Older Forests and Carbon

A Presentation to the Board of Natural Resources

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Agenda

Older Forest Discussion Review

Overview of the Forest Carbon Inventory Report
  • Carbon Terminology
  • Results of the Carbon Inventory
    • Carbon on the Landscape
    • Carbon in the Forest
    • How Carbon has Changed
    • Carbon emissions from Wildfire

Summary and Discussion
Old Growth and Older Forest Policy

Policies that shaped our current management

• 1997 Habitat Conservation Plan
• 2004 Sustainable Harvest Calculation
• 2004 Legislation on Old–Growth
• 2006 Policy for Sustainable Forests
• 2019 Marbled Murrelet Long-term Conservation Strategy – Habitat Conservation Plan Amendment
Policy Summary

Trust Lands are managed for long-term revenue

Old Growth is identified and protected from harvest

HCP landscape conservation protects species, habitat, and biodiversity

Policy framework creates landscapes with substantial structurally complex forests

HCP Amendment reinforced landscape conservation and released older forests not essential to conservation goals
Assessments, Monitoring, and Projections Summary

- Conducting ongoing old-growth field assessments
- HCP strategies have resulted in increased older forest conditions
- Projections show:
  - Continuing increase in older forest conditions
  - Increasing stored forest carbon
Washington Forest Ecosystem Carbon Inventory

Peter Gould

Forest Biometrician
Comprehensive Carbon Assessment
Partnership with USDA Forest Service

Forest Inventory and Analysis Program
• Since 1930
• Comprehensive survey of forest plots (10%+ forest cover)
• 10% annually – 100% over 10 years

Data for 2002-2006 & 2012-2016
• Repeat estimates for 5 years/50% of plots

Measures:
• Amount of carbon
• Form of carbon
• Change in carbon

Focus on DNR-Managed Lands

Washington Forest Ecosystem Carbon Inventory: 2002-2016

www.dnr.wa.gov/carbon
Carbon Terminology

**MT C** = metric tons of carbon

**MMT C** = million metric tons of carbon

**1 MT C** = 3.667 MT CO$_2$e

**CO$_2$e** = Carbon dioxide equivalent

- A measure of greenhouse gases based on global warming potential
- CO$_2$ is most prevalent gas, so other greenhouse gases are equated to CO$_2$ when discussing overall emissions

**Carbon Pool** = reservoirs of carbon that can take in and release carbon. (E.g. Live trees, soil, dead wood)

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**Interesting Facts**

- **Metric Ton** = 2,240 lbs.

Average car emits 4.7 metric tons of CO$_2$ / year*

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*EPA Office of Transportation and Air Quality EPA-420-F-14-040a May 2014
Carbon Stock = The amount of Carbon in a Pool
(e.g. live trees, standing dead trees, down wood, forest floor, soil)

Some Stocks are measured more precisely than others

Higher Precision:
above ground biomass

Lower Precision:
soil carbon

Reported in MT C
Carbon Flux =
The change in net carbon in one or more pools over a period of time

This report tracked the difference between:
2002-2006 and 2012-2016
Reported in MT CO₂e

Did not track the carbon once it was removed from the forest (e.g. harvested wood products)
Where is Carbon on the Landscape?

Washington Statewide – Percent of Forest Land Base and Percent of Carbon Stocks by Owner
Where is Carbon in the Forests?

- 22.1 million acres of forest
- 2.72 billion MT C in WA (gigatons)
- 122.9 tons/acre
- Nearly half in roots and soil

All Forests in Washington

- Live Tree - Above Ground: 33%
- Live Tree - Below Ground: 7%
- Dead Tree: 4%
- Understory Vegetation: 1%
- Down Wood: 6%
- Forest Floor: 5%
- Soil: 45%
Total Forest Carbon by Ownership and Pool
2007-2016

Tight confidence intervals for total forest carbon

Other federal includes National Parks primarily
Other state and local includes WDFW and State Parks as well as county lands
Density of Forest Carbon by Ownership and Carbon Pool

Big differences in Tree Carbon Stocks

Soil Carbon Stocks nearly the same on all ownerships

For the 2016 Inventory Period
Live-Tree and Dead-Tree Carbon Stocks
(percent difference from DNR)

Western Washington
- DNR: 70 MT C / Acre
- US Forest Service: 85 MT C / Acre (+21%)
- Corporate: 50 MT C / Acre (-48%)
- Non-Corporate: 56 MT C / Acre (-34%)

Eastern Washington
- DNR: 50 MT C / Acre
- US Forest Service: 60 MT C / Acre (+38%)
- Corporate: 40 MT C / Acre (-30%)
- Non-Corporate: 35 MT C / Acre (-14%)

4.3 Billion Metric Tons of Tree CO₂e in Trees Statewide
Equivalent to 925 million vehicle years | 2x all annual transportation emissions in US

https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

July 2021  Draft - subject to change
How Did Statewide Carbon Change?

Statewide Average Annual Net CO₂e Flux from Forest Pools, Land Use, and Land Use Change

~2.9 million cars per year

Increase 13.7 MMT C Annually

Forest trees biggest gains

Land conversion biggest loss

Large confidence intervals (less precision)
How did Carbon in Live Trees Change?

Annual change per acre in live tree Carbon from Growth, Removals, and Mortality

More Gain then Loss for all Ownerships
Annual Wildfire Greenhouse Gas Emissions

Between 2002-2006 & 2012-2016 Reporting Periods

By Ownership

3.1 MMT C CO₂e/year =~667,000 cars
Forest Carbon Inventory Take-Aways

Washington Forests Sequester ~13.7 MMT C Annually

U.S. Forest Service > DNR > Private

DNR Net Flux ≈ 0 (Estimate is imprecise)

Future reports will have more data – will it be enough?
This report provides resulting estimates of harvested wood products carbon stocks and flux, or net annual change in stocks, over the interval from 1906 to 2018 for the state of Washington.

Current DNR policy framework protects old-growth and creates landscapes with structurally complex forests.

Washington forests show an annual increase in stored carbon.

More information is needed about the relationship between carbon stored in the forest and atmospheric carbon.

Potential policy implications.