Science to Solutions

Harnessing Technology Improves Conservation Effectiveness

Introducing the Interactive Web App for Working Lands in the American West: map.sagegrouseinitiative.com

In Brief: Working Lands for Wildlife and the Sage Grouse Initiative, led by USDA's Natural Resources Conservation Service, developed an Interactive Web Application to bolster conservation outcomes across the American West. This innovative new technology empowers public agencies and non-governmental partners to more effectively and efficiently improve ranchland sustainability by reducing threats to at-risk wildlife. The free online mapping tool allows practitioners to easily visualize, download, and interact with resource data across the vast sagebrush sea. Powered by Google Earth Engine, the Web App uses the latest satellite imagery to perform instantaneous custom analyses, letting users quickly identify, compare, and evaluate opportunities for ecosystem restoration or threat-reduction. The tool shows both a landscape-level view across ownership boundaries, as well as site-specific data for individual parcels. Data layers will be continually added to the Web App, which currently provide valuable habitat information such as encroachment by conifers, resistance to invasive weeds and wildfires, and changes in wet meadow and riparian habitat over time. Collectively, the Web App increases conservation effectiveness by putting a landscape context around local projects, and by matching the right practices to the right places.

Cutting-Edge Mapping Tool Creates Conservation Efficiency

A new interactive online map combines layers of related data for the first time to better target habitat conservation and restoration efforts on working lands in the American West. The **Interactive Web Application** was created and is hosted by the Working Lands for Wildlife-led Sage Grouse Initiative (SGI), as a "one-stop shop" for accessing habitat data across 11 states. This cutting-edge, online mapping tool helps managers and landowners efficiently visualize and analyze how to improve and manage natural resources.

Through Working Lands for Wildlife (WLFW), the USDA's Natural Resources Conservation Service (NRCS) provides technical and financial assistance to agricultural producers

Research scientist Brady Allred explains how the SGI Web App informs conservation planning for wildlife and ranchers in the West.

to help them plan and implement conservation practices that improve ranchland sustainability by reducing threats to at-risk wildlife.

This science-based targeting tool focuses on resource opportunities related to sage grouse and ranch sustainability while also benefitting the 350 other species that depend on the sagebrush ecosystem. All Web App layers are self-contained online, eliminating the need for new or additional software. The Web App is intended to complement rather than replace existing planning software and on-the-ground information, providing a simple platform that offers WLFW-sponsored resource layers and tools.

New Technologies Emerge With Silicon Valley and BLM Partnerships

The Web App was made possible by Google Earth Engine, which converts big data instantaneously into a visual map. The new technology empowers practitioners to more effectively and efficiently deliver conservation outcomes that meet individual landowners' needs as well as the unique habitat needs of wildlife. Interactive features allow users to perform site-specific analyses for custom project planning. All **data can be easily downloaded** or shared via a simple link, which helps resource managers make more informed decisions on practices that conserve or restore working lands.

The Web App was born out of need for efficiently putting spatial data and resource information into field practitioners' hands. Previously, land managers and partners were often frustrated by the many steps required to locate and access data layers in order to strategically plan conservation projects on private lands.

"This new technology puts data directly into the hands of the people working on the ground. It helps prioritize conservation planning by providing a birds-eye view of the western landscape."
~Brady Allred, SGI Research Scientist

Based on the Web App's early success improving conservation planning and delivery on private lands, the NRCS is now partnering with the Bureau of Land Management (BLM) to expand these data layers to encompass priority watersheds on public lands, too.

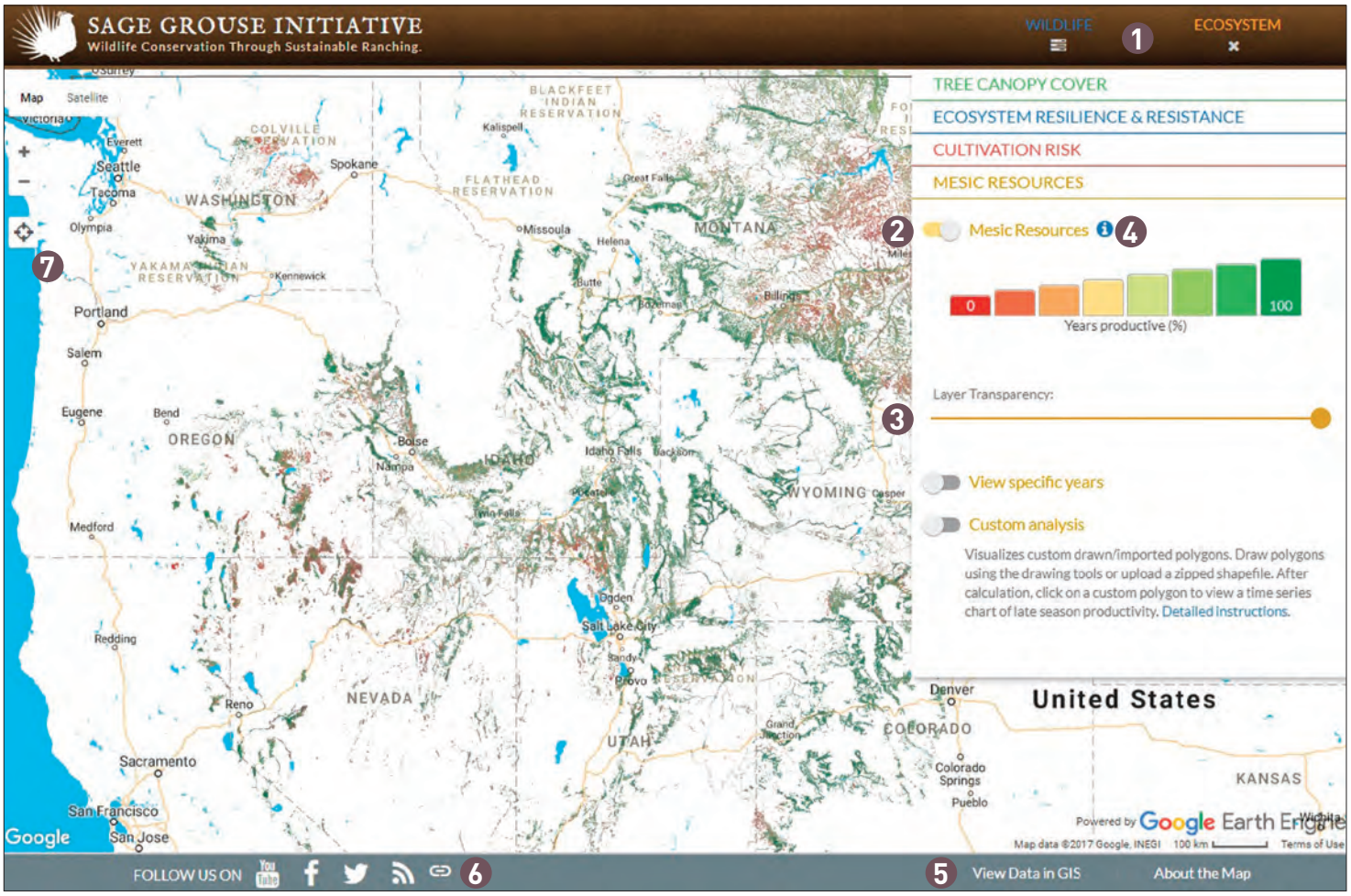
Through an agreement with the Intermountain West Joint Venture, the BLM is working with SGI to achieve whole-watershed benefits by working across ownership boundaries. BLM is supporting the development of new Web App layers—as well as the dissemination of existing layers to key practitioners—in order to enhance public lands conservation. Specifically, upcoming layers will support more strategic conifer removal and wet meadow restoration that spans sagebrush habitat across fence lines.

"Fueled by Google Earth Engine, we are able incorporate range-wide science into conservation planning in a way that was technologically impossible before," says Brady Allred, a rangeland ecologist with University of Montana who developed the web app for SGI. "Combined with site-specific information, this tool can help public and private land managers make good decisions for ranching and wildlife."

Big Picture Approach Accelerates Large Landscape Conservation

As a versatile targeting tool, the Web App provides a much-needed landscape approach to large-scale habitat conservation. The map presents a clear big picture view of what's occurring across public-private land ownership boundaries. In addition, the Web App allows users to zoom in to a specific parcel of land to see changes in certain resources over time. Combined with on-the-ground knowledge of how natural resources are faring on an individual ranch, this tool enables managers to tailor conservation practices to best address local resource concerns.

The WLFW science team—which includes researchers at partnering universities, public agencies and non-profit organizations across the country—will continue to add more data layers to boost the efficiency of conservation delivery in the field. Upcoming datasets include: genetic connectivity of sage grouse, range-wide abundance maps for sagebrush obligate songbirds, and remapping of encroaching conifers to track joint progress on public and private lands.



1. Click on the Ecosystem or Wildlife category to show or hide available layers.

2. Turn layers on or off by clicking on the toggle next to its name.

3. Adjust layer transparency with this slide bar to better see the underlying satellite imagery.

4. Click the circular blue 'i' button to read detailed information about how datasets were created, their intended uses, download availability, and to access associated scientific literature.

5. Find instructions for viewing the data on your desktop GIS.

6. Click the 'Share Link' button to distribute a custom map/dataset with partners.

7. Find and zoom to your location with this geolocation button.

Web App Resource Layers

Tree Canopy Cover | *Target conifer removal projects to improve sagebrush habitat*

Threat: Over the past century, conifers have expanded into sagebrush habitats, lowering rangeland productivity by crowding out native plants, reducing water availability, and providing perches for predators that eat grouse.

Resource: The tree canopy cover layer shows where conifers are located across the West. SGI and partners can use this information to target projects that restore native sagebrush and herbaceous understory by removing encroaching conifers when the trees are young and more easily eradicated.

Ecosystem Resilience & Resistance | *Predict and reduce negative impacts of fire and cheatgrass across sagebrush ecosystems*

Threat: Invasive annual weeds like cheatgrass replace diverse, native plants that provide food and cover for wildlife. Cheatgrass is also linked to hotter, more frequent wildfires that further degrade sagebrush habitat.

Resource: The ecosystem resilience and resistance layer uses soil temperature and moisture regimes to rate areas within the sagebrush ecosystem as "high, moderate or low" in its resilience to wildfire and resistance to cheatgrass invasion. Combined with local knowledge of site conditions, this landscape-level planning tool helps resource managers conduct rapid risk assessment to better prioritize resources and lower costs in fighting weeds and wildfires.

Fence Collision | *Prioritize where to mark fences to reduce bird collisions*

Threat: Sage grouse often fly close to the ground, especially when congregating at mating leks in the dim dawn light. Birds can collide with livestock fences, resulting in injury or fatality.

Resource: The fence collision layer visualizes and exports sage grouse collision risk relative to lek locations or other areas of high bird concentration. Users can upload lek data (which is kept confidential to protect sensitive mating areas) or add points manually to calculate risk at the local level. This dynamic layer helps partners prioritize where to 1) mark fences to improve visibility, 2) remove fences that are no longer needed, and 3) avoid building new fences in high risk areas.

Web App Resource Layers *(continued)*

Cultivation Risk | *Map cultivation risk to optimize effectiveness of conservation easements*

Threat: When native sagebrush-steppe rangeland is converted into crops like wheat, habitat values of that land are lost. Cropland is difficult and costly to restore back to native plant communities.

Resource: The cropland cultivation layer predicts where new cultivation could happen based on soils, climate, and topography of existing croplands and overlays that data with the birds' strongholds. This data helps partners make informed decisions on where to place conservation easements to reduce risk of future cropping. This protection strategy conserves prime intact landscapes for wildlife and grazing lands.

Mesic Resources | *Measure greenness to improve drought resilience and boost wet habitats*

Threat: Wet mesic habitats comprise less than 2 percent of arid western landscapes, which are often degraded by historic land use practices. Livestock and wildlife rely on reliable, healthy wet habitats including streams, springs and meadows for food, water, and cover, particularly during the late summer chick rearing period.

Resource: The mesic resources layer maps greenness on the landscape by analyzing 33 years of satellite imagery to determine areas of high productivity during late summer. The dataset helps visualize the locations of scarce wet habitats, and how their productivity fluctuates through time. Users can create custom analyses to visualize mesic resources on a single ranch or across an entire watershed. Paired with site-specific knowledge, this information helps target protection strategies in the most reliably wet habitats and implement restoration approaches that improve productivity of degraded sites.

Powered by Google Earth Engine, the SGI Web App uses the latest satellite imagery to perform instantaneous custom analyses for specific sites or at a landscape scale. This tool helps people quickly identify, compare, and evaluate opportunities to restore habitat and reduce threats to wildlife in the sagebrush sea.

Dynamic Interface Provides Best User Experience

The Web App is built upon the widely-used Google Maps interface, making it easy to navigate the platform. The application is mobile friendly and works smoothly on phones or tablets, enabling resource managers or landowners to access the Web App while out on the landscape. A geolocation button on the Web App detects and zooms to your location in order to quickly identify areas of interest while in the field.

To facilitate information transfer, all layers are available for download to users' computers in GIS format. In addition, link-sharing technology allows users to easily share their custom analyses and visualized data. This link can be shared over email, in documents, or over social media, providing a snapshot of the exact analysis created by the original user.

Dynamic layers represent the latest in cutting-edge technology, providing a deeper discovery experience for users. Currently, the fence collision and mesic resources layers are dynamic, and additional interactive layers will come online as the Web App continues to expand. These layers allow users to input site-specific information, which the Web App quickly analyzes to produce custom results.

By tailoring analyses to calculate data at the local level, dynamic layers help managers plan projects on individual parcels. For instance, if a user wants to see the changes in a ranch's wetland resources over time, the user can draw or upload a polygon around the area of interest. The Web App then calculates the area's greenness for desired years between 1984-2016. By pushing the "play" button, the user can watch a movie of the landscape's changes, visualizing how droughts and floods have impacted vegetation and wetland habitats on the ranch.

Contacts

- Brady Allred *(pictured right)*, SGI Research Scientist, University of Montana, Missoula, MT: allredbw@gmail.com
- David Naugle, SGI Science Advisor, University of Montana, Missoula, MT: david.naugle@umontana.edu
- Jeremy Malczyk, Web App Architect, Plutonic, LLC

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Writer: Brianna Randall, Writing & Communications Services, LLC

Designer: Maja Smith, MajaDesign, Inc. www.majadesignvt.com

Learn More

SGI's Interactive Web App helps managers and landowners plan sagebrush conservation projects by visualizing and mapping resources: **map.sagegrouseinitiative.com**

Working Lands for Wildlife, led by USDA's Natural Resources Conservation Service, is a partnership-based, science-driven effort that uses voluntary incentives to proactively conserve America's working agricultural lands and wildlife. **Sage Grouse Initiative** is part of Working Lands for Wildlife, and focuses on conserving sagebrush country through sustainable ranching.

Combined with on-the-ground information, the SGI Web App presents a big picture view of resources across sagebrush country to help practitioners plan conservation actions.