

Sage grouse DNA study maps crucial mating grounds in US West

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Sage grouse have a vast network of mating grounds in the U.S. West akin to interconnected regional airport hubs that the imperiled species is using to maintain genetic diversity across its entire range, a DNA study has revealed.

The 19-page report by the U.S. Forest Service that appeared in a scientific journal in early May involved nearly 6,000 sage grouse samples collected from 2005 to 2015 and maps of some 1,200 mating sites in 10 western states and the Canadian province of Saskatchewan.

Scientists say identifying mating sites that are the most critical hubs can help land managers avoid decisions that could cut the genetic exchange sage grouse need to remain a viable species.

"To have this snapshot and to have this massive sample that allows a much finer resolution than we've ever had before has powerful potential applications for managers," said Todd Cross, a research biologist with the U.S. Forest Service and one of the report's authors.

Sage grouse are found in 11 western states.

Officials in 2015 opted not to list the chicken-sized, ground-dwelling bird as needing federal protections under the Endangered Species Act and instead imposed land-use restrictions leading to multiple lawsuits from industry and environmentalists. Federal officials are expected to review the decision in 2020.

"This kind of research is just what's needed to blow some of the rhetoric and the politics aside for a little bit to focus on the science," said John Freemuth, a Boise State University professor and public lands expert.

Between 200,000 and 500,000 sage grouse remain, down from a peak population of about 16 million. The report noted that sage grouse once occupied about 463,000 square miles (1.2 million square kilometers), but that's now down to about 260,000 square miles (670,000 square kilometers). Experts generally attribute the decline to road construction, development and oil and gas leasing.

Sage grouse survival is completely dependent on sagebrush, which covers large open areas in parts of the U.S. West.

The mating grounds, called leks, are where male sage grouse perform an elaborate ritual that includes making balloon-like sounds with two air sacks on their necks. Researchers collected most of the DNA from feathers left behind at mating sites but also from blood samples from captured birds.

Most sage grouse stuck to one lek, but some traveled to multiple leks, including one that covered 120 miles one spring.

"There are these individuals who take massive chance dispersals in the spring and visit two different leks," Cross said.

Scientists grouped the leks within about 9 miles (15 kilometers) of each other into 458 clusters. Some of these clusters turned out to have increased importance due to being more central and offering network-wide connectivity for the population.

Other clusters were identified as areas that connected scattered population groups. And some clusters at the edges of sage grouse habitat

were end-of-the-road outposts with one way in and one way out.

Scientists characterized the clusters with five attributes, such as those with the greatest genetic diversity, or with improving gene flow across the network.

In the end, some 20 clusters scored extremely high in one or multiple attributes, identifying them as crucial areas for maintaining sage grouse genetic diversity in the network. Each state in the study had at least one such hub.

In the C.J. Strike Reservoir watershed in Idaho, for example, scientists found a cluster of leks that ranked high in being connected to other clusters as well as having a strong genetic exchange component.

In Wyoming, researchers found multiple important hubs, including one in the Big Horn Lake watershed.

Fragmentation of sage grouse habitat into unconnected islands is considered a primary threat to the bird, and the report notes that the loss of crucial hubs could "lead to disintegration of the network into smaller, isolated networks."

The next step scientists intend to explore, Cross said, is explaining why the network of mating sites exists in its current form.

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