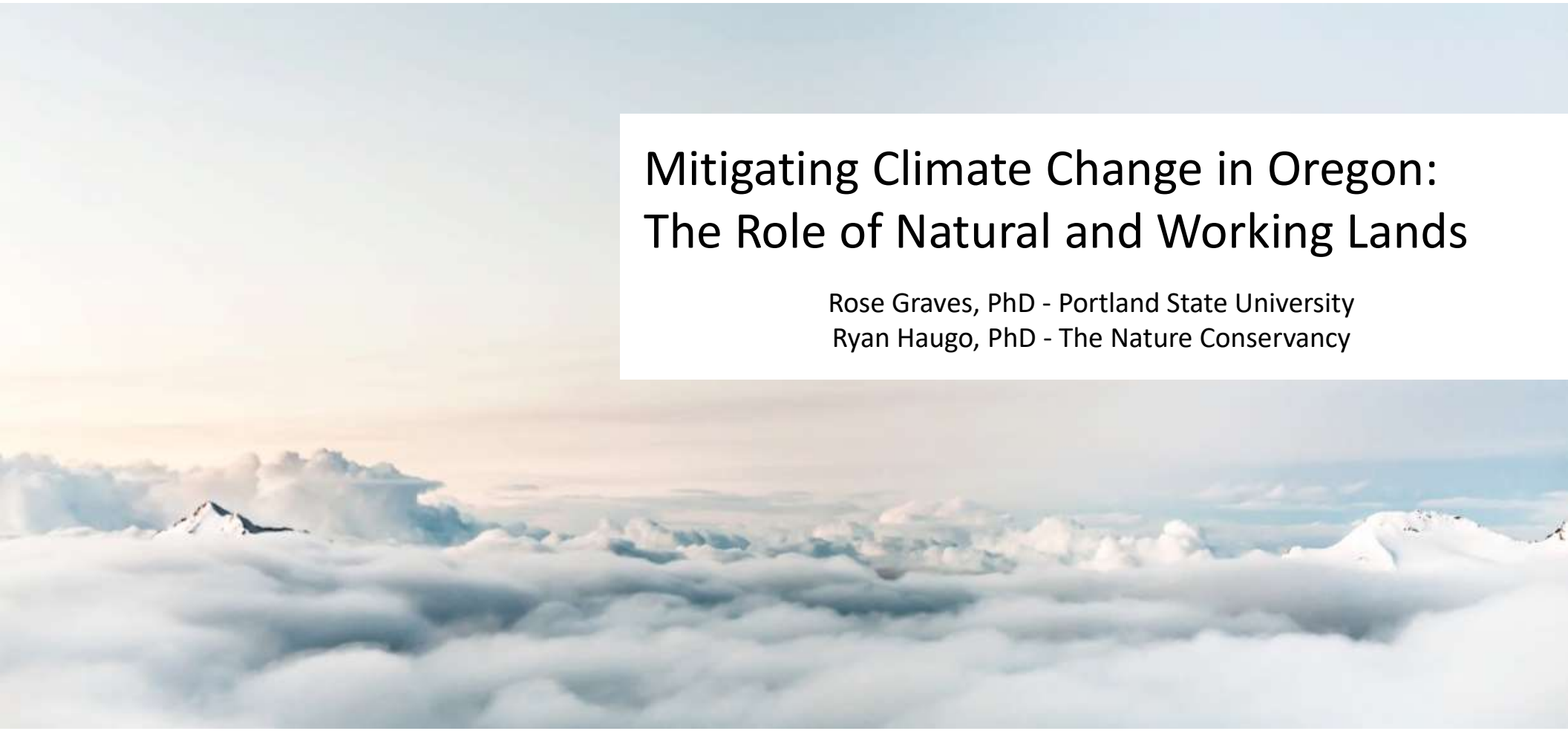

Mitigating Climate Change in Oregon: The Role of Natural and Working Lands

Rose Graves, PhD - Portland State University
Ryan Haugo, PhD - The Nature Conservancy

The Nature Conservancy

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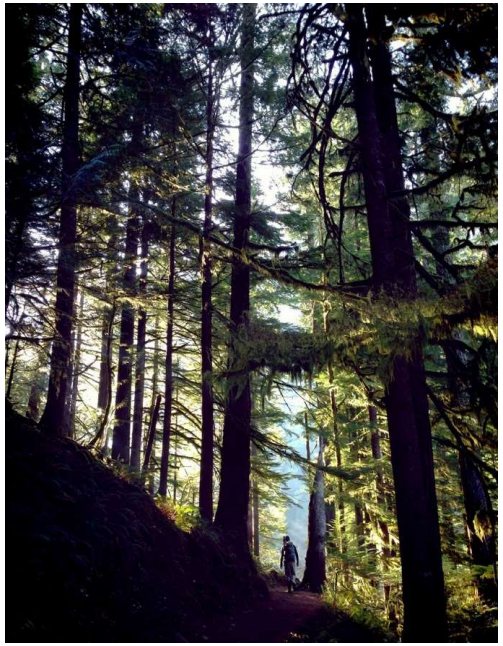
Actions on natural and working lands impact carbon storage and sequestration

AVOID CONVERSION
of natural and working land



RESTORE
natural ecosystems and processes

MODIFY LAND MANAGEMENT
practices on working lands

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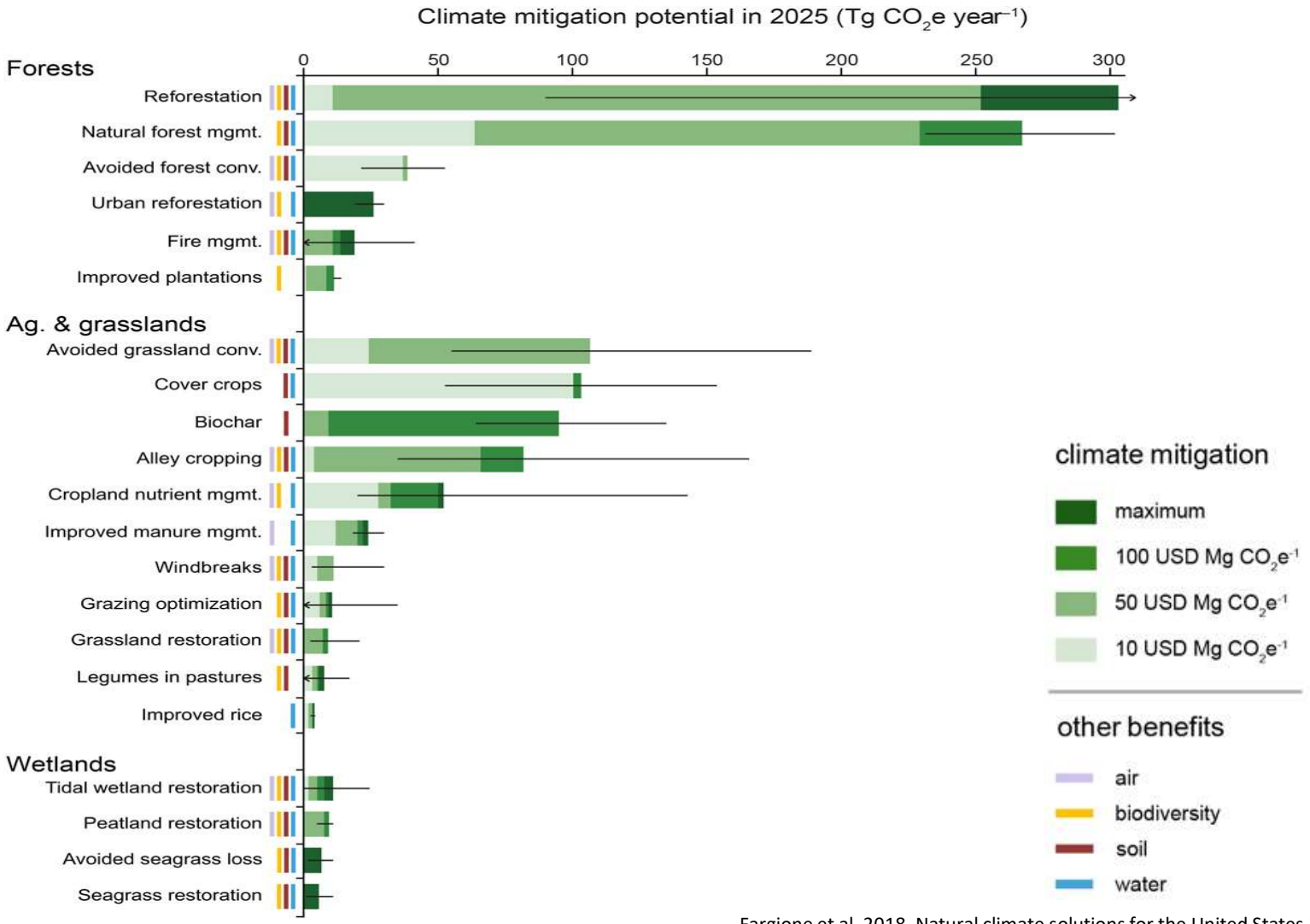
Potential Mitigation From Natural Climate Solutions in the United States



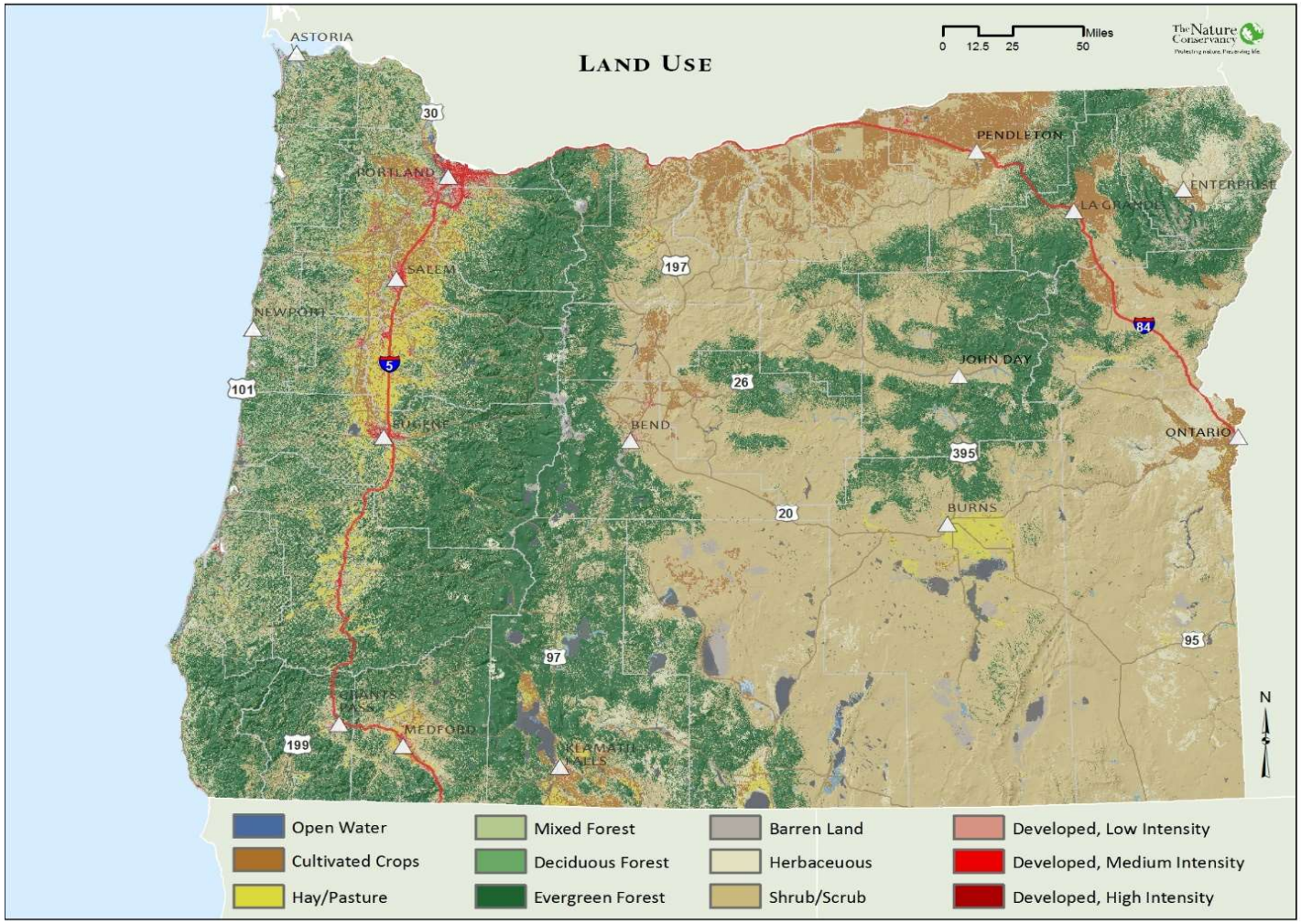
FORESTS

AGRICULTURAL LANDS & GRASSLANDS

WETLANDS

Fargione et al. 2018. Natural climate solutions for the United States." *Science Advances*.

What is the potential for climate mitigation from natural and working lands in Oregon?



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What is the potential for climate mitigation from natural and working lands in Oregon?

PLOS ONE

RESEARCH ARTICLE

Potential greenhouse gas reductions from Natural Climate Solutions in Oregon, USA

Rose A. Graves[1,2]*, Ryan D. Haugo[2], Andrés Holz[3], Max Nielsen-Pincus[4], Aaron Jones[2], Bryce Kellogg[2], Cathy Macdonald[2], Kenneth Popper[2], Michael Schindel[2]

1 College of Liberal Arts and Sciences, Portland State University, Portland, Oregon, United States of America, **2** The Nature Conservancy, Portland, Oregon, United States of America, **3** Department of Geography, Portland State University, Portland, Oregon, United States of America, **4** Department of Environmental Science and Management, Portland State University, Portland, Oregon, United States of America

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OPEN ACCESS

Citation: Graves RA, Haugo RD, Holz A, Nielsen-Pincus M, Jones A, Kellogg B, et al. (2020) Potential greenhouse gas reductions from Natural Climate Solutions in Oregon, USA. PLoS ONE 15 (4): e0230424. https://doi.org/10.1371/journal.pone.0230424

Editor: Debjani Sihi, Oak Ridge National Laboratory, UNITED STATES

Received: July 17, 2019

Abstract

Increasing concentrations of greenhouse gases (GHGs) are causing global climate change and decreasing the stability of the climate system. Long-term solutions to climate change will require reduction in GHG emissions as well as the removal of large quantities of GHGs from the atmosphere. Natural climate solutions (NCS), i.e., changes in land management, ecosystem restoration, and avoided conversion of habitats, have substantial potential to meet global and national greenhouse gas (GHG) reduction targets and contribute to the global drawdown of GHGs. However, the relative role of NCS to contribute to GHG reduction at subnational scales is not well known. We examined the potential for 12 NCS activities on natural and working lands in Oregon, USA to reduce GHG emissions in the context of the state's climate mitigation goals. We evaluated three alternative scenarios wherein NCS implementation increased across the applicable private or public land base, depending on the activity, and estimated the annual GHG reduction in carbon dioxide equivalents (CO_2e)

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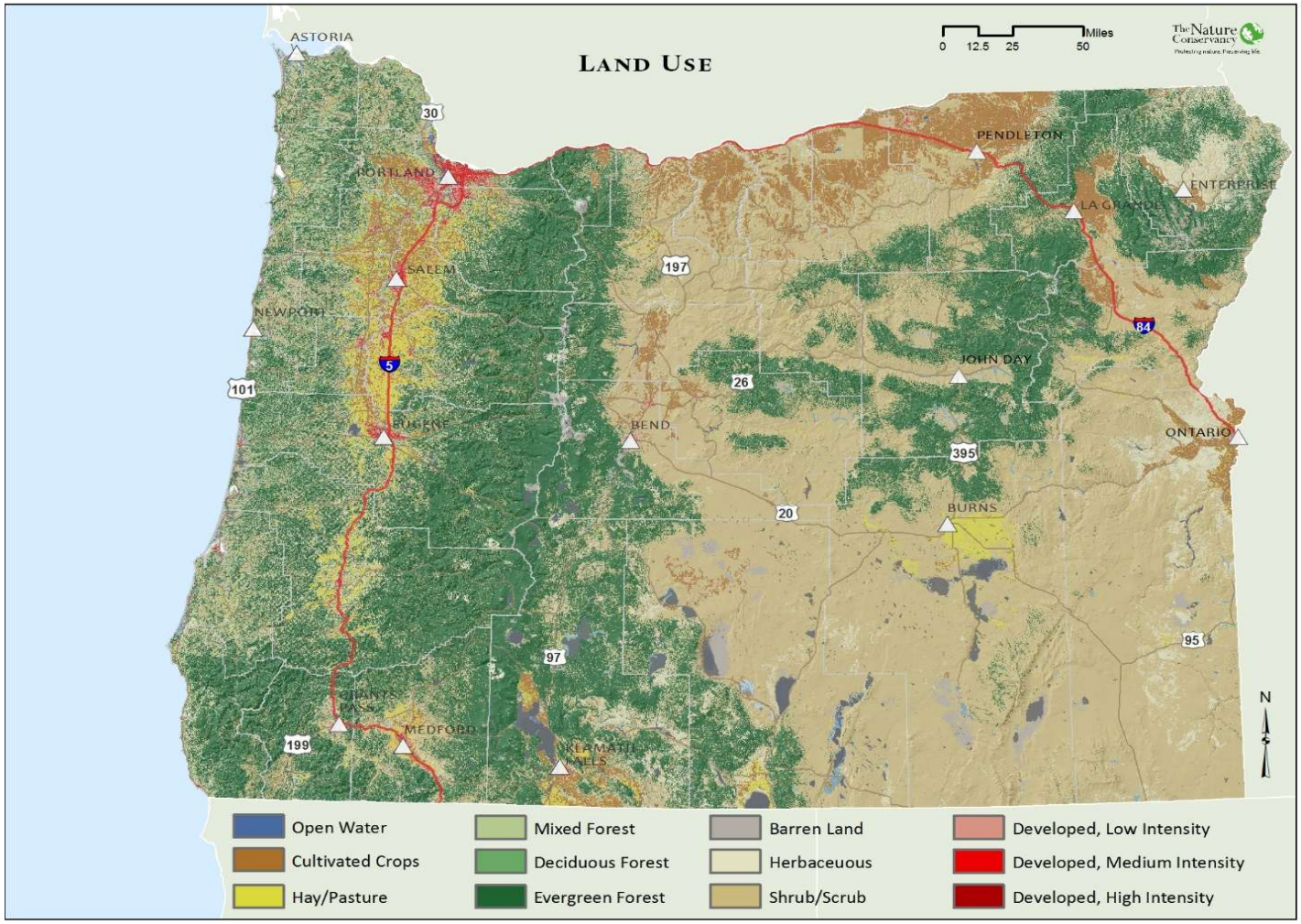
General analysis steps:

- Select relevant activities for Oregon from US analysis
- Determine the 'business-as-usual' rates for each activity
- Estimate the carbon sequestration and avoided emissions attributable to each activity
- Scenarios and simulations



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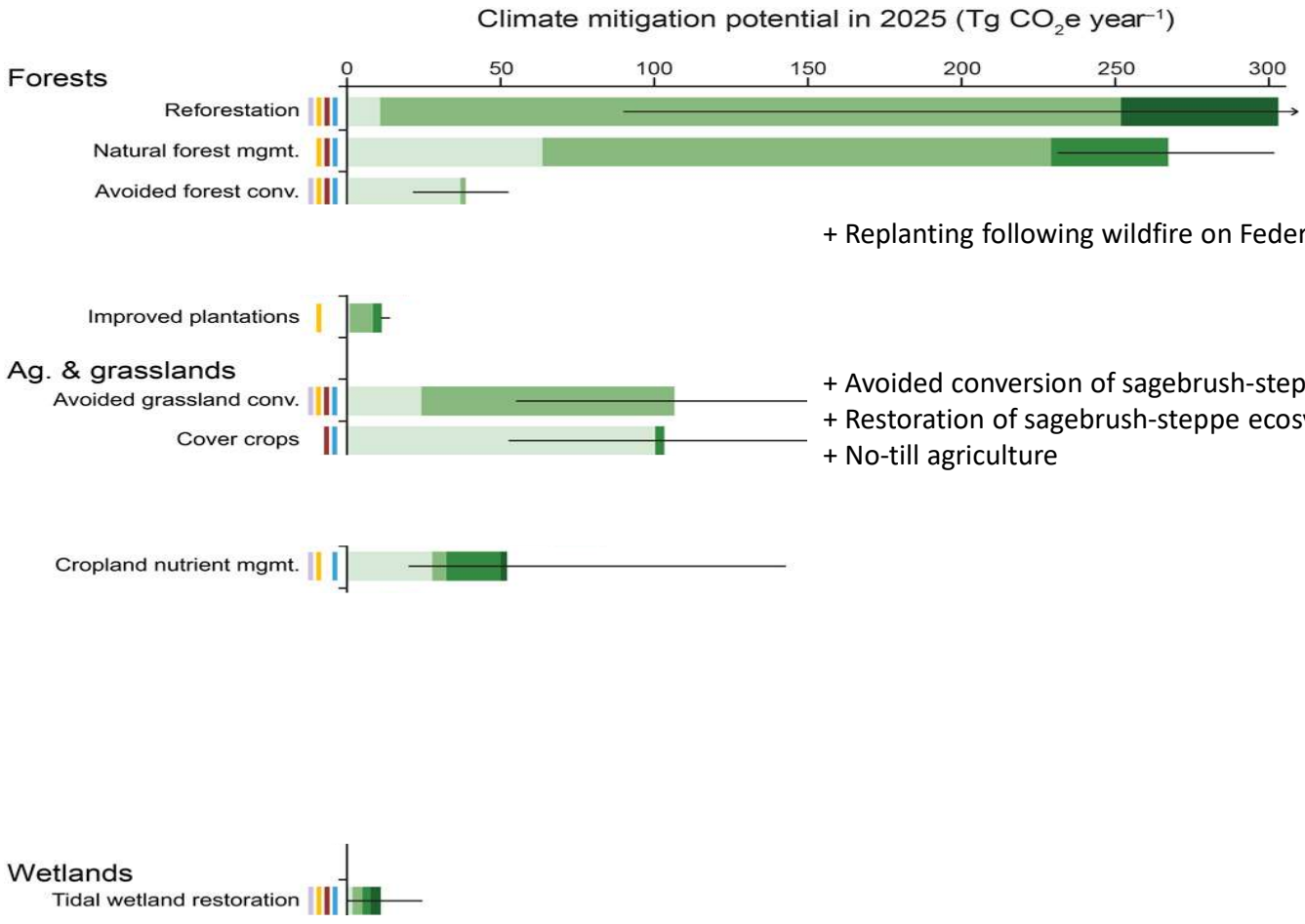
Potential Mitigation From Natural Climate Solutions in the United States



FORESTS

+ Replanting following wildfire on Federal forests

AGRICULTURAL LANDS & GRASSLANDS

+ Avoided conversion of sagebrush-steppe to invasive annual grasses
+ Restoration of sagebrush-steppe ecosystems
+ No-till agriculture

WETLANDS

Fargione et al. 2018. Natural climate solutions for the United States." *Science Advances*.

BASELINE = BUSINESS-AS-USUAL RATES OF EACH PRACTICE

	Activity	Baseline (Current Annual Rate)
Conversion	Forests to rural development	4770 acres
	Forests to urban development	360 acres
	Sagebrush-steppe to invasive annual grasses	9880 acres
	Grassland to cropland	2300 acres
Land Management	Timber harvest	3,405,00 MBF
	Cover crops	120,440 acres (2% of cropland)
	No-till agriculture	996,500 acres (35% of tilled crops)
	Nutrient management	193,000 Mg N
Restoration	Replanting after wildfire on federal land	9-12% of moderate to high-severity burned area
	Riparian forest restoration	6000 acres
	Tidal wetland restoration	120 acres
	Invasive annual grasses to sagebrush-steppe	13,813 acres

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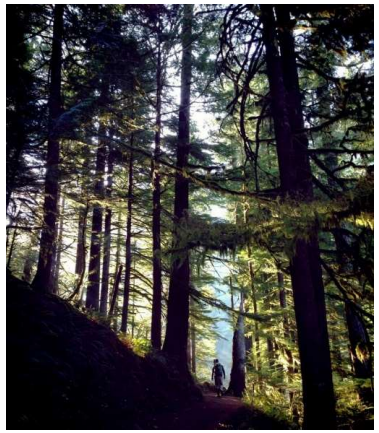
We explored **Natural Climate Solution scenarios** across the state of Oregon

Each scenario included **avoided conversion, improved land management,** and **restoration activities**.

Three scenarios represented Low, Moderate, and Ambitious changes relative to current baseline.

REDUCE FOREST & GRASSLAND CONVERSION



SAGEBRUSH-STEPPE: INCREASE RESTORATION & REDUCE CONVERSION

TIMBER HARVEST DEFERRAL

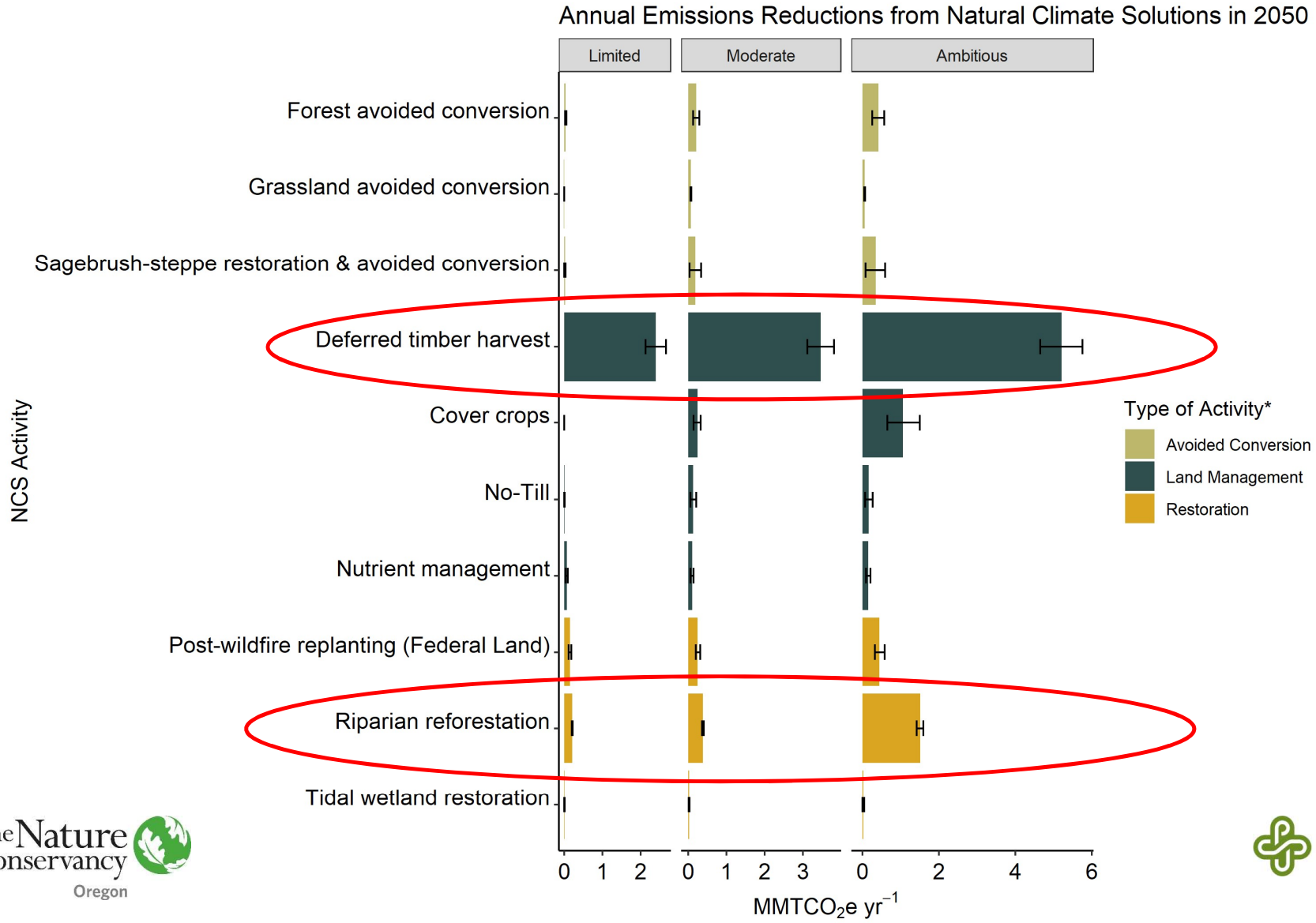
REDUCE N-FERTILIZER EMISSIONS

INCREASE COVER CROP & NO-TILL ACRES

INCREASE RIPARIAN FOREST REPLANTING

INCREASE POST-FIRE REPLANTING ON FEDERAL FORESTS

INCREASE TIDAL WETLAND RESTORATION



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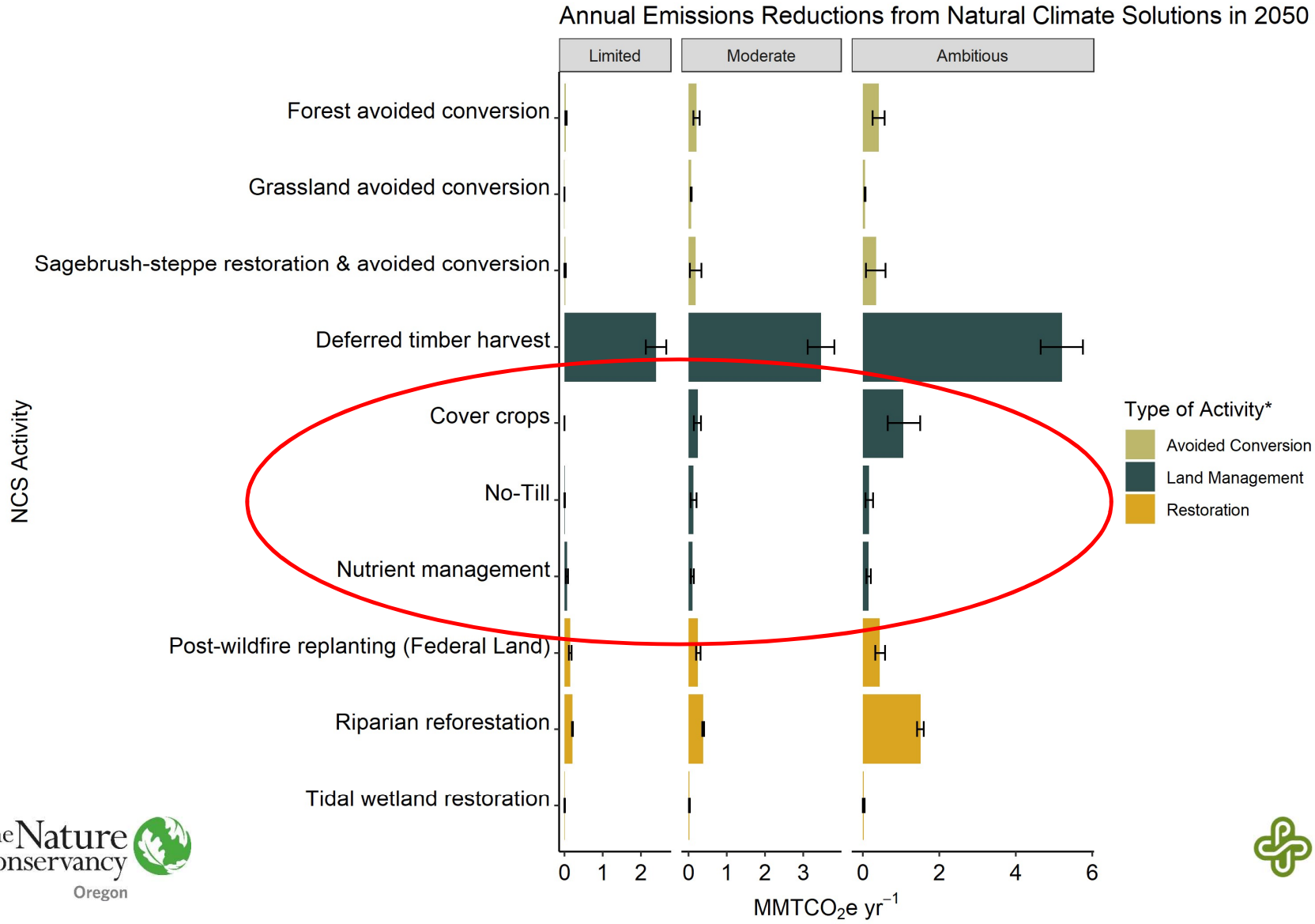

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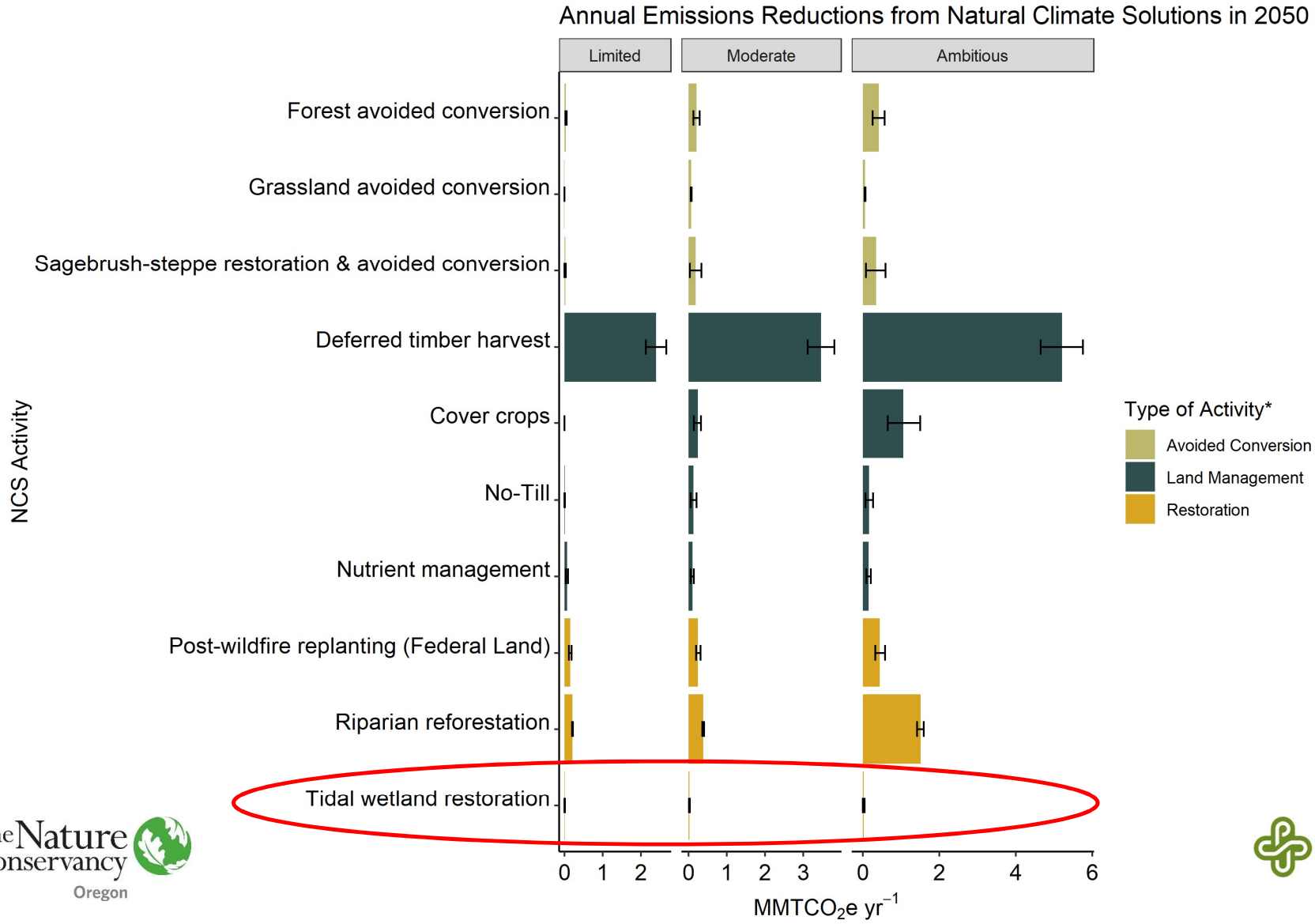

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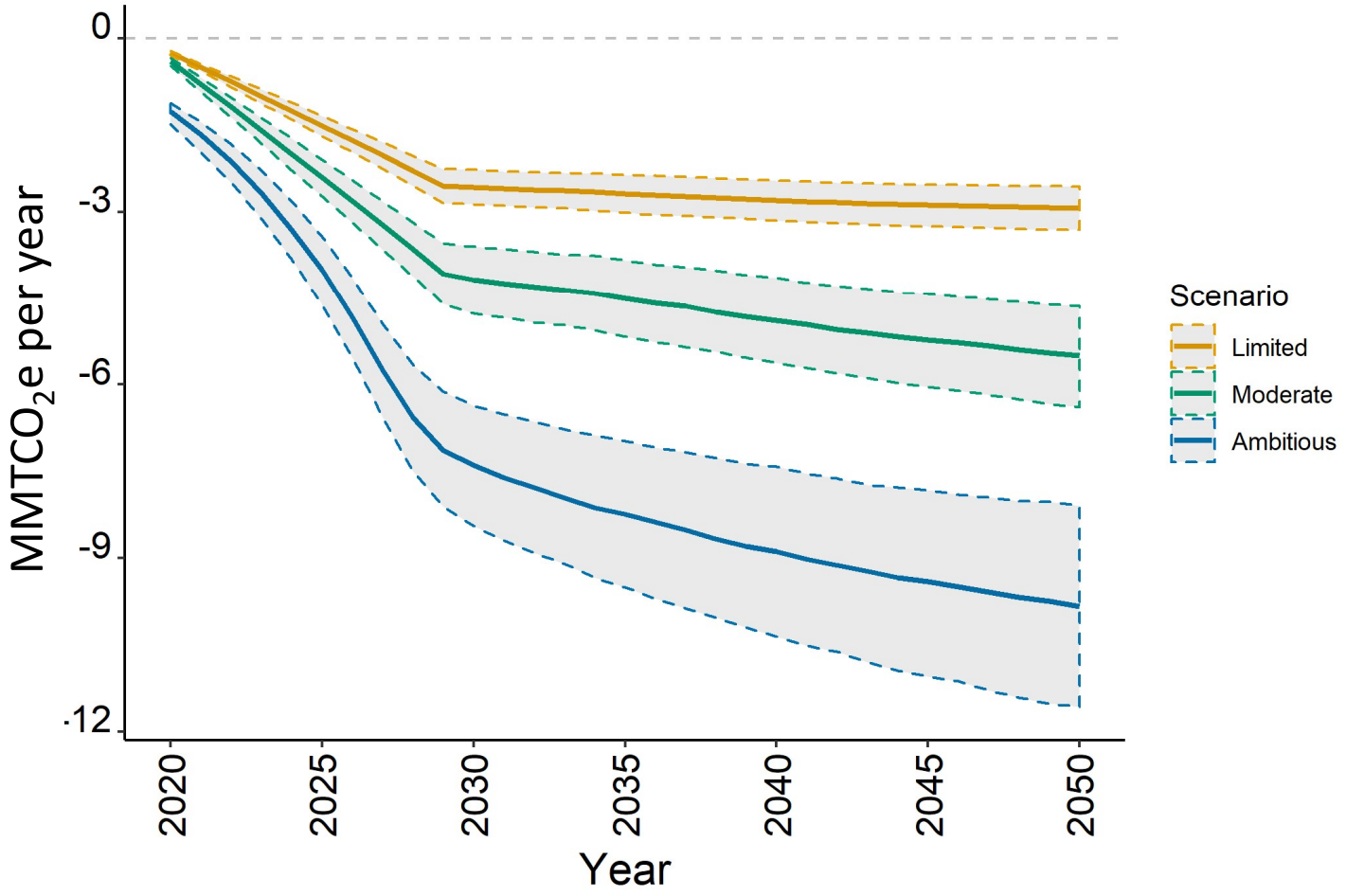
GHG REDUCTIONS

2.7 – 7.34 MMT
CO_2e / yr by 2030

2.9 – 9.51 MMT
CO_2e / yr by 2050



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Looking forward…

- Projections of future N&WL stocks and fluxes

Glob Chang Biol. 2019 Oct;25(10):3334-3353. doi: 10.1111/gcb.14677. Epub 2019 Jun 24.

Effects of 21st-century climate, land use, and disturbances on ecosystem carbon balance in California

Benjamin M Sleeter [1], David C Marvin [2], D Richard Cameron [2], Paul C Selmants [3], A LeRoy Westerling [4], Jason Kreitler [5], Colin J Daniel [6], Jinxun Liu [3], Tamara S Wilson [3]

Affiliations + expand

PMID: 31066121 PMCID: PMC6851753 DOI: 10.1111/gcb.14677

Free PMC article

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Looking forward…

- Projections can include changes in land use and land management as well as include changing climate conditions

Animated map of projected land-change in California under a Business as Usual scenario from 2001-2100. (Credit: Benjamin M. Sleeter, USGS. Public domain.)

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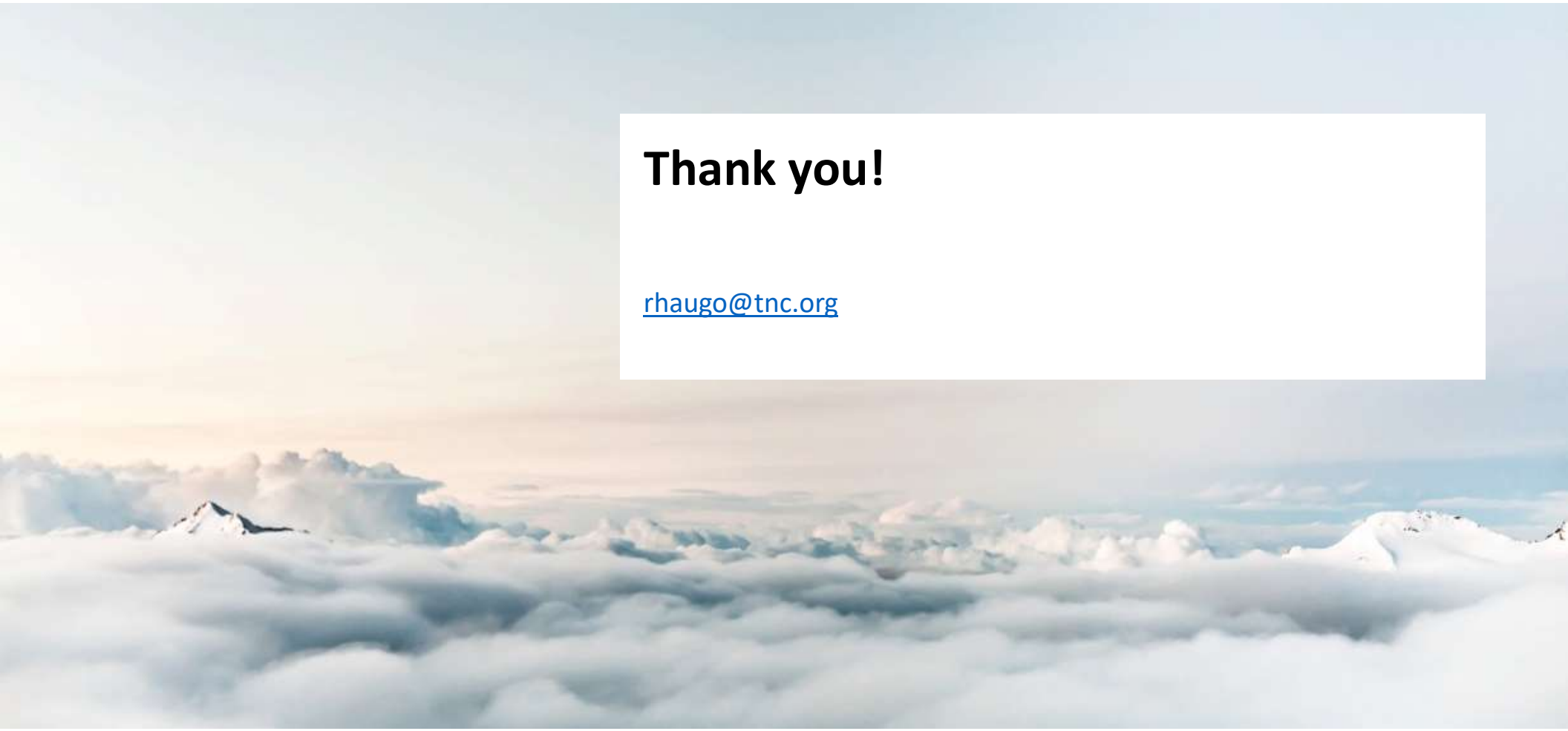

Thank you!

rhaugo@tnc.org

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Publication Link:
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0230424

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