Meeting Summary and Notes

Carbon and Forest Management Work Group | Meeting 9: November 13, 2024, 9:00 am to 12:00 noon

Meeting Overview

The 9th Washington Department of Natural Resources (DNR) Carbon and Forest Management Work Group meeting took place on Wednesday, November 13th, from 9 am – 12 pm, via Zoom Webinar. The purpose of this meeting was to develop an understanding of the carbon and climate change modeling methodologies.

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. DNR Updates
3. Carbon and Climate Change Modeling Methodologies Presentation and Discussion
4. Next Steps

After a brief overview of the meeting, Csenka Favorini-Csorba, Policy Director for DNR, gave an update on the legislative report and a refresher on how the scenarios being modeled were developed in the spring. She also reviewed a change to the agenda caused by a data discrepancy; instead of presenting the carbon modeling results as planned, ESSA will correct the data discrepancy and rerun the models before the December meeting. The modeling methodology was reviewed in detail at this meeting (meeting 9), and the results will be presented in December.

Representatives from ESSA gave a detailed presentation on the carbon and climate change modeling methodology. Work group members then each had a chance to ask questions about the methodology and data.

Finally, BluePoint closed with the next steps, which include the addition of two extra work group meetings in the spring and summer of 2025 to allow for adequate time to review the carbon and economic modeling results and provide a recommendation to the legislature.

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
- John Talberth, Center for Sustainable Economy

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

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
- Greg Latta

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. No public comment is allowed. Five members of the public attended the 9th work group meeting.

Meeting Highlights and Themes

- Meeting Schedule Update: DNR has proposed adding two additional meetings to the work group schedule in spring and summer 2025. Important details include the following:
  - These meetings will help give adequate time to review the carbon and economic modeling results and formulate recommendations to submit to the Washington State Legislature.

- o The additional dates are May 14 and June 25, 2025, which are in addition to the existing meetings on April 9 and June 11, 2025.

  - o The work group calendar is available on the DNR work group website.

- Carbon and Climate Change Modeling Methodology: ESSA gave an in-depth presentation on their carbon and climate change modeling methodology. Important details include the following:

  - o ESSA reviewed key definitions of the model, including spatial units such as stands and the study area.

  - o ESSA gave a refresher on the climate change methods used in the model. This section was a key area for questions during the discussion section of the meeting.

  - o The presentation also included information on how ESSA was able to innovate and speed up the modeling process using cutting-edge modeling and computing technology.

  - o Work group members were each given a chance to ask questions about the modeling process during the round-robin following the presentation. Reviewing the methodology in the November meeting will allow for more time during the December 11 meeting to focus on reviewing and discussing the modeling results.

- Next Steps:

  - o The next meeting of the work group will be on Wednesday, December 11 from 9 am to 3 pm. The focus of the meeting will be reviewing the modeling results from ESSA and discussing possible scenario and modeling modifications for the re-run of the carbon model in the spring.

Detailed Notes

Carbon and Climate Change Modeling Methodology

ESSA gave an in-depth presentation on the carbon and climate change modeling methodology used in the development of the FVS model and analysis of the results (Figure 1). The presentation was a thorough explanation of the inputs, outputs, and innovations used by ESSA to run the models within the required timeframe.

ESSA reviewed key definitions of inputs and outputs to the model, including spatial units such as stands and study area. The study area for the carbon study performed by ESSA is DNR land west of the Cascades. ESSA is using a time horizon of 100 years with five-year time steps in their modeling. The results will be evaluated and compared using a few scenario performance metrics, with a baseline of current DNR practices:

- Mean of total $MtCO_2e$ across simulation time steps
- Percent difference in mean total $MtCO_2e$ across simulation time steps

CO_2e is the metric used to compare and report on the impact of greenhouse gases on global warming via a common scale. One megaton (Mt) of Carbon multiplied by 3.67 equals one $MtCO_2e$.[1]

Basic model process

PREPARATION	MODELING		RESULTS
Prepare Inputs	Stand Initialization	Simulation	Outputs and Post-processing

Preparation data icon by monkik

- Growth
- Carbon fluxes
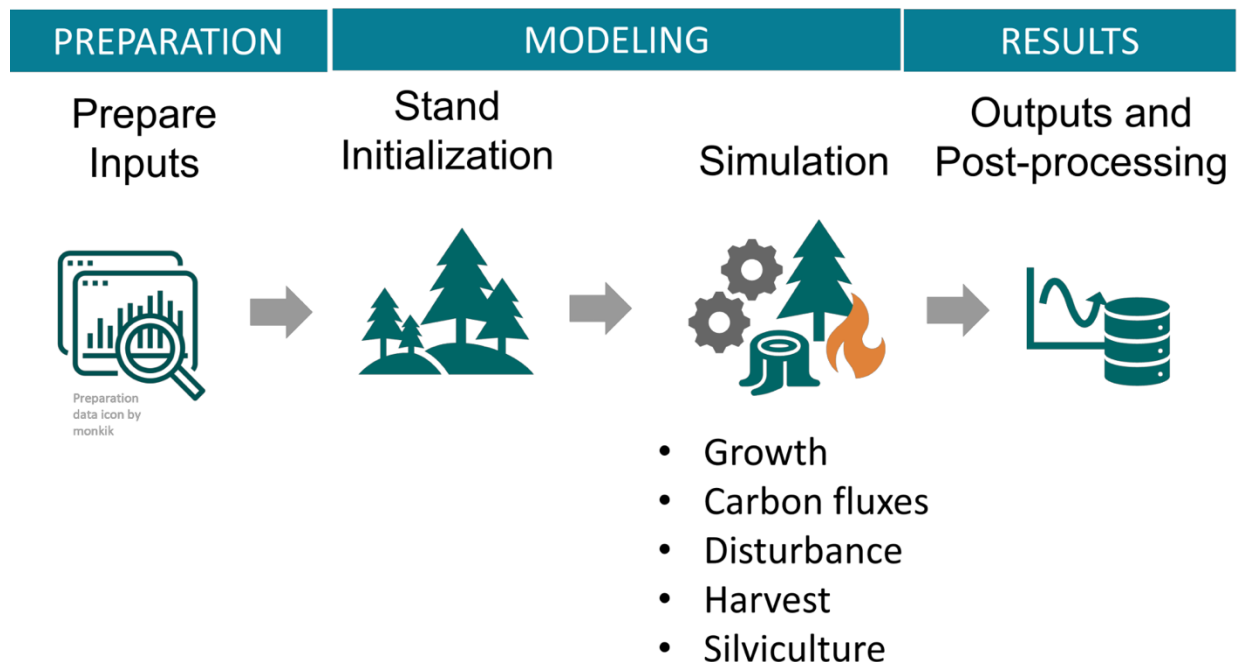- Disturbance
- Harvest
- Silviculture

Figure 1 - Basic Model Process

ESSA gave a refresher on the climate change methods used in the model. This discussion included information on how climate change may affect the range of different tree species, which is

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[1] Forest Carbon Modeling Results, ESSA. Slide 13. November 13, 2024.
https://www.dnr.wa.gov/publications/bc_cfm_m9ppt_carbon.pdf

determined through viability scores assigned to each species. This section was a key area for questions during the discussion section of the meeting. Work group members were especially interested in the Douglas-fir habitat viability scores decreasing between 1990 and 2030; ESSA replied that the viability is based on 35 variables, and it is hard to pinpoint exactly which variable causes a change in viability score. They also clarified that viability scores are based more on natural regeneration instead of human intervention or planting.

The presentation also included information on how ESSA was able to innovate and speed up the modeling process using cutting-edge modeling and computing technology.

During the presentation and subsequent discussion, several possible changes or issues with the scenarios were brought up. ESSA emphasized that they are not trying to be prescriptive about what changes should be made to the scenarios and instead want to be as impartial as possible so the work group can make informed decisions about modifying the scenarios at the next work group meeting.

Work group members were each given a chance to ask questions about the modeling process during the round-robin following the presentation. Discussing methodology in this meeting will allow for more time during the December 11 meeting to focus on reviewing and discussing the modeling results.

The full presentation can be viewed on the work group website.
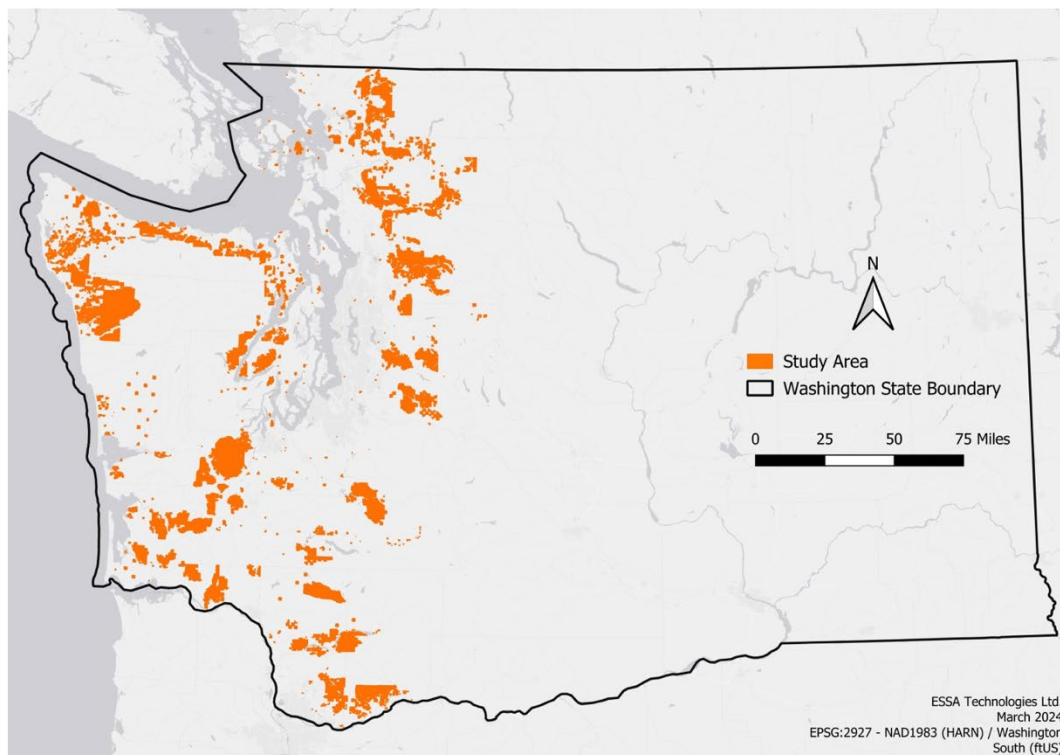

Figure 2 - Study Area for ESSA's Analysis in Western Washington

Modeling Results Pushed to December

Originally, the November 11 meeting was planned to include a presentation of preliminary carbon modeling results. Due to a data discrepancy, the carbon modeling results will be presented at the December work group meeting instead of the November meeting.

For their model, ESSA was initially instructed to use the "modeling" land classification approach, which classified areas subject to rain-on-snow requirements and the northern spotted owl conservation strategy as general ecological management (GEM) lands. This approach is necessary for the forest estate model that DNR uses for the sustainable harvest calculation; that model projects when these areas will meet required conditions for harvest, and schedule harvests accordingly.

However, ESSA is using FVS for the carbon modeling, which does not have the same capabilities as a forest estate model. Using the modeling land classification approach meant that ESSA was modeling rain-on-snow and northern spotted owl habitat areas as GEM lands, meaning these areas could be scheduled for stand replacement harvest and thinning in their model without restrictions.

ESSA will correct their methodology to reflect management restrictions in these areas and then rerun their model. The updated model results will be presented at the December 11 meeting.

Results in a draft presentation sent to the work group on November 6 could shift with the updated model results, which is why DNR decided to not present those results in the November work group meeting.

For more information, please view the DNR presentation from the meeting.

Next Steps

The next meeting of the work group will be on Wednesday, December 11 from 9 am to 3 pm. The focus of the meeting will be reviewing the modeling results from ESSA and discussing possible scenario and model modifications for the re-run of the carbon model in the spring.

The additional dates being added to the work group meeting calendar are May 14 and June 25, 2025, which are in addition to the existing meetings on April 9 and June 11, 2025. The work group calendar and all other meeting materials are available on the DNR work group website.

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.

DNR Updates

1. WG: Heard that this is not a forest estate model – so not looking at the entirety of DNR's ownership. Remembered that it was supposed to be a forest estate model, deferred acres and General Ecological Management (GEM) lands.
   a. DNR: It is an analysis of all DNR lands including deferred areas. Changing management practices on acres eligible for management, on GEM lands. But carbon modeling overestimated the acres available for harvest.
   b. ESSA: ESSA's portion (carbon study) is not a forest estate model. Evergreen would focus more on optimization.
   c. ESSA: Not looking to optimize the harvest, which is what the Forest Estate Model does.
   d. DNR: Understand the explanations but still confused about carbon sequestration/carbon stocks/carbon flux on unmanaged lands vs managed lands. Will we have results that show that? Deferred acres vs managed lands over time?
      i. ESSA: Yes that will be in the results.
2. (chat) WG: Will the draft model results be available a week prior to the December 11 meeting? It was helpful to have the draft available early this time.
   a. (chat) DNR: Given the very tight turnaround between now and Dec. 11 we can't promise that, but we will do our best to get it to you as soon as possible.
3. (chat) ESSA: Reminder that ESSA's portion (carbon study) is DNR lands west of the Cascades only.
4. WG: For clarification – once habitat threshold conditions are met, regeneration of harvest can happen – will that still be incorporated into the model? Making the area open to changes now smaller?
   a. DNR: Basically yes. Trying to figure out how to accurately portray that in the model, since it is not an optimization model. Need to tell the model that some areas are restricted, some aren't.
   b. ESSA: Need to make sure criteria are met. Limited to how many changes are made to the model with the tight timeline.
   c. WG: Are you going to be underestimating area to harvest? Within the areas constrained by the Habitat Conservation Plan (HCP)?
      i. ESSA: Potentially. With 50% criteria, some discrepancies could arise – depends on which units are used.

5. WG: First question – not expecting an answer immediately: struggling on why the definition of GEM lands and uplands has changed? Uplands was always defined as lands with other ecological restrictions on them – rain-on-snow zone is spatially explicit area, could still be defined as upland. Could do other types of harvest there. Also: wondering about trends – how will ESSA handle spatial aspects of rain-on-snow, spotted owl restrictions? How to decide when land is GEM, when it is upland.
    a. ESSA: Wanted to revisit the methods today to refresh everyone – and some new methods that are applied.
6. WG: Want to clarify before model is rerun – county-by-county limitations on harvest – applied to federally granted trusts or state forests?
    a. ESSA: Believe that is covered in the presentation.
    b. DNR: Not a policy restriction, just trying to accurately represent historical harvest level in these regions. Model will harvest what it is told to harvest. Trust blind.
7. WG: 1) Proviso distinguished between carbon sequestration and storage as concepts – didn't see anything about carbon sequestration in the presentation. Would like to see a year-by-year sequestration figures. 2) Operationalizing long rotations, unclear how that works – how is that constrained by other policies? 3) Group discussed including carbon emissions as well – seems like the report will not include that, is that correct?
    a. DNR: Great to note, some will potentially be covered by ESSA, will note for future discussion.
    b. ESSA: For emissions in terms of harvest, part of that is handled by Evergreen. Outside the scope of ESSA's work.
8. WG: Harvest volume – is that sold volume, is that harvested volume, where is the data from for that?
    a. ESSA: Sold volume is provided by DNR. Will have to get back to them for that answer.

Carbon and Climate Change Modeling Methodologies

1. (chat) WG: Do the files that Evergreen has have the same issue with misidentification of acres that can be managed differently?
    a. (chat) EG: The Evergreen model is more of a traditional estate model. It is based on DNR plots (4608 of them) with large data overlay (LDO) attributes overlaid on them (so a sample of the LDO in essence). It can treat the management restrictions using either the model land class or report land class.
    b. (chat) EG: Evergreen will account for rain-on-snow restrictions in the same was as we account for northern spotted owl (NSO) or other land management restrictions. So, we do not see it as affecting our analysis.
2. (chat) WG: How many field plots are included?
    a. (chat) ESSA: 3,183 DNR field plots were used.
3. (chat) ESSA: Just to clarify the process - DNR selected the Forest Vegetation Simulator (FVS) based on ESSA's recommendation after hearing work group input about desired scenarios (we think it was the right choice!).

Round-robin

4. WG: Question about how county yield targets were formed/set?

a. ESSA: Why did ESSA choose to use county yield harvest targets? To help prevent unrealistic modeling results (which would occur without stop-restart). Could make it more realistic but didn't have guidance at the time. Current practices scenario is using past 10 years of data.

5. WG: Impressed by the modeling. Struck by the image of the range contraction for Douglas-fir, under RCP 4.5. For communications purposes, would be nice to see those numbers for RCP 8.5. Previous question about breaking out sequestration and emissions – seems like they have the data to model carbon to atmospheric pool, something to include, not just be background data.

6. WG: Range changes for Douglas-fir, a lot of red in the coastal area, any insight into why Douglas-fir range contracted in coastal Washington and what species would replace it?
   a. ESSA: Dryness, annual index, doesn't show much change, suitability based on 35 variables, dryness might be one. Other things that effect change – spring range, heat.
   b. (chat) WG: I think it's not just moisture but heat. Heat stress is a significant factor in Douglas-fir mortality in southern Oregon.
   c. WG: Interaction between rule sets for regeneration harvest and thinning: guessing that those patterns are part of model behavior – absolute values might change but not the pattern of the results. Want to understand model behavior correctly.
      i. ESSA: Not so straightforward. At shorter rotation, more stands harvested more frequently but might not be in the threshold to trigger the thinning.
         1. WG: So there is some interaction effect?
            a. ESSA: Yes. Things don't get thinned unless there is a stand replacement harvest.

7. WG: Slide 50 - Douglas-fir shrinkage – 36 characteristics – confused about small percentage change in the Douglas-fir, because had similar work done in California, assumption was forest regenerated naturally, by seed fall, not planting. In the early portion of the life of the stand, often fails in regeneration, but seem to ignore the anthropomorphic ability of humans to plant in a forest. Don't think viability scores make sense. Is this based on natural regeneration or human planting?
   a. (chat) ESSA: Regarding future viability of Douglas fir on the coast, there is also concern that increasing impacts of Swiss needle cast will occur on Douglas-fir plantations near the coast. Agne et al. (2018) is a good reference on this and summarize that "Warm winter temperatures and leaf wetness during spore dispersal in late spring and summer are associated with increased Swiss needle cast severity (Black et al. 2010; Lee et al. 2013; Manter et al. 2005; Rosso and Hansen 2003; Stone et al. 2008)."
   https://www.sciencedirect.com/science/article/abs/pii/S0378112717306928
      i. (chat) WG: Very interesting, thank you. So stands with more diverse tree species could mitigate that impact?
         1. (chat) ESSA: The Agne et al (2018) paper is focused on Douglas-fir. Other species will have other interactions with climate change and western hemlock (a key coastal species) is no exception. Meanwhile, my general opinion is that more diverse species plantings will fare better under a changing climate.

b. ESSA: More on the natural side. Additional dial on the climate model to emulate temperature sensitivity of a species. Struggling to find how to do better.
    i. WG: Suggesting being more cautious when dealing with predicted species composition in managed forests.
        1. ESSA: Sometimes have species that fail because of a change, and so assume that another species would be planted instead. Suggestions for how to improve this are welcome.
    ii. WG: Caution – somewhat speculative.
    iii. ESSA: Have noticed this in the modeling results, now have data we didn't have before for what a species' viability score is. Can explore what would be better species to plant in a location, and to simulate, genetically, other species. Can be explored with the work group later.
    iv. WG: Relatively subtle change in Douglas-fir – but western hemlock had a much more dramatic change. How much western hemlock is there in that location to start with (Gifford Pinchot National Forest)?
    v. ESSA: Forest Inventory and Analysis (FIA) data is basis for historical viability scores, so must have been western hemlock observed at that place in 1990.

8. WG: Worried about "100 percent of stands will be harvested;" what are the base assumptions for that? Don't know how this feeds into the economic model, given current markets could be in a negative situation.
    a. ESSA: Financial questions go to Evergreen. Every stand has one commercial thinning in a rotation, other ways to change it so it isn't every single stand.
    b. DNR: Something that could be an adjustment with the scenarios after the models are run.

9. WG: County-level harvest limits – difference between sustainable harvest calculation versus actual harvest. Why using actual volumes versus the sustainable harvest calculation?
    a. ESSA: Had to do with the DNR current practices – historical actual harvest was a better representation of current practices. Also, work group could agree to have ESSA to look at different targets to model/simulate.

10. WG: Questions were interesting, use of actual harvest versus sustainable harvest calculation – not sure what the disparity between the two is? Using sustainable harvest calculation would give a better roadmap for the future.
    a. DNR: Something to discuss, might need to see the actual results first and see if things feel off. A question to table for now.

11. WG: No economics considered in this model? Because this model is just growing and treating stands absent of economic impact. So, when optimizing for something, how will commercial thinning be impacted when considering economics?
    a. DNR: Correct that we haven't incorporated into scenarios what is economically feasible, because work group agreed to model "ideal" scenarios that might need other action to make them feasible (legislative funding, policy changes). Also doesn't consider if thinning more than we currently are, will there be a market for that. Questions for model refinements once we have the results.
    b. WG: To clarify, if assuming in longer rotation scenarios that doing 100 percent commercial thinning, seems unlikely that 60-year-old stand without any commercial thinning, waiting for it to come back to the 60,000 Board Feet (MBF)

trigger, might not make sense. Need to make clear that we are modeling the optimum, not necessarily the reality.

      i. DNR: Something we could potentially tweak once results are out.

   c. EG: Have to figure out, what is reaction to private sector given results. To understand effect from ESSA's modeling, taking DNR harvest and accounting for what's coming out. Finding what they think the on-the-ground reaction of the industry would be, but raises question of, if DNR would actually do that.

      i. ESSA: Yes, seems unrealistic to do thinning on 60-year-old stand. But trying to find balance, things that could be implemented based on ESSA's judgement and what the work group thinks or wants to happen. Trying to provide guidance to the work group so they can make those decisions.

      ii. WG: Want to make sure everyone understands that when the real world is brought in, things can get messy.

12. (chat) WG: Trust revenue is negatively impacted if all stands are thinned at 30 MBF instead of waiting for final harvest at 50 MBF.

13. (chat) WG: The impact of Swiss needle cast appears to mostly be related to attempts to push Douglas-fir onto sites that were very low or normally Hemlock stands, and therefore should not have been in the range of suitable for Douglas-fir, and therefore not likely related to climate change.

   a. (chat) EG: Swiss needle cast is an odd one in that it doesn't kill trees but instead just slows growth through low needle retention. On the Oregon Coast, public lands still have high concentrations of Douglas-fir, but private lands have shifted away from Douglas-fir through planting choices as opposed to ecological means.

   b. (chat) ESSA: The Climate-FVS species viability scores are calculated based on species presence as detected in FIA plots. It is likely that Douglas-fir may have been detected in some FIA plots near the coast that were planted.

14. (chat) WG: Just FYI, DNR did a thinning in a stand that was probably 50-60 years in Capital State Forest near my house as part of a long-term silviculture study. It looks great, not sure what the growth response will be though. DNR/Forest Service is collecting that data.

15. (chat) EG: You may thin non-economically if it helps you meet a habitat goal, which may help long-term economic outcomes.

16. WG: Back to viability scores and receding – what drove the drop from 1990 to 2030 in viability, not seeing the drop there yet? For wind disturbances, how to handle extreme events impact over time? And how does the forecasted frequency of wildfire compare to previous wildfire burn extents?

   a. ESSA: Not trying to model disturbance as a stochastic event. Variation in timing and randomness is from stochastic model; FVS is deterministic, modeling the average.

   b. ESSA: Wildfire frequency – historical fire looked different than how it looks today. Did not try to incorporate historical disturbance fire regime. Suspect land ownership will not change over the next 100 years, will still be regime of fire suppression.

      i. WG: Ramping up fire intensity from current conditions, not necessarily over full, recorded time period.

         1. ESSA: Correct, 1990 – 2020.

17. WG: Making the model do even flow, what percentage of variation allowed from time step to time step?

    b. ESSA will Set as the maximum eligible stand... harvests set up to that but need to do

    c. At meeting materials first. Question online could have that limitation, so more variation between the scenarios, but want that to be a work group decision.

        i. WG: So didn't use a percentage, used a rule set about harvest limitation and combining commercial thinning and regeneration harvest?

            1. ESSA: Correct. That is a question we have for the work group with the results.

    b. WG: Had a graph in the results that was hard to read. When refining the results, could things be shown in a table how levels changed over time. On a total landscape level.

18. WG: What is the model doing about post-disturbance harvest?

    a. ESSA: No salvage for trees after a wind event, becomes coarse woody debris. Some disturbances kill the tree.

    b. ESSA: Not modeling large severity disturbances, don't happen in this model.

        i. WG: So, taking these factors and slowly reducing the net productivity of the forest by making trees go away?

            1. ESSA: Yes, by killing a certain percentage of trees.

    c. WG: Agree fires are kind of a non-issue. Chosen in the past to not model stochastic events at all, un-modellable and not applicable to each county.

        i. ESSA: Interesting comment – can't model within this project and timeline. New ability to run models simultaneously, set up virtual computers.

19. (chat) WG: Who should additional questions be sent to in writing?

    a. (chat) DNR: Please send to the CFM email account: CFMworkgroup@bluepointplanning.com

    b. (chat) WG: And will the presentation shown today be added to the website?

        i. (chat) DNR: Yes it will be posted to the website. We will also post the recordings, but those usually takes a few days to process.

20. DNR: Want to make clear about timeline – today was supposed to be looking at the results and talking about potential changes. Have gotten into some of that today, heard some suggestions, but those will not be possible before the December 11 meeting. The changes that will be made before December 11 will be correcting the data discrepancy, not making larger changes to the scenarios. And, might not be able to do all changes, or complex or advanced changes due to budget limitations.

21. WG: Want to make sure everyone understands – FIA plots have not been same plot methodology and same locations or same measurements going back historically. Some issues with plots being in different locations. Not as standardized as believed. Only last two measurements allowed modeling to do change over time.

    a. ESSA: Yes agree with that, to clarify, ESSA uses FIA plots for two things: helping to estimate disturbance rates, only measured precisely since 2002. Don't have the answer to the other thing: which date ranges have been used to calculate climate FVS scores, need to look that up.

Next Steps

1. Proposed extra meetings in May and June – will send out holds for those if people are ok with it.

    a. WG: Yes please send the notices.