

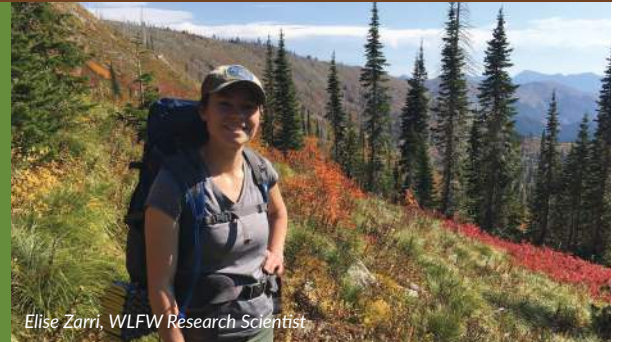


SCIENCE TO SOLUTIONS

# Brewer's Sparrows Rely on Conifer Removal to Maintain Core Sagebrush Habitat

## In Brief:

- Tree invasion of sagebrush habitat in southwest Montana has caused a 30% decline in the population of Brewer's sparrows since 1954.
- If nothing is done to prevent tree encroachment, Brewer's sparrows will decline by 60% in the next 30 years.
- Defending core sagebrush habitat through conifer removal can maintain populations of Brewer's sparrows into the future.



Elise Zarri, WLFW Research Scientist



Brewer's sparrow  
TOM KOERNER/USFWS

## Fewer Trees Today Means More Birds in the Future

We know that sage grouse avoid nesting in areas where trees have taken over sagebrush rangelands. [Research](#) shows that encroaching trees are bad for songbird nests, too.

From 2019-2022, researchers monitored eight species of songbirds on eight square kilometers of sagebrush grazing lands in southwest Montana. The [research](#) took place in a valley

where Douglas fir have encroached and replaced some of the mountain big sagebrush shrubs. Half of the plots were located where trees had been removed to restore sagebrush habitat, and the other half of the plots were in places where trees were left on the landscape.

Overall, this research found that the sagebrush-reliant songbirds were more abundant where trees were removed.

*“Trees drastically reduce the space these songbirds are willing to inhabit. It’s a major conservation issue.”*

-Elise Zarri, WLFW Research Scientist



## Trees Take Over Nesting Habitat

Researchers tracked the songbirds' nest success: whether chicks fledged and left the nest or whether they were killed by predators. Fledgling production for Brewer's sparrows (*Spizella breweri*), a species of conservation concern in many western states, was [119% higher in places without trees](#).

Elise Zarri, an ecologist with the University of Montana's Working Lands For Wildlife research team, took this data a step further and decided to estimate the historic and

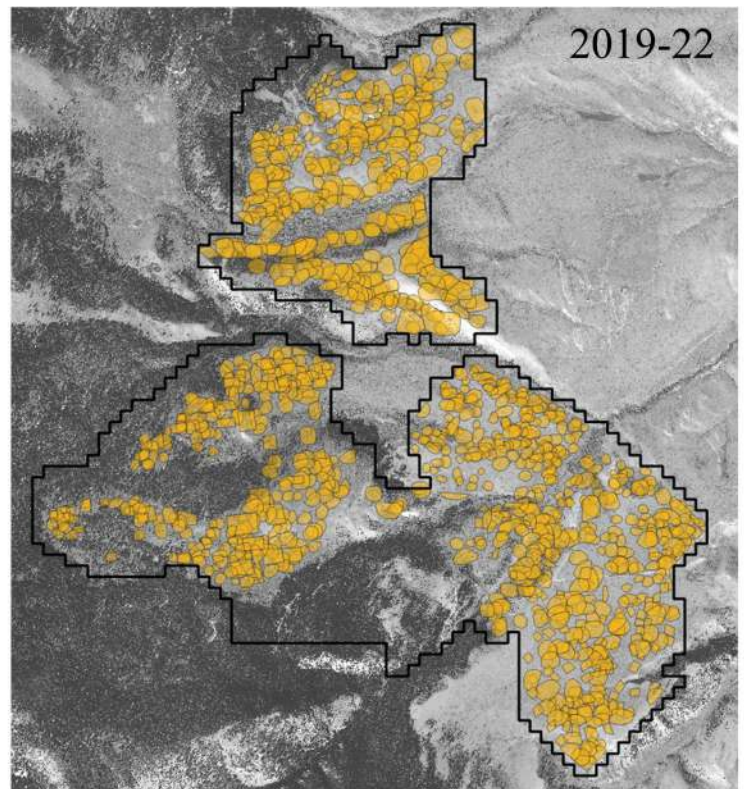
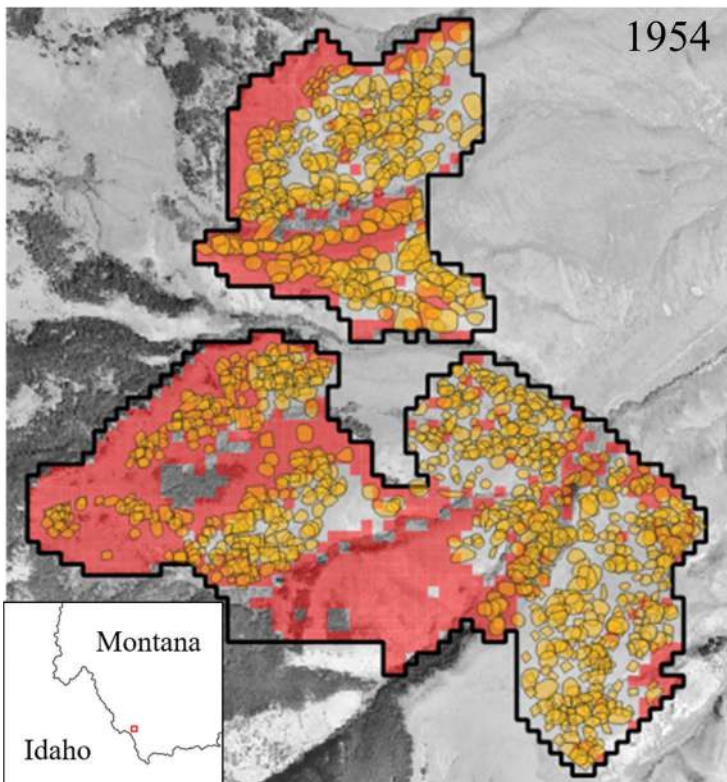
future numbers of Brewer's sparrows and their chicks. Brewer's sparrows are a good indicator species for the health of the sagebrush biome because they choose new nesting habitat annually instead of returning to the same nest each year.

"We wanted to understand how much we've lost from the population over the past 70 years, and what the population might look like in the future if trees continue to fill in sagebrush habitat," Zarri explained.

She overlaid the territories of 1,161 Brewer's sparrows with aerial imagery in the [Landscape Explorer](#). This online



map application compares historical images from the 1950s side-by-side with modern Google Earth images in 17 western states. Next, Zarri and her colleagues ran simulation models to estimate the historic abundance, as well as two future scenarios: one where no restoration action is taken, and another where some conifers are removed to keep sagebrush habitat intact.



Yellow polygons are territories occupied by Brewer's sparrows during surveys conducted in southwest Montana from 2019-2022. Red shading atop historical imagery from the Landscape Explorer shows the amount of tree-free sagebrush habitat available in 1954 (left), which has since filled in with trees (right).

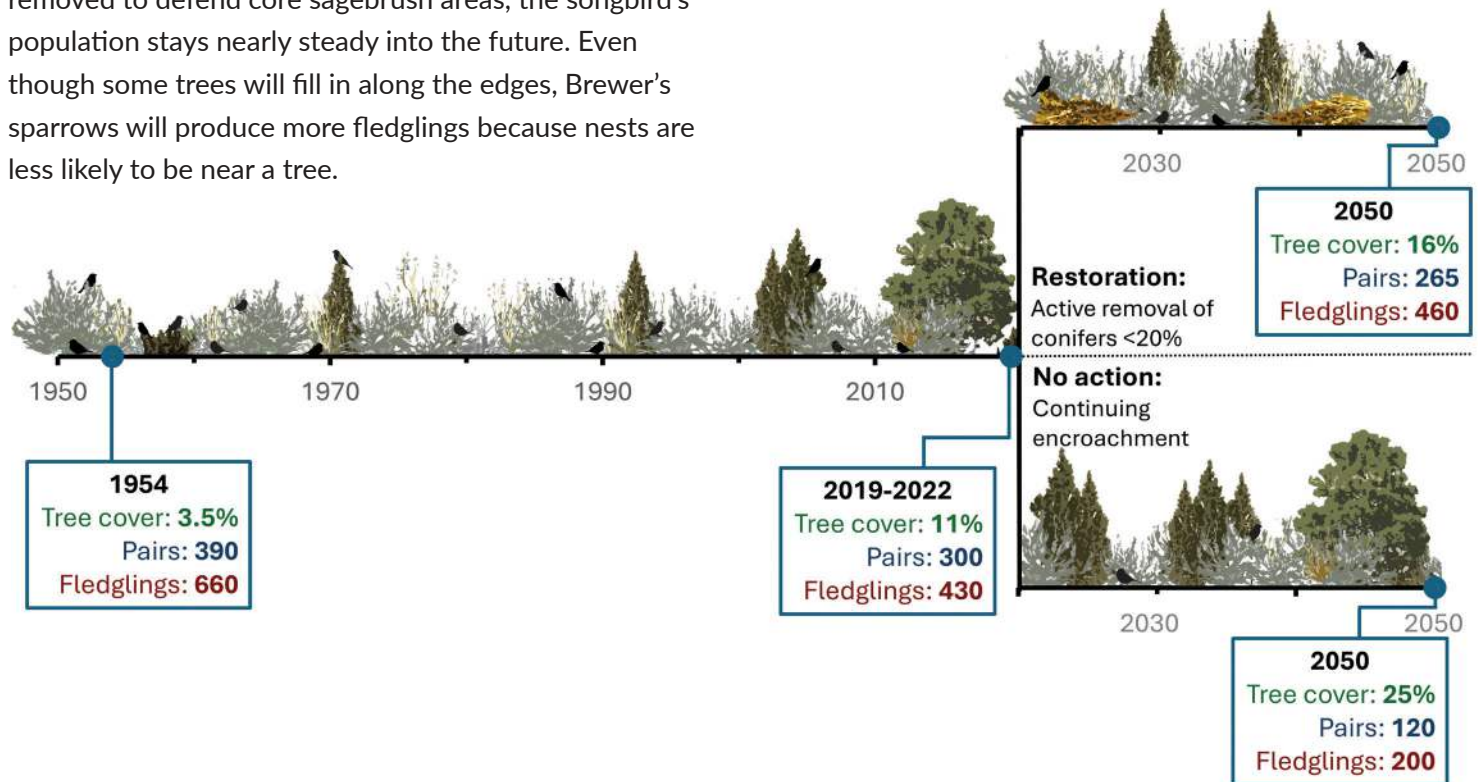


## Cutting Conifers Saves Baby Birds

Results show that tree invasion can cause a 30% decline in the population size of Brewer’s sparrows. The birds avoid nesting near trees, so fewer adults can use the habitat as Douglas firs encroach. **Zarri also found that the odds of nest failure increased if the nest was within 30 meters of a tree.** This is likely because animals that live near or in trees are eating the sparrow’s eggs or chicks.

“Brewer’s sparrows evolved with cover that’s fairly flat and low to the ground, so they aren’t accustomed to tall structures and defending against the predators that come with them,” Zarri said.

Looking to the future, models showed that the Brewer’s sparrow population will decline by another 60% in the next 30 years if no action is taken to prevent trees from taking over sagebrush habitat. However, when trees are removed to defend core sagebrush areas, the songbird’s population stays nearly steady into the future. Even though some trees will fill in along the edges, Brewer’s sparrows will produce more fledglings because nests are less likely to be near a tree.



CREDIT: ELISE ZARRI

## Nests Attract A Treasure Trove Of Creatures

Zarri and her colleagues tested 22 songbird nests for traces of environmental DNA, the first time an entire nest has been analyzed this way. They found over 10 million total genetic samples on the nests, showing that baby birds attract all sorts of life!

Over half of the genetic material came from fungi and about one-third came from animals. Of the 126 animal species discovered, 98 were insects like moths and grasshoppers—many of which are on the menu for songbirds. Worms, snails, and reptiles also left DNA in the nests, along with mammals that might eat eggs or chicks, like long-tailed weasels and yellow-pine chipmunks. Songbird nests give us a glimpse of how interconnected the food web is in sagebrush country.



## Science In Action

WLFW helps agricultural landowners remove encroaching trees to improve the productivity and profitability of working sagebrush rangelands. Keeping sagebrush core areas intact and tree-free is synonymous with saving at-risk wildlife like Brewer's sparrows.

It's especially important to remove conifers before they get too thick. Cutting trees when there are still only a few per acre—covering less than 10% of the landscape—takes much less money, time, and effort than trying to restore sagebrush landscapes where trees are dense. Once trees like Douglas fir or western juniper reach maturity, they are more difficult to remove. They also spread seeds in a 200-meter radius, speeding up the rate of habitat destruction as sagebrush shrubs and native grasses disappear.

Luckily, science shows that removing trees at large scales can maintain and boost populations of sagebrush-reliant birds, including Brewer's sparrows, sage thrashers, sage grouse, and sagebrush sparrows, which decline in abundance as tree cover increases.

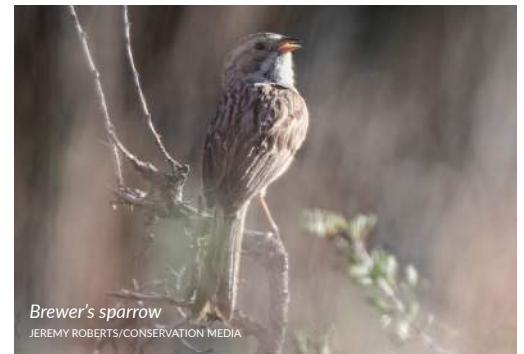


Centennial Valley, MT  
JEREMY ROBERTS/CONSERVATION MEDIA

**Learn about financial and technical assistance for agricultural landowners looking to remove trees on sagebrush rangelands: [wlfw.org](http://wlfw.org)**



Brewer's sparrow  
ELISE ZARRI



Brewer's sparrow  
JEREMY ROBERTS/CONSERVATION MEDIA



Brewer's sparrow nest  
ELISE ZARRI



**Working Lands for Wildlife** (WLFW) is the USDA Natural Resources Conservation Service's premier approach for conserving America's working lands to benefit people, wildlife, and rural communities.