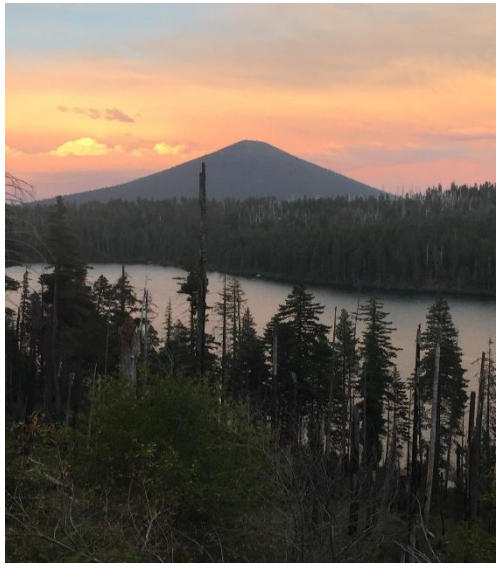
# Draft Land-based Net Carbon Inventory Methods and Results

**Public Webinar: December 5, 2025**

Staff:
Elizabeth Ruther
Jason Sauer



OCAC
Oregon Climate Action Commission

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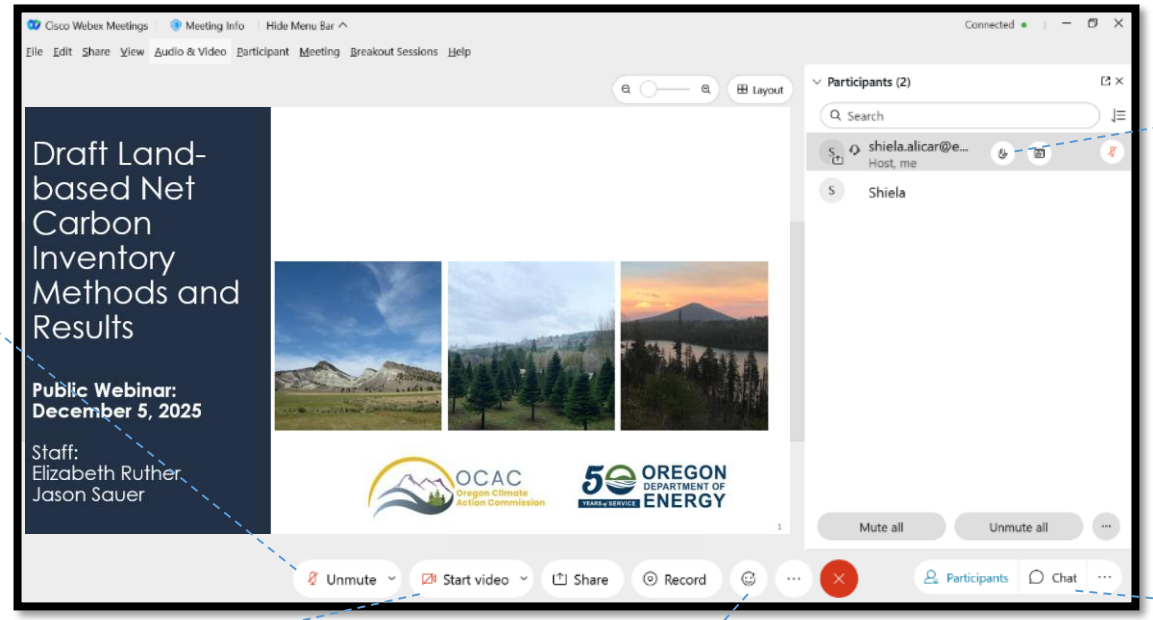
# USING WEBEX

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## Video Options

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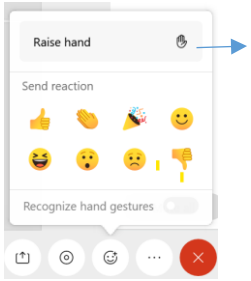
## Reactions

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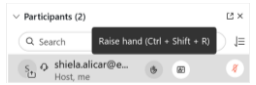


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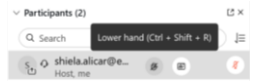
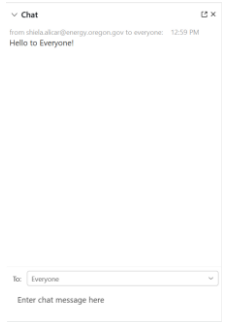



## Chat

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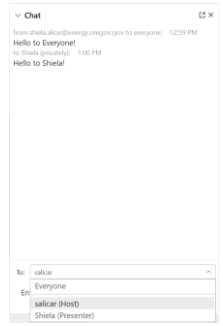
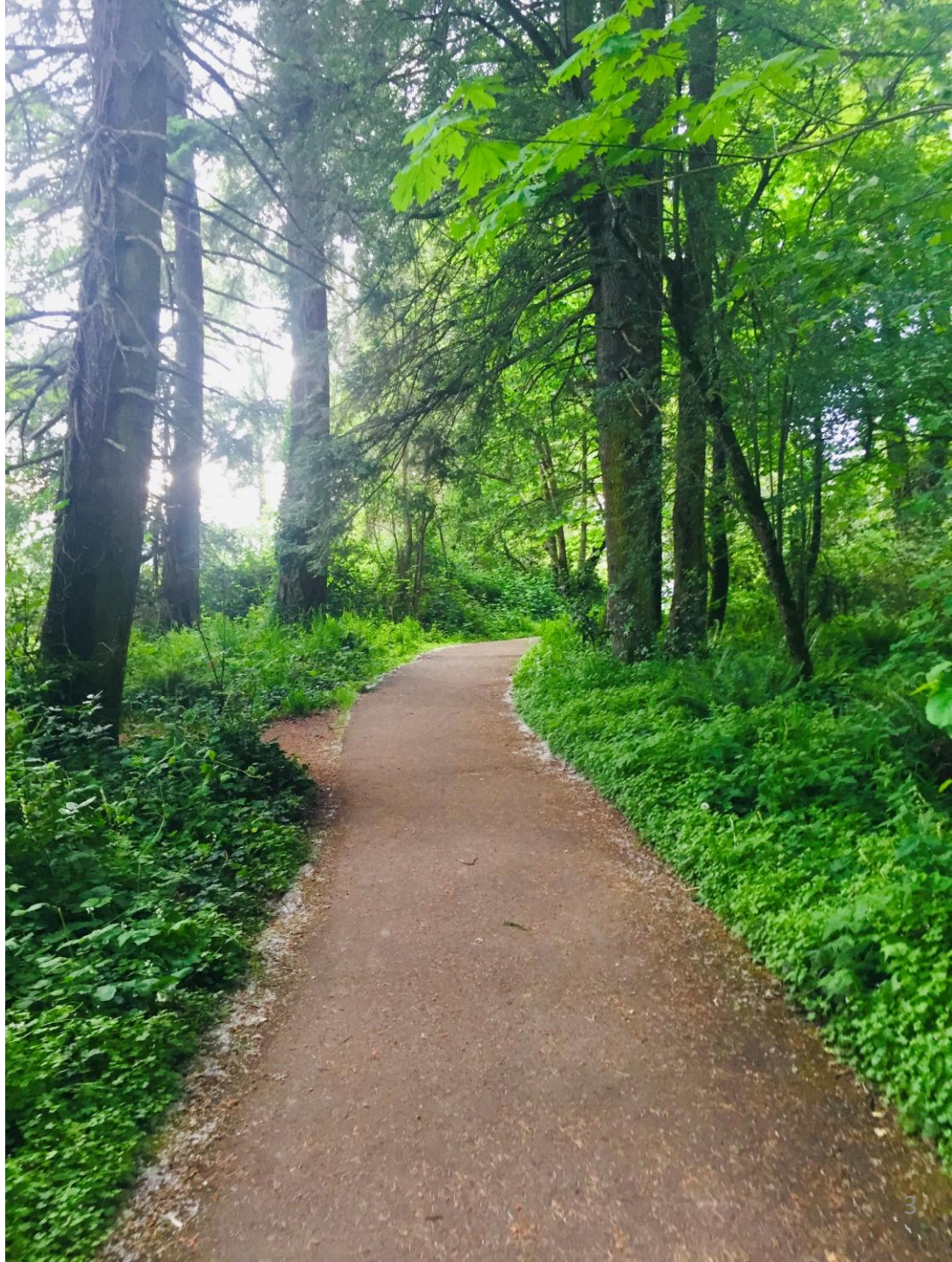
*You can send a private message to the Host or Presenter (or all Panelists when there is a Panel).*



# Purpose of Today's Meeting

- To share findings from our draft report on greenhouse gas emissions and removals from Oregon's natural and working lands.
- To answer clarifying questions to prepare you for submitting comments and feedback.



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# AGENDA

| Time | Topic | Presenter |
|---|---|---|
| 1:00 pm | Welcome | Christy Splitt, ODOE |
| 1:05 pm | Policy Context, Engagement, Inventory program – Q&A | Liz Ruther, ODOE |
| 1:20 pm | Inventory Basics | Jason Sauer, ODOE |
| 1:35 pm | Inventory Overview and Statewide Results – Q&A | Katie Goldman, GHGMI |
| 1:55 pm | Land Category: Forest | Anup Joshi, GHGMI |
| 2:03 pm | Land Category: Biomass Burning - Q&A | Olga Lyandres, GHGMI |
| 2:15 pm | Land Category: Croplands | Robert Parkhurst, SVS |
| 2:23 pm | Land Category: Grasslands - Q&A | Robert Parkhurst, SVS |
| 2:35 pm | Land Category: Developed Land | Olga Lyandres, GHGMI |
| 2:40 pm | Land Category: Wetlands | Lena Capece, SA |
| 2:50 pm | Grand Totals Review - Q&A | Katie Goldman, GHGMI |
| 3:00 pm | What We Have Learned and What's Ahead | Jason Sauer, ODOE |
| 3:10 pm | Questions | Christy Splitt, ODOE |
| 3:25 pm | Wrap Up and Thank You | Christy Splitt, ODOE |

# NCS WORKFORCE STUDY – DRAFT REPORT

## Primary Research Question

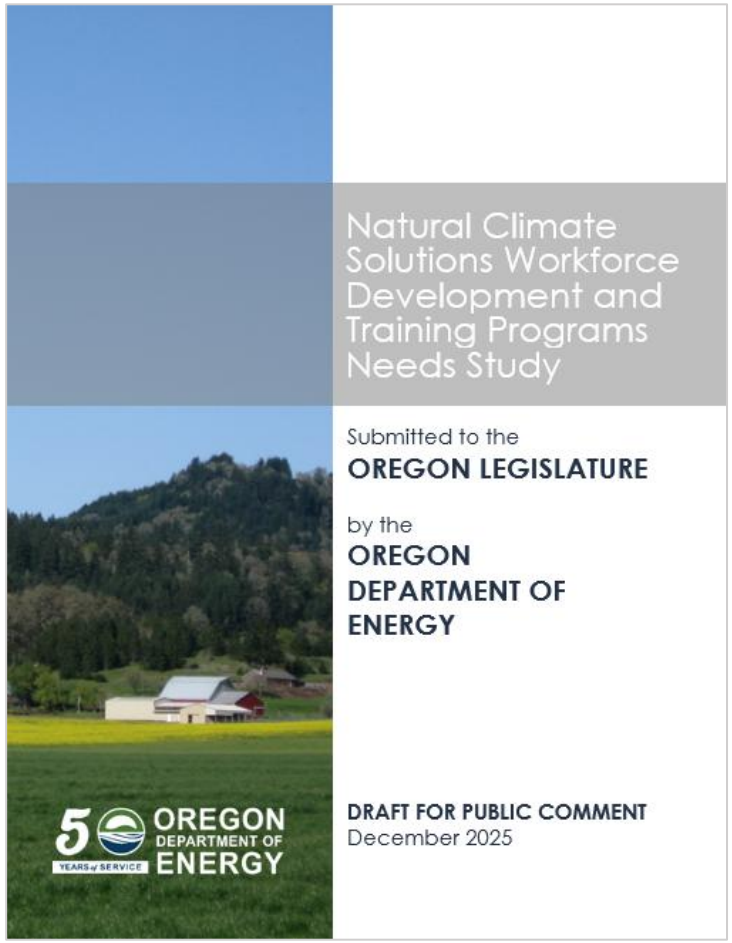
What are the workforce development and training solutions needed to support the adoption of natural climate solutions on natural and working lands?

First OR study to examine industries and occupations across all OR land types that now or in the future could implement NCS.

Involved interviews with array workforce partners.

Discovered similarities across workforces.

Illuminated potential next steps.



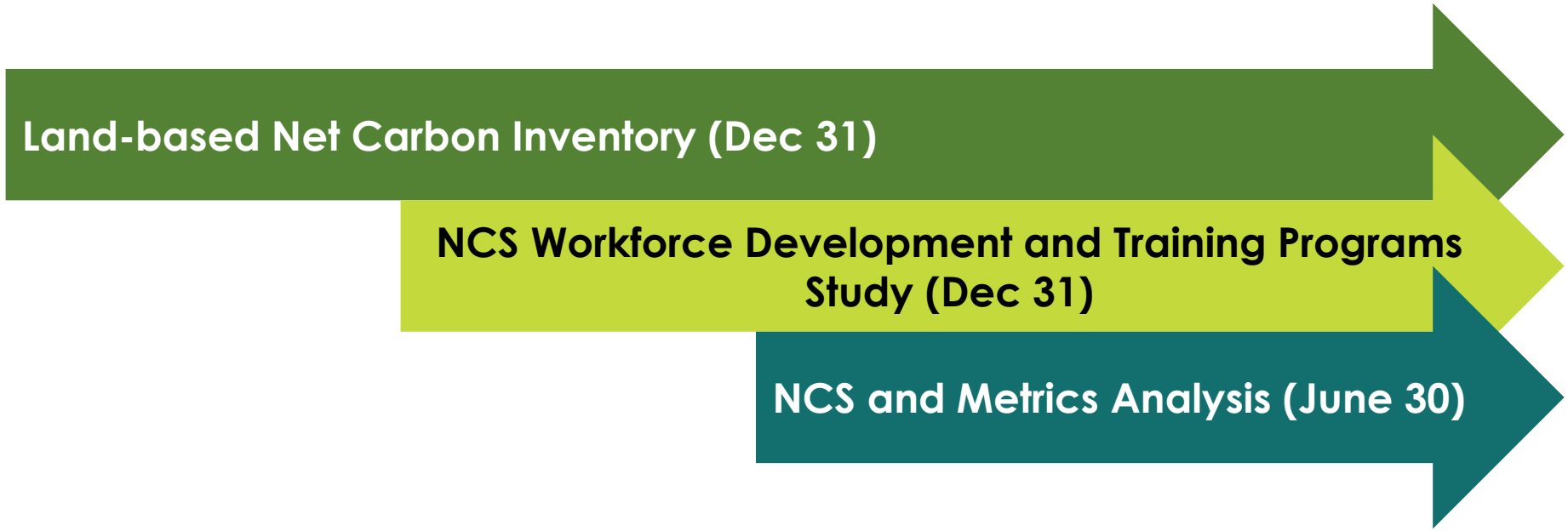
# TWO MAJOR CLIMATE MITIGATION ACTIONS

Rapidly **reduce** emissions

Rapidly **increase** carbon removal from the atmosphere

# HB 3409 NATURAL CLIMATE SOLUTIONS

In 2023, the Oregon State Legislature passed House Bill 3409, which acts on the Natural and Working Lands Proposal adopted by OCAC.




**OCAC establishes non-binding carbon sequestration goals (April 2026)**

"Natural climate solution" means an activity that enhances or protects net biological carbon sequestration on natural and working lands, while maintaining or increasing ecosystem resilience and human well-being.

# Purpose: Account for Actions and Track Progress

**Inventory**

- Landscape level trend data

**Tracking Strategies**

- Outcome-based progress
- Specific metrics

# INVENTORY USES

- Establishes long term trends in emissions and removals from land, starting in 1990
- Basis for future projections
- Enables tracking of progress when updated routinely
- Informs policy making
- Demonstrates the role Oregon lands play in greenhouse gas emissions and removals

# Advisory Committee Members

| Position | First | Last | Organization |
|---|---|---|---|
| Tribal culture, customs and government | VACANT | VACANT | VACANT |
| Local government | Ellen | Hammond | Jefferson County SWCD |
| Urban forestry or parks management | Jonathan | Soll | Metro |
| Forestry or forest products | Jason | Callahan | Green Diamond |
| Forestry or forest products | Betsy | Earls | Weyerhaeuser |
| Forestry or forest products (Private landowner <5,000 acres) | Ben | Hayes | Springboard Forestry and Hyla Woods |
| Agriculture | Jocelyn | Bridson | Tillamook County Creamery Assoc. |
| Agriculture (Small Family Farming Operation) | Mike | McCarthy | McCarthy Family Farm LLC |
| Livestock | Aubri | Spear | Eocene Environmental Group |
| Blue carbon | Jazmin | Dagostino | The Pew Charitable Trusts |
| Environmental Justice | Nikita | Vincent | Oregon Agricultural Trust |
| Environmental Justice | David | Mildrexler | Partnership for Policy Integrity |
| Conservation or environmental management | Lauren | Link | The Nature Conservancy |
| Conservation or environmental management | Megan | Kemple | Oregon Climate and Agriculture Network |
| Landowner technical assistance | Dean | Moberg | Tualatin SWCD |
| Landowner technical assistance | Andrea | Kreiner | Oregon Assoc. of Conservation Districts |

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# INTER-AGENCY WORKING GROUP

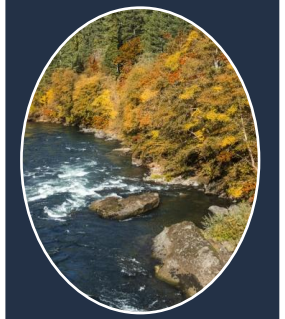
Forestry (ODF)

Fish & Wildlife (ODFW)

Agriculture (ODA)

Parks and Recreation (OPRD)

State Lands (DSL)



Watershed Enhancement Board (OWEB)

Environmental Quality (DEQ)

Land Conservation and Development (DLCD)

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# INVENTORY ENGAGEMENTS

| | |
|---|---|
| **Tribal Nations** | • Parallel process, 2 presentations<br>• Formal letters with Federally Recognized Tribes |
| **Climate Action Commission** | • Three meetings<br>• NCS Committee (1 meeting) |
| **Advisory Committee Meetings** | • 16 hours (8 meetings)<br>• ODOE facilitated |
| **Inter-Agency Working Group** | • 8 hours (3 meetings)<br>• ODOE facilitated |
| **1:1 Agency Meetings** | • At least one meeting with each agency about data<br>• Multiple follow ups with ODF and DEQ |
| **Inventory Technical Expert Contacts** | • Emails/meetings with 18 academic researchers<br>• Meetings with 2 non-profits |
| **ODOE NCS Monthly Emails** | • 10 partner updates<br>• 11 agency updates |

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# PROGRAMMATIC INFRASTRUCTURE


- Maintain/Improve the Inventory
  - Update methodology and monitor trends
- Due December 1 in even-numbered years
- 2026 will incorporate some new information:
  - Salinity modelling
  - New forest data

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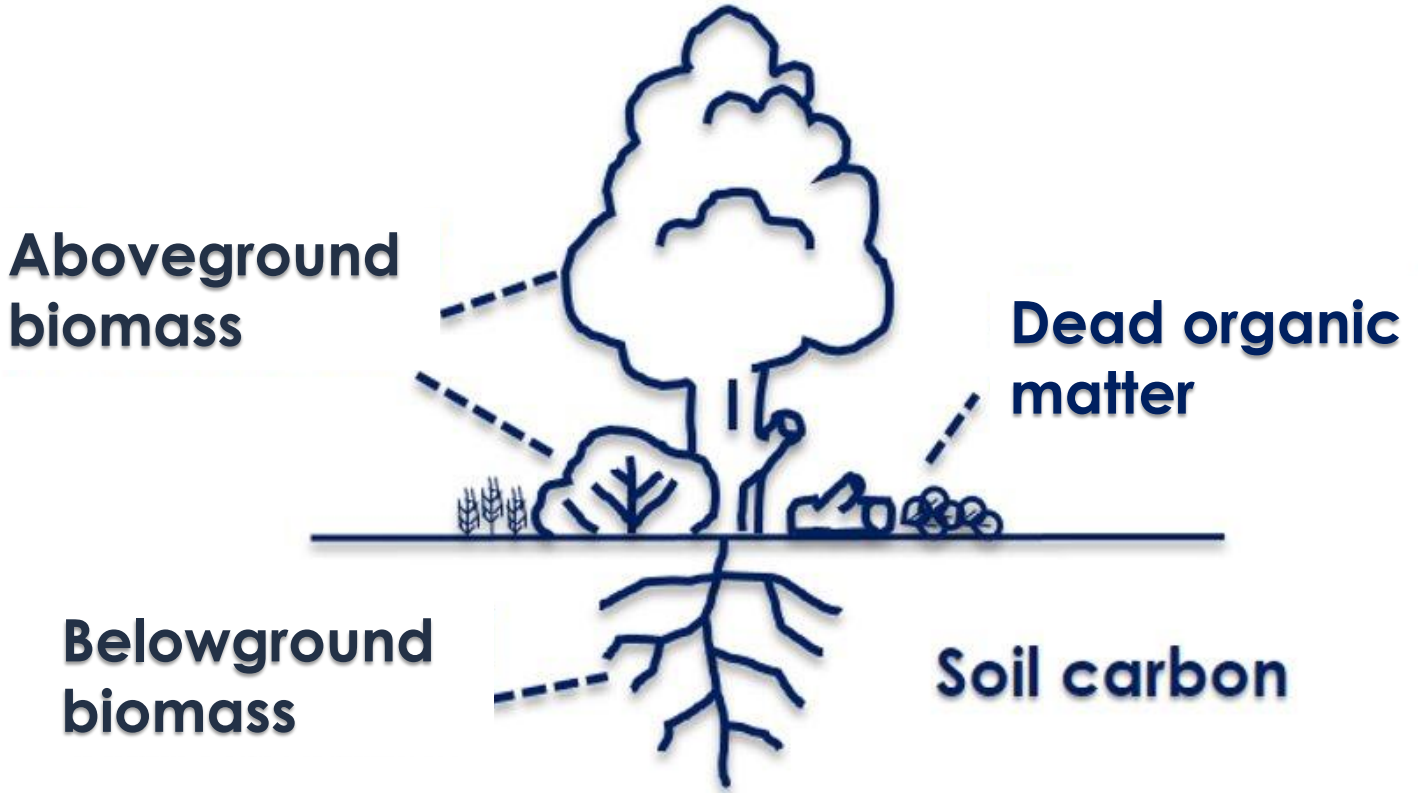
Q&A

# WHERE IS CARBON STORED IN THE LAND?

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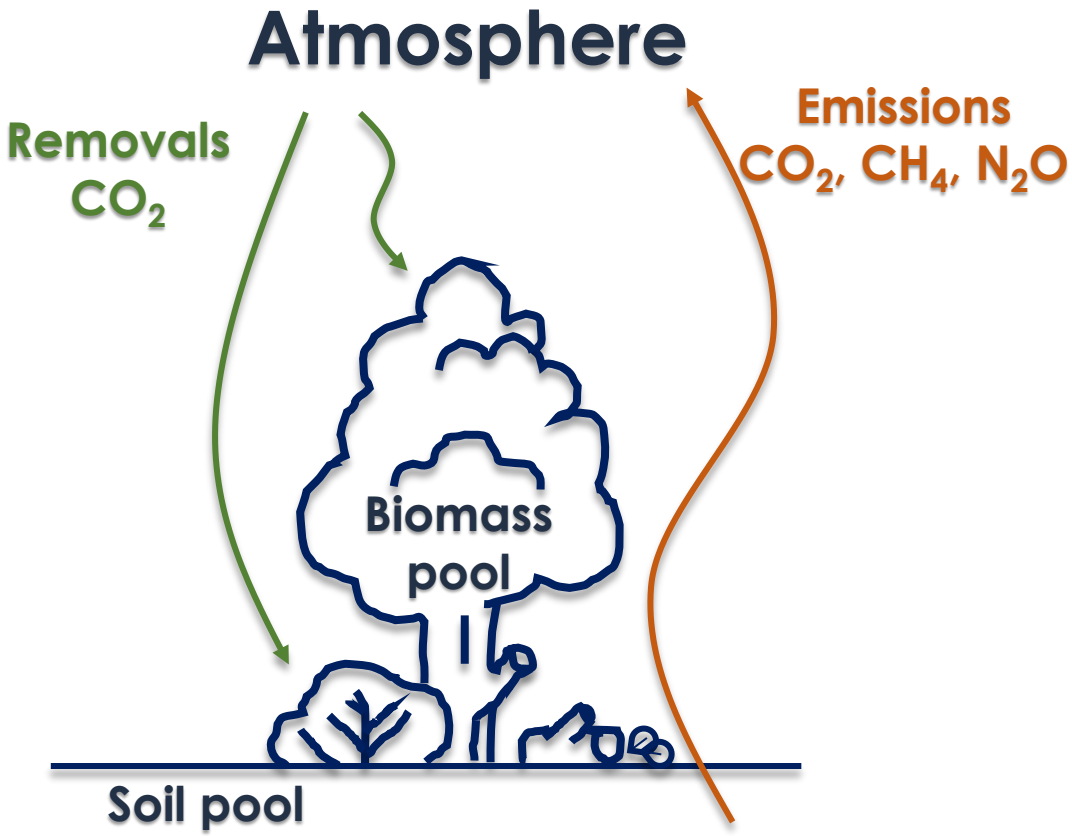
# OTHER KEY TERMS

- **Carbon pool** is a system that has the capacity to remove or emit carbon.
- **Carbon stock** is the amount of carbon in a particular carbon pool.
- **Carbon flux/stock change** is the movement and exchange of carbon between different pools over time.
  - **Emissions** are GHGs released into the atmosphere.
  - **Removals** are GHGs that are taken out of the atmosphere.
  - **Net flux** = Emissions – removals
  - **Sequestration and storage** are the processes of removing GHGs from the atmosphere and storing them.
- **GHGs**: Carbon dioxide ($CO_2$), Methane ($CH_4$), Nitrous Oxide ($N_2O$)
- **Non-$CO_2$ Emissions**: methane and nitrous oxide

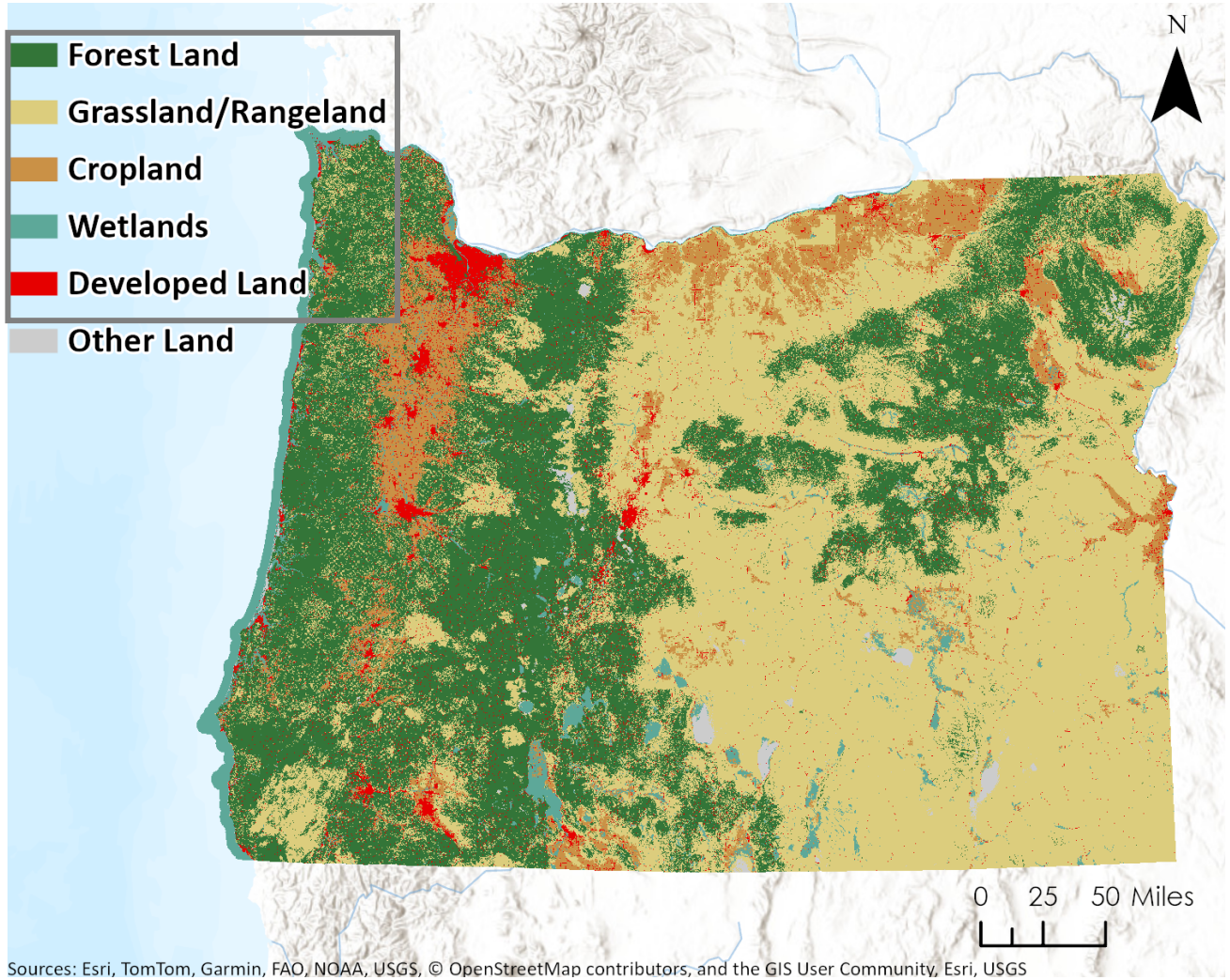


# INVENTORY OVERVIEW

**Land-based Net Carbon Inventory** (LCI):

- Estimates carbon stocks, stock change, and resulting GHG flux ($CO_2$, $CH_4$, $N_2O$) over time from Oregon's lands
- Reports on estimates of GHG flux over time resulting from:
  1. Land remaining the same type
  2. Land converted to another type
- Reports in unit of million metric tons of carbon dioxide equivalent (MMTCO2e)

Includes considerations of some land management practices, wildfires, and prescribed burns




*Map of OR land cover according to the National Land Cover Database (NLCD), 2021*

# LAND CATEGORIES


Land with woody vegetation consistent with thresholds used to define forest land

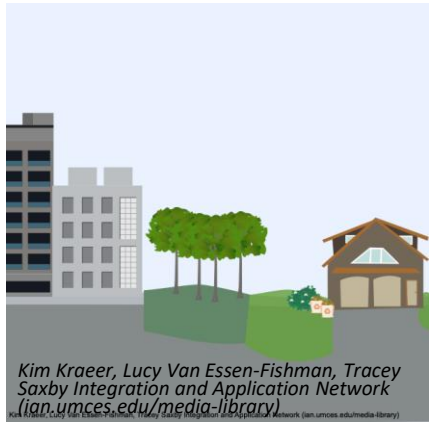
**Forest Land**


Land used for annual, perennial, and forage crops
Agroforestry
Pasture/hay

**Cropland**

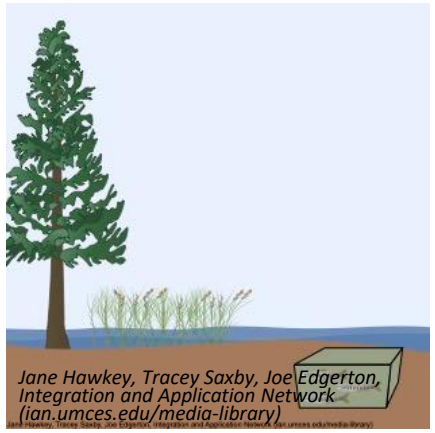

Rangelands, grasslands

**Grassland**



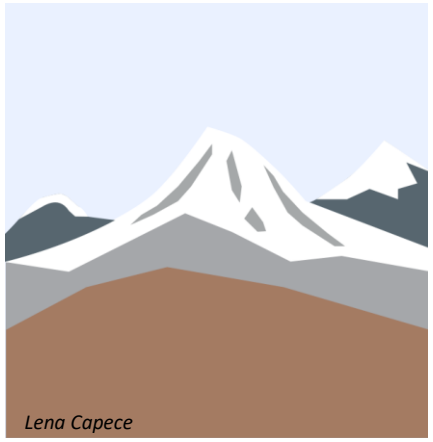

Low, medium and high density developed land

**Developed Land**




Land that is saturated by water
Coastal and inland

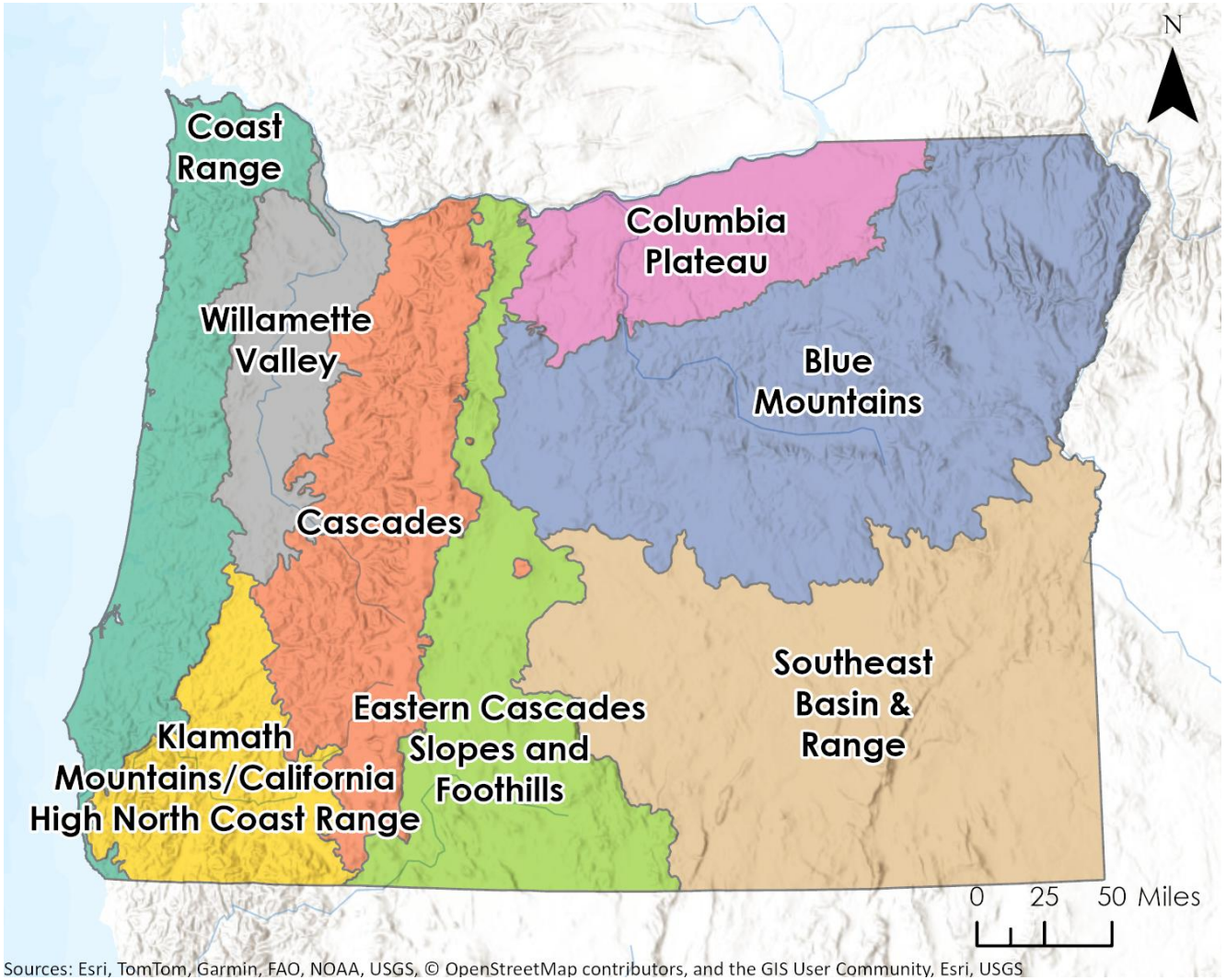
**Wetlands**



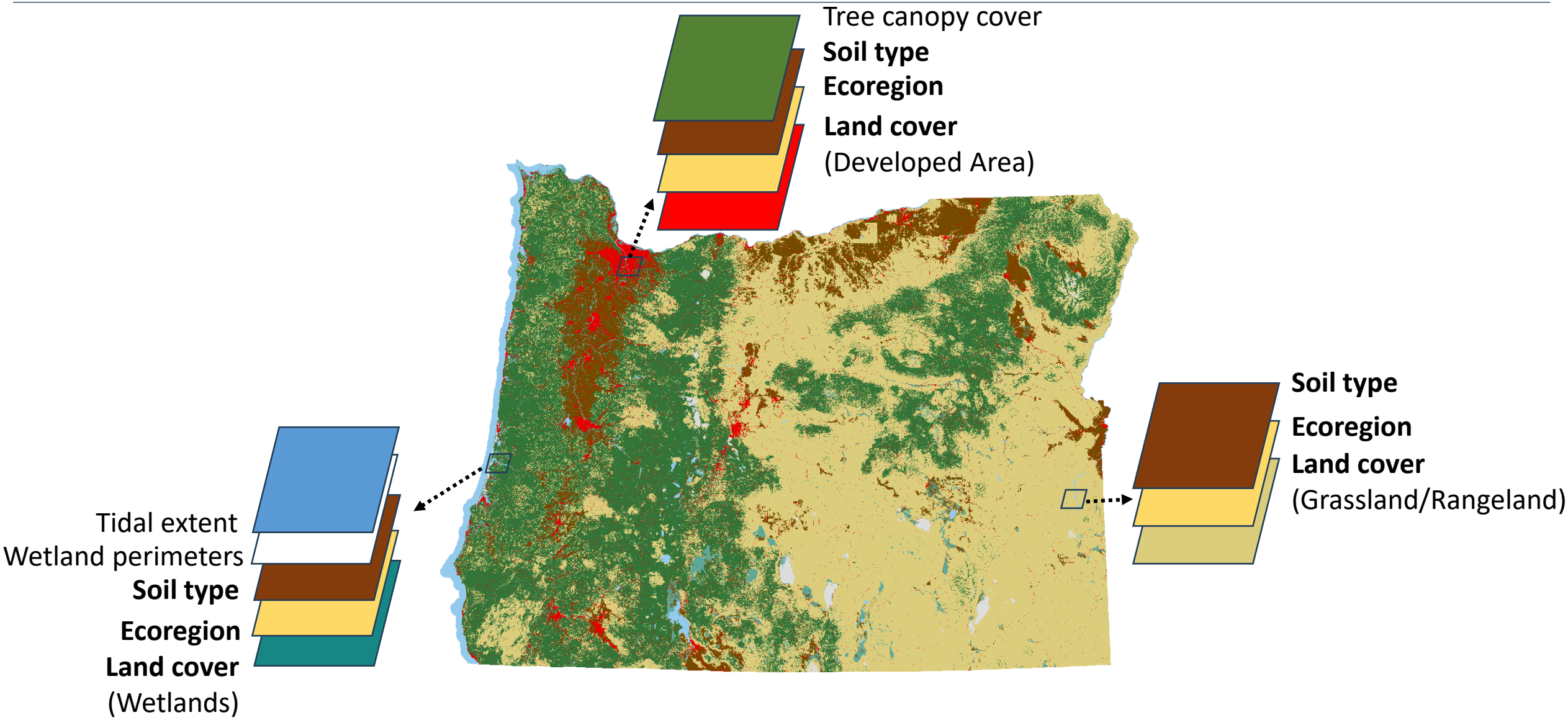

Includes bare soil, rock, and ice
Emissions estimated for transitions only

**Other Land**

# OREGON'S ECOREGIONS



# HOW INVENTORY DATA ARE USED



# STATE-LEVEL DATASETS CONSIDERED

- More than 30 datasets reviewed. See Appendix D of the draft for the complete list.
  - Identifies “Used” or “Not Used”
  - What improvements to the dataset would aid future application in inventory?
- Always welcome new datasets for review.



**Appendix D – State-specific Datasets Reviewed for Inventory**

The table below catalogues the state datasets considered for use in the Inventory, some key information about them, whether they were ultimately used, and why.

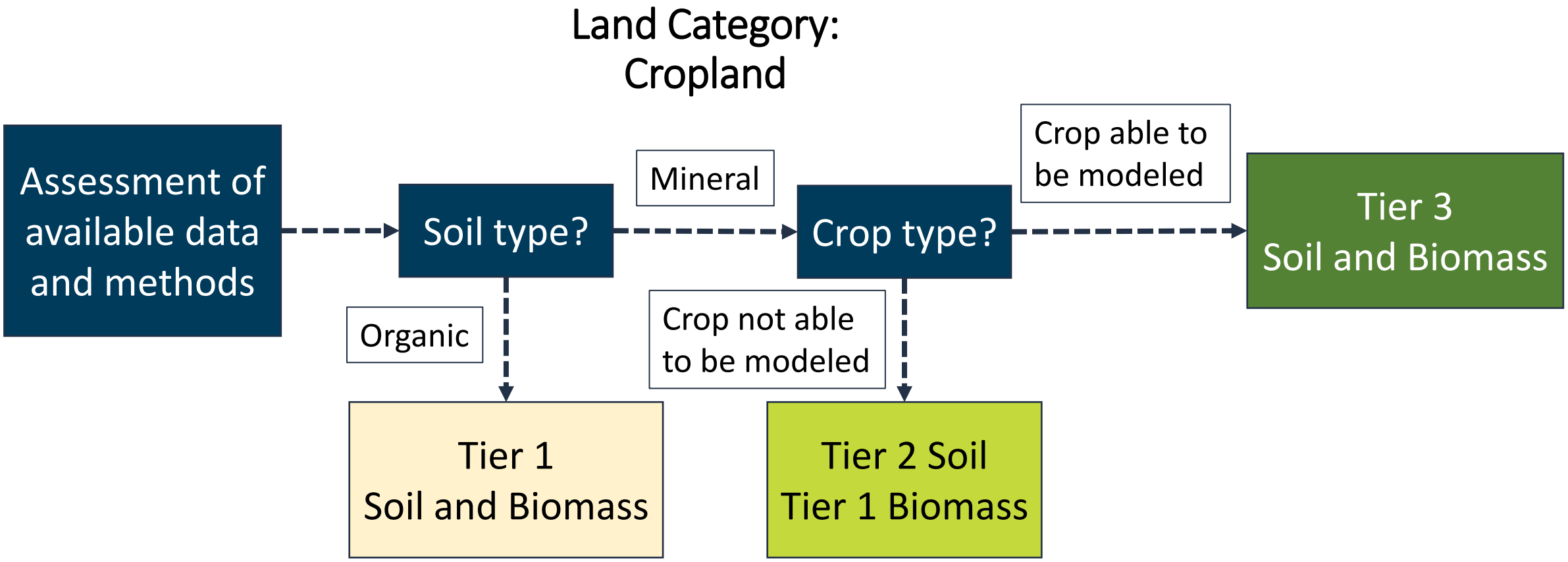
| Number ID | Dataset/Data of Interest within Dataset | Source Oregon Agency | Description | Spatially explicit (yes/no) | Used or Not Used | Reason Used/Not Used |
|---|---|---|---|---|---|---|
| 1 | Tree species viability scores | ODF | Suitability of local climate to various tree species in future years using climate change models | Yes | Not Used | Data currently does not contain information on stocks or accumulation of carbon in trees.<br><br>Potential for future use if periodic measurements of growth are conducted. |
| 2 | Various simulated vegetation change layers based on climate projections | ODF | Various simulated vegetation change layers based on climate projections | Yes | Not Used | Data does not align with the inventory analysis, which requires ex-post data.<br><br>Not suitable for direct use in Inventory, however, could be used to validate other datasets. |
| 3 | Vegetation Type (forest) | ODF | Modeled forest vegetation characteristics, densities, size classes | Yes | Not Used | Data currently does not have a temporal component.<br><br>Potential for future use if regularly updated and |

# INVENTORY METHODOLOGICAL TIERS

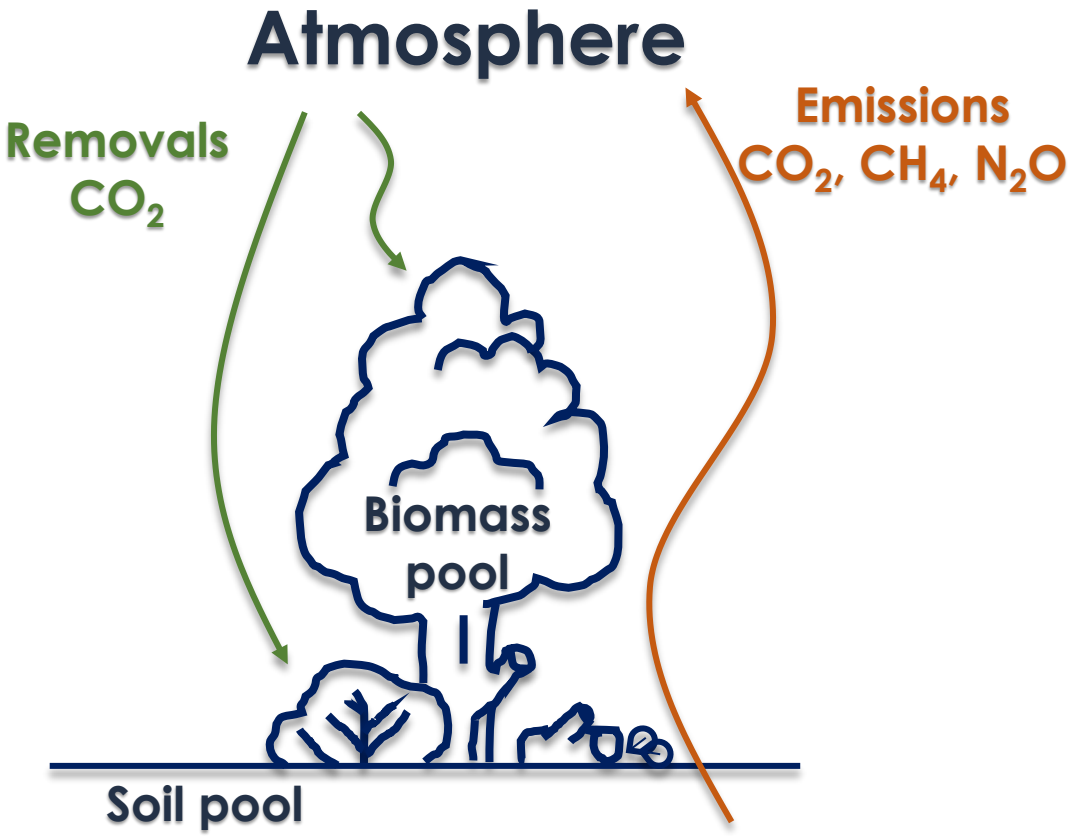
| Tier 1 | Tier 2 | Tier 3 |
| --- | --- | --- |
| Uses **data specific to country** | Uses **data specific to country** | Uses **data that may be more specific to state or region** |
| Employs **default emission factors** | Employs **improved emission factors** | Employs **models and field studies** |
| **May *not* capture many** land management practices | **May capture some** land management practices | **May capture more** land management practices |

**Complexity/Accuracy**

# METHODOLOGICAL TIER DECISION TREE EXAMPLE



# KEEP IN MIND




- Lands may emit GHGs through natural processes.
- Lands can produce net GHG emissions but store additional carbon every year.
- Lands contain carbon stocks. Protecting those stocks is critical. If they are not protected, they become emissions.
- The Inventory focuses on emissions and removals. The team will talk less about carbon stocks.

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# UP NEXT

**Land-based Net Carbon Inventory**

- Inventory Scope
- Land Classification
- Statewide Totals – Q&A
- Land Categories:
  - Forest Land
  - Biomass Burning – Q&A
  - Grassland and Rangeland
  - Cropland – Q&A
  - Wetlands
  - Developed Area
- Interpretation – Q&A

Katie Goldman
Strategy, cross-cutting, GHGMI

Anup Joshi
Forestry, grasslands, GHGMI

Olga Lyandres
Biomass burning, developed land, GHGMI

Robert Parkhurst
Croplands, grasslands, Sierra View

Lena Capece
Wetlands, Silvestrum

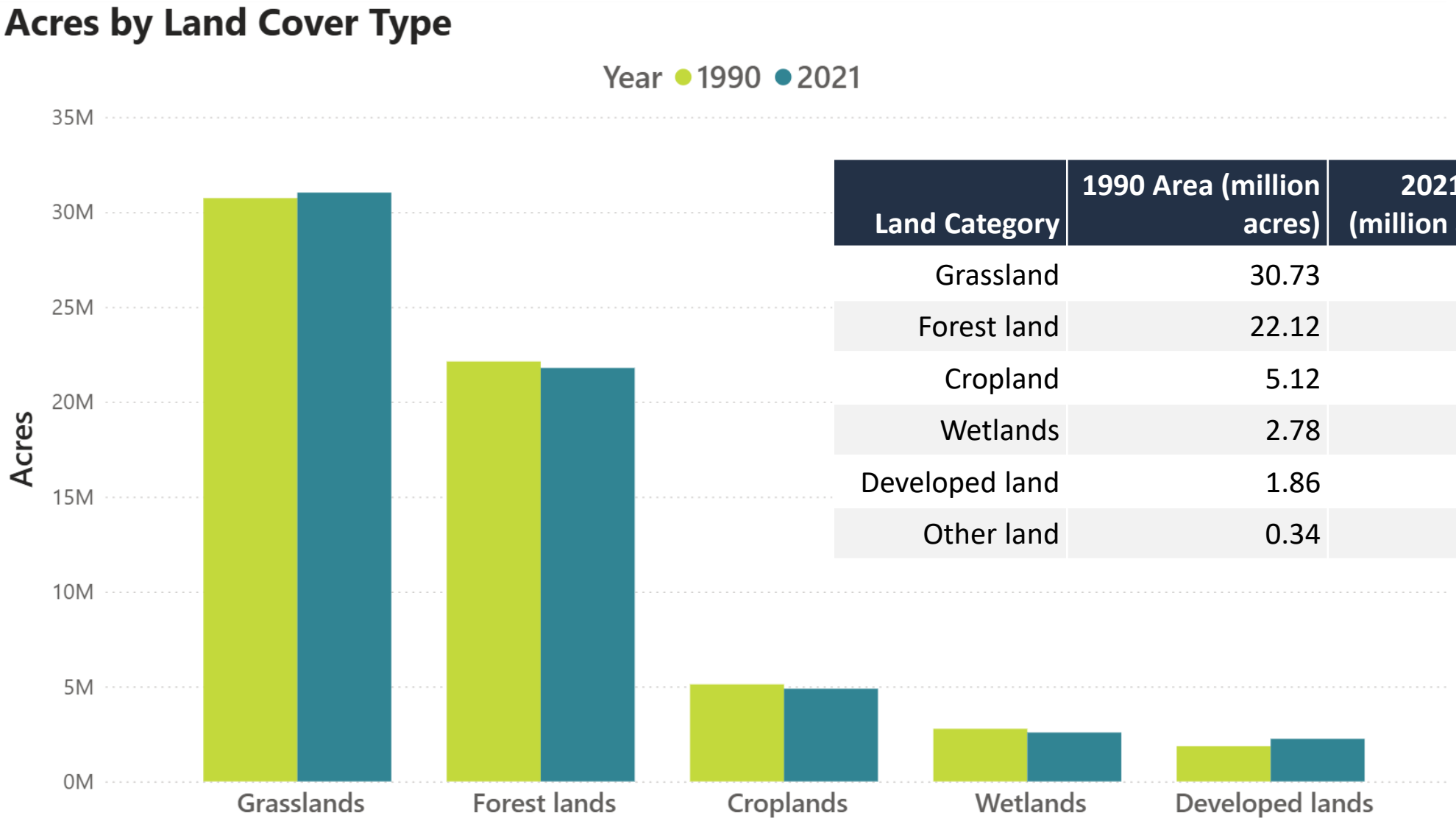
# INVENTORY SCOPE

- Accounts for **all land** in the state.
- Aligned with Intergovernmental Panel on Climate Change (IPCC) Guidelines and national GHG inventory land sector methodology.
- Accounts for emissions and removals due to **carbon stock changes** on lands AND **non-$CO_2$ emissions ($CH_4$ and $N_2O$)** specific to the land categories.
- Estimating emissions for 49 categories, by land type and gas.
  - 18 Tier 1
  - 22 Tier 2
  - 9 Tier 3
- Time series: 1990-2024.

# IMPORTANT NOTES

- The National Land Cover Database (NLCD) is used to classify land:
  - Classification based on cover not function & management.
  - Best available wall-to-wall coverage over time.
  - NLCD data is joined with other spatial datasets to identify soils types, forest groups, eco-regions.
  - Needs to be supplemented with other functional datasets in the future to improve.
- Given data gaps, assumptions are made:
  - Activity data is interpolated between available datasets.
  - For years following the last available land cover dataset, area is held constant to until new dataset is available.
- Organic soils are assumed to be drained in croplands and developed land areas.
- Future inventory cycle will prioritize improvements and refine assumptions.

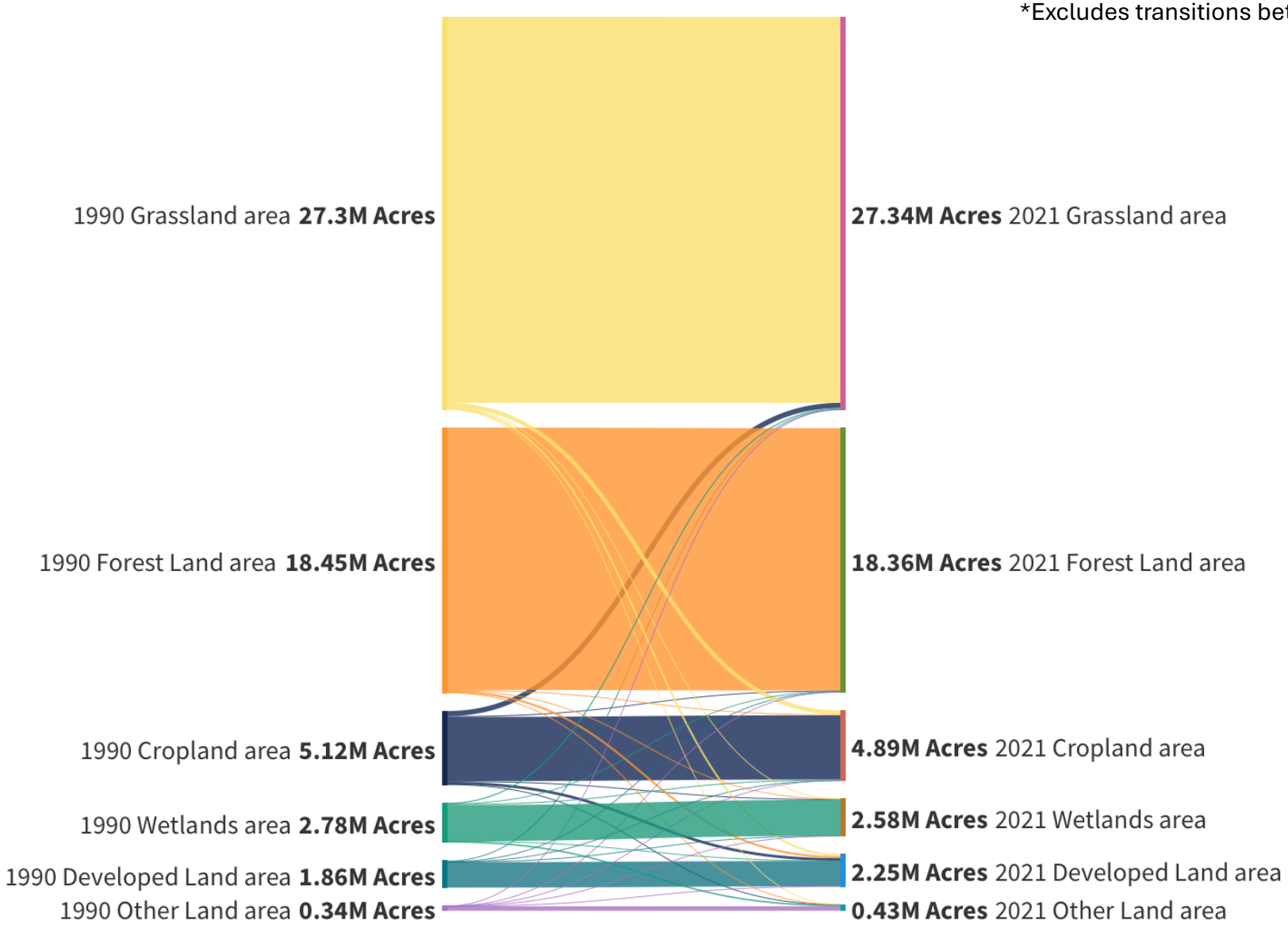
# RESULTS: LAND COVER CHANGE SNAPSHOT



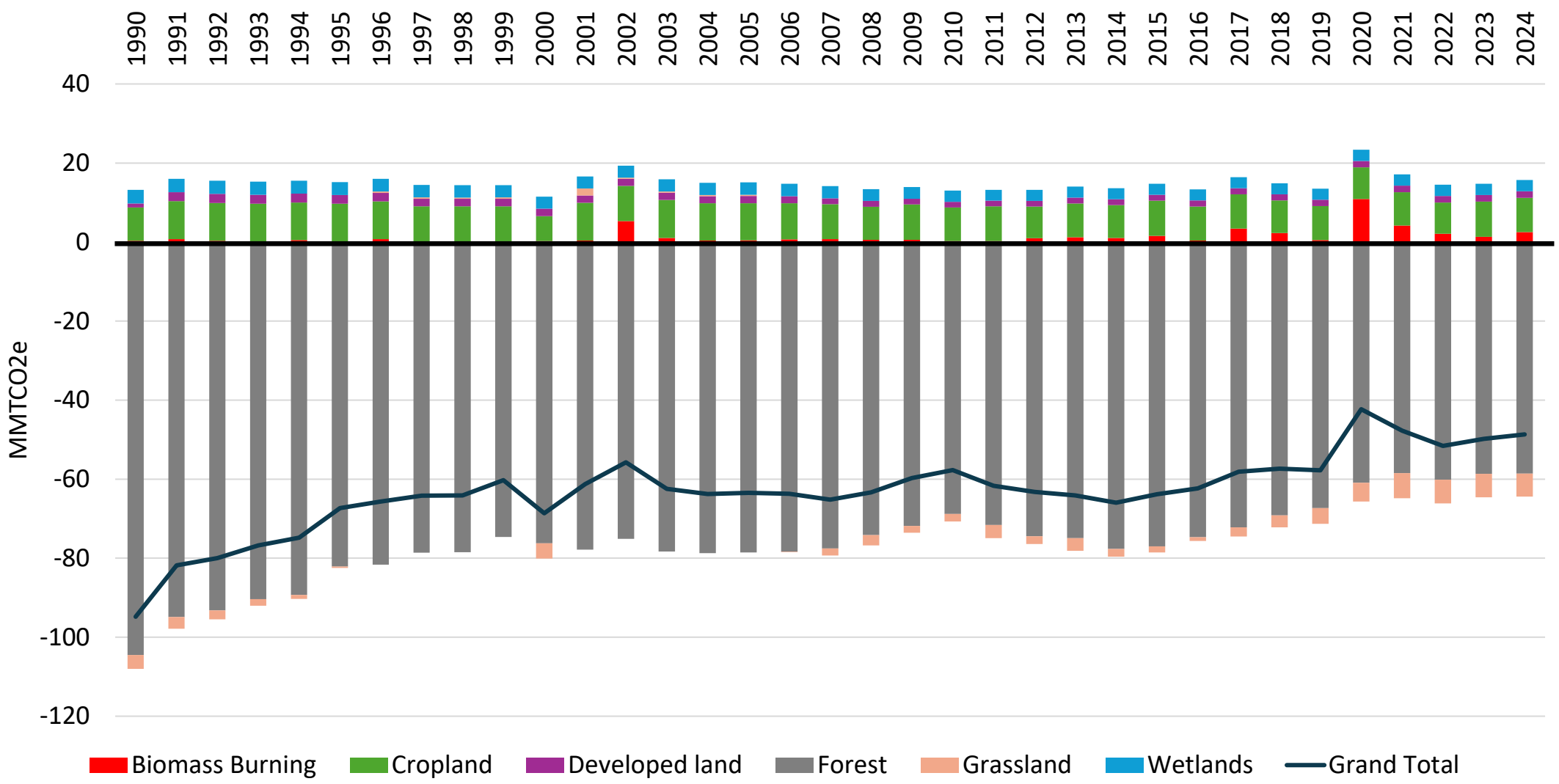

| Land Category | 1990 Area (million acres) | 2021 Area (million acres) | % change |
|---|---|---|---|
| Grassland | 30.73 | 31.02 | 0.9% |
| Forest land | 22.12 | 21.79 | (1.5%) |
| Cropland | 5.12 | 4.89 | (4.5%) |
| Wetlands | 2.78 | 2.58 | (7.0%) |
| Developed land | 1.86 | 2.25 | 20.7% |
| Other land | 0.34 | 0. 42 | 24.2% |

# LAND COVER TRANSITIONS

*Excludes transitions between forest land and grassland



# GRAND TOTAL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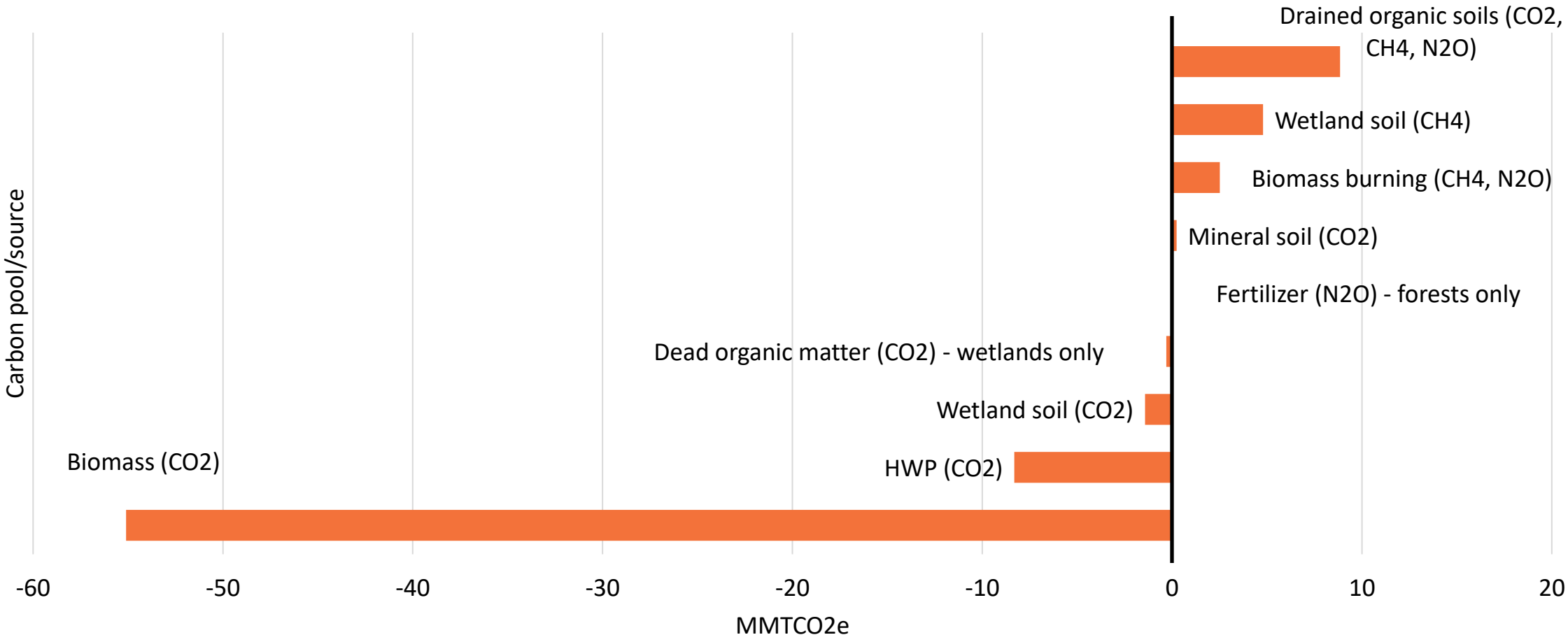
MMTCO2e
Biomass Burning
Cropland
Developed land
Forest
Grassland
Wetlands
Grand Total

# DISTRIBUTION OF EMISSIONS AND REMOVALS IN 2024



# MAIN TAKE AWAYS

Net removals decreased from **95 MMTCO2e to 49 MMTCO2e** between 1990 and 2024.

More $CO_2$ is removed from the atmosphere and stored in biological carbon pools than the amount of $CO_2$, $CH_4$, and $N_2O$ emitted overall.

- Net $CO_2$ removal is primarily due to $CO_2$ sequestered and stored in forest biomass and in durable harvested wood products produced from Oregon forests.
- Draining organic soil to manage cropland and to build on developed land is the largest source of GHG emissions.
- Methane emissions from wetlands is a relatively large source of emissions; however, wetlands are also a carbon sink.
- Wildfires and prescribed burns are also important sources of emissions, which are increasing.
- Cropland is a source of emissions, while grazing lands are a sink.

# MAIN TAKE AWAYS

National Land Cover Dataset is currently the best available data for designating land categories, but it has limitations that are worth exploring.

Expanding regional data on carbon fluxes across land-use categories, would enhance the robustness and accuracy of the inventory.


Q&A

# FORMAT OF RESULTS SLIDES

# DATA & METHODS

**What is included:**

Area of forest by:

- NLCD class (deciduous, coniferous, mixed), Forest group type, soil type

Emissions/removals:

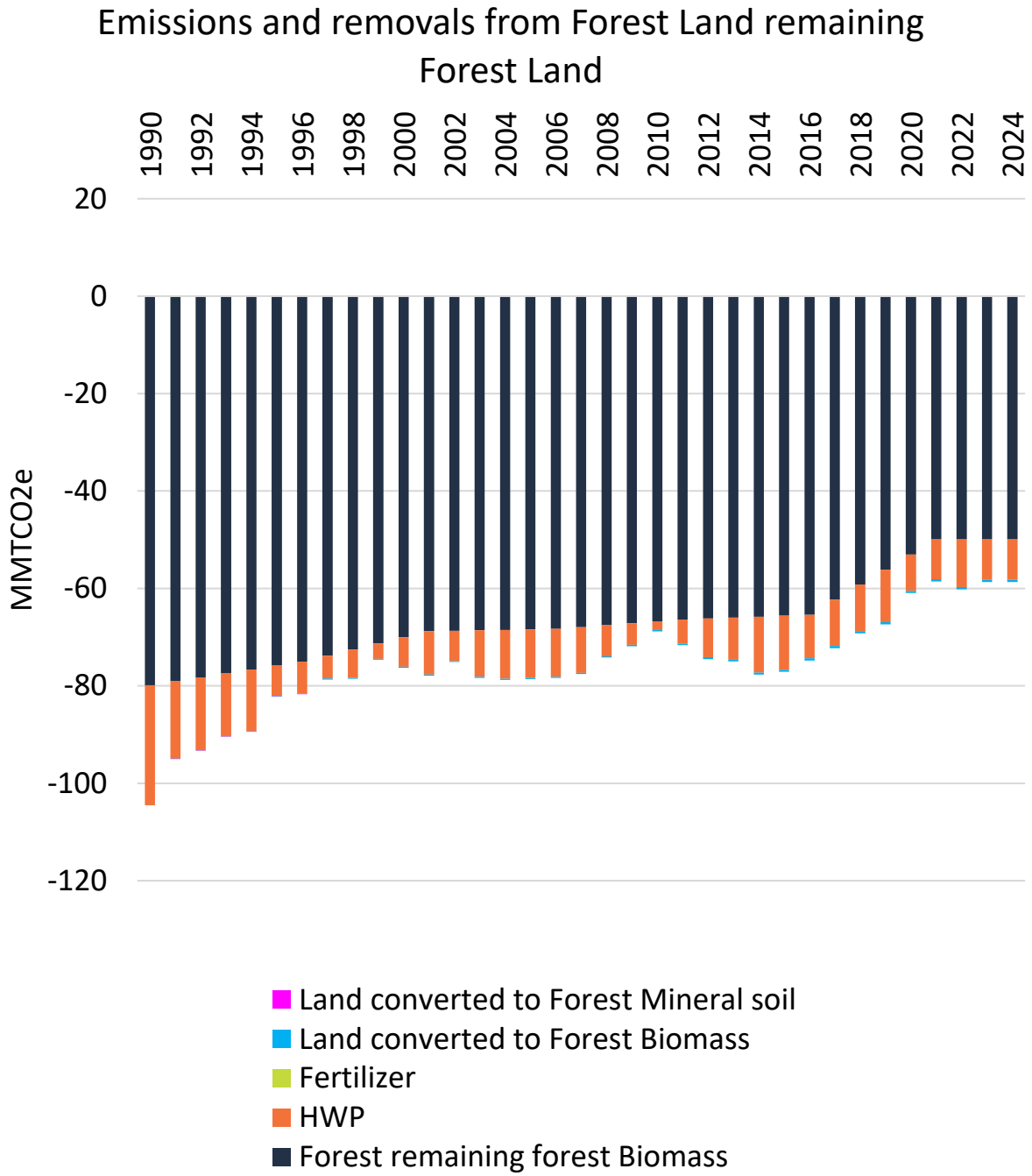
- Biomass
- Harvested wood product pool
- Amount of nitrogen (fertilizer) applied

**Data Sources:**

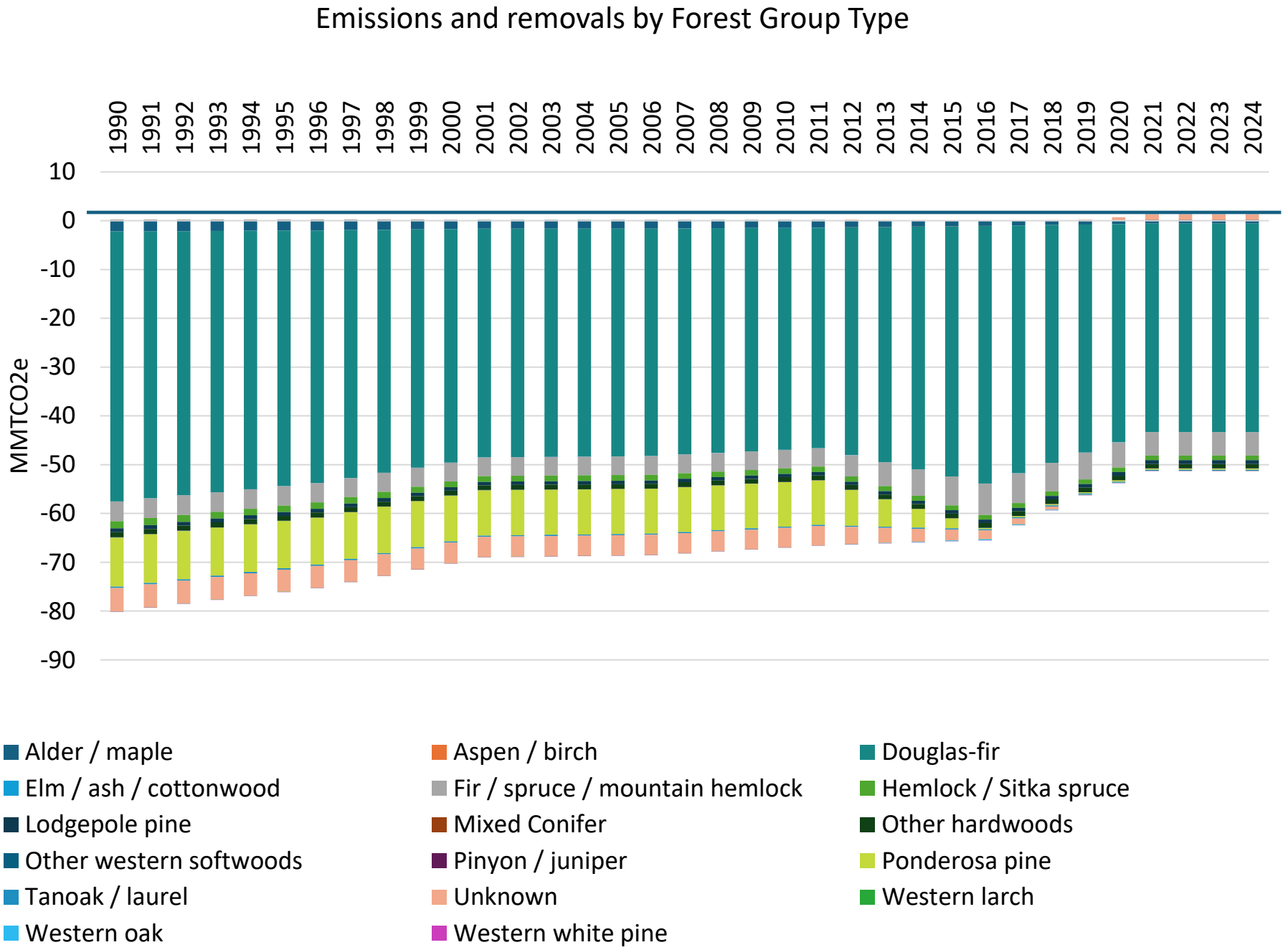
- USGS National Land Cover Database (NLCD)
- USFS Forest Inventory & Analysis Database (FIA)
- ODF - Timber harvest, FERNS database

Forest Land

| | 1990 MMTCO2e | 2024 MMTCO2e |
|---|---|---|
| **Biomass** | -79.9 | -50.35 |
| **$N_2O$ from Fertilizer** | 0.033 | 0.035 |
| **Mineral soils** | 0.000 | 0.034 |
| **HWP** | -24.67 | -8.31 |



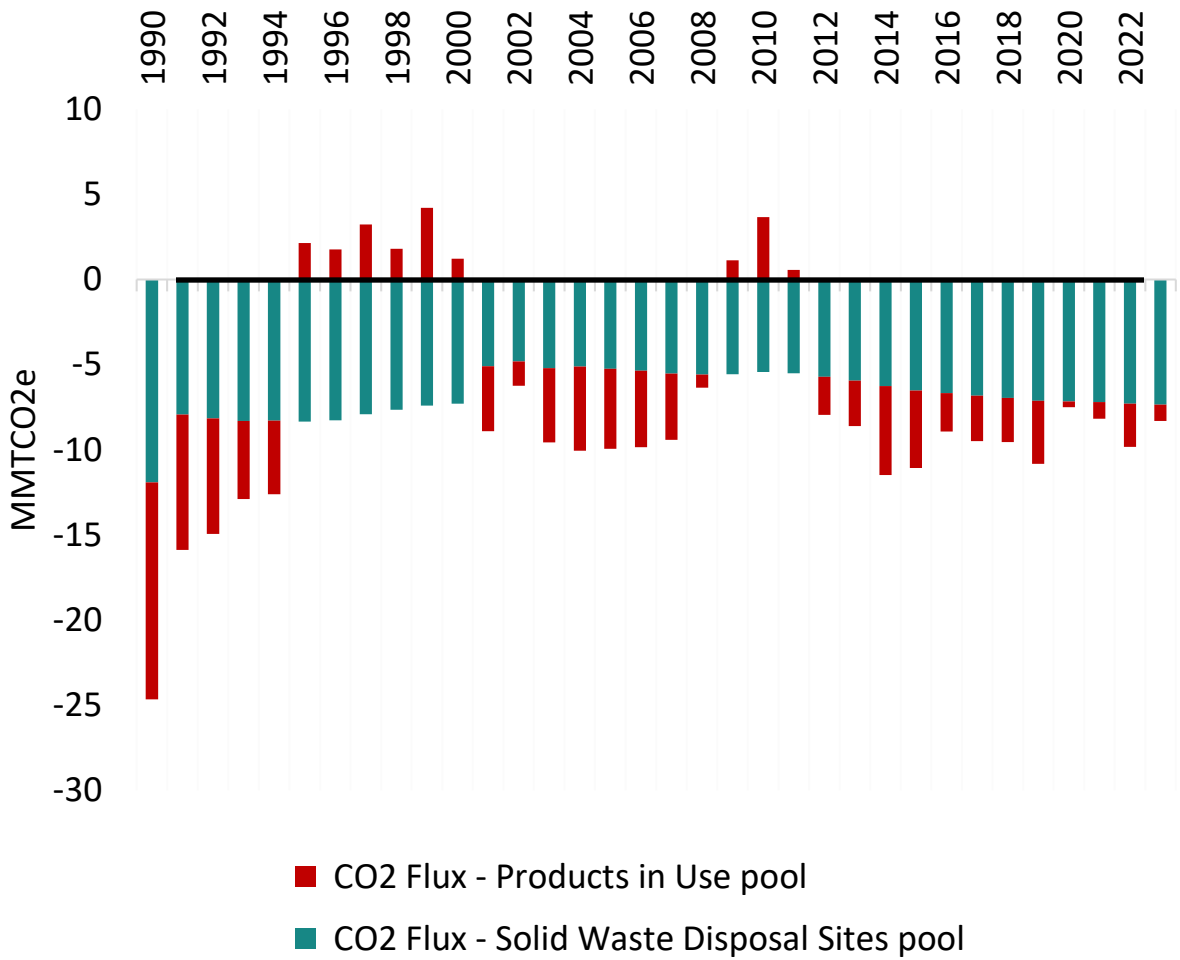
Emissions and removals by forest group types



# Harvested Wood Products*

| | 1990 MMTCO2e | 2024 MMTCO2e |
|---|---|---|
| **Harvested Wood Products** | -24.67 | -8.31 |

CO2 emissions/removals from Harvested Wood Products




*ODF methodology used

FOREST

# SUMMARY FINDINGS

- **Oregon's forests are a significant climate asset**, removing approximately 50 MMTCO2e annually - a substantial carbon sink.
- **Harvested Wood Products act as a sink,** removing additional 8.3 MMTCO2e in 2024. As harvests decreased, the amount removed by HWPs also decreased.
- **Forests are critical to Oregon's climate mitigation strategy.** The forest sector's annual carbon removal plays a major role in removing greenhouse gas from the atmosphere.

# FUTURE IMPROVEMENTS

- Enhance NLCD classification accuracy — integrate disturbance data to refine forest classifications and improve consistency
- Identify optimal forest mask dataset — evaluate statewide GIS layers for most accurate forest extent data
- Quantify uncertainty — conduct error propagation analysis to provide confidence intervals for $CO_2e$ estimates

BIOMASS BURNING

# DATA USED & METHODS

What is included:

- $CH_4$ and $N_2O$ emissions from wildfires on grassland and forest land
- $CH_4$ and $N_2O$ emissions from prescribed burns activities: broadcast, grassland, pile, landing, underburns, and right of way burns

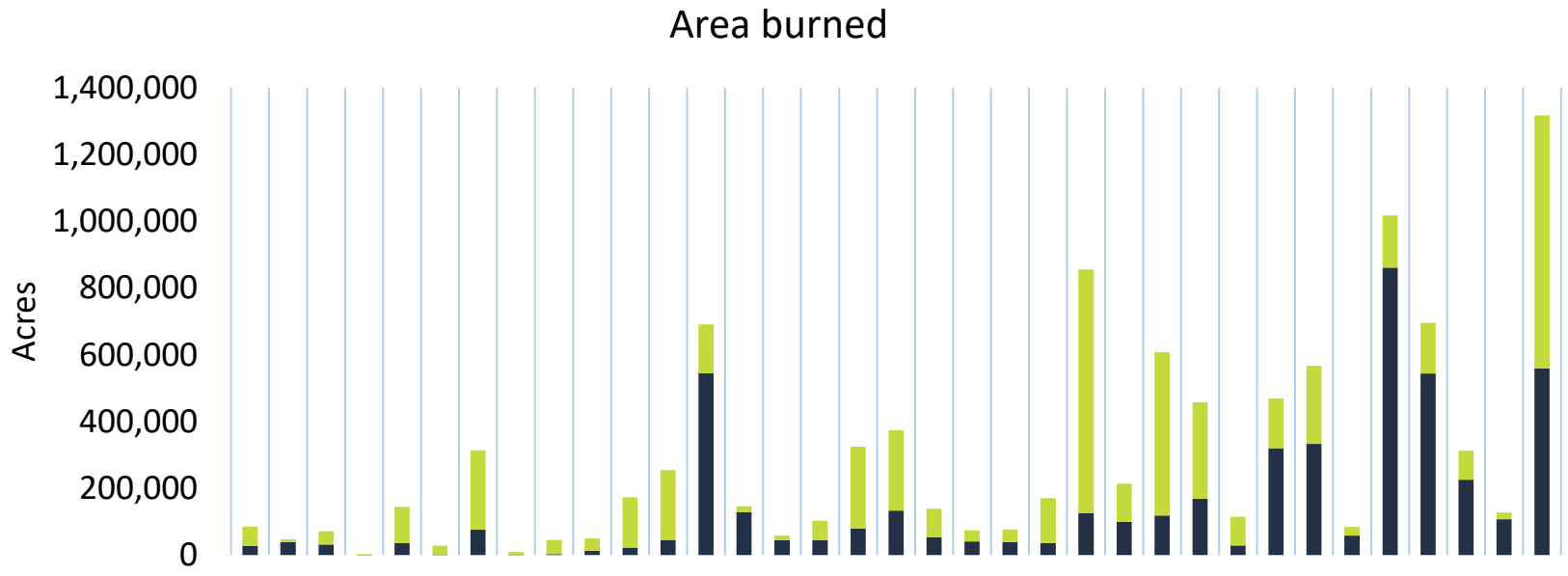
Data sources:

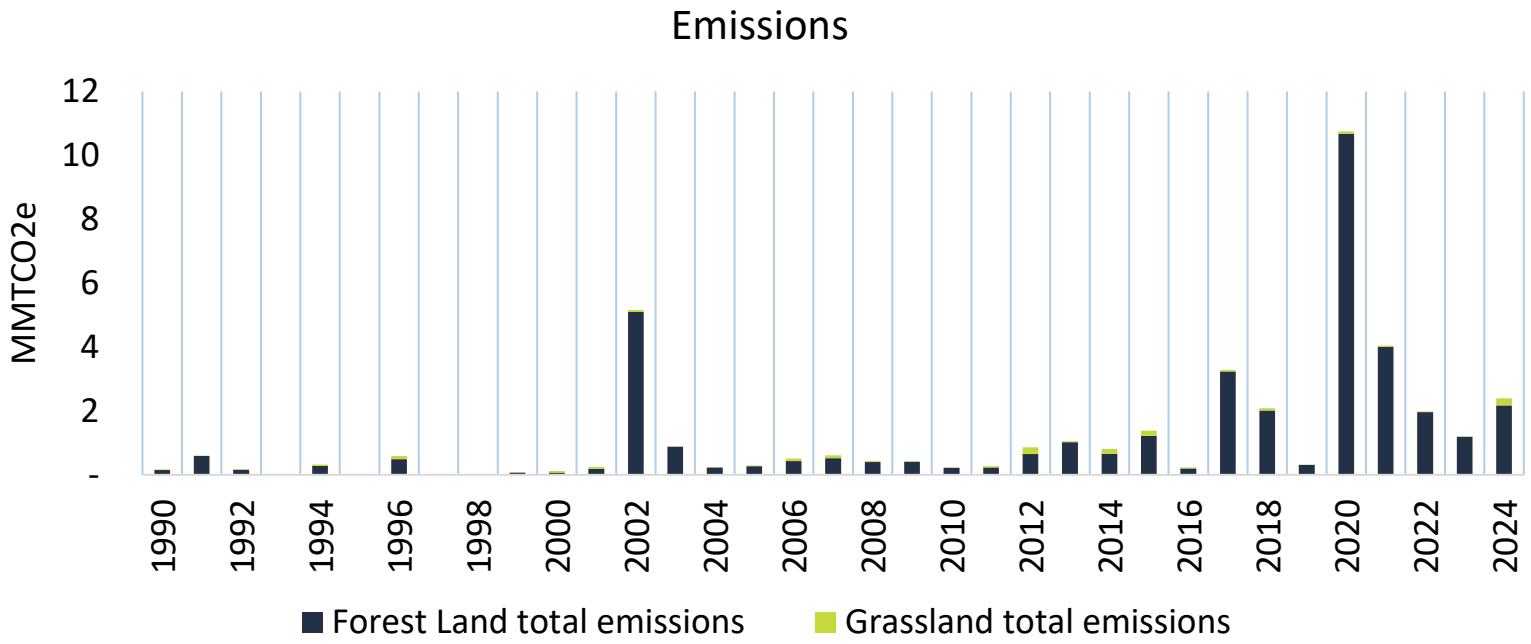
- ODF historic burn perimeters
- MTBS burn perimeters
- MODIS burn perimeters, NIFS burn perimeters
- ODF Smoke management program prescribed burn activities

PBS News

# Biomass Burning: Wildfires

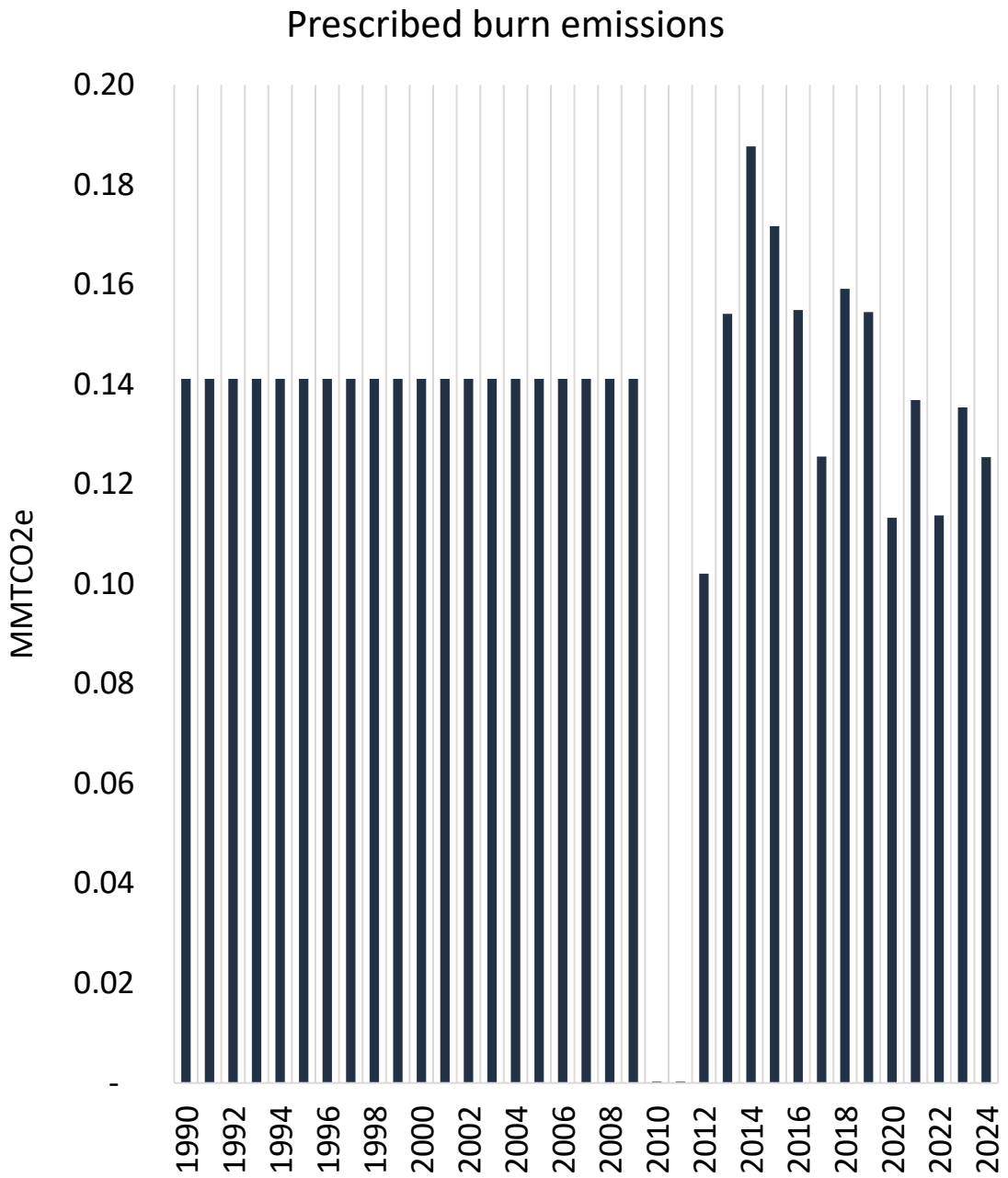
| | 1990 MMTCO2e | 2024 MMTCO2e |
|---|---|---|
| **Wildfires** | 0.17 | 2.39 |



# Biomass Burning: Prescribed burns

| | 1990 MMTCO2e | 2024 MMTCO2e |
|---|---|---|
| **Prescribed burns** | 0.14 | 0.13 |



# SUMMARY FINDINGS

- The consistent increase in wildfire emissions underscores the need to integrate fire management and risk reduction into climate and land-use strategies.
- While these are natural disturbances, their increasing magnitude highlights how climate change and land management interact to shape the state's carbon balance.
- Prescribed burn emissions represent approximately 5% of wildfire emissions in 2024, landing and pile burns contributing the most to emissions.

# FUTURE IMPROVEMENTS

- For wildfires, improved data collection at the state level would enhance the completeness of the burn area mapping and reduce discrepancies with national data.
- For prescribed burns, the collect data to capture burn perimeter to enable more advanced estimation methodology using the WFEIS tool.
- The inventory team utilize the support of the WFEIS team to conduct analysis, understand tool improvements and refine the modeling parameters.


Q&A

# DATA & METHODS

**What is included:**

Area of cropland by:

- Soil type, EPA Ecoregion/County

Emissions/removals:

- Biomass, soil, nitrous oxide, methane

**Data Sources:**

- USGS National Land Cover Database (NLCD)
- EPA Level 3 Ecoregions
- USDA SSURGO soil data
- USDA Census and Survey
- USGS fertilizer data
- Local agronomic experts

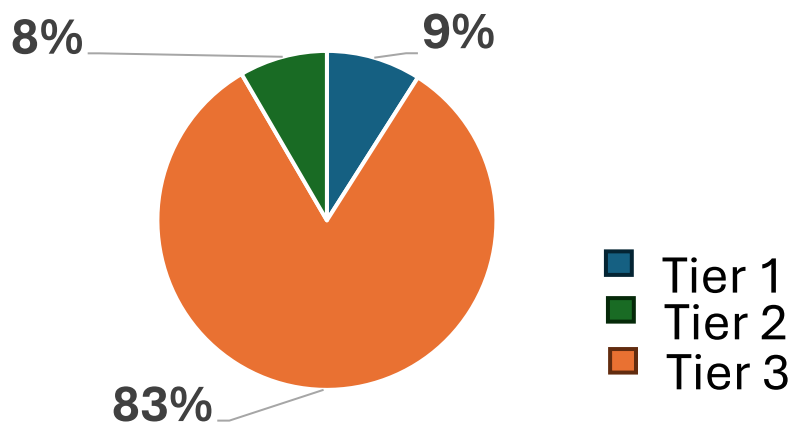
# METHODS

| Non-Modeled Crops – Tier 2 | |
|---|---|
| Apples | Hazelnuts |
| Blackberries | Hops |
| Blueberries | Mint |
| Boysenberries | Onions |
| Broccoli | Peaches |
| Carrots | Pears |
| Cauliflower | Plums |
| Cherries | Pumpkins |
| Cranberries | Raspberries |
| Cucumbers | Squash |
| Garlic | Strawberries |
| Grapes | Watermelon |

| Modeled Crops – Tier 3 | |
|---|---|
| Alfalfa | Peas |
| Barley | Potatoes |
| Beans | Rye |
| Corn | Sugar beets |
| Hay | Wheat |
| Oats | |

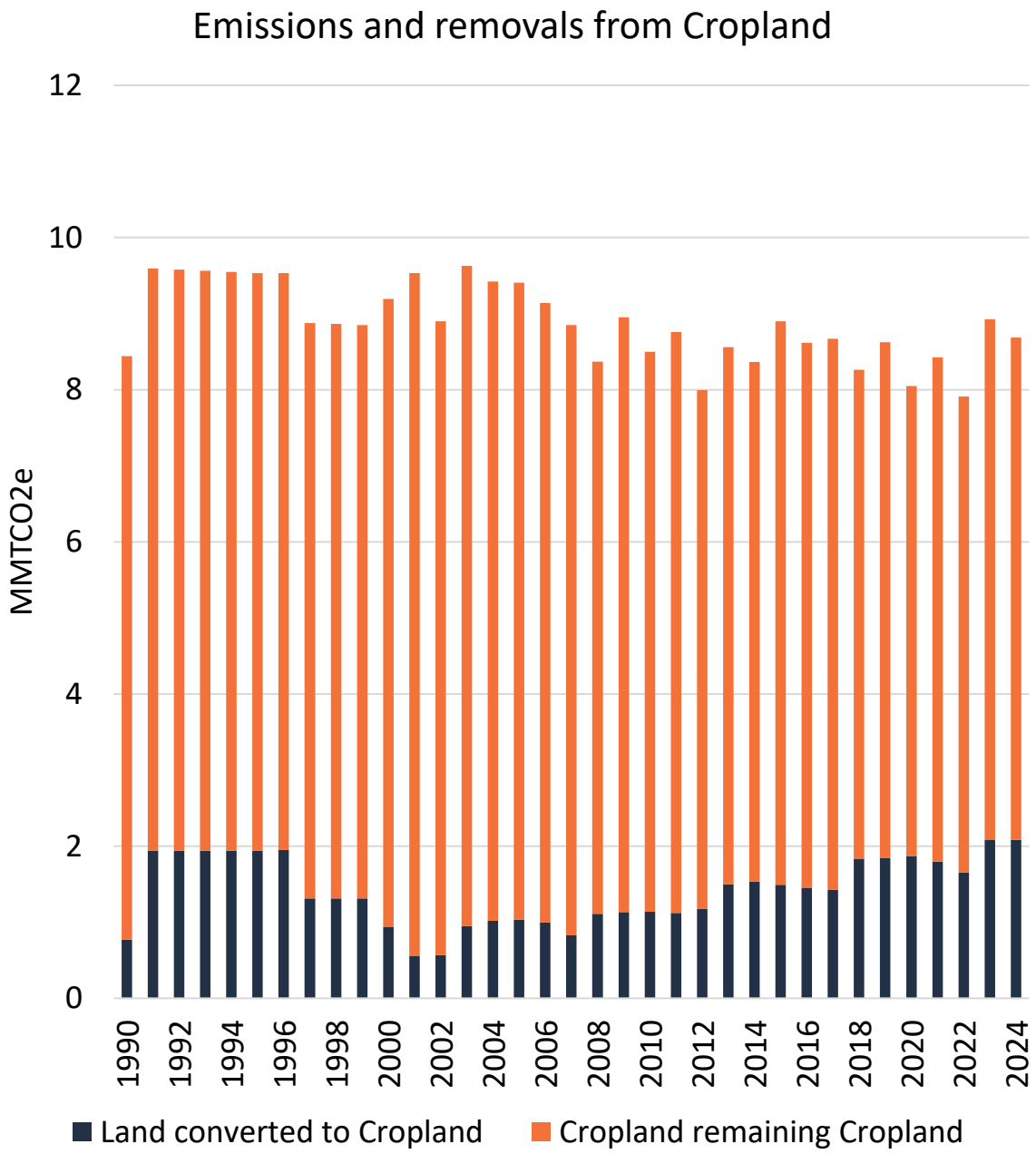
Crop rotations for modeled crops:

- Alfalfa – Oats
- Corn – Wheat – Alfalfa
- Potato – Oats – Beans
- Spring Wheat – Fallow
- Sugar beets – Barley – Beans
- Winter Wheat – Fallow
- Winter Wheat – Peas



# Cropland

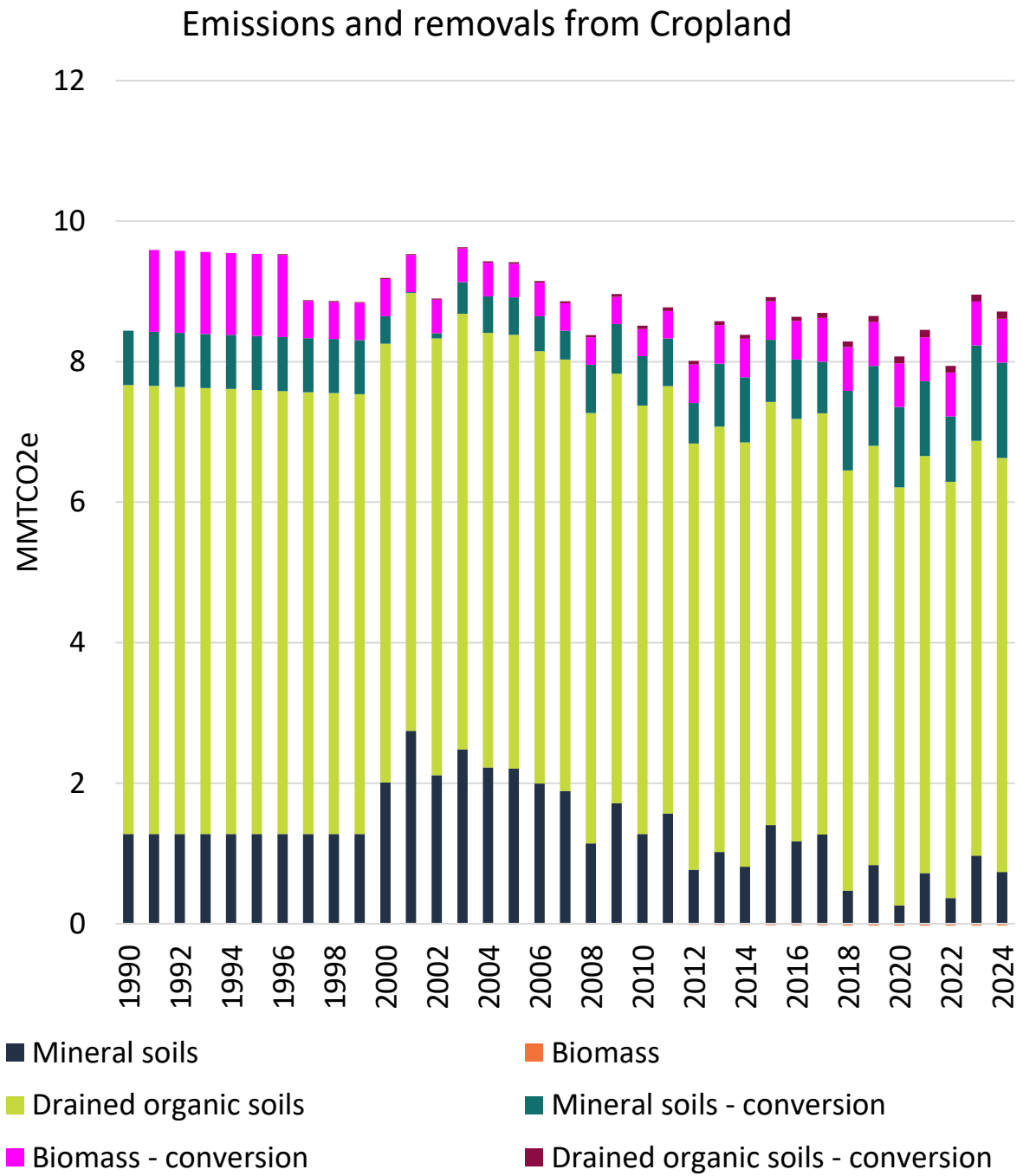
| | 1990 MMTCO2e | 2024 MMTCO2e |
|---|---|---|
| **Cropland** | 8.4 | 8.7 |



# Cropland emissions by source

| | 1990 MMTCO2e | 2024 MMTCO2e |
|---|---|---|
| **Mineral soils** | 1.28 | 0.74 |
| **Biomass** | -0.000 | -0.028 |
| **Drained organic soils** | 6.4 | 5.9 |

| | 1991 MMTCO2e | 2024 MMTCO2e |
|---|---|---|
| **Mineral soils** | 1.54 | 2.7 |
| **Biomass** | 1.2 | 0.62 |
| **Drained organic soils** | - | 0.102 |



# SUMMARY FINDINGS

- **Organic soils in Oregon are a significant emissions source when drained for cultivation.** The consistent emissions from these areas could present opportunities for potential reduction or even carbon removal projects.
- **Carbon emissions from crops grown on mineral soils have decreased over time.** Further research is needed to determine both the reason and identify additional emission reduction measures.
- **Carbon flux from cropland biomass is not significant**. The orchards, vineyards, and Christmas tree operations accumulate a small amount of carbon, but do not have a significant impact on overall emissions and removals.

# FUTURE IMPROVEMENTS

- Collect systematic management data at the state level for different cropping systems including tillage, cover cropping, use of fertilizer and soil amendments.
- Improve emission factors for drained organic soils and collect state level data on drainage practices.


Q&A

GRASSLAND

# DATA & METHODS

## What is included:

Area of grassland or rangeland by:

- Vegetation (shrubs/herbaceous), soil type, EPA Ecoregion/County

Emissions/removals:

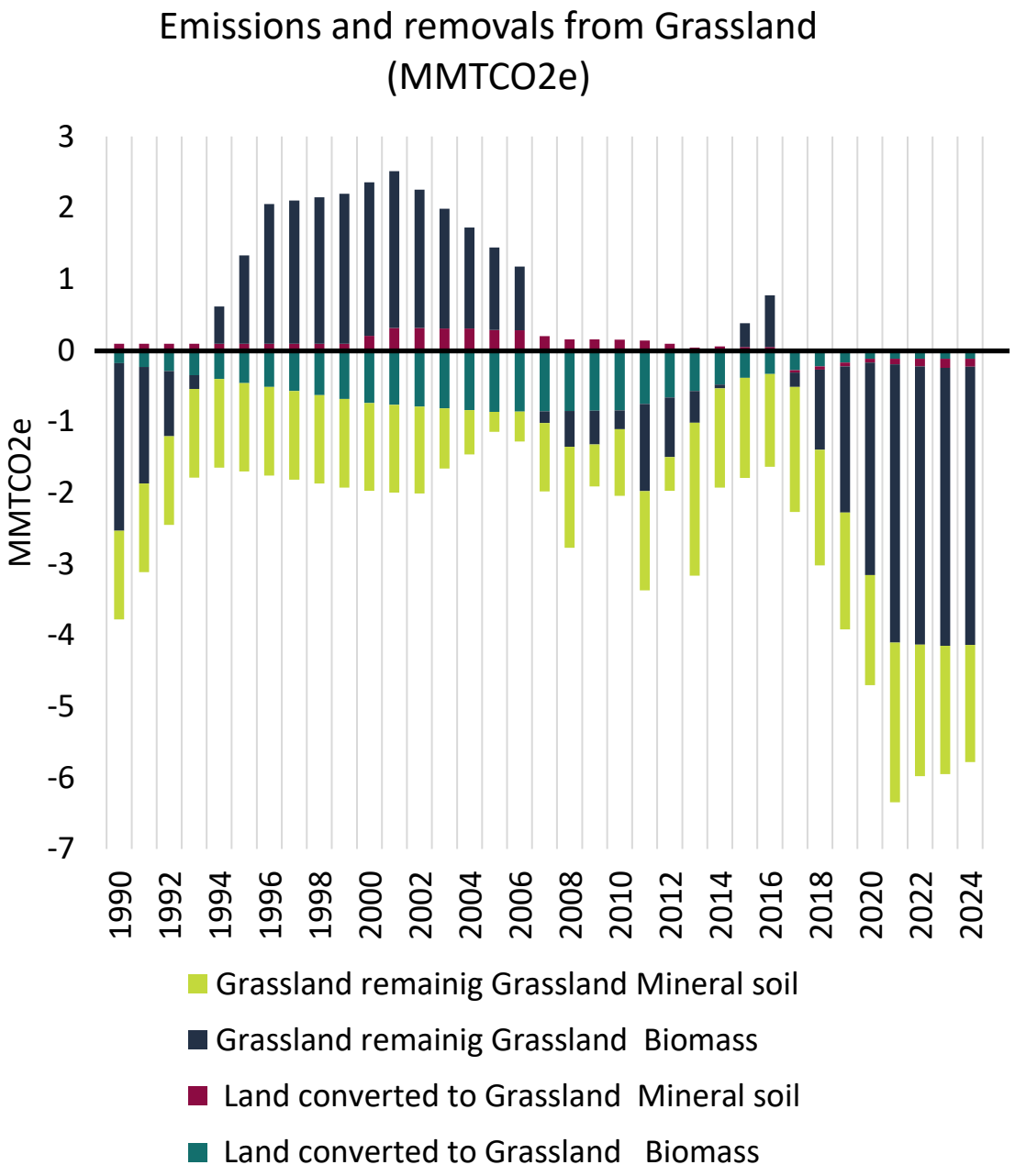
- Biomass, soil

Data Sources:

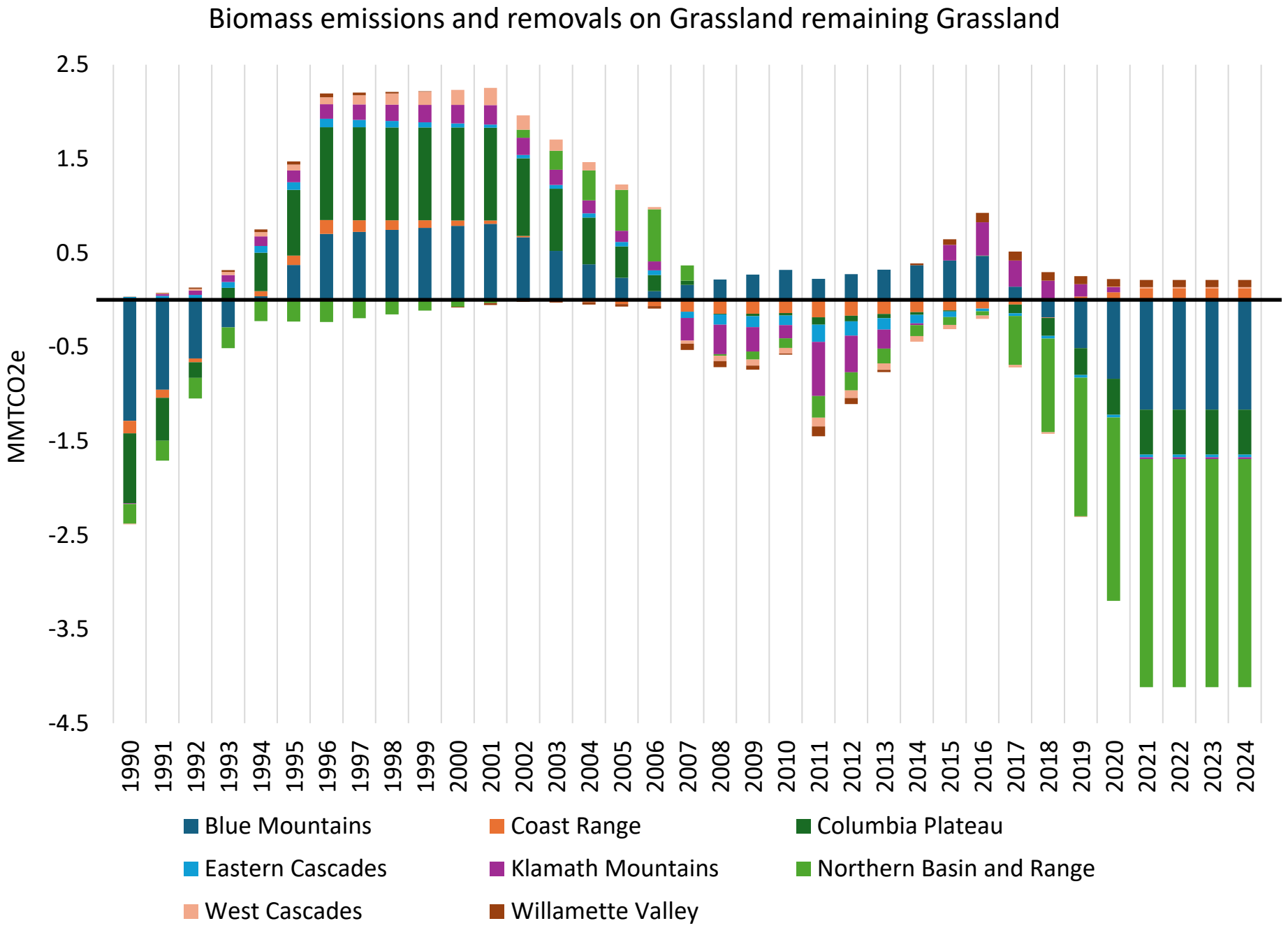
- USGS National Land Cover Database (NLCD)
- EPA Level 3 Ecoregions
- USDA SSURGO soil data
- Rangeland Analysis Program
- Local grazing and rangeland management experts

# Grassland

| | 1990 MMTCO2e | 2024 MMTCO2e |
|---|---|---|
| Mineral soils | -1.24 | -1.76 |
| Biomass | -2.35 | -4.02 |



Grassland biomass by ecoregion



# SUMMARY FINDINGS

- **Oregon's grasslands are a net sink - removing greenhouse gases from the atmosphere.**

- Carbon uptake by biomass varies by region and year, grassland mineral soils tend to remove carbon.

- **Grassland carbon is primarily stored in belowground biomass.** Belowground biomass stores twice as much carbon as aboveground vegetation, meaning grassland management strategies must prevent soil degradation to preserve climate benefits.

# FUTURE IMPROVEMENTS

- Enhance NLCD classification accuracy — integrate additional data to refine grassland classifications and improve consistency

- Collect state level data on management and grazing activities to capture potential emissions and removals as a result of management changes.


Q&A

# DATA & METHODS

## What is included:

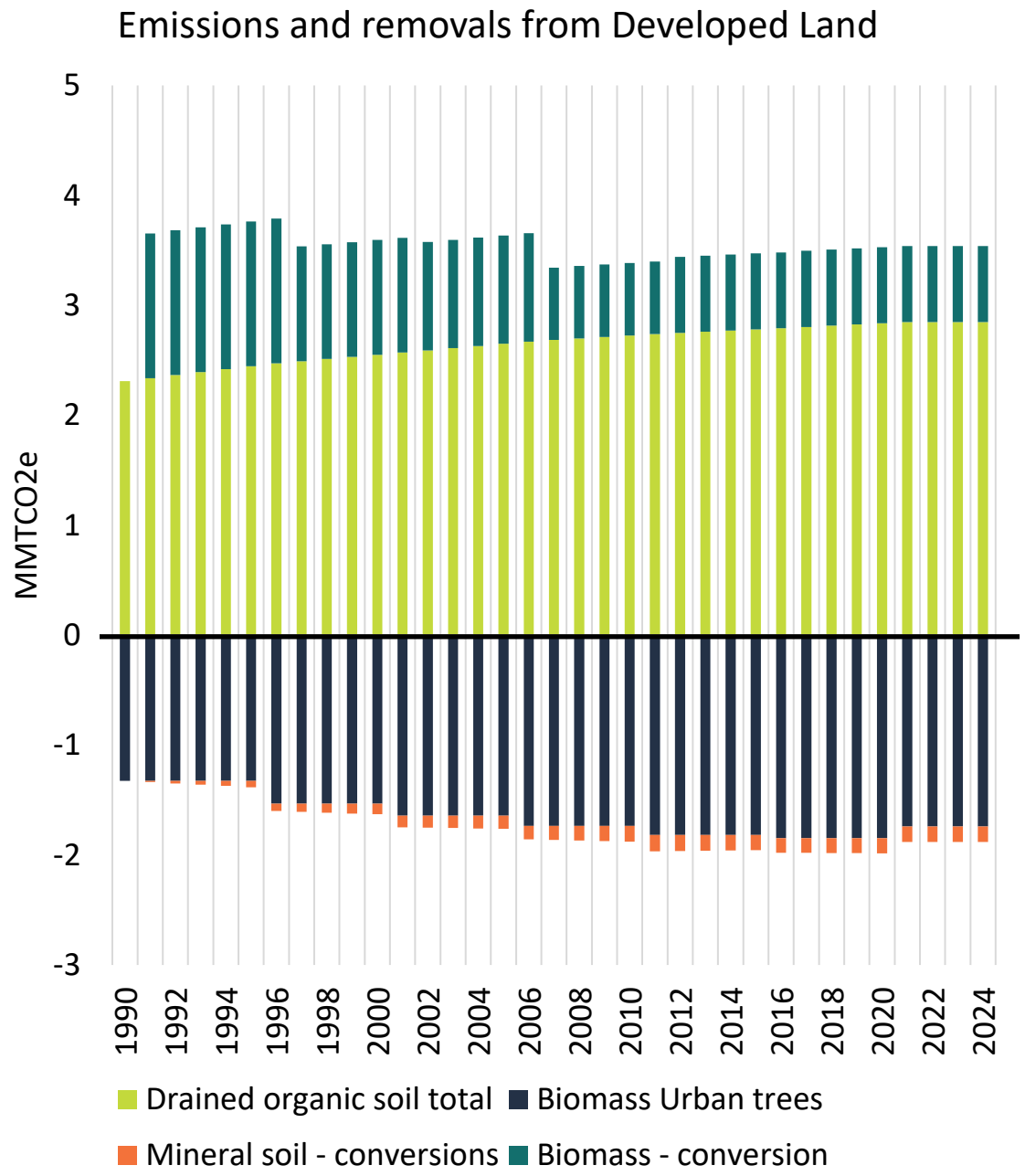
- Carbon fluxes from urban trees, by development class
- Emissions from drained organic soils
- Biomass and mineral soil carbon fluxes due to land conversions

## Data sources:

- USGS National Land Cover Dataset (NLCD)
- USGS NLCD tree cover
- USDA SSURGO soil maps
- IPCC, literature

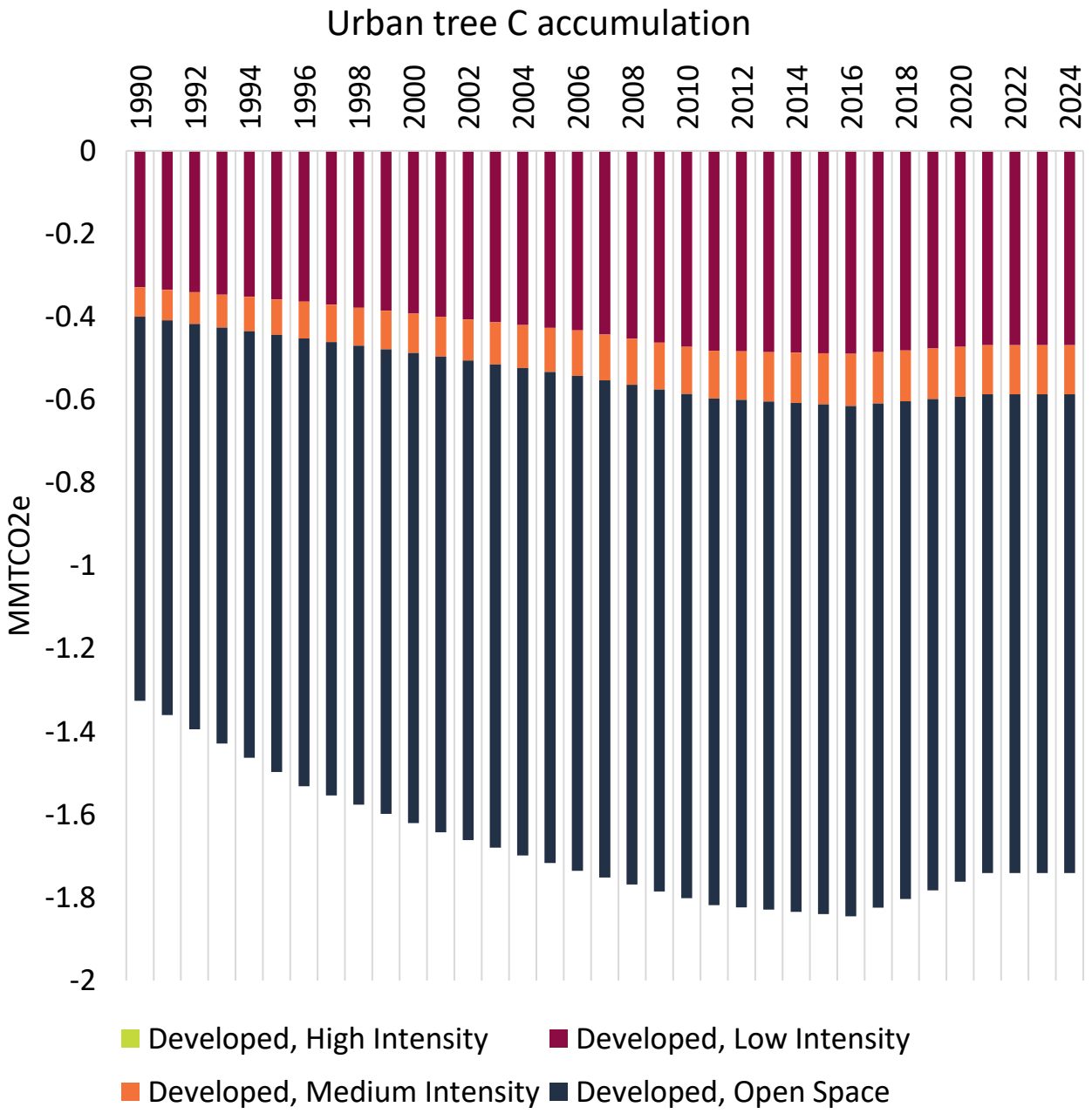
Developed Land

| | 1990 MMTCO2e | 2024 MMTCO2e |
|---|---|---|
| **Urban trees** | -1.33 | -1.74 |
| **Drained organic soils** | 2.31 | 2.85 |
| **Biomass** | 1.32 | 0.69 |
| **Mineral soils** | -0.011 | -0.141 |



Urban trees

| | 1990 MMTCO2e | 2024 MMTCO2e |
|---|---|---|
| **Urban trees** | -1.33 | -1.74 |



# SUMMARY FINDINGS

- Developed lands are a net emitter, while urban trees remove carbon from the atmosphere, there are also emissions from drained organic soils and land conversion.

- These findings emphasize the value of maintaining and expanding urban tree cover and the challenge of persistent soil emissions in developed environments.

- Conducting field studies to refine emission parameters for organic soils would improve estimate accuracy.

# FUTURE IMPROVEMENTS

- Updating and/or disaggregating the urban tree sequestration parameters by other relevant attributes would better capture urban tree characteristics across Oregon and improve estimates.
- Enhancing tree cover data and ODF state level urban tree inventory to be used for analysis and development of necessary emission parameters.
- Refinement of activity data and emission factors for drained organic soils is also recommended to improve the accuracy of the estimates. Currently it is assumed that drained organic soils behave like drained organic soils on croplands.

# DATA & METHODS

**What is included:**

Area of wetland by:

- Tidal status, wetland class, soil type, ecoregion

Emissions/removals:

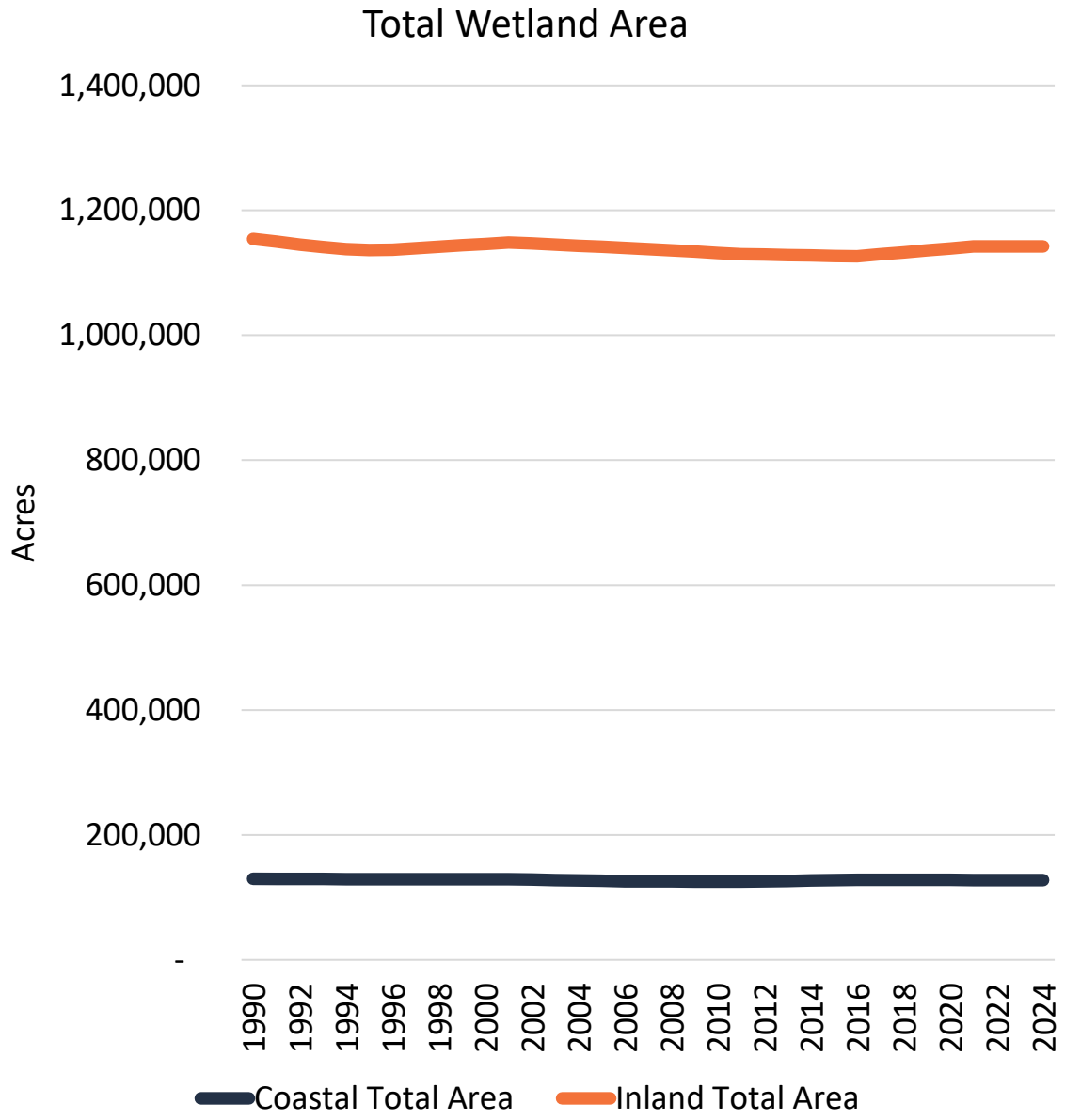
- Biomass, dead organic matter, soil, methane, nitrous oxide

**Data Sources:**

- NOAA Coastal Change Analysis Program
- Pacific Marine and Estuarine Fish Habitat Partnership
- The Nature Conservancy
- PNW Blue Carbon Working Group
- IPCC, literature

# Wetland Area

- Fairly consistent trends in area over time—no major declines or increases
- The area of coastal wetland is 10x smaller than inland wetland

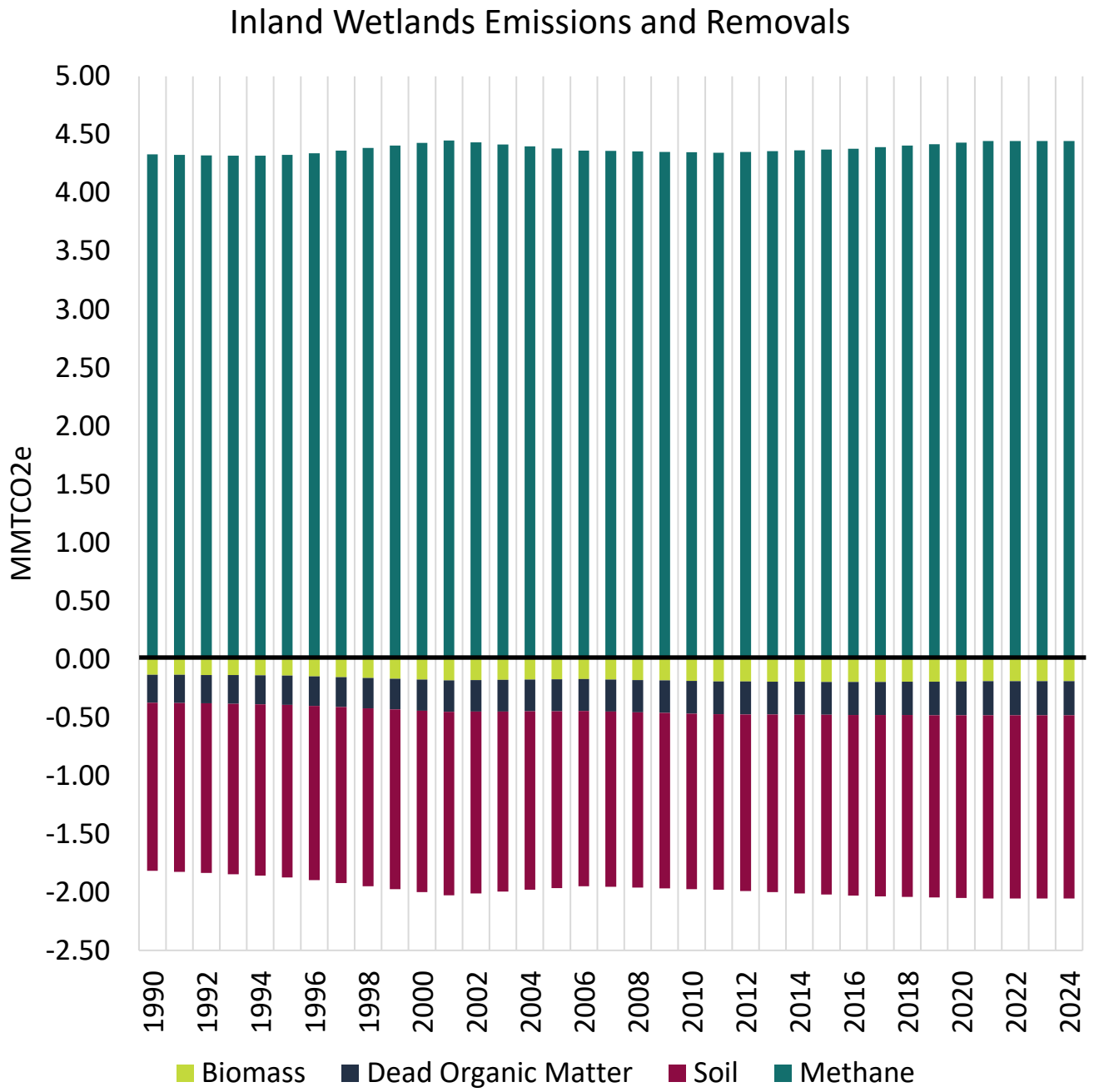


# Coastal Wetlands

| | 1990 MMTCO2e | 2024 MMTCO2e |
|---|---|---|
| **Biomass** | 0.02 | -0.04 |
| **Dead Organic Matter** | 0.00 | -0.01 |
| **Soil** | 0.57 | 0.15 |
| **Methane** | 0.35 | 0.35 |

# Inland Wetlands

| | 1990 MMTCO2e | 2024 MMTCO2e |
|---|---|---|
| **Biomass** | -0.135 | -0.191 |
| **Dead Organic Matter** | -0.239 | -0.292 |
| **Soil** | -1.443 | -1.573 |
| **Methane** | 4.331 | 4.444 |



# SUMMARY FINDINGS

- Compared to Oregon's initial blue carbon inventory, this inventory now includes tidal and non-tidal wetlands within the coastal zone—**resulting in a ~2× increase in mapped coastal wetland extent accounting for emissions from impounded wetlands.**

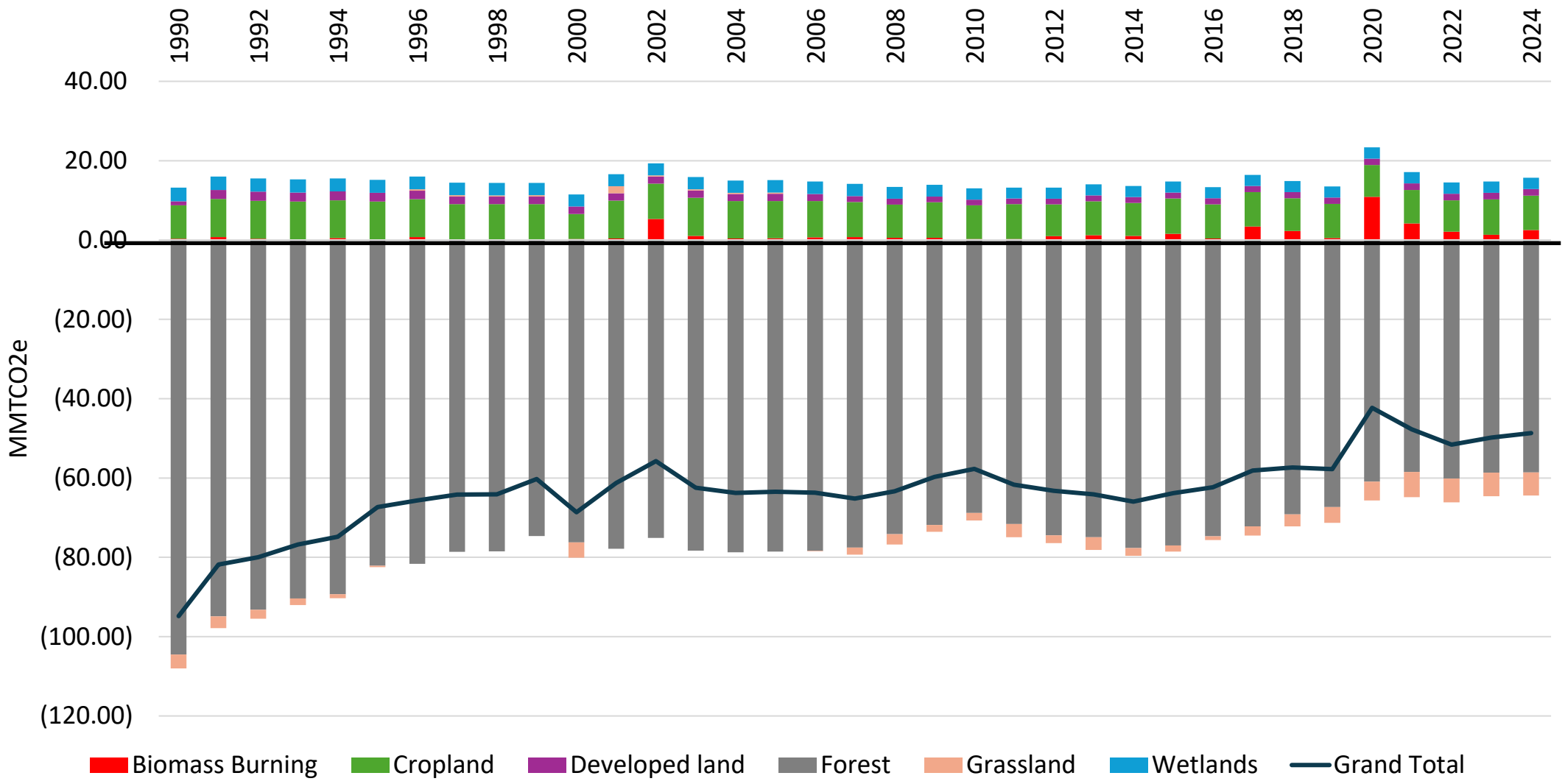
- While **tidally connected coastal wetlands are a net sink**, $CH_4$ emissions from brackish and freshwater wetlands in the coastal area and conversion of wetland to open water offset these removals—continued **restoration and conservation is critical.**

- Results indicate that while **inland wetlands remove $CO_2$** from the atmosphere storing it in **soils and biomass,** this is **offset by $CH_4$ emissions**—this may shift as more data become available for Oregon's diverse wetland types.

# FUTURE IMPROVEMENTS

- Better spatial data and more refined carbon flux data will improve the accuracy of the current inventory.
  - Salinity map, Wetland Intrinsic Potential Tool, The Nature Conservancy restoration polygons.
  - Regionally specific inland wetland carbon flux data (Trout Unlimited).
- Inclusion of eelgrass, mudflats, and kelp forests.
- Transitioning toward a Tier 3, spatially explicit modeling framework could help reduce uncertainty in greenhouse gas flux estimates and better represent local conditions.

# GRAND TOTAL


1990
1992
1994
1996
1998
2000
2002
2004
2006
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2012
2014
2016
2018
2020
2022
2024
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20.00
0.00
(20.00)
(40.00)
(60.00)
(80.00)
(100.00)
(120.00)
MMTCO2e
Biomass Burning
Cropland
Developed land
Forest
Grassland
Wetlands
Grand Total


Q&A

# WHAT HAVE WE LEARNED?

1. Land use in Oregon has stayed relatively consistent over the last 35 years, which is a testament to Oregon's land use system.
2. Acres affected by wildfire across many land categories has increased over the inventory period. It has affected above ground carbon stores and, when fires are severe enough, soil carbon as well.
3. It is also important not to overlook landscape carbon stocks.

## Forest Land

- Forests contribute substantially to removals
- The decline in the contribution of Oregon's forests over the inventory period raises concerns and questions
- Increasing sequestration in productive forests results in more fiber per acre, important to Oregon's economy and communities

## Cropland

- Cropland is a source of emissions due largely to emissions from drained organic soils.
- Perennial crops are a relatively small but growing sink due to orchard and vineyard expansion
- Opportunities to reduce emissions: promoting soil health and returning unproductive croplands back to wetlands where feasible

## Grassland

- Grassland is usually a sink but carbon flux varies over time depending on soil type, topography, precipitation and disturbance
- Need data to improve delineation of area and Grassland types
- Better mapping and research are critical to approach the type of understanding we'd like at the landscape scale

## Developed Land

- Developed land is a net emitter
- Urban trees are sinks and drained organic soils (historic wetlands) are emitters
- Restoring historic wetlands and avoiding further degradation to current wetlands are key
- Increasing urban tree canopy offers both nature-based adaptation and mitigation benefits.

## Wetlands

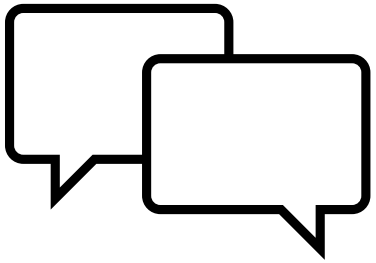
- Wetlands are broadly net emitters, though emissions small compared to other lands
- Restored and tidally connected tidal wetlands are a sink
- Science on carbon dynamics of inland wetlands is developing
- Wetlands represent disproportionately large carbon stores per area and should be protected and restored


## Biomass Burning

- Wildfires increasing in frequency and area in forests and grasslands
- Emerging science on different recovery pathways after burn that alter carbon stocks and rates of carbon sequestration


50
YEARS of SERVICE
OREGON
DEPARTMENT OF
ENERGY
Questions?
Thank you!

# NEXT STEPS & PUBLIC COMMENT



**Submit comments on this draft report by December 19 via email: elizabeth.ruther@energy.oregon.gov**

ODOE expects to submit the final report to the Oregon Legislature on December 31, 2025.