MEMORANDUM

TO	Oregon Global Warming Commission Members
FROM	Cathy Macdonald, Vice-Chair
SUBJECT	Natural and Working Lands Inventory, Baseline and Goal Setting
DATE	September 3, 2019

Introduction

Healthy landscapes sequester carbon and provide significant and cost-effective opportunities to reduce greenhouse gas (GHG) emissions. The Global Warming of 1.5°C. Special Report from the Intergovernmental Panel on Climate Change (IPCC 2018) emphasized the urgency of climate action and the important role the land sector can play as part of a comprehensive climate mitigation strategy.

Recently published research estimates that reduced emissions and increased sequestration on natural and working lands (N&WL) could offset 21 percent of U.S. emissions (Fargione et al. 2018) and produce approximately 30 percent of the needed global mitigation needed by 2030 (Griscom et al. 2017).

In our September 3, 2019 memorandum Chair Duncan and I proposed the Commission consider the following draft Natural and Working Lands recommendations:

- Strengthening Oregon's inventory methods for land-based carbon flux to include non-forested lands, as well as advocate for strengthened federal inventories to address non-forested lands;
- Establishing a land-sector goal that is additional to Oregon's fossil-fuel reduction goal and reflects an intent to increase carbon stored in natural and working lands and products from those lands;
- Identifying best practices to reduce land-based GHG emissions and increase resilient carbon sequestration on natural and working lands;
- Advancing policies, programs, and incentives to reduce land-based GHG emissions and enhance resilient carbon sequestration;
- Increasing the state's capacity to verify and validate carbon sequestration from natural and working lands via independent third-party analysis, with the aim of resulting in long-term carbon storage; and
- Integrating priority actions and pathways involving natural and working lands into the state's in-development GHG mitigation plans by the end of 2020.

Unlike other sectors, the land sector can be a carbon storage reservoir or "carbon sink" as well as a source of emissions. N&WL carbon – "stocks," the total amount of carbon stored in soils, above and below ground plant biomass, and wood products; and carbon "fluxes," the change in carbon storage (through emissions and sequestration) – can be affected by both natural

processes and land use and management changes. These characteristics add complexity to developing methods for land carbon inventories, establishing business-as-usual baselines and setting emission reduction and sequestration goals.

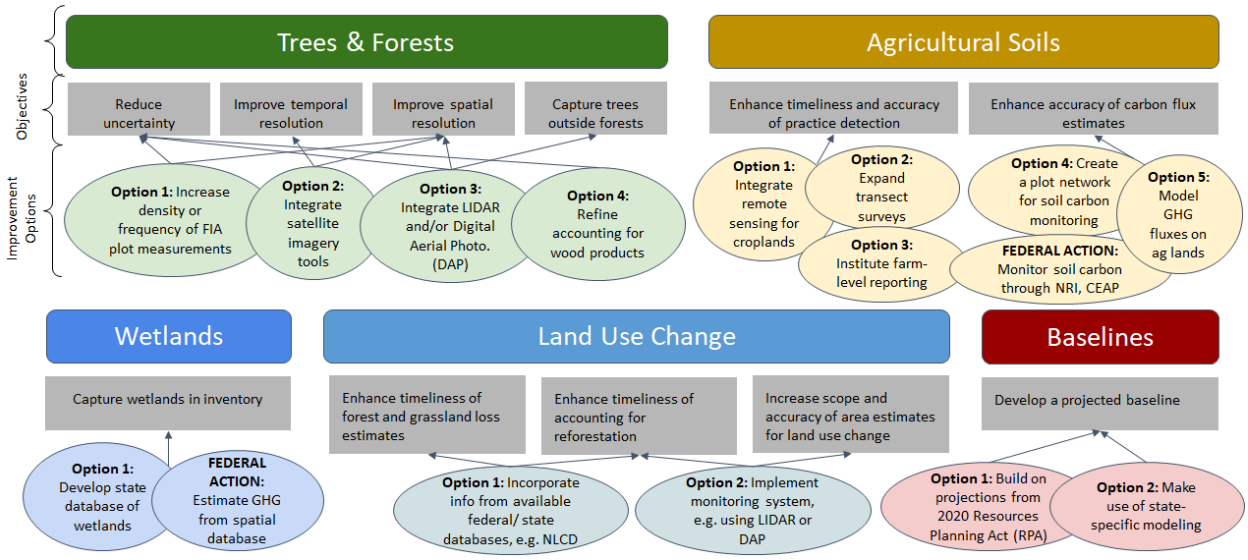
Below, I provide a brief overview of: existing land-based sequestration and emissions information; issues and options for improving land-based carbon inventories and baseline; considerations for goal setting; and policies and programs the Commission may want to consider recommending in our 2019 report to the legislature and Governor Brown. Jamey Mulligan, Senior Associate from the World Resources Institute and Rose Graves, Postdoctoral Fellow from Portland State University/The Nature Conservancy will present additional information on these topics at our December 12th meeting.

Existing Natural and Working Lands Inventories

The Environmental Protection Agency (EPA) maintains data and tools designed to help states develop greenhouse gas (GHG) emissions inventories and projections. The EPA data and tools are easy to use, the underlying datasets are consistent with the National GHG Inventory, and the tools provide some options for state-specific customization. However, the Inventory Tool has significant data limitations, poor temporal and spatial resolution, and outdated default assumptions (5-20 plus years old) in relation to the land sector.

Because of these shortcomings, many states are opting to improve their N&WL inventories. Options for improving inventory data include increasing field data collection, integrating field data with remotely sensed data, and modeling (Figure 1). The Oregon Department of Forestry's current work with US Forest Service Pacific Northwest Research Station (PNW) is a good example of such an effort to improve forest and wood products inventory data.

Figure 1: Options for improving Natural and Working Lands Baselines (Source: World Resources Institute, 2019).

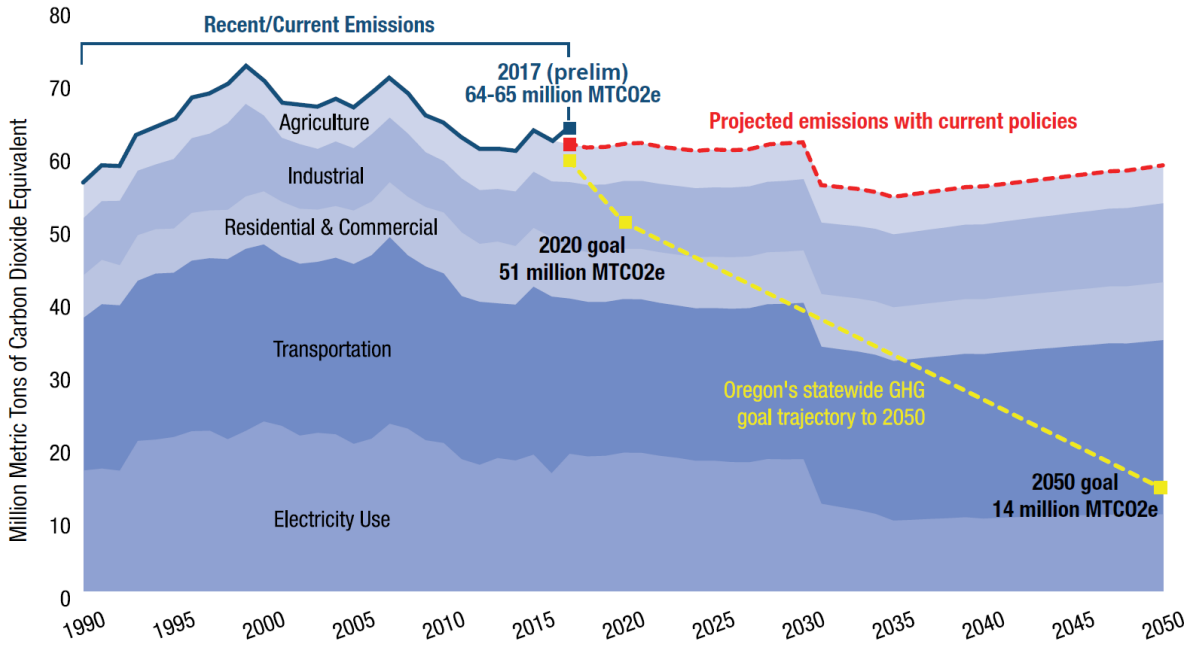


In developing recommendations on how to further invest to improve Oregon's N&WL inventory, the Commission should consider how the inventory will be used, which land use types are likely to have the greatest current and potential impact on overall land sector emissions and sequestration, state policy priorities, availability of better state level datasets, relative cost effectiveness of the methods, and the desired reporting frequency.

Historical and Projected Baselines

The Oregon Global Warming Commission uses historical data and estimates of projected business-as-usual emissions assuming current policies to establish an emissions baseline for the state. This baseline is used to: assess progress toward the state's GHG emissions goals, estimate the future benefits of existing policies, and assess the additional emissions reductions needed to meet the state's 2050 goal (Figure 2).

Figure 2: Oregon past and projected greenhouse gas emissions compared to goals. (OGWC 2018)



An historical and projected land sector baseline would fill a similar role in relation to a N&WL goal. Due to the limitations in EPA's State Inventory described above, improvements should be considered for establishing an historical baseline for Natural and Working Lands.

The EPA's Projection Tool does not provide a projection for N&WL. However, the Forest Service completes a decadal assessment of projected carbon fluxes from forests, grasslands, and land use change by region looking out 50 years as required by the Resource Planning Act (RPA) Assessment that could be consulted in the development of a projected baseline for Oregon. In addition, several other modeling tools and approaches are available for projecting net emissions from the land sector. State-specific modeling can be done using spatial datasets to estimate carbon flux in future years under "business as usual" conditions. Projecting a baseline

with spatial data allows for more targeted actions and policies affecting land use planning. Once completed a projected baseline can be used to back-cast in order to improve the historical baseline. In developing projections and improved historical baselines, any modeling should include clear, consistent and defensible assumptions. The International Panel on Climate Change (2006) provides guidance on four different methods for bridging historical datasets with newer datasets, providing straightforward ways to preserve the consistency of the estimates over time.

Setting a Goals for Natural and Working Lands

A number of states (California, Hawaii, Maine, New York) have recently established or increased their greenhouse gas emission reduction goal to achieve net neutrality through legislation or executive order. These states and others in the USCA are now working on how to best incorporate sequestration and reduced emissions goals/targets for natural and working lands as part of their plans for achieving their emissions reduction goal(s).

As mentioned above, land sector emissions and sequestration can result from both natural versus anthropogenic factors. To set a goal for the land sector, states should decide:

- What type of goal to set – a fixed-level goal, a base year goal (similar to Oregon's current GHG emission reduction goal for other sectors), or a forward-looking baseline goal,
- What land use and land use categories will be included in the goal,
- What carbon pools, fluxes and activities with those categories will be included in the goal,
- How natural disasters will be treated within the context of the goal,
- How ambitious the state can be in reducing emissions and increasing sequestration in natural and working lands, and
- What actions would be taken if the goals are not met.

Dr. Graves recently completed research that provides one set of estimates of the potential to increase net emission reductions across 12 forest, grassland, cropland and wetland pathways in Oregon (Graves et al., *in review*). Several analyses have been done for California that might also be instructive regarding options for inventory improvements and N&WL goals:

- January 2019 Draft: California 2030 Natural and Working Lands Climate Change Implementation Plan
- Draft Technical Document: CALAND Version 3 (Updated in June 2019)
- Next Ten Report: Toward a Carbon Neutral California

Natural and Working Lands Policies and Programs

States in the US Climate Alliance (USCA) are taking a wide range of steps to increase sequestration and reduce emission from N&WL. Several states have passed legislation or created executive orders directing agencies to set a climate mitigation goal for the land sector. In addition, states are considering re-tooling existing state programs to better focus on and

track climate mitigation benefits and creating new soil health, nutrient management and forest health programs. New approaches, such as practice-based offset protocols, are being tested to facilitate better access to existing programs. Together, the efforts being undertaken across USCA states provide an incredible opportunity to exchange best practices and combine efforts to create efficiencies in developing policies and programs.