Carbon Sequestration
in Degraded Sagebrush Rangelands

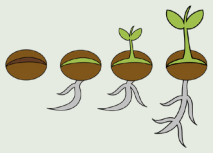
Science shows that nature-based solutions can provide more than 30 percent of the emissions reductions we need by 2030.[1] We often think of forests as the best way to store carbon. But what if there is another solution, right beneath our feet?

In Nevada, our rangelands can help to address our climate problems by sequestering carbon dioxide. In partnership with the Nevada Division of Natural Heritage and Apex Resource Management Solutions, and with funding from the U.S. Climate Alliance, The Nature Conservancy in Nevada science team recently mapped the cover of non-native annual species over 120 million acres of sagebrush shrublands across the West. We simulated how much it would cost to seed sagebrush areas with perennial grasses and shrub species and how much carbon could be stored over 25 years. We found that replacing non-native annual species like cheatgrass, an invasive species that covers rangelands extensively, with perennial grasses and woody species would be beneficial for wildlife, ranching and fire management. It would also store carbon, mostly into soils, which represent 58 to 90 percent of all ecosystem carbon and are a stable form of carbon storage.

Our modeling found that 11 million square miles of sagebrush shrublands are available for feasible seeding, and more than 152,071 metric tons of carbon could be stored at a cost of $1.3 billion in the 120 million-acre geography centered on Nevada. Seeding degraded sagebrush rangelands to achieve these multiple conservation goals and sequester carbon is worth pursuing. With little existing research on this topic, this transformative study is the first of its kind on Intermountain West sagebrush. Further funding of studies like this can support a future carbon market.

The Nature Conservancy
Nevada

BY THE NUMBERS



>58%

During our simulated seeding of sagebrush rangelands, more than 58 percent of carbon was stored in soils

152,071

Metric tons of carbon per year could be stored in the soils of 120 million-acre sagebrush shrublands available for seeding

$1.3B

The cost of feasibly storing 152,071 metric tons of carbon across 7.4 million acres in the Intermountain West

1. nature.org/en-us/what-we-do/our-insights/perspectives/natures-make-or-break-potential-for-climate-change/

How much carbon can be stored, and at what cost?

Rangelands are often ignored in the discussion of using management to sequester carbon. However, carbon storage gains achieved by sagebrush restoration can be valued in carbon credit markets.

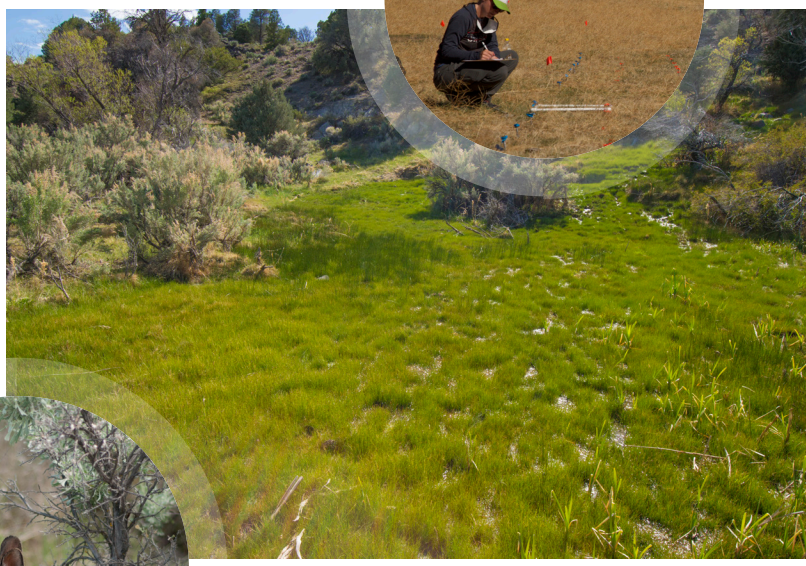
Quantifying carbon sequestration potential

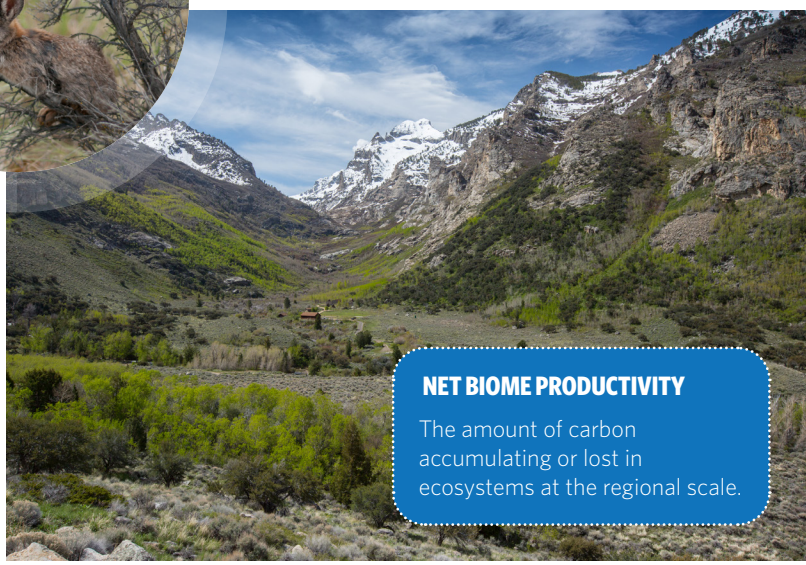
To find out how much carbon could be stored, and how much it would cost, we compared simulations of two scenarios: 1) seeding perennial grass and shrub species in sagebrush shrublands dominated by non-native annual grass and forb species 2) and not doing any seeding. Using Sentinel-2 satellite imagery and analysis conducted in Google Earth Engine, we mapped the cover of non-native annual grasses and forb species across a 120-million-acre geography centered on Nevada where those species dominated the vegetation. Using spatial state-and-transition simulation modeling software with a carbon stock-and-flow sub-model that we populated, the comparisons were done across three large landscapes: the Columbian Plateau ecoregion in Nevada, the north-central Great Basin ecoregion outside the North American Monsoon in Nevada, and the southeastern Great Basin ecoregion within the North American monsoon in Utah. Landscape results were extrapolated to these climatic sub-ecoregions.

The net biome productivity (NBP) and cost per unit area of sagebrush shrublands was estimated by simulating restoration of non-native annual species to perennial vegetation over a 25-year period. About 58 to 90 percent of NBP was stored in the soil. Across the geography, the most and least carbon stored, respectively, was in Utah, with 136,132 metric tons of carbon per year stored for $287 million, and the central Great Basin, where 3,196 metric tons of carbon per year could be stored for $23 million. Positive NBP values reported showed that ***sagebrush shrublands can store as much or more carbon than more productive systems in the U.S. and around the world***.

Contact us to learn more

Read the full report here. "Carbon Sequestration in Intermountain West Rangelands" was written by Louis Provencher, Sarah Byer, Leonardo Frid, Sheeram Senthivasan, Kevin J. Badik and Kristin Szabo. To learn more or for questions, please contact us at **(775) 322-4990** or **nevada@tnc.org**.





NET BIOME PRODUCTIVITY

The amount of carbon accumulating or lost in ecosystems at the regional scale.

PHOTOS: Sagebrush (Cover, top and center photo on second page) © Chip Carroon/TNC; Eastern Nevada © Simon Williams/TNC; INSET: TNC scientists testing seeds © Lori Mathews; Pygmy rabbit © Hannah Letinich.

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