come together in Meeting 4.

### 2:40 PM: Next steps

- CSAG regrouped to cover next steps and logistics for Meeting 4.
  - Meeting 4 will be on Friday, September 18, 2020. Anticipated meeting topics include:
    - IT work between Meetings 3 and 4
  - A draft Meeting 3 Summary will be distributed within ten business days. CSAG will discuss any needed changes and approve a final meeting summary at the group's fourth meeting.
  - All materials will be posted online on the CSAG website.
  - ITs will convene between Meetings 3 and 4.
  - The agenda for Meeting 4 will be distributed two weeks prior to the meeting.

### 2:45 PM: Adjourn



# Carbon Sequestration Advisory Group

## Meeting 4 Summary

### MEETING INFORMATION

**Date:** September 18, 2020  
**Time:** 9:00am – 1:45pm  
**Location:** Zoom virtual meeting

#### 9:00 AM: Welcome and Opening Remarks

- Welcome from Lenny Young
- CSAG Members in attendance:

David Diaz, University of Washington	Joseph Donnegan, US Forest Service
Ara Erickson, Weyerhaeuser	Kathleen Farley Wolf, King County
Indroneil Ganguly, University of Washington	John Henrikson, Wild Thyme Tree Farm
Theo Holt, The Nature Conservancy	Cherie Kearney, Columbia Land Trust
Mark McPherson, City Forest Credits	Gary Morishima, Quinault Indian Nation
John-O Niles, Salesforce (alternate for Max Scher)	Steve Rigdon, Yakama Tribe
Julius Pasay, The Climate Trust	Jason Spadero, SDS Lumber
Edie Sonne Hall, Three Trees Consulting	Bill Turner, Sierra Pacific Industries
Skip Swenson, Forterra	Max Webster, Washington Environmental Council (alternate for Lisa Remlinger)
Mike Warjone, Port Blakely	Lenny Young, DNR (CSAG Chair)
Mark Wishnie, BTG Pactual	

- CSAG Staff:

Dan Stonington, DNR	Shelby Thomas, Ross Strategic
Rob Willis, Ross Strategic	

- Other Attendees:

Glenn Christensen, USFS-FIA	Pascale Chamberland, UW
Brian Cochrane, SCC	Doug Cooper, Hampton Lumber
Chris Elder, Whatcom County	Sarah Zaniewski, Squaxin Tribe
Seth Zuckerman, Northwest Natural Resource Group	

#### 9:20 AM: Draft Incentives Recommendations and Discussion

CSAG members reviewed collective edits and comments they made to potential incentives recommendations prior to Meeting 4. Observations on specific recommendations included:

##### Possible Incentives Recommendation 1

- The avoided conversion recommendation is an example of how the incentive recommendations need to be better tied into the inventory recommendations.
- In addition to avoided conversion, reforestation and afforestation are key components to mitigating conversion and maintaining forestland; these other components should be referenced or included.
- CSAG should consider whether other topics (e.g., wildfires, forest management, afforestation) should have a similar set of recommendations.

#### **Possible Incentives Recommendations 2 and 4**

- A gap analysis would be helpful to determine whether programs are adequately sequestering carbon, although, without carbon sequestration goals or targets, this may be difficult to determine.
- Small forest landowners need a program that specifically pays landowners for carbon sequestration and funds it at adequate amounts.
- Recommendation 2 as currently written needs to link to inventory information. This would help inform needs for program funding.
- Merging Recommendation 2 with Recommendation 4 could make them more substantial. The first component is how to boost existing programs. Then there is an opportunity to identify gaps and, perhaps, any new programs that may be needed.
- An analysis could estimate how much funding would be necessary to hit a particular carbon sequestration target.

#### **Possible Incentives Recommendation 3**

- Price point transparency for different options in the voluntary carbon market could be helpful.
- Carbon offsets are designed to compensate for continuation of emissions elsewhere and therefore do not necessarily reduce global atmospheric GHG concentrations. Offsets are also a small part of the overall picture of incentive programs.
- Ideas for advancing offsets include advocating for changes to the CA offset system, creating a separate crediting system in WA, developing cap and trade in WA, or linking WA to a regional offset market.
- Work on offsets should be mindful of potential impacts on wood supply and use of products.

#### **10:30 AM: 15-minute Break**

#### **10:45 AM: Draft Inventories Recommendations and Discussion**

CSAG members reviewed collective edits and comments they made to potential incentives recommendations prior to Meeting 4. Observations on specific recommendations included:

#### **Possible Inventories Recommendation 1**

- Further thoughtfulness is needed about communicating to legislators and how information is packaged. This information will be used by many groups for communication purposes, not just DNR or UW.

#### **Possible Inventories Recommendation 2**

- Flux information is important because it highlights where carbon sequestration work needs to happen.
- This recommendation should apply to harvested wood products and all land types, not just forestland.

### **Possible Inventories Recommendation 3**

- Sensitivity analysis is an important next step; assumptions in the models need to be transparent to avoid misinterpretation.
- The idea behind sensitivity analysis is to make the research and inventory results actionable.

### **Possible Inventories Recommendation 4**

- Inventories are currently limited in terms of small area estimation (finer scales). Linking inventories together would create a more holistic picture of forest conditions and be more scalable.
- There are many remote sensing opportunities that could be pursued, and it would be most beneficial if data were open and shared among parties.

### **Additional Possible Inventories Recommendations**

- Inventory results are a snapshot in time. It may be beneficial to increase frequency of FIA data collection (currently every 10 years). More frequent information would be helpful as markets continue to evolve.
- There is a need to focus on the net impact of using wood materials versus other materials (substitution).
- Lack of funding is a key concern for incentive-based programs. The CSAG report should add a statement that encourages the Legislature to consider DNR requests to fund various carbon sequestration programs and implement recommendations.

### **12:00 PM: 45-minute Lunch Break**

### **12:45 PM: Round Table Discussion**

This discussion time was designed to capture any additional thoughts CSAG members had about recommendations. Some topics that were brought up include:

- Impacts of wildfires (loss of carbon stocks, carbon emissions, forest management, impacts of climate change that affect forest health) are top of mind for everyone right now and should be underscored in some way. We need to see this as a common problem so we can work together on solutions.
- We need to acknowledge that forests are changing and their character will continue to change.
- The CSAG focus was limited to forestry and should have been attuned to reducing GHG concentrations.
- As a diverse group, we recognize that there is no one solution. Instead, there are many different actions that will have an impact. This is an important finding from our journey of learning as a group – our recognition of all the different ways we can advance efforts to solve this massive challenge.

- The state energy strategy could be an opportunity to focus carbon sequestration work on specific targets.
- A big opportunity to sequester carbon lies in local-level action with landowners. The challenge is too complex for one size fits all solutions. Communities and landowners need to take ownership of what is in our backyard.

#### **1:30 PM: Process to Finalize CSAG Report**

- Draft of CSAG Report will be shared with CSAG members on Sept. 28
- CSAG members will have ~1 week to provide detailed feedback

#### **1:40 PM: Next steps**

- Meeting 5 on Monday, October 12, will focus on report revisions based on CSAG member edits and comments
- The final CSAG report will be distributed to the CSAG before DNR submits its report to the Legislature on December 01

#### **1:45 PM: Adjourn**

# Carbon Sequestration Advisory Group

## Meeting 5 Summary

### MEETING INFORMATION

**Date:** October 12, 2020

**Time:** 9:00am – 1:45pm

**Location:** Zoom virtual meeting

#### 9:00 AM: Welcome and Opening Remarks

- Welcome from Lenny Young
- CSAG Members in attendance:

Cody Desautel	Joseph Donnegan, US Forest Service
Ara Erickson, Weyerhaeuser	Kathleen Farley Wolf, King County
Indroneil Ganguly, University of Washington	John Henrikson, Wild Thyme Tree Farm
Cherie Kearney, Columbia Land Trust	Gary Morishima, Quinault Indian Nation
John-O Niles, Salesforce (alternate for Max Scher)	Julius Pasay, The Climate Trust
Edie Sonne Hall, Three Trees Consulting	Jason Spadero, SDS Lumber
Skip Swenson, Forterra	Bill Turner, Sierra Pacific Industries
Max Webster, Washington Environmental Council (alternate for Lisa Remlinger)	Mark Wishnie, BTG Pactual
Lenny Young, DNR (CSAG Chair)	

- CSAG Staff:

Dan Stonington, DNR	Shelby Thomas, Ross Strategic
Rob Willis, Ross Strategic	

- Other Attendees:

Brian Cochran, SCC	Jason Callahan, Washington Forest Protection Association
Chris Elder, Whatcom County	Hilary Franz, Washington Commissioner of Public Lands
Heath Heikkila, American Forests	

#### 9:10 AM: Non-forest Ecosystem Update

- DNR is working with Colorado State University to extract Washington-specific data from US EPA National Greenhouse Gas Inventory. The final DNR report will include cropland and grassland results from 1990-2015.
- Although the results are not ready as of Meeting 5, a snapshot of cropland soil carbon flux (below) was provided as an example.

**Table 6-30: Net CO<sub>2</sub> Flux from Soil C Stock Changes in Cropland Remaining Cropland (MMT CO<sub>2</sub> Eq.)**

Soil Type	1990	2005	2014	2015	2016	2017	2018
Mineral Soils	(58.2)	(62.4)	(44.7)	(44.9)	(54.3)	(55.1)	(49.4)
Organic Soils	35.0	33.4	32.5	32.1	31.6	32.8	32.8
<b>Total Net Flux</b>	<b>(23.2)</b>	<b>(29.0)</b>	<b>(12.2)</b>	<b>(12.8)</b>	<b>(22.7)</b>	<b>(22.3)</b>	<b>(16.6)</b>

Notes: Totals may not sum due to independent rounding. Parentheses indicate net sequestration.

### 9:25 AM: Revising Inventory Recommendations

CSAG members reviewed CSAG Report changes made by the consulting team between Meetings 4 and 5 based on the discussion during Meeting 4. Lenny Young, the CSAG Chair, encouraged members to share anything they believe should be in the CSAG Report and to keep the distinction between the CSAG Report and DNR’s report in mind. Observations included:

- Because the CSAG did not have an opportunity to review DNR’s report, they do not know whether DNR followed the recommendation to present inventory information in clear, non-technical terms that makes it easy for decision makers to identify where carbon stocks and fluxes could be affected by policies and incentives. Therefore, the CSAG cannot endorse DNR’s representation of inventory results. The relationship between the CSAG process and DNR’s report needs to be clear in the final CSAG Report.
- The CSAG Report does not include a dedicated section that describes the discussion CSAG members had regarding forest carbon inventories, methodologies, and interpreting results, despite the fact this work is outlined in the proviso.
- The CSAG discussions and recommendations have covered topics beyond carbon sequestration and it’s more accurate to use the phrase “carbon impacts.”
- Regarding Inventory Recommendation 4: It’s important to distinguish between databases and models: inventory databases can be refined by using different techniques (e.g., remote sensing) and improve models.

### 10:35 AM: 10-minute Break

### 10:45 AM: Revising Inventory Recommendations, continued

CSAG observations, continued:

- Regarding Inventory Recommendation 5: There is a difference between “carbon stored in wood” and “embodied carbon.” Embodied carbon refers to carbon-intensive materials that are substituted for harvested wood products (which actually store carbon).

### 10:50 AM: Message from Hilary Franz, Commissioner of Public Lands

### 10:55 AM: Revising Incentives Recommendations

CSAG observations regarding the incentives recommendations included:

- The CSAG Report does not provide much context for incentive-based programs and their barriers.
- The CSAG discussed several types of barriers to incentive-based programs; this broad consideration should be reflected in the CSAG Report even if does not list every single barrier discussed.
- Specific to Incentives Recommendation 3: It's important to be very clear about what the CSAG is asking the state to do in terms of increasing flexibility and accessibility to carbon offset projects. Not all members feel this recommendation is clear enough. Additionally, several CSAG members don't feel comfortable recommending carbon offset programs without more context. (The CSAG did not have the opportunity to discuss carbon offset programs at length.) The CSAG discussed the idea of including a disclaimer with this recommendation along the lines of, "The CSAG was focused on removing barriers to landowner participation in offset markets and not on the climate effectiveness of the offset markets themselves," but ultimately decided not to include it because the same could be said for many of the incentive-based programs and in fact offset programs are the only programs with a carbon accounting methodology subject to scientific and public review. Instead, the recommendation will include preamble language to clarify that the CSAG didn't discuss or endorse the effectiveness of any protocols.

### **12:00 PM: 45-minute Lunch Break**

### **12:45 PM: Revisions to CSAG Report, continued**

*Note: The discussion around Incentives Recommendation 3 continued into this time.* The CSAG ended the meeting by discussing the Introduction section of the CSAG Report. Observations included:

- The CSAG is not a stand-alone effort yet the Report does not reference the Forest Action Plan, State Energy Strategy, Sustainable Farm and Field legislations, etc. The broader framework is important and DNR staff acknowledged that it will be included in the DNR report.

### **1:30 PM: Process to Finalize CSAG Report**

- Final draft of CSAG report will be shared with CSAG members on Monday, October 19
- CSAG members will have one week (until Monday, October 26) to provide a response.
- The final CSAG Report and CSAG member responses will be appended to the DNR Report which will be submitted to the Legislature on December 01, 2020.

### **1:45 PM: Adjourn**