2020 Fire Season

Board of Forestry
November 4, 2020

Doug Grafe, Chief of Fire Protection
Oregon Department of Forestry

COVID-19 IMT Camp Subcommittee

- Took a collaborative effort to operationalize existent plans
- Studied lessons learned and ground truths from current fire assignments

COVID-19 Prevention & Response Guidelines for Large Fires

- Developed and implemented protocols for prevention, coordination and response efforts specific to fire camp

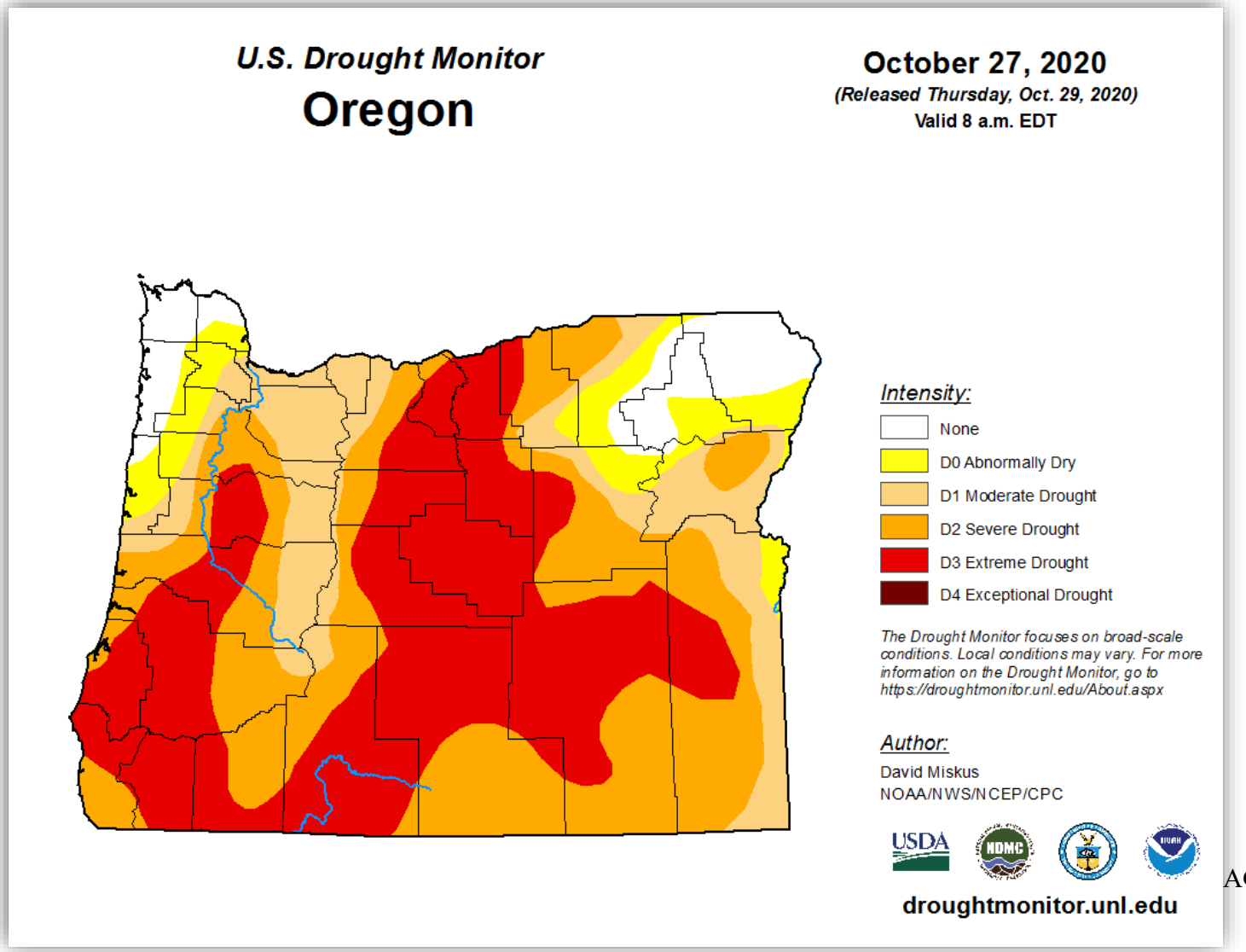
COVID-19 Module

- Assigned a three-person team to an incident specifically for the purpose of COVID-19 mitigation in fire camp
- Health Liaison, COVID-19 Responders

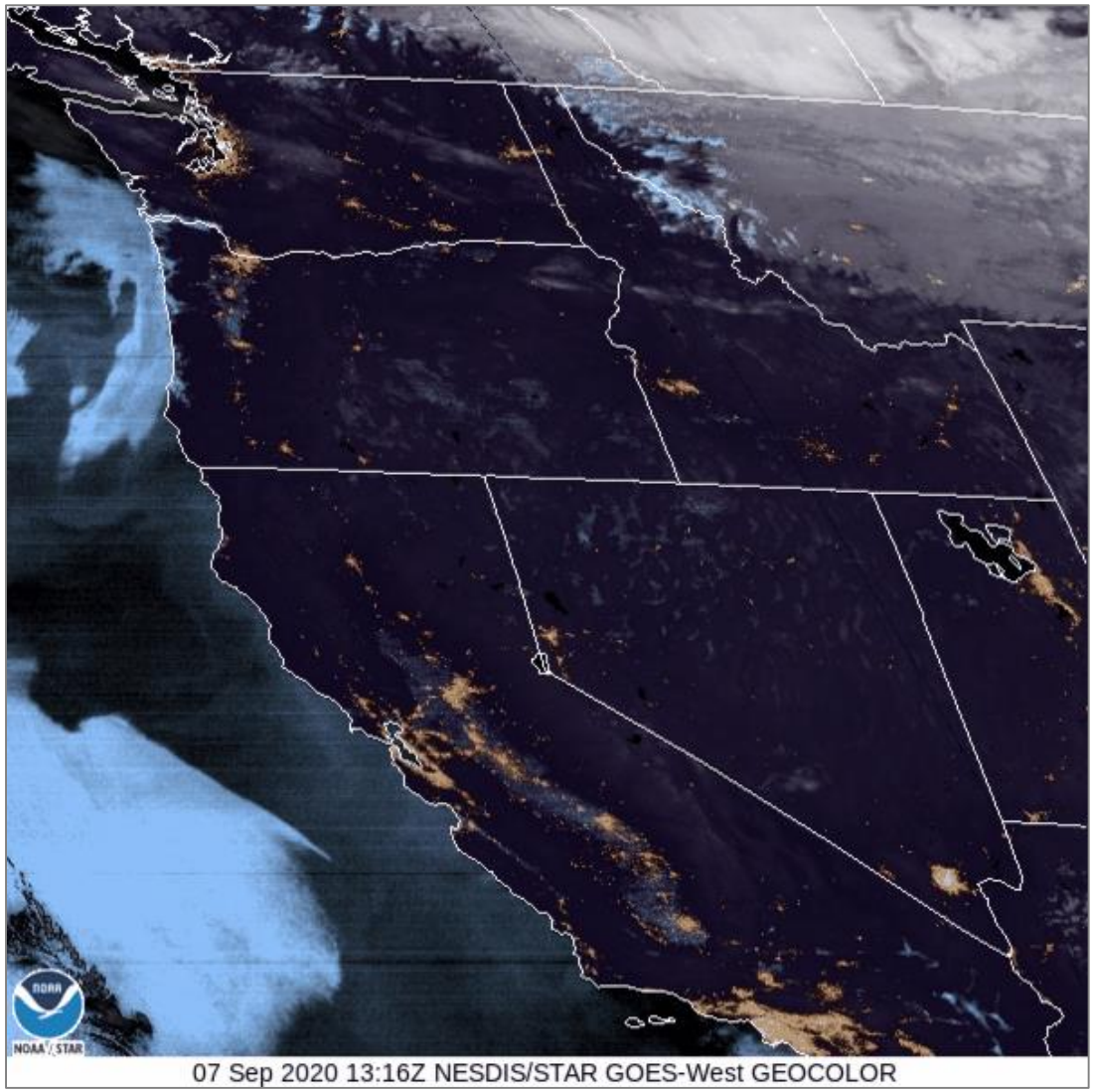
COVID-19 Coordinators

- Experts in field of emergency response and public health
- Regionally staffed and assisted with coordination/communication between ODF districts, IMT's and State and local public health

Drought Monitor



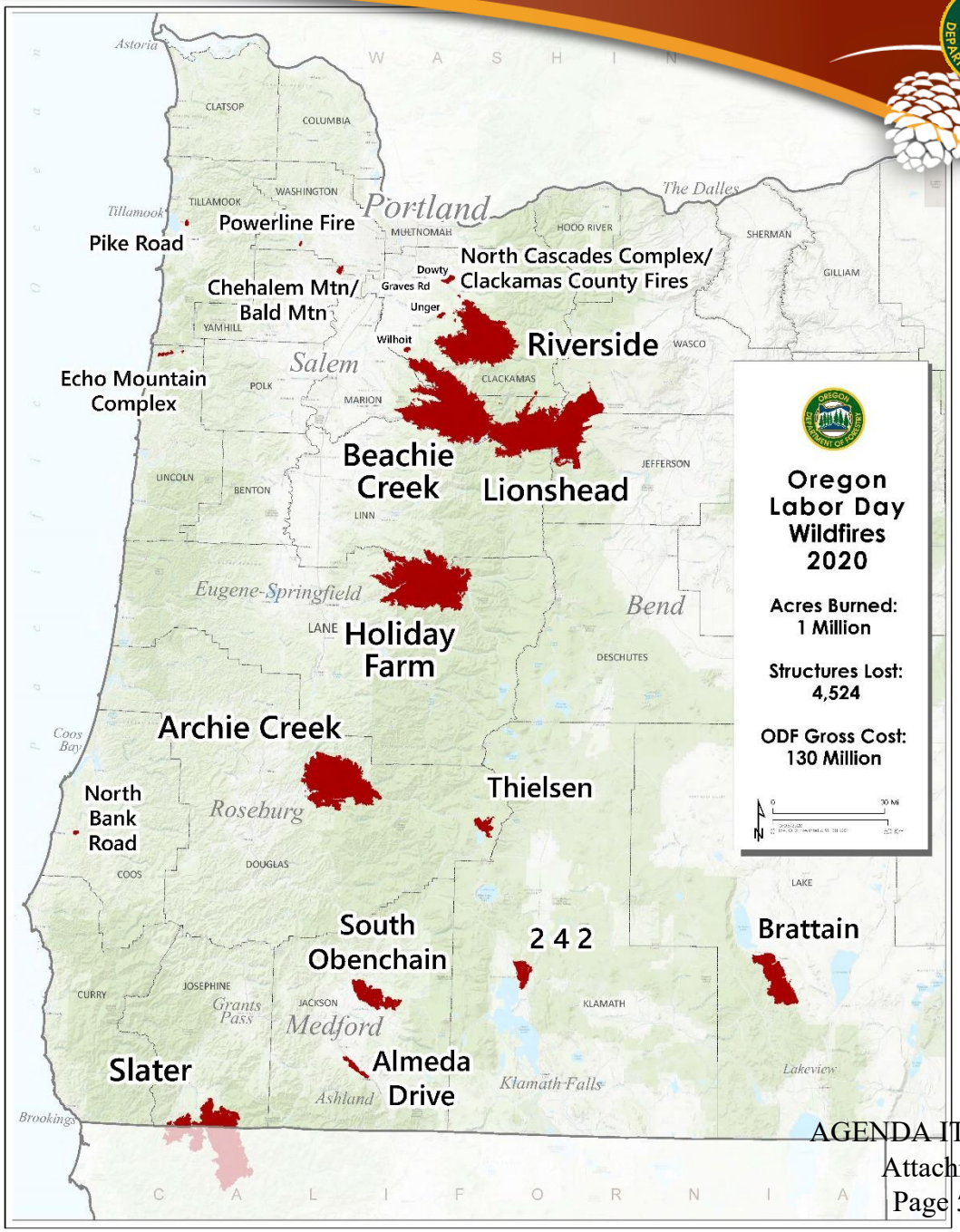
Weather Phenomena - September 7, 2020
“An Alignment of Forces”



Oregon Labor Day Wildfires 2020

Fire Briefing Map

Post Sept. 7



ODF Fire Statistics to date

Oct 29, 2020

2020 Year To Date		
	Fires	**Acres**
Lightning	168	24,212
Human	751	517,232
Total	**919**	**541,444**
10-Year Average (2010-2019 Year To Date)		
Lightning	254	30,463
Human	676	11,008
Total	930	41,471

94%

fires kept at 10 acres or less to date in 2020

4599% more human caused acres burned, **about *47* times more than 10 year average**

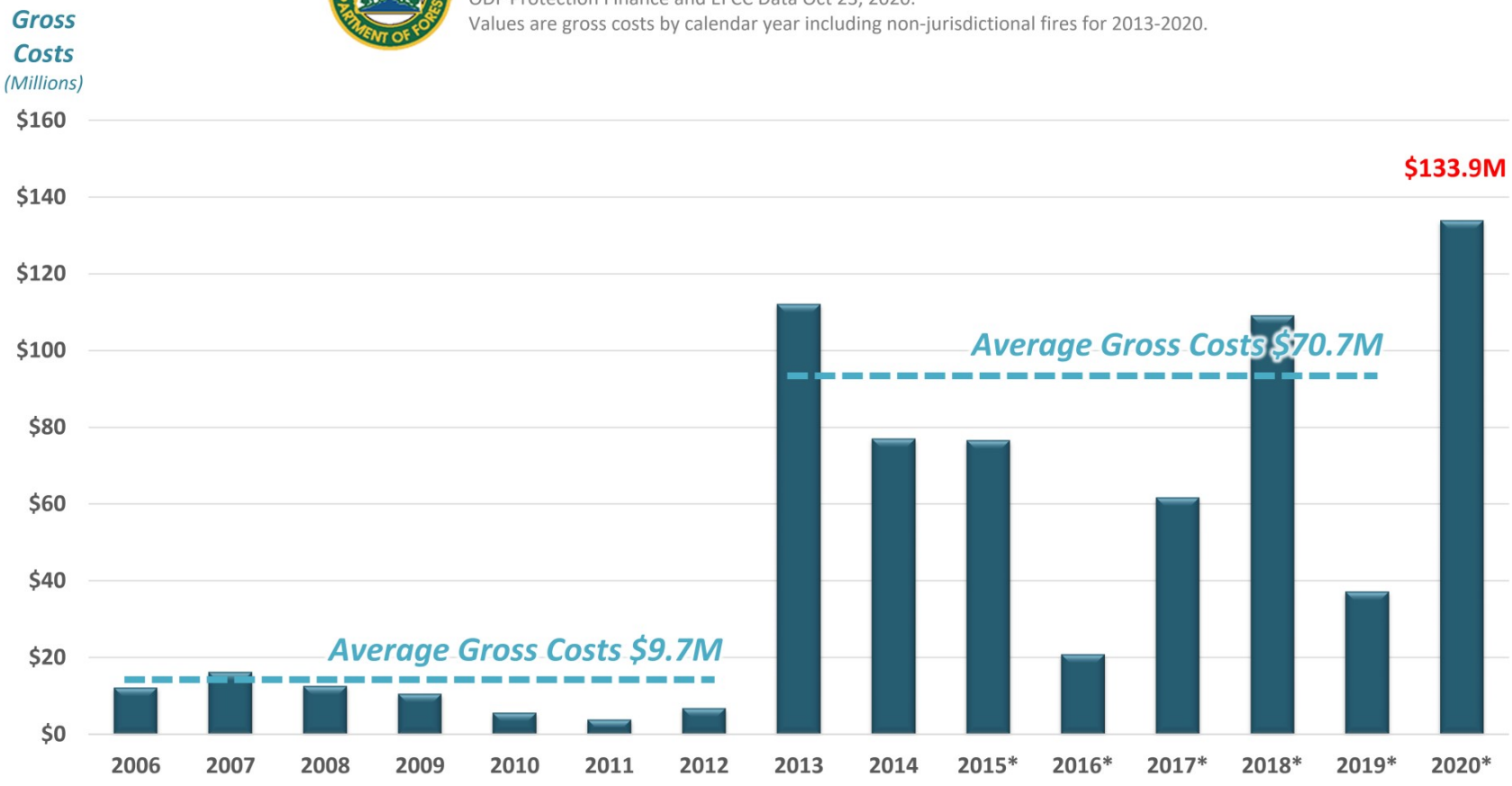
1,206% more total acres burned, **about *13* times more than 10 year average**

All 2020 data is considered draft until end of fire season and until all incident data has been assessed and recorded.

Gross Costs YTD

ODF Large Fire Costs

ODF Protection Finance and EFCC Data Oct 23, 2020.
Values are gross costs by calendar year including non-jurisdictional fires for 2013-2020.



*includes draft claims figures

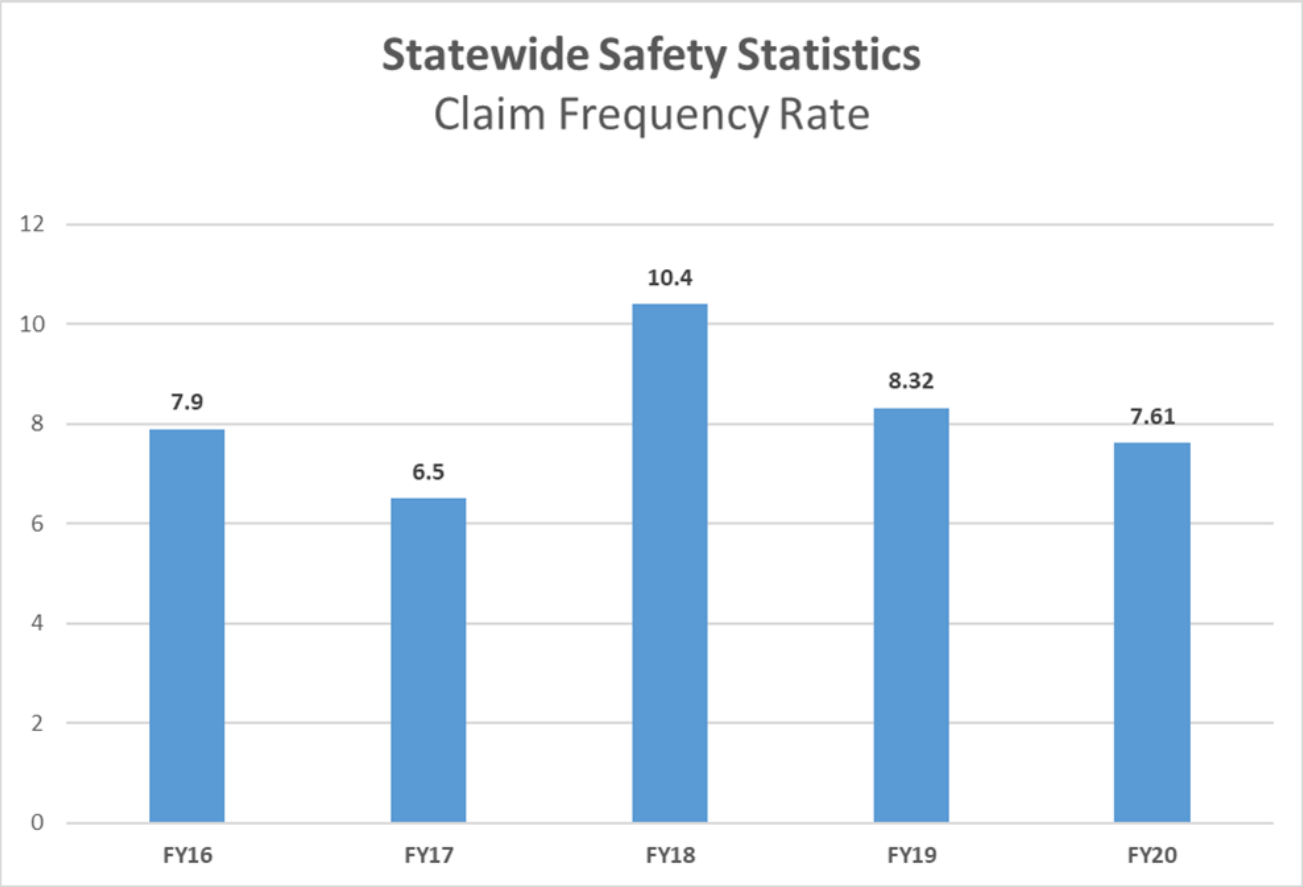
Fire Protection Financial Summary as of 10/28/20

Fire Protection Large Fire Cost Summary						
Fire Season	2015	2016	2017	2018	2019	Total
Fire Costs	$76.48	$20.89	$61.66	$109.39	$34.51	$302.93
Currently Invoiced	($12.86)	($2.32)	($2.57)	($7.10)	($1.34)	($26.19)
Outstanding to Invoice	($0.04)	($0.03)	($2.76)	($2.08)	($8.51)	($13.42)

Invoiced Costs (in millions)						
Fire Season	2015	2016	2017	2018	2019	Total
FEMA	$12.57	$2.31	-	$3.85	-	$18.73
Other agency billings	$0.29	$0.01	$2.57	$3.25	$1.34	$7.46
Total	$12.86	$2.32	$2.57	$7.10	$1.34	$26.19

Costs Remaining to Invoice (in millions)						
Fire Season	2015	2016	2017	2018	2019	Total
FEMA	$0.04	$0.01	$2.25	$1.87	$7.89	$12.06
Other agency billings	-	$0.02	$0.51	$0.21	$0.62	$1.36
Total	$0.04	$0.03	$2.76	$2.08	$8.51	$13.42

Safety Statistics



5 year averages:

- 8.15 injuries per 200,00 hours worked
- 1.613 million hours worked
- 65.2 total claims

FY 2020:

- 7.61 injuries per 200,000 hours worked
- 1.576 million hours worked
- 60 total claims

Safety Statistics

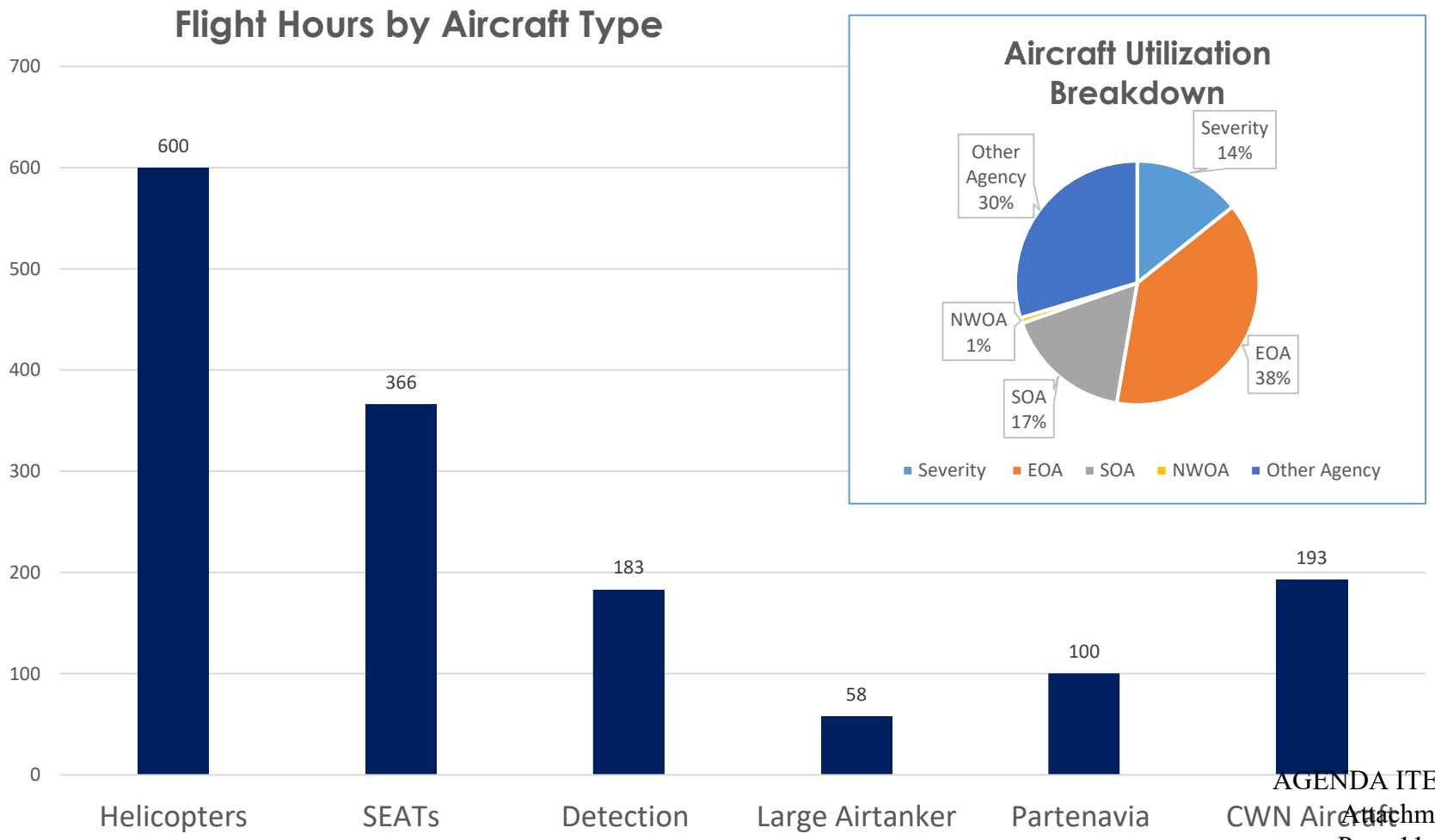
2020 Fire Season Injuries and Hours Worked, 6/1 to 9/30			
	Injuries	***Hours Working on Fires***	***Agency-Wide Total Hours Worked***
June	6	7,176.75	167,462.08
July	8	32,973.9	242,247.53
August	15	75,008.06	284,318.56
September	6	154,130.13	317,187.63
Total	**35 injuries**	**269,288.84 hours**	**850,930.47 hours**

Top Causes of Injury:

- Miscellaneous causes:
  - Smoke inhalation
  - Object in eye
  - Poison oak
- Struck by:
  - Hand tools
  - Knives
  - Lifting objects
- Sprains and strains
  - Lifting objects
  - Hand tools

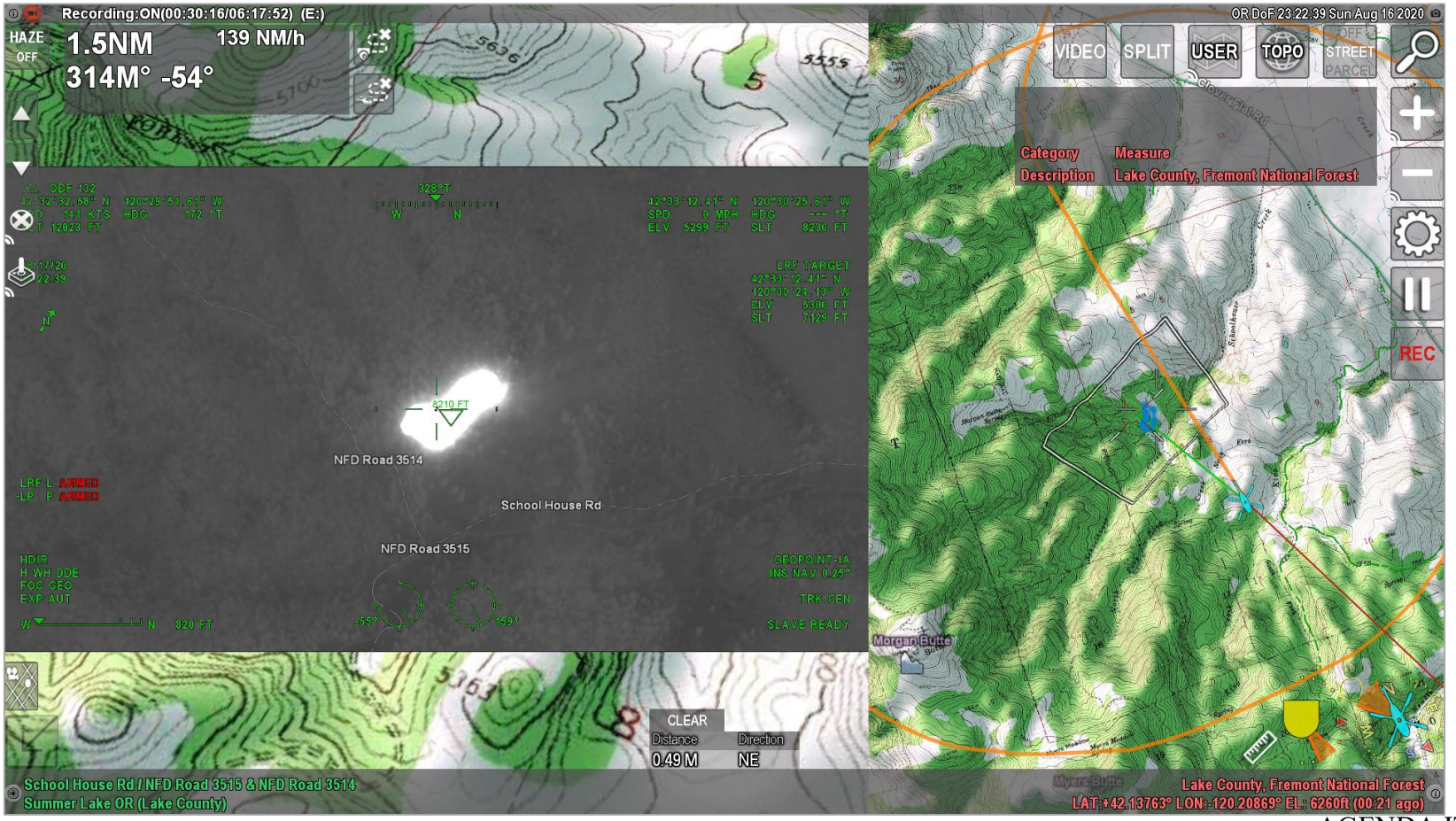
Severity Program

Total Program Flight Hours = 1500



Severity Program

Partenavia: Multi-Mission Aircraft

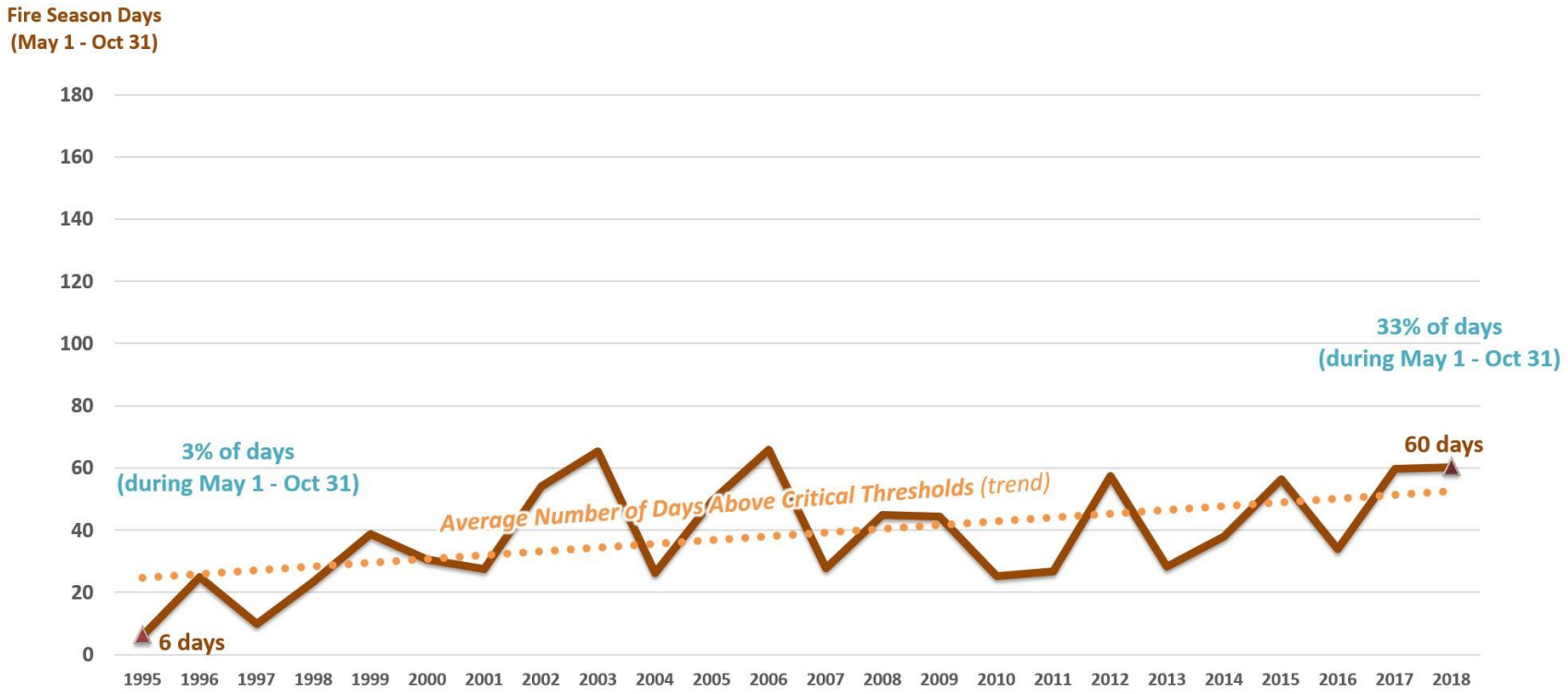


Landowner & RPA Contributions

Fire Season Severity Increasing Across OR

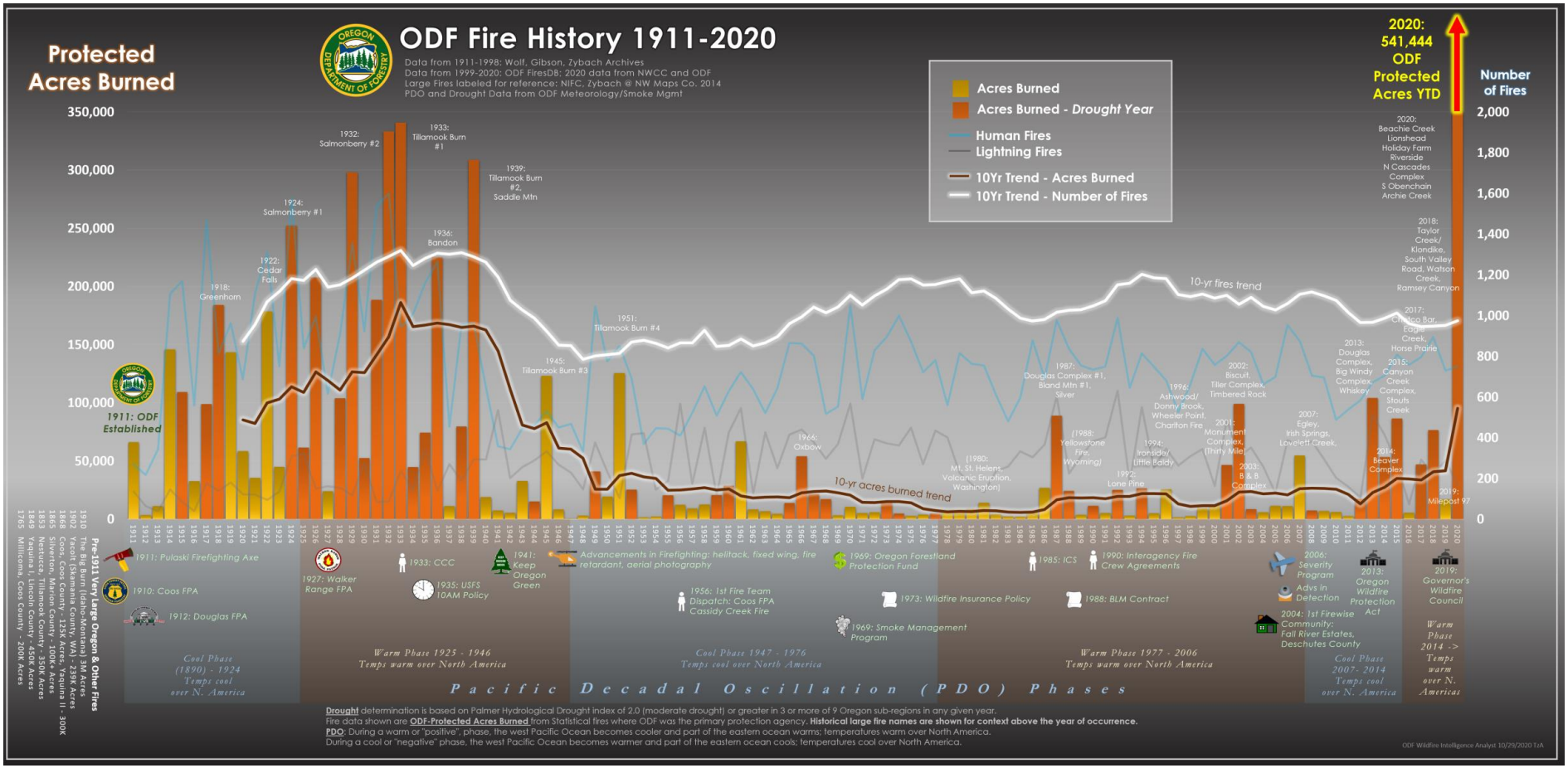
Fire Season Severity - Average Number of Days of Exceeding Critical ERC Percentiles All ODF Fire Danger Rating Areas 1995-2018

Average number of days 1995-2018 where all ODF Fire Danger Rating Area (FDRA) ERC values exceeded locally-set critical percentile ERC thresholds. Data is from WIMS, dated May 1 - Oct 31 (184 days), although actual *declared* fire season dates vary per year.



The Energy Release Component (ERC) is an index from the National Fire Danger Rating System (NFDRS). ERC is related to how hot a fire could burn at the flaming front, based on cumulative drying of live and dead fuels. Through the fire season, as live fuels cure and dead fuels dry, ERC values increase, providing a good reflection of seasonal drying of fuels and drought conditions. The ERC can serve as a good characterization of fire season as it tracks seasonal fire danger trends well. Fuel loading, woody fuel moistures, and larger fuel moistures all have an influence on the ERC. ERC has low variability, and is the best fire danger component for indicating the effects of intermediate to long-term drying on fire behavior. For more information: http://gacc.nifc.gov/oscc/predictive/fuels_fire-danger/psa_nfdrs/ercindex.html

ODF Century Fire History



Looking Forward

Governor's Wildfire Council

- ODF personnel capacity has grown little in past 3 decades
- Environmental Conditions expected to worsen in future

Response and Mitigation:

- Large Fire Funding Fix – A structural funding challenge
- Fire Fighting Capacity
- Mitigating the Fire Risk – Policy Advancements

Recovery:

- Forestry Recovery
- Private Forest Investment Programs
- Santiam State Forests

Thank You

Questions?

Doug Grafe, Chief of Fire Protection

Board of Forestry Authority to Address Issues Related to Climate Change

November 4, 2020

Matt B. DeVore
Assistant Attorney General
Oregon Department of Justice

Question #1:

Does the Board of Forestry's authority to "supervise all matters of forest policy and management" include establishing climate change and forest carbon goals?
- ORS 526.016

Question #1 statutes:

ORS 526.016(1) The Board shall supervise all matters of forest policy and management under the jurisdiction of this state.

ORS 526.016(4) The Board shall adopt rules to perform the functions defined by statute.

Question #2:

Is net carbon storage and sequestration included in "management of all forestlands in Oregon should be encouraged to provide continuous production of all forest benefits?"
- ORS 526.460

Question #2 statutes:

ORS 526.460(1) The State recognizes that forests makes a vital contribution to Oregon, and provides benefits that are economic, environmental, and other benefits.

Question #2 statutes:

ORS 526.460(1) Management of all forestlands in Oregon should be encouraged to provide continuous production of all forest benefits.

Question #2 statutes:

ORS 526.460(2) Nonindustrial private forestlands can make major contributions to Oregon's economy and provide many other social benefits.

Question #2 statutes:

ORS 526.460(2) Therefore, it is the policy of the State of Oregon to provide conditions favorable for long term forestry investments that lead to increased management of and harvest from these lands.

Question #2 statutes:

ORS 526.470(1) A state forest tree seed bank may be operated by the Forester and Board.

ORS 526.472(1) A state forest tree seed orchard may be operated by the Forester and the Board.

Question #3:

Does the Board have the authority to include harvested wood products in policy development related to climate change and forest carbon?
- ORS 526.016

Question #3 statutes:

ORS 526.016(1) The Board shall supervise all matters of forest policy and management under the jurisdiction of this state.

ORS 526.016(4) The Board shall adopt rules to perform the functions defined by statute.

Question #4:

Must the board consider climate change in setting policy related to maximizing forest benefits? Can those include the carbon costs of harvest and processing timber removed from forestlands?
- ORS 526.460

Question #4 statutes:

ORS 526.460 State policy statements.

ORS 526.470 Tree seed bank.

ORS 526.472 Tree seed orchard.

Question #5:

Does the Board have the authority to regulate forest carbon under the Forest Practices Act?
- ORS 527.710

Question #5 statutes:

ORS 527.710(1) The Board shall adopt rules establishing standards for forest practices.

ORS 527.710(2) The rules shall ensure the continuous growing and harvesting of forest tree species.

Question #5 statutes:

ORS 527.710(2) Consistent with ORS 527.630, the rules shall provide for the overall maintenance of the following resources:

(a) Air quality;
(b) Water resources;
(c) Soil productivity; and
(d) Fish and wildlife.

Question #6:

Can the Board adopt forest practices rules based on or including future climate projections and/or climate models, or does there need to be a measurable degradation currently?
- ORS 527.714

Question #6 statutes:

ORS 527.714(5) For rules that set standards not addressed in statute and provide new or increased standards for forest practices, the Board may adopt such a rule only after determining that the following facts exist and standards are met:

Question #6 statutes:

ORS 527.714(5)(a) If forest practices continue to be conducted under existing regulations, there is monitoring or research evidence that documents that degradation of resources maintained under ORS 527.710 (2) or (3) is likely;

Question #6 statutes:

ORS 527.714(5)(c) The proposed rule reflects available scientific information, the results of relevant monitoring and, as appropriate, adequate field evaluation at representative locations in Oregon;

Question #7:

The Good Neighbor Authority (GNA) policy authorizes pursuing projects related to a list of specific outcomes. Does this specificity limit applications to climate change?
- ORS 526.274 and 526.275(2)

Question #7 statutes:

ORS 526.274(1) The Board may direct the State Forester to facilitate the development of stewardship contracts to carry out forest management activities on federal lands.

ORS 526.274(2)-(6) Board's involvement.

Question #7 statutes:

ORS 526.274(1) The State Forester may, under the stewardship contract agreements:

(a) Perform road and trail maintenance;

(b) Set prescribed fires;

(c) Manage vegetation;

(d) Perform watershed restoration and maintenance; …

Question #7 statutes:

…

(e) Restore wildlife habitat;

(f) Control exotic weeds and species; and

(g) Perform other activities related to stewardship.

Question #8:

Does the Board have authority to identify and establish rules related to climate refugia, to include mitigation and/or adaptation for climate change?
- ORS chapters 526 and 527

Question #8 statutes:

ORS 526.016(1) The Board shall supervise all matters of forest policy and management under the jurisdiction of this state

Question #8 statutes:

ORS 526.630(1) Public policy of the State to encourage economically efficient forest practices that ensure the continuous growing and harvesting of forest tree species and the maintenance of forestland for such purposes as the leading use on privately owned land…

Question #8 statutes:

ORS 526.630(1) … consistent with sound management of soil, air, water, fish and wildlife resources and scenic resources within visually sensitive corridors as provided in ORS 527.755 and to ensure the continuous benefits of those resources for future generations of Oregonians.

Question #8 statutes:

ORS 527.710(2) Consistent with ORS 527.630, the rules shall provide for the overall maintenance of the following resources:

(a) Air quality;
(b) Water resources;
(c) Soil productivity; and
(d) Fish and wildlife.

Question #8 statutes:

ORS 527.714(5) For rules that set standards not addressed in statute and provide new or increased standards for forest practices, the Board may adopt such a rule only after determining that the following facts exist and standards are met…

October 28, 2020

Oregon Board of Forestry
Attention: Hilary Olivos-Rood, Board of Forestry Administrator
(503) 945-7210
by email: hilary.olivos-rood@oregon.gov

RE: Oregon Board of Forestry November 4, 2020 Meeting Items #4 and #8:

- **Item #4: DOJ Memorandum on Statutory Authority relating to Carbon and Climate and Board review of Forestry Plan for Oregon, Goal G Climate Change;**
- **Item #8: OGWC Goal setting and EO 20-04.**

Dear Oregon Board of Forestry and Staff:

We recognize the incredibly challenging year it has been; and would like to acknowledge the massive effort Oregon Department of Forestry (ODF) and Board of Forestry, together with other State of Oregon agencies, undertook in managing an unprecedented wildfire season. We are grateful for the tremendous effort, information and resources marshalled by the ODF this year.

Regarding Board agenda Item #4, wpd wind projects Inc. is pleased to provide comments to the Board on the process of evaluating and updating Goal G as defined in the 2011 Oregon Forestry Program. We urge the Board to consider adding wind energy as a renewable resource to the list of Goal G objectives. Doing so would contribute to both:

a) ODF's ongoing development of a Climate Change Plan; and
b) compliance with the Governor's Executive Order on Climate Action EO #20-04.

Goal G's seven objectives, Item Number 5[1], could be revised to include wind energy as a renewable energy source; we suggest an addition to Item Number 5: "Biomass and wind as a renewable energy resource".

Adding wind energy to the list does not automatically advance this resource, as any actual projects are still be subject to all of the local, state and federal permitting regimes. However, adding it to the list creates an additional potential means of complying with state climate change and carbon objectives.

Wind energy is natural resource with many similarities to timber harvesting. Both depend on climate, topography and are derived from a sustainable resource base. Both California and Washington now have commercial wind farms operating in heavily forested topography. Weyerhauser has been heavily involved with the wind industry to foster the highest and best use

[1] https://www.oregon.gov/odf/board/bof/bofwp-climate-change-2020.pdf

of their forested lands, as has WA Department of Natural Resources (DNR), attesting to the compatibility of forestry and wind projects.

Wind projects only use a very small amount of dedicated land adjacent to each turbine; thus only a negligible amount of land is taken out of forest production. Roads to support these projects are multiple use – supporting logging, recreational and other common forest uses. Temporary uses of the land for constructing a wind project all can be replanted to trees.

What OR Department of State Lands (DSL) and WA DNR have done to enable the use of this resource[2] by leasing parcels for multiple use, can be considered by ODF. Rule-making actions by ODF could enable private industry to evaluate the resource – subject to compatible environmentally, commercially and with traditional uses of the forests.

Regarding Board agenda Item #8, Oregon's governors and legislatures have long prioritized permanently sustainable resources throughout the state. The environmental benefits of wind energy generation would help ODF comply with EO #20-04 directives and long-established Oregon renewable energy policies by helping to facilitate Oregon's achievement of the GHG emissions reduction goals, while supporting Goal G of the Oregon Forestry Program by reducing carbon emissions. A revision to Goal G of the Department's management plans and actions to include wind energy generation would support the Governor's Executive Order by integration of a compatible land use that would help Oregon address climate change.

The wind resource in the forests of Western Oregon's Coastal Range is unique and compliments the seasonal production wind production patterns of wind farms East of the Cascades. Thus, it is potentially more valuable to the entire electric system than more East-side wind development. This diversity in clean renewable energy is critical to the State's energy and climate future by making a more reliable sustainable electricity supply.

Wind energy presents a unique opportunity for the Department to reduce greenhouse emissions by allowing this compatible energy resource on State forest lands. ORS 530.050 provides that "the State Forester shall manage [state forests] so as to secure the greatest permanent value of those lands to the state, and to that end may "permit a variety of uses on the land." The State Forester may:

> Permit the use of the lands for [purposes other than timber production], ***including but not limited to*** forage and browse domestic livestock, fish and wildlife environment, landscape effect, protection against floods and erosion, recreation, and protection of water supplies when, in the opinion of the [State Board of Forestry], the use is not detrimental to the best interest of the state. ORS 530.050(5) (emphasis added).

[2] OAR 141-125-0100(2)(j)

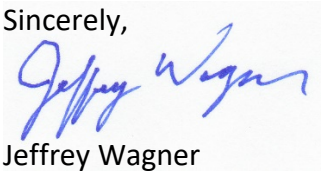
The State Forester also may “do all things and make all rules, not inconsistent with law, necessary or convenient for the management, protection, utilization and conservation of” state forests. ORS 530.050(13).

Thus, ODF has broad statutory discretion to allow a wide variety of non-timber harvest uses in state forests, provided that those uses secure the "greatest permanent value" and do not detract from the State of Oregon's best interest. The benefits as defined by OAR 629-035-0020(1) include “sustainable and predictable production of forest products that generate revenues for the benefit of the state, counties and local taxing districts” and “productive soil, air and clean water”.

Wind energy clearly constitutes a “social, economic, and environmental benefit to the people of Oregon.” Not only does it align with state policy, it will generate significant economic benefits in the form of lease payments to ODF, revenue sharing in the hosting county (ies), jobs and increased property tax revenue.

We recommend that ODF, the State Forester and the State Board of Forestry consider inclusion of wind energy and wind energy leasing in the Forestry Program for Oregon Goal G.

Sincerely,



Jeffrey Wagner
President, wpd wind projects Inc.
Cc by email:

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October 30, 2020

Oregon Board of Forestry
Attention: Hilary Olivos-Rood, Board of Forestry Administrator
(503) 945-7210
by email: hilary.olivos-rood@oregon.gov

RE: Oregon Board of Forestry November 4, 2020 Meeting Item #4: DOJ Memorandum on Statutory Authority relating to Carbon and Climate and Board review of Forestry Plan for Oregon, Goal G Climate Change;

Dear Oregon Board of Forestry and Staff:

We submit additional testimony regarding Board agenda Item #4 having had opportunity to review the Department of Justice ("DOJ") Memorandum to the Oregon Board of Forestry dated November 4, 2020 (the "Memo").

In Answer # 1 of the Memo, the DOJ states:

> "The legislature, in ORS 526.016, authorizes the Board to supervise all matters of forest policy or management. The Board's authority from this statue is broad and comprehensive. This authority, combined with the rulemaking authority in ORS 526.016(4) and ORS 527.715, support the conclusion that the Board has authority to determine the goals for supervision of forest policy and management, including establishing forest carbon and climate change-related goals, if the Board determines that is appropriate as a matter of forest policy and management."

The above answer supports the position that the Oregon Board of Forestry currently holds statutory authority:

- to provide policy direction to the State Forester and the Department of Forestry in respect of climate change goals, including consideration of leasing for wind energy potential on Department of Forestry lands as a means to achieve climate change-related goals; and
- to include wind energy as a renewable energy source to consider in Goal G objectives

Thank you for your kind attention to this testimony.

Sincerely,

Jeffrey Wagner
President, wpd wind projects Inc.

Cc by email:

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John.a.tokarczyk@oregon.gov
Danny.norlander@oregon.gov
Catherine.mcdonald@oregon.gov
Oregon.GWC@Oregon.gov

TO: Oregon Board of Forestry
CC: Oregon Global Warming Commission
FROM: Oregon Wild
DATE: 11/16/2020
RE: Written Testimony, Oregon Wild
Agenda Item #4: DOJ Memorandum on Statutory Authority relating to Carbon and Climate
Oregon Board of Forestry – Virtual Public Meeting
Wednesday, November 4, 2020

This year, the Board of Forestry (the Board) asked the Oregon Department of Justice (DOJ) a series of questions to clarify its authority for rulemaking and policymaking as it relates to carbon and climate. The DOJ's response affirms that the Board does indeed have broad authority to regulate forest carbon under the Forest Practices Act, and that the Board does have the authority to establish climate change and forest carbon goals under ORS 526.016. This clarification now enables the Board to move forward with implementing Governor Brown's Executive Order 20-04. As such, we urge the Board to pursue policies that position the State as a national leader in 21st century climate-smart forest management. Now is a critical time in the effort to slow the most dire impacts of global climate change and the Board must recognize this opportunity to harness the internationally important carbon potential of Oregon's forests.

Oregon's forests offer some of the most carbon-rich ecosystems in the world. Capturing the potential of this massive carbon sink should be at the forefront of the Department of Forestry's (ODF) efforts to combat climate change. The two biggest steps Oregon can take to confront the global threat of climate change will be to protect and grow its forests to sequester more carbon, and reduce its greenhouse gas emissions from logging — its largest source of carbon emissions.[1] Preserving western forests with high and medium carbon-storing abilities would be the equivalent of halting eight years of burning fossil fuels in the same western states,[2] with the largest 1 percent of trees in mature and older forests comprising 50 percent of the biomass, storing half a forest's carbon.[3]

This science directly counters the common misconception that young trees sequester more carbon — it is actually mature and old growth forests that offer the most climate value, and any credible forest carbon

[1] Beverly E. Law, Tara W. Hudiburg, Logan T. Berner, Jeffrey J. Kent, Polly C. Buotte, Mark E. Harmon 2018. Land use strategies to mitigate climate change in carbon dense temperate forests. Proceedings of the National Academy of Sciences DOI: 10.1073/pnas.1720064115
https://web.archive.org/web/20180727130028/http://www.pnas.org/content/pnas/115/14/3663.full.pdf
[2] Polly C. Buotte, Beverly E. Law, William J. Ripple, Logan T. Berner 2019. Carbon sequestration and biodiversity co-benefits of preserving forests in the western United States. Ecological Applications DOI: 10.1002/eap.2039.
http://opb-imgserve-production.s3-website-us-west-2.amazonaws.com/original/buotte_eap.2039_accepted_1576697573797.pdf
[3] James A. Lutz, Tucker J. Furniss, Daniel J. Johnson, Stuart J. Davies, et. al. 2018. Global importance of large-diameter trees. Global Ecology and Biogeography. DOI: 10.1111/geb.12747
https://www.fs.fed.us/rm/pubs_journals/2018/rmrs_2018_lutz_j001.pdf

strategy must start with growing and retaining older, larger trees. The forests of the Pacific Northwest also offer cultural value to indigenous peoples and outdoor recreation opportunities to nature enthusiasts. Healthy forests help improve climate resilience to impacts like drought and wildfire and they support clean water and habitat for fish and wildlife.

The next steps the Board should take are clear. In the Report on Proposed Actions for Executive Order No. 20-04 that ODF produced in May 2020,[4] it stated that: *"Following input from the DOJ and revision of the climate change goal, the Board and department plan to implement a systematic review of all statutes and rules as they relate to climate change, greenhouse gas mitigation, climate adaptation, and the impact of the regulations on meeting policy and executive goals."*

We look forward to an open and transparent revision of the climate change goal (Goal G) that allows for stakeholder engagement, and we urge the Board to expand upon its review of statutes and rules to identify where these policies create barriers to implementation of EO 20-04 and produce recommendations for how these policies can be updated and expanded to best address climate change, greenhouse gas mitigation, and climate adaptation. This is also a matter of utmost urgency, and the Board of Forestry and ODF staff should establish a clear timeline for adoption of policies to implement the Oregon Climate Action Plan. As part of this effort, we ask the Board and ODF to consider the following guiding principles as they pursue implementation of EO 20-04:

1. Use the best available science for all forest management decisions and focus on climate solutions that are durable and within ODF's control. There are numerous sources of misinformation regarding best practices for climate-smart forestry, as well as efforts to distract agencies from forest conservation strategies to focus instead on dubious carbon claims around wood products.[5] We ask that the Board and ODF ensure that all studies referenced during the decision making process come from reputable academic and research institutions, be subject to rigorous peer review, and that the funding for referenced studies remain independent of logging interests.
2. Ensure that vulnerable communities and minority populations are given equal access to the decision-making process and ensure that equity and inclusion are considered alongside desirable environmental outcomes in any forest policy.
3. Ensure forest management policies account for lifecycle carbon emissions and promote ecological health in both the near term and long term. For example, some management practices (such as prescribed fires and non-commercial thinning of small-diameter trees in Oregon's Eastern and Southwestern forests) may result in near-term emissions, but if done correctly could ensure ecological health and better climate resilience in the long-term.

[4] Oregon Department of Forestry 2020. Report on Proposed Actions for Executive Order No. 20-04. https://www.oregon.gov/gov/Documents/2020%20ODF%20EO%2020-04%20Implementation%20Report.pdf

[5] USDA 2009. Forest Service Global Change Research Strategy, 2009–2019. https://www.fs.fed.us/climatechange/documents/global-change-strategy.pdf

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Bend, Oregon 97701
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4. Ensure that the carbon benefits of any policy recommendation are quantifiable and account for both direct and indirect impacts to the carbon pool, including soil carbon, carbon in dead biomass, carbon in wood products and waste material from logging and processing.
5. Ensure that forest management practices aim to optimize net carbon sequestration, storage, and stocks. While efforts to enhance carbon sequestration and grow Oregon's forest carbon sinks should be compatible with other ecological values, such as clean water and biodiversity conservation, where conflicts do exist the Board should balance carbon storage with other ecologically desirable outcomes, using the social cost of carbon to weigh the impacts of any potential emissions.

The Science Already Supports Several Near-Term Policy Opportunities

We consider the following practices "low-hanging fruit" as the Board and ODF seek to *"prioritize actions that reduce GHG emissions in a cost-effective manner,"* and *"prioritize actions that will help vulnerable populations and impacted communities adapt to climate change impacts"* as directed in EO 20-04.[6]

Decades of scientific study — including research from world leaders in forest climate science from Oregon State University — clearly demonstrate the need for action. While some climate smart opportunities will be more challenging and time consuming to fully implement, the Board has the authority to act quickly on other fronts even as it continues to facilitate further research.

1. **Lengthen logging rotations**
   The best available science[7] has made clear that current standard logging rotations (often as short as 35 years) short-circuit the ability of forests to maximize carbon stored.[8] By allowing trees to grow longer the Board can improve carbon stocks while also increasing fiber yield, timber quality, and financial return.
2. **Retain more trees during harvest and promote diversity of species as opposed to monoculture plantations**
   Greater retention of standing trees after logging will keep more carbon on site, help to make regrowing forests more resilient to natural disturbance, reduce the need for widespread aerial pesticide applications, and provide for more higher-quality habitat for native species.
3. **Eliminate logging in biologically significant, carbon-rich mature and old growth forests, and in forests with the highest carbon potential**
   Mature and old growth forests store immense amounts of carbon. Research has shown that our remaining unlogged native and old growth forests store nearly three times the carbon than

[6] EO 20-04. https://www.oregon.gov/gov/Documents/executive_orders/eo_20-04.pdf
[7] Beverly E. Law, Tara W. Hudiburg, Logan T. Berner, Jeffrey J. Kent, Polly C. Buotte, Mark E. Harmon 2018. Land use strategies to mitigate climate change in carbon dense temperate forests. Proceedings of the National Academy of Sciences DOI: 10.1073/pnas.1720064115 https://web.archive.org/web/20180727130028/http://www.pnas.org/content/pnas/115/14/3663.full.pdf
[8] Harmon, M.E. 2019. Have product substitution carbon benefits been overestimated? A sensitivity analysis of key assumptions. Environ. Res. Lett. in press https://doi.org/10.1088/1748-9326/ab1e95

industrially managed lands. Wherever native stands of large trees exist, they should be protected as climate reserves. Further, the Board and ODF should work to identify areas of the highest carbon storage potential that should also be protected as part of this carbon reserve. These same stands also provide the highest quality habitat for salmon and other at-risk wildlife, helping the Board and ODF achieve two objectives at once.

4. **Seek climate-friendly provisions in the upcoming Habitat Conservation Plan (HCP) process**
   Upcoming negotiations based on the passage of SB 1602 in 2020 will focus on modernizing Oregon Forest Practices Act (OFPA) rules in order to benefit aquatic and riparian-dependent species. These negotiations should also optimize potential climate co-benefits outlined in EO 20-04, along with other key environmental concerns including better rules around riparian buffers, steep slope logging, cumulative impacts.
5. **Ensure better incentives for small family forest owners to implement climate-smart forestry on their lands**
   The Board and ODF should promote stronger incentives and market development for small family forest owners willing to implement climate-smart forestry on their lands, including better state incentives for the production of FSC certified wood products.[9]
6. **Focus wildfire defense investments on preparing communities as opposed to backcountry logging, and ensure post-fire recovery efforts account for equity concerns**
   Logging contributes to further carbon emissions, while doing little to protect homes and communities during wildfire season. More effective ways of preparing communities for more intense, climate-influenced fire seasons include home hardening and retrofitting to be more fire-wise, reducing fuels in the home ignition zone, and limiting new development in high-risk areas.

Regarding Carbon Offsets

As part of EO 20-04, both the Department of Environmental Quality (DEQ) and the Environmental Quality Commission (EQC) have been directed to jointly establish a cap and reduce program for GHG emissions, and the Board and ODF will be expected to provide input on a potential carbon offsets component.

While we believe that a direct incentive program for private landowners may be a better climate solution than an offset program, we recognize that a carbon offsets program within Oregon has the potential to provide financial support for forest protections on private lands. In Oregon, small forest owners have few options when it comes to restoring and protecting older forests on their property, as current tax and financial incentives are geared strongly towards short rotation logging as opposed to protecting valuable carbon stocks. But while a carbon offset program holds promise as a climate solution, there are also several challenges that can undermine its effectiveness. As such, Oregon Wild has several policy priorities we advise the board to take under consideration:

[9] Ecotrust. Climate-Smart Forestry https://ecotrust.org/project/climate-smart-forestry/

1) Any future carbon offset program policies must incorporate strong integrity mechanisms that do not enable any toxic air or water pollution elsewhere, with special consideration for communities of color and lower income areas that are already facing higher pollution burdens.
2) Forest offset projects must be durable and aim toward long-term storage — that is, they should not only sequester carbon, but also be managed to withstand the stresses of a changing climate in the long-term. Forest projects should be managed for species diversity and climate resilience, with an emphasis on natural forest composition.
3) Forest offset projects must be additional — that is, they must incentivize forest practices that are better for the climate than business-as-usual as opposed to rewarding people for current practices. Further, an offset program should incorporate requirements for credit replacement by forest owners for any intentional reversals.
4) The carbon benefits of any projects must be quantifiable and verifiable, and therefore ODF must establish a working third-party accountability program with the DEQ and the EQC with the capacity to ensure this. This program must account for industry-based emissions, including emissions from fuel use in industry operations, soil disturbance during harvest operations, and the estimated loss of carbon when a tree is harvested, transported, and processed into wood products. Approved offset transactions must be subject to third-party follow up monitoring to ensure compliance over time, with meaningful penalties should a party violate their commitments.
5) An offset program should incorporate meaningful buffer accounts that are large enough to mitigate for natural processes that impact carbon sequestration, like wildfire.
6) Any offset program must be comprehensive, covering all carbon emitting sectors of the economy. An effective offset program must avoid leakage of GHG emissions in unregulated sectors.

In addition, the Board and ODF should work closely with small family forest owners to ensure an open and transparent decision-making process. Any future offsets program should focus on privately owned lands, as there are few options for ensuring protections of these forests and they have significant potential in terms of carbon sequestration — data has shown that the carbon stocks on privately owned forests in western Oregon's Coast Range are only a third of their ecological potential.[10] Publicly owned forests are already, by law, held to higher standards for balancing multiple values and should therefore not be included in offset mechanisms.

[10] Stephen Fain, Brian Kittler, Amira Chowyuk 2018. Managing Moist Forests of the Pacific Northwest United States for Climate Positive Outcomes. Forests. 10.3390/f9100618 https://www.mdpi.com/1999-4907/9/10/618

County Forest Trust Land Advisory Committee Testimony

Chair Imeson, Members of the BOF, and State Forester Daugherty, I'm John Sweet, Coos County Commissioner, and Vice Chair of CFTLAC.

The more I think about BOF's decision to move ahead with the process to implement the proposed HCP on the Trust Lands, the more upset I become, both as a Trust Land County Commissioner and as a citizen and taxpayer of our State.

Three times now courts have ruled that the counties' rights regarding management of the Trust Lands are being ignored. The latest decision resulted in a billion dollar judgement against the State. That, too, is being ignored in spite of interest which is accruing at the rate of a quarter million dollars a day. The judgement is divided into two parts, past damages and future damages. It would seem reasonable to expect that ODF and the BOF would be working to mitigate future damages which exceed $300 million. We're talking about serious money here!

But, no, instead of working to reduce future damages, ODF and the BOF seem intent on increasing them. Have ODF and the BAF notified the governor's office and the legislature of where this is going?

On top of the dollars involved in the Linn County lawsuit, the State is the beneficiary of the vast majority of annual Trust Lands' harvest proceeds. ODF receives just over one third. The remaining two thirds goes to the counties which in turn distribute it to local taxing districts including schools, which receive 40 to 50 percent of the two thirds or another one third of the whole. This reduces almost dollar for dollar what the State pays into the school equalization program. Is the State aware of how an HCP that reduces acreage available for harvest to less than half of the Trust Land acreage will decrease ODF and school funding? Where will the money currently generated from Trust Lands come from to fund ODF and our schools once half those lands are put off limits to harvest? Millions of dollars are at stake.

Surely, reduced harvest levels under the HCP will put people out of work. Has anyone calculated what this will cost the State in increased safety net benefits and, more importantly, in loss of human capital?

Given the State's current financial condition and the incidence of poverty in many of our rural counties, why are we considering a HCP which drastically reduces harvest?

Keep in mind that hundreds of thousands, no, millions of acres of Oregon forest lands have already been set aside almost entirely for environmental purposes. Add it up. Our national forests, the BLM managed O&C Railroad and Coos Bay Wagon Road Lands, and the Elliott State Forest are already providing for little to no harvest. They have systematically been precluded from any reasonable level of

harvest. Where does all this stop? Are our efforts to limit harvest on public lands resulting in too much harvest pressure on private lands? By restricting harvest on Oregon's lands which are subject to environmental regulation, are we driving harvest out of our country to places like Brazilian rainforest which is being depleted at an alarming rate. Check with U.S. plywood producers whose market share in our own country was being taken by Brazilian producers until they encountered quality problems if you think this is not happening. The unintended consequences of our unnecessary harvest restrictions are real and pose serious threats to our global environment.

An lastly, has anyone at ODF or the BOF taken time to compare the incremental gain in environmental well-being to the incremental loss of revenues, jobs, and human capital that will result from the HCP? These are not apples to apples comparisons, but they have to be done. You have a duty to see that the Trust Lands are managed for economic,

social, and environmental benefits. The proposed HCP does not even come close to doing this. Please abandon it or insist on better terms.

Respectfully submitted,

John W. Sweet

OREGON FOREST CARBON ACCOUNTING FRAMEWORK

- Introduction and Background
- Presentations
    1. Forest Ecosystem Carbon
    2. Harvested Wood Products Carbon
    3. Oregon Sawmill Energy Consumption and Production
    4. Forest Management Simulations for Carbon Mitigation

Oregon Board of Forestry

- **Goal G** in the *Forestry Program for Oregon*: Improve carbon sequestration and storage and reduce carbon emissions in Oregon's forests and forest products
  - **Indicator G.a.** *Carbon Stocks on Forestlands and Forest Products*

Oregon Global Warming Commission

- mandated by Section 12(1)(i) of HB3543 passed in 2007 directs the Commission to:

"track and evaluate the carbon sequestration potential of Oregon's forests, alternative methods of forest management that can increase carbon sequestration and reduce the loss of carbon sequestration to wildfire, changes in the mortality and distribution of tree and other plant species and the extent to which carbon is stored in tree-based building materials"

OREGON FOREST CARBON ACCOUNTING FRAMEWORK

Based on Monitoring of Historical and Current Processes

Based on Simulations of Future Conditions

Forest Ecosystem Carbon Stocks and Flux

- Live and dead trees
- Live and dead roots
- Understory vegetation
- Fallen logs & branches
- Forest Floor
- Soil

Harvested Wood Products Carbon Stocks and Flux

- IPCC Production Accounting
- Harvests from 1906 to 2017
- Ownership from 1962-2017
- Products in Use, Landfills
- Emissions from fuelwood & decay
- Total Forest and HWP Carbon

Forest Industry Emissions & Energy Production

- Accounted for in industrial sector-DEQ
- Oregon Sawmill Energy Report
- Non-road diesel
- Transportation
- Life Cycle Analysis

Forest Management Scenarios for Carbon Mitigation

- Forest growth and management simulation
- Collaborating with American Forests
- Carbon Budget Model
- Stakeholder process
- Collaborating with MOU partners & PNW RS

Presentations and Biography

Forest Ecosystem Carbon Stocks and Flux

- **Glenn Christensen,** Forester and Forest Inventory Analyst with the US Forest Service's Forest Inventory and Analysis (FIA) Program, at the Pacific Northwest Research Station

Harvested Wood Products Carbon; Oregon Sawmill Energy Consumption & Production

- **Todd Morgan,** Director of Forest Industry Research at The University of Montana's Bureau of Business and Economic Research.

Forest Management for Carbon Mitigation and Simulation Modeling

- **Dr. Werner Kurz,** Senior Research Scientist at the Canadian Forest Service in Victoria, BC
- **Kendall Delyser**, Projects Manager Forest Climate Science with American Forests

Oregon Forest Carbon Inventory Results & PNW Carbon Initiative

- **Glenn Christensen – FIA Inventory Analyst**
- **Andrew Gray – FIA Research Ecologist**
- **Olaf Kuegler – FIA Statistician**
- **Andrew Yost – ODF Forest Ecologist**

USDA U.S. FOREST SERVICE
Caring for the land and serving people
United States Department of Agriculture

Pacific Northwest Research Station

Overview

- Brief overview of Forest Service's Forest Inventory & Analysis Program
- Oregon carbon inventory results: 2001-2016
- Pacific temperate forests regional carbon reporting effort
- Overview of PNW Research Station Carbon Initiative
- Westside Fire Effects and Recovery Study

FIA Current Sampling Design

- All forested lands
  - All states, territories, and U.S. affiliated islands
  - All ownerships – public, private, National Forests, National Parks, wilderness areas, military installations, etc.
- Sampling intensity – Annualized design
  - 10% of all plots measured every year in the western states, 10 year remeasurement cycle
  - Field measured plots permanently located on a base grid of 1 plot per 6,000 acres
  - Starting with 2020 field season, ODF forest lands now measured on intensified sampling grid, same as National Forests and BLM forest lands

FIA is a National Program of 4 Regions a.k.a. “work units”

<u>FIA at PNW</u>

Alaska

California

Oregon

Washington

Hawaii

Guam

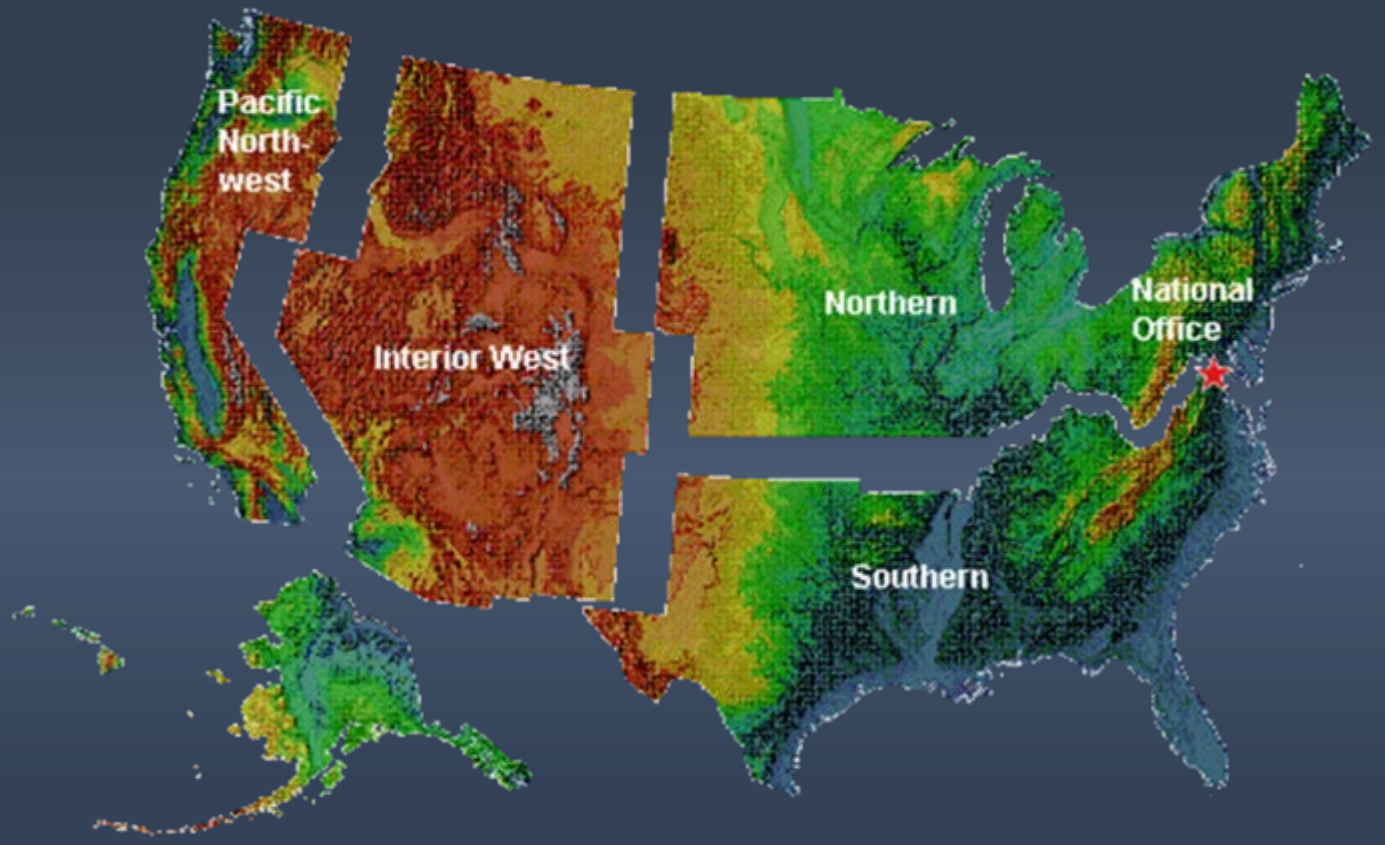
American Samoa

Palau

Marshall Islands

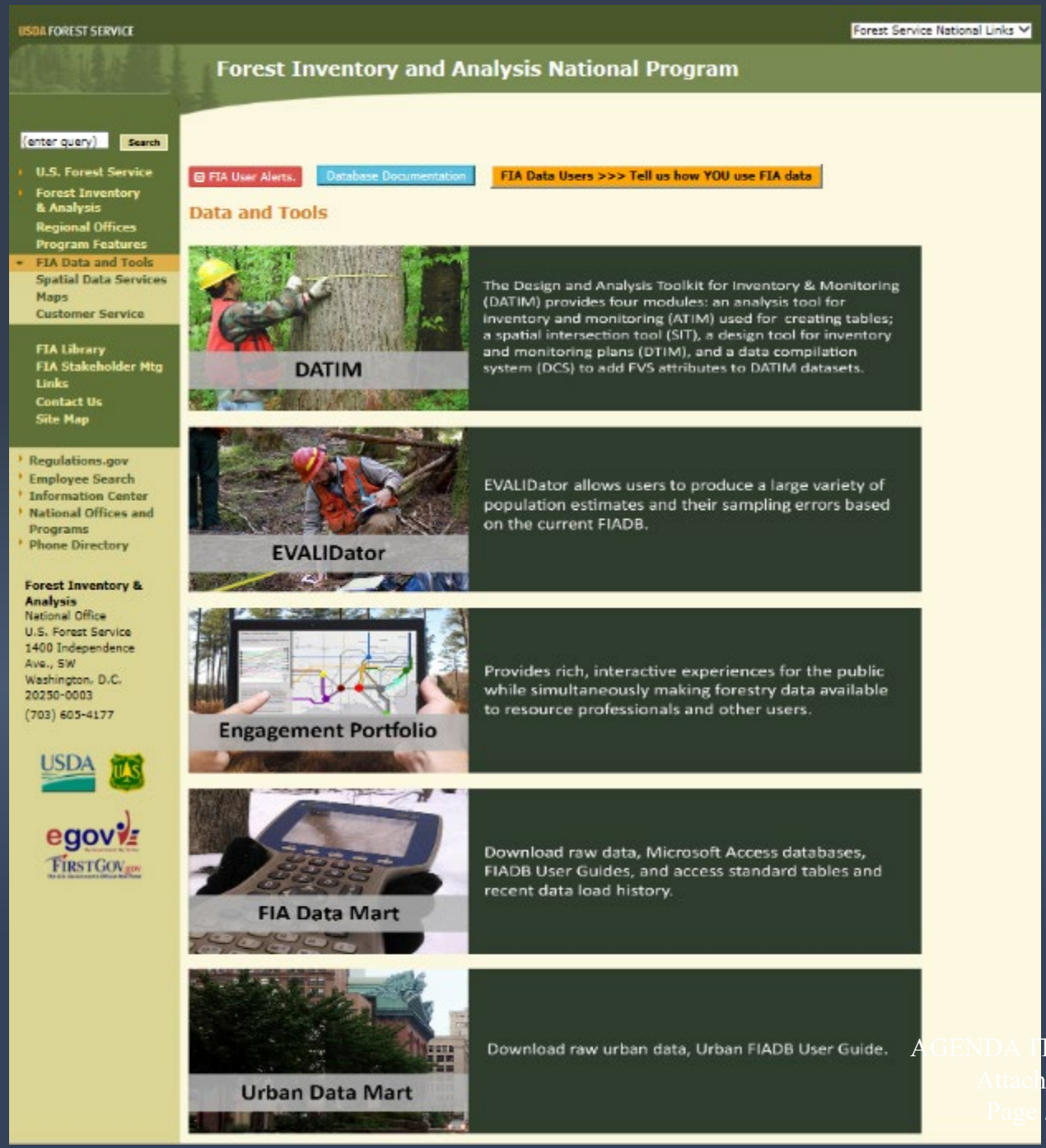
Federated States of Micronesia

Northern Mariana Islands



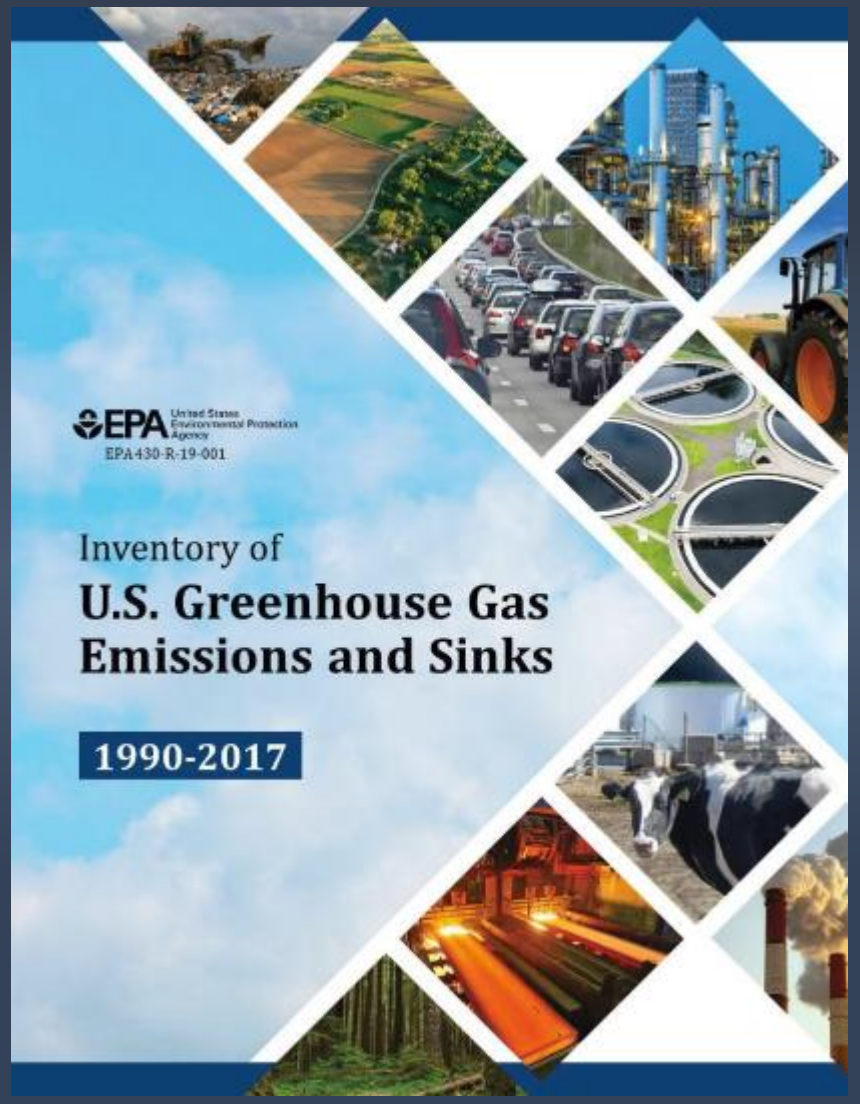
FIA online: www.fia.fs.fed.us

- State summary reports
- Reporting tools
- Data Mart: Download inventory databases
- Documentation and training
- Status of inventory



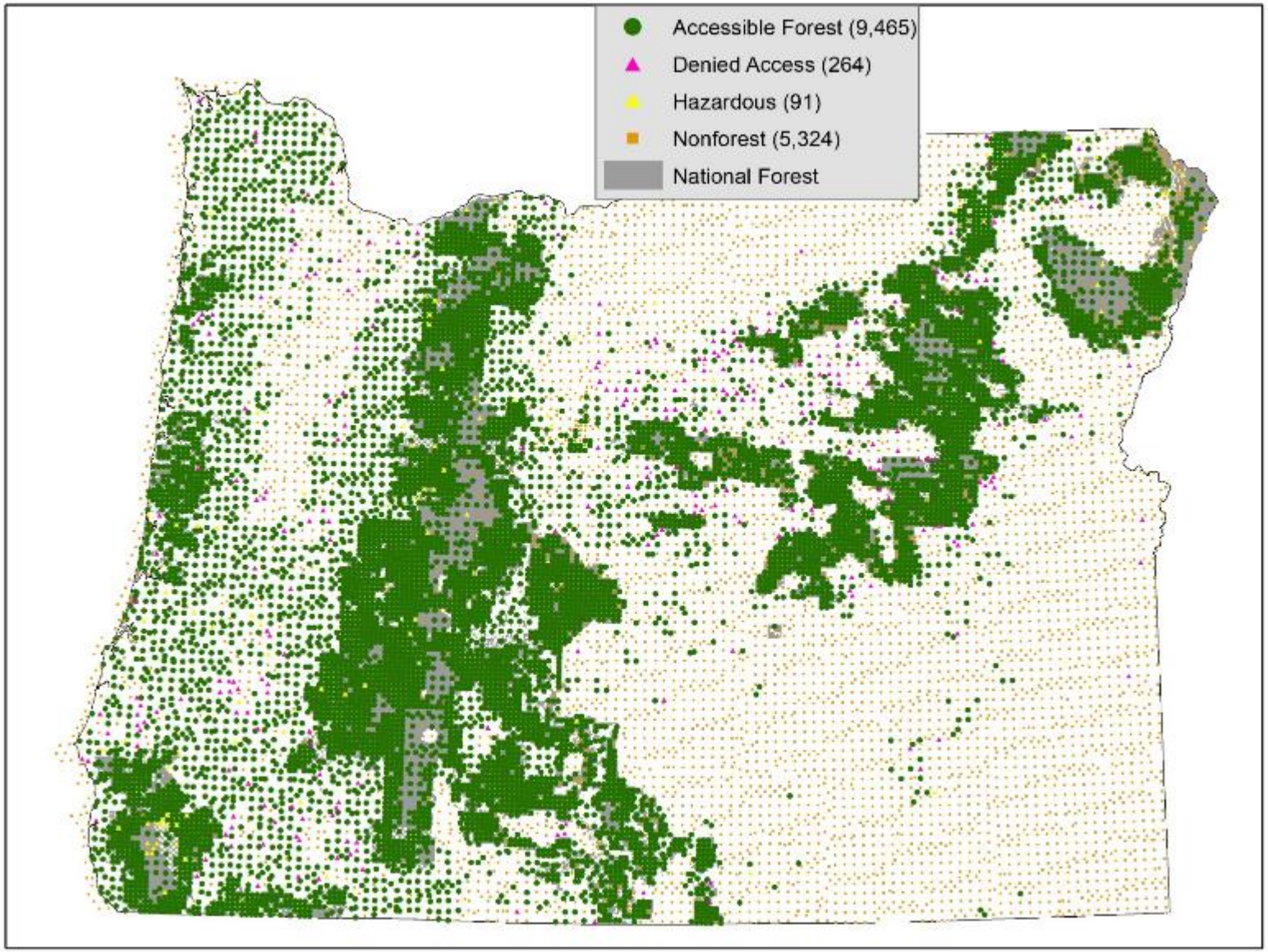
FIA National Program: Carbon Assessments

- US EPA Greenhouse Gas Inventory
- National Climate Assessment
- National Forests Carbon Assessments
- FAO Global Forest Resources Assessment
- UN Land use, Land change and Forestry Assessment



Forest Carbon Reporting at PNW-FIA

- California –
  - 2008: PNW-FIA completed initial baseline carbon estimates for California Air Resources Board in support of California Cap & Trade forest protocol and AB32
  - 2014 – 2018: CAL FIRE funded statewide carbon reports and data updates
  - 2018: Completed statewide carbon report including carbon in harvested wood products (HWP)
- Washington –
  - 2018: Washington Department of Natural Resources requests forest carbon and harvested wood products report. Report completed October 2020. HWP report draft completed.

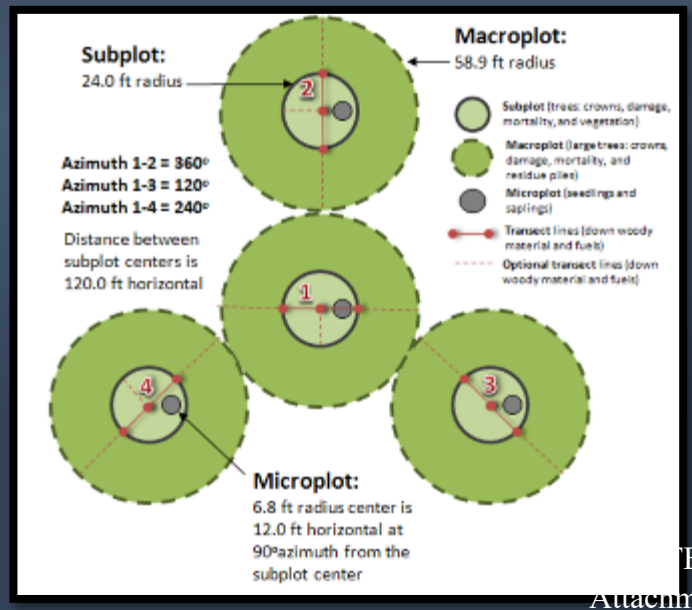


FIA in Oregon

Annual field measurements began 2001

Reporting 10-year period, 2007-2016:

- 9,465 field plots measured
- Includes 4,350 R6 Intensified plots
- 29.7 million ac of forest land
- 10.3 billion trees ≥ 1-inch DBH



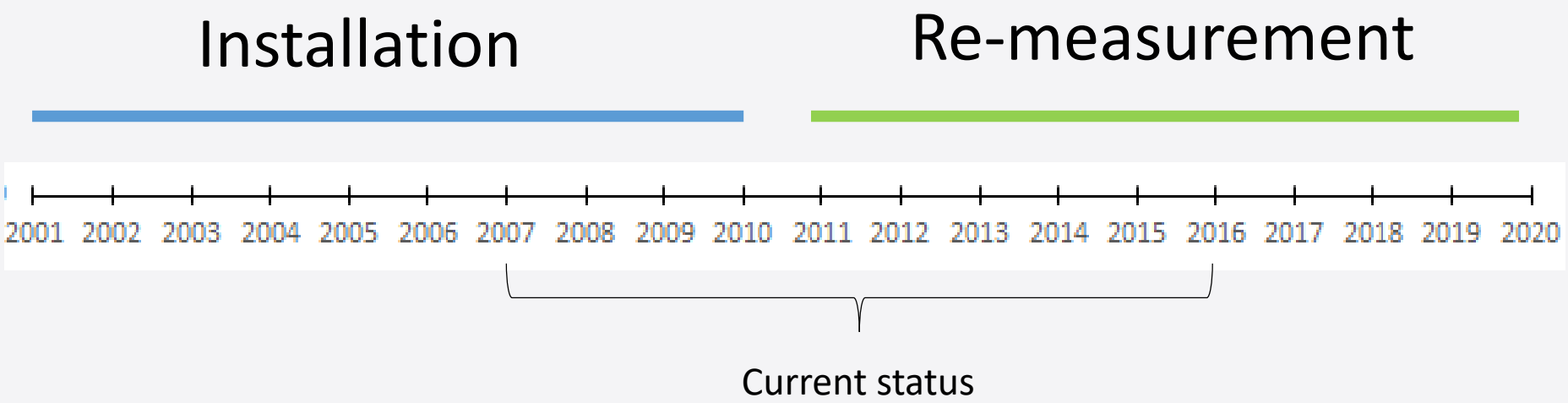
FIA Forest Carbon Pools

- Forest carbon pools include:
  - Live trees
    - Foliage
    - Roots
  - Standing dead trees
    - Roots
  - Downed woody debris
  - Understory vegetation
    - Roots
  - Forest floor – duff and litter
  - Soils
- Carbon stored as harvested wood products – addressed in separate analysis

Forest Carbon Stocks

- **Live trees**: Based on FIA regional biomass equations, adds foliage
- **Standing dead trees**: Same as live trees, including reductions for decay
- **Understory vegetation**: As modeled and populated in FIA Database
- **Down wood debris**: Use collected measurements and National FIA estimation protocol, piles not included
- **Forest floor**: Use collected measurements and national estimation protocol
- **Roots on live and standing dead trees**: Uses National FIA protocol
- **Organic soils**: As modeled and populated in FIA Database using Domke et al. (2017)

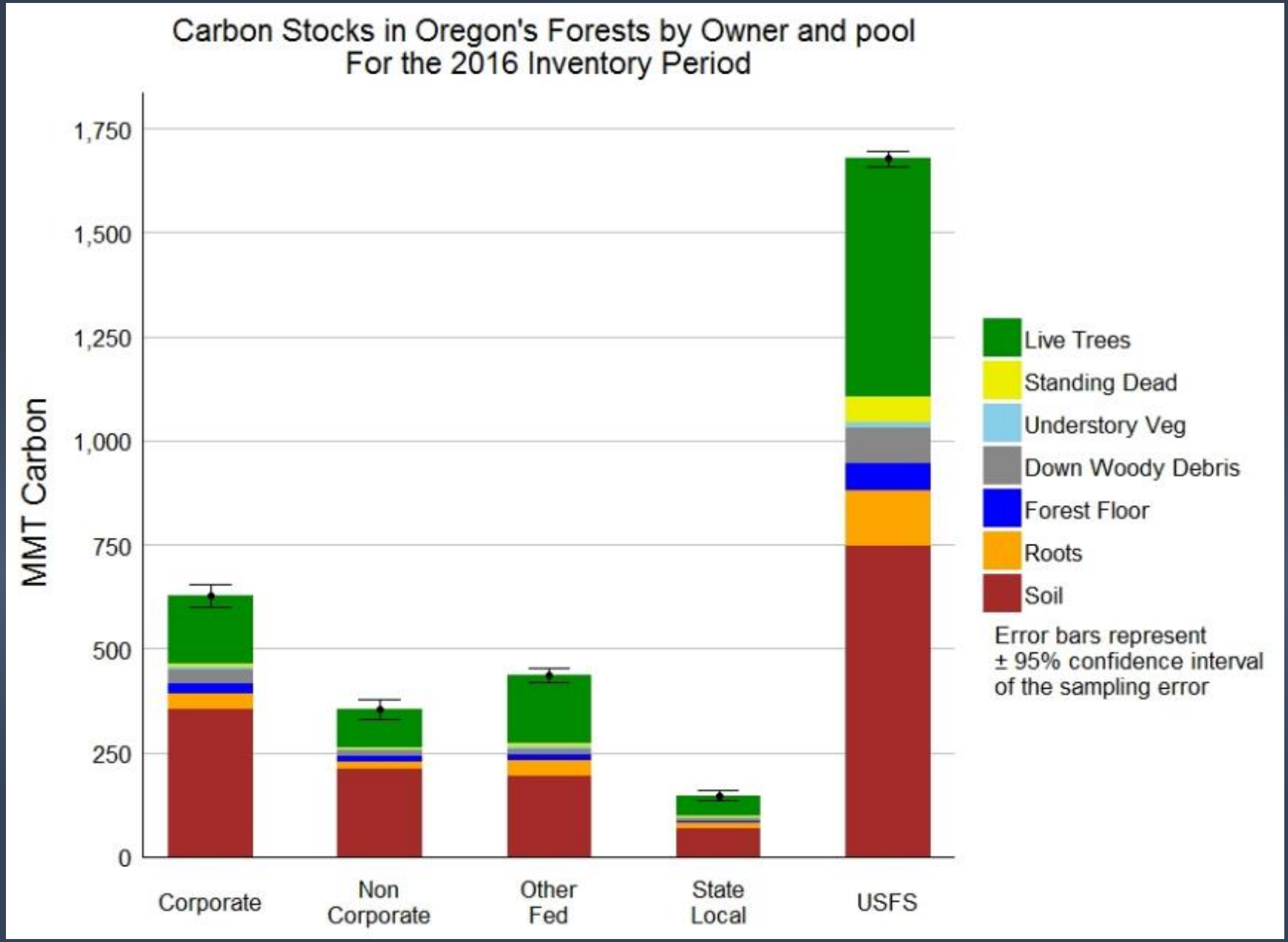
Carbon Stocks, estimate of current status: 10-yr cycle

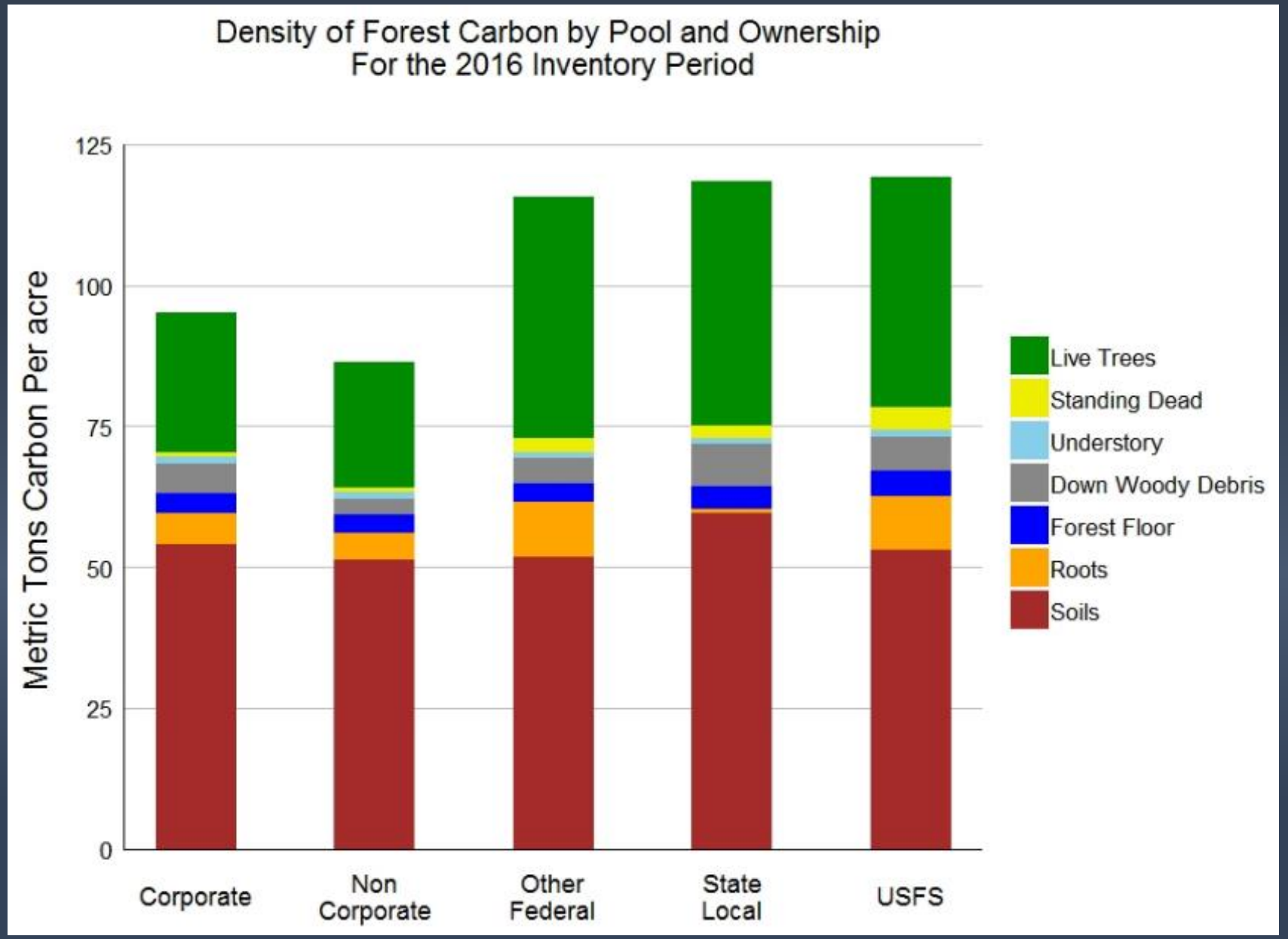


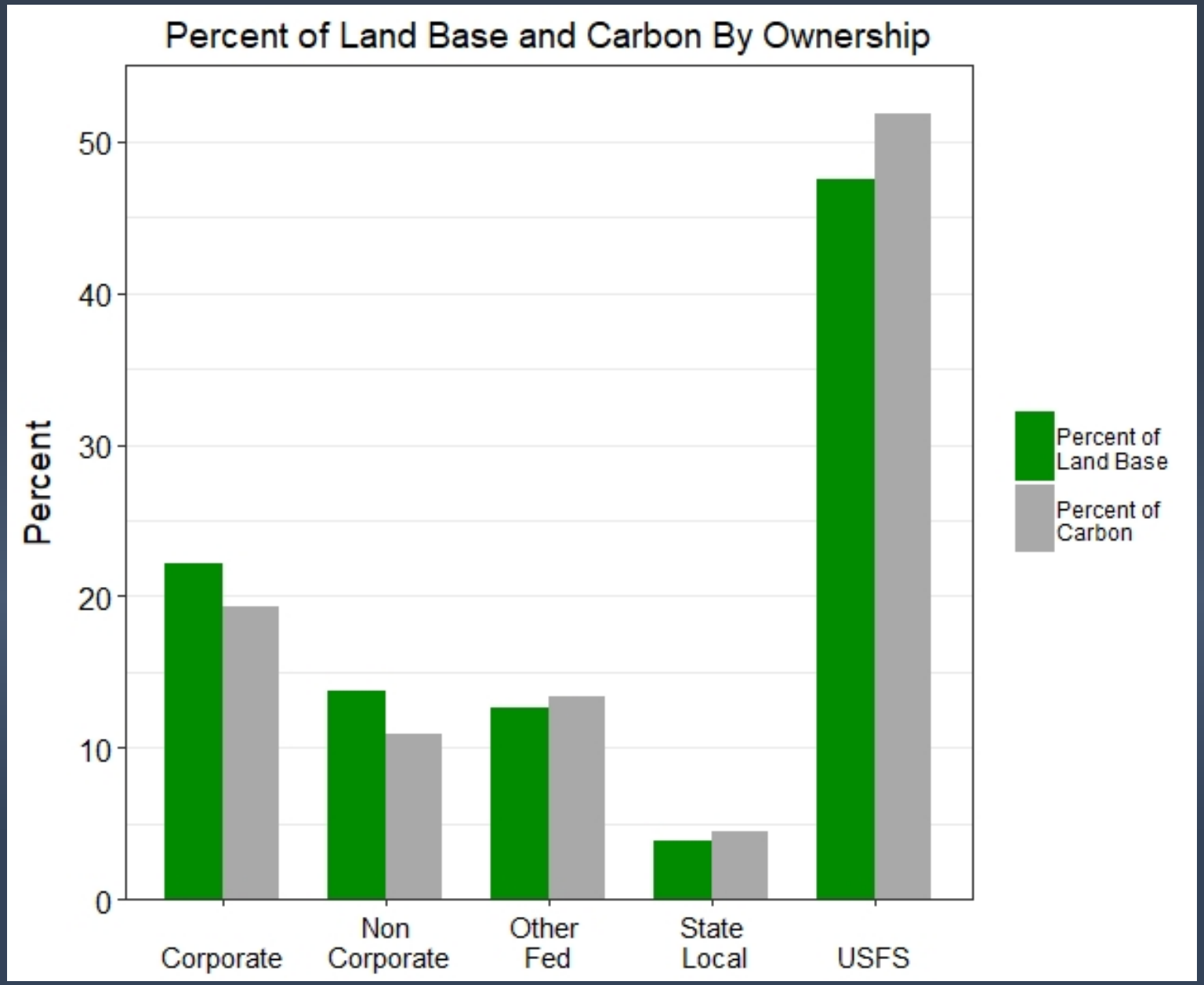
Estimates of carbon stocks based on current 10-year moving average, ex. Oregon 2007-2016

Forest Carbon Stocks: Current Status

Oregon Statewide Forest Carbon Stocks by Forest Pools, 2007-2016		
Forest Carbon Pools	Total Carbon	SE
	million metric tons	
Live Trees	1,039.0	9.6
Standing Dead	79.0	1.6
Understory Veg	34.0	2.1
Down Woody Debris	156.8	1.9
Forest Floor	117.19	0.55
Roots	238.0	2.2
Soil Organic C	1,575.27	7.55
All Pools	3,239.7	16.7


Carbon Stocks in Oregon's Forests by Owner and pool
For the 2016 Inventory Period
MMT Carbon
1,750
1,500
1,250
1,000
750
500
250
0
Corporate
Non Corporate
Other Fed
State Local
USFS
Live Trees
Standing Dead
Understory Veg
Down Woody Debris
Forest Floor
Roots
Soil
Error bars represent ± 95% confidence interval of the sampling error

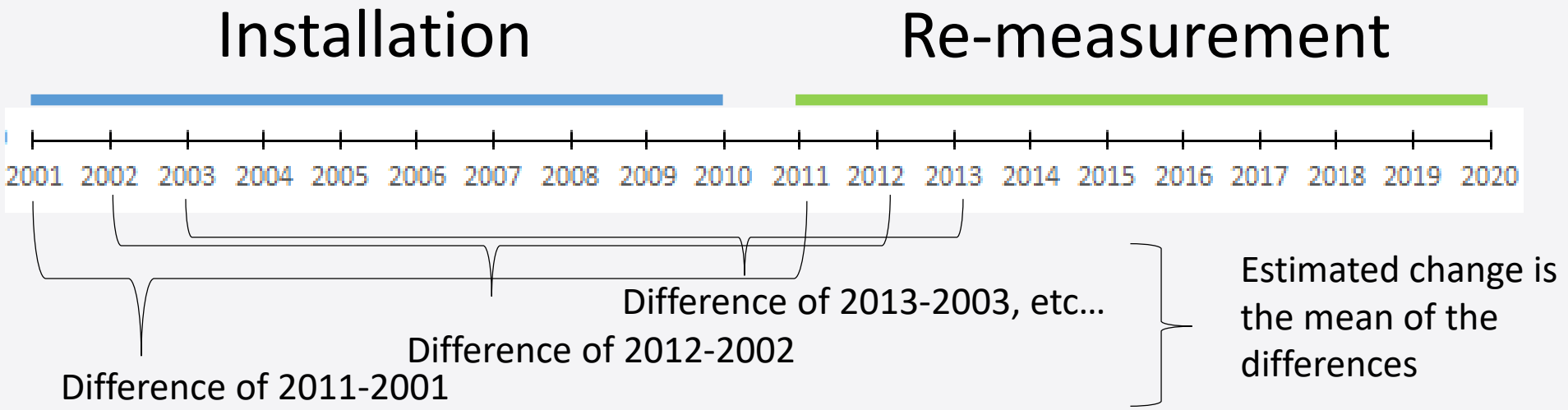

Density of Forest Carbon by Pool and Ownership
For the 2016 Inventory Period
Metric Tons Carbon Per acre
125
100
75
50
25
0
Corporate
Non Corporate
Other Federal
State Local
USFS
Live Trees
Standing Dead
Understory
Down Woody Debris
Forest Floor
Roots
Soils


Percent of Land Base and Carbon By Ownership
Percent
0
10
20
30
40
50
Corporate
Non Corporate
Other Fed
State Local
USFS
Percent of Land Base
Percent of Carbon

Forest Carbon Flux: Estimates of Change

- Every pool of forest carbon has a rate of carbon input and rate of carbon output.
- Flux represents the amount of carbon going into a pool minus the amount going out
- Flux is reported in units of CO_2 equivalents
- Current estimates of forest carbon flux were based on one repeat measurement on 60% of all plots in Oregon.
- 100% of all forest inventory plots are re-measured by 2020 field season
- Annual forest carbon flux is estimated from actual measurements of growth, removals, and mortality

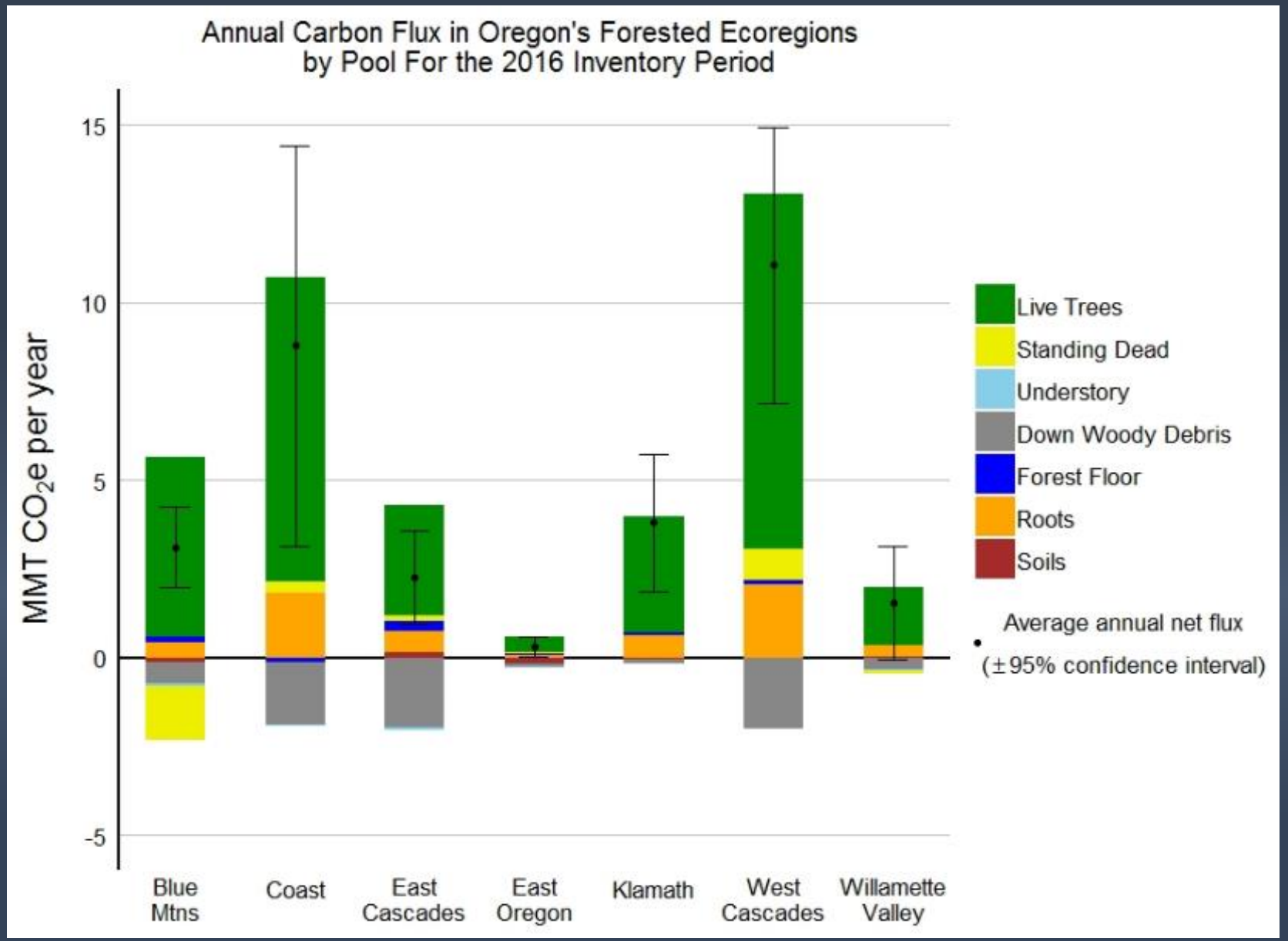
Carbon Flux: estimate of change on remeasured plots

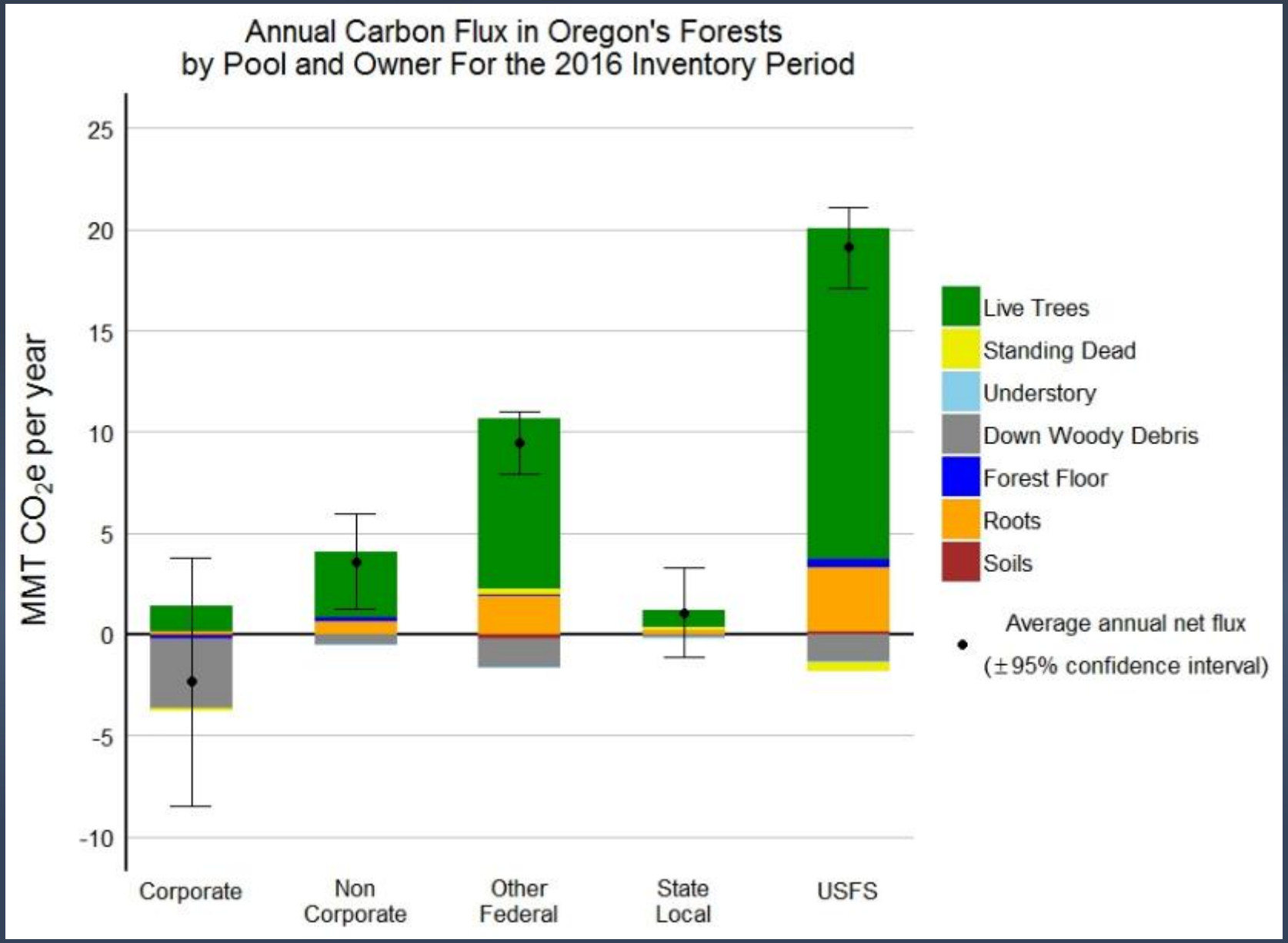


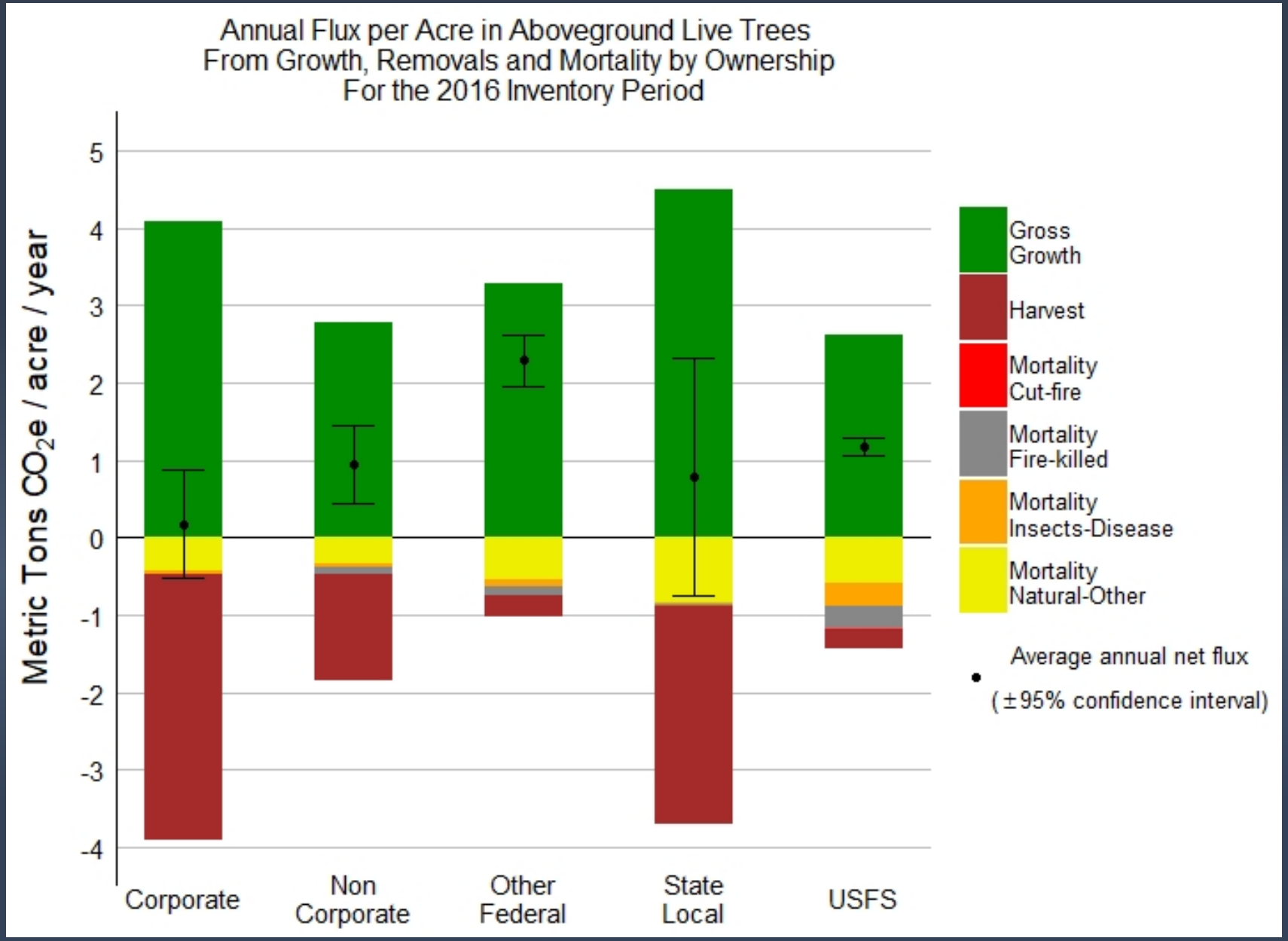
Change (flux) is based on the measured growth on the same set of plots and trees 10 years apart. Estimated carbon flux is the average change of the 10 year periods.
As of 2016, 60% of all FIA plots were remeasured.

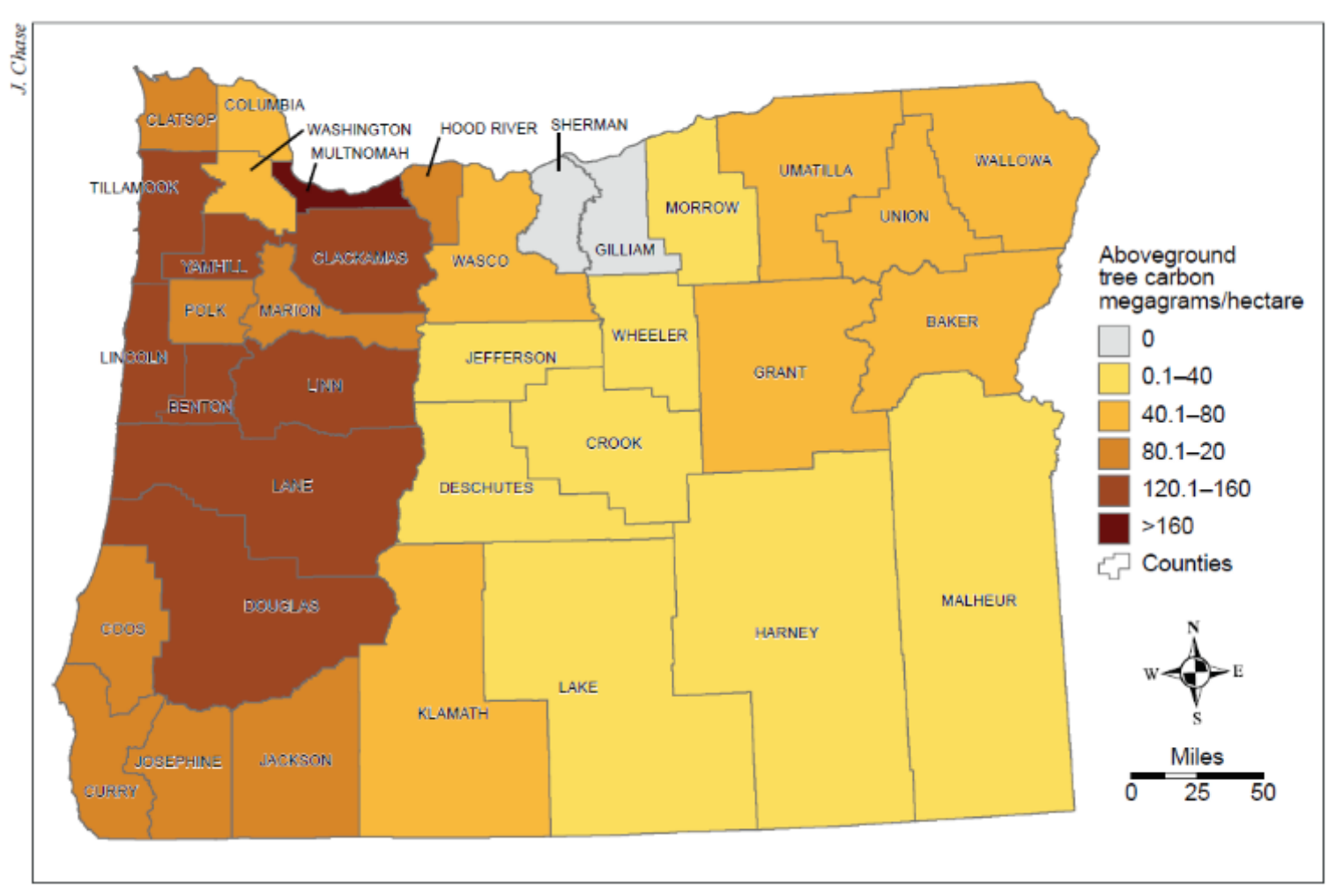
Annual Carbon Flux (CO_2e) on Forest Land by Pool, All Ownerships: 2001-2006 to 2011-2016

Annual Net CO2e Flux From Forest Pools in Forest Land Remaining Forest Land, 2001-2006 to 2011-2016		
Forest Carbon Pools	**Net flux**	
	Total	SE
	Million Metric Tons CO2 equivalent/yr	
Live Trees	31.73	2.90
Standing Dead	-.018	0.68
Understory Veg	-0.21	0.04
Down Woody Debris	-6.82	0.82
Forest Floor	0.56	0.13
Roots	5.98	0.69
Soil	-0.17	0.29
Net flux All Pools	30.91	3.77


Annual Carbon Flux in Oregon's Forested Ecoregions
by Pool For the 2016 Inventory Period
MMT CO_2e per year
15
10
5
0
-5
Blue Mtns
Coast
East Cascades
East Oregon
Klamath
West Cascades
Willamette Valley
Live Trees
Standing Dead
Understory
Down Woody Debris
Forest Floor
Roots
Soils
Average annual net flux
(±95% confidence interval)


Annual Carbon Flux in Oregon's Forests
by Pool and Owner For the 2016 Inventory Period
MMT CO_2e per year
25
20
15
10
5
0
-5
-10
Corporate
Non Corporate
Other Federal
State Local
USFS
Live Trees
Standing Dead
Understory
Down Woody Debris
Forest Floor
Roots
Soils
Average annual net flux
(±95% confidence interval)


Annual Flux per Acre in Aboveground Live Trees
From Growth, Removals and Mortality by Ownership
For the 2016 Inventory Period
Metric Tons CO_2e / acre / year
5
4
3
2
1
0
-1
-2
-3
-4
Corporate
Non Corporate
Other Federal
State Local
USFS
Gross Growth
Harvest
Mortality Cut-fire
Mortality Fire-killed
Mortality Insects-Disease
Mortality Natural-Other
Average annual net flux
(±95% confidence interval)



Source: Figure 17, PNW-GTR-971 (2018) Oregon's Forest Resources, 2006-2015 FIA Report

Note: FIA considers Hood River County westside forest land

Live tree Carbon Stocks and Net Flux on Forest Land by Westside/Eastside County Groups

<u>Westside Counties (75% of live tree stocks)</u>
Live tree stocks: 780.9 MMT (SE: 9.9 MMT)
Public: 73% Private: 27%

Net CO_2e Flux: 22.4 MMT/yr
(SE: 2.8 MMT/yr)

<u>Eastside Counties (25% of live tree stocks)</u>
Live tree stocks: 258.3 MMT (SE: 4.3 MMT)
Public: 82% Private: 18%

Net CO_2e Flux: 7.6 MMT/yr
(SE: 0.8 MMT/yr)

Oregon Annual Carbon Flux (CO_2e) by County Group and Pool: 2001-2006 to 2011-2016

Westside Counties		
	Net flux (CO_2e)	
Forest Carbon Pool	**Total** *(MMT/yr)*	**SE** *(MMT/yr)*
Live Trees	24.4	2.8
Standing Dead	0.8	0.5
Understory Veg	-0.1	0.03
Down Woody Debris	-4.0	0.7
Forest Floor	0.1	0.1
Roots	4.9	0.6
Soil	0.01	0.2
Net flux All Pools	25.4	3.7

Eastside Counties		
	Net flux (CO_2e)	
Forest Carbon Pool	**Total** *(MMT/yr)*	**SE** *(MMT/yr)*
Live Trees	7.6	0.8
Standing Dead	-0.9	0.4
Understory Veg	-0.1	0.02
Down Woody Debris	-2.8	0.4
Forest Floor	0.4	0.07
Roots	1.4	0.2
Soil	-0.2	0.2
Net flux All Pools	5.5	1.0

Oregon Annual Carbon Flux (CO_2e) by County Group and Ownership: 2001-2006 to 2011-2016

Westside Counties

Ownership	Net flux (CO_2e) Total *(MMT/yr)*	Net flux (CO_2e) SE *(MMT/yr)*
Forest Service	14.5	0.8
Other Federal	9.4	0.8
State and Local	0.9	1.1
Corporate	-2.3	3.1
Noncorporate	2.8	1.1
All Ownerships	25.4	3.7

Eastside Counties

Ownership	Net flux (CO_2e) Total *(MMT/yr)*	Net flux (CO_2e) SE *(MMT/yr)*
Forest Service	4.6	0.6
Other Federal	0.08	0.3
State and Local	0.1	0.1
Corporate	-0.03	0.5
Noncorporate	0.8	0.7
All Ownerships	5.5	1.0

Pacific Temperate Forest Carbon Stocks and Flux

- Regional report including all West Coast forest land, all ownerships
- Coordination with California, Oregon, Washington and British Columbia
- Uses current FIA and British Columbia forest inventories
- FIA inventory includes complete remeasurement of first 10-year cycle
- Phase 1: Initiated in 2020, funded by Cal Fire
- Phase 2: Harvested wood products, not funded

Phase 1: Report Content and Timeline

- Report content includes region-wide carbon stocks and flux by:
  - Ownership
  - Ecological region
  - Moisture regime
  - Forest productivity
  - Disturbance impacts
  - Forest land conversion
- Ecological capacity of Pacific temperate forests to store and sequester carbon
- Set of ecological metrics to monitor forest carbon pools to track progress toward state and regional goals
- Timeline: Report delivery 6/30/2022

PNW Research Station Carbon Initiative

- Established Sept. 2019: PNW hosted Forest Carbon Dynamics Workshop, Portland OR.
- Stakeholder driven, identified 3 initial research objectives:
    1. Carbon science synthesis – literature review summarizes current knowledge and information gaps
    2. Carbon model assessment – evaluates strengths, limitations, and data inputs of current carbon models.
    3. Carbon fluxes and implications of management strategies – define forest management and utilization scenarios addressing forest health, socio-economic and other resource objectives to run carbon model projections.

Carbon fluxes and implications of management strategies

- Pacific Temperate Forest Carbon Report as modeling baseline
- Regional timber and wood product flow analysis
- Scenario development goals include:
  - Developing science-based climate mitigation targets for emissions reductions, understand disturbance effects on target development.
  - Understanding carbon impacts from forest management/utilization across different ownerships to improve forest resilience/achieve State-level goals.
  - Understanding how changes to forest management/utilization in one area may affect the region.
- Initial modeling to begin in 2021 (i.e., model calibration, business-as-usual model run for selected landscapes)

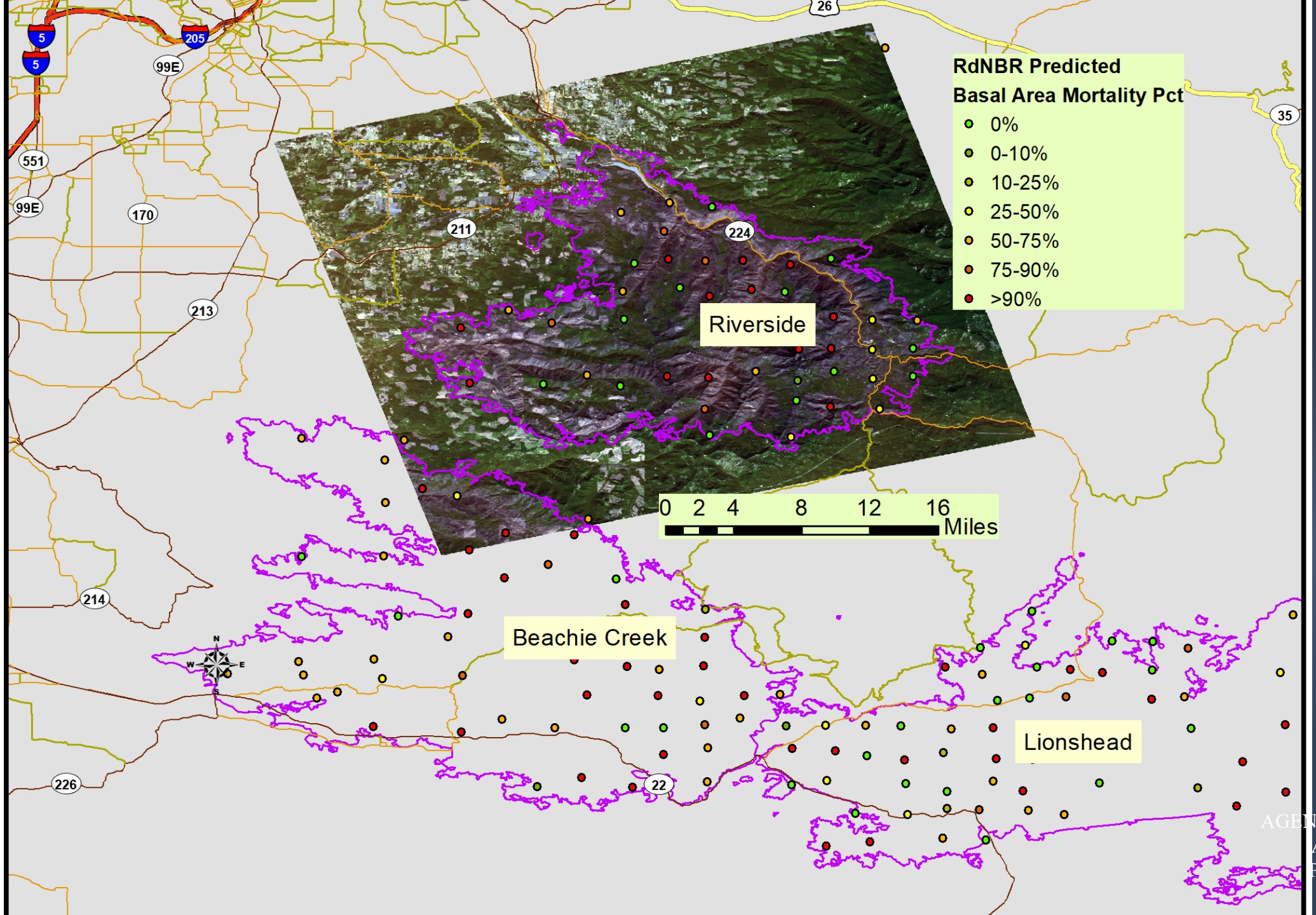
Westside Fire Effects and Recovery Study (WFERS) 2021

Owner	Archie Creek	Beachie Creek	Big Hollow	Holiday Farm	Lionshead	Riverside	Plot Count
NFS	14	21	12	21	53	39	**160**
BLM	12	9		5		2	**28**
ODF		4					**4**
Corporate	12	17		22		7	**58**
Non-corporate	1	3		2	17		**23**
Total	**39**	**54**	**12**	**50**	**70**	**48**	**273**

Age Class	Share of forest
0-20	12%
21-40	19%
41-60	14%
61-80	8%
81-100	7%
101-200	22%
201-400	15%
401-720	4%

- Diverse ownership
- Diverse age class structure
- Many forest types, no dry forest

Forest Type	Share
Douglas-fir	70%
Western hemlock	7%
Pacific silver fir	7%
Red alder	3%
Mountain hemlock	2%
Noble fir	2%
Nonstocked	2%
Western redcedar	2%
Others, <2% each	7%


RdNBR Predicted
Basal Area Mortality Pct
0%
0-10%
10-25%
25-50%
50-75%
75-90%
>90%
Riverside
Beachie Creek
Lionshead
0 2 4 8 12 16
Miles
5
205
99E
551
170
211
224
213
214
226
22
26
35

Study questions to be addressed

- How does pre-fire stand structure (managed or not) drive fire effects on tree mortality, canopy and forest floor?
- What are short- and long-term carbon dynamics in burned westside forests?
- Mid-term response/recovery: latent mortality, regeneration and dead wood dynamics
- Post-fire trajectories by initial and post-fire conditions, and post-fire management such as salvage or rehabilitation, to the extent this occurs
- Evaluating accuracy of remote sensing models of fire impact
- Does stand structure and management history matter under extreme weather?

Thank you!

Contact: glenn.christensen@usda.gov

Oregon Harvested Wood Products (HWP) Carbon and Sawmill Energy Use & Emissions

Todd A. Morgan, CF

University of Montana – Bureau of Business & Economic Research

Oregon Board of Forestry – Virtual Public Meeting

November 4, 2020

Acknowledgments

USDA, Forest Service,
Forest Inventory and Analysis (FIA) Program

Oregon Department of Forestry (ODF)

Jeremy Groom, Nate Anderson, Tom Donahue,
Thale Dillon, Eric Simmons

Oregon Timber Product Output (TPO) Activities & Results

Mill Surveys

- 2003, 2008, 2013 – published through PNW Station
- 2017 – in press at PNW
  - >3.9 BBF Scribner of harvest annually
  - >160 active facilities
  - >$7 Billion in sales
  - ~5.2 BBF of lumber produced
- Annual surveys (sample) 2019…

Logging Residue

- 2011-2015 logging utilization study report (PNW-RB-268)
- 2016 study published in *Forest Science 62 (5):564-573*
- ~1.9 green tons of logging residue per MBF Scribner harvested

Background: multiple team efforts

- **Original HWP model development:** FS-led team, Utah State, UM
- **HWP analyses for NFS:** FS-led team, UM

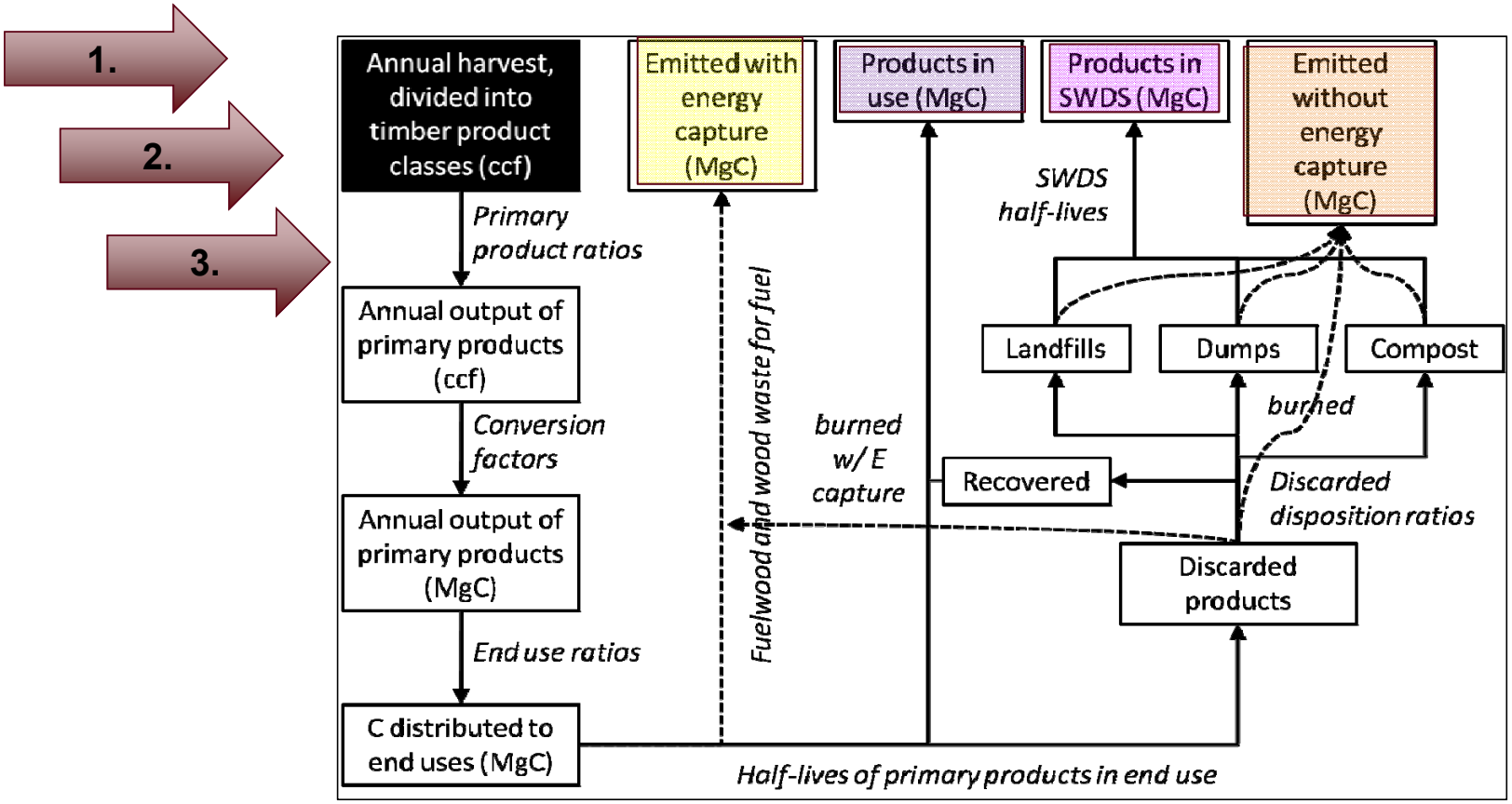
- -

- **Mill surveys/TPO:** UM-BBER, FIA
- **Forest ecosystem carbon analysis:** FIA, CalFire, ODF
- **HWP model CA variant**: Utah State University, CalFire, UM-BBER
- **HWP analysis for states:** UM-BBER, FIA, CalFire, ODF, FS-RMRS

- -

- **HWP model re-write**: Groom Analytics, ODF

HWP Model Framework



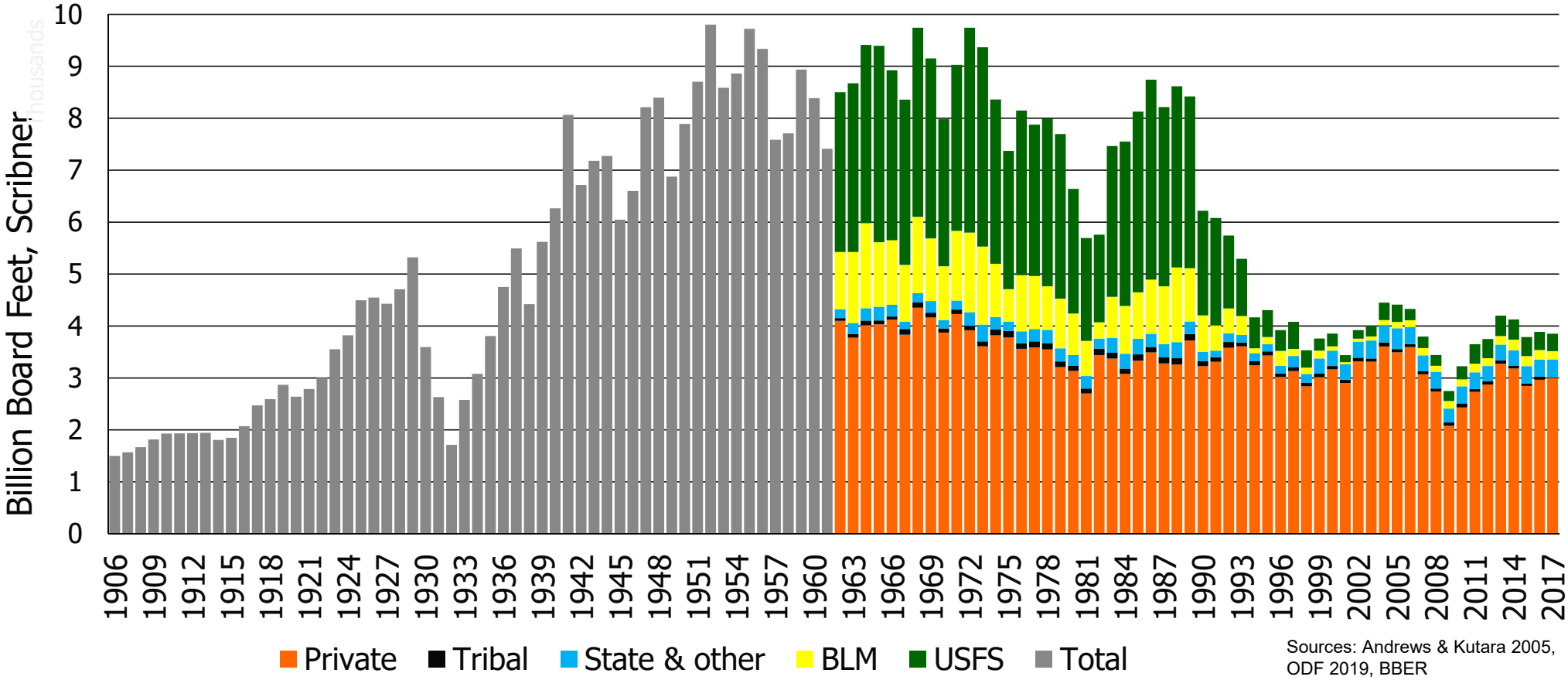
From Stockmann et al. 2012, Carbon Balance and Management 7:1.

HWP Data Sources: Oregon

- **Annual harvest data (Andrews & Kutara 2005, ODF 2019, BBER)**
- **Timber & Primary product ratios (from OR mill studies):**
  - **2013, 2008, 2003, 1998, 1994, 1992, 1988, 1985, 1982, 1976, 1972, 1968, 1962, 1942, 1930**

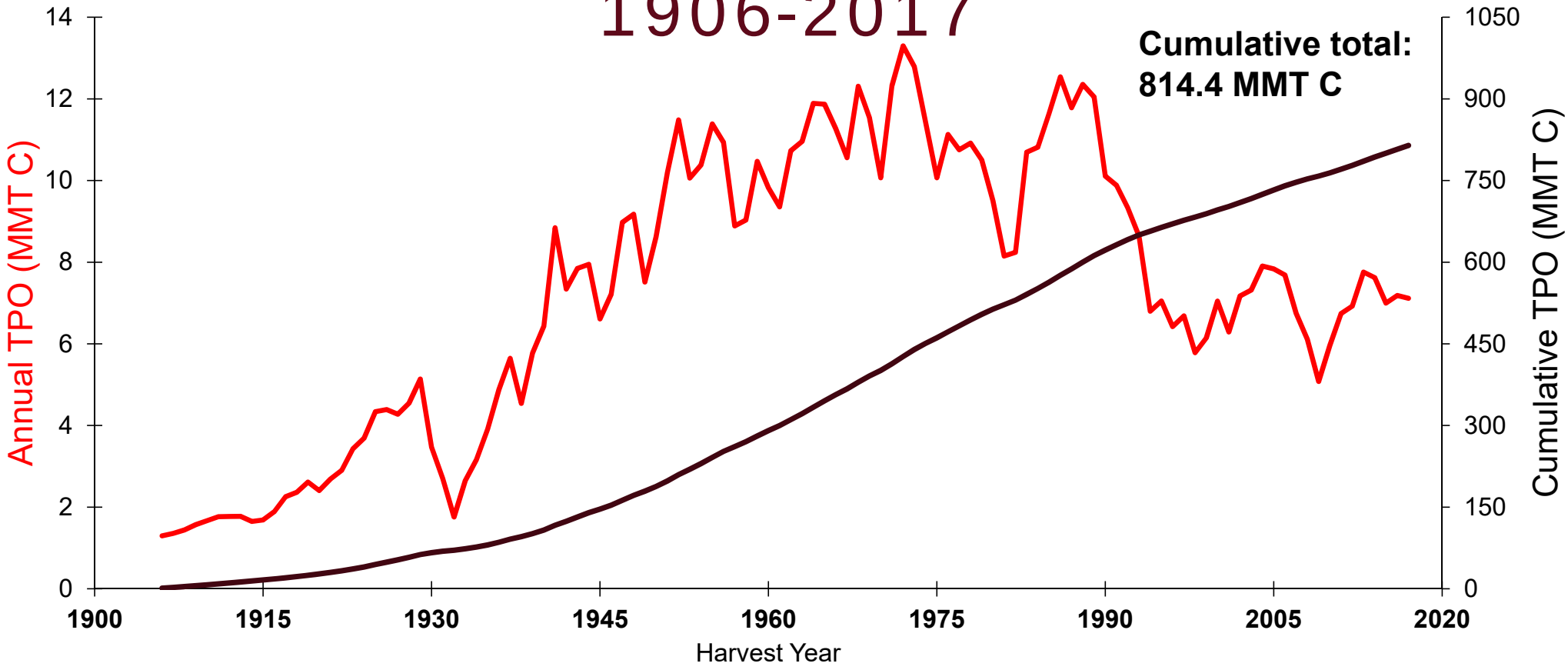
- Wood to carbon estimates (Smith et al. 2006)
- Half-life data (Skog 2008)
- End use ratios (McKeever 2009)
- Fuelwood and wood waste emitted with energy capture, discarded products to landfills, dumps, compost (Skog 2008)

Oregon Timber Harvest,1906-2017



Sources: Andrews & Kutara 2005, ODF 2019, BBER

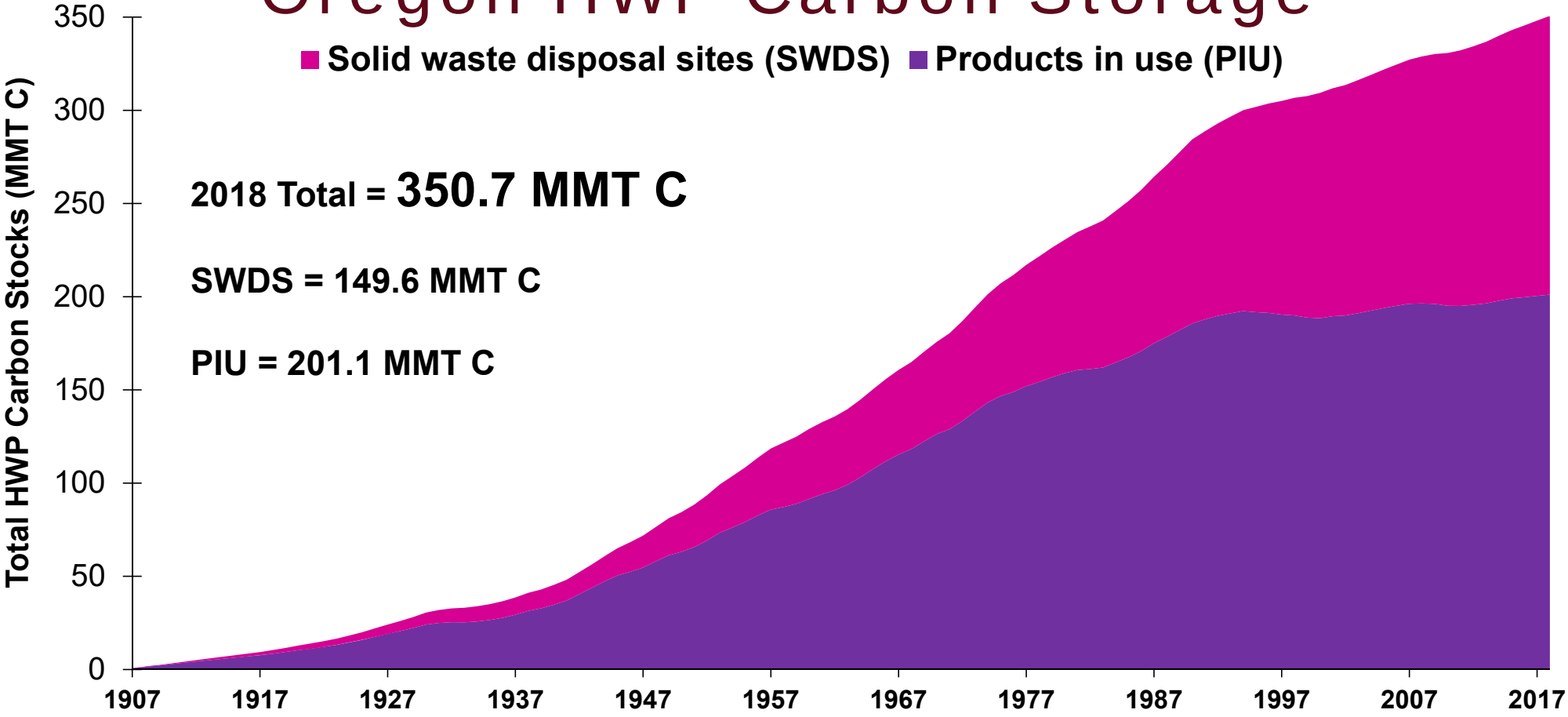
Oregon Timber Product Output (TPO) 1906-2017



FOREST INDUSTRY RESEARCH PROGRAM
UNIVERSITY OF MONTANA

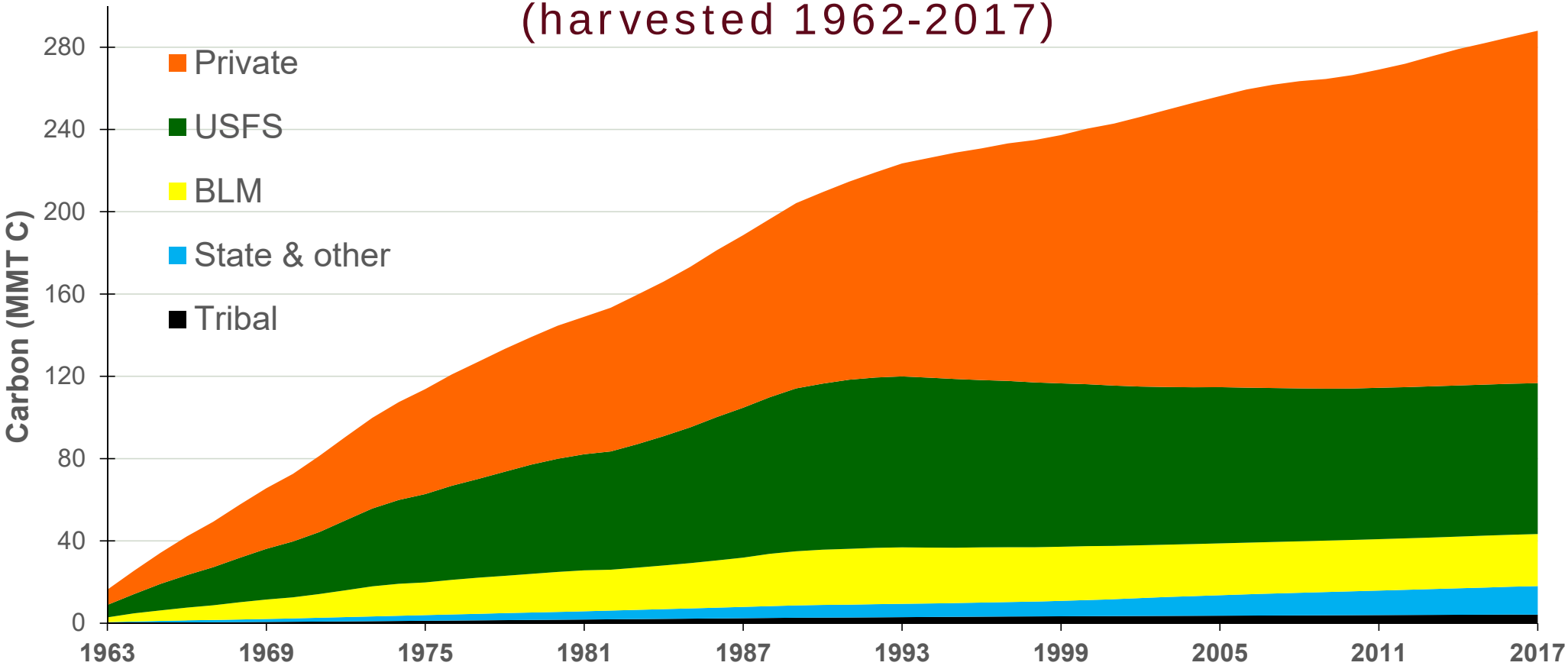
Oregon HWP Carbon,
Sawmill Energy Use & Emissions

Oregon HWP Carbon Storage



Oregon HWP C Storage by Ownership

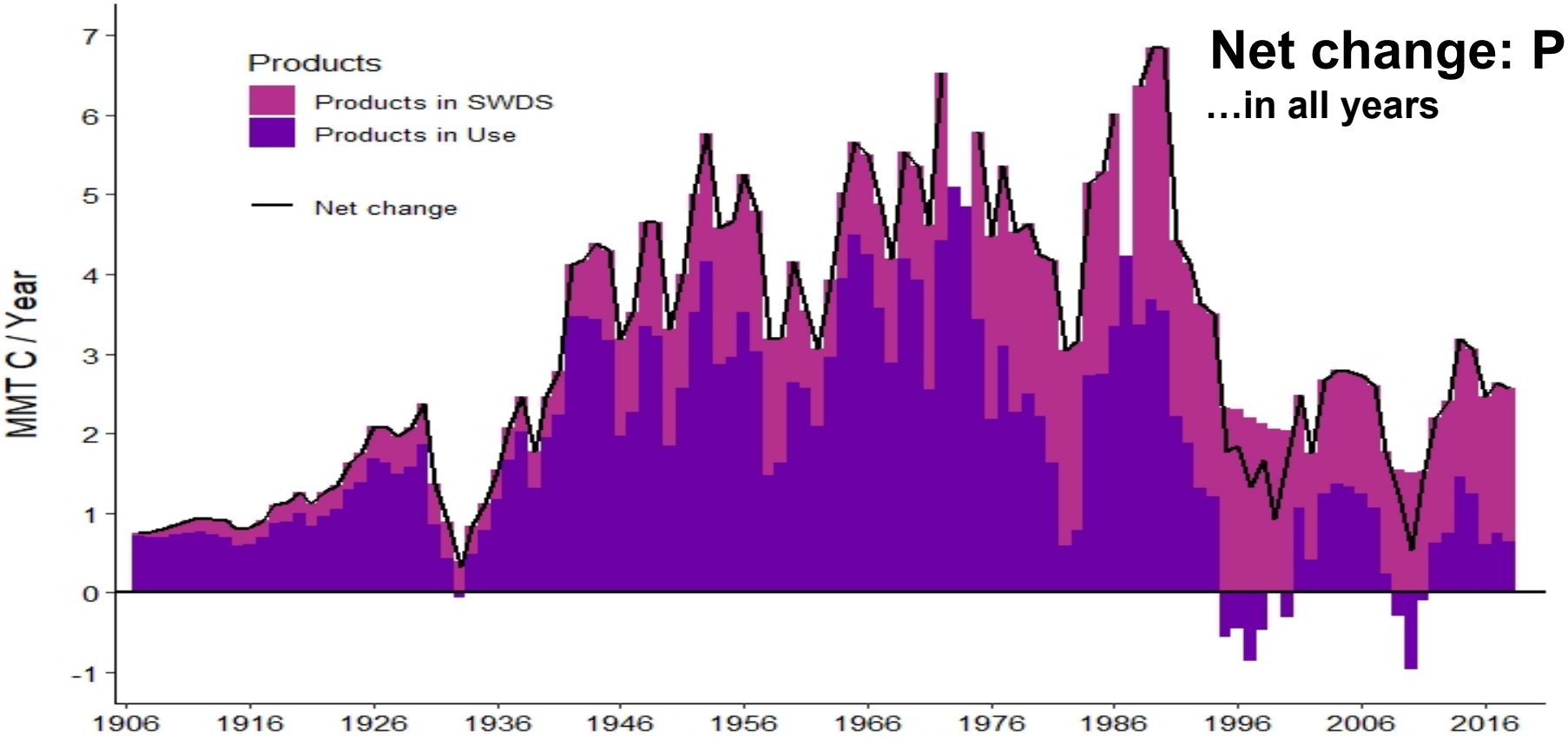
(harvested 1962-2017)



Oregon HWP C Storage by Ownership of Harvested Timber **(for timber harvested 1962-2017)**

	PIU	SWDS	Total HWP	Ownership % of total	% of Total ecosys. C
Owner group	MMT C				
Private & Tribal	105.7	69.7	175.4	60.9	17.9
Federal (USFS + BLM)	49.8	48.9	98.6	34.3	4.7
State and local gov't	8.9	5.0	13.9	4.8	9.5
All owners 1962-2017	**164.4**	**118.5**	**288.0**	**100**	**8.9**
All owners 1906-2017	**201.1**	**149.6**	**350.7**	**N/A**	**10.8**

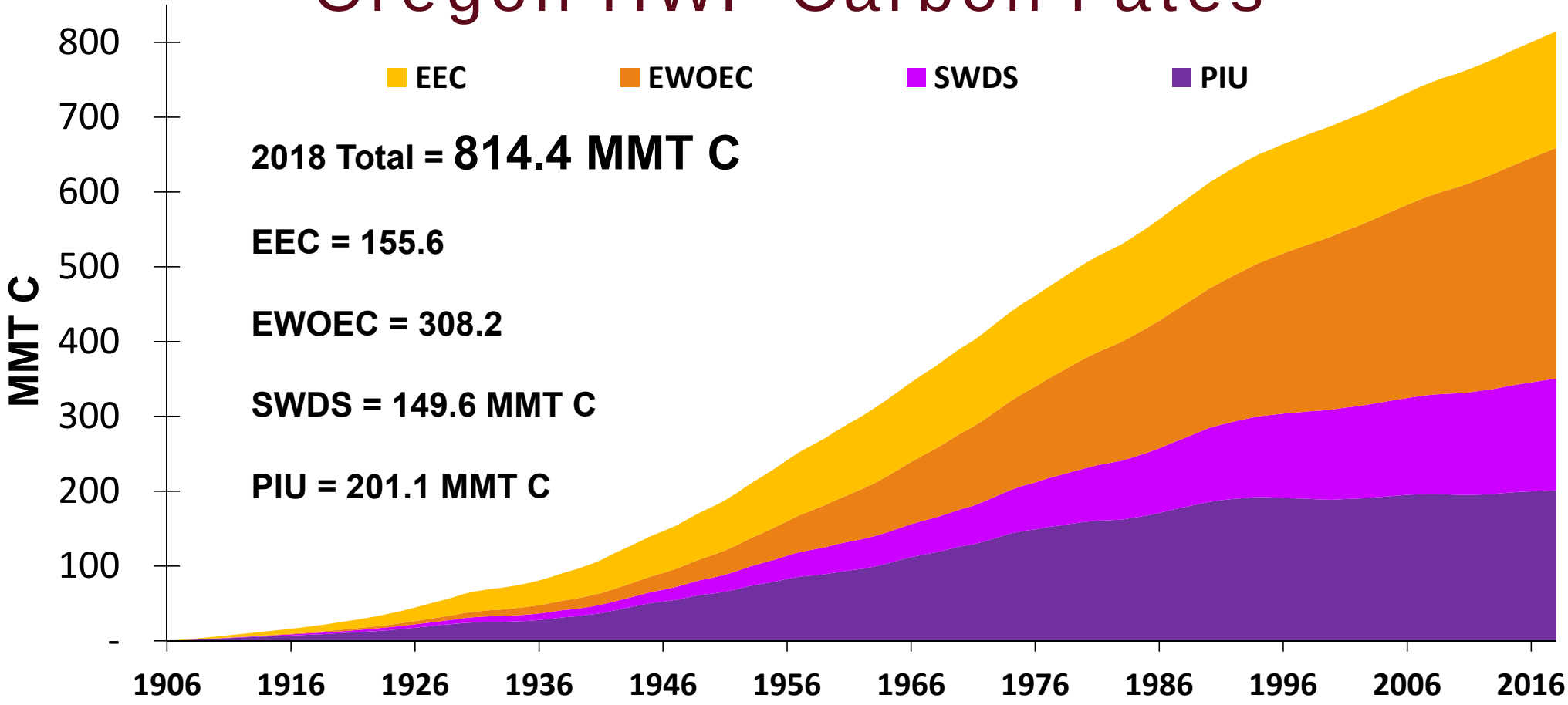
Oregon HWP Carbon Change



Net change: Positive

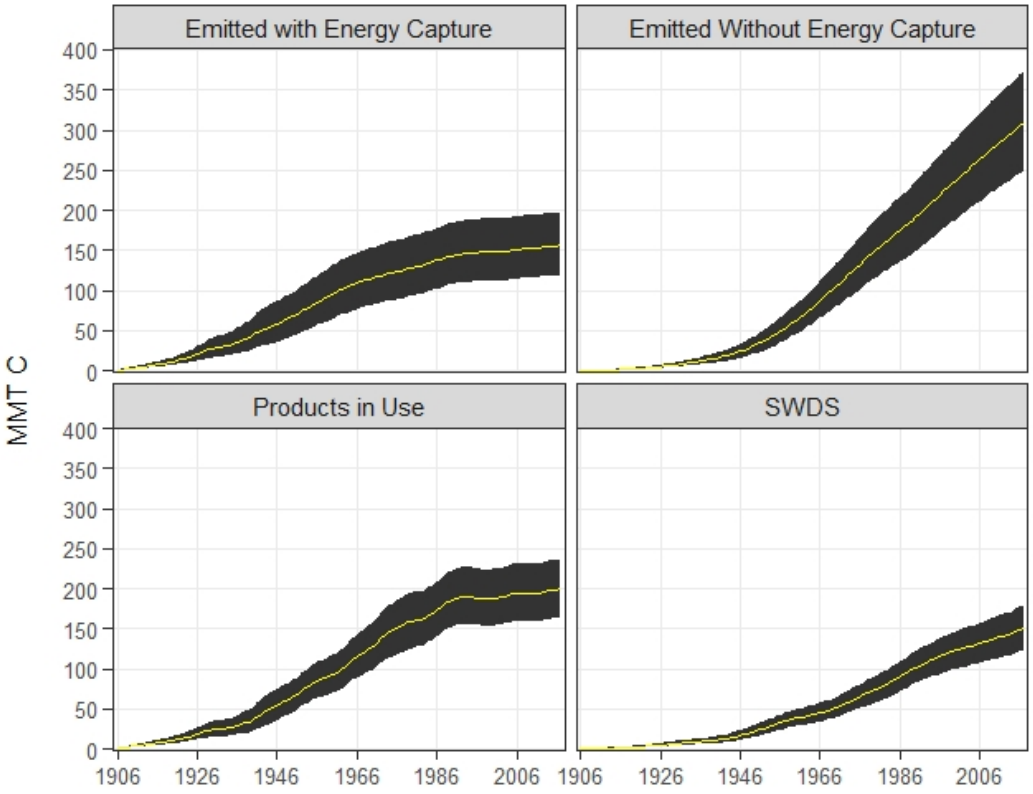
…in all years

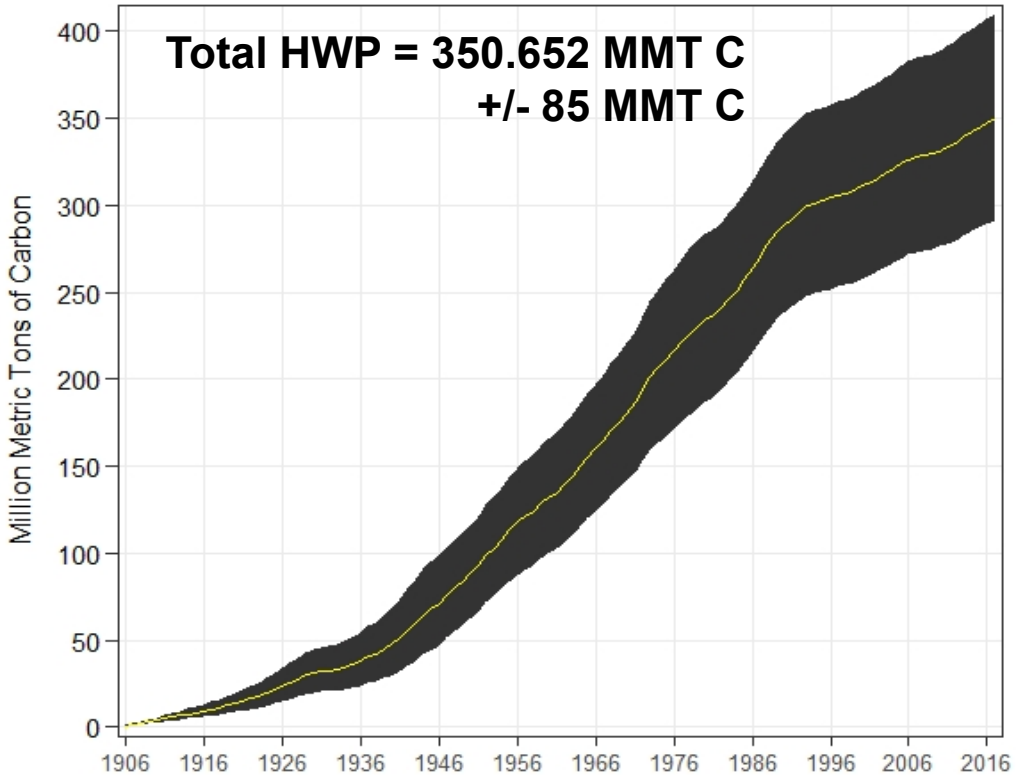
Oregon HWP Carbon Fates



Oregon HWP Uncertainty Analysis

Monte Carlo Simulations, with 90% Confidence Intervals





Oregon TPO, HWP C Storage & Emissions

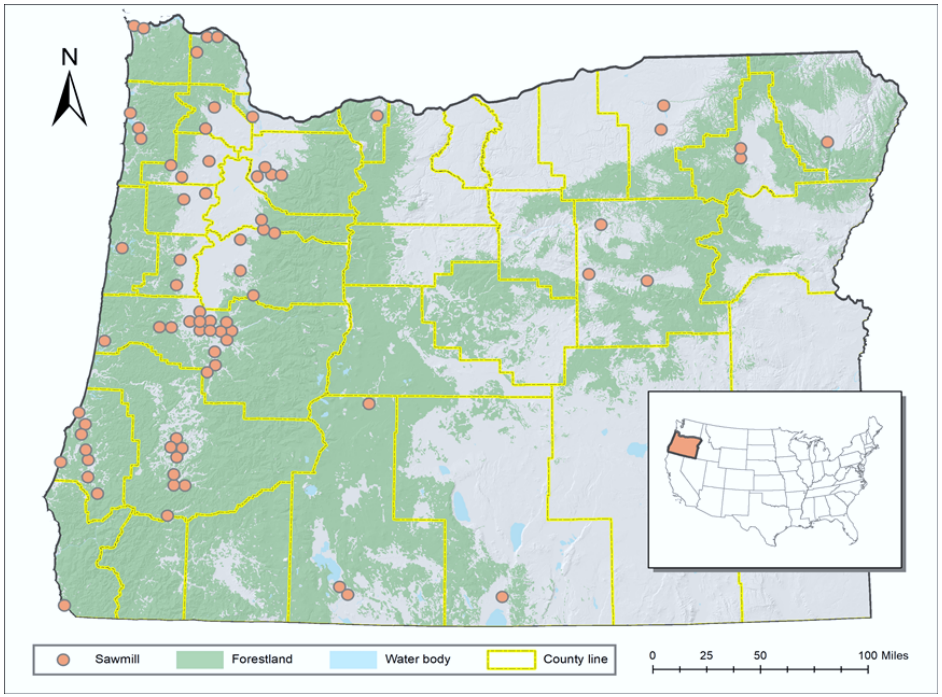
HWP category	MMT C
Cumulative TPO (1906 – 2017)	**814.4**
Cumulative storage	
Products in use (PIU)	201.1
In SWDS	149.6
Total HWP stock (2017)	**350.7**
Cumulative emissions	
With energy capture (EEC)	155.6
Without energy capture (EWOEC)	308.2
Total HWP emissions (through 2017)	**463.8**

Cumulative & Annual Oregon HWP Emissions

Cumulative emissions (MMT CO_2e)	
Emitted w/ energy capture	570.38
Emitted w/out energy capture	1,130.16
Total cumulative emissions	**1,700.53**
2017 Annual emissions (MMT CO_2e/year)	
Emitted w/ energy capture	1.65
Emitted w/out energy capture	15.04
Total 2017 emissions	**16.69**

Oregon Sawmill Energy Use and Emissions, 2017

- **23.7 million acres of timberland**
- **166 active timber processors**
- **2017 harvest 3.92 BBF Scribner**
- **Sawmills used > 60% of harvest**



Data Sources

- **2017 mill census (75 sawmills)**
- **Sawmill energy consumption survey**
- **2011-2015 logging utilization/residue study**
- **Energy contents & emission factors**

Energy Consumption Survey

Quantities of all fuels used on-site:

- **Fuels used for equipment**
- **Non-electric heat and steam sources**
- **Electricity and provider**

Methods: Energy & Emissions

- **Used US EIA for energy contents of on-site and each utility's fuels**
- **Used US EPA & other literature for emissions factors for fuels**
- **Select emissions: CO_2, CH_4, PM10, NOx, SOx**

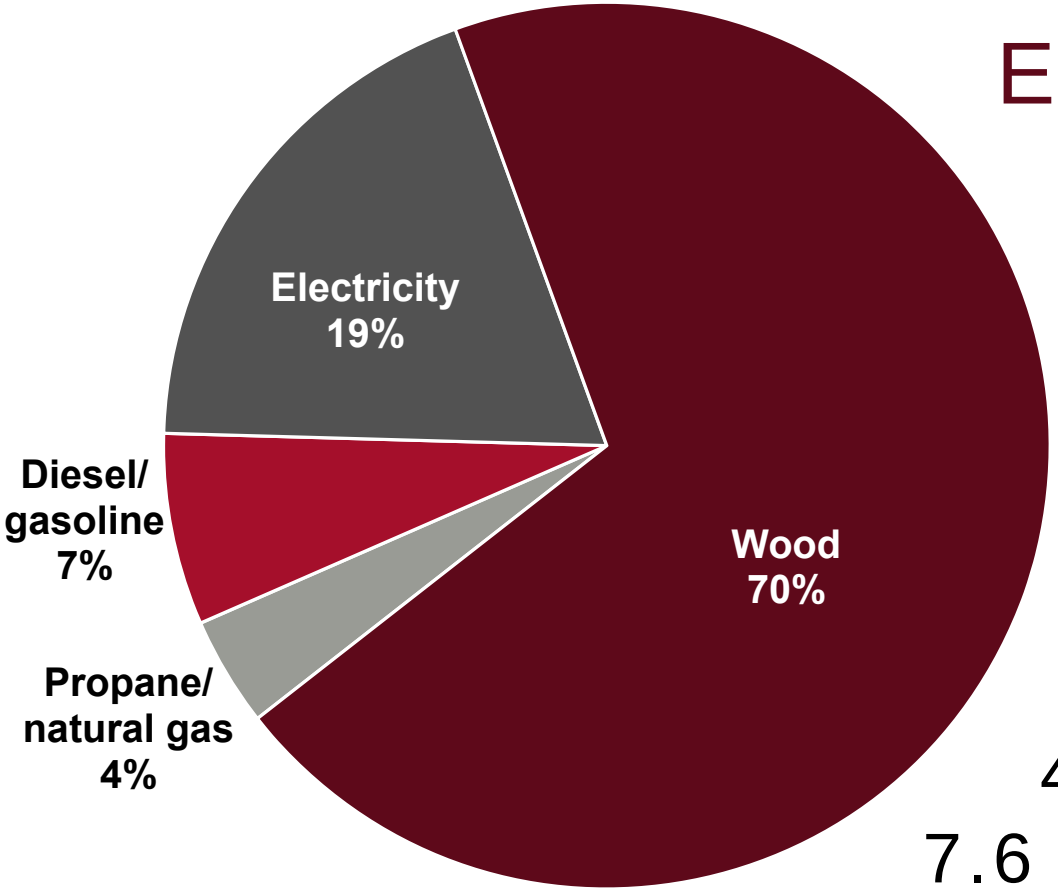
Methods: Logging Residue

- **Developed mill-specific estimates of logging residue quantities associated with timber volume used by each responding sawmill, using TPO methods**

- **Estimated energy and emissions using moisture contents, higher heating values, and associated emissions factors**

Results

- **30 of 75 sawmills provided energy info (40%)**
- **Accounted for 59% of OR 2017 lumber production**
- **Used 1,386 MMBF Scribner of timber**



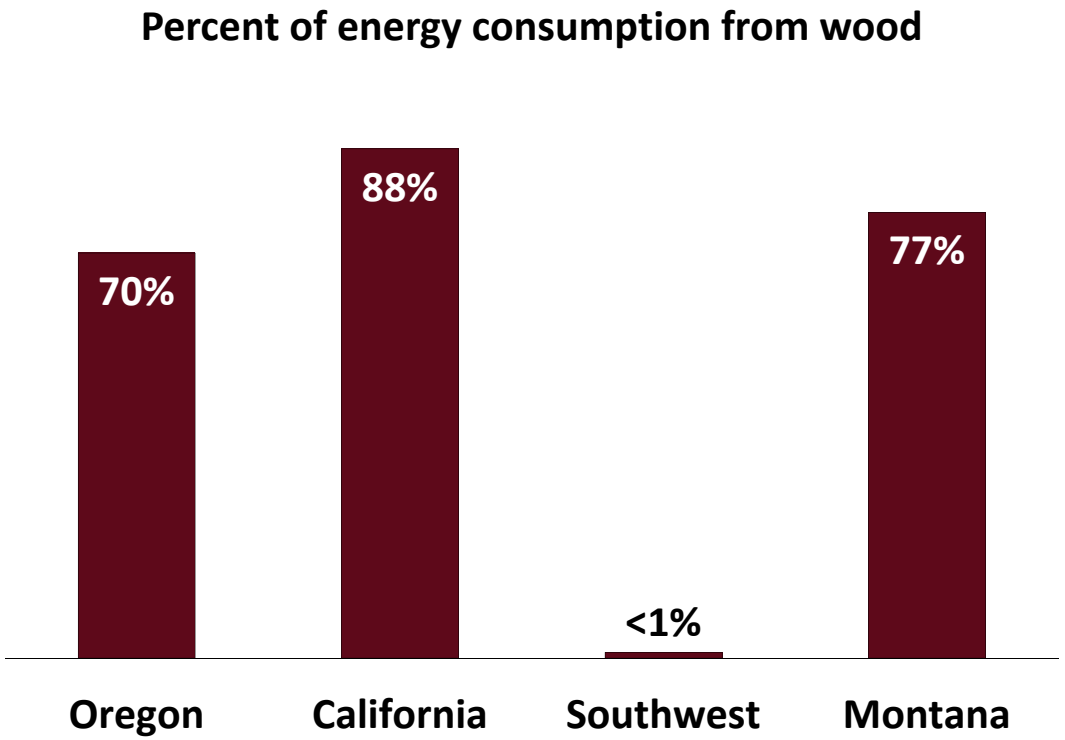
Energy consumption by OREGON sawmills

84% from renewables
4.5 Trillion Btu (30 mills)
7.6 Trillion Btu (all 75 mills)
1,458 MMBtu per MMBF of lumber

On-site energy consumption MMBtu per MMBF of lumber

Fuel	Oregon	California	Southwest	Montana
Diesel	**96**	202	673	192
Gasoline	**6**	4	35	16
Propane	**4**	2	8	8
Natural gas	**50**	297	n/a	39
Electricity	**287**	148	387	616
Wood & bark	**1,016**	4,615	5	2,958
Total	**1,458**	5,267	1,108	3,829

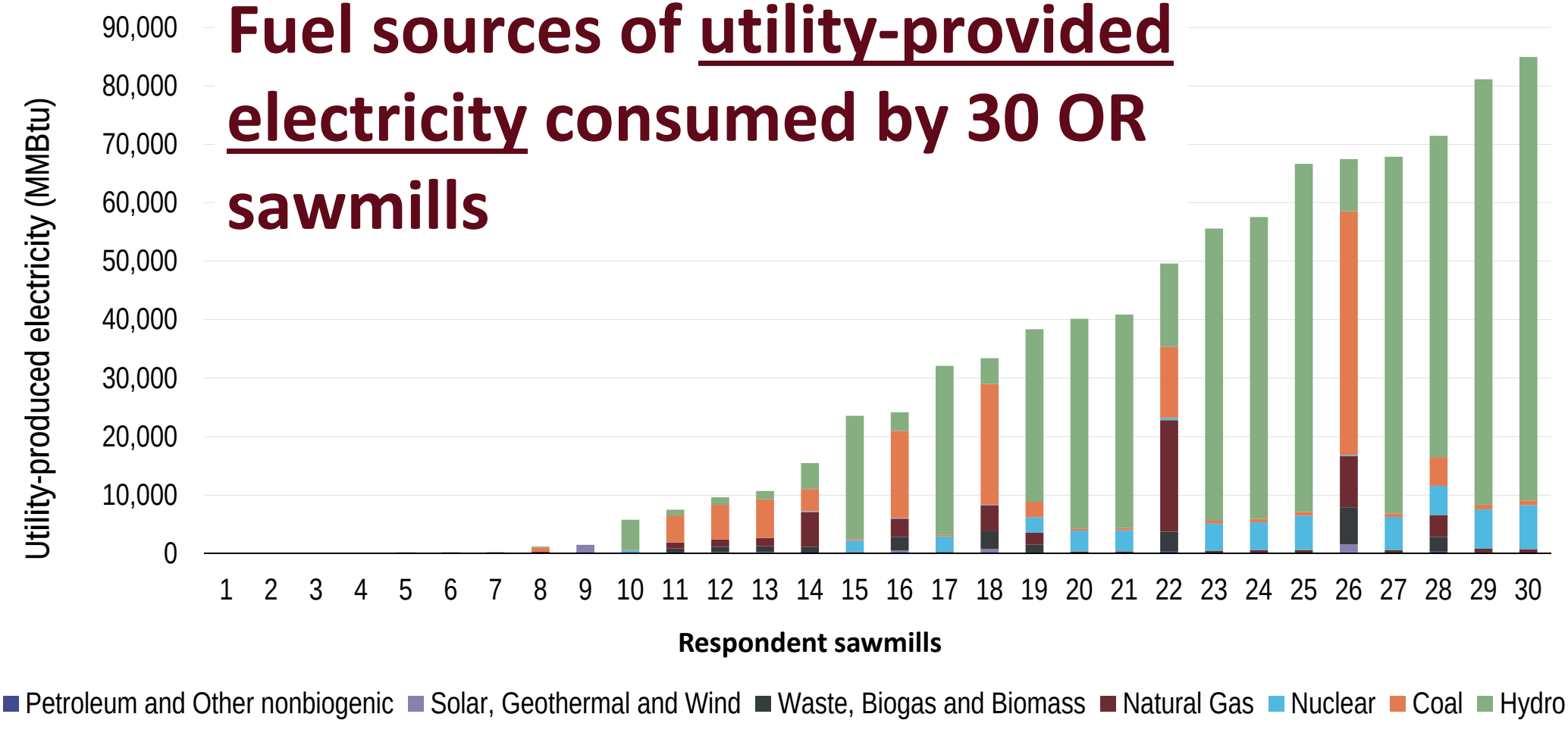
Sawmill energy use is dominated by wood in Oregon, as well as California and Montana



Why do Oregon and Southwest sawmills have relatively low energy use per MBF of lumber?

- **Many don't dry their lumber or operate dry kilns.**
- **Many don't use mill residue for on-site energy; they sell mill residue for pulp production.**

Fuel sources of utility-provided electricity consumed by 30 OR sawmills



Estimated emissions from on-site energy consumption by OR sawmills, 2017

Emissions	Total short tons (30 sawmills)	Short tons per MMBF	Total short tons (all sawmills)	Total (all sawmills) MMT
CO_2	361,680	116.53	610,567	0.554
PM_{10}	564	0.18	952	0.001
CH_4	333	0.11	563	0.001
NO_X	1,596	0.51	2,694	0.002
SO_X	348	0.11	588	0.001

If logging residue from sawlog harvest were ...

Logging residue	Energy (MMBtu)	CO_2 (tons)	CH_4	PM_{10}	NO_x	SO_x
Burned in forest	n/a	2,413,104*	8,453	11,868	5,047	3,049
Used for bioenergy	28,763,441	2,804,435	792	1,064	3,164	360
Potential difference	28,763,441	(391,331)	7,661	10,804	1,883	2,690

***Equivalent to 2.19 MMT CO_2**

Sawmill Energy: Key Points

Regional/state differences are important.

Oregon sawmills:

- **Have relatively low energy use & emissions per MMBF of lumber.**
- **Most (84%) sawmill energy is from renewables – wood (70%) & hydro (14%).**
- **Dry kilns are a major energy use, but not all mills operate dry kilns, not all kilns are wood-fueled, and not all lumber from mills with kilns is dried.**

Sawmill Energy: Key Points

- **Wood is the major energy & emissions source: 70% of total energy utilized, 85% of total emissions.**
- **Substantial amounts of logging residue are associated with the timber used by sawmills. Not certain how much is burned.**
- **Some emissions from burning logging residue could be reduced with more biomass utilization, but other trade-offs.**
- **Oregon's electricity portfolio is already ~51% renewables.**

“Stocks”

Forest ecosystem total carbon = 3,239.72 MMT C
Live & dead trees aboveground = 1,118.30 MMT C
HWP pool (PIU + SWDS) = 350.65 MMT C
FIA (annual average) cut = 9.49 MMT C
2017 annual TPO = 7.11 MMT C

“Fluxes”

FIA (annual average) cut = 34.78 MMT CO_2e
2017 annual TPO = 26.09 MMT CO_2e
2017 EWOEC (SWDS) emissions = 15.04 MMT CO_2e
2017 Slash burning emissions = 2.19 MMT CO_2
2017 EEC (fuelwood) emissions = 1.65 MMT CO_2e
2017 Sawmill energy emissions = 0.55 MMT CO_2

More Context…

[a]2017 Harvest & forest road construction = 0.32 MMT CO_2e

[b]2017 Haul emissions = 0.29 MMT CO_2e

2017 Sawmill energy emissions = 0.55 MMT CO_2

2017 Slash burning emissions = 2.19 MMT CO_2

Σ of harvest, slash, haul & milling emissions = 3.35 MMT CO_2e

= 12.8% of 2017 annual TPO

= 9.6% of FIA (annual average) cut

[a] ERG 2020

[b] Healey et al. 2009

Thank you!

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Global Carbon Flux and Forest Considerations

Werner A. Kurz
Natural Resources Canada
Canadian Forest Service

Oregon Board of Forestry
Virtual Public Meeting
November 4, 2020

PICS
PACIFIC INSTITUTE
FOR CLIMATE SOLUTIONS

Natural Resources Canada
Ressources naturelles Canada

Canada

We cannot keep global warming below 2 ºC without land sector contributions

- **Net negative emissions** are required later this century:

  CO_2 removals from the atmosphere must be greater than emissions.
- Government expectations are high that the land sector will contribute these removals.

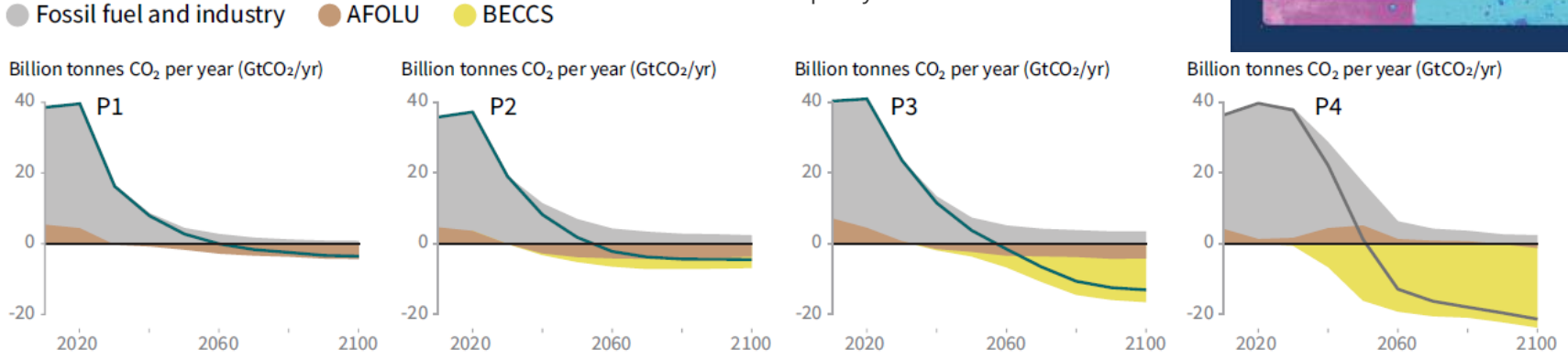
IPCC SR1.5

Emissions must be reduced and land sinks must be increased.

Delays in emission reduction will increase required future land sinks

This further increases the demand for land …

Note BECC capacity limitations



Bioenergy Plantations Land Demand (Mha)	**22**	**93**	**283**	**724**

~ 95 % of US (lower 48 states)

Source: IPCC Special Report 1.5 Degrees

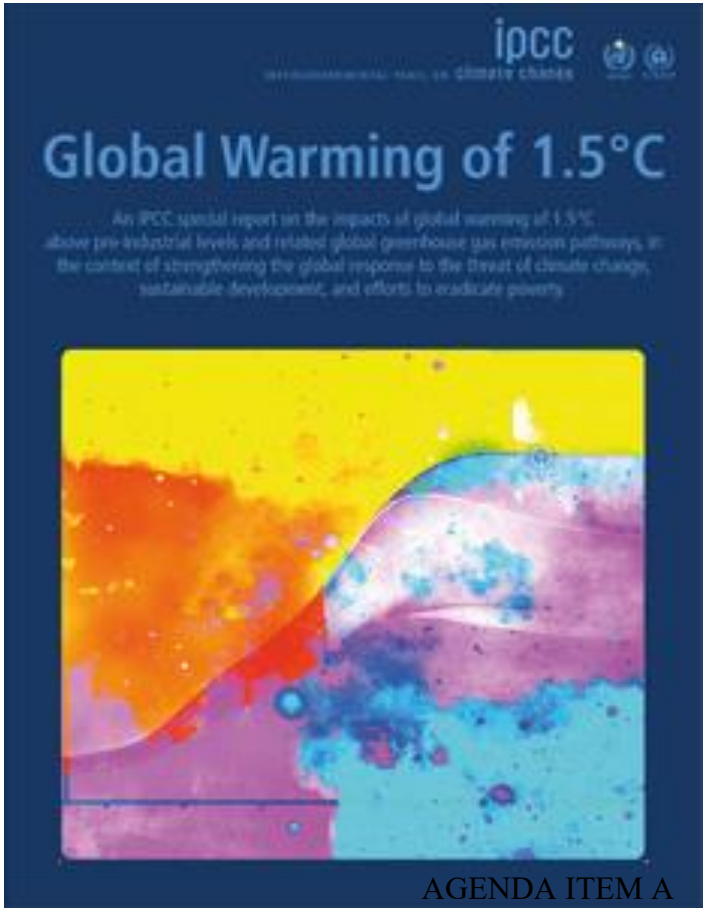
IPCC SR1.5

Every tonne of GHGs matters

Every year matters

Every degree of warming matters

We still have choices …



Source: IPCC Special Report 1.5 Degrees

IPCC SRCCL

Identified risks, opportunities & synergies for carbon removal through land sector

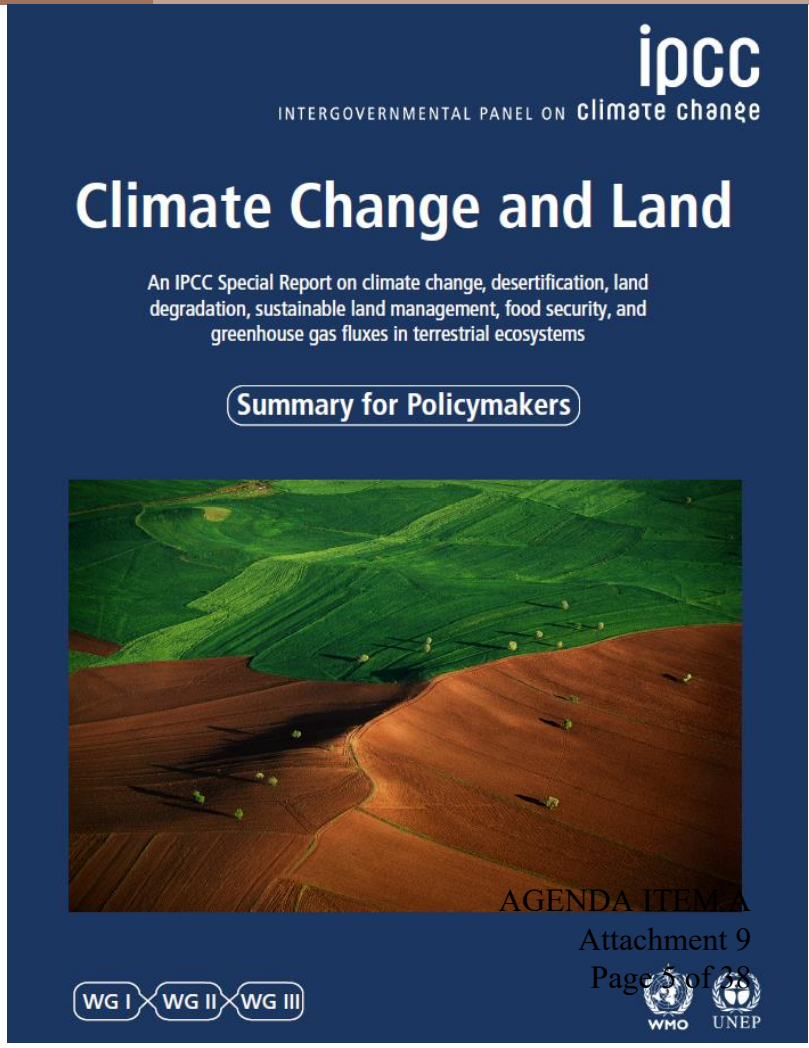
Impacts on desertification, degradation and food security

Benefits of sustainable land management

Not all activities require land

Expected future land sinks must not become an excuse to avoid reducing fossil fuel emissions now.

https://www.ipcc.ch/report/srccl/



Fate of anthropogenic CO_2 emissions (2009–2018)

Sources = Sinks

34.7 $GtCO_2$/yr

86%

14%

5.5 $GtCO_2$/yr

17.9 $GtCO_2$/yr

44%

29%

11.5 $GtCO_2$/yr

23%

9.2 $GtCO_2$/yr

Can sink be sustained or enhanced?

Budget Imbalance:
(the difference between estimated sources & sinks)

4%

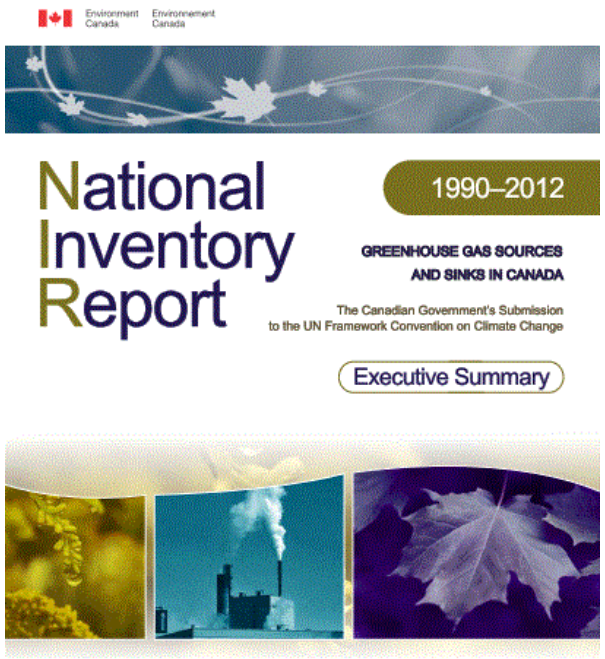
1.6 $GtCO_2$/yr

Source: CDIAC; NOAA-ESRL; Houghton and Nassikas 2017; Hansis et al 2015; Friedlingstein et al 2019; Global Carbon Budget 2019

Canada's National Forest Carbon Monitoring, Accounting and Reporting System (NFCMARS)

One national system, many uses:

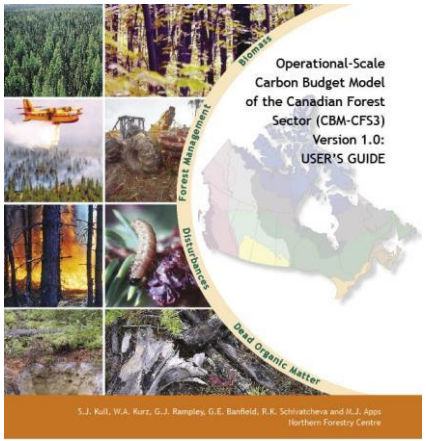
- Reporting past C dynamics
  - National GHG Inventory since 2006
  - State of Canada's Forests
- Projecting future C dynamics
  - Emission Trends Reporting
  - Scientific research
  - Policy development
- Develop climate mitigation and adaptation strategies



http://www.ec.gc.ca/ges-ghg/

Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3)

- An operational-scale model of forest C dynamics.
- Developed over past ~30 years
- Allows forest managers to assess carbon implications of forest management: increase sinks, reduce sources



CBM-CFS3
Operational Scale Carbon Budget Model of the Canadian Forest Sector Release 1.0

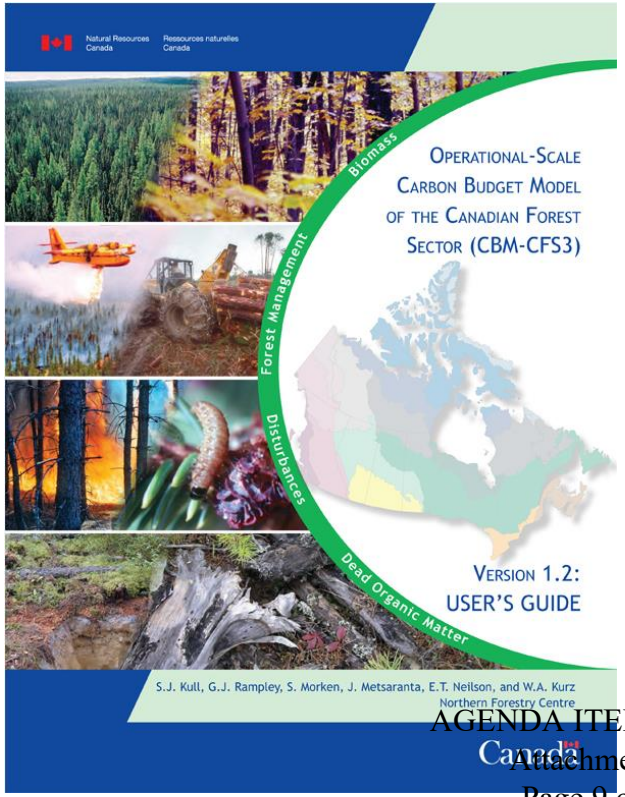
Natural Resources Canada | Ressources naturelles Canada
MODEL FOREST NETWORK / RÉSEAU DE FORÊTS MODÈLES
Canada

Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3)

- CBM-CFS3 Toolbox includes
  - Software and databases
  - User's Guide and Tutorials
- Freely available
- 1500+ downloads in 70 countries,
- 700+ people trained in 31workshops
- model in 5 languages

- User community includes government, industry, academia, agencies, ENGOs

- Extension Forester for support: Stephen.Kull@canada.ca



Calculation of stock changes and GHG emissions

Based on IPCC Gain-Loss Method.

Initial Forest Inventory (e.g. 1990)
+ Growth
- Decomposition Losses
- Disturbance Losses (Harvest, Fires, Insects, etc.)
- Land-use Change (Afforestation, Deforestation)

_____
Ending Forest Inventory

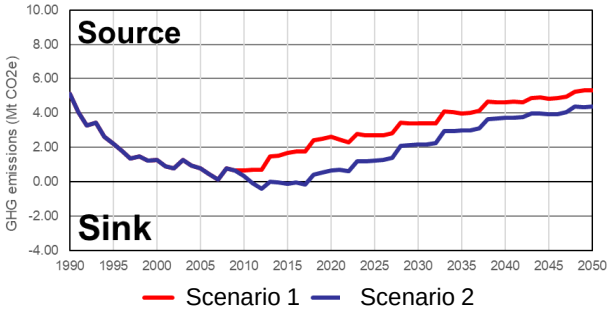
Gain-loss method: annual variability of emission can be attributed to its causes.
Stock-difference method averages change over 5 or 10 year measurement period.

Use of Gain-Loss method in projections

Stock difference method – based on repeated inventory measurements over periods of time – but measurements of future conditions do not exist.

Gain-loss method uses annual ‘activity data’ time series from past (1990) to present (reporting year). By extending activity data into the future a seamless transition between reported (past) and projected (future) emissions is achieved.

In the next reporting year, the first year in the time series of projections is replaced with actual activity data.



Convergence of methods to take advantage of strengths of both approaches.

CBM-CFS3 General Approach

Stratification of forest into classes

Species, site productivity, management type and other criteria used to divide forest into strata

Relies on existing forest inventory information

Input data from forest inventories (or remote sensing)

Empirical representation of growth dynamics at stand level (yield curves).

Dead Organic Matter (DOM) dynamics linked to biomass

Process modelling of litterfall, mortality, disturbance impacts and decomposition to estimate DOM pools

Represents natural disturbances, forest management & land-use change

Input data from forest monitoring including remote sensing

CBM-CFS3 in peer-reviewed literature

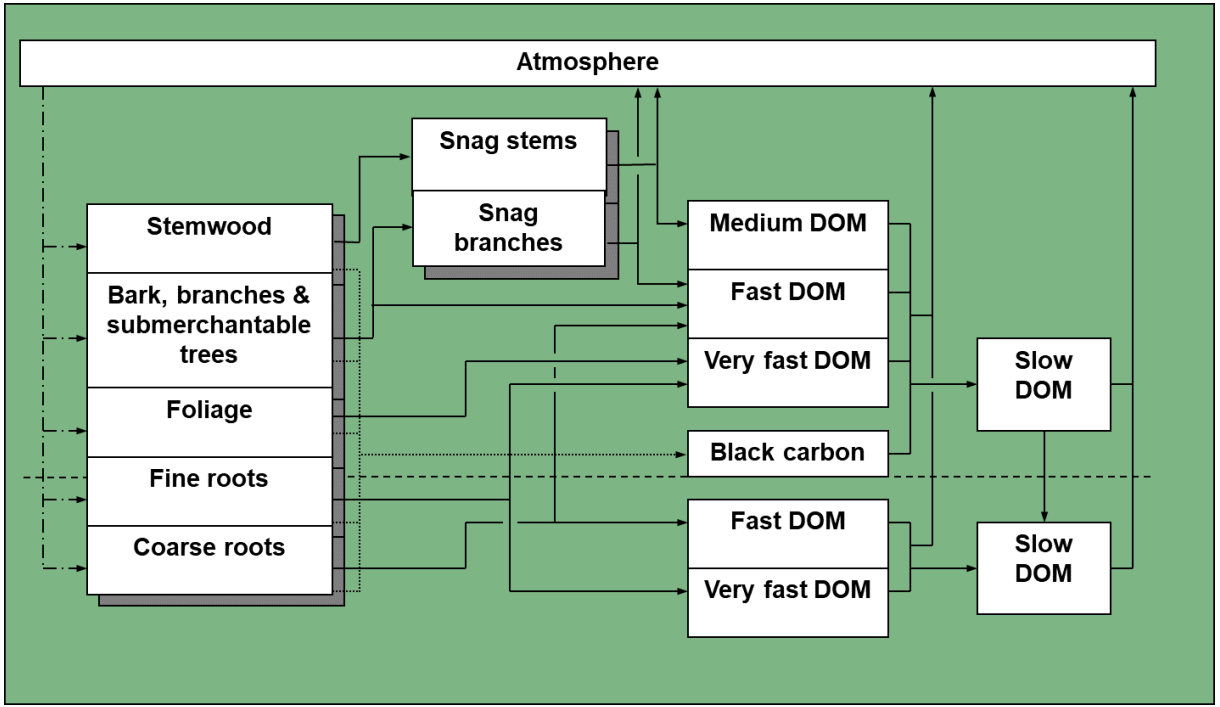
- Model description, validation, uncertainty analyses, example applications in Canada and many countries, including the US are published in the peer-reviewed scientific literature.
- Model as applied in Canada's national GHG reporting subject to expert review by UNFCCC teams.

Publications available at:

https://cfs.nrcan.gc.ca/authors/read/13977

Carbon pool structure of the CBM-CFS3

10 biomass pools and 11 dead organic matter pools



Model description: Kurz et al. 2009; https://doi.org/10.1016/j.ecolmodel.2008.10.018

CBM-CFS3 Data Integration

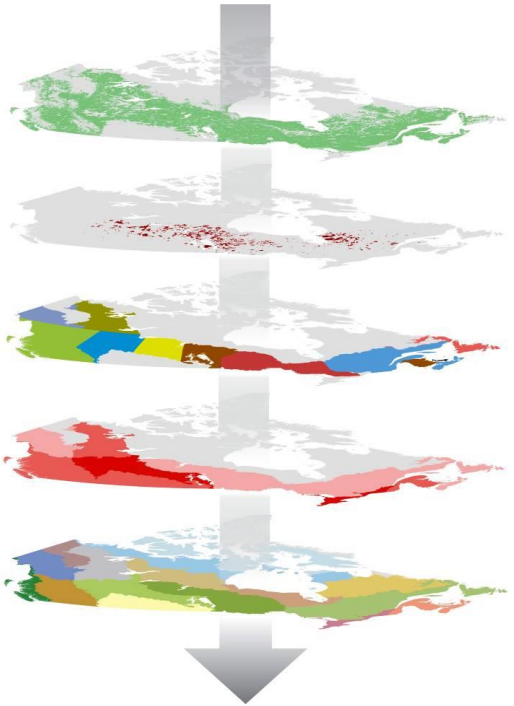
Forest inventory and growth & yield data

Natural disturbance monitoring data

Forest management activity data

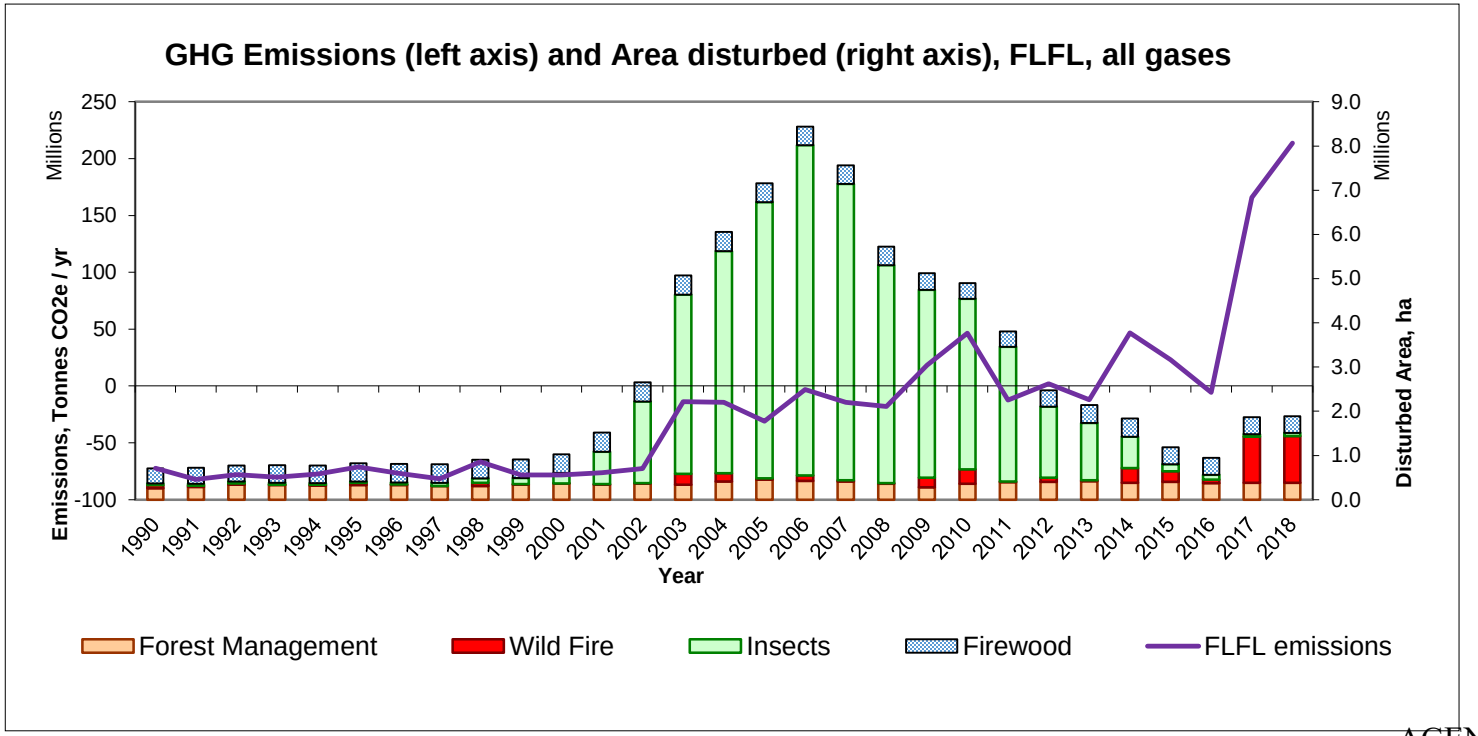
Land-use change data

Ecological modelling parameters



CBM-CFS3

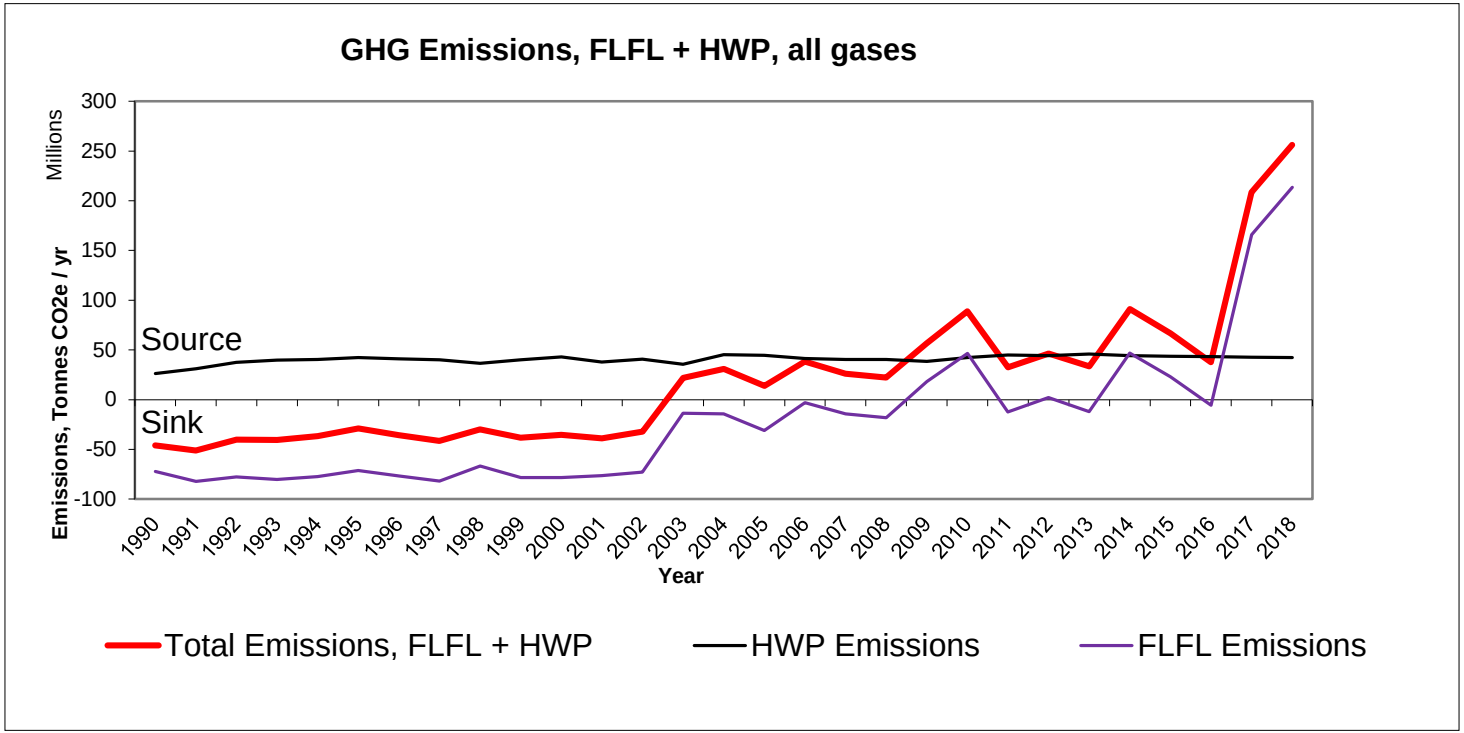
Annual BC Forest GHG Balance and its drivers 1990 - 2018



FL-FL = Forest land remaining forest land, HWP = harvested wood products

Source: Natural Resources Canada from NIR 2020

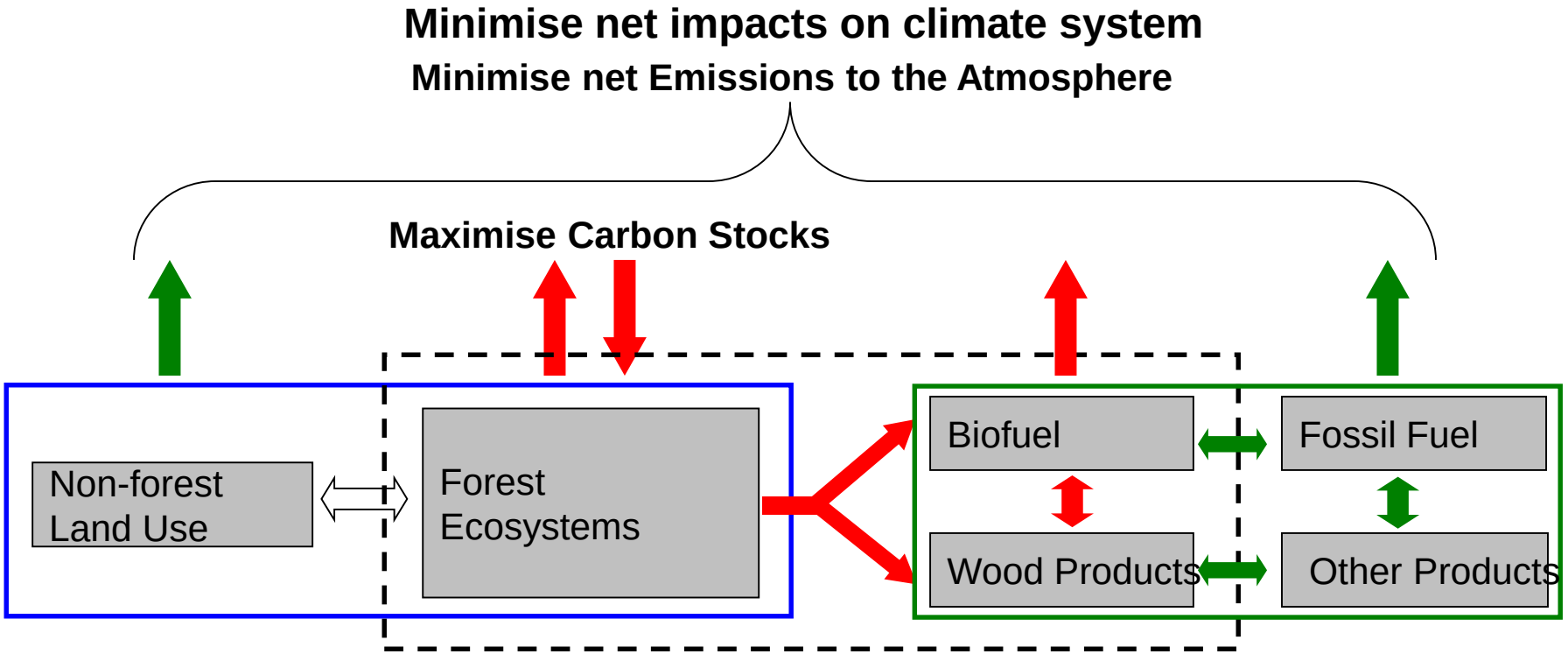
Annual BC Forest GHG Balance including HWP emissions 1990 - 2018



FL-FL = Forest land remaining forest land, HWP = harvested wood products

Source: Natural Resources Canada from NIR 2020

Mitigation Strategies: Need for Systems Perspective



Source: IPCC 2007, AR4 WG III, Forestry

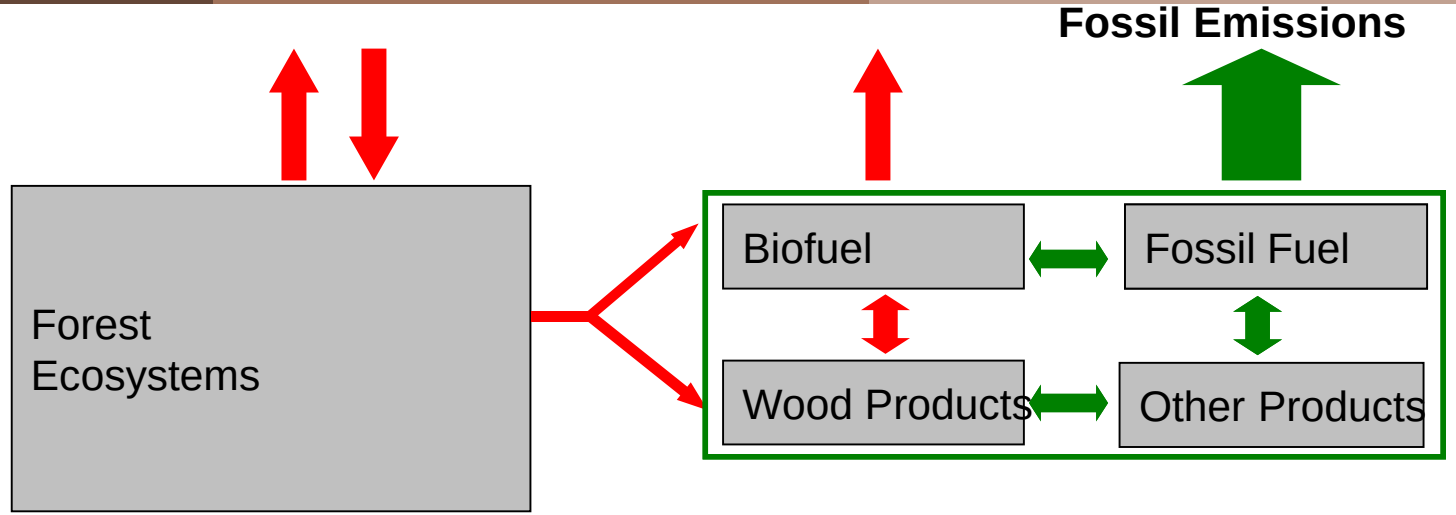
Focus on GHG balance, not stocks

Design of climate change mitigation portfolios in the forest sector should account for net GHG balance in

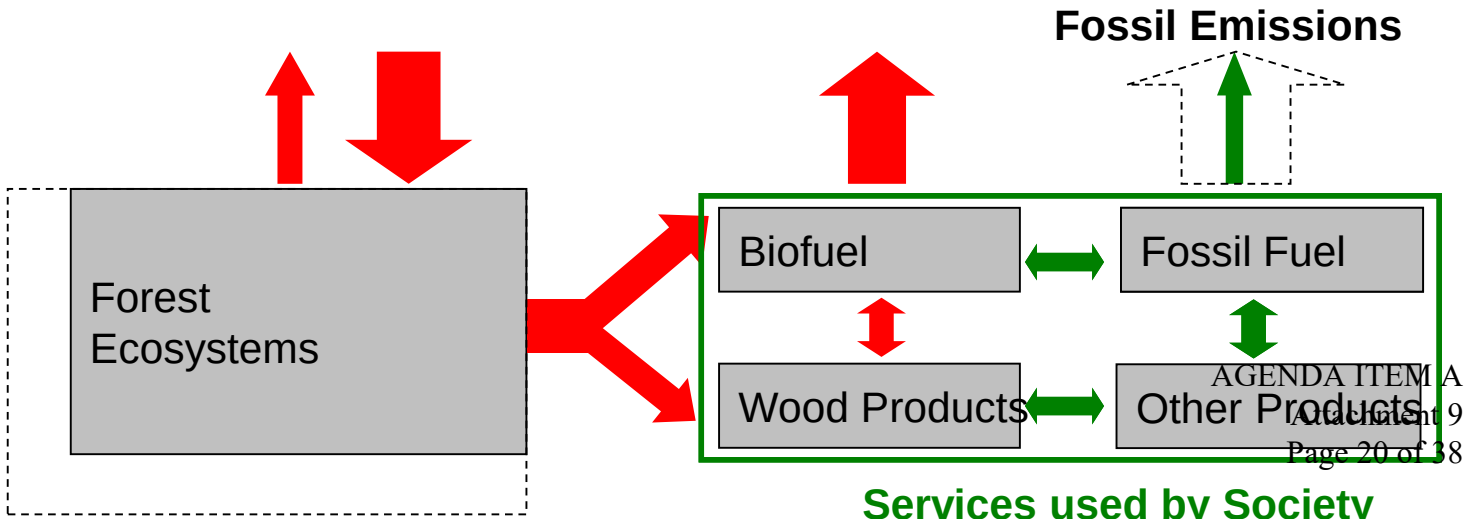
- **forest ecosystems,**
- in **harvested wood products**, and
- from **substitution benefits**

relative to a base case.

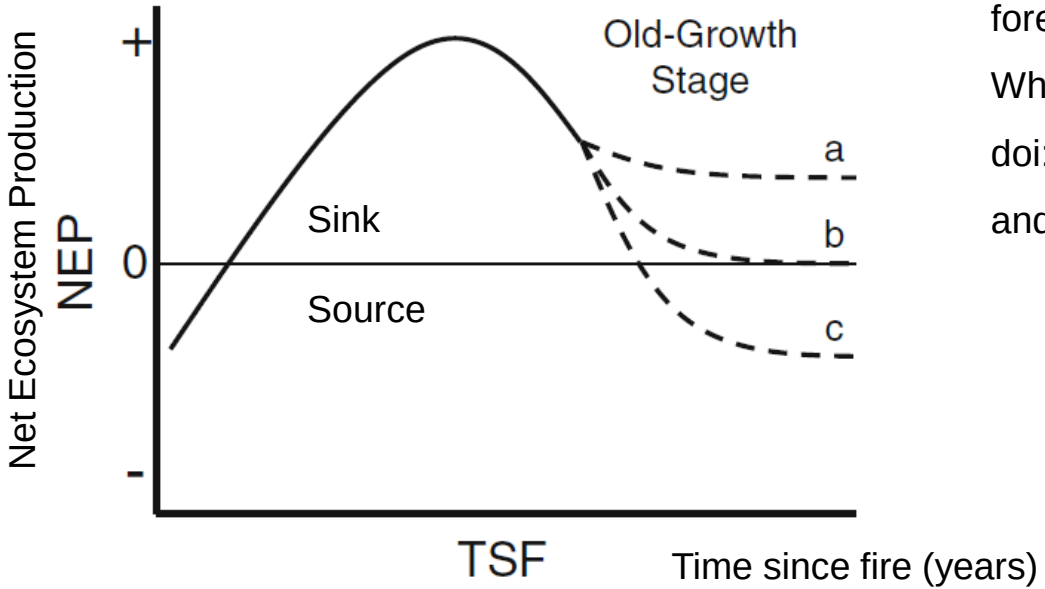
Maximise Carbon stocks



or maximise Carbon uptake?



Carbon sinks decrease in older forests which can become sources*



* e.g. flux tower measurements in 500 yr-old forest at Wind River, WA

Wharton and Falk, 2016

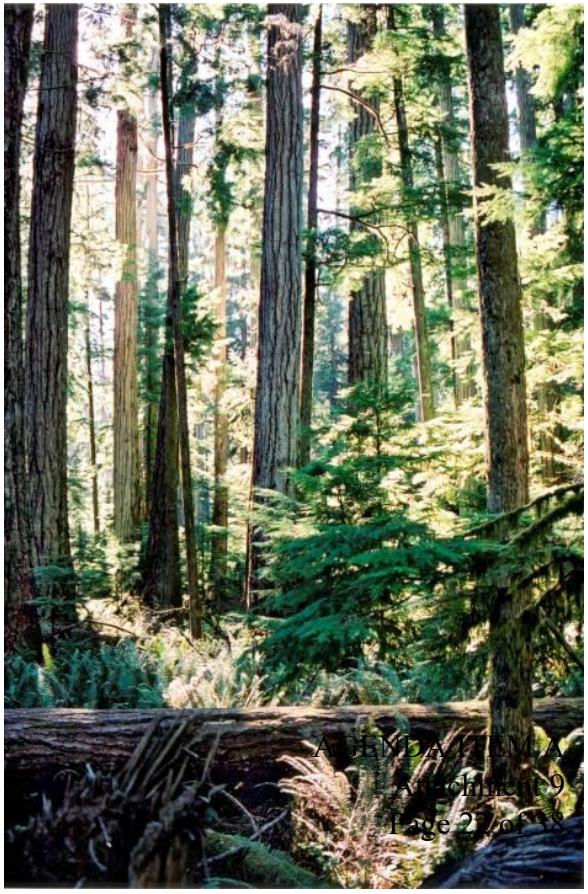
doi:10.1088/1748-9326/11/4/044016

and many other publications

Source: Taylor et al. 2014

How to increase forest sector sinks?

- Avoid deforestation
- Increase afforestation
- Increase forest restoration
- Sustainable forest management
- Increase use of long-lived wood products
- Increase forest resilience to climate change



ATTACHMENT 9
Attachment 9
Page 22 of 38

How to increase forest sector sinks?

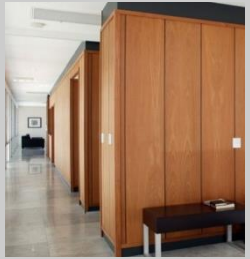
- Avoid deforestation
- Increase afforestation
- Increase forest restoration
- Sustainable forest management
- Increase use of long-lived wood products
- Increase forest resilience to climate change

- C benefits achieved in the short term (avoided deforestation) or the long term (increased afforestation).
- There will be trade-offs – e.g. activities aimed at protecting existing forests (large C stocks) may not enhance future C sinks
- Need to quantify benefits of mitigation portfolios: potential to take up additional carbon and risks from climate change impacts.

Options for forest sector mitigation activities:







Increase sinks through forest management: fertilization, stand tending, tree selection, etc.

Rehabilitation after natural disturbances (wild fire and insects).

Reduce harvest residue burning.

Harvest less / more depending on conditions.

Increase afforestation and avoid deforestation.

Maximize carbon retention in long-lived products.

Cascading wood use.

Reduce wood waste at every stage.

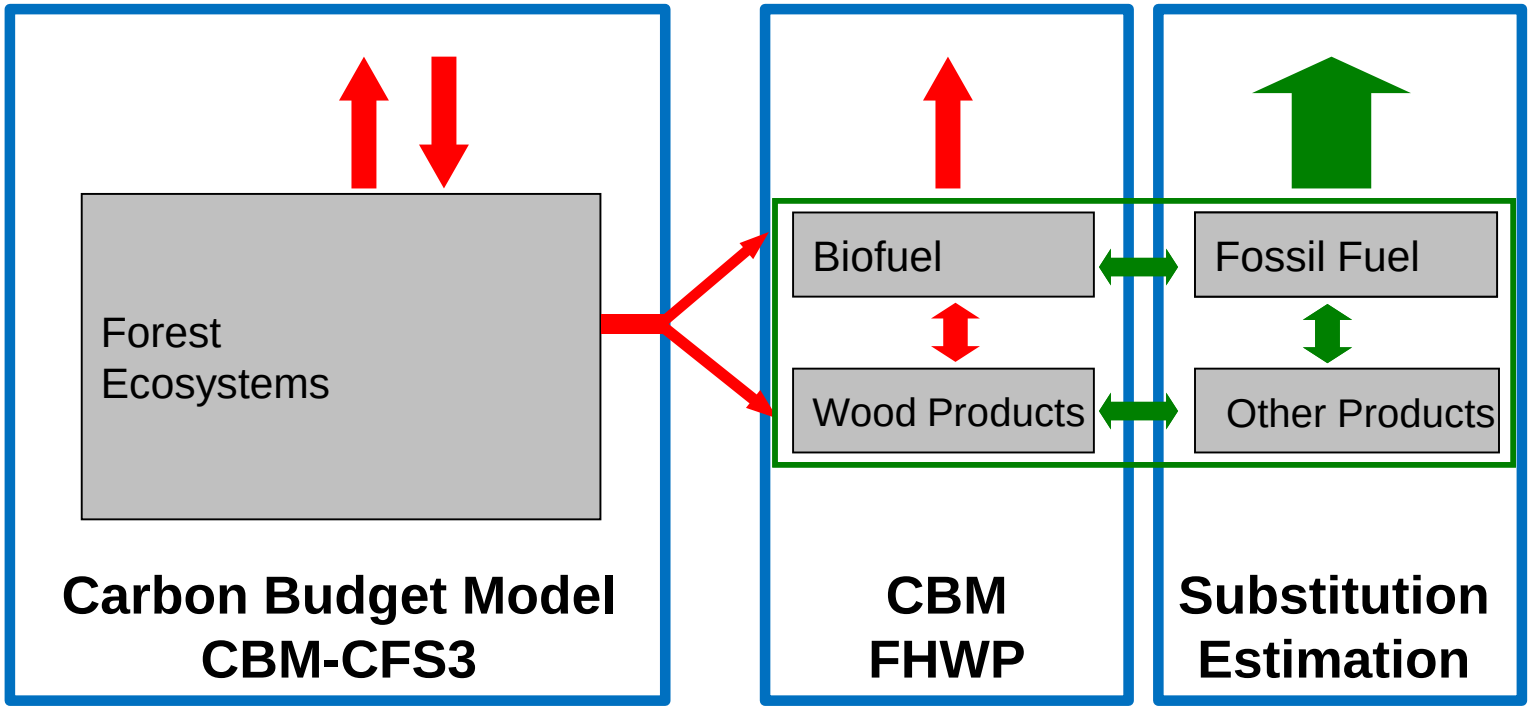
Divert wood products from landfills.

Replace emissions-intensive products such as steel and concrete with wood products.

Replace fossil fuels with bioenergy from wood waste, where appropriate.

We have modeled some of these .

Mitigation analyses: analytical framework

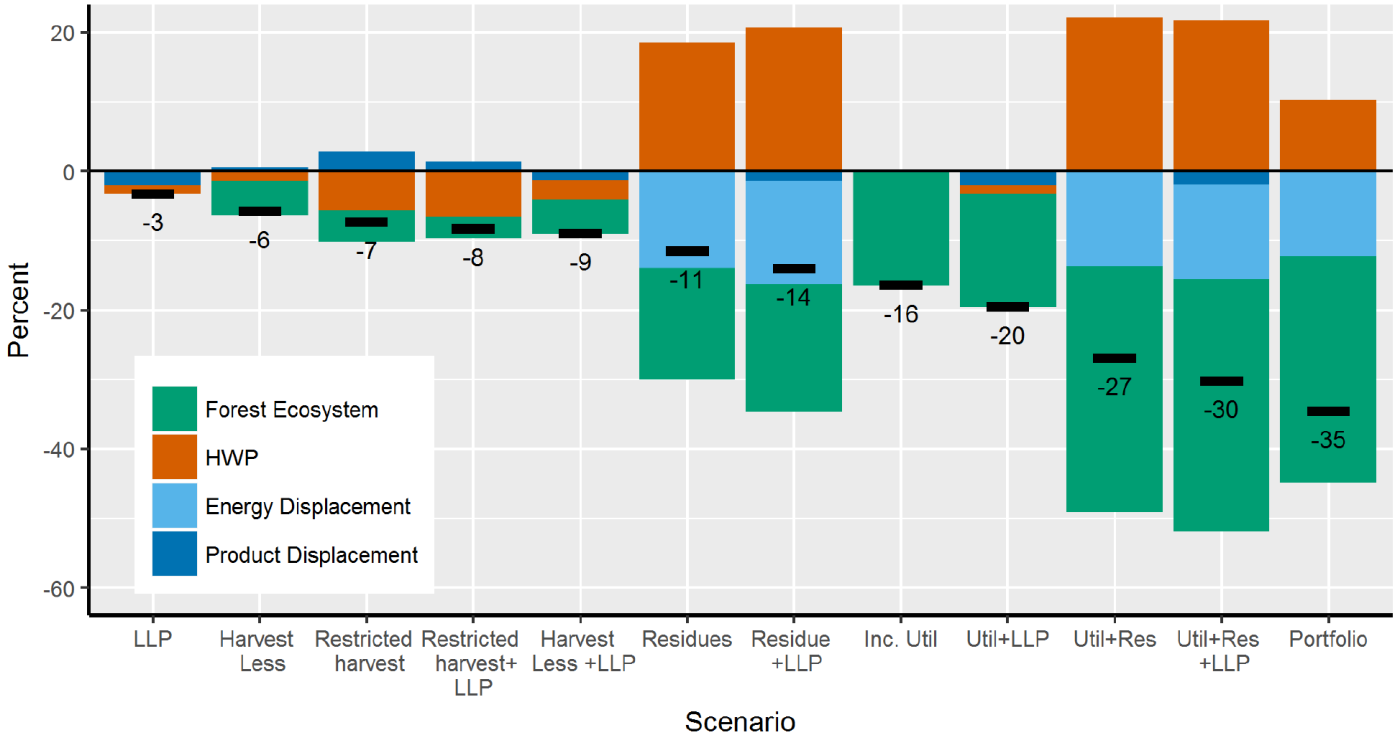


CBM-CFS3 and CBM-FHWP used for Canada's National GHG inventory reporting.
Substitution impacts reported in other domestic sectors or countries.

Results (Xu et al. 2017)

http://link.springer.com/article/10.1007/s11027-016-9735-7

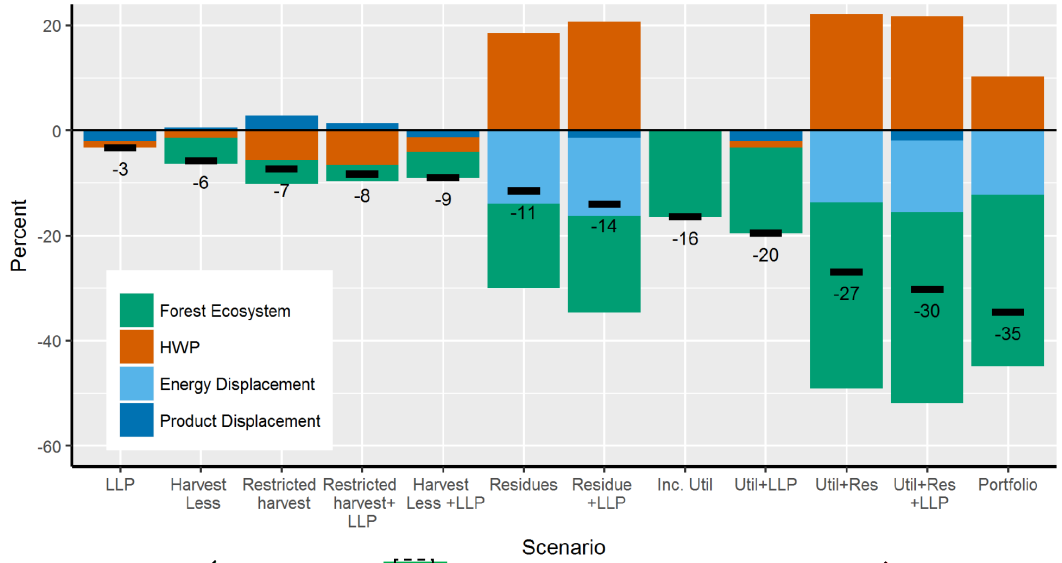
Best mitigation activities vary by region in BC: a portfolio of regionally-differentiated forest management and wood-use strategies can achieve 35% of emission reductions in BC by 2050.



Increased wood product emissions,

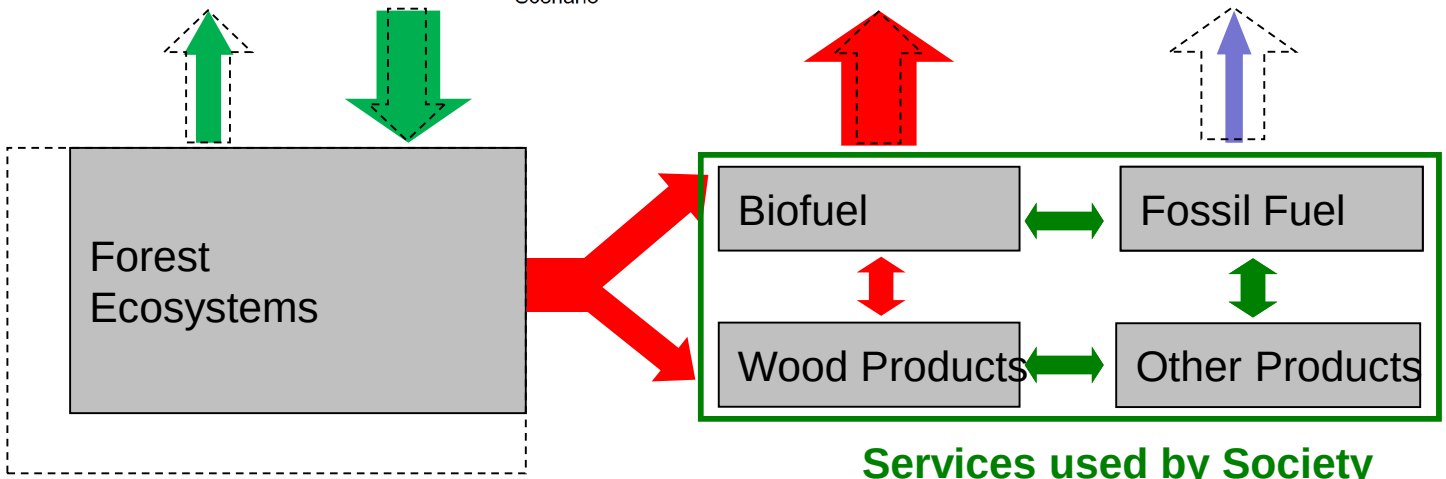
but these reduced emissions from non-wood sources,

and reduced emissions or enhanced sink in the forest.



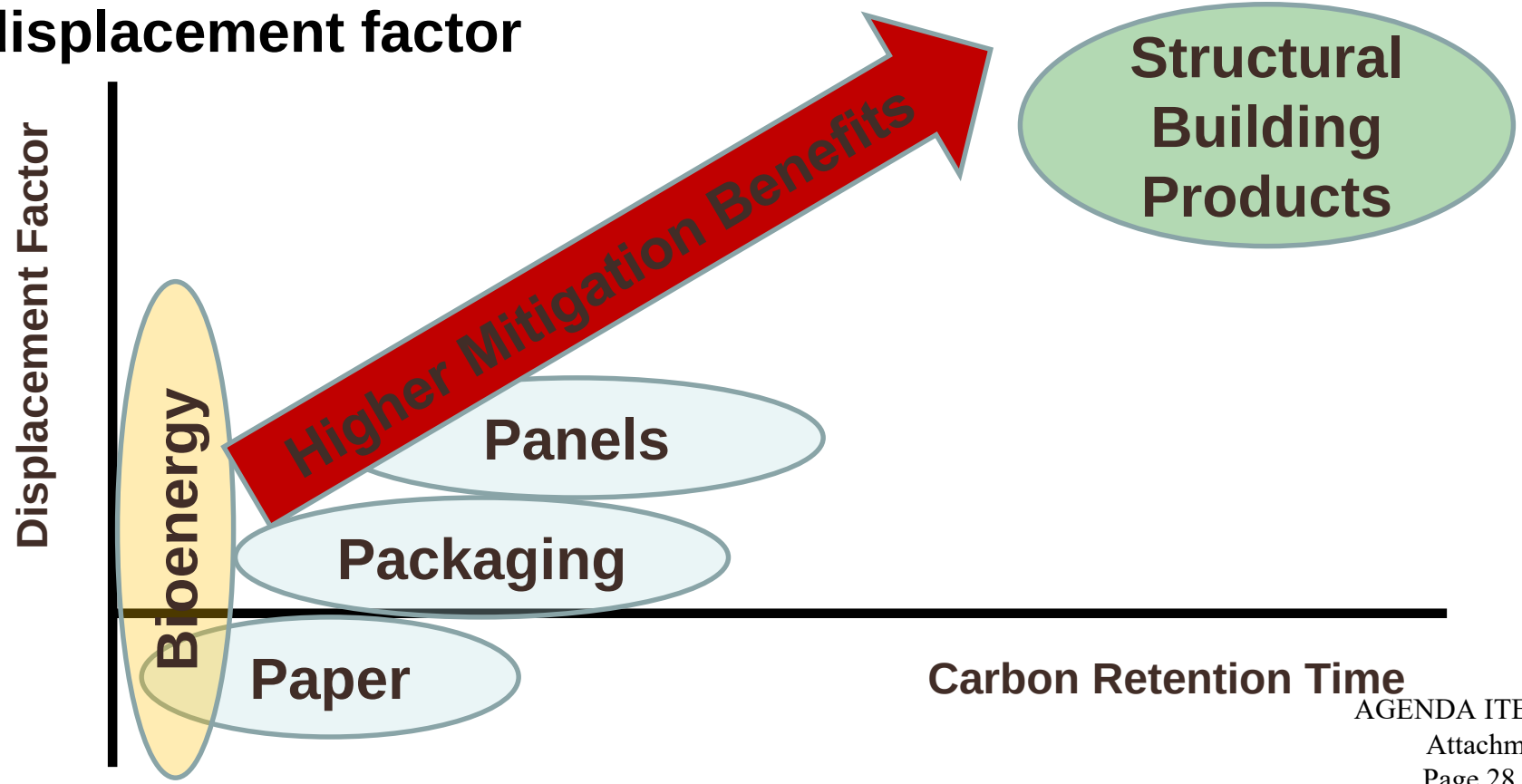
Portfolio impacts on changes in carbon fluxes

Other Emissions



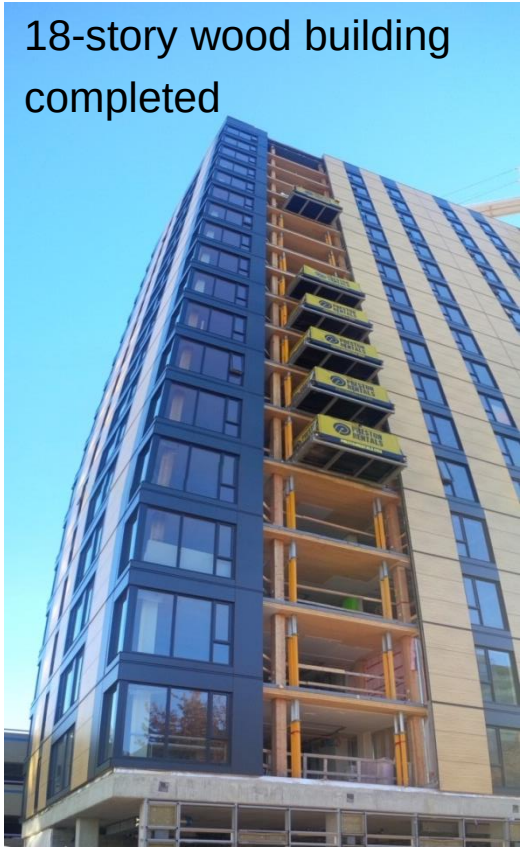
Services used by Society

Mitigation benefit increases with carbon retention and displacement factor

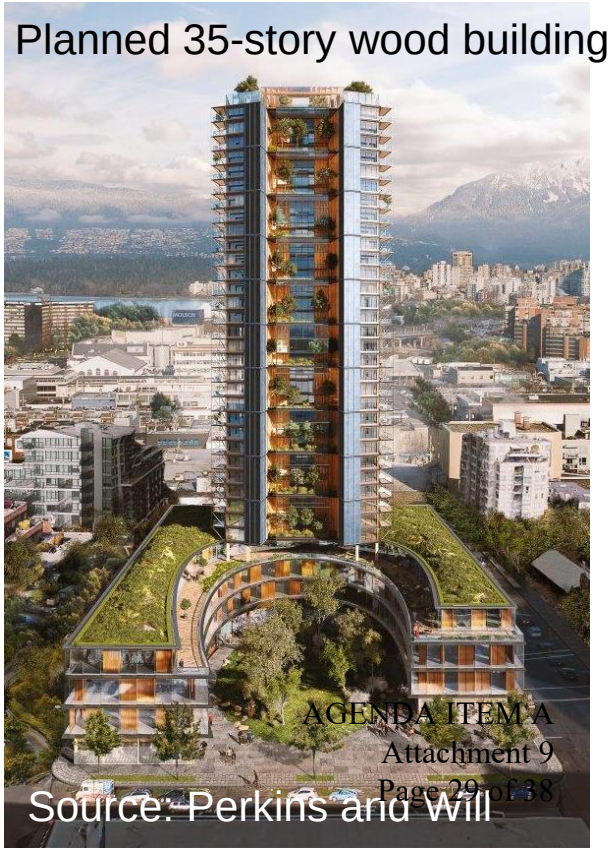


Mitigation benefits by displacing emissions from concrete and steel through the use of wood products

Art Gallery of Ontario
Toronto, Ontario



18-story wood building completed



Planned 35-story wood building

Source: Perkins and Will

Innovation

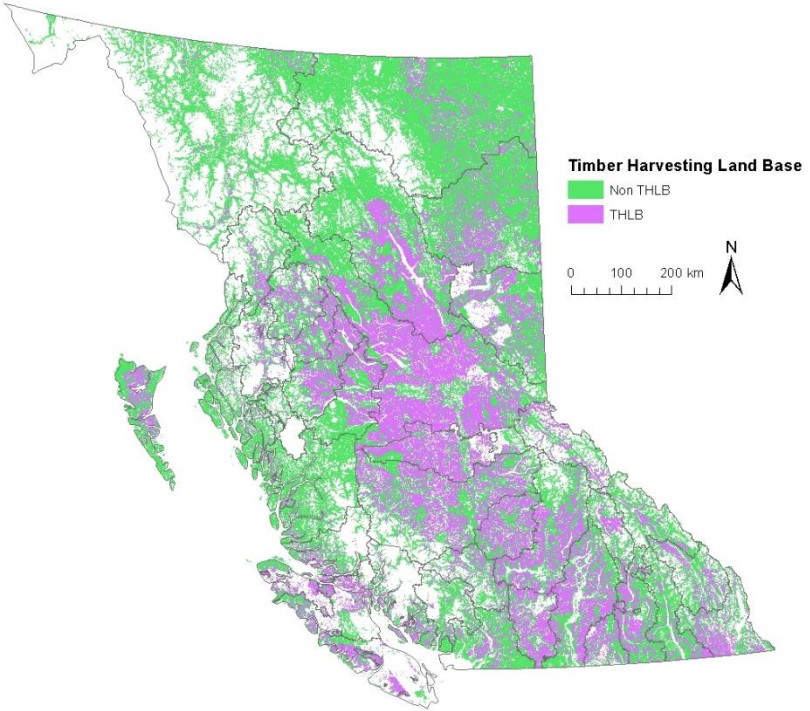
New bioproducts
Bioplastics
Textiles
Nanocellulose
Engineered wood products
etc.


Photo: https://www.nordic.ca/

Innovation aimed at increased C retention and substitution of emissions intensive materials.

New analyses for BC

Province-wide analysis at 1 ha spatial resolution, projections to 2070.



Smyth *et al. Carbon Balance Manage* (2020) 15:21
https://doi.org/10.1186/s13021-020-00155-2

Carbon Balance and Management

RESEARCH Open Access

Climate change mitigation in British Columbia's forest sector: GHG reductions, costs, and environmental impacts

C. E. Smyth[1*], Z. Xu[2], T. C. Lemprière[3] and W. A. Kurz[1]

https://doi.org/10.1186/s13021-020-00155-2

Climate change impacts

- Climate change impacts will be regionally-differentiated
  - Enhanced or reduced growth and mortality rates (CO_2, N, T)
  - Increased decomposition rates
  - Thawing permafrost
  - Shifting vegetation zones
  - Increased disturbances

Net effects are difficult to predict

but there is an asymmetry of risk (slow removal fast emission)

Climate change impacts

British Columbia, 2017 and 2018 direct wildfire emissions
~200 Mt CO_2e/yr ~3 times the emissions from all other sectors

Climate change impacts: 2020 forest fires

Australia: 24 Mha of which 7.5 Mha in temperate forest, emissions 940 Mt CO_2e

Russia: >14 Mha, 244 Mt CO_2e

California: ~ 2.2 Mha, >90 Mt CO_2e

OR, WA, CO – fires still burning …

These 2020 wildfire emissions alone > 1.2 Gt CO_2e

Wildfire risks will further increase with climate change

Contributing to climate change solutions through wildfire emission reductions and a forest-based bio-economy (Wildfire and Carbon)

Investigate climate change mitigation and adaptation solutions that identify and enhance synergies between activities aimed at reducing emissions from wildfires and those that strengthen BC's forest-based bio-economy.

Collaborative project between Canadian Forest Service, US FS, UBC, Parks Canada, BC and PICS.

https://pics.uvic.ca/projects/wildfire-and-carbon

PICS
PACIFIC INSTITUTE FOR CLIMATE SOLUTIONS

Conclusions

- Keeping temperature increase to below 2 ^{o}C requires **net negative emissions** before 2100, within the **lifetime** of children born today!
- Requires **drastic reductions of emissions** in all sectors.
- Not achievable without also greatly increasing **forest sinks** but these are **at risk** from climate change.
- **We still have options** – but the longer we delay action, the more severe the consequences will be.

Thank you!

werner.kurz@canada.ca

Publications at:

https://cfs.nrcan.gc.ca/authors/read/13977

PICS
PACIFIC INSTITUTE FOR CLIMATE SOLUTIONS

Natural Resources Canada | Ressources naturelles Canada

Canada

Recent Publications

Smyth et al. 2020. **Climate change mitigation in British Columbia's forest sector: GHG reductions, costs, and environmental impacts**. Carbon Balance Management 15, 21 (2020). https://doi.org/10.1186/s13021-020-00155-2

Kurz et al. 2016. **Climate change mitigation through forest sector activities: principles, potential and priorities**. Unasylva 246 (67): 61-67. www.fao.org/3/a-i6419e.pdf

Lemprière et al. 2017. **Cost of climate change mitigation involving's Canada's forest sector.** Canadian Journal of Forest Research. DOI: 10.1139/cjfr-2016-0348 http://www.nrcresearchpress.com/doi/pdfplus/10.1139/cjfr-2016-0348

Smyth et al. 2016. **Climate change mitigation potential of local use of harvest residues for bioenergy in Canada**. Glob. Chg. Biol. Bioenergy. DOI: 10.1111/gcbb.12387 http://onlinelibrary.wiley.com/doi/10.1111/gcbb.12387/abstract

Smyth et al. 2016. **Estimating product and energy substitution benefits in national-scale mitigation analyses for Canada**. Glob. Chg. Biol. Bioenergy. DOI: 10.1111/gcbb.12389 http://onlinelibrary.wiley.com/doi/10.1111/gcbb.12389/abstract

Xu et al. 2017. **Climate change mitigation strategies in the forest sector: biophysical impacts and economic implications in British Columbia, Canada**. Mitigation and Adaptation Strategies for Global Change. DOI: 10.1007/s11027-016-9730-z http://link.springer.com/article/10.1007/s11027-016-9735-7.

AMERICAN FORESTS
- SINCE 1875 -

Impacts of Forest Management on Carbon Sequestration and Storage in Oregon

Oregon Board of Forestry – Virtual Public Meeting | November 4, 2020

Kendall DeLyser, Senior Manager of Forests and Climate

Today's Agenda

- Who we are:
  - *Introduction to American Forests and our CBM modeling team*
- What we're doing:
  - *Overview of the CBM model*
  - *Our work with ODF*
- When it'll happen:
  - *Our research timeline*
- Why it matters:
  - *Results and uses of our research*

Who we are: American Forests

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NIACS
Northern Institute of Applied Climate Science

FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE

Canada
Natural Resources Canada
Canadian Forest Service

Forest Carbon and Climate Program
Department of Forestry
MICHIGAN STATE UNIVERSITY

UNITED STATES CLIMATE ALLIANCE

pennsylvania
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

MARYLAND
FOREST SERVICE

DEPARTMENT OF NATURAL RESOURCES

WISCONSIN
DEPT. OF NATURAL RESOURCES

DEPARTMENT OF NATURAL RESOURCES
DNR
MICHIGAN

OREGON
DEPARTMENT OF FORESTRY

Who we are: Our research partners

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☞ The Carbon Budget Model of the Canadian Forest Sector

- Model of forest ecosystem carbon dynamics at various levels:

  stand → operational → state → regional → national

- Links to associated CBM-Framework for Harvested Wood Products model
- Model is spatially referenced – not tied to specific locations, but can reference types of forest stands using *inventory classifiers*

What we're doing: The CBM-CFS3

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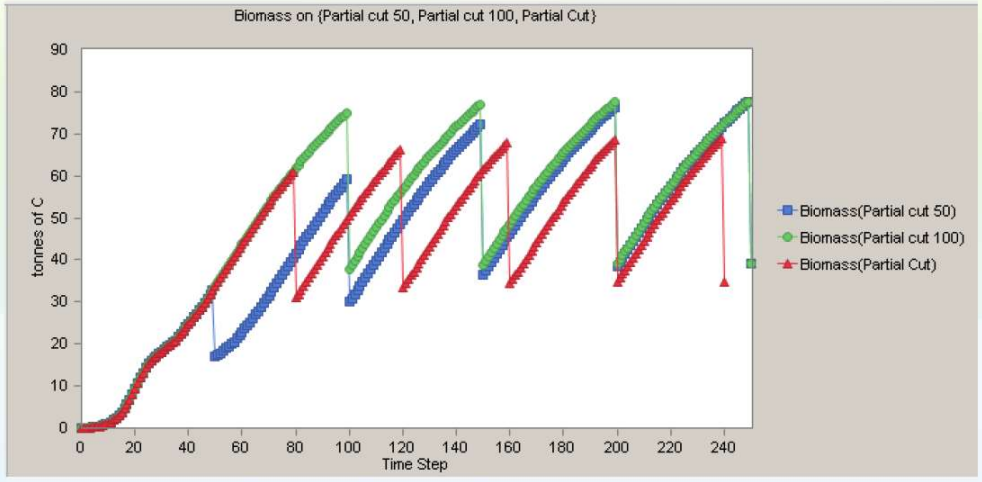
We can compare ecosystem carbon results for alternate forest management scenarios containing different assumptions about:

- Growth and yield
- Natural disturbances and management activities
- Disturbance impacts on carbon pools
- Dead organic matter turnover
- Biomass turnover
- Volume to biomass conversion
- Changing climate*



**Note that this is currently linked to decay, not changes in growth*

What we're doing: Uses of the CBM-CFS3

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☞ Our work is based on sound science

- CBM-CFS3 is built on 30+ years of research and refinement
  - Follows IPCC reporting guidelines
- Expanding the science to the US:
  - South Carolina/Wisconsin (case studies)
  - Pennsylvania (State Forest lands)
  - Vermont (in progress)
- ODF's previous studies (ecosystem carbon, HWP)

☞ We'll survey existing science to fill knowledge gaps

Dugan *et al. Carbon Balance Manage (2018) 13:13*
https://doi.org/10.1186/s13021-018-0100-x

Carbon Balance and Management

RESEARCH Open Access

A systems approach to assess climate change mitigation options in landscapes of the United States forest sector

Alexa J. Dugan[1*], Richard Birdsey[2], Vanessa S. Mascorro[3], Michael Magnan[4], Carolyn E. Smyth[4], Marcela Olguin[3] and Werner A. Kurz[4]

USDA United States Department of Agriculture

Assessment of Forest Sector Carbon Stocks and Mitigation Potential for the State Forests of Pennsylvania

A report for the Pennsylvania Department of Conservation and Natural Resources

What we're doing: Using the CBM-CFS3 in the US

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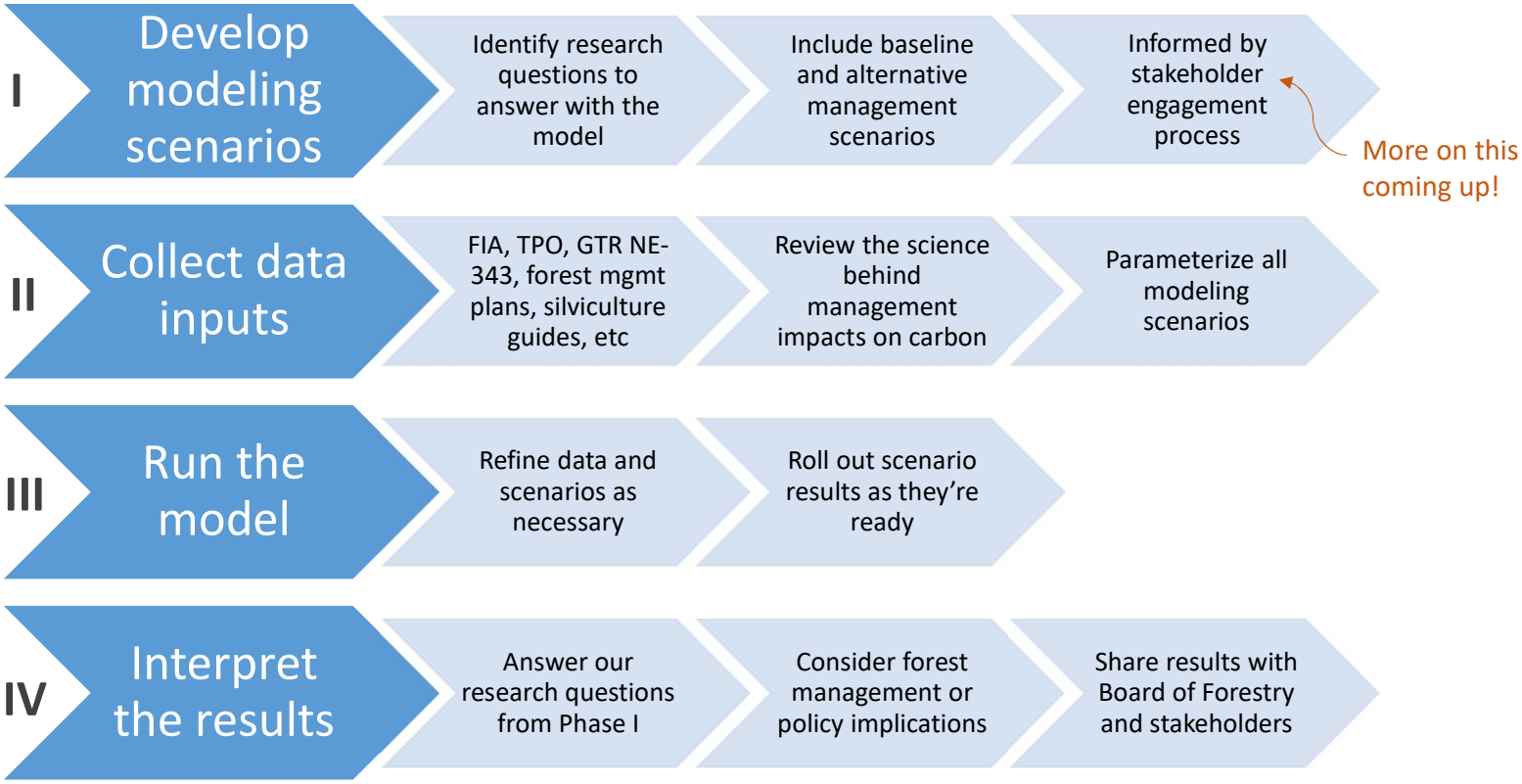
- SINCE 1875 -

☞ What are the carbon impacts of forest management in Oregon?



What we're doing: Our work with ODF

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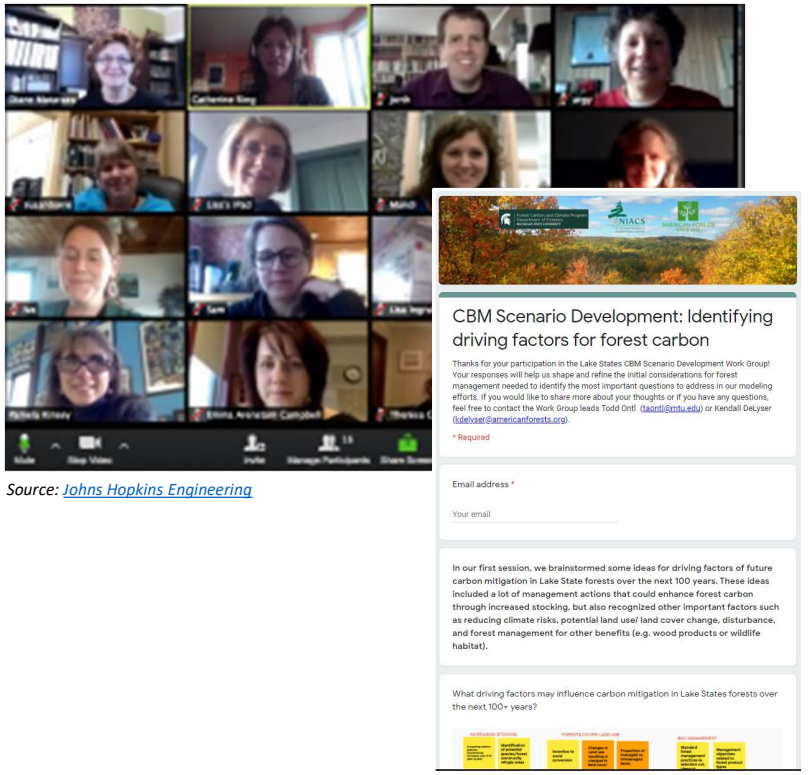
We want input from Oregon's forest community to help us develop our management scenarios

☞ **What research questions should we ask about forest management and carbon?**

i.e. "What are current carbon sequestration trends in Oregon?"
"Does Practice X or Practice Y capture more carbon long-term?"

- Series of virtual meetings
- Advance participant surveys to collect input on potential research questions
- Flesh out research questions in each meeting
- Technical work group to advise on silvicultural details



Source: Johns Hopkins Engineering

What we're doing: Stakeholder engagement

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✓ November 4, 2020: presentation to the Oregon Board of Forestry

I. Stakeholder engagement surveys and meetings: 3-4 months
II. Scenario development, science review, and data collection: 2-3 months
III. Model runs and refinement: 3-4 months
IV. Results and data interpretation, final reporting: 3 months

☞ Anticipated finish by December 2021

When it'll happen: Our research timeline

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- Model a broad range of forest management scenarios
- Assess the carbon sequestered in forests and harvested wood products (HWP), along with associated economic effects

- Better understanding of the climate mitigation potential of Oregon's forests and forest sector

- Integrate carbon management into policies and programs for various forest ownerships statewide
- Enable the inclusion of forests in state-level climate action planning

Why it matters: Results and uses of our research

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Thank you!

Kendall DeLyser, *Senior Manager of Forests and Climate*
kdelyser@americanforests.org

The Urban and Community Forestry Assistance Program at (almost) 30 … and Looking Ahead

Newport

Presented by
Kristin Ramstad
U&CF Program Manager

To the
Oregon Board of Forestry
November 4, 2020

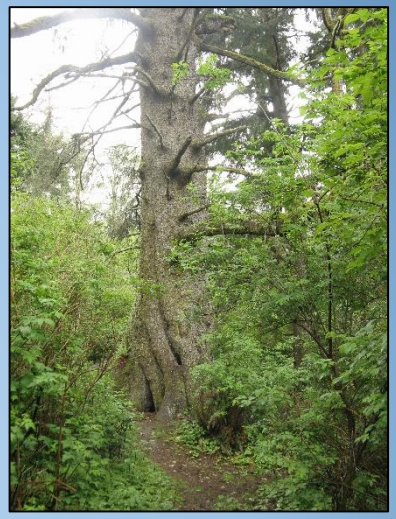
Urban Forestry = Collaboration

Oregon Community Trees Board of Directors, Dec 2018

Representing the cities of Hood River, Salem, Corvallis, La Grande, Ashland, Eugene, Portland, the USDA Forest Service, OSU Extension, World Forestry Center, Private Sector arboriculture companies, Clackamas County Forestry, Clean Water Services, Eugene Water & Electric Board, Friends of Trees, and ODF.

Urban Forests

Salem

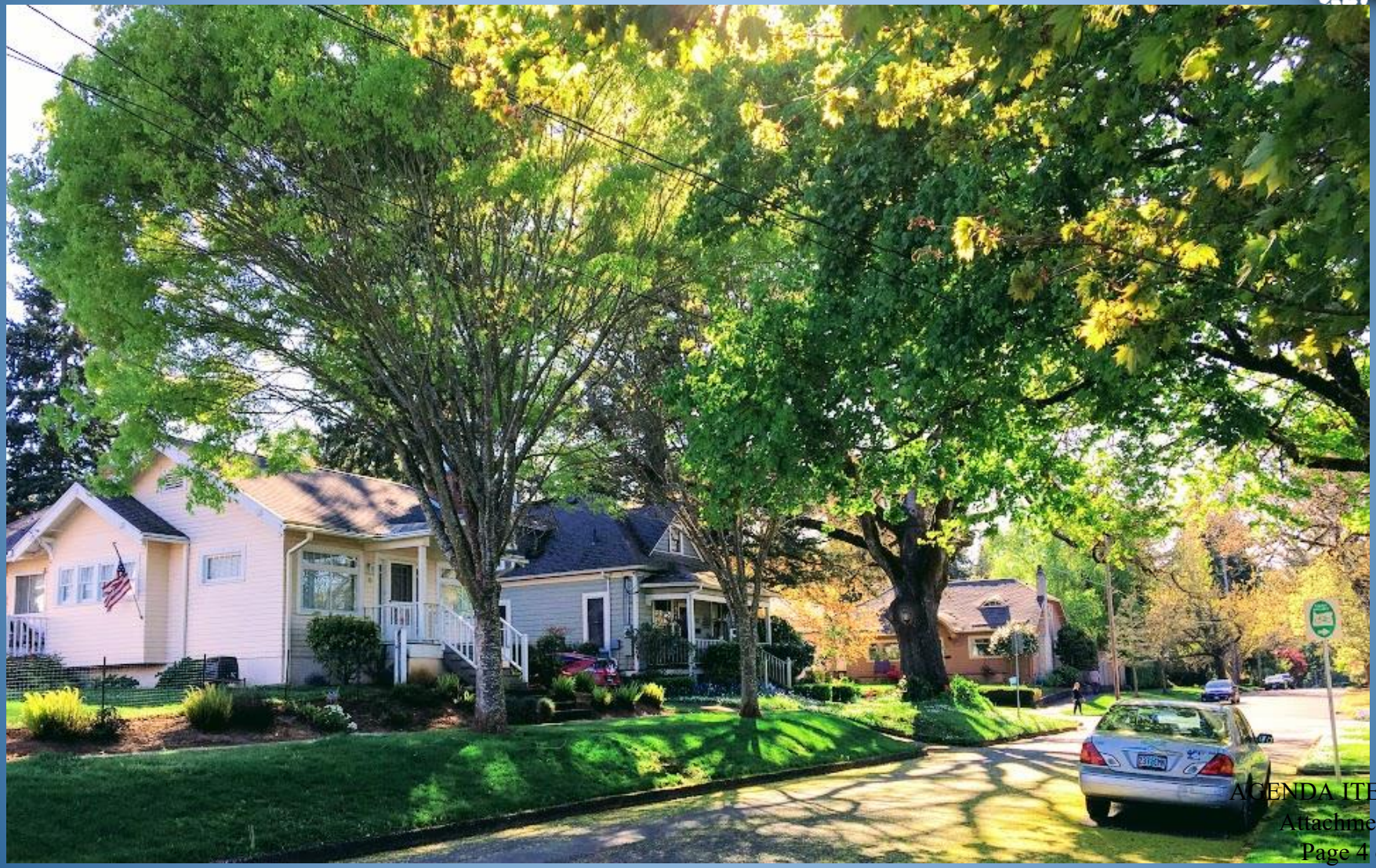


Lincoln City

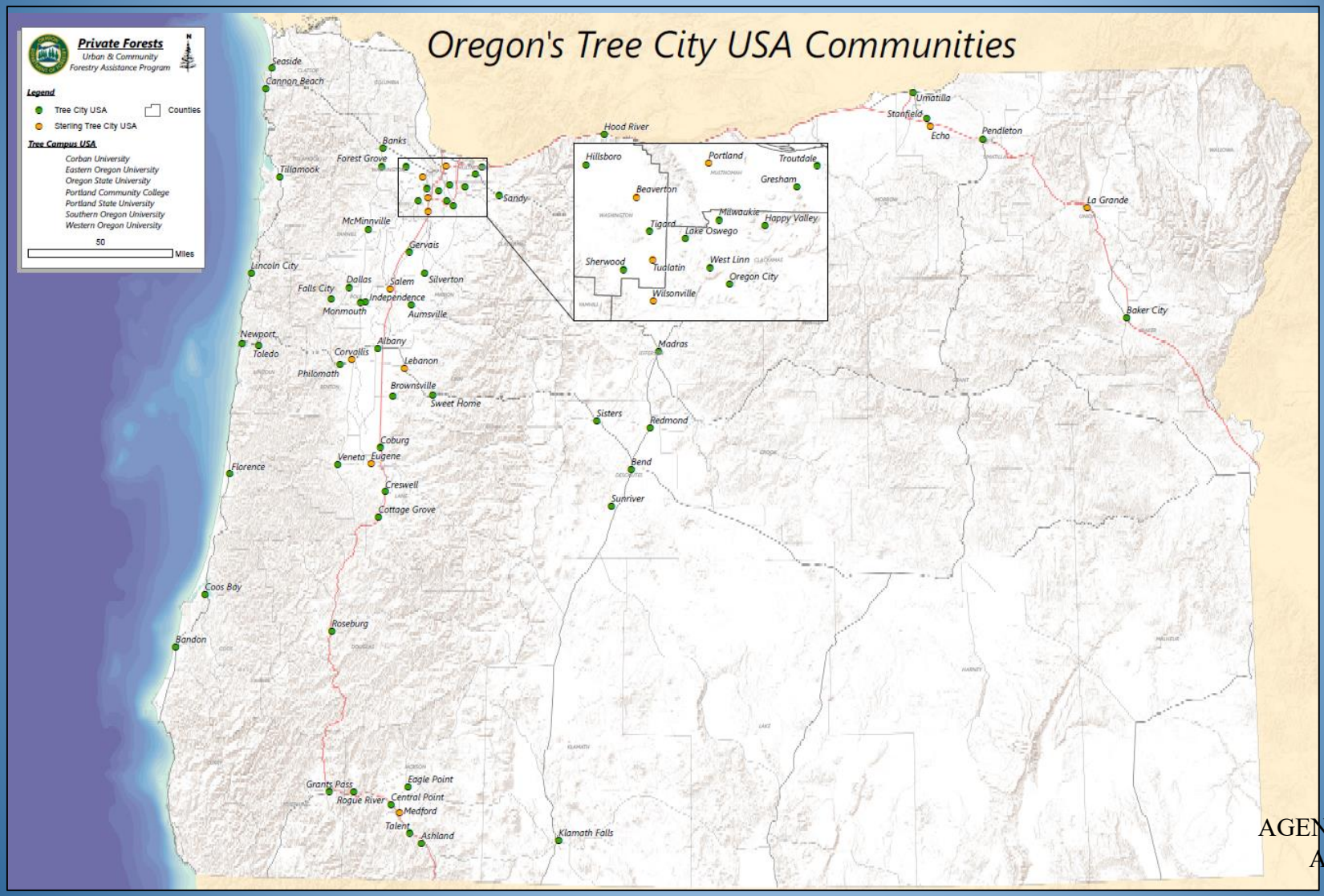
Eugene

Sisters

Trees as Ambassadors

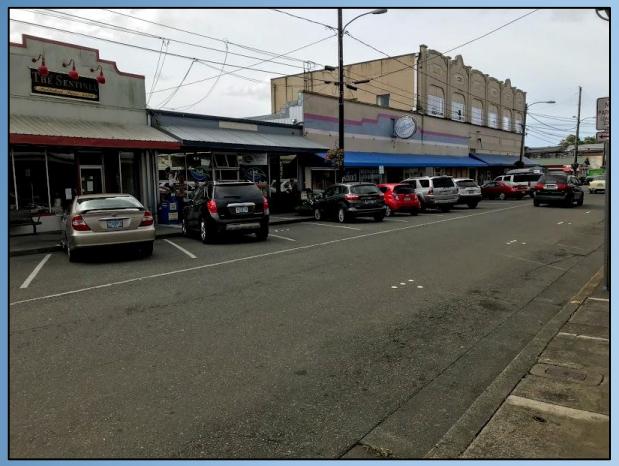


Why Tree City USA?



TCUSA map design – Michael Lathrop, ODF

Trees as Liabilities and Expense



South Coast

North Coast

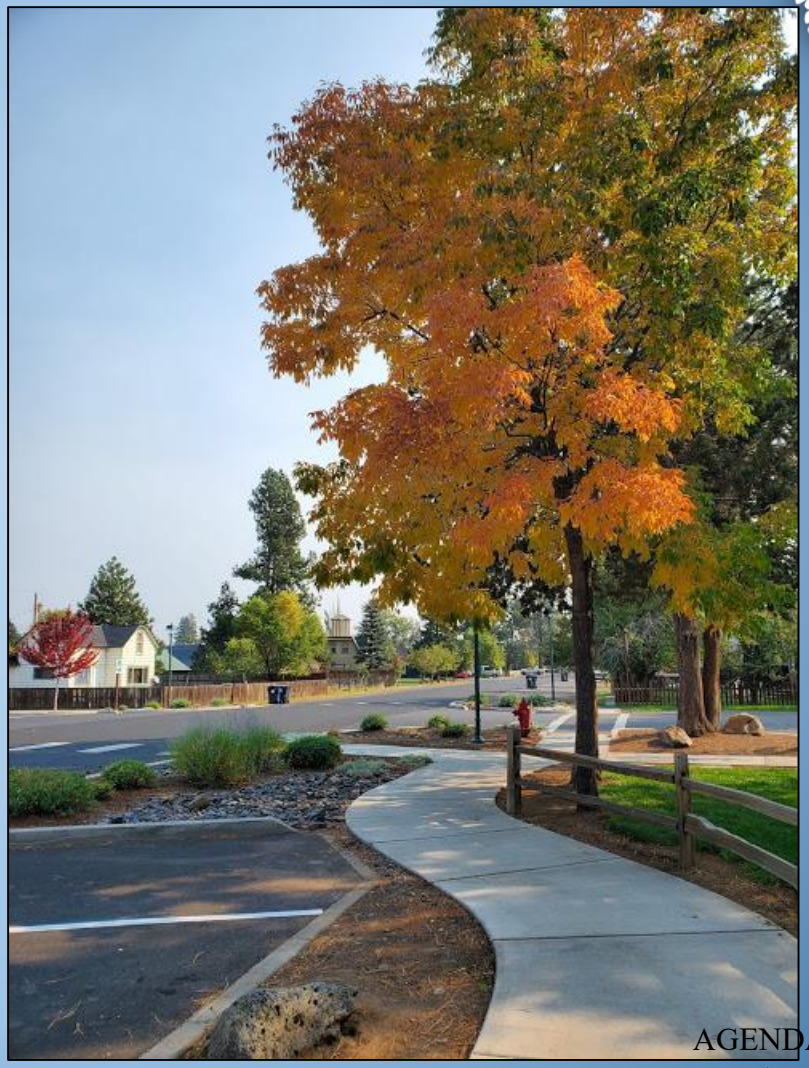
NW Oregon

South Coast

Central Oregon

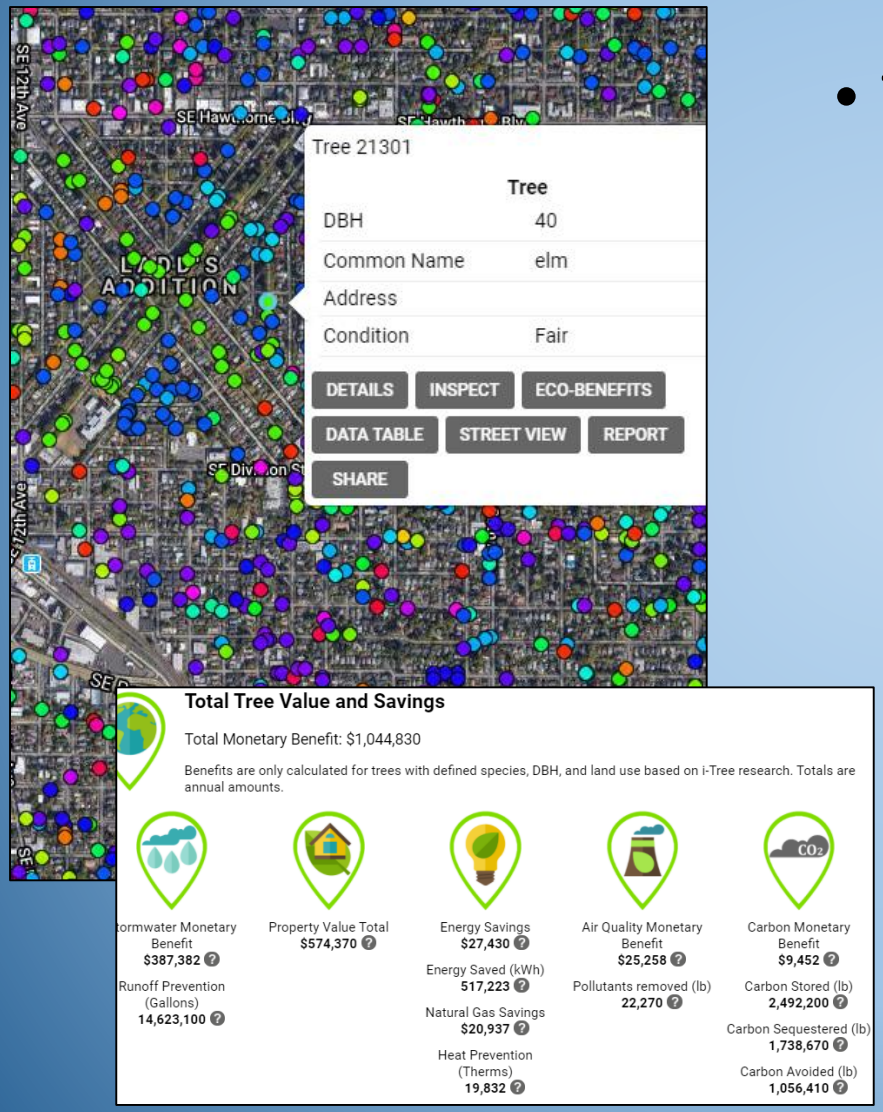
Trees as Living Machines

Portland suburb



Sisters

Tree Plotter Inventory Platform



- Tree Mapping & Inventory Project
  - Goal: increase proactive management of Oregon's urban forests
  - Cloud-based tree inventory software available for free to Oregon communities
  - Statewide UF tree database
  - Estimation of tree/UF benefits

Trees as Demographic Indicators

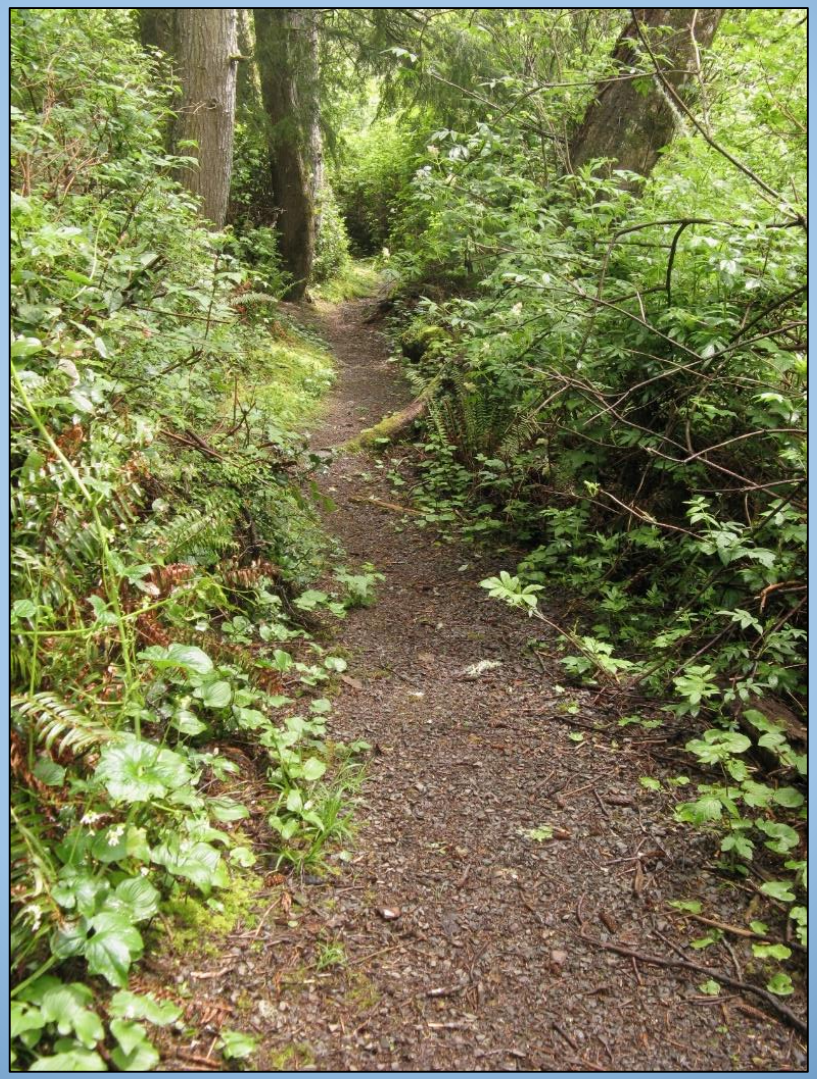
Willamette Valley

After Shandas/Donovan Presentations

Checking-in With Local Residents

Riverside Elementary School, Portland

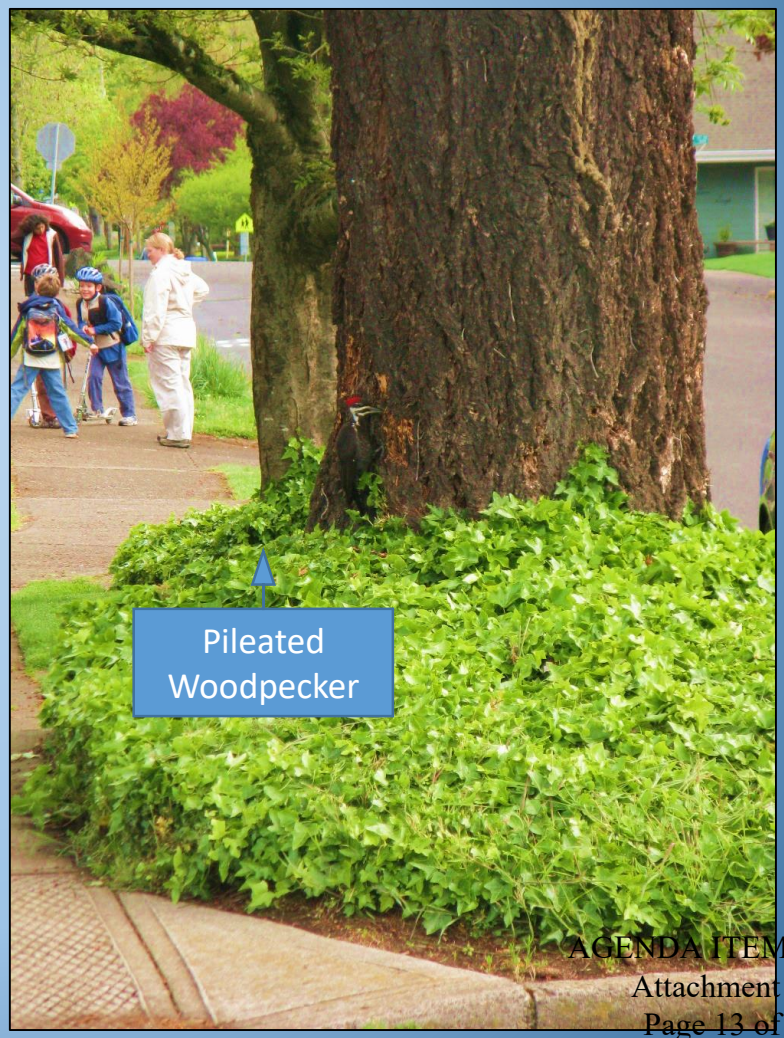
What Lies Ahead



Lincoln City

Increase Oregon's Urban Canopy Cover Through Tree Planting and Active UF Management

- Increase canopy in residential neighborhoods
  - To 20-25 percent (est. west OR)
  - To 15-20 percent (est. east OR)
- Create canopy goals for large parking lots
  - To 25-50 percent
- Incentivize tree planting on private property
- "Depave" impervious surfaces to create additional UF planting areas



Salem – near McKinley Elementary School

Increase the Use of the Statewide Urban Tree Mapping Software and Database

Hillsboro

- UCF staff-city interactions
- Intra- and inter- state pest invasion coordination
- Regional tree species analysis
- Identify canopy disparities
- Tree risk emergency planning
- Urban wood use

Increase Wildfire Awareness & Preparedness in WUI and Towns

Photo from FEMA

Build an UF Strike Team

Urban Forest Strike Team Members assess and record tree damage from Hurricane Mathew in 2016. Photo Courtesy of the Southern Group State Forests (SGSF).

What the Future U&CF Program *Could* Look like…?

Wrap Up: Trees as Story-Tellers

Talent

Hideko Tamura-Snider, Hiroshima bombing survivor and founder of the One Sunny Day Initiatives, left, at the Talent Peace tree planting, a few weeks after the Alameda Fire, October 2020.

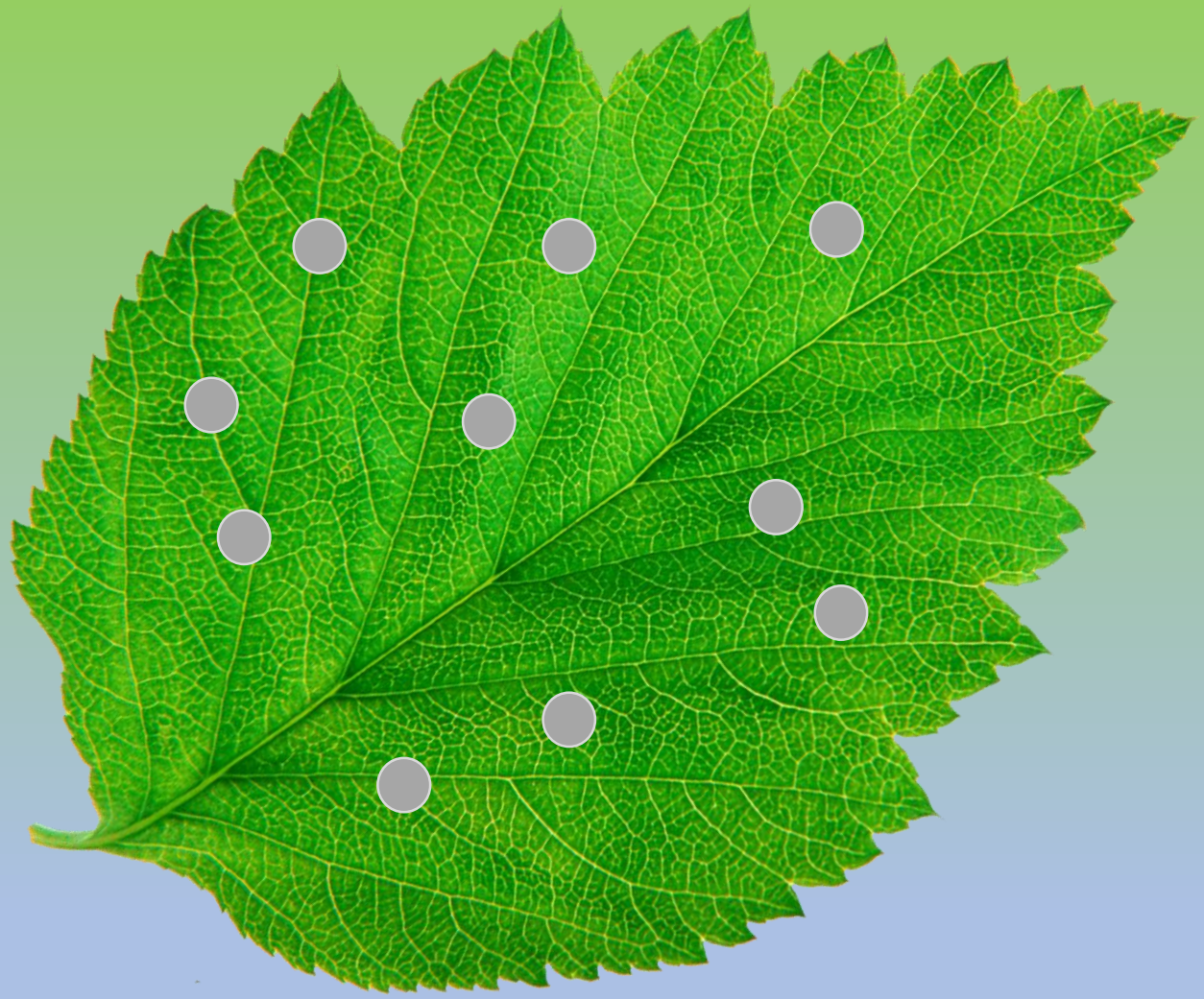
La Grande

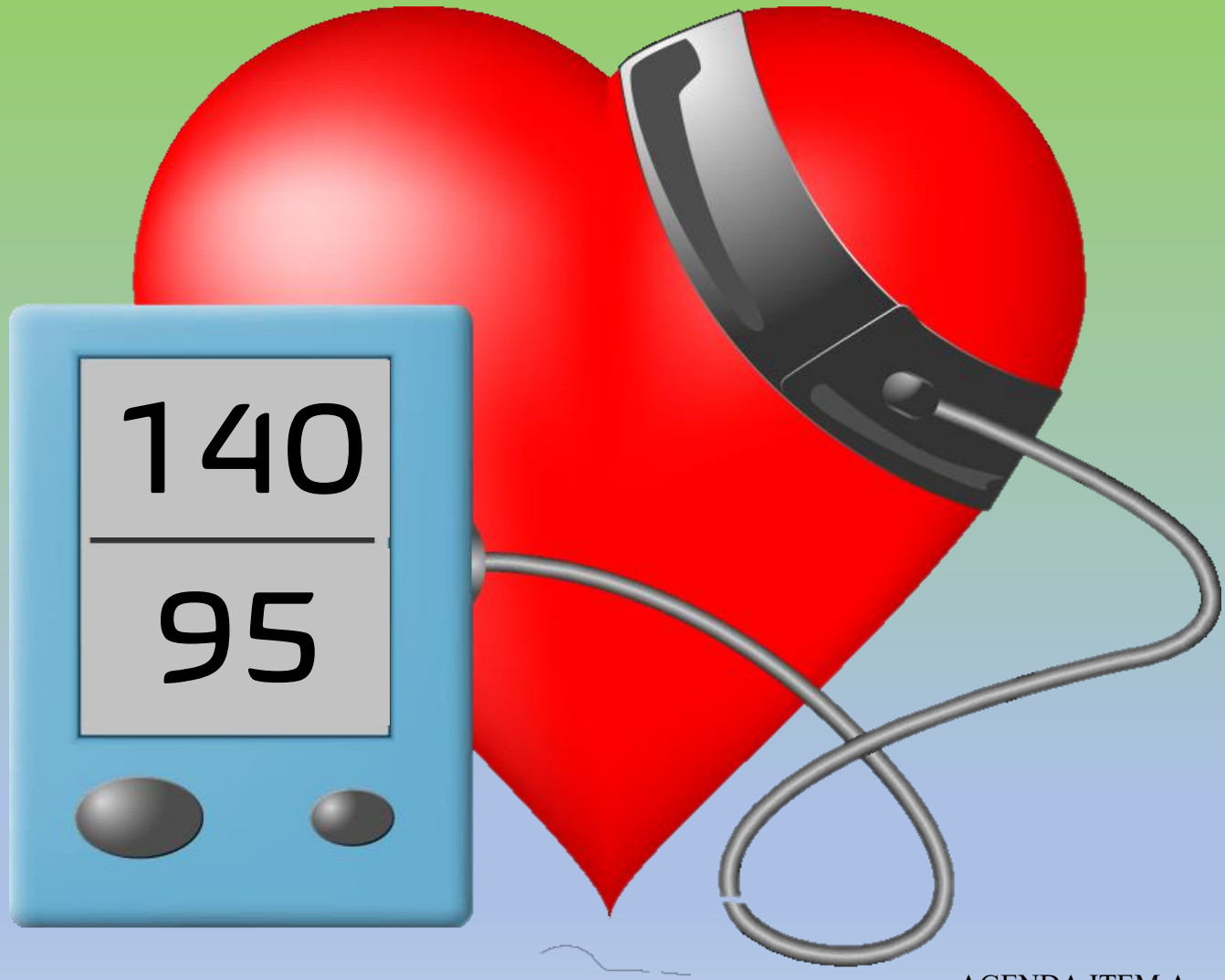
Urban trees—a matter of life and death

Geoffrey Donovan

USDA Forest Service

PNW Research Station

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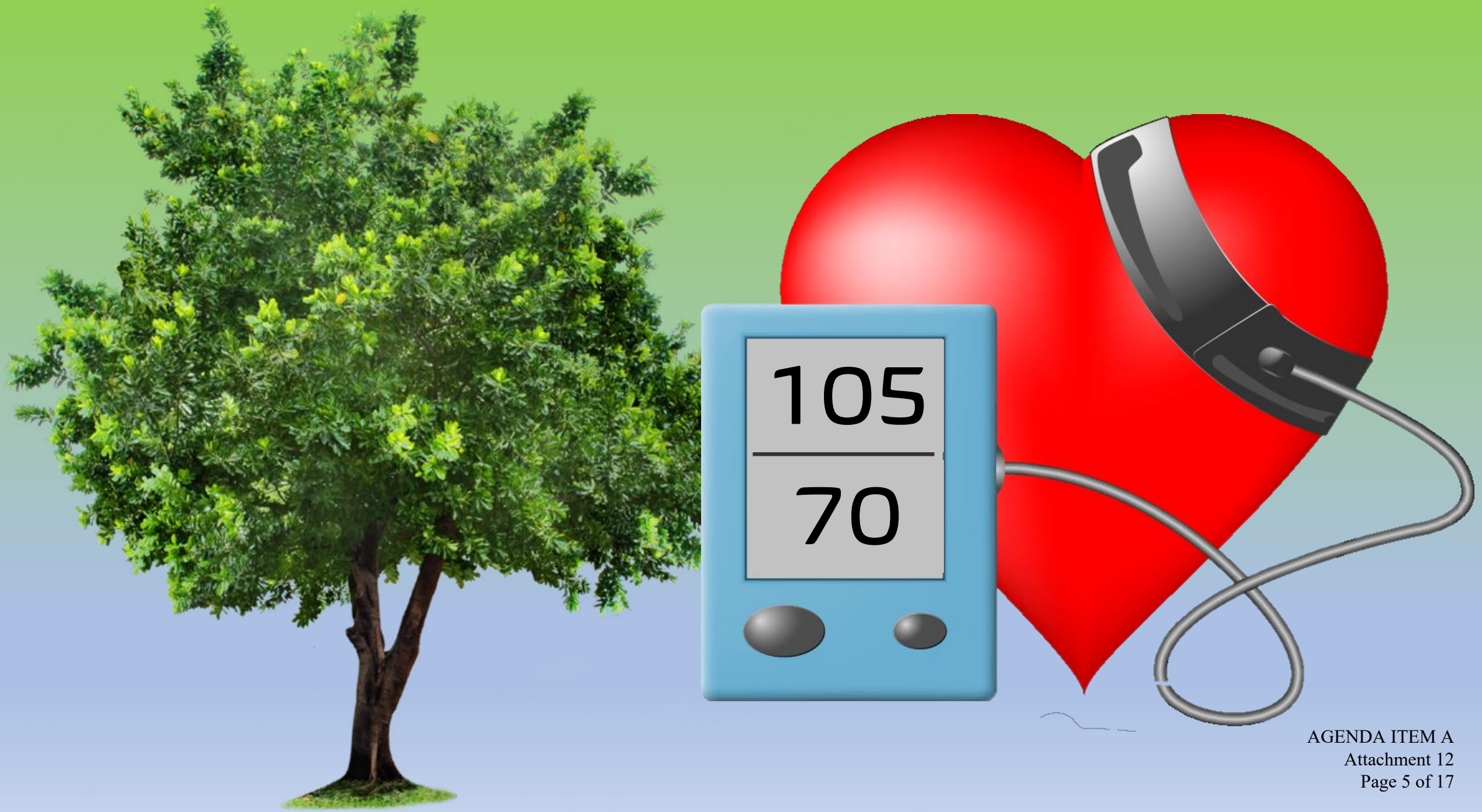
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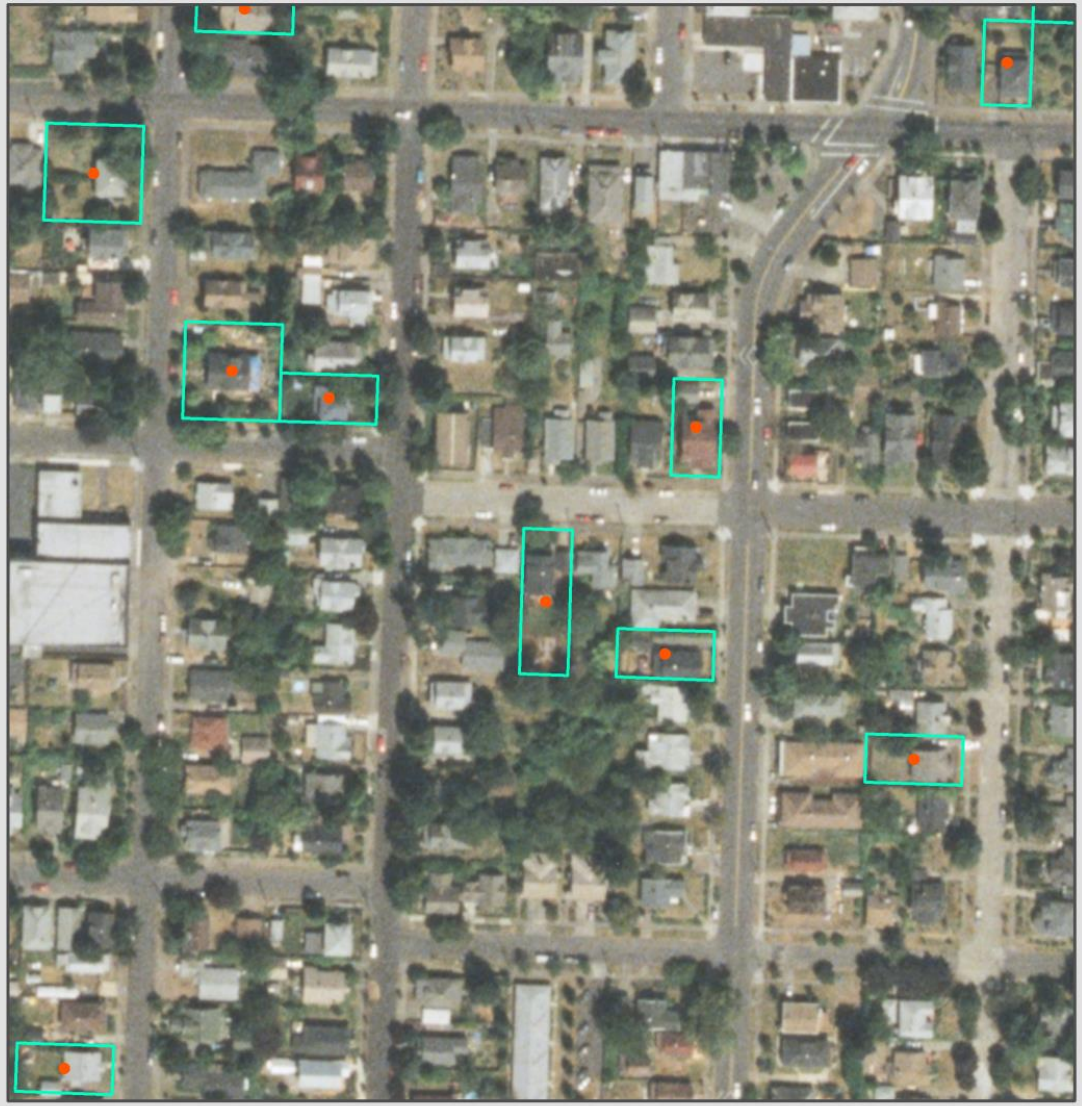
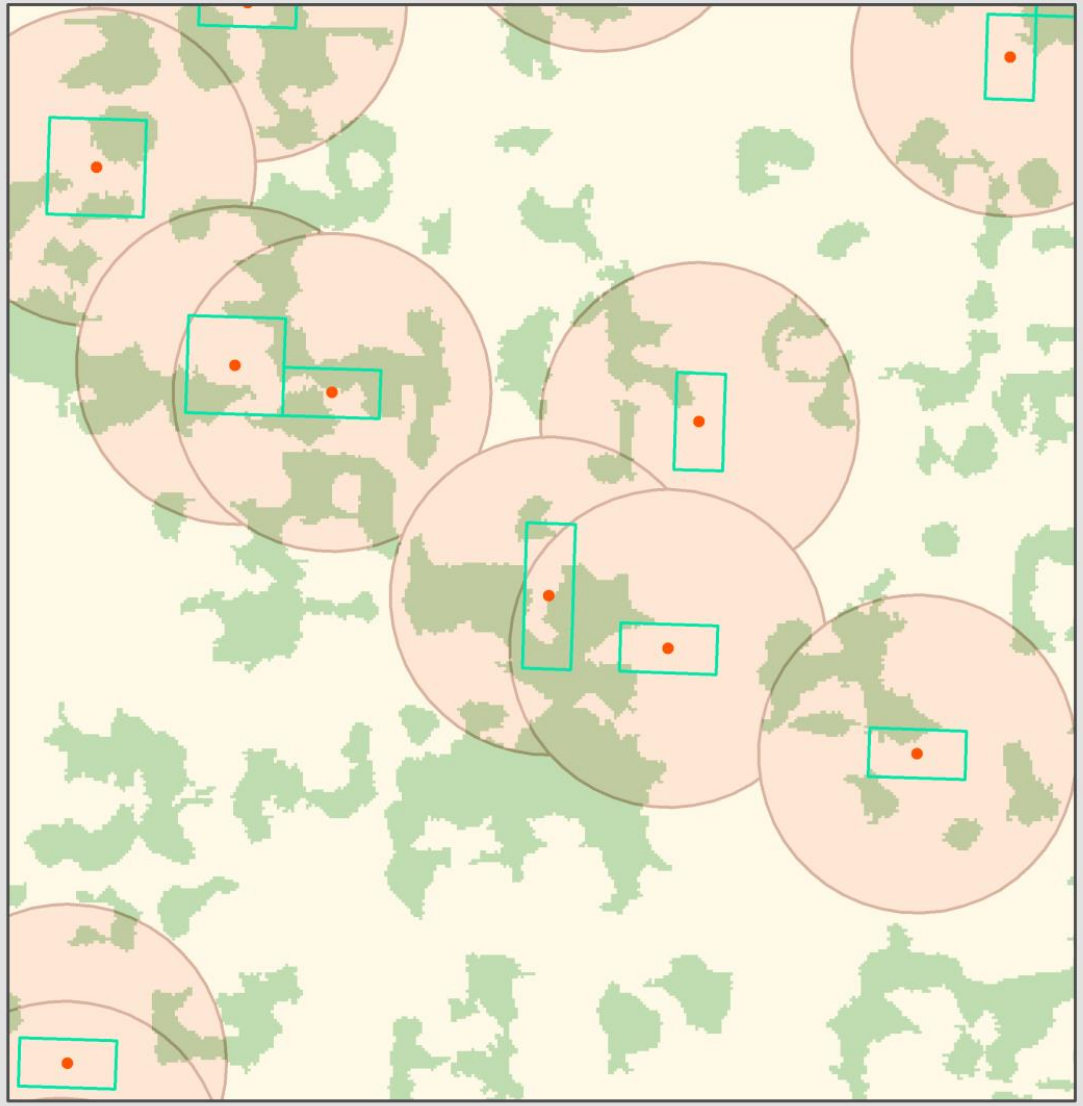


Half meter natural color aerial imagery with taxlot polygons and centroids around which buffers were calulated.



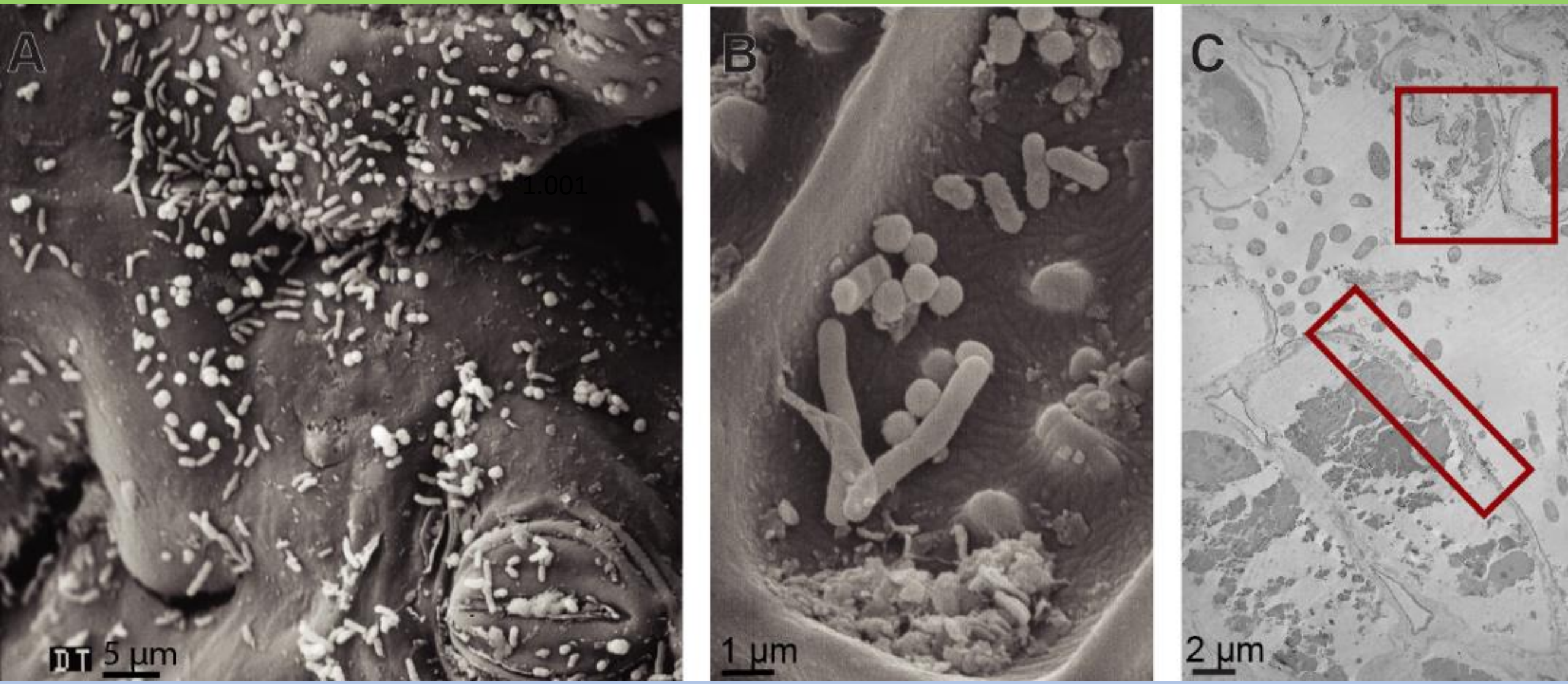
Tree canopy layer extracted from classification of aerial imagery with 50 meter buffers around taxlot polygon centroids. Green is tree canopy and tan is non-canopy.

150

Meters

Source: Portland Metro Regional Government Regional Land Information System (RLIS), City of Portland Bureau of Planning and Sustainability.


MIRAMAR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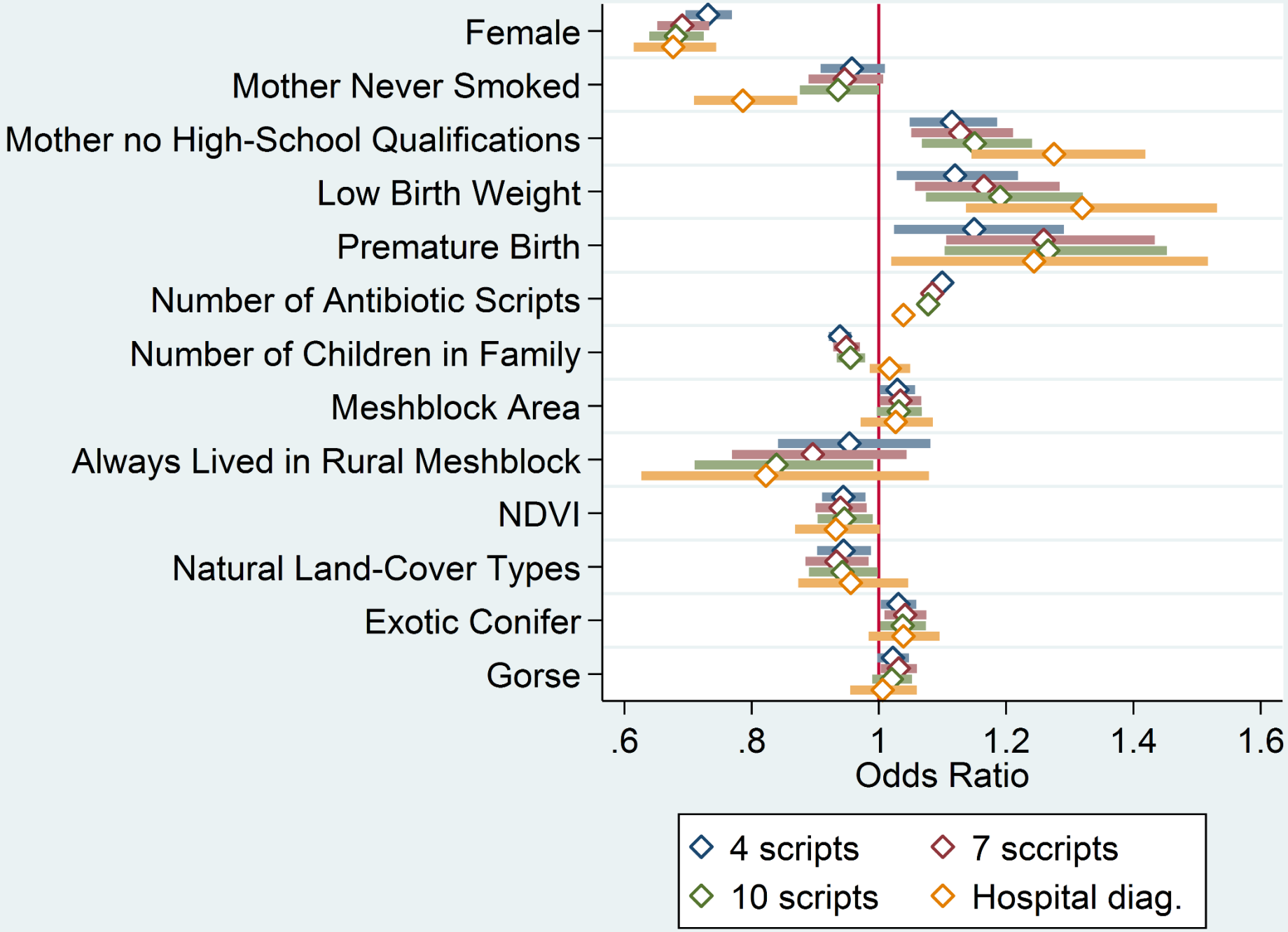
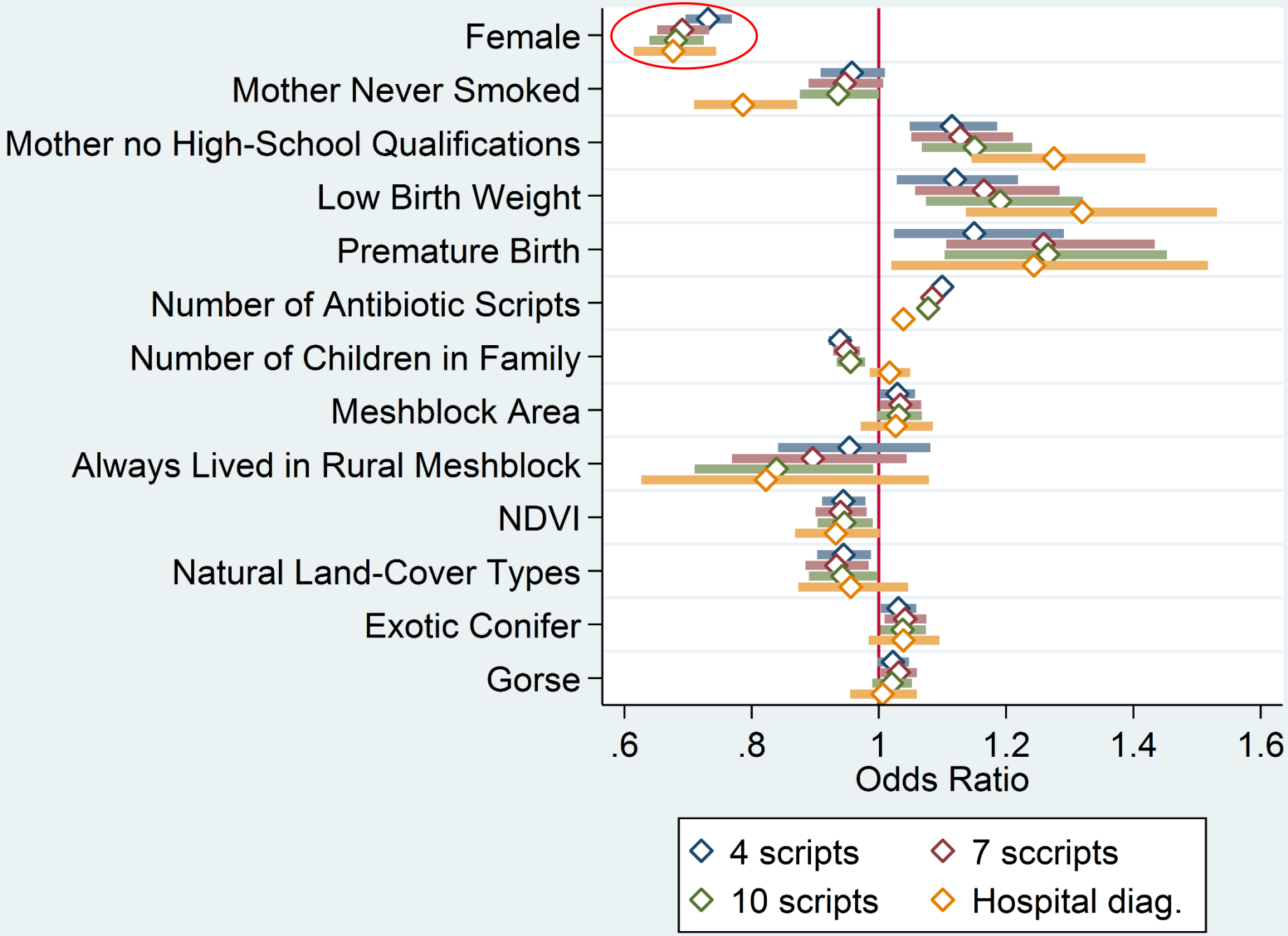
1.001
5 µm
B
1 µm
C
2 µm


Female
Mother Never Smoked
Mother no High-School Qualifications
Low Birth Weight
Premature Birth
Number of Antibiotic Scripts
Number of Children in Family
Meshblock Area
Always Lived in Rural Meshblock
NDVI
Natural Land-Cover Types
Exotic Conifer
Gorse
.6
.8
1
1.2
1.4
1.6
Odds Ratio
4 scripts
7 sccripts
10 scripts
Hospital diag.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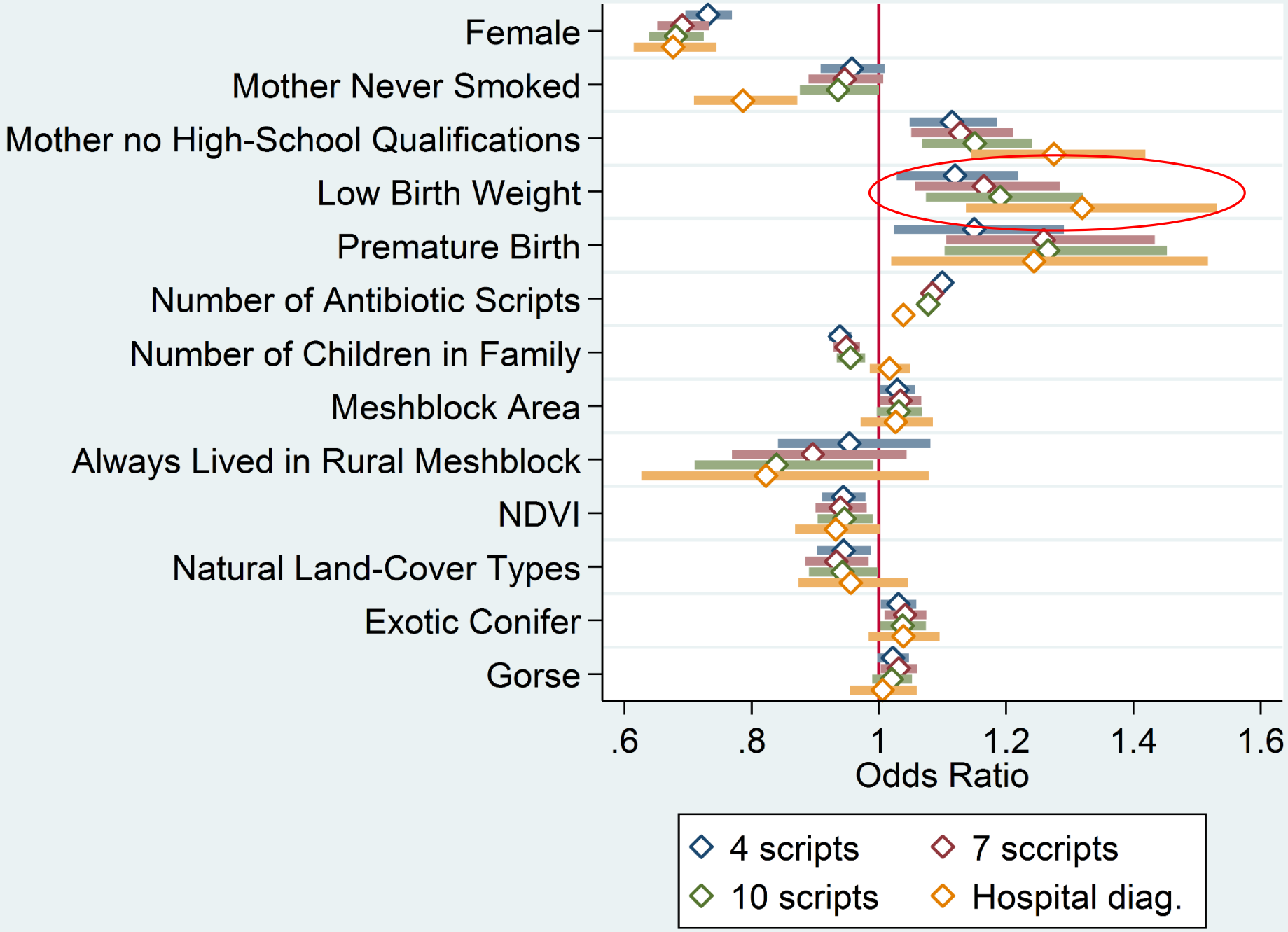
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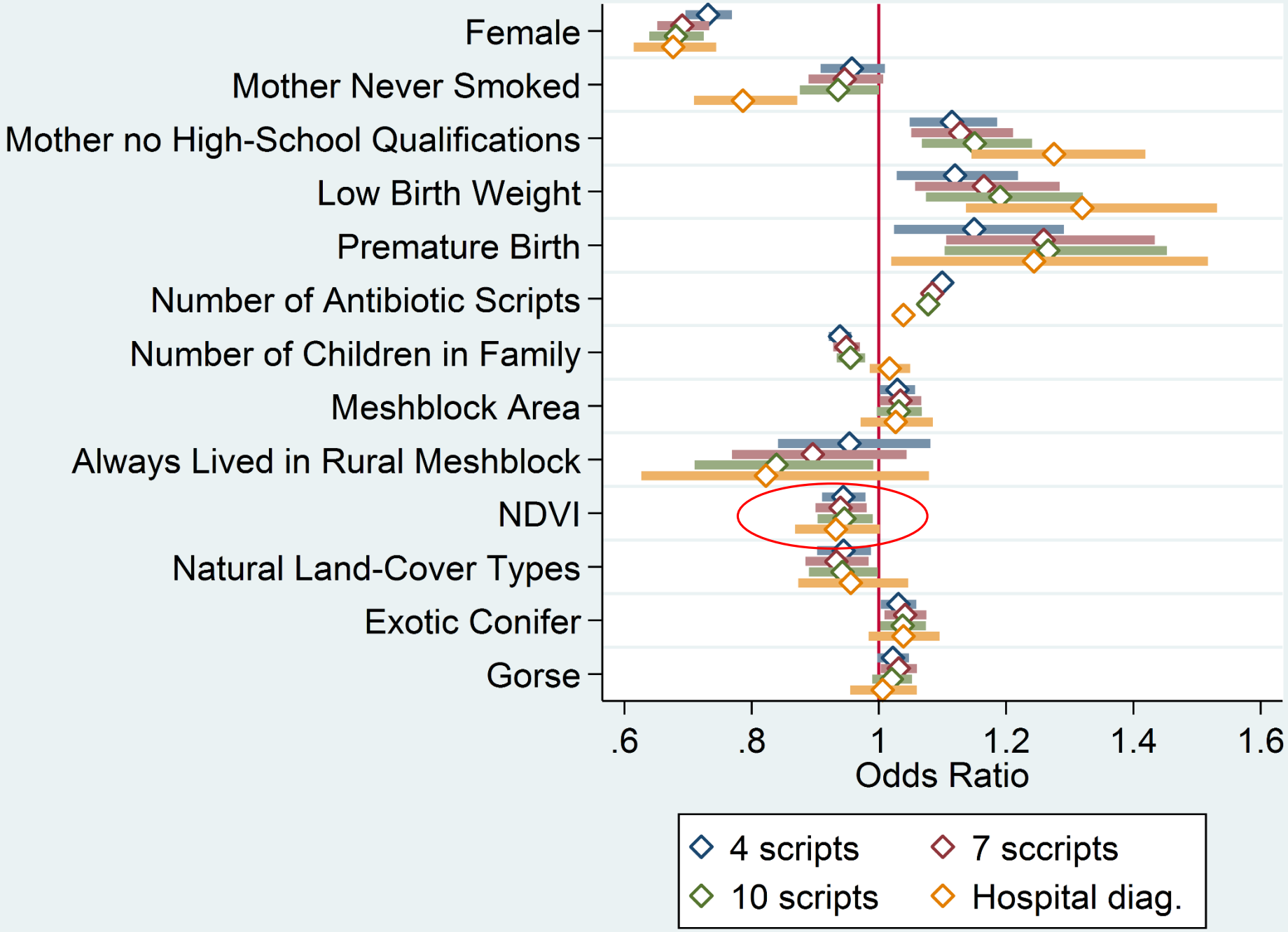
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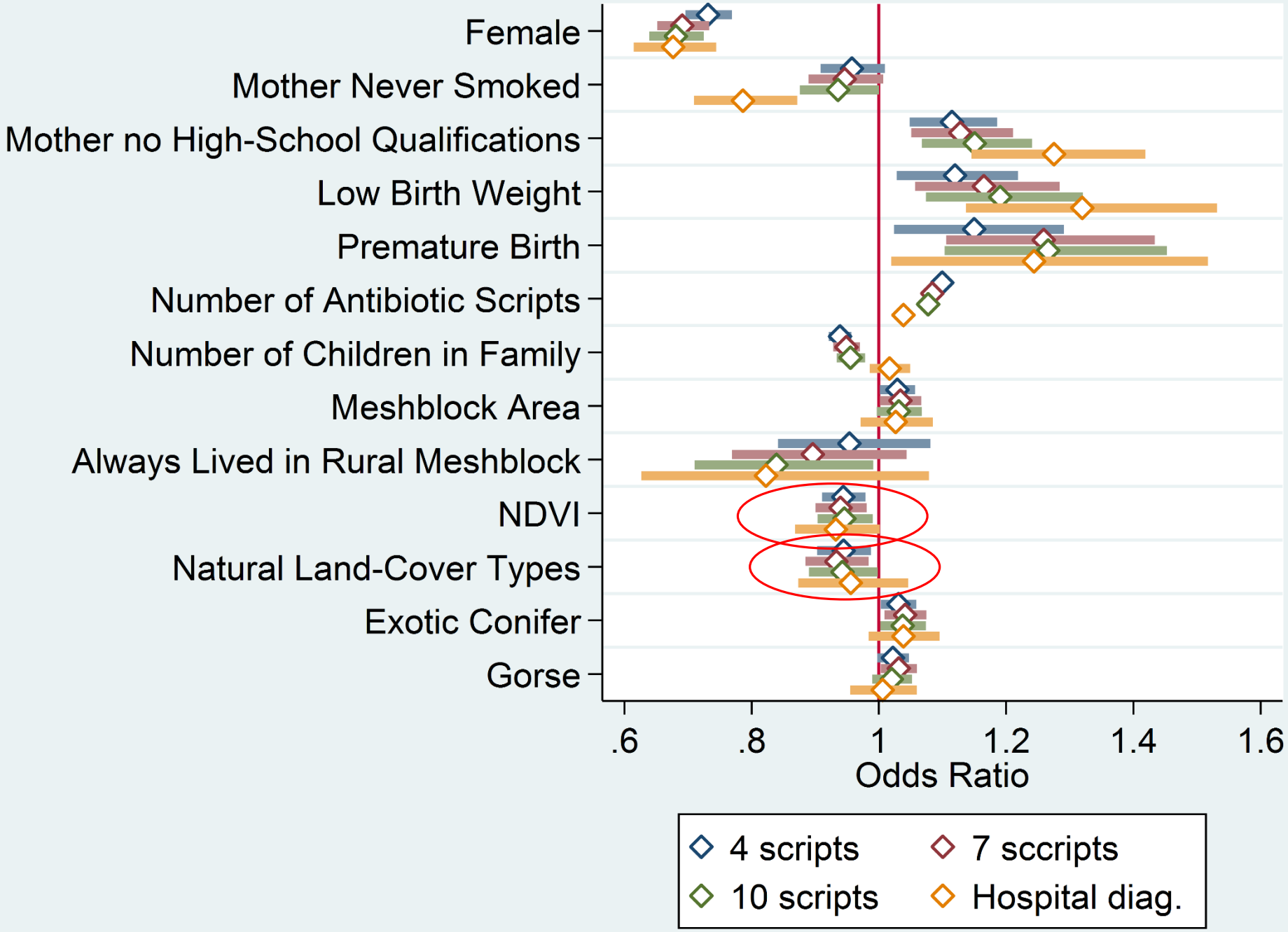
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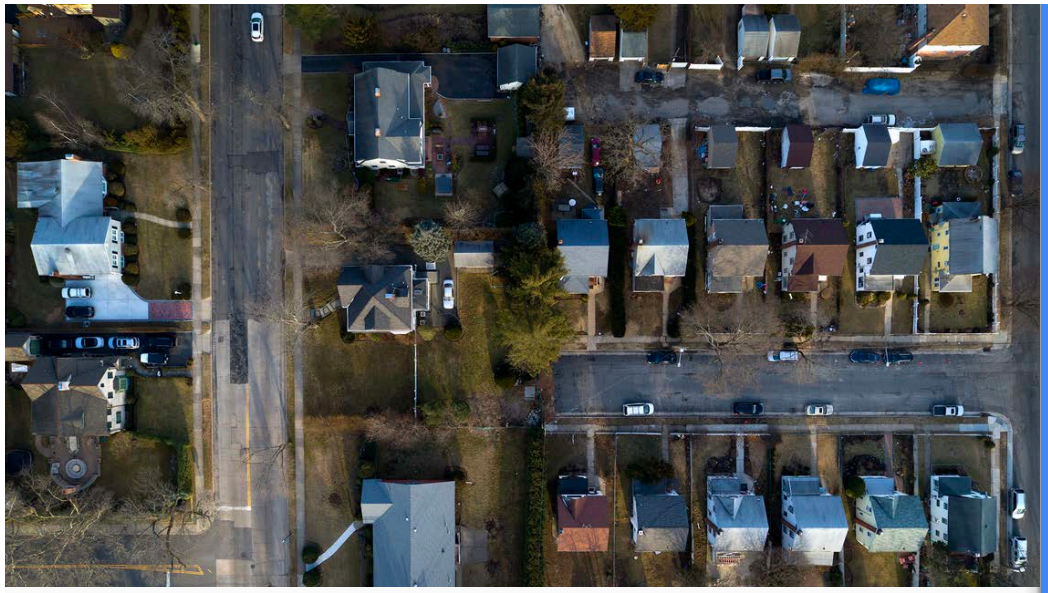
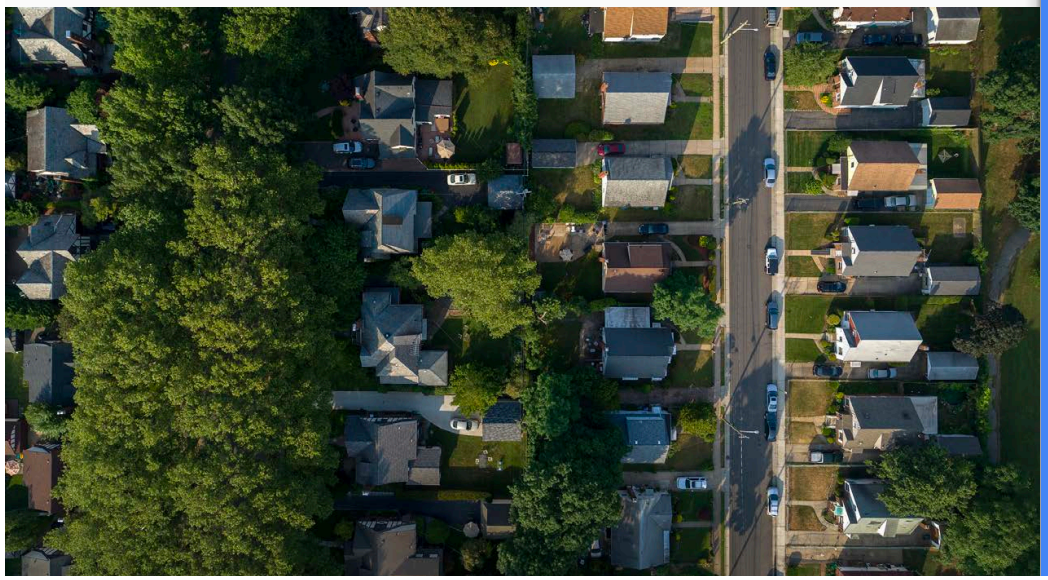
10 scripts
Hospital diag.

Reduced risk

Reduced risk

Questions?



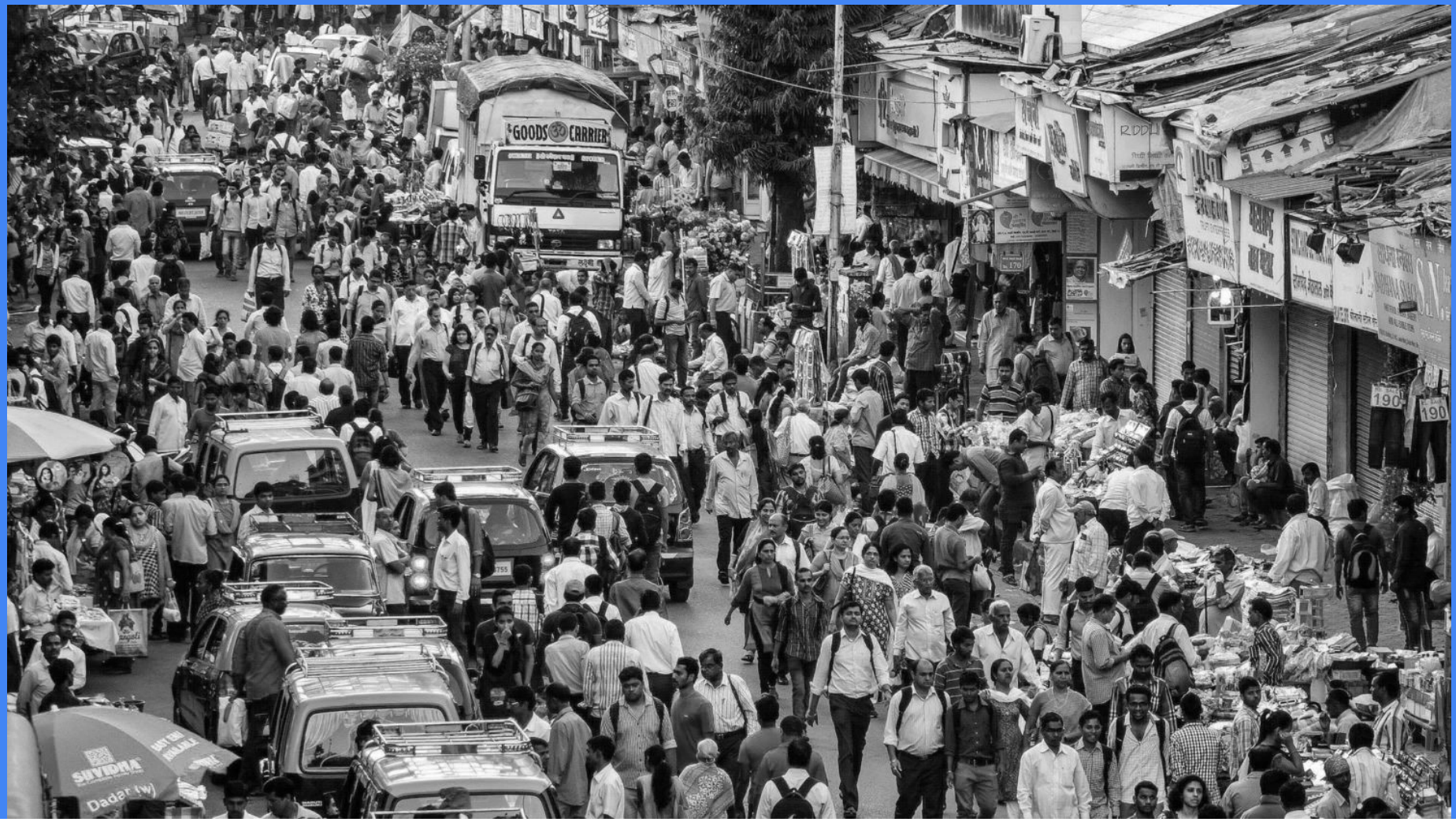


Inequitable Ecologies

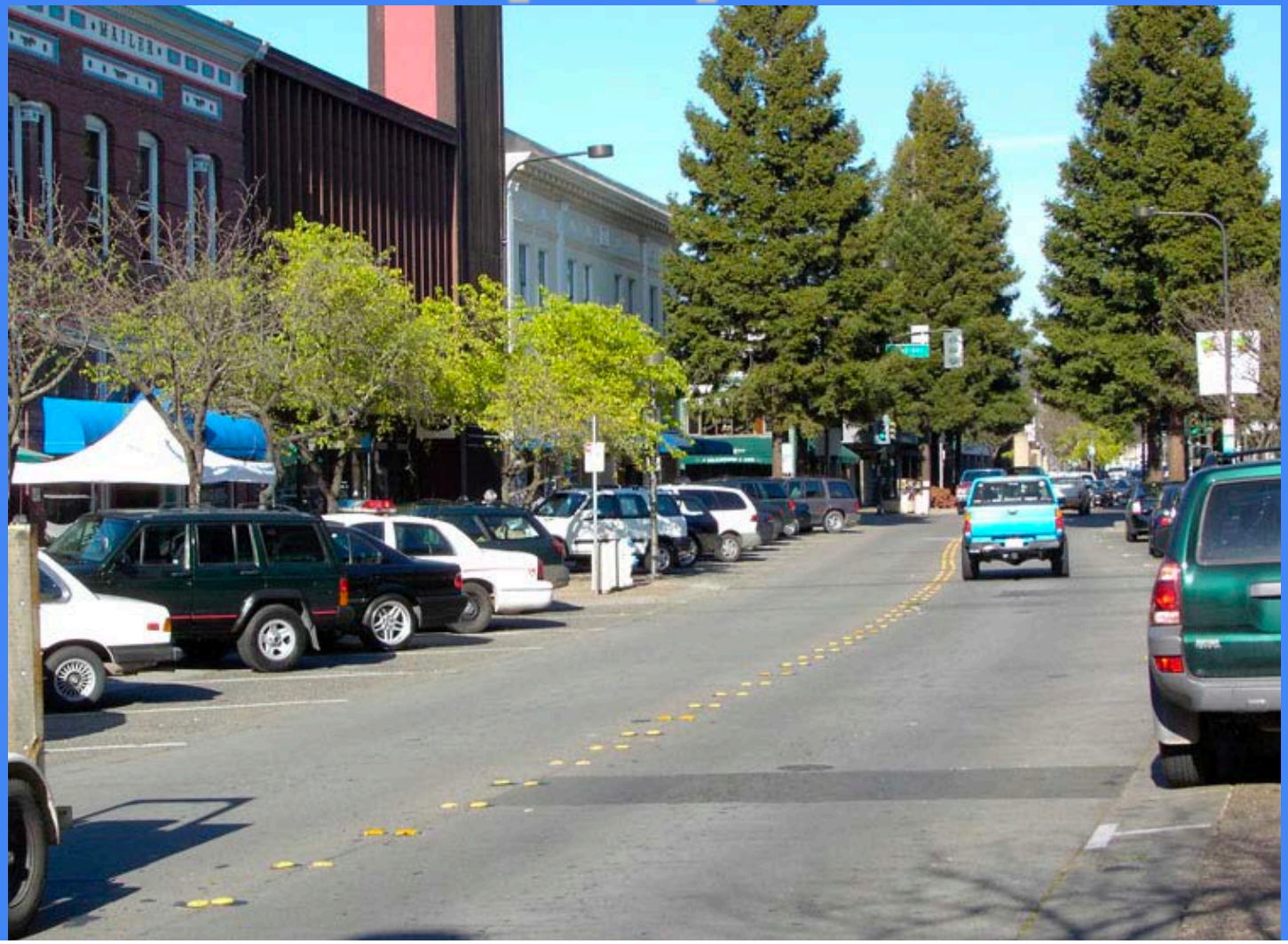
The role of past urban planning practices in managing today's urban forests

Vivek Shandas, *Professor*
Portland State University

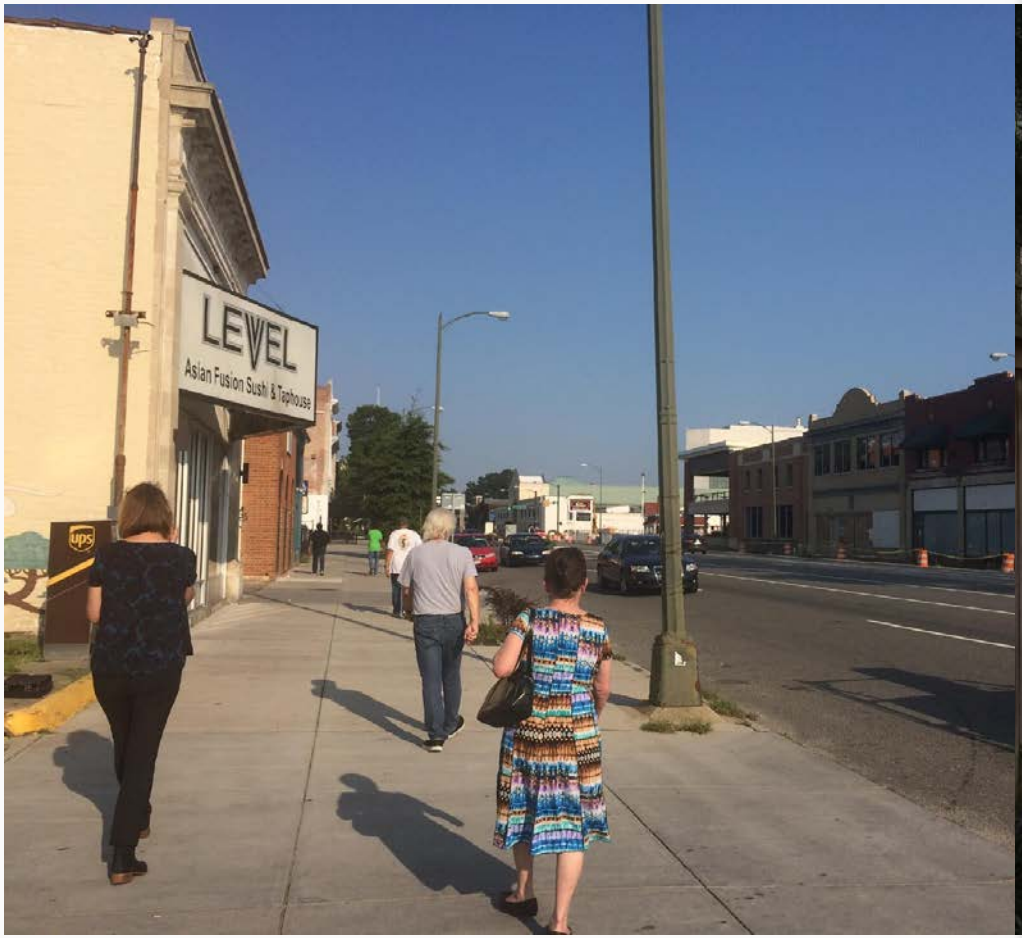
Landscape Experiences 1

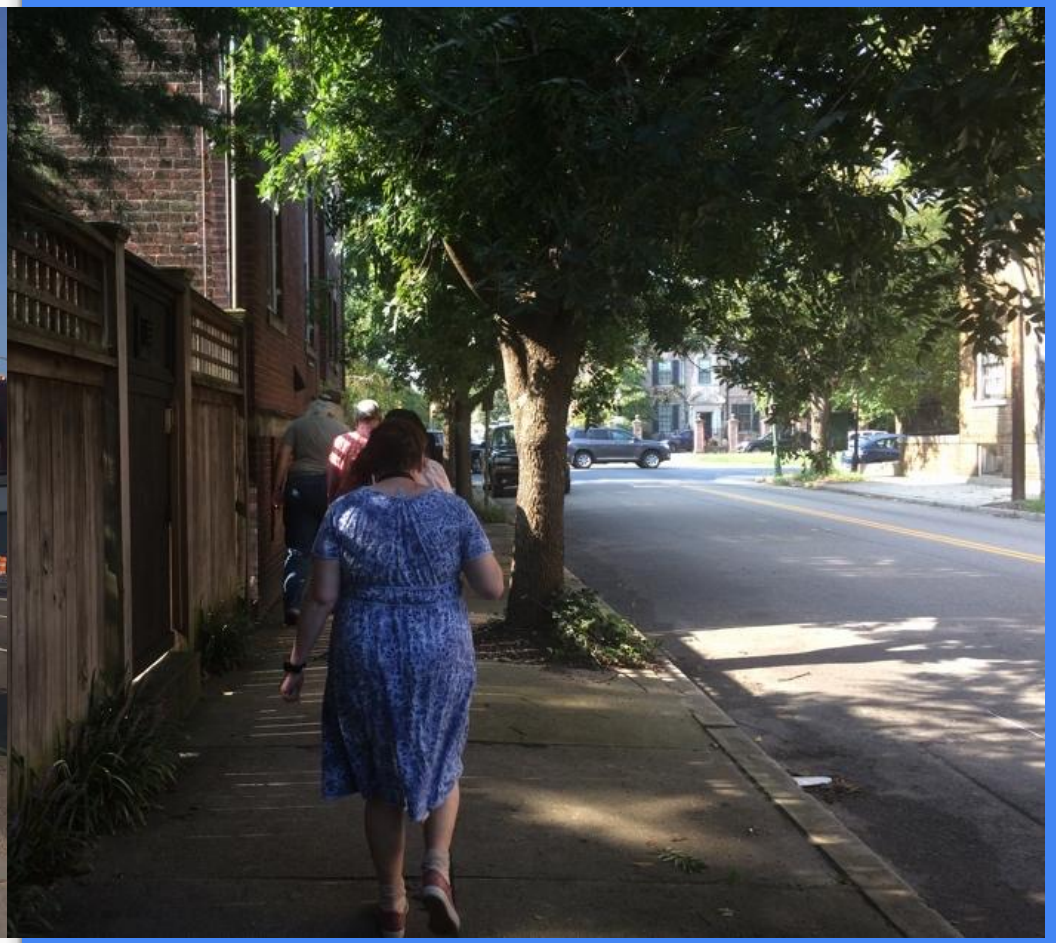


Landscape Experiences 2

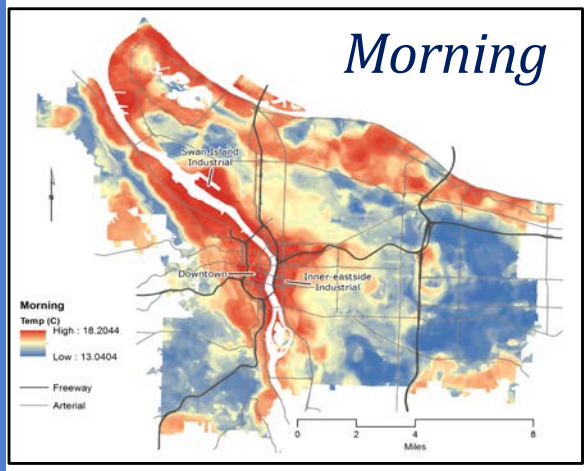


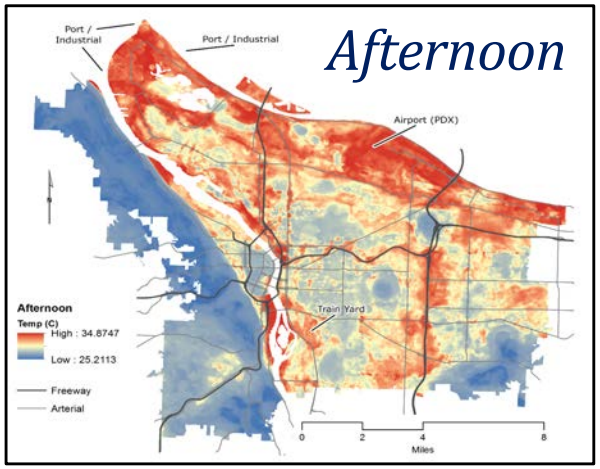
Landscape Experiences 3

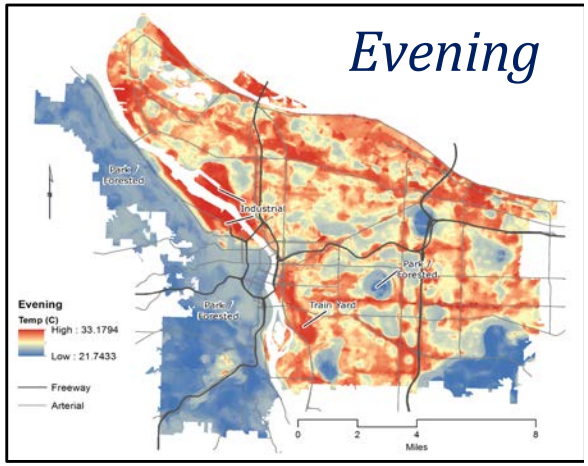


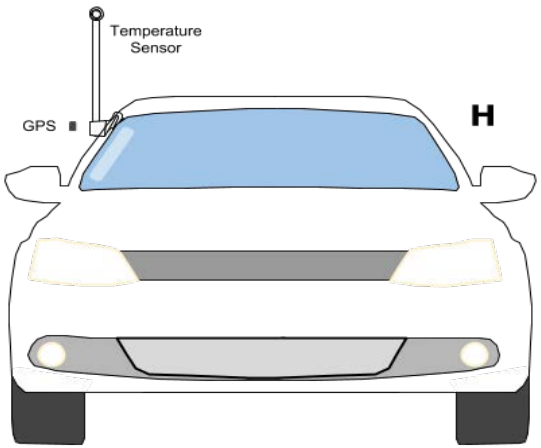


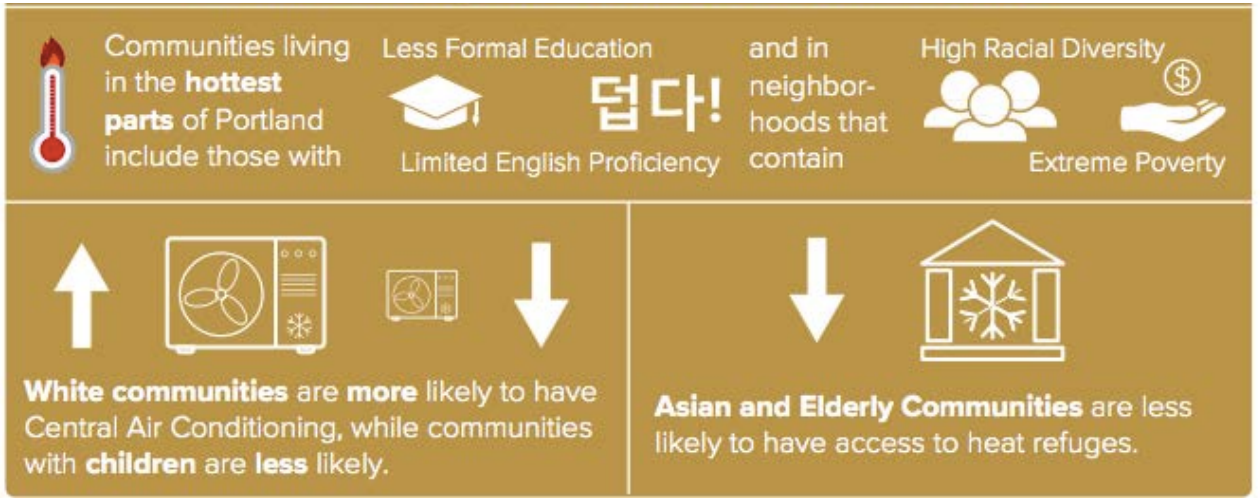
Air Temperatures











Trees Grow on Money: Urban Tree Canopy Cover and Environmental Justice

Kirsten Schwarz, Michail Fragkias, Christopher G. Boone, Weiqi Zhou, Melissa McHale, J. Morgan Grove, Jarlath O'Neil-Dunne, Joseph P. McFadden, Geoffrey L. Buckley, Dan Childers, Laura Ogden, Stephanie Pincetl, Diane Pataki, Ali Whitmer, Mary L. Cadenasso

ELSEVIER

Landscape and Urban Planning
Volume 36, Issue 1, October 1996, Pages 49-57

Measuring and analyzing urban tree cover

David J. Nowak [a], Rowan A. Rowntree [a], E.Gregory McPherson [b], Susan M. Sisinni [a], Esther R. Kerkmann [a], Jack C. Stevens [a]

Environment and Planning A 2009, volume 41, pages 2651 – 2670

doi:10.1068/a41236

Street trees and equity: evaluating the spatial distribution of an urban amenity

Shawn M Landry
Florida Center for Community Design and Research, University of South Florida, 4202 E Fowler Avenue, HMS 301, Tampa, FL 33620-8340, USA; e-mail: landry@arch.usf.edu
Jayajit Chakraborty
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Received 8 August 2008; in revised form 3 December 2008

CITYLAB

Can Planting Trees Make a City More Equitable?

Cities across the U.S. are pledging to plant trees and restore urban forests to combat climate change and cool off disadvantaged communities.

Examining the distributional equity of urban tree canopy cover and ecosystem services across United States cities

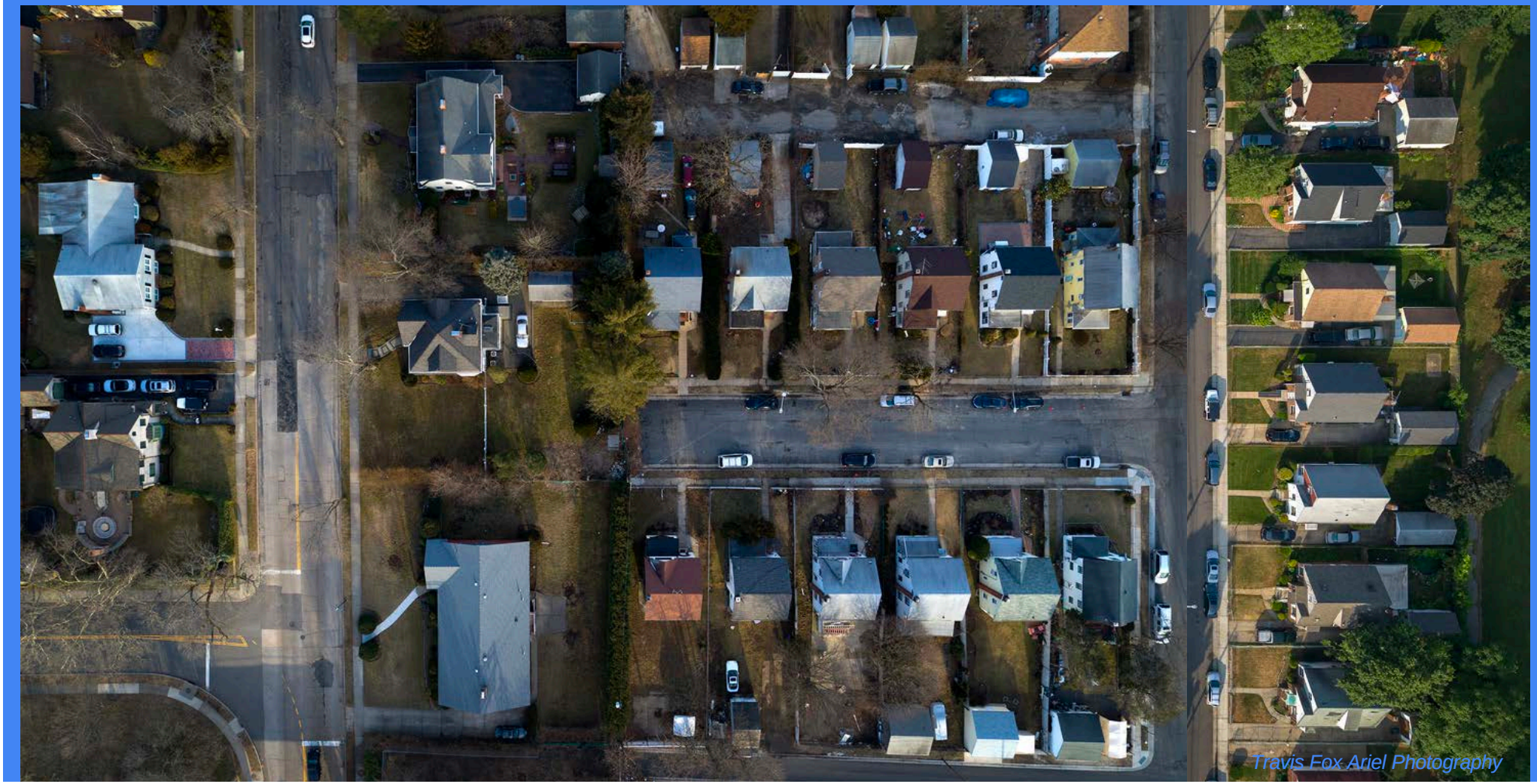
Christopher B. Riley, Mary M. Gardiner

Published: February 11, 2020 • https://doi.org/10.1371/journal.pone.0228499

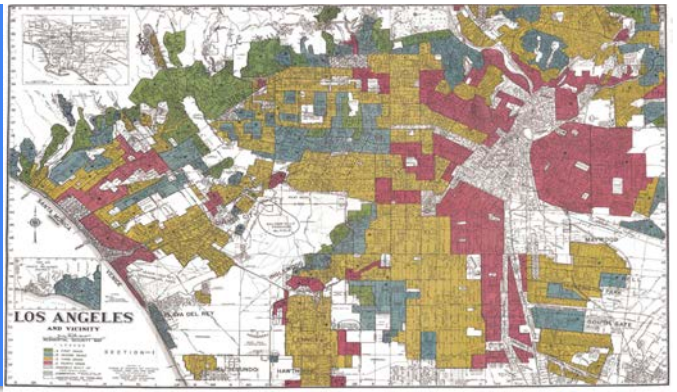
US cities are spending millions on trees to fight heat – but are their plans equitable?

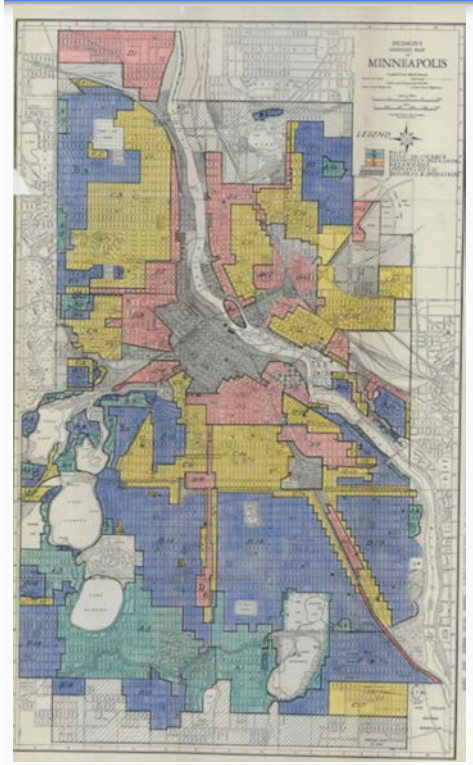
As US cities cope with rising temperatures, some are investing in planting and maintaining trees – but experts warn the coverage might benefit wealthy neighborhoods more

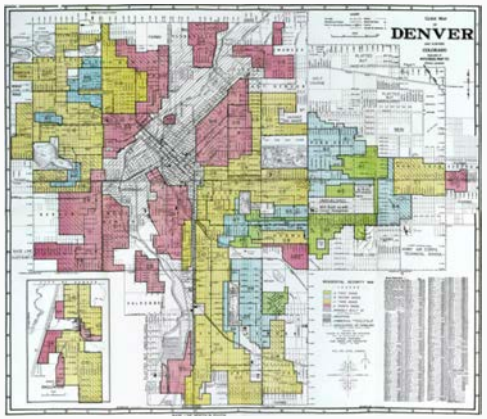
Landscape Legacies

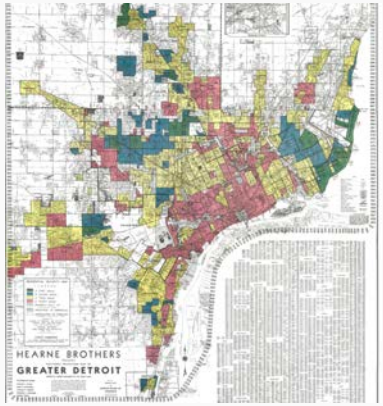


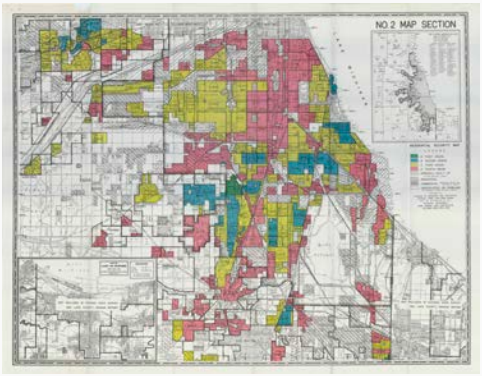
Federal Planning Decisions





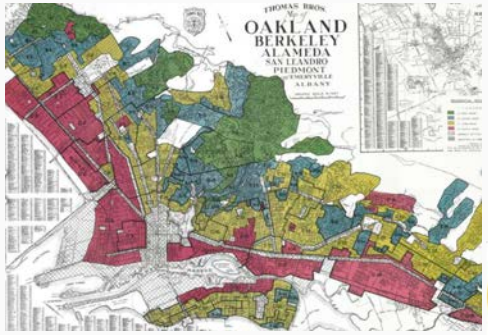






The party of the second part hereby agrees that the premises hereby conveyed shall not at any time be conveyed, mortgaged or leased to any person or persons of Chinese, Japanese, Moorish Turkish, Negro, Mongolian or African blood or decent. Said restrictions and covenants shall run with the land and any breach of any or either thereof shall work a forfeiture of title, which may be enforced by re-entry.

A typical Minneapolis restriction. This example comes from a home along West River Road in the Longfellow Neighborhood. Image courtesy of the Hennepin County Registrar's Office.



Economic Implications

HOLC "Redlining" Maps: The Persistent Structure Of Segregation And Economic Inequality

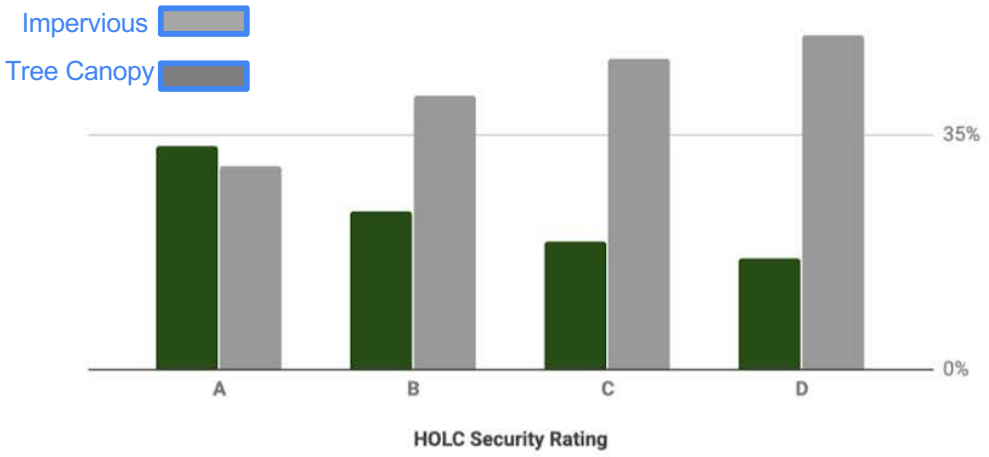
By Bruce Mitchell PhD., Senior Research Analyst and Juan Franco, Senior GIS Specialist, NCRC / March 20, 2018 / Research

Home Values Remain Low in Vast Majority of Formerly Redlined Neighborhoods

By Sarah Mikhitarian on Apr. 25, 2018

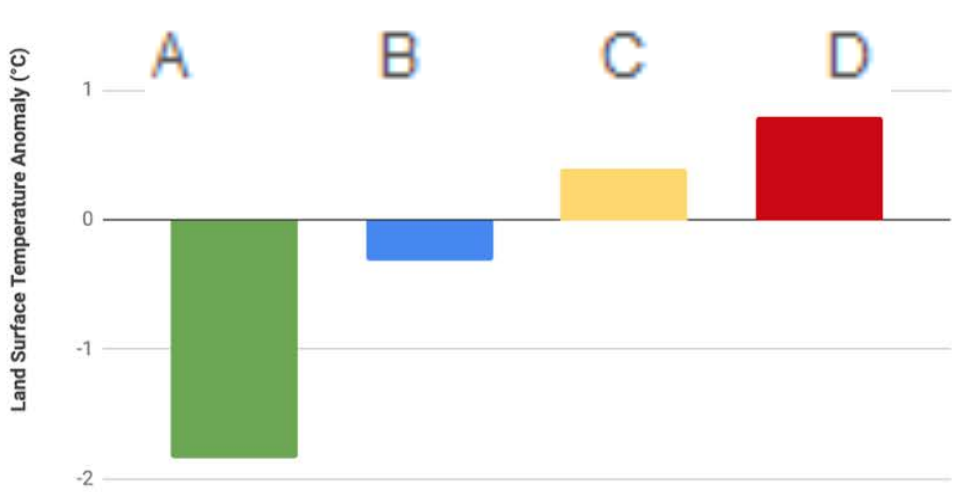
- Home values in the vast majority of neighborhoods that were "redlined" as hazardous for mortgage lending by the federal government 80 years ago are lower now than in areas rated more highly.
- The median home value in neighborhoods labeled "best" has risen 230.8 percent to $640,238 over the past 22 years, whereas the median value in the areas rated "hazardous" has climbed only 203.1 percent, to $276,199.
- Of 151 areas examined, only in Haverhill, Mass., are median home values in formerly redlined neighborhoods higher than those in neighborhoods that were labeled "best."

Landscapes And Temperatures



Interactive Map Link

https://www.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=ef0f926eb1b146d082c38cc35b53c947



Conscious and Deliberate Planning

1. Greater amount of asphalt and pavement
2. Highway projects and big box stores
3. Large-scale housing projects
4. Industrial facilities
5. Lack of parks and green spaces

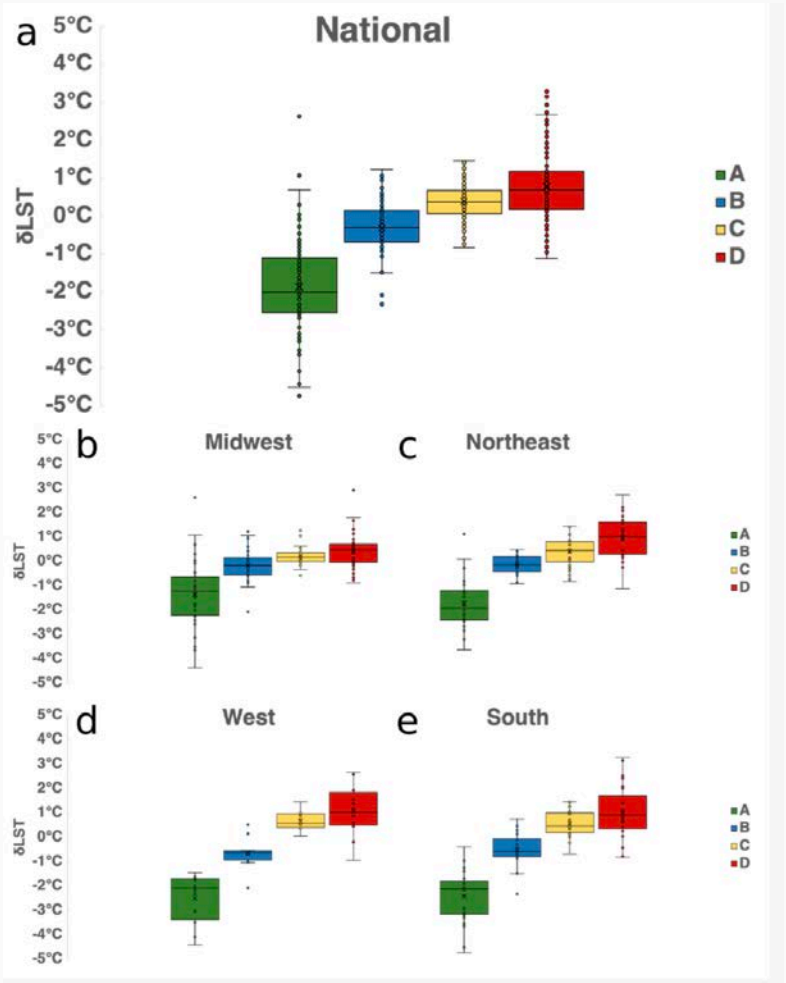
Hoffman, Shandas, & Pendelton, 2020

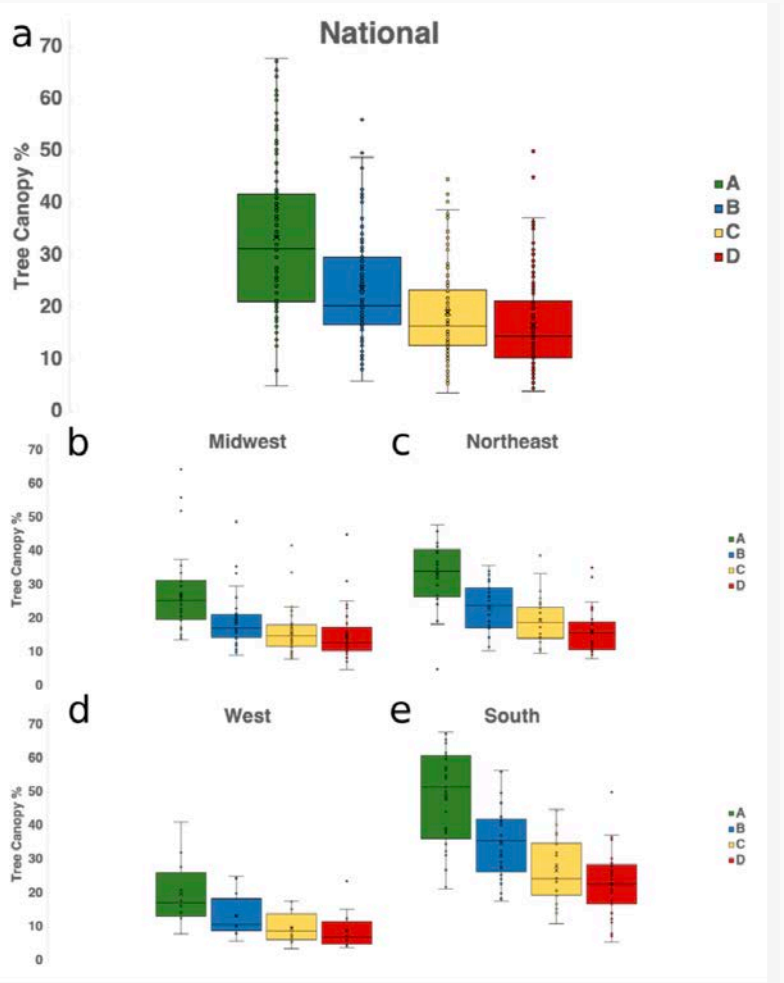
Redlining & Temperature Differences

Ranking	State	City	D-A Rating Difference (°F)
1	OR	Portland	12.8
2	CO	Denver	12.0
3	MN	Minneapolis	10.8
4	GA	Columbus	10.3
5	FL	Jacksonville	9.9
6	CT	East Harford	9.7
7	TN	Chattanooga	9.6
8	IN	Indianapolis	9.5
9	VA	Roanoke	9.5
10	PA	Philadelphia	9.4
11	KY	Louisville	9.4
12	MD	Baltimore	9.3

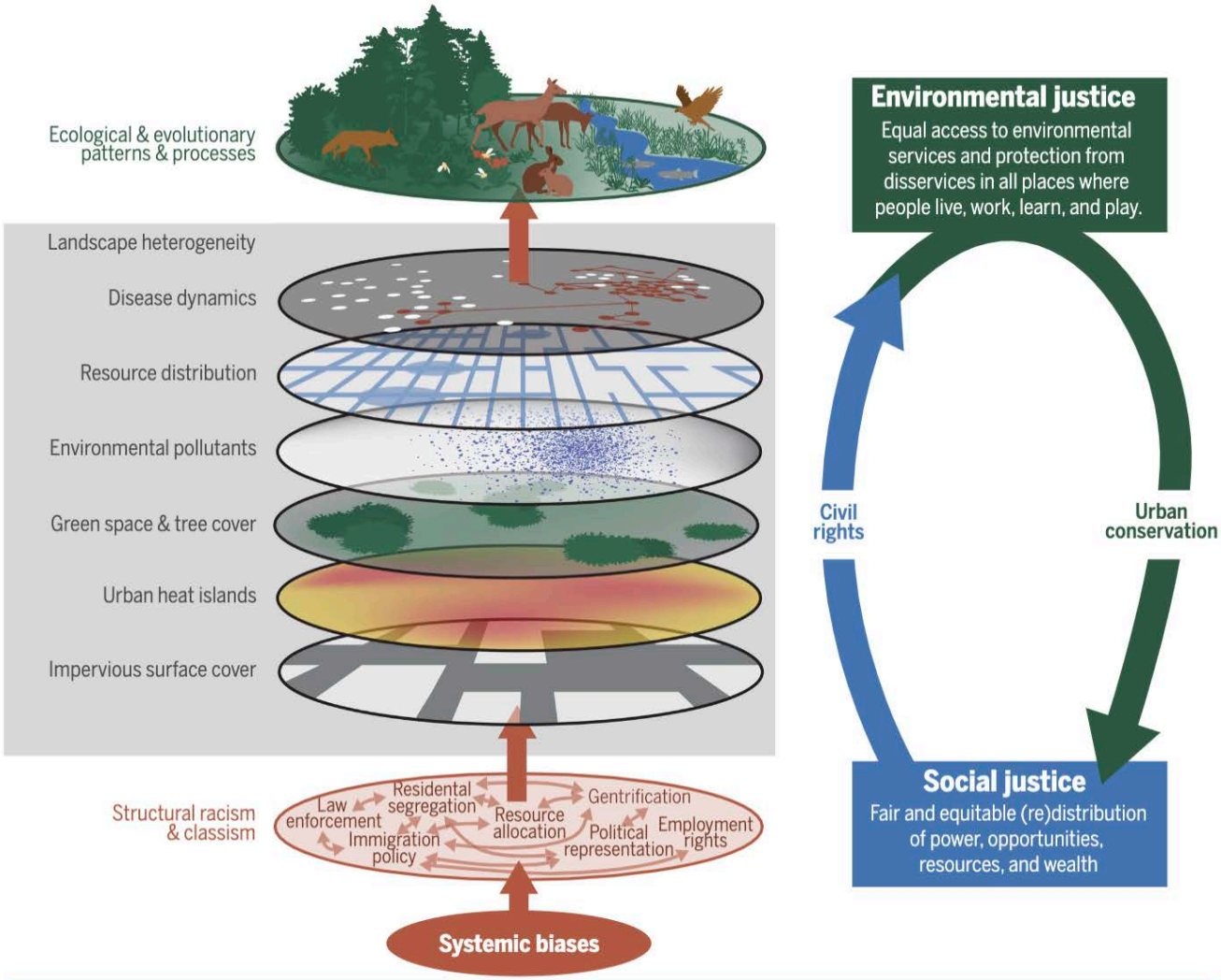
Hoffman, Shandas, & Pendelton, 2020

Redlining and Landscape Conditions





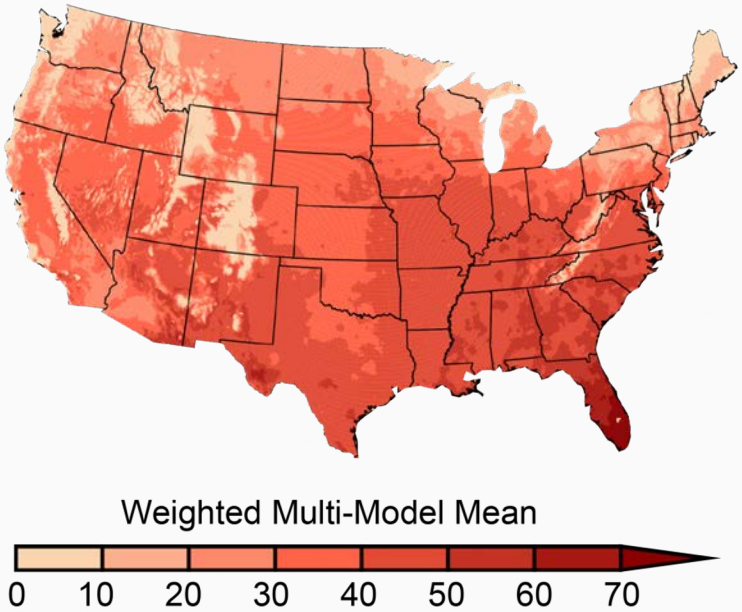
Ecological Implications



Source: Schell, et al., (2020) The ecological and evolutionary consequences of systemic racism in urban environments, *Science*.

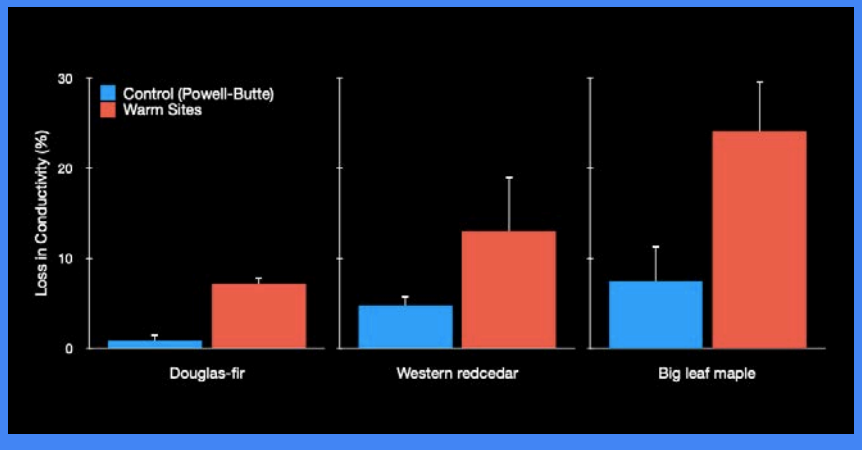
The Climate Age

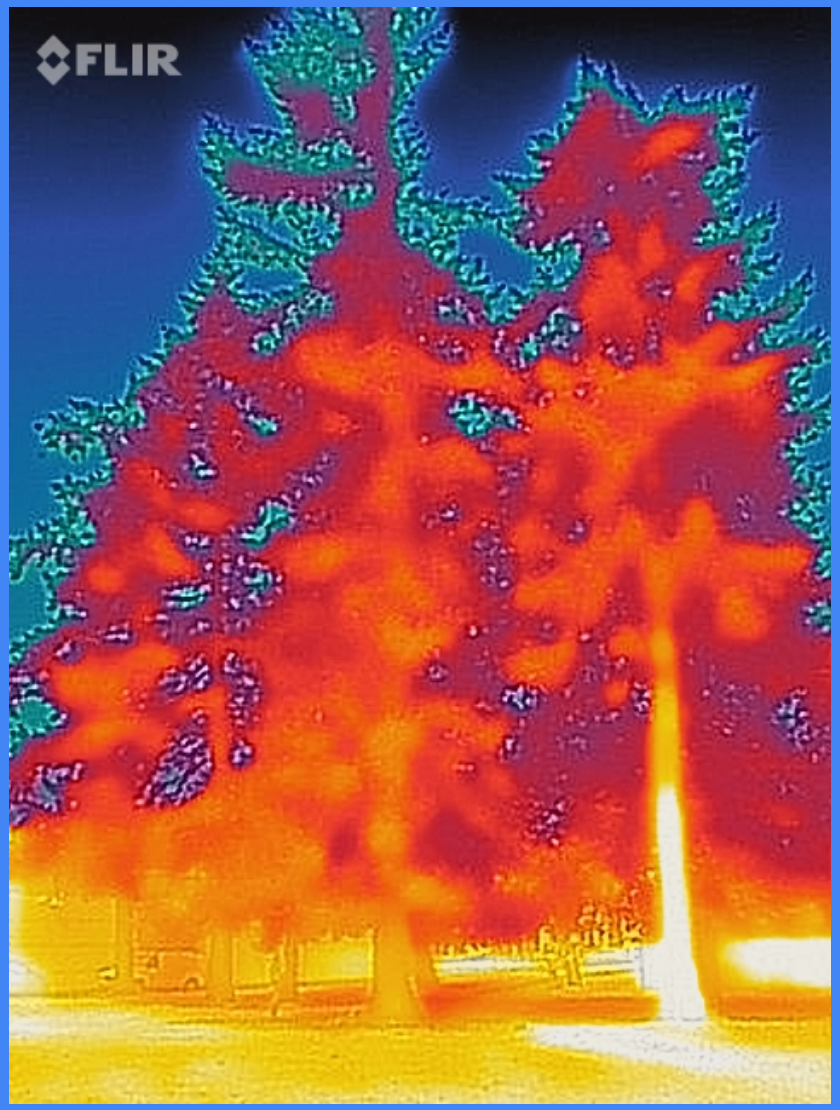
Projected Change in Number of Days Above 90°F
Mid 21st Century, Higher Scenario (RCP8.5)



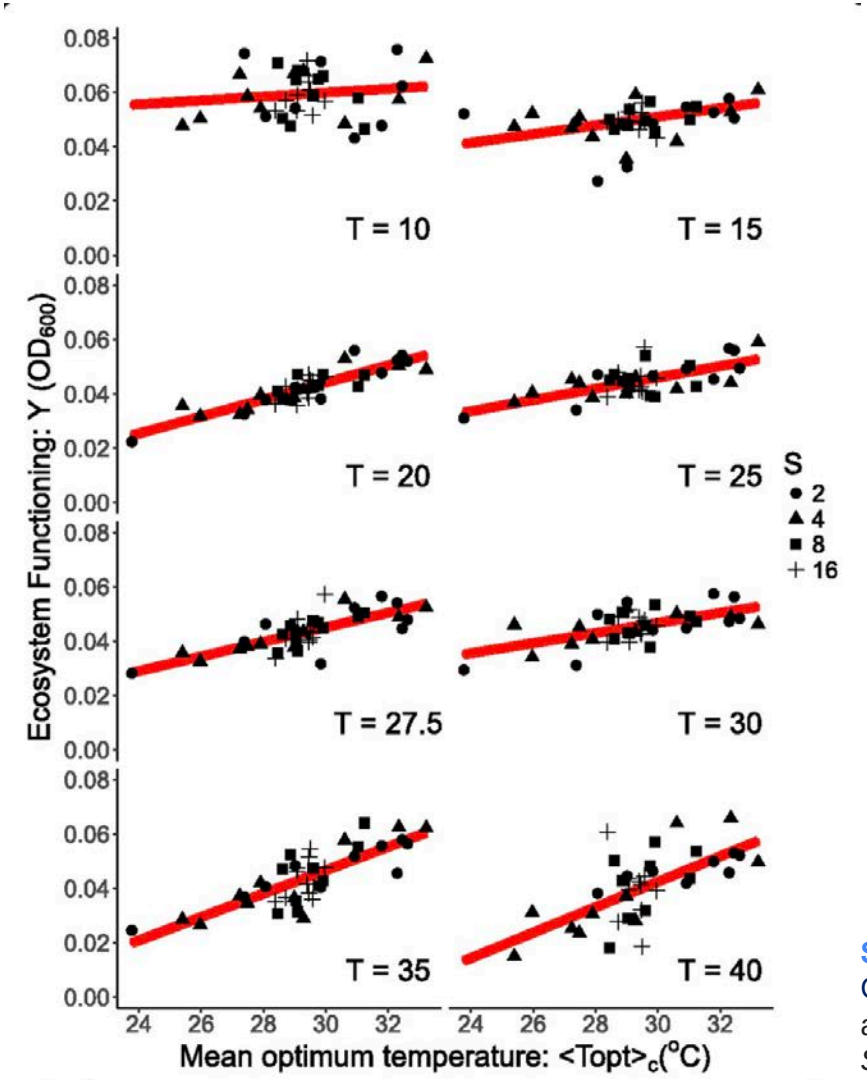
Source: Yale e360, NOAA

Ecosystem Changes





Ecological Implications

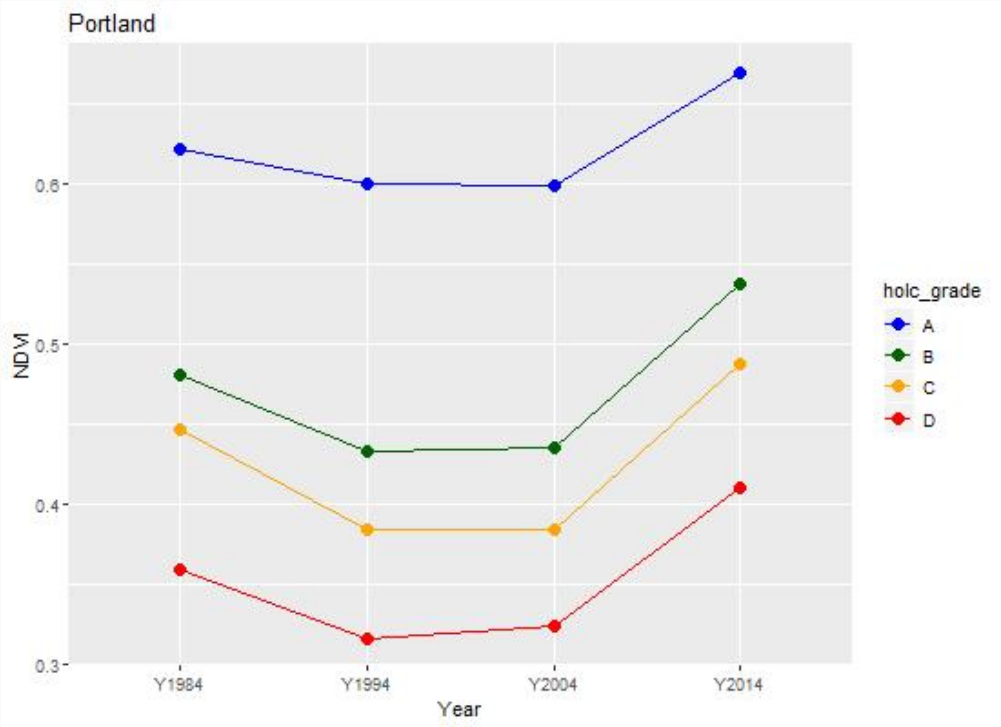


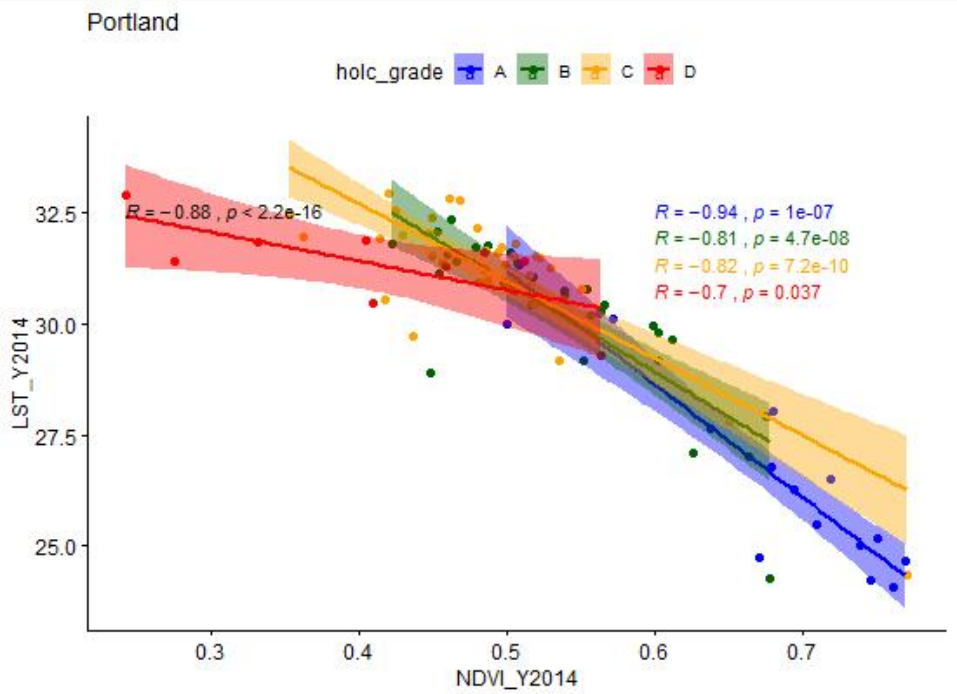
"…..changes in species interactions played a critical role in mediating the impacts of temperature change on the relationship between biodiversity and ecosystem functioning. Our results highlight that if biodiversity loss occurs independently of species' thermal tolerance traits, then the additional impacts of environmental warming will result in sharp declines in ecosystem function."

Source: García, FC., E Bestion, R Warfield, G Yvon-Durocher, 2018. Changes in temperature alter the relationship between biodiversity and ecosystem function. *Proceedings of the National Academy of Sciences*, 115 (43).

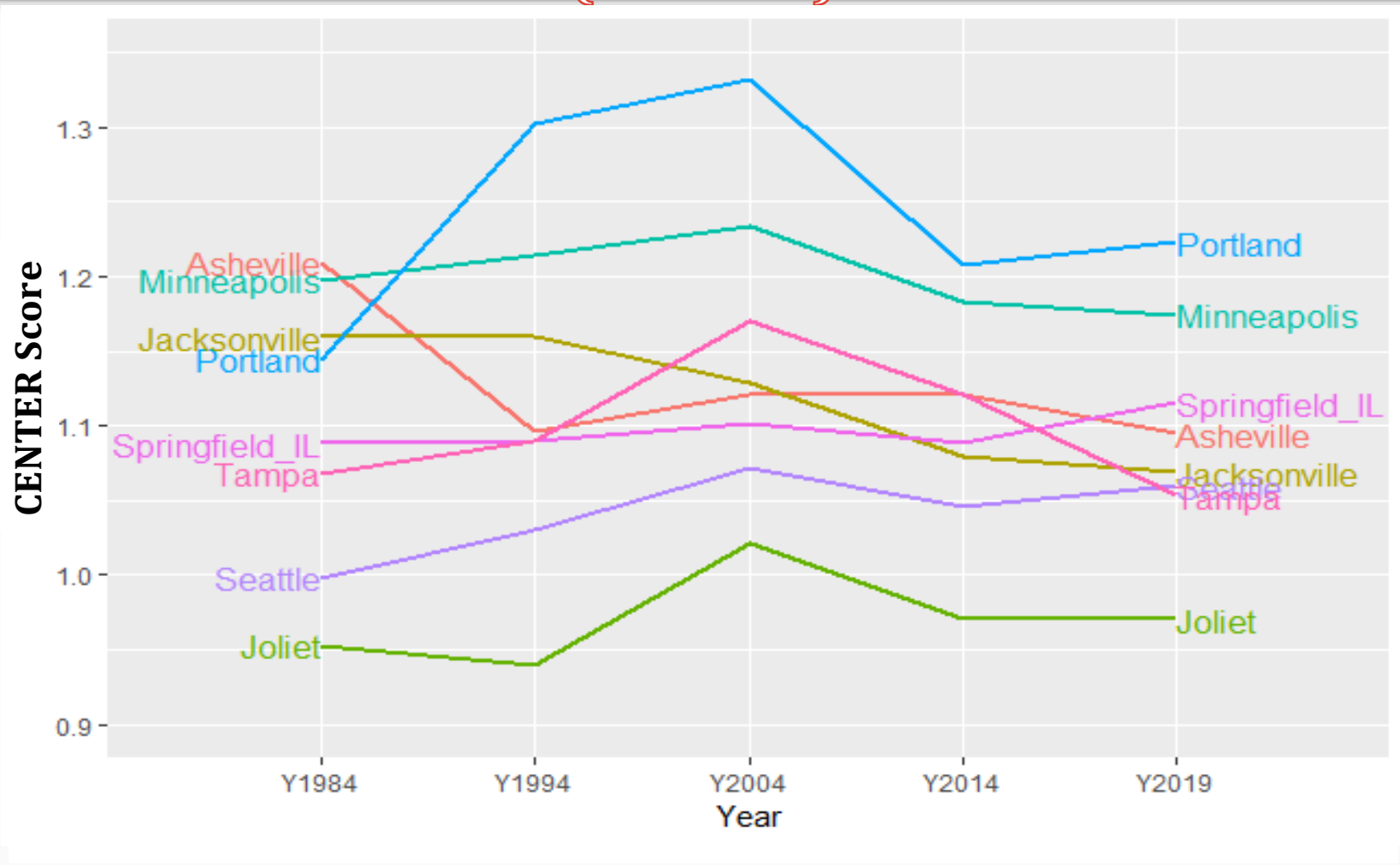
Neighborhood Ecologies and Temperature

By involving communities and understanding the role of greening options in relation to other real needs, municipalities can begin to improve access to ecosystem services provided by trees – understand how different neighborhoods relate to temperature and greening efforts



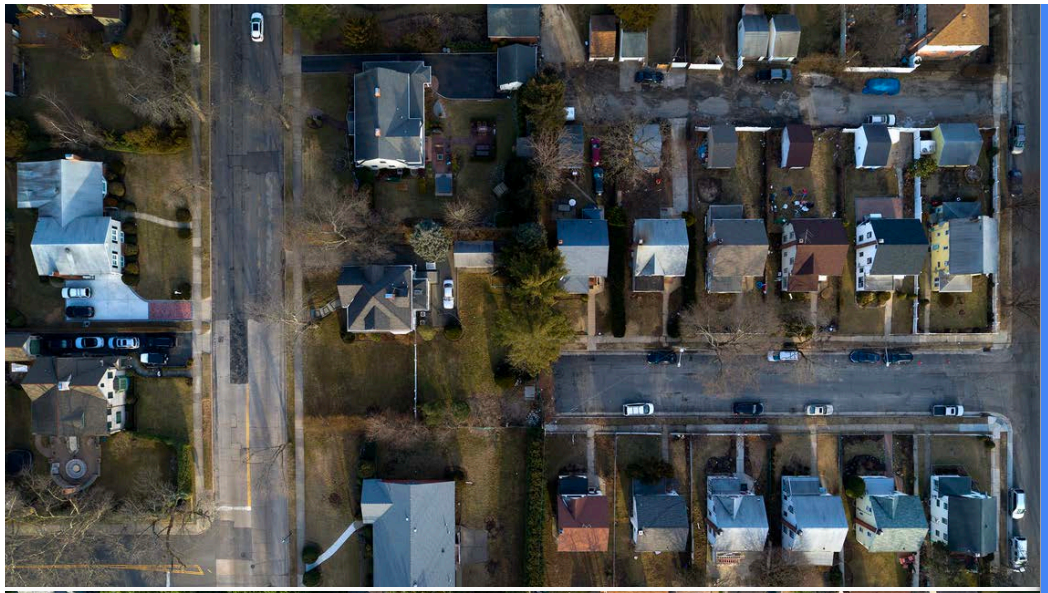


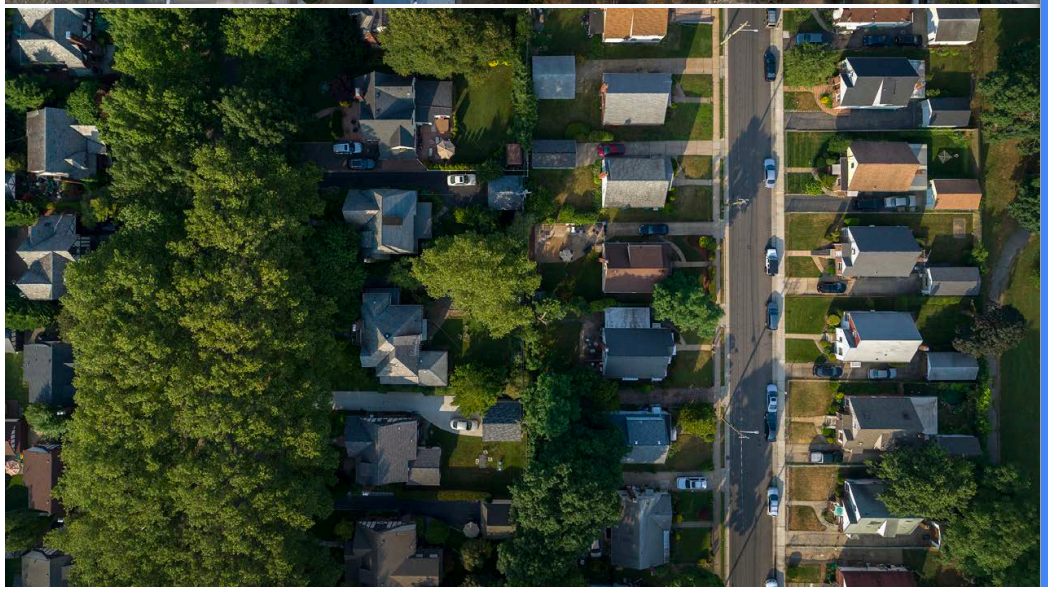
Community-Engaged Neighborhood Tree Equity Ratio (CENTER)



What we are doing…

1. Storytelling: www.canopystory.org
2. Assessing distribution – Canopy Analytics
3. Identifying strategic planting locations: www.branchoutpdx.org





Contact

Vivek Shandas

vshandas@pdx.edu

Developing a recommendation for a Natural and Working Lands Emissions Reduction and Sequestration Goal

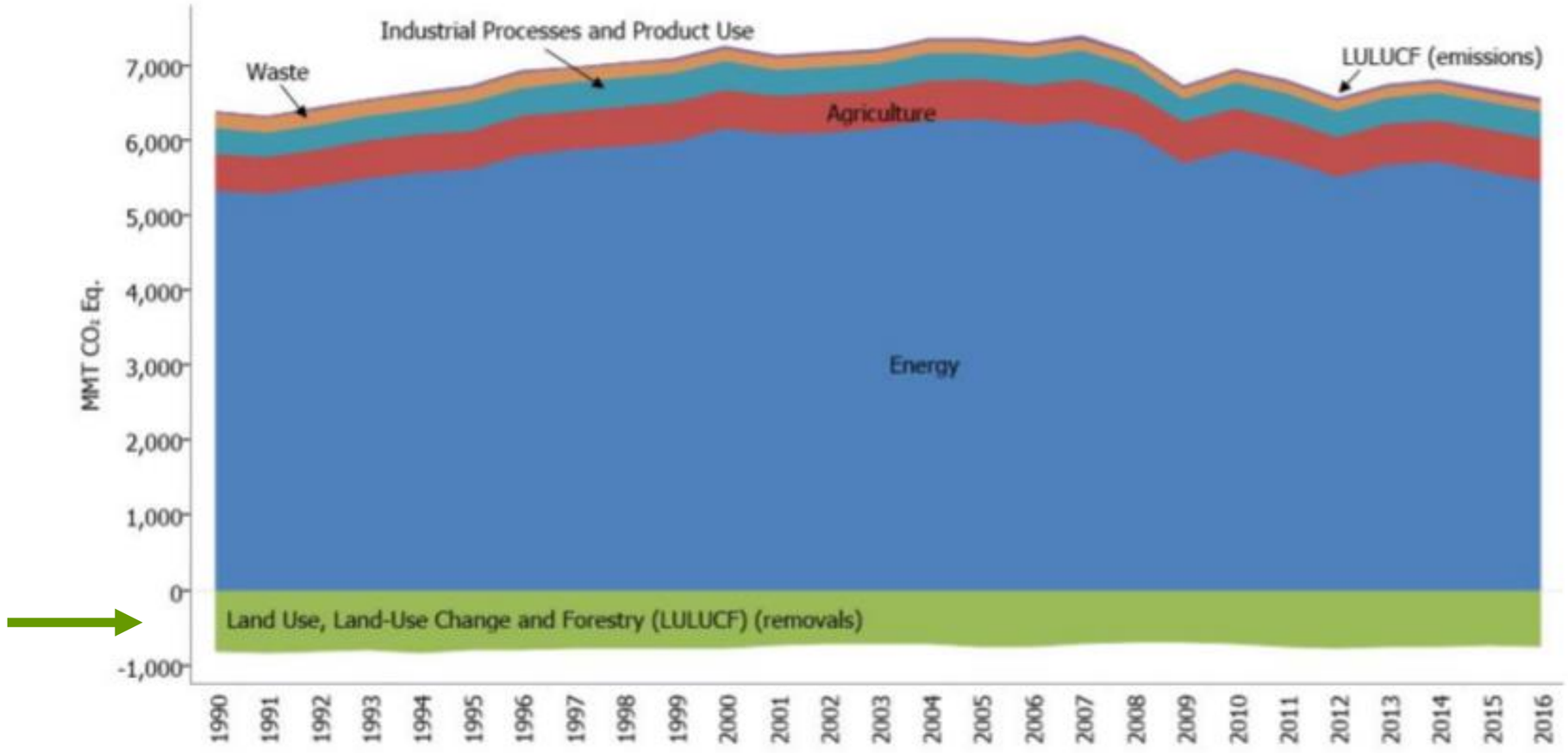
Presentation to the Board of Forestry Commission Meeting, 11.04.2020 by Catherine Macdonald

Governor Brown's Executive Order 20-04

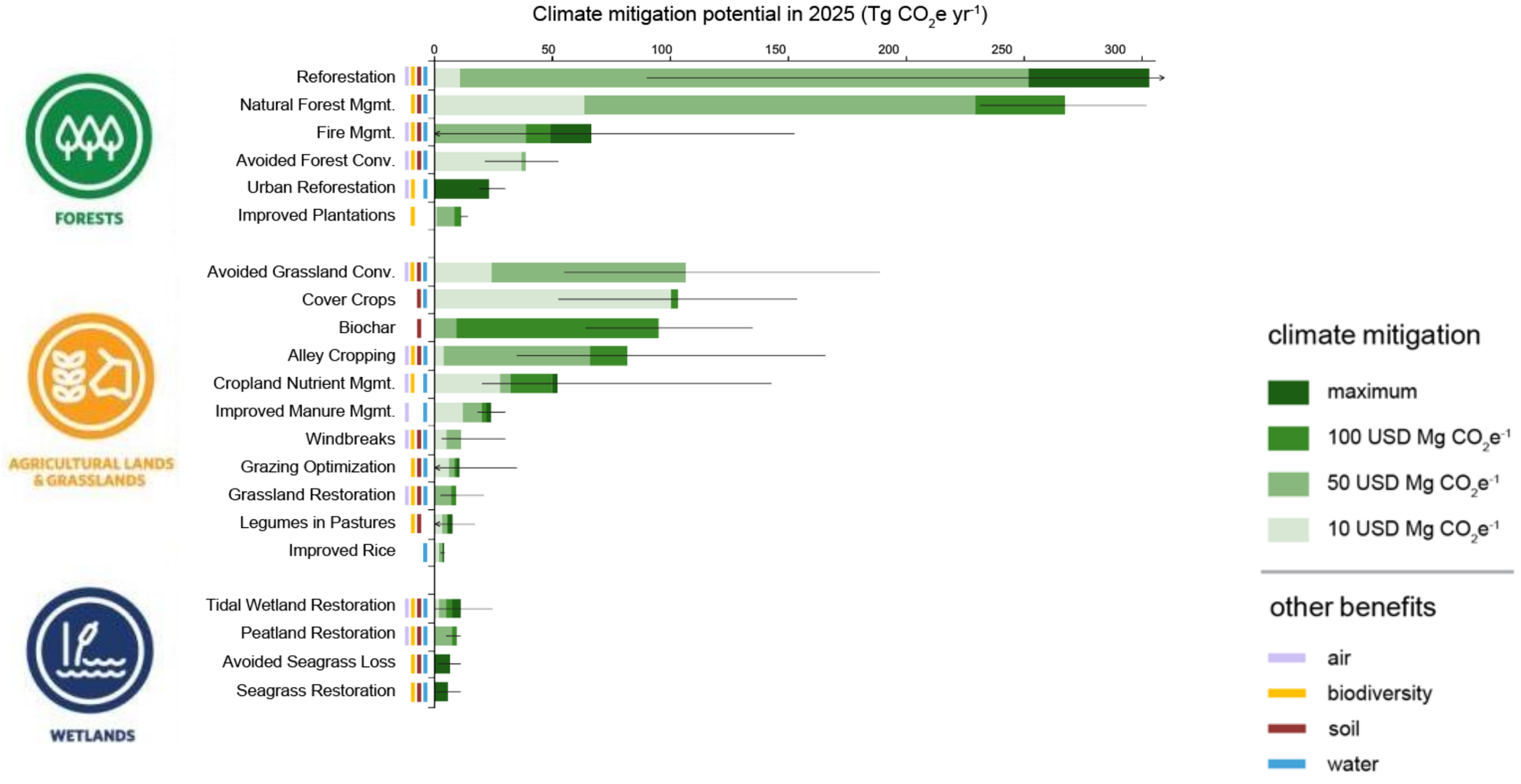
Directive to the Oregon Global Warming Commission on Natural and Working Lands:

- *"In coordination with ODA, ODF and OWEB, the OGWC is directed to submit a proposal to the Governor for consideration of adoption of state goals for carbon sequestration and storage by Oregon's natural and working landscapes, including forests, wetlands and agricultural lands, based on best available science. The proposal shall be submitted no later than June 30, 2021."*

Current Mitigation From Nature



Added Potential From Natural Climate Solutions



The Nature Conservancy

Source: Fargione et al, 2018

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Steps to Developing a Recommendation

Stakeholder Engagement

1. Identify existing inventory data.
2. Identify priority improvements to the land sector inventory.
3. Establish the methods for tracking emissions and sequestration from the land sector.
4. Develop a baseline and a Business-as-Usual projection.
5. Identify potential policies, programs and practices that could be advanced to reduce emissions and increase sequestration on Natural and Working Lands.
6. Develop proposed goals and a process for including Natural and Working Lands in Oregon's climate mitigation plan.

NATURAL AND WORKING LANDS CHALLENGE

- Improve inventory methods
- Identify best practices for conservation and management
- Advance programs, policies, and incentives to reduce GHG emissions and enhance resilient carbon sequestration
- Integrate actions and pathways into state GHG mitigation plans

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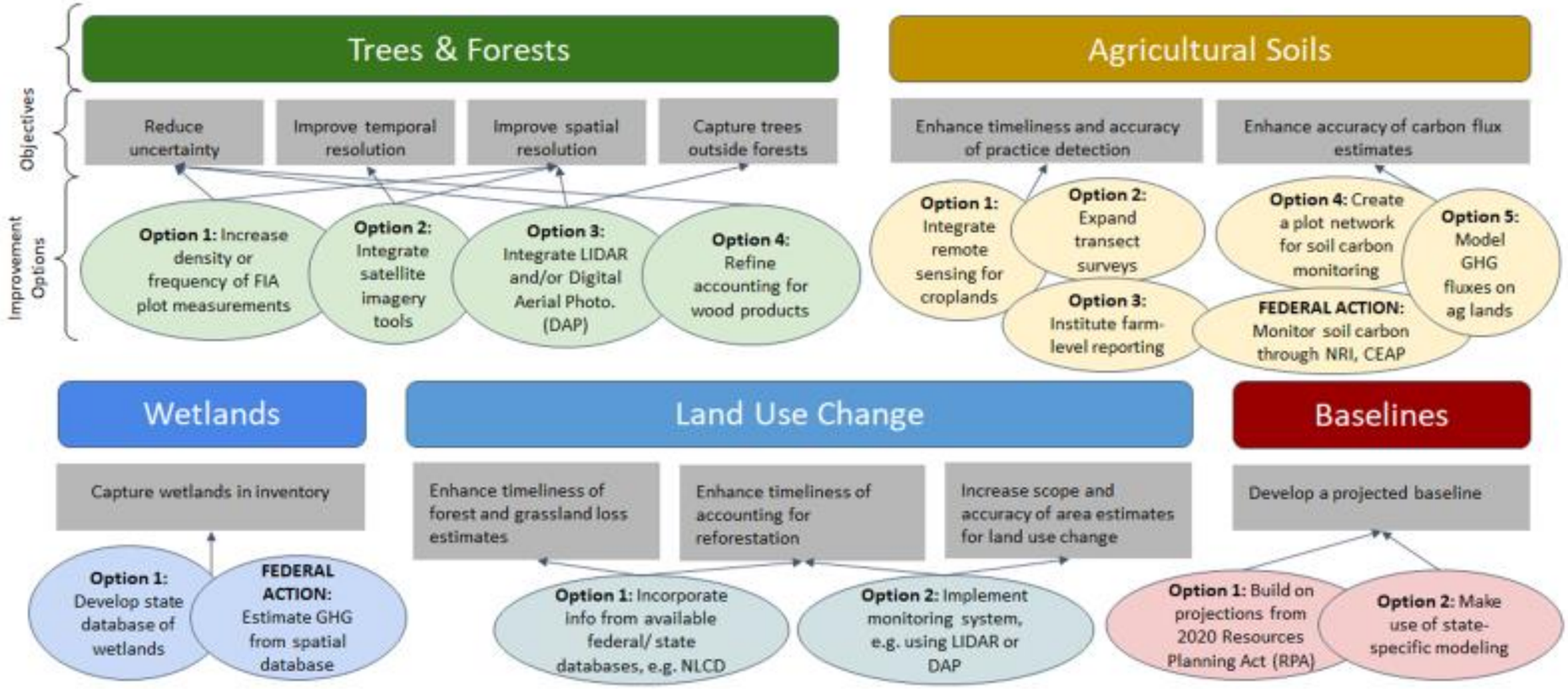
Oregon Global Warming Commission

Potential Inventory Improvements



Source: WRI

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Options for Land Sector in Climate Mitigation Goals

Treatment of land sector	Advantages	Disadvantages
Included in the goal boundary	• Consistent with other sectors covered by the goal • Provides a signal to reduce land sector emissions • May lead to a more efficient distribution of mitigation effort across sectors	• May require additional land sector data • Provides less flexibility to design a specialized goal for the land sector, unless special rules are applied
Sectoral goal	• Provides a signal to reduce land sector emissions • Enables users to design a specialized goal for the land sector • Special circumstances of the sector may be easier to explain.	• May require additional land sector data • Having multiple goals (one for the land sector and one for other sectors) may be difficult to communicate to stakeholders • May reduce efficiency of mitigation across sectors
Offset	• Provides flexibility to treat the land sector differently from other sectors covered by the goal • Allows users to choose land sector accounting method	• May not provide a signal to reduce land sector emissions • Depending on accounting approach chosen, may account for emission reductions or enhanced removals that would have occurred in the absence of the goal, which would enable the goal to be met without additional effort • May require additional land sector data
Not accounted for	• Appropriate for users with insignificant land sector emissions or lack of capacity to account for the land sector	• Does not provide a signal to reduce land sector emissions

Source: WRI

Setting a Goal for Oregon's Natural and Working Lands

SCIENCE COLLABORATIVE

Enhancing Coastal Zone Management through Quantification and Public Dissemination of Carbon Stocks Data for Pacific Northwest Tidal Wetlands

Project Location
Pacific Northwest

Project Duration
November 2016 to October 2019

Project Lead
Craig Cornu
Institute for Applied Ecology/Estuary Technical Group
(541) 260-2916
cecornu@gmail.com

Project Type
Collaborative Research – generating science that informs decisions

Project Partners
- South Slough National Estuarine Research Reserve
- Padilla Bay National Estuarine Research Reserve
- California Coastal Conservancy
- Environmental Services Inc.
- GeomaticsResearch LLC
- Institute for Applied Ecology
- Oregon State University
- Pacific Northwest National Laboratory
- Portland State University
- Puget Sound Partnership
- Restore America's Estuaries
- Silverstrum Climate Associates LLC
- The Climate Trust
- U.S. Geological Survey
- Verified Carbon Standard
- Washington State Department of Natural Resources

Overview

Tidal wetlands are recognized for their important role in carbon sequestration, as well as for their potential to become significant sources of greenhouse gas emissions when converted to other land uses. The substantial quantities of carbon captured and stored by tidal wetlands—termed "blue carbon"—is an ecosystem service of great interest to those developing regional, national, and global climate change adaptation and mitigation strategies, including carbon markets. While carbon stocks data have been collected in several parts of the world to quantify the carbon sequestration potential of tidal wetlands, there is a scarcity of such information in the Pacific Northwest. This project helps to fill this gap by conducting the first-ever comprehensive blue carbon assessment in Pacific Northwest tidal wetlands and generating a user-friendly database of regional blue carbon data. Input from end users will guide the design, scope, outputs, and outcomes of the project. This project will contribute to national and international efforts to incorporate blue carbon science into coastal management and climate change mitigation and adaptation.

Anticipated Benefits

- An important data gap will be addressed in estimating potential carbon stocks for coastal and estuarine habitat classes across the Pacific Northwest.
- Regional decision-makers will have improved access to and better understanding of scientific data on carbon stocks and other blue carbon data through a newly established Pacific Northwest blue carbon database.
- Pacific Northwest blue carbon stock data will be available to help guide coastal restoration efforts and inform regional and national climate change adaptation and mitigation projects.

OFFICE FOR COASTAL MANAGEMENT
National Estuarine Research Reserve System

Oregon Forest Ecosystem Carbon Inventory: 2001-2016

Glenn A. Christensen[1], Andrew N. Gray[1], Olaf Kuegler[1], & Andrew C. Yost[2]

Report completed through an agreement between the U.S. Forest Service, Pacific Northwest Research Station, and the Oregon Department of Forestry
(PNW Agreement No. 18-C-CO-11261979-019)

[1]U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station
[2] Oregon Department of Forestry

October 29, 2019

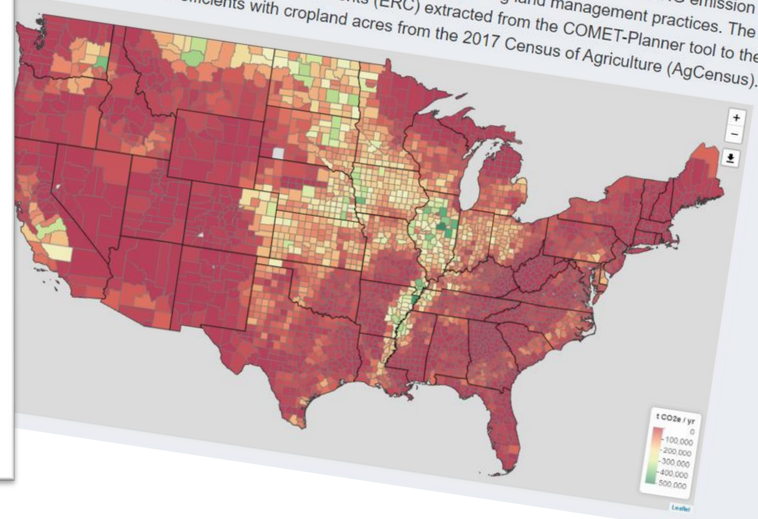
Carbon Reduction Potential Evaluation (CaRPE) Tool

Carbon Reduction Potential Evaluation (CaRPE) Tool™

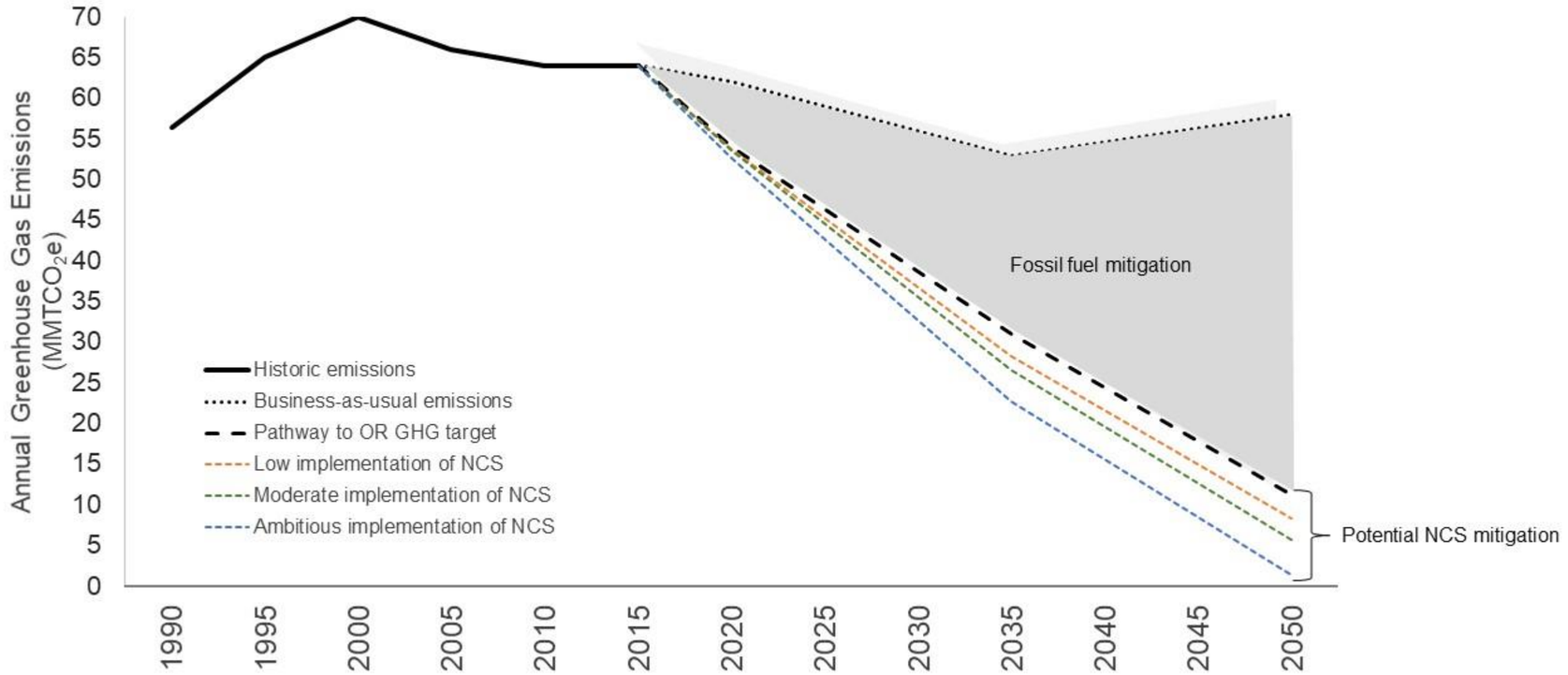
Jennifer Moore-Kucera[1], Daniel Manter[2], Tabitha Brown[1]

[1]American Farmland Trust; [2]USDA-Agricultural Research Service

In order to evaluate the current and projected GHG mitigation potential we developed the interactive Carbon Reduction Potential Evaluation (CaRPE) Tool™ to quantify and visualize county-level GHG emission reductions resulting from the implementation of a suite of cropland and grazing land management practices. The CaRPE Tool™ scales the emission reduction coefficients (ERC) extracted from the COMET-Planner tool to the county level by coupling the coefficients with cropland acres from the 2017 Census of Agriculture (AgCensus).



Setting a Goal for Oregon's Natural and Working Lands



Source Graves et al. 2020
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0230424

The Nature Conservancy

Outreach and Engagement

Who:

- Tribal Governments
- Boards and Commissions
- Technical Experts
- Landowners & Technical Assistant Providers – programs and practices
- Stakeholders including Landowners, Environmental Justice, Land Use, Environmental, Conservation and Climate Advocates – goal, programs, strategies, etc.

Outreach and Engagement

Process:

- Meetings with Tribes, Boards & Commissions – preliminary overview of charge and process – October/November
- Webinar to explain the EO's Charge to stakeholders - November
- Survey – one for landowners, one for all interested parties – November - January
- Synthesis – report out to Boards and Commissions – February
- Commission – review of draft proposal
- Draft – Out for public review and input - March
- Commission – Decision May/June
- Send to Governor - June

Policy Options.

- Set a sequestration goal for natural and working lands
- Increase investment to improved land sector inventories
- Include investments in NCS in broader climate legislation
- Public land management policies and budgets
- Incentive programs (e.g. Tax Policy, Farm Bill like programs, etc.) for key practices
- Federal incentives for better state laws
- Private Land Use and Land Management Practice policies

The Nature Conservancy

Contact Information:

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cmacdonald@tnc.org

503-475-6782

OGWC Website: Keep Oregon Cool

October 28, 2020

Oregon Board of Forestry
Attention: Hilary Olivos-Rood, Board of Forestry Administrator
(503) 945-7210
by email: hilary.olivos-rood@oregon.gov

RE: Oregon Board of Forestry November 4, 2020 Meeting Items #4 and #8:

- **Item #4: DOJ Memorandum on Statutory Authority relating to Carbon and Climate and Board review of Forestry Plan for Oregon, Goal G Climate Change;**
- **Item #8: OGWC Goal setting and EO 20-04.**

Dear Oregon Board of Forestry and Staff:

We recognize the incredibly challenging year it has been; and would like to acknowledge the massive effort Oregon Department of Forestry (ODF) and Board of Forestry, together with other State of Oregon agencies, undertook in managing an unprecedented wildfire season. We are grateful for the tremendous effort, information and resources marshalled by the ODF this year.

Regarding Board agenda Item #4, wpd wind projects Inc. is pleased to provide comments to the Board on the process of evaluating and updating Goal G as defined in the 2011 Oregon Forestry Program. We urge the Board to consider adding wind energy as a renewable resource to the list of Goal G objectives. Doing so would contribute to both:

a) ODF's ongoing development of a Climate Change Plan; and
b) compliance with the Governor's Executive Order on Climate Action EO #20-04.

Goal G's seven objectives, Item Number 5[1], could be revised to include wind energy as a renewable energy source; we suggest an addition to Item Number 5: "Biomass and wind as a renewable energy resource".

Adding wind energy to the list does not automatically advance this resource, as any actual projects are still be subject to all of the local, state and federal permitting regimes. However, adding it to the list creates an additional potential means of complying with state climate change and carbon objectives.

Wind energy is natural resource with many similarities to timber harvesting. Both depend on climate, topography and are derived from a sustainable resource base. Both California and Washington now have commercial wind farms operating in heavily forested topography. Weyerhauser has been heavily involved with the wind industry to foster the highest and best use

[1] https://www.oregon.gov/odf/board/bof/bofwp-climate-change-2020.pdf

of their forested lands, as has WA Department of Natural Resources (DNR), attesting to the compatibility of forestry and wind projects.

Wind projects only use a very small amount of dedicated land adjacent to each turbine; thus only a negligible amount of land is taken out of forest production. Roads to support these projects are multiple use – supporting logging, recreational and other common forest uses. Temporary uses of the land for constructing a wind project all can be replanted to trees.

What OR Department of State Lands (DSL) and WA DNR have done to enable the use of this resource[2] by leasing parcels for multiple use, can be considered by ODF. Rule-making actions by ODF could enable private industry to evaluate the resource – subject to compatible environmentally, commercially and with traditional uses of the forests.

Regarding Board agenda Item #8, Oregon's governors and legislatures have long prioritized permanently sustainable resources throughout the state. The environmental benefits of wind energy generation would help ODF comply with EO #20-04 directives and long-established Oregon renewable energy policies by helping to facilitate Oregon's achievement of the GHG emissions reduction goals, while supporting Goal G of the Oregon Forestry Program by reducing carbon emissions. A revision to Goal G of the Department's management plans and actions to include wind energy generation would support the Governor's Executive Order by integration of a compatible land use that would help Oregon address climate change.

The wind resource in the forests of Western Oregon's Coastal Range is unique and compliments the seasonal production wind production patterns of wind farms East of the Cascades. Thus, it is potentially more valuable to the entire electric system than more East-side wind development. This diversity in clean renewable energy is critical to the State's energy and climate future by making a more reliable sustainable electricity supply.

Wind energy presents a unique opportunity for the Department to reduce greenhouse emissions by allowing this compatible energy resource on State forest lands. ORS 530.050 provides that "the State Forester shall manage [state forests] so as to secure the greatest permanent value of those lands to the state, and to that end may "permit a variety of uses on the land." The State Forester may:

> Permit the use of the lands for [purposes other than timber production], ***including but not limited to*** forage and browse domestic livestock, fish and wildlife environment, landscape effect, protection against floods and erosion, recreation, and protection of water supplies when, in the opinion of the [State Board of Forestry], the use is not detrimental to the best interest of the state. ORS 530.050(5) (emphasis added).

[2] OAR 141-125-0100(2)(j)

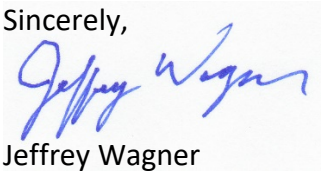
The State Forester also may “do all things and make all rules, not inconsistent with law, necessary or convenient for the management, protection, utilization and conservation of” state forests. ORS 530.050(13).

Thus, ODF has broad statutory discretion to allow a wide variety of non-timber harvest uses in state forests, provided that those uses secure the "greatest permanent value" and do not detract from the State of Oregon's best interest. The benefits as defined by OAR 629-035-0020(1) include “sustainable and predictable production of forest products that generate revenues for the benefit of the state, counties and local taxing districts” and “productive soil, air and clean water”.

Wind energy clearly constitutes a “social, economic, and environmental benefit to the people of Oregon.” Not only does it align with state policy, it will generate significant economic benefits in the form of lease payments to ODF, revenue sharing in the hosting county (ies), jobs and increased property tax revenue.

We recommend that ODF, the State Forester and the State Board of Forestry consider inclusion of wind energy and wind energy leasing in the Forestry Program for Oregon Goal G.

Sincerely,



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