



Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

Meeting Overview

The fifth meeting of the Washington Department of Natural Resources (DNR) Carbon and Forest Management Work Group took place on Wednesday, March 15th, 2024, from 9 am to 3 pm, via Zoom Webinar. The purpose of this meeting was to finalize the initial list of management scenarios for the carbon study contractors to model and to determine the extent to which climate change is incorporated into each scenario. 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 & Updates
2. Discussion of Management Scenarios
3. Climate Change in Management Scenarios
4. Discussion and Vote of Management Scenarios
5. Next Meeting Discussion

After a brief overview of the meeting objectives and agenda, BluePoint Planning introduced the formal voting process, as laid out in the [work group charter](#), that would be used throughout the meeting. Work group members used a thumbs-up/thumbs-sideways/thumbs-down scale to indicate their position on each vote. Two members designated alternates for this meeting, and two other work group members served as designated proxies for two absent members.

Next, Csenka Favorini-Csorba, Policy Director for DNR, presented on the current DNR operations for forest management. Following some discussion, work group members voted to keep the current DNR operations as a management scenario to be modeled. More information, including vote tallies, is included in the Detailed Notes section of this document.

Don Robinson, Senior Systems Ecologist at ESSA (carbon study contractor), presented on the ability of the selected carbon model, FVS, to model climate change for the management scenarios. Work group members then discussed the options for modeling the scenarios with and without climate change. They suggested adding a new option, in which eight unique scenarios are modeled without climate change and eight are modeled with moderate climate change, for a total of 16 modeled scenarios. This option received a supermajority of votes and thus passed.

The work group then discussed and voted on the remaining six proposed management scenarios. Of the six, three passed and three were voted down but will be discussed again at the next work group meeting. The three passed scenarios each have one variable that is changed and will be used in comparing results to the more complex scenarios proposed for discussion at the next meeting. In total, the work group voted to pass four management scenarios. The carbon contractor will begin to configure these scenarios for the model before the next meeting.

Finally, work group members reviewed and discussed the proposed list of management scenarios for the April work group meeting. The scenarios are more complex than the ones discussed at this meeting; there are four remaining spots for modeling scenarios. Work group members agreed to remove three scenarios from the list, including the “bookend” scenarios discussed in February.

After a review of the next steps, BluePoint closed the meeting. All meeting materials, including the presentations and recording, are posted on the Washington DNR Carbon and Forest Management [Work Group website](#).





Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

Attendees

Work Group Members

- Matt Comisky, American Forest Resources Council
- Heidi Eisenhour, Jefferson County
- Mike French (Alternate for Randy Johnson), Clallam County
- Steve Hinton (Alternate for Ryan Miller), The Tulalip Tribes
- 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
- Brianna McTeague
- 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

- David Ford
- Ted Helvoigt

Contractors, Carbon Study, ESSA

- Cedar Morton
- Eric Neilson
- Don Robinson
- Alex Tekatch

Work group meetings are public, meaning that members of the public may join the meeting to observe. No public comment is allowed. Ten members of the public attended the fifth work group meeting.





Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

Meeting Highlights and Themes

- **Formal Voting:** As agreed upon in the [work group charter](#), work group members used a thumbs-up/thumbs-sideways/thumbs-down scale to indicate their preference for each proposed management scenario. Thumbs-up and thumbs-sideways were considered “pro” votes, while thumbs-down was considered “against.”
 - Two work group members designated alternates for this meeting.
 - Two work group members served as designated proxies for two members absent during voting.
- **DNR Current Operations Presentation:** This presentation explained current DNR forest management practices. Important details include the following:
 - DNR uses timber volume per acre, not age, as the determining factor for when to harvest a stand on DNR-managed forest lands.
 - Work group members voted to include DNR current operations as a management scenario to be modeled by the carbon study contractor (ESSA).
- **Climate Change Modeling:** ESSA presented on the ability of the selected model, FVS, to model climate change for the management scenarios. Important details include the following:
 - There are two levels of severity of climate change the work group considered: RCP 4.5, a moderate scenario, and RCP 8.5, a high scenario.
 - Work group members voted to include climate change in half of the management scenarios at RCP 4.5; climate change will not be included in the other half of the scenarios. This means a total of eight unique scenarios will be modeled, each modeled once with climate change and once without, for a total of 16 scenarios.
- **Management Scenario Vote:** Work group members reviewed the seven scenarios proposed by DNR with input from work group members. Each scenario changes one variable: rotation length, thinning, or deferrals. Important details include the following:
 - Work group members voted to include four scenarios: DNR current operations, lengthen and shorten rotations, and significantly increase thinning.
 - The remaining three scenarios did not pass but will be included in the management scenarios discussed at the April meeting.
 - Work group members reviewed the list of more “complex” scenarios that are proposed to be discussed at the April meeting. Work group members agreed to remove the “bookend” scenarios, no harvest and manage by state minimum requirements, from the list, along with the scenario “defer forests that may develop into structurally complex forests.”



Detailed Notes

Formal Voting

As agreed upon in the [work group charter](#), work group members used a thumbs-up/thumbs-sideways/thumbs-down scale to indicate their preference for each proposed management scenario. Thumbs-up and thumbs-sideways were considered “pro” votes, while thumbs-down was considered “against.” For a vote to pass, it must receive a supermajority of 75 percent of thumbs-up or thumbs-sideways votes; in this meeting, 11 members were present, so a supermajority was eight pro votes.

Work group members are allowed to designate an alternate to attend in their place if they are unable to attend the meeting and can also designate another work group member to act as a proxy and vote for them during meetings with formal votes. Two work group members designated alternates for this meeting. Two work group members served as designated proxies for two absent members.

Voting Logistics

- Vote thumbs up/down/sideways:
 - Thumbs up: Full endorsement of scenario
 - Thumbs sideways: Consent to scenario with reservations
 - Thumbs down: Formal disagreement with scenario
- **Supermajority of 75%** must vote thumbs up or sideways for a scenario to advance to modeling.
- If all members present, must have 9 thumbs up or sideways votes.



Figure 1 - Slide from Meeting Presentation titled, "Voting Logistics"

Discussion of Management Scenarios

DNR Current Operations Presentation

This presentation explained current DNR forest management practices. The focus of the presentation was the use of timber volume versus stand age to determine rotation length. From the presentation, “trees grow differently based on the productivity of the soil, the climate, and other factors.” For example, an 80-year-old tree on a productive site may be the same size as a 400-year-old tree on a poor site.

DNR harvests forests on DNR-managed forest lands when they achieve a certain timber volume per acre, not when they reach a certain age. Thus, all scenarios will use timber volume per acre instead of age to



indicate rotation length. Rotation length will vary according to site class. DNR also explained the many considerations that go into determining if a stand is ready for harvest, including a minimum timber volume, projected revenue, acres in the stand, and environmental concerns.

Douglas Fir Sample Yield Curve (DNR Current Operations)

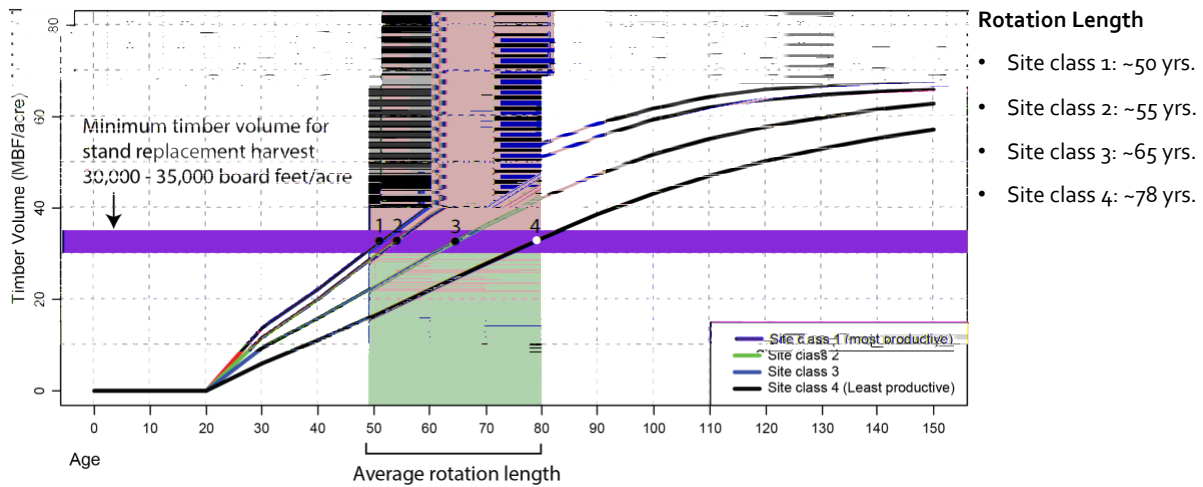


Figure 2 - Slide from DNR Current Operations Presentation, titled "Douglas Fir Sample Yield Curve"

The presentation also reviewed DNR practices regarding stand replacement harvests and commercial thinning. This presentation can be viewed in full on the [work group website](#).

Current Operations Scenario Vote

Following the presentation on DNR current operations, work group members voted to include DNR current operations as a management scenario to be modeled by the carbon study contractor.

Scenario 1: DNR Current Operations

- Thumbs-up: 9
- Thumbs-sideways: 2
- Thumbs-down: 0

Both thumbs-up and thumbs-sideways votes are considered "for" votes, so the scenario passed.

Climate Change in Management Scenarios

Climate Change Modeling Presentation

The carbon study contractor, ESSA, presented on the ability of the selected model, Forest Vegetation Simulator (FVS), to model climate change for the management scenarios. The purpose of this presentation was to inform the work group's decision on whether to include climate change as part of



the management scenario modeling. The modeling would be done through Climate-FVS, an extension of the FVS model. From the presentation, “Adding climate sensitivity and using GCMs and RCPs it [Climate-FVS] tries to answer the question: Will a species that is currently found in stands be viable under future climate?”

Climate-FVS changes the following assumptions, based on the level of climate change severity chosen to be modeled: stand carrying capacity, tree mortality, tree growth, and species regeneration. It does not currently simulate changes to fire dynamics, decay rate, or snag dynamics.

Future Climate Prediction

Climate-FVS is an extension to the Forest Vegetation Simulator (FVS), a computer model that projects growth and yield

Adding climate sensitivity and using GCMs and RCPs it tries to answer the question: Will a species that is currently found in stands be viable under **future** climate?

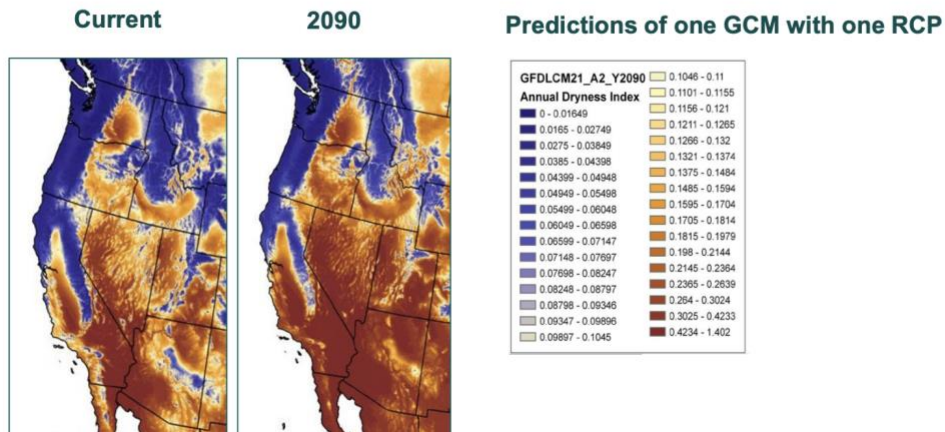


Figure 3 - Slide from Climate Change modeling presentation titled, "Future Climate Prediction"

There are two levels of severity of climate change the work group considered: RCP 4.5, a moderate scenario, and RCP 8.5, a high scenario.

Climate Change Modeling Vote

Work group members discussed the merits and limitations of including climate change in the management scenario modeling, especially since climate change is not just a hypothetical possibility but a worsening reality. Members discussed modeling some scenarios with climate change and some without, as that would allow comparison between the two results for the same scenario. This option was added to the original list of choices for the climate change vote as a fifth option, option E.

Climate Change Vote: To what degree should climate change be included in the management scenarios?





Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

- a) On all 16 scenarios
- b) Some scenarios (number TBD) – possibly ESSA’s suggested bookends
- c) Half (8) scenarios at medium climate impacts (RCP 4.5), half (8) at high climate impacts (RCP 8.5)
- d) No climate consideration on any scenario (16)
- e) Half (8) with no climate change, half (8) at medium climate impacts (RCP 4.5)

First vote results:

- a) 1
- b) 1
- c) 1
- d) 0
- e) 8

The results of the first vote did not result in a supermajority for one option. After some discussion following the vote, two members changed their votes to Option E, so that the results were as follows:

- a) 0
- b) 0
- c) 1
- d) 0
- e) 10

Work group members voted for Option E, to include climate change in half of the management scenarios at RCP 4.5; the other half of scenarios will not include climate change. This means a total of eight unique scenarios will be modeled, each modeled once with climate change and once without, for a total of 16 scenarios.

This presentation can be viewed by visiting the [work group website](#).

Discussion and Vote of Management Scenarios

Scenario 2 Vote

Proposed management scenario 2, lengthen harvest rotation, is specific to stand replacement harvest in general ecological management (GEM) areas only. The minimum timber volume is 50,000-55,000 board feet/acre, which translates to a rotation length of about 75-130 years depending on site class.

Work group members discussed the simplicity of the two scenarios and were concerned about using up all eight of the possible scenarios on simple scenarios instead of more complex scenarios. DNR responded that due to the limited time available for the carbon contractor to model the scenarios, having a few simple scenarios would allow the contractor to begin the modeling while the more complex scenarios were developed. The contractor added that using “simple” scenarios that only change one variable would allow for comparisons with the more complex scenarios once they are finalized.

An initial vote on Scenario 2 was held, passing the scenario. However, after the lunch break, DNR provided clarification about the voting process for the afternoon. Only four scenarios would be chosen





Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

at the meeting so that four more complex scenarios could be developed and voted on in the April meeting.

The vote for Scenario 2 was redone after lunch so that work group members could make a better-informed choice.

Scenario 2: Lengthen Harvest Rotation

- a) Thumbs-up: 6
- b) Thumbs-sideways: 3
- c) Thumbs-down: 2

This scenario passed with nine votes to pass the scenario and two to not pass.

Scenario 3 Vote

Proposed management scenario 3, shorten harvest rotation, is also specific to stand replacement harvest in GEM areas only. The minimum timber volume is 20,000-25,000 board feet/acre, which translates to a rotation length of about 40-60 years depending on site class.

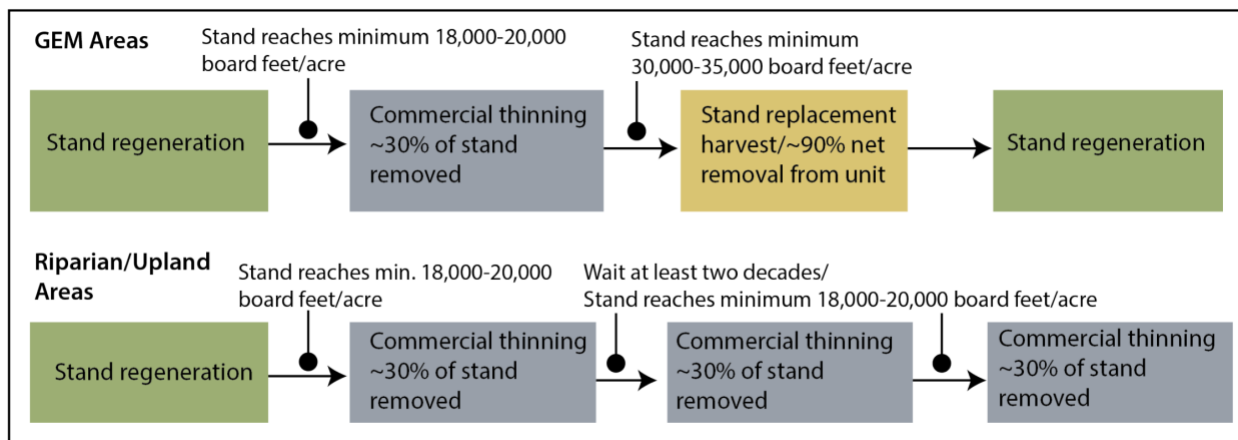
Scenario 3: Shorten Harvest Rotation

- a) Thumbs-up: 8
- b) Thumbs-sideways: 1
- c) Thumbs-down: 2

This scenario passed with nine votes to pass the scenario and two to not pass.

Scenario 4 Vote

Proposed management scenario 4, significantly increase thinning, would only have one thinning entry per harvest rotation in GEM lands. In the uplands, thinning would be conducted in areas allowed under the *State Trust Lands Habitat Conservation Plan (HCP)*.



Mistake on drawing corrected since 3/13 meeting

Figure 4 - Thinning process in GEM areas and Riparian/Upland Areas

A work group member made a friendly amendment to add pre-commercial thinning to this scenario. This was agreed upon by work group members and added to the scenario prior to the vote. Another





Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

suggestion was adding in silvicultural practices that increase growth and sequestration, which was not added to the scenario but will be considered as a more complex scenario at the April meeting.

Scenario 4: Significantly Increase Thinning, including pre-commercial thinning

- a) Thumbs-up: 7
- b) Thumbs-sideways: 4
- c) Thumbs-down: 0

This scenario passed with eleven votes to pass the scenario and two to not pass.

Scenario 5 Vote

Proposed management scenario 5, thinning only, would have forests in all land classes (GEM, upland, riparian) undergo commercial thinning repeatedly with no stand replacement harvest.

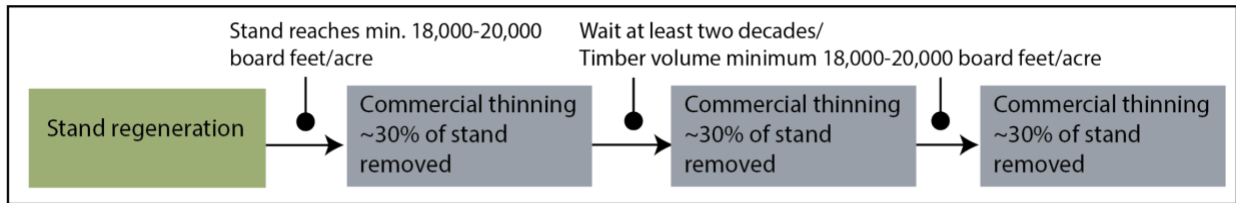


Figure 5 - Diagram showing the process for scenario 5: Thinning Only

Scenario 5: Thinning Only

- a) Thumbs-up: 1
- b) Thumbs-sideways: 0
- c) Thumbs-down: 10

This scenario did not pass with one vote to pass the scenario and 10 to not pass; however, it will be discussed again at the April meeting.

Scenario 6 Vote

Prior to the discussion of scenarios 6 and 7, DNR gave a brief presentation on what a carbon-dense, older, structurally complex forest is. For the purposes of this work group and scenario development, DNR is using the definition of structurally complex forest from the 2006 Policy for Sustainable Forests (PSF):

A forest in the ‘botanically diverse’ ‘niche diversification’ or ‘fully functional’ stage of stand development. Forests in these phases have varying sizes of trees, understory vegetation and lichen, downed wood and snags, etc.



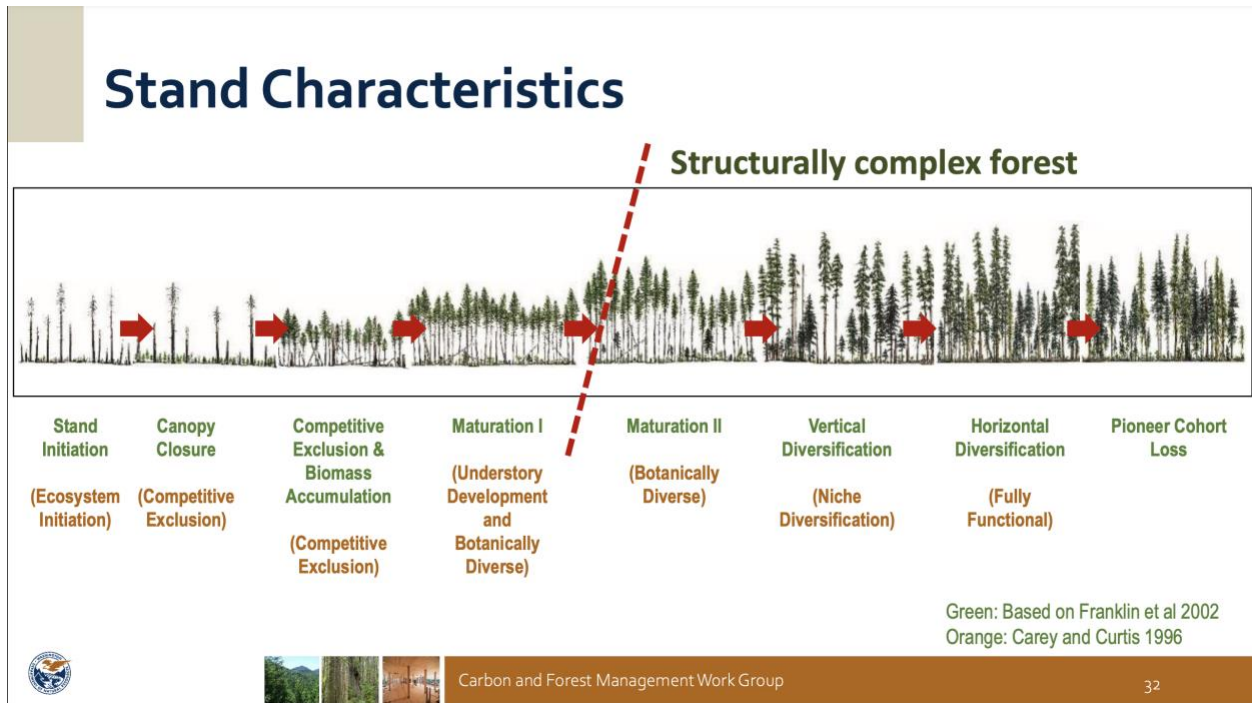


Figure 6 - Slide from DNR Presentation titled, "Stand Characteristics"

Proposed management scenario 6, Increased Deferrals of Carbon-Dense, Older, Structurally Complex Forest, would defer approximately 50 percent of forest stands in GEM areas currently identified through modeling as carbon-dense, older, structurally complex forest that are not already deferred. Stands would be indefinitely deferred from stand replacement harvest.

Work group members discussed the complexity of the assumptions for these scenarios, including determining stand classification and carbon density.

Scenario 6: Increased Deferrals of Carbon-Dense, Older, Structurally Complex Forest

- a) Thumbs-up: 0
- a) Thumbs-sideways: 0
- b) Thumbs-down: 11

This scenario did not pass with zero votes to pass the scenario and eleven to not pass; however, it will be discussed again at the April meeting.

Scenario 7 Vote

Proposed management scenario 7, Defer All Acres of Carbon-Dense, Older, Structurally Complex Forest, would defer all forest stands in GEM areas currently identified as carbon-dense, older, structurally complex forest that are not already deferred, and would indefinitely defer stands from stand replacement harvest.

Work group members commented that they are interested in seeing this scenario modeled but would like more information and details before it is finalized.

Work group members also indicated interest in combining scenarios 6 and 7 into one scenario.





Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

Scenario 7: Defer All Acres of Carbon-Dense, Older, Structurally Complex Forest

- a) Thumbs-up: 0
- a) Thumbs-sideways: 3
- b) Thumbs-down: 8

This scenario did not pass with three votes to pass the scenario and eight to not pass; however, it will be discussed again at the April meeting.

Summary of Voting

Of the seven proposed scenarios, four were passed and three were not passed. The three scenarios that did not pass will be discussed again at the April meeting.

Scenario	Pass	No Pass, but Cont. To Discuss	Notes
Scenario 1: DNR Current Operations	X		
Scenario 2: Lengthen Harvest Rotation	X		
Scenario 3: Shorten Harvest Rotation	X		
Scenario 4: Significantly Increase Thinning (with pre-commercial thinning added)	X		
Scenario 5: Thinning Only		X	
Scenario 6: Increase Deferrals Carbon-dense, Older, Structurally Complex Forest (50%)		X	MERGE Potentially with changes (50 not 100 seems best option)
Scenario 7: Defer all Acres of Carbon-dense, Older, Structurally Complex Forest (100%)		X	

Table 1 - Summary of Voting on Management Scenarios

Other Scenarios

In April, the work group will continue discussing the management scenarios to finalize the remaining four scenario slots. DNR has developed an initial list to consider for this discussion, along with the three scenarios that were not passed during the March meeting.

- a) Longer rotation and more thinning
- b) Defer forests that may develop into structurally complex forest
- c) Small adjustments to improve carbon sequestration (such as seedling improvements, planting densities, silviculture, etc.)
- d) Turn multiple dials (such as rotation age based on site class, additional thinning, additional deferrals, managing to 10-15% older forest per HCP planning unit)
- e) Harvest rotation length based on site class





Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

- f) Polyculture with long rotations
- g) Manage by state minimum requirements (instead of the HCP)
- h) No harvest

Work group members discussed increasing the complexity of the scenarios by increasing the number of variables changed. DNR replied that although possible, this would be difficult due to timing and the complexity of detail that the model would have to be programmed with.

In February, work group members discussed removing the “bookend” scenarios from consideration, as they are difficult to model and would require significant amendments to current law or governing plans, making them unlikely to happen. The two scenarios are g) Manage by state minimum requirements (instead of HCP), and h) no harvest. Work group members continued this discussion and agreed to remove them from consideration since the total number of scenarios to be modeled is so limited given the climate modeling. Work group members agreed that if one of the bookend scenarios was removed, then it would make sense to remove both.

Work group members also agreed to remove scenario b) defer forests that may develop into structurally complex forests, given the difficulty of modeling something that “may” develop into a structurally complex forest.

The final list of management scenarios that will be developed for the April meeting and vote is below. Four more scenarios must be determined at the April meeting.

- a) Longer rotation and more thinning
- b) Small adjustments to improve carbon sequestration (such as seedling improvements, planting densities, silviculture, etc.)
- c) Turn multiple dials (such as rotation age based on site class, additional thinning, additional deferrals, managing to 10-15% older forest per HCP planning unit)
- d) Harvest rotation length based on site class
- e) Polyculture with long rotations

Next Steps

The next meeting of the work group is scheduled for April 10th, 2024, from 9 am to 3 pm. The focus and goal of the April meeting is to finalize the list of management scenarios given to the carbon study contractor to model. The proposed topics for the meeting are:

- Discussion on the remaining scenarios to model.
- Formal vote on each scenario to give to the carbon contractor.
- Presentation from carbon study contractor on carbon model methodology.

Work group members are asked to complete “homework” between the meetings to accommodate for the tight timeline to begin the carbon modeling. More details on the homework will be provided in an email to work group members. Homework will likely include reviewing the draft list of scenarios and providing feedback to better shape the discussion at the April 10th meeting.





Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

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 **WGQ** (work group question) or **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 other two contractors, Evergreen Economics and ESSA are noted with **Evergreen** or **ESSA**, respectively.

Welcome

- Voting – can have a proxy vote if missing part of the meeting and the vote
- Comments from work group about initial list of management scenarios were helpful
 - (chat) WG: Are the comments going to be shared with the rest of the workgroup? As a public process, I think it would be good for the comments to at least be shared with the other workgroup members prior to voting.
 - (chat) DNR: I can email them

Discussion of Management Scenarios

- Presentation on DNR Current Operations
 - (chat) WG: DNR Staff: can you tell the group how many west-side acres you have in each site class?
 - (chat) DNR: Please see question 1:
https://www.dnr.wa.gov/publications/bc_cfm_m3_qa.pdf
 - (chat) DNR: Oh, apologies, you are asking about site class, not land class. I don't believe we have those numbers to hand right now.
 - WG: Other important dimension to rotation – acreage threshold. Can we supplement with acreage basis as well?
 - DNR: Yes – in FVS simulation will know acreage of each stand. Will also need to include context of larger blocks. Yes if we can aggregate individual model stands into the larger groups. But, often have volume constraints or targets
 - WG: Last slide, for what type of thinning?
 - DNR: Not for variable retention harvest, for minimum volume stand must have before thinning.
 - WG: Different thinning prescriptions for GEM uplands? Thinning by years, my experience is 10 years.
 - DNR: Very site-specific, not creating large non-forested gaps on GEM lands
 - WG: FIA data enhanced with DNR's inventory? What level are we stratifying?
 - ESSA: Just got data from DNR of DNR's own inventory. Don't have FIA data
 - WG: Curious about choice of using FIA data vs DNR's own inventory data





Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

- DNR: Using DNR inventory data
 - (chat) ESSA: Thanks for your Q about harvest across larger areas (e.g. 20,000 acres) ... I need to think more deeply about this, and how we would dynamically simulate this in FVS.
 - (chat) WG: For a 10,000-acre parcel of suitable and available land, a 40-year rotation means 250 acres a year, 125 for 80. That's all, just putting this out there as a modeling approach.
- Current Operations Vote
 - (chat) WG: The species diversity mix is changing as conditions change, right?
 - WG: What are the limiting factors on doing commercial thinning? Why is little done, economics? Or other restrictions? And pre-commercial thinning, how much is done and what are any limiting factors?
 - DNR: The sustainable harvest model has those built in. Retain 25% of revenue regardless of cost. Can't do as many commercial thinning operations as private operations.
 - (chat) WG: This is a fundamental structural barrier for DNR to be able to do good silviculture or find different management pathways.
 - WG: Possible to get breakout of commercial thinning acres by land class? What is going to be the starting point for the modeling? Many lands will already be at board foot thresholds.
 - DNR: Believe current day is starting point. What's on the landscape right now.
 - WG: Want to know what year 0 is.
 - WG: Sideways – do we discuss why people voted sideways?
 - BPP: Yes
 - WG: Want further clarity why we even have a sideways vote?
 - BPP: Can't really change how current operations are done
 - WG: Have concerned that just using board foot threshold will overestimate volume from riparian areas and growth and yield of areas.
 - DNR: See where coming from, do not do significant thinning
 - WG: Don't consider this a baseline scenario, is current operations. Would like to revisit no-action baseline, absence of management
 - **Vote: Pass**
- Climate change in management scenarios
 - WG: FVS model – planting almost always overcomes issue (soil moisture) will modeling include planted regeneration?
 - ESSA: Active planting. Climate model also allows to describe genetic provenance of seed stock. "Management Mitigation Measures"
 - (chat) DNR: Can you give a brief overview of the differences between RCP (representative concentration pathway) 4.5 and 8.5?
 - WG: Wondering about effects about extreme heat events. Important to plug into the models



Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

- ESSA: Good to know limitations. Fire risk – allowing to be in the background of the model, or something that we want to simulate? How to decide what the stochastic events rates are?
- WG: Slide 8 – at what geographic level are we talking about. Pinchot National Forest, multiple ecosystem types? Would ponderosa pine increase at the level on the table?
 - ESSA: Will have to look into selection of stands that went into the calculations. Climate FVS model is aware of those things on the stand level.
- WG: If downloaded model doesn't show significant difference in drought, moisture levels
- WG: Would model account for differences in regrowth in completely harvested stands vs stands with more standing trees?
 - ESSA: Yes. Because, going to be dynamically sensitive based on viability score.
- WG: Previous questions about silvicultural treatment on density of trees. Model will take into account density of trees, moisture, etc.?
 - ESSA: Yes.
- BPP: Explaining the difference between the two RCP assumptions?
 - (chat) ESSA: RCP 4.5 is described by the Intergovernmental Panel on Climate Change (IPCC) as a moderate scenario in which emissions peak around 2040 and then decline. RCP 8.5 is the highest baseline emissions scenario in which emissions continue to rise throughout the twenty-first century
 - (chat) ESSA: This may also be a useful infographic for everyone to understand RCP8.5 vs RCP4.5:
<https://coastadapt.com.au/sites/default/files/infographics/15-117-NCCARFINFOGRAPHICS-01-UPLOADED-WEB%2827Feb%29.pdf>
- (chat) WG: Please share the source for slide 7.
 - ESSA: Can follow up on that later.
- WG: In FVS model, we don't get to the actual GHG (greenhouse gas) associated with logging practices? Would have to do that elsewhere?
 - ESSA: Yes, would have to do that separately.
- WG: Wondering utility of voting. Science is clear that we have climate change. However, wonder whether it should be half not modeling and half at one of the two RCPs to see difference between incorporating climate change and not incorporating. Would have more to worry about if high impact climate scenario goes forward. Maybe should look at RCP 4.5 because that's what most countries are aiming for.
 - BPP: Could change item B to be half and half.
 - DNR: If WG members want on some scenarios then vote for b. Number of scenarios with climate change on scenario B is TBD. Work group would have to make that decision.
 - BPP: Option E: half no climate, half at RCP 4.5
- WG: Clarification – some scenarios from February that weren't included in the documents from this month.



Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

- BPP: TBD. Want to have the conversation about the climate change and discuss the less complex scenarios first. Both a question on climate and a question on the total number of scenarios.
- (chat) DNR: Some scenarios were not yet developed enough for a vote. They aren't gone from the list; we'll take them up later.
- WG: Going back to intent of the work group – not sure how options B or C could happen within the expectations to the project. If purpose of the modeling is to look at different management scenarios and taking into account all requirements, not sure how you can model climate change in a scenario and then not in another. Should either be all or nothing.
- WG: Agree that anyone who plans in RCP 8.5 isn't planning to live in continental US, would be too hot. Would recommend RCP 4.5.
- WG: Trying to understand advantage of having any scenarios that don't take climate change into account.
- (chat) BPP: Once we get through questions, we'll ask ESSA to share their thoughts about modeling before we vote.
- ESSA: Not including climate change will help answer the question of what the effects of climate change are. One option is to do climate change on two scenarios, with three levels – no climate change, RCP 4.5, and RCP 8.5. So, 6 scenarios total with climate change considered.
 - BPP: Would be option B for voting
- (chat) WG: What they just said is what I was trying to get at, we should see how applying CC (climate change) impacts all scenarios.
- (chat) WG: I agree, all scenarios should have some assumption about the trajectory of climate change - minimal, most likely, worst case.
- WG: Clarifying question – Suggestion E, would all scenarios with climate change, all would be RCP 4.5.
 - BPP: Would be 16 total, 8 unique scenarios. 8 would be modeled with no climate change, 8 would be modeled with medium climate change RCP 4.5
 - (chat) WG: To clarify, option C or E require us to narrow our total scenarios down to 8?
 - (chat) BPP: Yes
- (chat) WG: So under E. Scenario 1 would be run twice - once with and once without climate @RCP4.5. And Scenario 2 would be run twice - once with and once without climate @RCP4.5 and so forth.
 - (chat) BPP: Correct
- WG: Reasoning for modeling no climate change and climate change – seems like relatively new ability to model with climate change. Would like ESSA to comment on that.
- WG: If do model without climate change, would get false read on tree mortality?
 - ESSA: Always going to be scientific uncertainty to how trees respond to changing climate. Like value of non-climate change scenario, would be easier to gauge whether FVS is responding adequately, because that is the reality that most people have worked with in the past.



Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

- (chat) WG: I think we definitely need to include the [RCP] 8.5 since the history of climate change models is that we're always on the worst-case track and the worst case is always getting worse. Besides, worst case scenarios are standard operating procedures for environmental analyses.
- (chat) WG: Getting at the previous question - to further clarify - we are still talking about 16 scenarios correct with c & e? I think you just answered that in the previous question?
 - (chat) DNR: It would be 8 different management scenarios with c and e.
 - (chat) BPP: 16 total scenarios. If we choose to model 4.5 + 8.5 or no climate + 4.5 - that would mean 8 scenarios
- Options:
 - On all 16 scenarios
 - Some scenarios (number TBD) – possibly ESSA's suggested bookends
 - Half (8) scenarios at medium climate impacts (RCP 4.5), half (8) at high climate impacts (RCP 8.5)
 - No climate consideration on any scenario (16)
 - Half (8) with no climate change, half (8) at medium climate impacts (RCP 4.5)
- **First Vote:**
 - **A: 1**
 - **B: 1**
 - **C: 1**
 - **D: 0**
 - **E: 8**
- WG: Would like more than 8 scenarios, but could change to just 9
- After changes:
 - A: 0
 - B: 0
 - C: 1
 - D: 0
 - E: 10
 - Result: E passes
- ESSA: Want to encourage work group to think about changing the dials, getting into details for developing the remainder of the scenarios

Discussion of management scenarios

- BPP: 7 Scenarios to discuss today, options are to include in modeling, hold for next meeting or further discussion, and no, remove from the list
- DNR: Similar scenarios grouped, but voting on each scenario individually
- Scenarios 2 and 3
 - 2 – Lengthen harvest rotation
 - Results: Sideways: 4, up: 7, down: 0





Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

- WG: Voted sideways because it's a single strategy, lack creativity and vision. Would like to see scenarios that have more details
- WG: Concerned about using up all scenarios if we just have 8 to choose from. Don't want to spend all chips in one day. Clarification – as voting, are we still going to discuss the model assumptions, or is this a full yes vote?
 - DNR: Sideways vote is a yes vote, with reservations but still a yes. If concerned about using up scenarios, then would consider voting no.
 - DNR: Regarding questions submitted from work group, can still address those after lunch time. Or when we get into the scenarios that the questions more apply to. More complicated scenarios need more time to discuss. Tight timeline for modeling that we are working with.
- (chat) WG: Maybe we need to understand the approach the modelers are taking to understand why they are proposing single variable scenarios first?
- BPP: Want to go through the scenarios today, then at end of the meeting, look at each scenario, decide if we want to hold and defer to later, next meeting
 - DNR: This is still a formal vote. But, if supermajority votes no, can re-discuss at the end of the meeting and ask if it's an absolute no, or just a 'hold' waiting for other new scenarios.
- WG: Think that work group still doesn't have mind wrapped about purpose of the modeling. Goal – learn about what scenarios could turn into actual policy recommendations. Scenarios that only turn one dial are not by themselves informative enough to come up with a policy recommendation. Why is there hesitancy about turning more than one dial at once?
 - (chat) ESSA: From a modeling perspective, turning one dial only as first assessment allows for comparisons with multi-dial options later. It's useful to understand/tease out the effects of single dials on combined options
 - DNR: Time and complexity are issues. Could quickly get into long list of complicated scenarios.
 - DNR: Reanalysis possibility – could tweak scenarios, not substantial changes, after the initial results come in and things seem off. Not accurate to say simple scenarios couldn't be management recommendations. If you don't want to see a simple, one dial turned scenario, then vote it down, not sideways.
 - (chat) So it is not, do simple scenarios, see the results, then go back and build more complex scenarios?
- WG: Voted sideways but wanted to discuss the scenarios before voting. Concerned about making specific prescriptions for each site class, more unique scenarios
 - DNR: Why we ended up on volume rather than age.
- WG: About voting – voting on today the scenarios, if any, that are single dial, that one is certain one wants to see model. The rest could be held and brought forward in April with some more complex scenarios. Question – possible to revisit the climate considerations if it turns out that want 10 scenarios so option e isn't possible
 - DNR: No, because there was a clear supermajority. Also, would interfere even more with timeline. If vote no on everything today, then will have a



Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

- long list of scenarios to discuss in April. Might have to extend the April meeting. Formal votes are formal votes for a reason, need to keep the work group moving forward.
- (chat) WG: Sorry, I did not see that response before I typed mine. What they said makes more sense to me, but that is not how I am hearing DNR describe the process.
 - (chat) ESSA: My response was from a modelling perspective. DNR's point that there are single-dial scenarios people may want to see as potentially viable policy options is also important
 - WG: Voted sideways because scenarios need more refinement, more details. Such as adding in acreage criteria, need constraints.
 - WG: Would want to assign by site class. Need some certainty about rotation timing. Need ages for rotations to analyze regardless of if they reach target volumes. How to implement if don't have many 50,000 acre stands to start with?
 - DNR: Latter half of question can be talked about later. This discussion is why we have representation from ESSA on the call, so that they can hear everyone's questions and concerns and take those into consideration.
 - WG: All scenarios today are single dial scenarios. Going to vote on at least a few of these today, and then in April, could talk about scenarios that are combinations of things or more complex. Would need to save space for a few more complex scenarios to discuss in April.
 - DNR: Again, if you do not want a scenario because you want to have a more complex scenario later, vote no, not sideways.
 - BPP: Going to vote on all scenarios today, but can determine which are hold and which are hard nos.
 - (chat) WG: Don't want to understand the impact of all of the single dial scenarios so we can use them in the more complex / multiple scenarios later?
 - (chat) WG: One other question: are we going to hear from the other modeling contractor more deeply about their methodology as well?
 - (chat) BPP: The plan is to have ESSA provide additional information on their methodology at a later meeting.
 - (chat) WG: Ok great - will Evergreen be sharing before or after our vote in April?
 - (chat) DNR: We are hoping to have that presentation in April, but we haven't developed the agenda yet, so I don't know if it will be before or after the vote.
 - (chat) WG: It would be helpful to do that before the vote I think
 - (chat) DNR: OK, I should clarify that the agenda in April will depend largely on how much time we need to finish the scenarios. Can't promise anything at this point but we will have this conversation soon :)
 - (chat) WG: sounds good
 - WG: Purpose of exercise to determine how to preserve existing structurally complex forests. More complex scenarios to better handle those issues. Single dial scenarios could possibly address policy recommendations but won't get at all of the issues that all stakeholders care about.



Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

- DNR: Single dial scenarios are good for comparisons.
- WG: Initial vote on climate was for A, 16 scenarios, because want to understand impacts of variable dials on each other. Have capacity to make more complex scenarios. Want to vote no on the single dial scenarios to save votes for more complex scenarios. Could respond to the proviso in a meaningful way, or just do basic scenario ideas.
 - DNR: Need to vote on things in an order, so voting on simpler scenarios first.
 - WG: Have experts in the room, aren't modelers going to want more complex ideas for the scenarios?
 - DNR: Want to make clear, can't retroactively longer rotations to isolate that variable. Would have to have a single scenario, not a more complex scenario.
- WG: Do need single variables, because don't have the knowledge of this model on these lands, without running single scenarios. Recommend narrowing it down to four today, and then have four more complex scenarios. Would be foolish to do all climate, need to have comparison.

Management Scenario Discussion continued

- ESSA: Will review all scenarios and hope to come forward with four suggestions for today and then leave four spots open for the April meeting. Will pair the scenarios up to better make the descriptions
- Scenario 2 – Lengthen rotations – second vote,
 - Voting Results
 - Up: 6
 - Sideways: 3
 - Down: 2
 - **Result: PASS**
 - WG: Sideways vote – still have previous questions. Nuance between 50-55 that could be variable based on-site quality
 - WG: So, this would be available to put on hold
- Scenario 3 – shorten rotations – first vote
 - Voting Results
 - Up: 8
 - Sideways: 1
 - Down: 2
 - **Result: PASS**
 - WG: Still confusion about how to model these. Reasoning for voting is mixed. Still in an unsettled place, votes don't make sense.
 - (chat) WG: I agree
 - WG: Still struggling to figure out how scenarios will all interact with each other.
 - DNR: If objection is purely methodological, then maybe should vote sideways, not down
- Scenario 4 – Significantly increase thinning – first vote
 - Voting Results



Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

- Up: 7
- Sideways: 4
- Down: 0
- **Result: PASS**
- WG: Final harvest, what is the volume board feet? DNR current operating orientation?
 - DNR: Yes
- WG: Only talking about commercial thins here, not pre-commercial. Why not include pre-commercial thinning? Could reduce number of scenarios, looking at commercial and pre-commercial thinning as one scenario
 - DNR: Something that could be added. Could be a friendly amendment to scenario 4, to add commercial thinning and pre-commercial thinning
- WG: The type of thinning matters, talking about variable density thinning or just commercial thinning?
 - DNR:
- WG: Looking at these, “economics blind”? Seems like scenario 4 is setting up situation where economically you can’t implement either pathway. Ignoring economic aspect in this stage.
- WG: Want to clarify, can do habitat creation thinning and sell logs from it.
 - DNR: Any commercial thinning is to generate revenue. On GEM lands – going to look like variable density thinning. Some scenarios might not be financially viable right now.
 - WG: If adding in pre-commercial thinning, then commercial thinning, would increase overall volume of the stand. Would it make sense to increase the minimum board feet in a scenario like that?
- WG: Second the friendly amendment about pre-commercial thinning, but also want to add silvicultural practices that increase growth and sequestration. Don’t see reason for two-decade delay after thinning for regeneration, if a stand reaches the board feet minimum before that, then that would be a benefit for all.
 - (chat) DNR: I believe we have a potential scenario that includes other types of pre-commercial treatments to increase productivity for discussion in April.
 - DNR: One friendly amendment is to add pre-commercial thinning, yes that is in the same realm as the scenario 4.
 - (chat) WG: It is a question strictly from the perspective of taking advantage of the thinning for optimal time to harvest.
- WG: Choosing scenarios based on economically viable scenarios, especially because some of those constraints could be changed by policy. How to support forests to become carbon sequestration “allies” and also balance other requirements.
- WG: 30% variable density thinning will have no effect on remaining stands’ growth. Will not have more growth, won’t have enough space to grow. Only option is to do thinning on very regular basis
- BPP: Is anyone opposed to adding in pre-commercial thinning?
 - No one opposed
- Scenario 5 – Thinning only – first vote



Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

- Voting Results
 - Up: 1
 - Sideways: 0
 - Down: 10
 - **Result: NO PASS**
- Scenario 6 – increase deferrals of carbon-dense, older, SCF – first vote
 - Voting Results
 - Up: 0
 - Sideways: 0
 - Down: 11
 - **Result: NO PASS**
 - WG: would like to hear about why maturation 2 is the assumption.
 - DNR: Don't have GIS layer that says, "Maturation 1" and "Maturation 2." Have set of conditions to evaluate. Policy for sustainable forests have defined Structurally Complex Forests, along with botanically diverse definition.
 - WG: Also question about carbon density?
 - DNR: Have GIS layers about carbon density, live carbon per acre, etc. It is combination of both carbon density and age. Could have carbon dense stand that is 40 years old, has to meet both objectives. Assumption that if it is Structurally complex and has a certain stands per acre, will be carbon dense
 - WG: Several members are concerned that maturation 2 is too restrictive, doesn't include original conception of what stands look like. Might have something that cuts it off too short, too few acres.
 - DNR: In table, analysis of both botanically diverse and maturation. Not a single thing.
 - WG: Community's initial analysis had about 70,000 acres on GEM lands, has been groundtruthed, most things identified from remote sensing did have the characteristics of carbon dense. How to pick which stands from a modeling perspective? Lots of data layers about carbon density, don't think 40-year-old stand would be carbon dense. Harder to figure out how to use the inventory data to pick which stands to defer. Might need to spend time going over technical issues about how to pick the stands out
 - DNR: Will need more discussion on this, will work with ESSA on this once they have all of the data.
 - WG: How are we going to select the stands? Not convinced data is there to do it remotely. For modelers – stands won't stay static. How to model what we know will someday be carbon emissions.
 - WG: If this gets majority no votes, just means modelers won't move forward with it but could be continued part of the discussion in April
 - BPP: Yes, correct
- Scenario 7 – Defer all acres of carbon-dense, older, SCF – first vote
 - Voting Results
 - Up: 0



Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

- Sideways: 3
- Down: 8
- **Result: NO PASS**
- WG: Want this scenario modeled, need to meet the purpose of the proviso. Can't ignore this in the modeling. Scenario 7 matches more with what the conservation community wants. The ambiguity is about how it is defined. Just because it is modeled doesn't mean it will become a policy. Want to see the technical issues resolved first.
- (chat) WG: I'm also very curious about it - just don't think it's quite settled enough to vote on yet!
- ESSA: FVS on structurally complex stands: model keeps track of snags from natural stand mortality and disturbance, decay, erode, etc. Also, coarse woody debris/down wood that is modeled. Complex canopies – FVS can model crowns and decide how many canopy layers there are and what they are like. Still struggling with is what the best way to define when you've hit that target, something that is ecologically sensible.
- WG: Need to model carbon dense forests as a basic scenario. Choosing between 50 and 100% isn't really a choice.
 - BPP: Want to talk about the next meeting, what questions do people have and want to discuss at the next meeting.
- WG: Reread the proviso, conservation doesn't automatically mean preservation. Nothing that states that all acres have to be preserved. DNR still has to look at carbon available on the landscape, and that this is a system, not static. Should review what the proviso says, what DNR is expected to do.
- (chat) WG: I did not state that the proviso requires an outcome, but it does require that we look at how such conservation might occur. Therefore, it needs to be assessed as part of a scenario.
 - (chat) From the proviso: Collaborate on approaches related to the conservation and management of older, carbon dense, structurally complex forest stands located on lands managed by the department; increasing carbon sequestration and storage in forests and harvested wood products from department managed forestlands; generating predictable beneficiary revenue; maintaining timber supplies that support local industry; and addressing economic needs in rural counties
 - (chat) "(i) Collaborate on approaches related to the conservation and management of older, carbon dense, structurally complex forest stands located on lands managed by the department; "
 - (chat) WG: Nothing in that says remove from management. It states "conservation and management" which does not preclude active management.
 - (chat) WG: Agree. But if all the remaining structurally complex forest is clear-cut, it rather defeats the purpose of the discussion. Management can include thinning.
- Scenario Voting Review
 - Scenario 1 – 4 passes, include in modeling



Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

- Scenario 5 – 7 do not pass. Hold?
 - Should we hold onto scenario 5 for additional conversation next time?
 - WG: Would like to see it later, useful exercise later
 - WG: Also interested in seeing it later
 - Hold scenarios 5 – 7 to discuss at the next meeting
 - WG: Might not need more discussion about thinning only, but would like to have it in the pile of other scenarios to discuss
 - WG: 6 and 7 are really distinct, 50 or 100% doesn't seem like a real choice.
 - DNR: Can give folks some homework to think about this before the next meeting. Lots to cover in April, need folks to be prepared for the meeting. Would like to hear what they propose instead.
 - WG: Did suggest that Scenario 6 and 7 be updated.
 - (chat) WG: A question for DNR. What is the starting point for the acres to be removed from management? Are the ~2,300 acres in the recent provisos considered already removed?
- Other scenarios to cover in April
 - (chat) DNR: other scenario list
 - Longer rotation and more thinning
 - Defer forests that may develop into structurally complex forest
 - Small adjustments to improve carbon sequestration (such as seedling improvements, planting densities, silviculture, etc.)
 - Turn multiple dials (such as rotation age based on site class, additional thinning, additional deferrals, managing to 10-15% older forest per HCP planning unit)
 - Harvest rotation length based on site class
 - Polyculture with long rotations
 - Manage by state minimum requirements (instead of the HCP)
 - No harvest
 - WG: Could have a bunch of dials to turn?
 - DNR: would get into sensitivity analysis, too hard to go into
 - WG: These scenarios go outside of the capabilities of FVS
 - BPP: Eliminate no harvest?
 - WG: Don't call no harvest a scenario, it's actually a baseline. Need to know about with and without a baseline.
 - ESSA: Regardless of if it is a baseline or not, would still use up a scenario, would count as a scenario
 - WG: Would be the easiest scenario to model
 - WG: More to the definition
 - BPP: Need to hone down the April scenarios, want to take some of the options off
 - Option 2 – defer forests that may develop into SCF
 - WG: How to model something that says "may"
 - DNR: Back to "No Harvest" scenario – going forward or no?



Carbon and Forest Management Work Group

Meeting 5: March 13, 2024 | 9:00 am – 3:00 pm

Meeting Summary and Notes

- BPP: Seems like people agree that it should be removed
- DNR: Complementary scenario – state minimum requirements, remove that too?
 - BPP: No one saying they want that too much
 - WG: If going to eliminate no harvest alternative, then good to drop state minimum requirements. Little value in modeling minimum requirements if not doing no harvest scenario.
- (chat) BPP: - Longer rotation and more thinning
 - REMOVE - Defer forests that may develop into structurally complex forest
 - - Small adjustments to improve carbon sequestration (such as seedling improvements, planting densities, silviculture, etc.)
 - - Turn multiple dials (such as rotation age based on site class, additional thinning, additional deferrals, managing to 10-15% older forest per HCP planning unit)
 - - Harvest rotation length based on site class
 - - Polyculture with long rotations
 - - REMOVE Manage by state minimum requirements (instead of the HCP)
 - - REMOVE No harvest
- WG: Harvest rotation length based on site class, already incorporated into DNR modeling, can remove from the list.
 - WG: Disagree, don't think it is fully incorporated. Lower site class will take longer based on harvest.

Next Steps, next meeting

- BPP: Going to be a very busy meeting in April, want to confirm that will get similar attendance, please let us know if you are unable to attend and set up a proxy or alternate.
- Plan for April: finalizing the scenarios, ESSA going to present on the modeling
- DNR staff will be working with ESSA to flesh out the scenarios before the meeting.
 - Work group members asked to provide feedback on the scenario ideas before the April meeting
- April 10th meeting will be the 6th meeting. Potential canceling the May and June meetings, and then returning in July with preliminary modeling results.
 - Will get back to work group on the cancellations ASAP
 - WG: Many important questions for the economics modeling team but won't be able to think about those questions until summer if the May and June meeting are canceled.
 - DNR: Will think about it and get back to the work group.
- Please give comments on the scenarios soon