What words come to mind when you think about ecosystem service markets?

(Open a browser, or pull out your phone, and put in all words that come to mind!
P.S. It's anonymous!)

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Ecosystem Services Work Group Meeting #3



August 29, 2024 9am-12pm

Presented by: Mackenna Milosevich
and Greene Economics

Agenda

Welcome & Agenda	9:00-9:10
Project Progress Update	9:10-9:15
Presentation – Marginal Abatement Cost Curve and Ecosystem Service Market Feasibility	9:15-9:55
Discussion	9:55-10:15
Break	10:15-10:30
Presentation – Uncertainties: Market, Regulatory, and Technical	10:30-11:00
Uncertainties Discussion	11:00-11:20
Challenges Poll and Discussion	11:20-11:40
Next Steps and Final Remarks	11:40-12:00

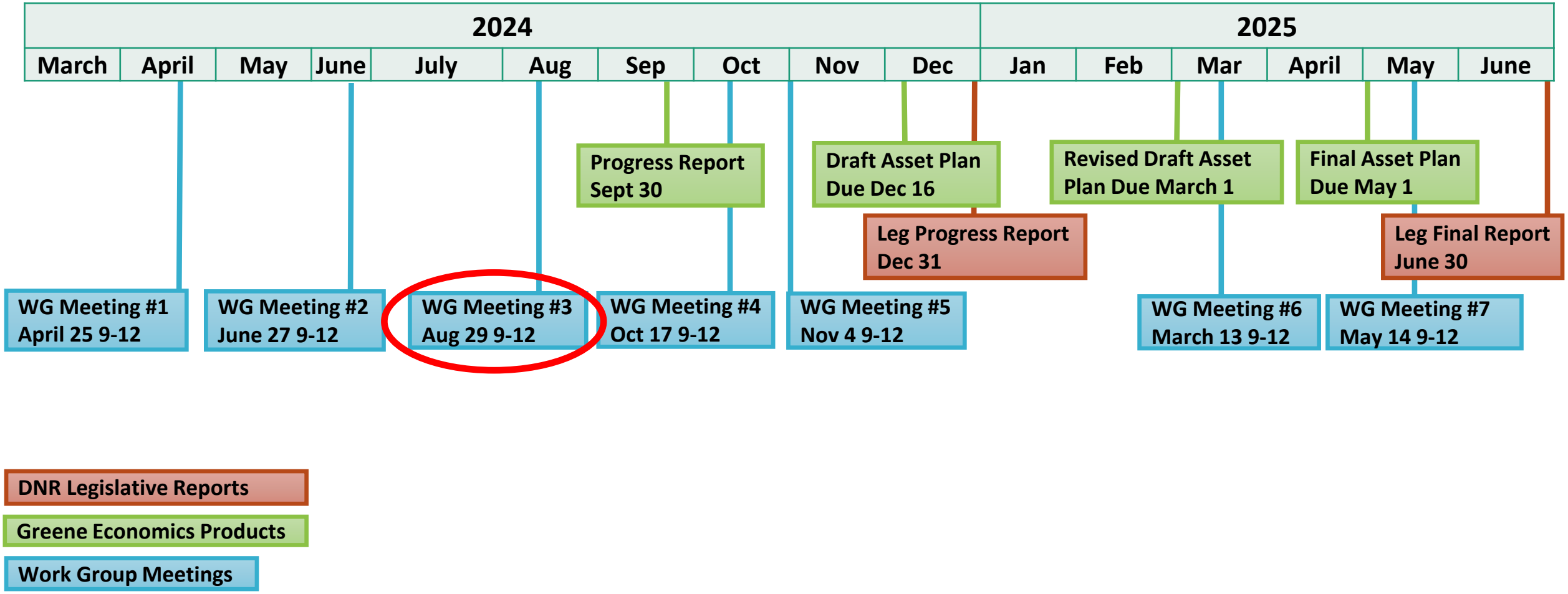
Before we get started

- This is a public meeting and is being recorded.
- Only the Work Group members have access to the chat, not members of the public.
- We will have designated times to address questions throughout the meeting.
- Please keep cameras on.
- Please keep microphones off unless speaking.
- Materials, including the meeting recording, will be shared after the meeting and available on the Work Group website.

Role of the Work Group

- Advise the technical contractor and DNR to guide the technical analyses and development of the ecosystem services asset plan
- Share relevant experiences and applicable expertise
- Provide counsel based on the interests and perspectives of the stakeholder group they represent
- Provide feedback to DNR pertaining to ecosystem services markets
- DNR has the final authority over the analyses, methods, and content of the legislative report

Ecosystem Services Project Timeline





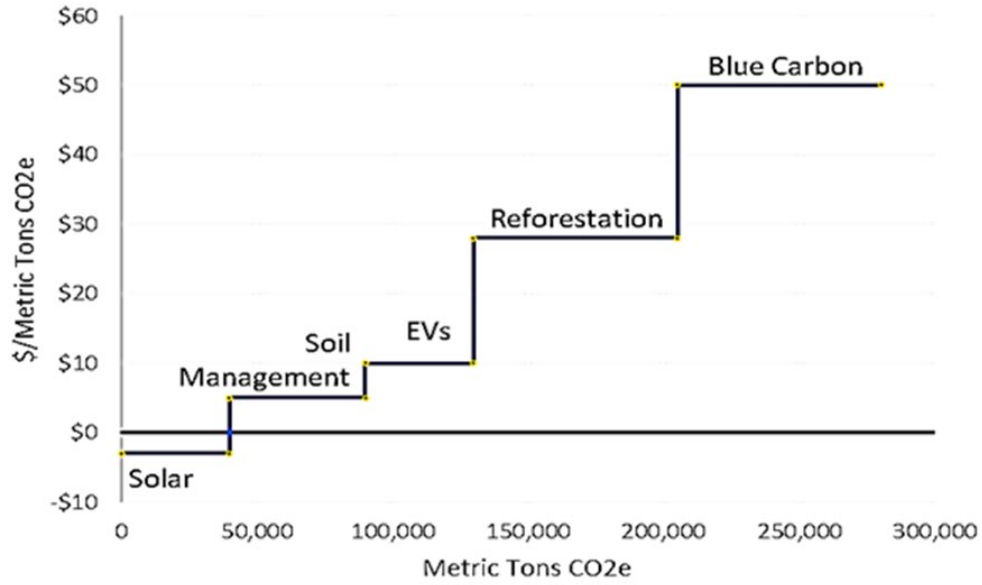
Marginal Abatement Cost Curve Model and Ecosystem Services Market Feasibility



Model Overview, Approach, and Steps

Marginal Abatement Cost Curves

- A tool for decarbonization;
- How to prioritize actions to reduce carbon emissions or increase carbon sequestration;
- Popular because it is simple; easy to understand



MACC Models Strengths/Weaknesses

Table 1: Advantages and disadvantages of MAC curve concept

ADVANTAGES	DISADVANTAGES
▪ Present the marginal abatement cost for any given total reduction amount ▪ Give the total cost necessary to abate a defined amount of carbon emissions ▪ Allow the calculation of average abatement costs	▪ Limited to one point in time ▪ No representation of path dependency ▪ Limited representation of uncertainty ▪ Lacking transparency of assumptions ▪ No consideration of ancillary benefits

Source: Kesicki, Fabian, 2011. Marginal abatement cost curves for policy making – expert-based vs. model-derived curves. Presented at 33rd IAEE International Conference, Rio, Brazil.

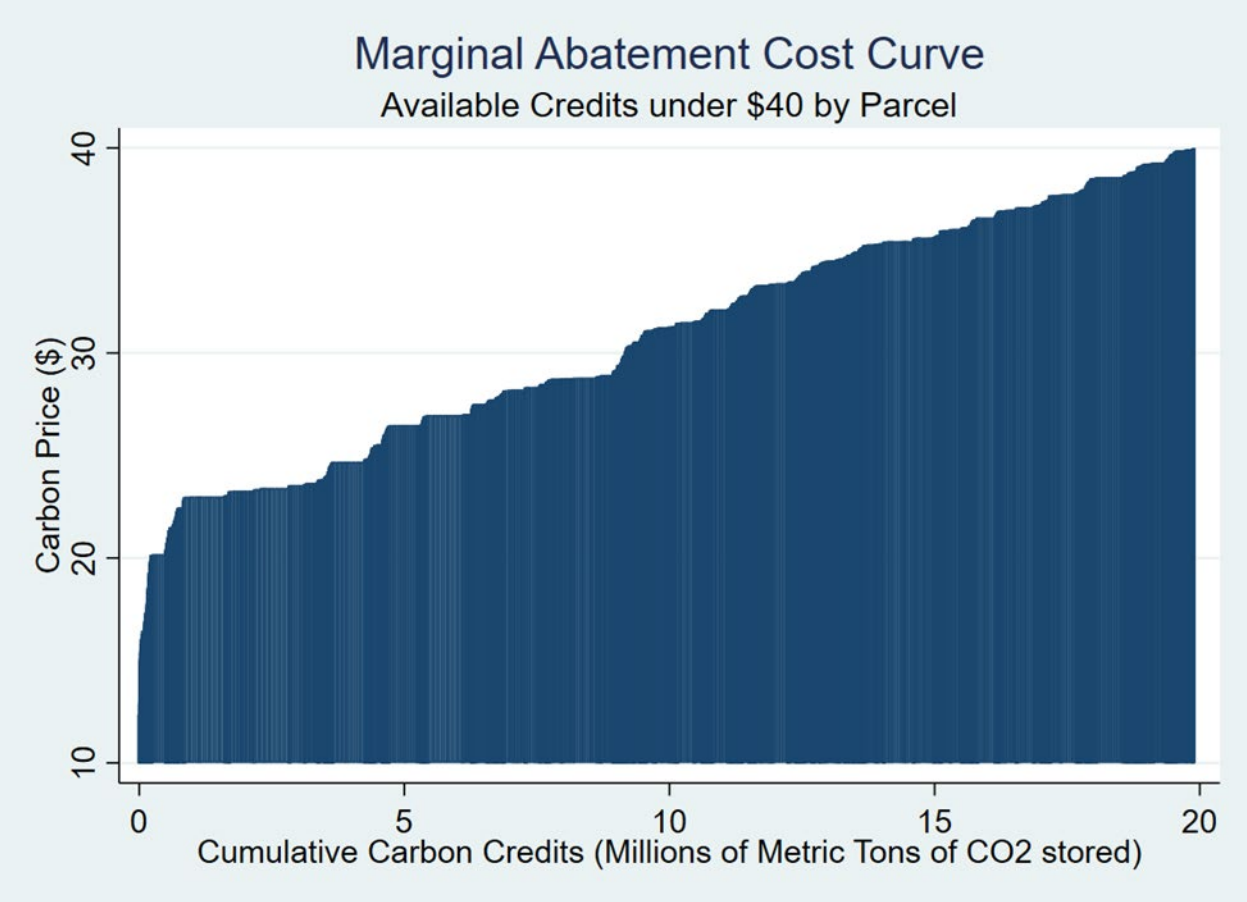
Preliminary Model for Illustration

- Conceptual Example for **illustration purposes-** to demonstrate how Marginal Abatement Cost Curves can be used
- **Not indicative of DNR Policy Decisions or Recommendations**

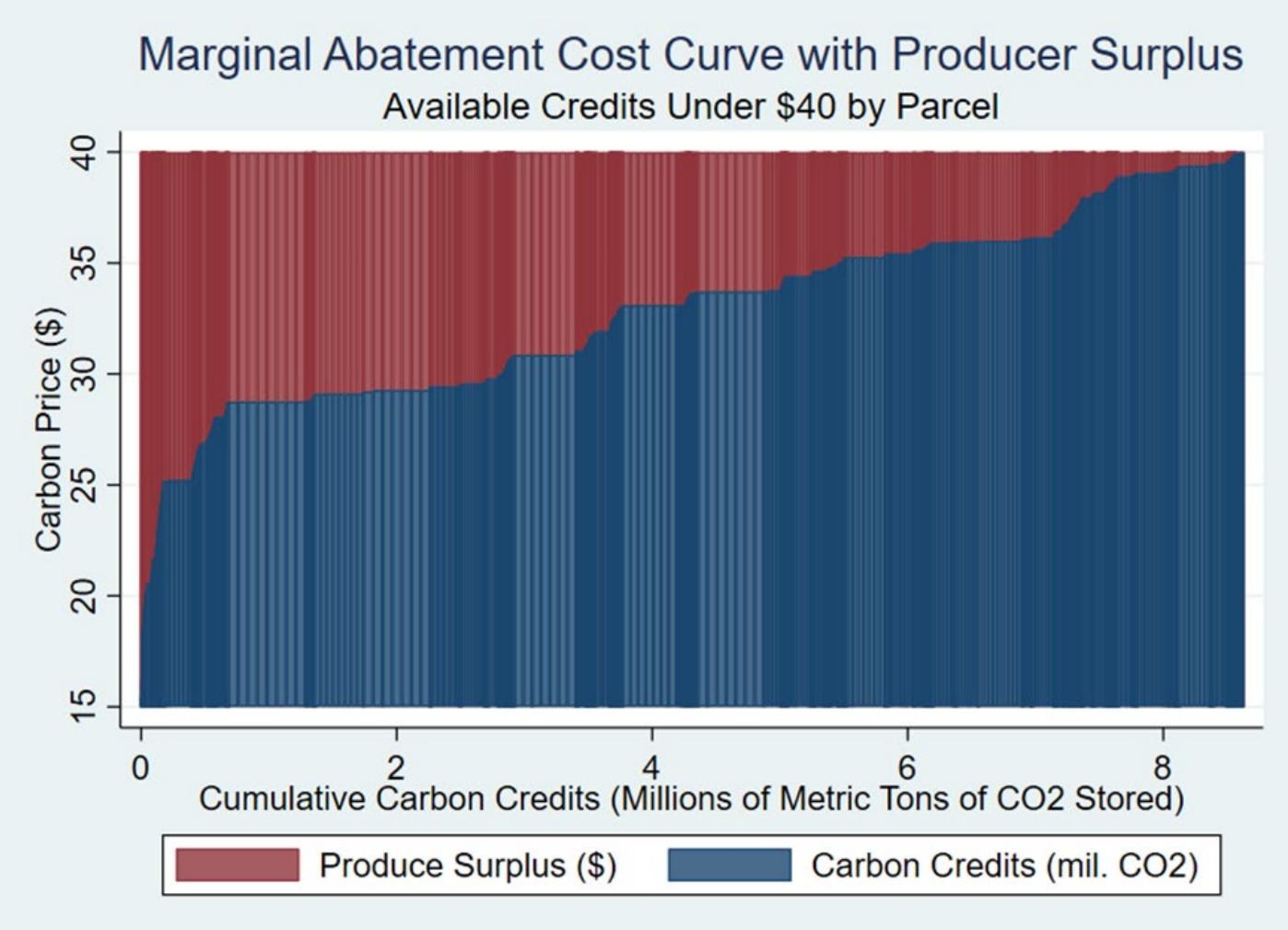
MACC Example for Illustration

ASSUMPTIONS:

- Based on DNR Forest Estate Model
- Foregone timber harvests correlate to sequestration potential
- Credits derived using California Air Resource Board protocol
- 3% Discount rate (from Forest Estate Model)



MACC Example



MACC Example – Strengths/Caveats

STRENGTHS

- Additionality is strong!
- Provides a means of identifying ***potential target parcels***

CAVEATS

- Cost estimates may be preliminary or inadequate
- Compliance market demand decreases through time (cap and trade)
- Voluntary market demand uncertain
- Does this truly decrease emissions compared to non-participation?

Purpose and Application to Other Ecosystem Service Markets

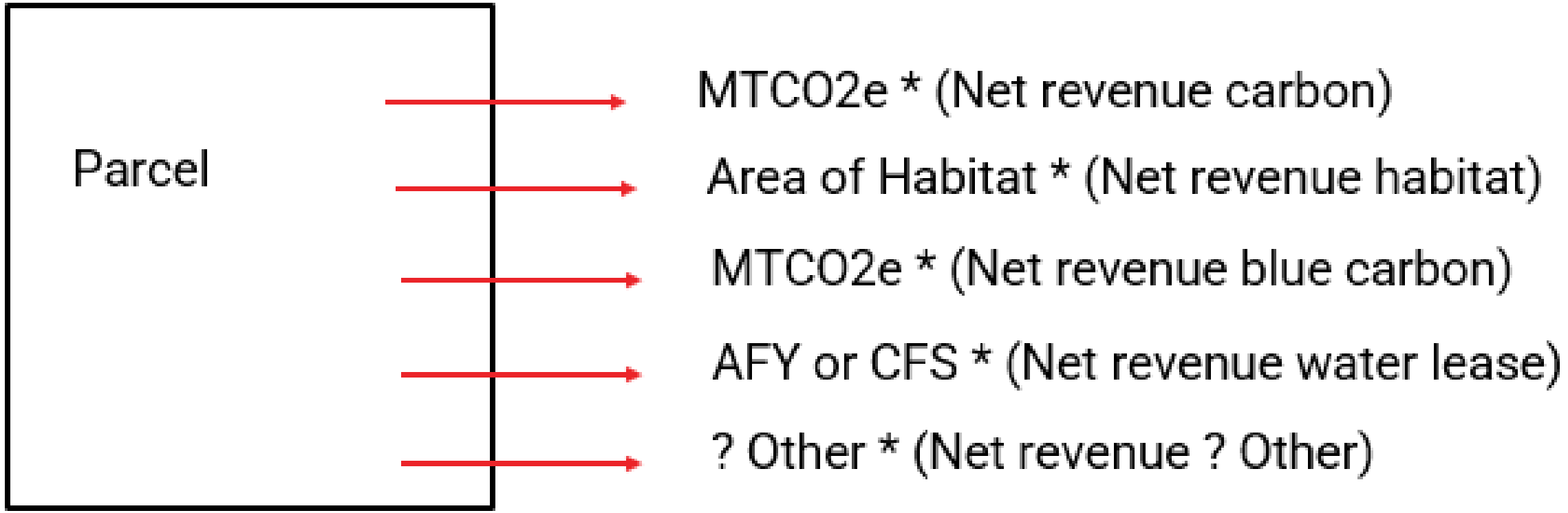
- Highest and best use of state assets
- Learn from MACC that opportunities lie in ***properties that are underutilized*** and where there are opportunities for new:
  - ❖ Revenue

  OR

  - ❖ Improved ecosystem service provision

Conceptually

Net Revenue = (P – C - OC)
Opportunity Cost (OC)



Algebraically

To estimate of the Highest and Best Use for a parcel we need to consider:

$$\text{Potential Value}_i = \sum_{k=1}^{5} A_{ik} * (Pk - Ck - OC_k)$$

Where:

i is the parcel

k is the ecosystem service:

1=carbon, 2 = biodiversity/habitat, 3=blue carbon, 4=water, 5= other

A_{ik} is the area in parcel i available/suitable for ecosystem service k,

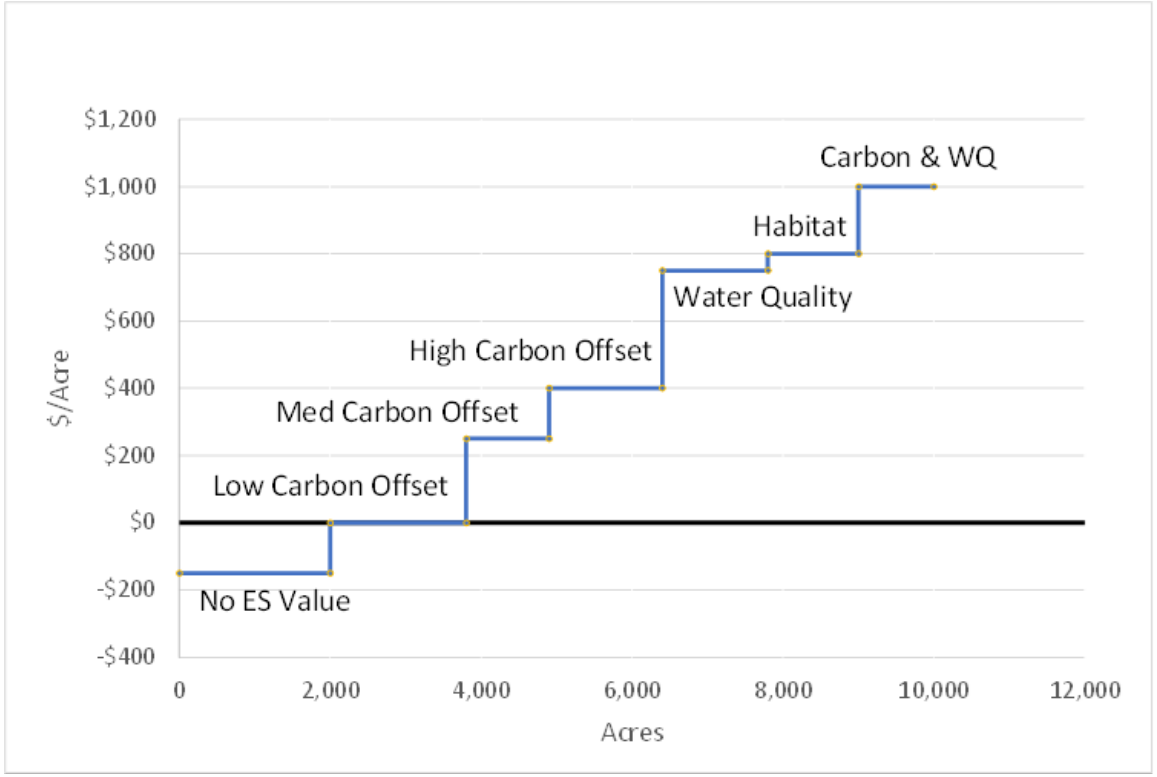
P is the potential price for the ecosystem service credit

C is the *estimated* cost of getting the credit to market

OC is the opportunity cost, or the lease revenue currently generated by the A

Ecosystem Service Market Feasibility Approach

- MACC for Forest Carbon + similar models for other carbon (following a MACC format) and
- Modified Ecosystem Enhancement Model for Ecosystems with Potential for Uplift
- If ($Pk–Ck–OCk$>o) on a given parcel, for ecosystem "k"



Potential Net Revenue - ES Market Participation

Stacking and Bundling

Not Stacked (Spatially Distinct)		Stacked (Spatially Overlapped)
1 acre forest earning carbon credits	1 acre forest earning endangered species habitat credits	1 acre forest earning both carbon credits and endangered species habitat credits
 One property		 One property
Total Credits = 2 Total Acres = 2		**Total Credits = 2 Total Acres = 1**

Activity July through September

- GIS team finalizing data and identifying areas suitable for lift
  - habitat and biodiversity
  - blue carbon
  - other ecosystem services
- Economics team developing model and evaluating
  - Value of opportunities carbon sequestration potential
  - Value of opportunities for other ecosystem service lifts (blue carbon, biodiversity, and water)

Using the Model Going Forward

- Price and cost of terrestrial carbon sequestration options
  - Compliance-related markets
  - Voluntary markets
  - Avoided Wildfire Emissions
- Price and cost for habitat and biodiversity options
- *Price and cost for blue carbon (less well-defined)*
- Price and cost of leasing water

Discussion

- Having now seen the model, what questions do you have about the Marginal Abatement Cost Curve Model? Are there any questions or comments about the inputs, outputs, or how it functions?
- What questions do you have about the Ecosystem Services Market Feasibility Model?

Discussion continued

- Of the opportunity markets to be included in the model, are there any questions about these specific markets and their relation to the model? These markets were biodiversity, carbon, blue carbon, and water.
- If you have expertise in one of these markets, can you share any advice that might impact the model or its function? If you don't have direct experience, what did you find most interesting about the model?

Discussion continued

- Are there any new developments in the markets discussed that we should know about? How about new markets not discussed?
- Are there other resources we should be considering? Resources when it comes to modeling Ecosystem Services and carbon or resources in exploring the different markets.

In Your Opinion, which two Ecosystem Service Markets are most promising for DNR Participation?

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15 min break



Uncertainties: Markets, Regulatory, and Technical

Sources of Uncertainty

- Compliance Markets (declining)
- Voluntary (heterogeneous) and Emerging Markets
- "Additionality" under much review
- Existing market protocols under development or review
- Regulatory and technical uncertainties

Additionality

For an offset project to qualify under the CCA, it must meet the following requirements:

- Result in greenhouse gas reductions or removals that are real, permanent, quantifiable, verifiable, and enforceable
- Reduce, remove, or avoid emissions that are not covered by cap and invest or other programs to avoid double counting of emissions reductions
- Result in emissions reductions in addition to those which would normally or naturally occur without the financial incentive provided by the program
- Provide Direct Environmental Benefits (DEBs) to Washington

11/7/2023

DEPARTMENT OF ECOLOGY
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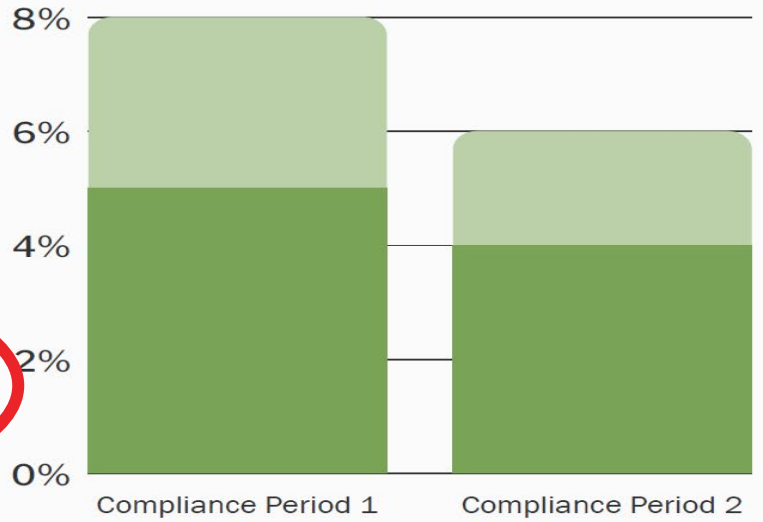
Percentage of Entity's Compliance Obligation Eligible to be Covered by Offsets



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Offset Protocol Uncertainties

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Ecology has adopted four offset protocols:

- U.S. Forest Protocol
- Urban Forest Protocol
- Livestock Protocol
- Ozone Depleting Substances Protocol

9

Example U.S. Forest Protocol Revisions

- Alternative approaches to baseline calculations
  - Dynamic baselines, updated common practice data, simplified baseline approach for certain projects types
- Conservation easement flexibility
  - Phased approach to easement development, allow multiple easements to cover a project area
- Verification frequency, alternative approaches to sampling
- Approaches facilitate project aggregation

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Rule Development Timeline*

Timeline and scope may shift to accommodate full technical consideration of protocols revisions and editions, as well as other rulemakings

Fall/Winter 2023	Winter/Spring 2024	Spring 2024	Est. Fall 2024	Est. 2025
Begin U.S. Forest Protocol Technical Working Group	Begin ODS Technical Working Group	Begin Blue Carbon Protocol Technical Working Group	Propose rule	Adopt rule

Timeline is tentative and subject to change.

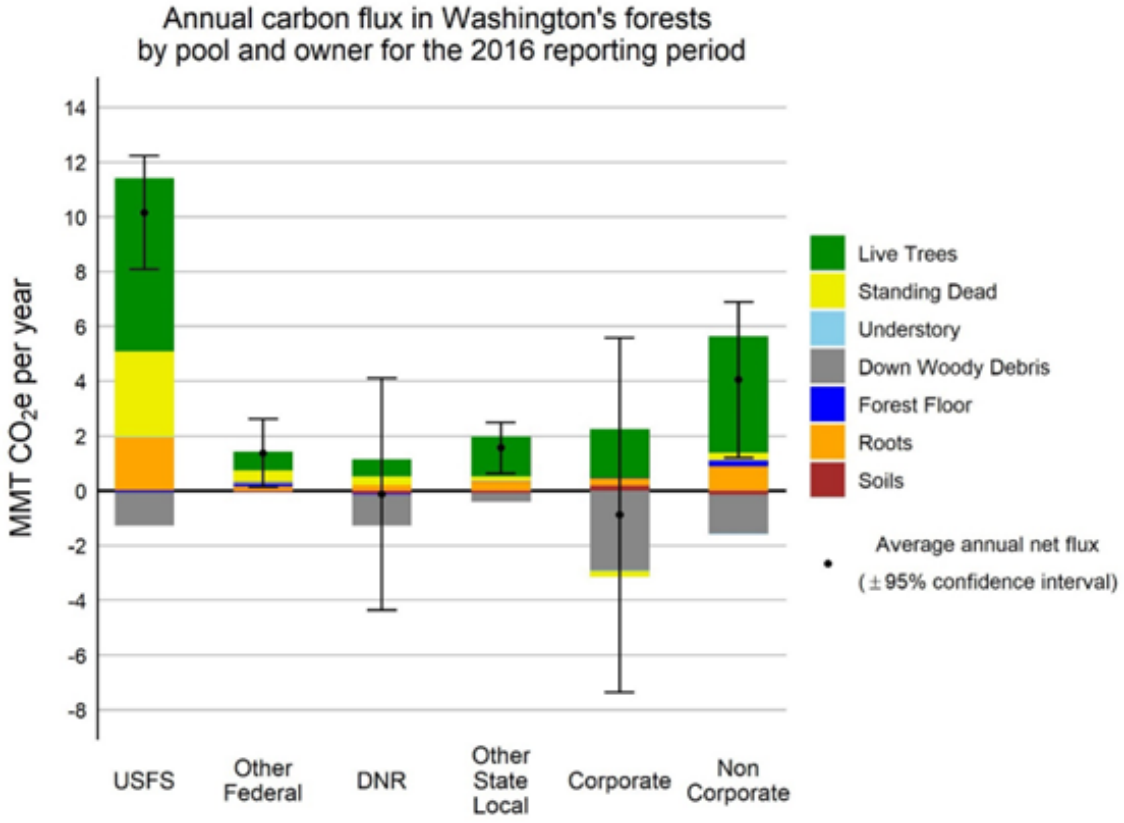
25

Blue Carbon Offset Protocol

- Rationale for considering adoption of a Blue Carbon Offset Protocol
  - Public comments received during 446 rulemaking
  - CO_2 Removal Project Standards Analysis completed by SCS Global

Uncertainties – Regulatory/Technical

- I-2117 Initiative to Prohibit Carbon Tax Credit Trading and Repeal Carbon Cap-and-Invest Program Measure 2024
- Other legal cases
- National and Global Trends
- Wildfire
- Quantifying sequestration rates (DNR/USFS 2020)



Next Steps

- Apply/Conduct Ecosystem Services Market Feasibility Model (Identify Feasible Opportunities)
- Marry Feasibility Model Results with Market Risks
- Regulatory Analysis
- Develop Roadmap and Marketing Plan

Discussion

- Does anyone have questions on the uncertainties Greene Economics presented?
- Does anyone have anything to add when it comes to the Market Uncertainties just described? What about Regulatory? And Technical uncertainties?
- If you have expertise in one of the markets, how important are these uncertainties when entering or expanding into these markets? Do you have tips or knowledge you can share?

Discussion continued

- Did we miss any uncertainties when it comes to entering any of these Ecosystem Services Markets?

- Does anyone have insight on how these uncertainties might impact the models described earlier today?

Future Challenges

What Barriers, Challenges, and Complexities might limit participation in these ES Market Spaces?

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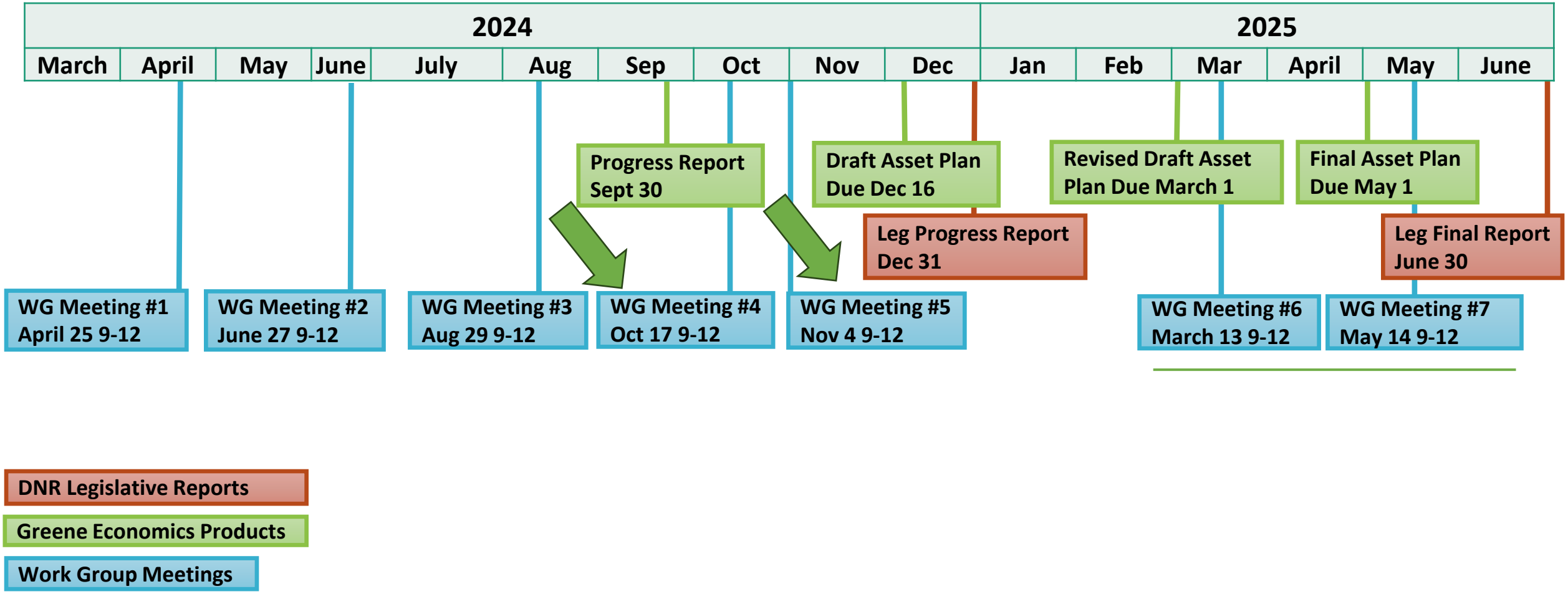
Questions?

Ecosystem Services Project Timeline



DNR Legislative Reports

Greene Economics Products

Work Group Meetings

Work Group Meetings

- Held via zoom

Meeting	Date	Time	Topic
1	April 25th, 2024	9am-12pm	Introductions & project overview
2	June 27th, 2024	9am-12pm	Inventory & preliminary market landscape
3	August 29th, 2024	9am-12pm	Marginal cost abatement model
4	October 17th, 2024	9am-12pm	Market opportunities and challenges
5	November 4th, 2024	9pm-12pm	Draft roadmap, inventory, and dashboard
6	March 13, 2025	9am-12pm	Review draft asset plan and inventory
7	**May, 14 2025**	9am-12pm	Final asset plan and inventory

Our mission: *Manage, sustain, and protect the health and productivity of Washington's lands and waters to meet the needs of present and future generations.*