Meeting Summary and Notes

Carbon and Forest Management Work Group | Meeting 10: December 11, 2024, 9:00 am to 12:00 noon

Meeting Overview

The 10th Washington Department of Natural Resources (DNR) Carbon and Forest Management Work Group meeting took place on Wednesday, December 11th, from 9 am – 3 pm, via Zoom Webinar. The purpose of this meeting was to review the carbon modeling results with and without climate change and provide feedback on those results.

Representatives from BluePoint Planning, the firm hired to facilitate the work group in partnership with DNR staff, opened the meeting with an overview of the agenda:

1. Welcome
2. Carbon Modeling Results
3. Carbon under Climate Change Modeling Results
4. Potential Modifications to Model and Scenarios
5. Next Steps

Csenka Favorini-Csorba, Policy Director for DNR, gave an overview of the models used by DNR and an update on the modeling process. The carbon contractor ESSA then gave the first part of their results presentation, focusing on the carbon modeling results; work group members each had a chance to ask questions about those results. This presentation was followed by ESSA's climate change modeling results for carbon, after which work group members again had a chance for questions and discussion.

Following the modeling results presentation and discussion, Ms. Favorini-Csorba gave an overview of the modification process for potentially revising the model and scenarios. After significant discussion, work group members were asked to identify their top priorities for modifications.

Finally, BluePoint closed with the next steps, which include sending any questions and top priorities for modifications to DNR for their review. All meeting materials, including the presentations and recording, are posted on DNR's Carbon and Forest Management Work Group website.

Attendees

Work Group Members

- Matt Comisky, American Forest Resources Council
- Heidi Eisenhour, Jefferson County
- Steve Hinton, Tulalip Tribes (alternate for Ryan Miller)
- Randy Johnson, Clallam County

- Hannah Jones, Firelands Workers United
- Ed Murphy, Sierra Pacific Industries
- Bryan Pelach, Washington Conservation Action
- Russ Pfeiffer-Hoyt, Washington State School Directors Association
- Jason Spadaro, Washington Forest Protection Association
- Paula Swedeen, Conservation Northwest
- Brel Froebe, Center for Responsible Forestry (alternate for John Talberth)

Not in attendance: Pat Tonasket, Confederated Tribes of the Colville Reservation

Washington DNR Staff

- Cathy Chauvin
- Duane Emmons
- Csenka Favorini-Csorba
- Theresa Keith
- Sharon Lumbantobing
- Mackenna Milosevich
- Denise Roush-Livingston
- Ben Welna

Facilitator (BluePoint Planning)

- Nora Bayley
- Mindy Craig
- Lauren Schmitt
- Chris Mendoza, Mendoza Environmental (sub-consultant to BluePoint Planning)

Contractors, Wood Basket Study, Evergreen Economics

- Ted Helvoigt

Contractors, Carbon Study, ESSA

- Cedar Morton
- Frank Poulsen
- Don Robinson
- Ira Sutherland
- Alex Tekatch

Work group meetings are public, meaning that members of the public may join the meeting to observe but cannot make public comments. Seven members of the public attended the 10th work group meeting.

Meeting Highlights and Themes

- DNR Updates, Models and Process: DNR staff presented the differences between the forest estate model and the carbon model. Important details include the following:
    - DNR typically uses the forest estate model to calculate the decadal sustainable harvest level.
    - ESSA is using the forest vegetation simulator (FVS) to model the 16 scenarios for this work group.

  - After the December meeting, ESSA will provide preliminary harvest volumes to Evergreen to use as constraints on the economic models.

- Carbon Modeling Results: ESSA presented the carbon modeling results for the scenarios identified by the work group with no climate change assumptions. Important details include the following:
  - The scenarios with the highest timber yields also had the lowest carbon benefits.
  - All scenarios showed lower timber yields relative to 2013-2023 harvest levels.
  - Work group members had questions about the assumptions used in the models and the land classification definitions, specifically between uplands and general ecological management (GEM) lands and deferrals.
- Climate Change Modeling Results: ESSA presented the climate change modeling results from modeling the scenarios identified by the work group with climate change incorporated. Important details include the following:
  - Under climate change, the direction of change in scenarios relative to current practices is consistent, but the magnitude varies.
  - Carbon declines 23 percent to 33 percent and simulated yield declines 39 percent to 73 percent under climate change compared to a non-climate change current practices baseline. (This is without simulation of climate change adaptation - for example, planting with climate-adapted species).
  - Work group members had questions about tree mortality rates, species composition, and the results from deferred versus non-deferred lands.
- Potential Modifications to Model and Scenarios: DNR reviewed parameters for adjusting the carbon model and scenarios. Work group members discussed their priorities for refinements. Important details include the following:
  - DNR summarized the modification ideas discussed at the November meeting; ESSA reviewed those ideas and provided estimates on the difficulty and potential impact on the modeling results.
  - Work group members asked questions and provided their priorities for modifying the scenarios and were given until 9 am on December 16, 2024 to make additional comments.
- Next Steps: The next meeting of the work group will be on Wednesday, April 9, 2025, from 9 am to 3 pm. At the meeting, ESSA will present the final carbon modeling results and Evergreen will present the preliminary economic analysis results.

Detailed Notes

Carbon Modeling Results

ESSA presented the initial carbon results from modeling the eight scenarios identified by the work group in spring 2023. They gave a brief refresher on the methods used in the modeling; the full presentation on the modeling methodology, given in November 2024, can be viewed on the work group website. They also reviewed the revisions they made to correct the data discrepancy discovered in November.

The results showed that the scenarios with the highest timber yields also had the lowest carbon benefits. All scenarios showed lower yields relative to harvest levels from 2013-2023. The results also show that the only scenario to increase both timber yield and carbon over current practices was Scenario 2, lengthen rotations. The only scenario to decrease both timber yield and carbon over current practices was Scenario 3, shorten rotations.

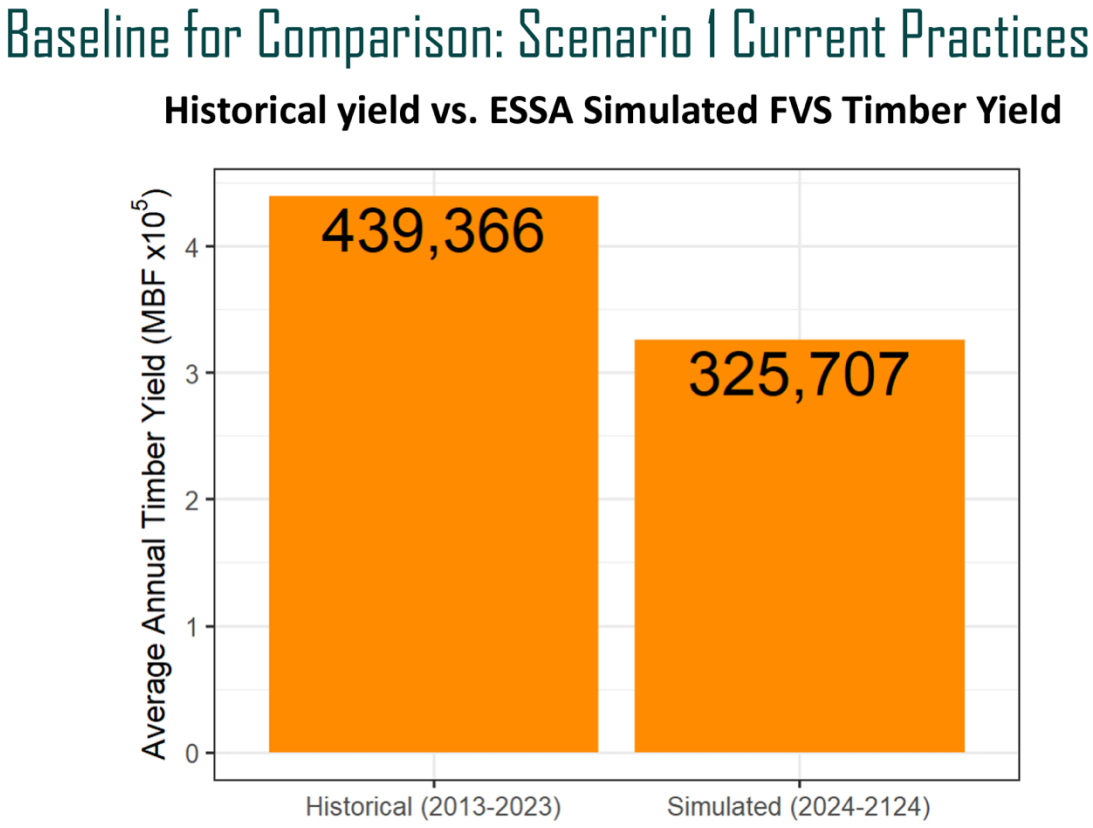

Figure 1 - Historical and Simulated FVS Timber Yields

The full presentation with results can be viewed on the DNR website. The carbon modeling results are on slides 1 to 61.

Work group members had questions about the assumptions used in the models; ESSA staff pointed to a report used in creating the assumptions (Smith et al. [2006]) as well as the bibliography of sources created by the work group. Work group members also had questions about the land classification definitions, specifically between uplands and general ecological management (GEM) lands. DNR staff pointed them towards the *State Trust Lands Habitat*

Conservation Plan (HCP) annual reports that explains the complexities of the HCP strategies and classifications. The land classification definitions are also in the 2024 legislative report for this work group.

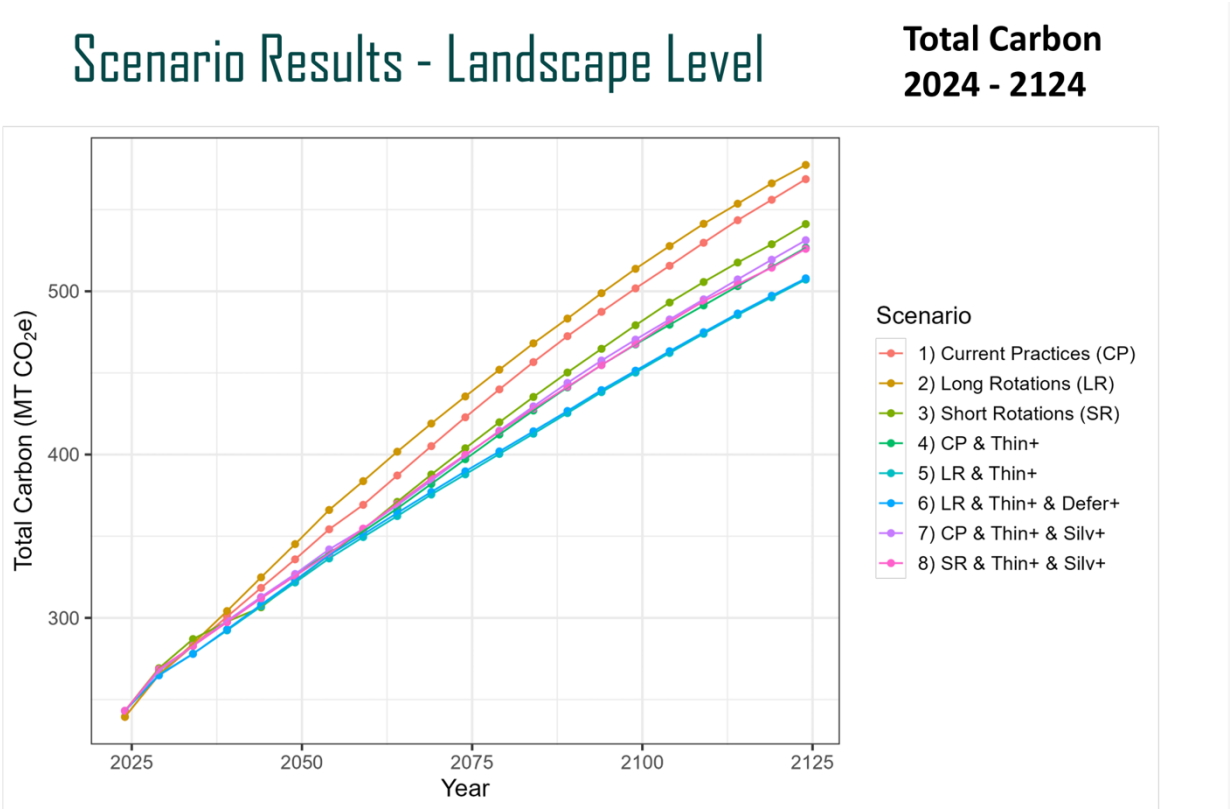

Figure 2 - Scenario Results, Landscape Level; Total Carbon, 2024 - 2124

Climate Change Modeling Results

ESSA presented the climate change modeling results from modeling the eight scenarios identified by the work group with climate change risk incorporated. They provided a brief refresher on the climate change methodology for the modeling. The full presentation on the climate change methodology can be viewed on the work group website; the climate change section is on slides 23 to 29.

The results show that, under climate change, the direction of change in scenarios relative to current practices is consistent, but the magnitude varies between scenarios. Carbon declined 23 percent to 33 percent and simulated yield declined 39 percent to 73 percent under climate change compared to a non-climate change, current practices baseline. Note that this is without simulation of climate change adaptation, such as planting with climate-adapted species.

The results also show that carbon increases initially (in other words, in the first 2 to 3 decades), flattens out, and then declines toward the end of the simulation.

Work group members had questions about tree mortality rates, specifically, if there is an overestimation of certain types of mortality. They also asked about species composition and the results from deferred versus non-deferred lands; ESSA replied that things are complicated by the fact that different species react differently to climate change. The model configuration for these

results did not include specific climate change adaptation strategies, such as replanting with climate-adapted species.

The full presentation with results can be viewed on the DNR website. The climate change modeling results are on slides 64 to 95.

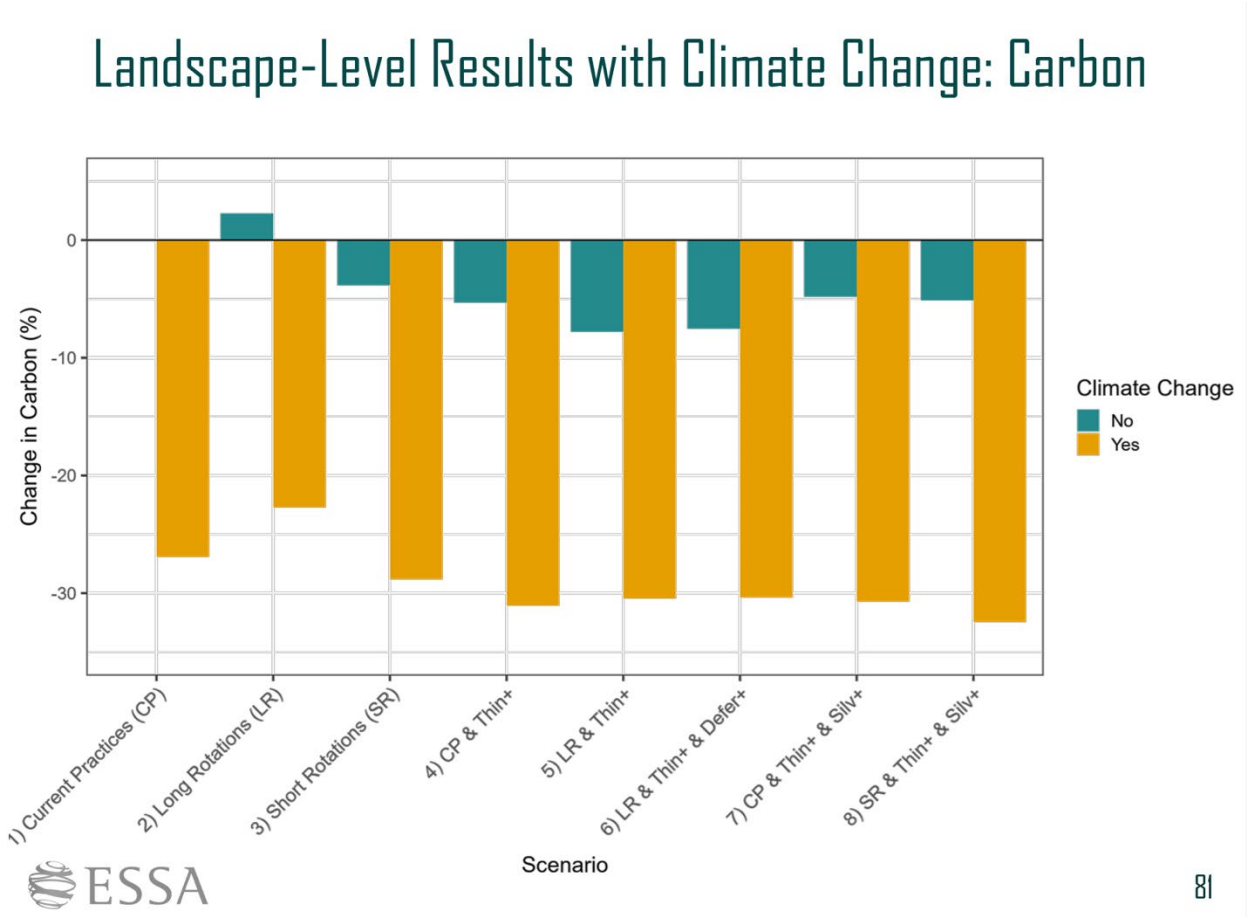

Figure 3 - Percent Change in Carbon, with and without climate change

Potential Modifications to Model and Scenarios

Following the November meeting, DNR summarized the modification ideas discussed at the meeting and presented the ideas at the December meeting; ESSA reviewed those ideas and provided estimates on the difficulty and potential impact on the results. The modifications included both scenario and model adjustment ideas.

During the discussion of carbon modeling results, DNR captured additional ideas for revisions from work group members, along with questions and comments. DNR and ESSA also reviewed the limitations to each additional proposed carbon model adjustment, including available time, budget, and difficulty of revisions.

Each work group member gave their top three priorities for modifying the scenarios. Work group members were encouraged to stay focused on the proviso goals when considering modifications, and to avoid difficult changes that are unlikely to change trajectories over time. Additional ideas for modification included changing how the model addresses mortality, modifying thinning amounts, and adding increased emphasis on silviculture to more scenarios.

Work group members asked questions and provided their priorities for modifications. Priorities stated by work group members include mortality modifications and reducing the amount of commercial thinning.

New Ideas

Idea	Difficulty Level Estimate	Potential Impact on Results
7. (Specific to Idea 2) Alter thinning volume/area, particularly for the lengthening rotations + significantly increased thinning scenario	% area provided: Low Other metric provided: Medium to High (code changes required)	High
8. Explore wood product life cycle numbers. For example, literature review of wood products life cycle numbers.	Unknown	Low-Medium
9. Modify climate change related mortality	High	High
10. For Scenario 2, change the threshold for Site Class 3 and 4 from harvest volume to age to match Scenarios 5 and 6	Low	Low-Medium
11. Add increased emphasis on silviculture to Scenario 2	Low	Low
12. For scenarios with increased thinning, set a maximum age for thinning and reduce the area of stands being thinned (Ideas 1 and 2)	Medium	High

Figure 4 - New Ideas for Scenario Modification

Some work group members expressed concern over providing feedback on revising the model without fully understanding the results. Work group members were given additional time to read and interpret modeling results, with a final deadline for providing priorities and modeling feedback set at 9:00 am on December 16. Following that deadline, DNR and ESSA will consider the list of potential modifications as a whole and determine which can reasonably be accomplished given the available time and budget.

The full modification presentation can be viewed on the DNR website.

Next Steps

The next meeting of the work group will be on Wednesday, April 9, 2025 from 9 am to 3 pm. At the meeting, ESSA will present the final carbon modeling results and Evergreen will present the preliminary economic analysis results.

Raw Notes: Verbal and Written Communication

These notes include verbal and written questions and comments from the Zoom chat log.

- Comments from the Zoom chat are denoted with (chat) at the beginning of the comment or question.
- Questions and comments from the work group members are denoted with **WG** at the beginning of the comment or question.
- Responses from DNR staff or BluePoint Planning staff are noted with **DNR** or **BPP**, respectively.
- Responses from the contractors, Evergreen Economics or ESSA are noted with **EG** or **ESSA**, respectively.

ESSA Carbon Modeling Presentation

1. (chat) WG: What landcover data set was used?
    a. (chat) ESSA: We are using the Large Data Overlay (LDO) dataset provided by DNR.
2. (chat) WG: Slide 16/17 (12 in PDF sent this morning) are these acres classified as uplands now and do not shift from uplands to general ecological management (GEM) lands as the previous model did?
    a. ESSA: End up with a lot more area as uplands than in the previous model.
3. (chat) WG: At some point, can DNR clarify the definitions of uplands versus GEM lands in terms of management classification - e.g., what Habitat Conservation Plan (HCP) categories and what kind of management is allowed?
    a. (chat) DNR: GEM lands are available for the full range of management. Uplands have specific ecological objectives that limit but do not preclude harvest per the HCP and the *Policy for Sustainable Forests*. Uplands include areas managed for northern spotted owls and marbled murrelets. A good source for understanding the complexities of the HCP strategies is in the appendix to the HCP annual report. Here is the link: https://www.dnr.wa.gov/programs-and-services/forest-resources/habitat-conservation/monitoring-and-reporting. The annual reports are at the bottom of the page.
    b. (chat) WG: Are there spotted owl areas included in the GEM category?
    c. (chat) WG: Follow up to that question. What accounts for the deferred acres in the GEM lands? If deferred then not available for "full range of management" In this case does deferred = long term forest cover?
4. (chat) WG: On slide #22. do you limit the model to county-by-county for federal trusts?
    a. (chat) ESSA: Yes that is correct
5. (chat) WG: Why is there more thinning in the lengthen rotation scenario versus the current practices scenario? I mean the lengthen rotation + thinning (Scenario 5) versus current practices + thinning (scenario 4).

   a. (chat) ESSA: There is more thinning because more stands are eligible for thinning, because the board foot threshold is 50,000 board feet for long rotation, compared to 30,000 board feet for current practices.

6. (chat) WG: I have a long list of questions. How would you like to handle them? I can send them to the workgroup email later this morning and have ESSA respond.
   a. (chat) BPP: We appreciate getting detailed questions by email. Yes, please send to the work group email. For all work group members, we will need all comments, questions and feedback after the meeting by 9:00 am on Monday, Dec. 16.

Round Robin

1. WG: County level harvest limit – trying to understand why business-as-usual looks like historical scenarios?
   a. ESSA: Has big impact on the results – limit is because not trying to optimize an objective, not realistic. Part of the proviso is having a predictable supply of harvest, so had to implement that to make results look plausible. Trying not to lead the study in specific direction.
2. WG: Scenario 6 – could extrapolate the impacts of deferrals – wondering if that is possible?
3. WG: Why was there a higher level of absolute thinning?
   a. ESSA: Some things are easier to change, some are much larger changes.
   b. WG: Looking for clarification about the categorization that goes into GEM category and uplands category.
      i. ESSA: Looking into it to see if there is a relatively concise answer.
4. WG: Similar ask about understanding land classification acres. And, is this looking at currently deferred acres under the HCP? Seems counter-intuitive – carbon flux, confused how the shorter rotations had little increase in harvested wood product and thinning had little increase in harvested wood product.
   a. ESSA: Depends on the size of the wood products and assumptions taken. Have some supplementary slides and can point to Smith et al. 2006 report.
      i. (chat) ESSA: Here is the Smith et al. (2006) reference: https://research.fs.usda.gov/treesearch/22954
      ii. (chat) WG: It's been awhile since I have read Smith et al., 2006. Does it account for methane emissions from landfills?
   b. (chat) WG: These proportions of carbon in wood products versus carbon in the forest are consistent with many other modeling exercises and research on the topic.
5. WG: Agree with wanting clarification about uplands and deferrals.
   a. ESSA: Might be a historical question for how things were initially deferred – DNR questions.
6. WG: California Air Resources Board (CARB) uses much different numbers, net effect is virtually no increase in carbon dioxide, most models show that long-lived wood products

accumulate. Huge difference in that effect; percentage in use on pulpwood are short lived, but that mostly goes into landfills now.

   a. ESSA: Different theories that use different numbers for wood products. Numbers are hard-coded into the model, can't be changed. Acknowledging that there are different ranges, can't re-run with other numbers.
   b. ESSA: Harvested wood products carbon pool increases over time – is consistent with what is happening here.
   c. WG: With a four-fold difference in carbon resulting from harvest that is no longer available to be part of the atmosphere.
   d. WG: Smith et al. is almost 20 years old, there have been changes in understanding with some methodology, but it is the methodology baked into Forest Vegetation Simulator (FVS) now. Could be proposed as a consideration to review more recent literature.

7. WG: Constraints with county level harvests – would like to spend more time on that subject. Assuming that Olympic Experimental State Forest (OESF) was separate and distinct? Going to have each alternative go into the economic model?
   a. DNR: Difference between economics component and carbon—how ESSA addressed the harvesting of the model is to look at historical harvest levels and set that as constraint at the county level. Very complicated to do that by trust. For recommendations, will have to extrapolate from the results to get a sense of what that would mean for the trusts.
   b. DNR: Constraints on the model – can incorporate into the thinking. But, not a forest estate model, can't do the same things as that.
   c. (chat) WG: If I remember correctly, Greg Latta from Evergreen is going to do some modeling of emissions (but not a full life cycle analysis (LCA) because of timing/budget constraints). Is that still happening? And if so could we get a reminder of what he will be modeling? If he is still doing this, then the results from ESSA and Evergreen would need to be synthesized in order to get a full picture of CO2-avoided emissions impacts.
8. WG: Echo county-by-county limits question. How does mortality associated with climate change affect things? Don't understand how currently deferred lands are performing.
   a. ESSA: Climate presentation coming up next. Deferrals staying the same for scenarios, but accounting for it in other terms. See a large increase in deferred areas, and non-deferred areas.
   b. WG: Still don't see, over the timeframe, how the deferred acres are performing.
   c. (chat) ESSA: Note that you should be able to see density numbers for carbon in each land class in the notes to those slides in the PDF version that was sent out. In case that helps!
9. WG: Want to underscore the lack of clarity to see what different levels of thinning and deferrals do to the carbon. Difference between Scenarios 1 and 2, what is happening there.

   a. ESSA: Adopted scenarios document should lay out the scenario details that were applied in the model. The minimum board foot threshold bumped up from 35,000 to 50,000.

   b. DNR: Had graphs that showed, according to site class, the average age.

10. WG: Confused about Slide 23 – shows simulated timber yield, average for each of the eight scenarios, but slide 57 is different. How to get numbers above 3,000,000 per year, when slide 57 doesn't go above 2,500,000?

    a. ESSA: First three scenarios – commercial thinning is very small, can't see it on the graph. On slide 57 – showing annual yield, by timestep – slide 23 is divided by five. The Y-axis should be corrected to show yield by 5-year timestep, needs to be fixed.

11. (chat) DNR: Spotted owl management units are considered uplands. Per previous questions, GEM areas are available for harvest, but they are also subject to the constraints of the HCP, *Policy for Sustainable Forests*, and all relevant laws. So it is possible for an area classified as GEM to be constrained or deferred from harvest. For example, we may have gene pool reserves or special ecological features in the GEM land class.

    a. (chat) DNR: Here are the full definitions we provided in the legislative report: General ecological management (GEM): Lands available for harvest subject to the requirements of the State Trust Lands Habitat Conservation Plan (HCP), Policy for Sustainable Forests, and all relevant laws. GEM areas are the primary revenue-generating lands in the state trust lands portfolio. Riparian: Lands designated through the riparian and wetland habitat conservation strategy in the HCP. These lands include fish-bearing streams and wetlands plus protective buffers. Buffer widths depend on stream and wetland type. Management in these areas is guided by both the HCP and DNR's Riparian Forest Restoration Strategy (RFRS), as well as all relevant laws. Uplands: Lands that have specific ecological objectives that limit (but do not preclude) harvest per the HCP, Policy for Sustainable Forests, and all relevant laws. Examples include areas being managed for northern spotted owl conservation or for hydrologic maturity, and special habitat areas managed for marbled murrelets.

Climate Change Modeling Results

1. WG: How did we define climate change for this modeling?

   a. Recap of the climate change modeling? – yes

   b. ESSA: Using a hybrid version of the global circulation model (GCM), driven by socio-economic storyline. Under those storylines, what will emissions look like? We are looking at the RCP 4.5 scenario.

2. WG: With climate change, where in the data can we see the increased impact of climate change on the deferred areas?

   a. ESSA: Don't have examples of yield curves for most stands, carbon is declining with climate change broadly, hitting non-Douglas fir stands the worst.

   b. WG: What would it take to make a yield curve with the data?

i. ESSA: Can create that, don't have any for the presentation but do have that data. Some deferred stands might not be much left of them in 100 years. Classified from data from DNR, western hemlock, Douglas-fir, and red alder. And only using RCP4.5, could be worse than that.

ii. WG: Also tracking redcedar?

1. ESSA: Yes, tracking each tree over a 100-year time period.

3. (chat) WG: Is carbon stock loss due to fire disturbance incorporated?
4. WG: Wondering based on the results, sounds like Douglas-fir is going to be the surviving species, assuming that species would change over time?
    a. WG: Lack of adaptation in the simulation – revisiting as a potential revision. Trying to mimic what DNR plants today, haven't altered the species composition—could be a meaningful revision. Not changing from species composition because that was agreed upon at previous meetings.
5. WG: Seems redundant to last meeting – still confused, in other models, they don't have significant mortality in small trees. Could they produce a tree list to show when mortality is occurring in the 100-year cycle. Other models don't take into account the human planting of the forest. Not much change to tree growth, think it will actually increase.
    a. ESSA: In deferred areas, stands already in place, will look into whether planting species is effective enough.
    b. ESSA: In the face of climate change, individual tree growth rate will decline, depending on the viability score. For replanting, not letting nature do anything, planting based on silvicultural guidance. Mortality model size curve is generally u-shaped.
    c. WG: Follow up – deferred lands are old to start with. Seems that there's an over estimation of certain types of mortality, with large established trees.
        i. ESSA: Would have to look at a single stand over time to understand how things changed over time.
        ii. WG: Someone should be able to say what the average is for each half of the state.
6. (chat) WG: Some deferred stands under the HCP are relatively young, or at least, it's the location for Endangered Species Act (ESA) listed species conservation that drives many of the deferrals, and the intent to re-grow habitat.
7. (chat) ESSA: It was perhaps oversimplified. Sample stands that we looked at yesterday to prepare all had mature stands at the outset in 2024 and still saw a decline.
8. WG: Comparing slides with deferred lands and non-deferred lands, with and without climate change – can we dive deeper into those slides? Slide 73 – see that non-deferred acres are performing better than deferred acres. Also, does climate change include carbon stock loss due to fire disturbance?
    a. ESSA: Complicated by different species reacting differently to climate change. Different types of land have different mixes of species of tree.

b. WG: Greatly informs how to manage DNR lands for carbon sequestration. Is it wise to defer acres from management.

c. ESSA: If going to defer, need to make sure the species is correct/ resilient – what areas have a good chance of surviving for 100 years?

d. (chat) ESSA: This is the total carbon stored in forest biomass alone in 2024 as estimated by FVS. This is the same starting point for all scenarios in both the climate change and non-climate change scenarios. It is important to note that the deferred areas have a higher overall carbon density (carbon / acre) than non-deferred areas in 2024: The corresponding values on a per acre basis (tCO2e/acre) are as follows:

   i. 280 for non-deferred GEM lands

   ii. 515 for deferred GEM lands

   iii. 399 for non-deferred Riparian lands

   iv. 478 for deferred Riparian lands

   v. 349 for non-deferred Uplands

   vi. 432 for deferred Uplands

e. (chat) ESSA: This is the total carbon stored in forest biomass in 2124 as estimated by FVS under the current practices scenario with climate change. There is still an increase in carbon in GEM lands, but half as much compared to the non-climate change scenario. We see that deferred areas are hit slightly worse than areas in the active harvesting land base. Keep in mind with all of these results that this is just based on the climate-FVS methods we described last month. And also bear in mind that these model configurations do not include specific climate change adaptation strategies, such as replanting with climate-adapted species. The corresponding values on a per acre basis (tCO2e/acre) are as follows:

   i. 304 for non-deferred GEM lands

   ii. 314 for deferred GEM lands

   iii. 333 for non-deferred Riparian lands

   iv. 327 for deferred Riparian lands

   v. 334 for non-deferred Uplands

   vi. 340 for deferred Uplands

9. WG: Agree with questions from previous speaker – agree that it seems mortality is overzealous, trying to understand the mechanisms of that. Are reductions in growth rate making a difference here?

   a. ESSA: Slide 234 – if change in suitability – affected by the aggregate maximum stand density which may drop. Mortality is turned up when stands have 60 to 85 percent of maximum stand density.

   b. WG: Deferred areas – areas that had been managed in the past. Why are areas with more thinning resulting in lower carbon?

   c. ESSA: Thinning does behave in ways you would not expect.
   d. (chat) WG: But in the case of deferred acres for the marbled murrelet, there is no opportunity for thinning in nearly all cases. So thinning in stem exclusion deferred stands is unlikely to happen. Model outputs likely reflect the management or lack thereof of deferred acres.

10. WG: When comparing difference between deferred and non-deferred, recollect that Greg Latta discussed calculations of emissions, would like to see the full picture. Don't remember what was landed upon for that, what Greg would be analyzing.
    a. EG: Will cover emissions from harvesting and transportation. Will need to confirm if it's additive.
11. ESSA: Evergreen not modeling climate change results.
12. WG: Interested in retention of water on the landscape. Some species can retain moisture differently.
    a. ESSA: FVS will not be driving that directly, might see some indirect effects. Trying to think if there's a way to capture it quantitatively.
13. (chat) WG: One thing I did not raise in relation to a previous comment, we do not have scenarios where we look at the carbon implications of harvesting more than the HCP currently allows in HCP areas. Carbon according to FVS may decline but Slide 97 still shows more carbon in 2124 than 2024. Harvesting would release even more stored carbon from the forest ecosystem. Many research papers show this so I would caution suggesting changing from deferred to non-deferred based on these results.
14. (chat) WG: Since we know climate change is a reality, is the fact that Evergreen isn't going to model the climate change results going to prevent the work group from comparing apples to apples and make recommendations based on the data?

Potential Modifications to Model and Scenarios

1. All modification suggestions (top 3) from work group members are due by Monday December 16 at 9 am.
2. WG: Top three priorities depend on questions that are not asked yet. What is new deadline for ESSA to respond to questions?
   a. DNR: Will need questions earlier.
3. WG: How to develop appropriate questions, hard to suggest what overarching questions might be. Difficult because the data isn't all in the same format.
4. (chat) WG: Ideas 4 and 5: Would the model be hard coded to apply the adopted SHC level? And would each decade from the 2019 Sustainable Harvest Calculation (SHC) be used over the model period for this exercise?
5. WG: Of ideas on the table, 2 and 7 are priorities.
6. WG: For commercial thinning, would like to see apply both rules. Silvicultural treatment with thinning. Coupling long rotations with increased silvicultural treatment. And, take both ideas 1 and 2 and apply it to commercial thinning.

   a. (chat) DNR: On your change, were you thinking of adding increased emphasis on silviculture only to Scenario 2, or all the scenarios that have long rotations?.

7. WG: Mortality discussion – high priority (idea 9).
8. WG: Wondering if offer to produce yield curve considered a model change or something to do on the side?
   a. DNR: More of a data request, but part of all of this because it would take time.
   b. WG: Would that merit a vote?
      i. DNR: Yes
   c. WG: Unclear what most feasible way to try to get around county-by-county limits on harvest?
      i. DNR: Not really feasible but some thoughts about adjusting harvest levels.
   d. WG: Not trust specific, getting away from county-by-county.
   e. DNR: Sustainable harvest units – nothing lines up easily.
9. WG: Reducing commercial thinning – from a trust beneficiary or financial standpoint, thinning does not produce much value.
10. (chat) WG: Having some data around acres deferred/not deferred by land class, acres by treatment type, yield curves, etc. would be helpful to provide feedback on these ideas.
11. (chat) WG: I would include reducing commercial thinning, modifying planting as conditions change, and possibly modifying climate-related mortality. Thank you for providing the information to a non-scientist.
12. (chat) WG: In relation to the previous question about shifting from county harvest limits, how would that impact the economics analysis?
13. WG: Modifying thinning – think it makes sense to dial it back some. Wouldn't use the age limit, might be instances of overstocked stands. Perplexed by some climate change results. Concerned about any policy recommendations based on those results without much more digging into those results. Literature review of climate change modeling? Mortality changes – hard but worth exploring.
    a. DNR: Reminder, this is not the last time we'll see this information, final results will come out in April. Will be more time then to go through to understand how everything works.
    b. WG: Concerned we are flying blind.
    c. DNR: ESSA could spend more time asking questions but then couldn't make the revisions. Worried that if we pushed things out now, we'd have less time in the spring to discuss everything and people would be frustrated about the timeline. Only will be able to make a few revisions, not all 9 that are suggested now.
14. (chat) WG: Based on the concerns raised, does ESSA have ideas for changes that could be made for mortality issue?

15. WG: What's really driving the loss in deferred areas—want to better understand that, which would help explain the outcomes. Not sure what DNR and ESSA want about recommendations.
16. WG: Questioning why talking about changing the model, it feels more like we are tweaking the model to get the answers we want. And, where do the economics fit into this? Some choices won't be viable based on the economics. Still want the background data to understand how the model is running.
    a. DNR: Have the opportunity now to make things more realistic. Think this is the best way to do this. Not presupposing the scenario results.
    b. WG: Why is it realistic to thin in stands over 70?
    c. DNR: Would be helpful to have recommendations for what would make the model more realistic. Hearing that Idea 1 is not something they agree with.
    d. WG: Does FVS handle the response of trees to thinning based on their age differently?

Next Steps

1. Please send comments and questions as soon as possible.
    a. Not just trying to make more realistic but also the impact of the changes.
    b. Will try to get those back as soon as they can answer them.
    c. Last cut-off for comments will be Monday, December 16 at 9 am.
    d. Modifications presentation will be sent out ASAP.
2. DNR will work with ESSA to determine what will be changed.