INTERMOUNTAIN WEST
JOINT VENTURE

INTERMOUNTAIN INSIGHTS:

Inspiring Conservation Action Through Science

MAINTAINING RESILIENCY OF CONTINENTAL WATERBIRD FLYWAYS

Photo by Patrick Donnelly
Upper Bear River, Idaho

Across the water-scarce Intermountain West, waterbirds (shorebirds, waterfowl, and wading birds) rely on a limited number of key wetland sites as they travel hundreds or thousands of miles between wintering and breeding grounds. These individual sites create a larger flyway network that fulfills the resting and refueling needs of birds on their continental migration. Recognized for their regional, international, or hemispherical importance to sustaining populations, these sites make North America's Intermountain West among the most important inland waterbird flyways in the Western Hemisphere.

Sites important to waterbirds are often associated with terminal saline or freshwater lakes surrounded by freshwater wetlands either along lake peripheries or throughout adjacent riparian drainages. These distinct environments are often close in proximity, concentrating numerous species within ecologically diverse wetland landscapes.

> "Current climate and land-use changes impact wetland availability and present new challenges for waterbirds."

In the past, drought resiliency of wetland networks in the Intermountain West allowed pioneering waterbirds to maintain flyway connectivity by adapting migratory pathways to shifting wetland conditions. Current climate and land-use changes impact wetland availability and present new challenges for waterbirds.

New science co-produced by researchers from the Intermountain West Joint Venture (IWJV), University of Montana, U.S. Geological Survey, and the U.S. Fish and Wildlife Service's Migratory Bird Program is monitoring changes to network resiliency caused by shifting climate and human water demands. Preliminary findings have identified emerging bottlenecks to continental waterbird migration that are being used to inform local conservation projects. The outcomes of these projects translate to flyway scale benefits for birds.

The research looked at lake and wetland surface water changes over 35 years in 26 key waterbird landscapes in the Intermountain West. Results revealed a potential gap in flyway connectivity that is forming across the Great Basin region of California, Idaho, Nevada, Oregon, and Utah. Here, snowpack is a major driver of seasonal wetland flooding, and lake areas have declined by 27 percent in the last 15 years. Wetland flooding has also reduced by 47 percent over the same time period.

Photo by Patrick Donnelly
Warner Valley, Oregon

Researchers found declines were a result of functional loss. In other words, this means lakes and wetlands still physically exist, but the water needed to support migratory birds, fisheries, and other wildlife is drying up sooner and more often.

"For decades, wetland loss has been measured by acres lost to urban or agricultural expansion. In the West, functional loss is a far greater threat," noted Patrick Donnelly, the spatial ecologist for the IWJV. "This happens when the wetland remains, but the water it needs to function no longer exists. Conservation efforts often do a good job conserving wetlands, but a poor job securing the water they need to remain wet."

Rising temperatures and growing human water demands were important factors linked to lake and wetland drying. Researchers speculate higher temperatures and elevated evaporation is reducing spring runoff of mountain snowpack while simultaneously increasing ecological, agricultural, and urban water demands.

Study results have significant implications for waterbirds at both local and landscape levels. Shrinking saline lakes are edging closer to tipping points where local food webs important to migrating waterbirds collapse under intolerable salinity levels. Combined with functional wetland loss, these trends could result in cascading effects that reduce migratory connectivity along continental flyways.

While lake and wetland declines raise concern over loss of flyway connectivity, the trends they reveal provide crucial information needed to offset increasing water scarcity. Wetland monitoring and evaluation tools developed through this research have the potential to accelerate the conservation of climate-resilient wetlands in key waterbird landscapes.

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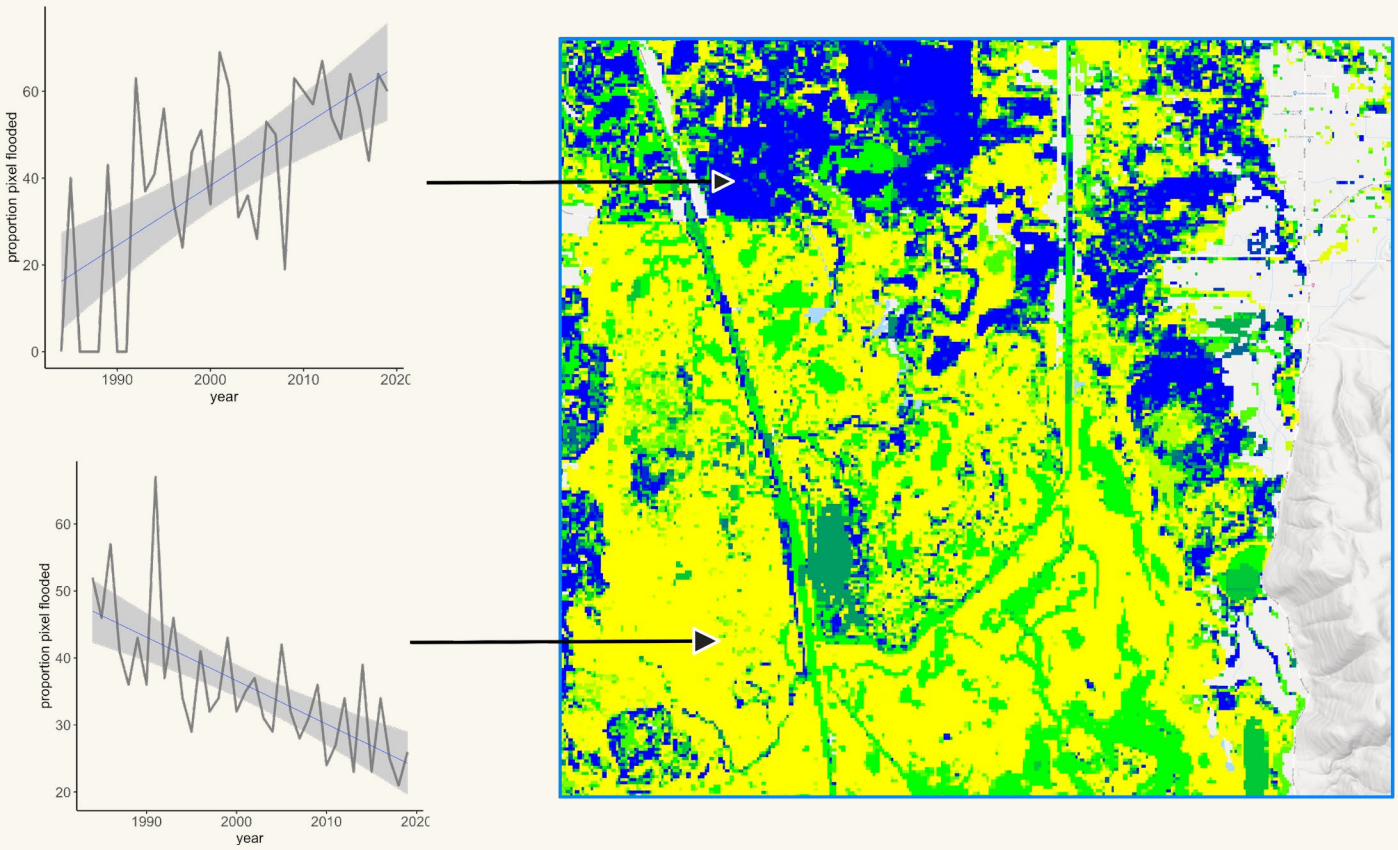
EXAMPLE

Wetland resiliency map of the Upper Bear River floodplain in southwestern Idaho, showing 36-year late-spring wetland surface water trend. Graphs depict trends for selected areas of map. Colors are linked to regression slopes: blue = wetter, green = stable, and yellow = drier. Satellite image of the same area mapped (below).



New maps produced through these studies allow biologists and planners to visualize long-term wetland trends (1984-2019) to determine if individual wetlands are becoming drier, wetter, or have remained unchanged. Patterns can be interpreted locally to identify ecological or human influences. For example, in some watersheds, warmer temperatures have resulted in wetter trends where faster-melting snowpack is filling wetlands quicker in the spring. Wetlands influenced by water rights may also drive trends wherein senior water users exhibit stable to wetter conditions while junior users more vulnerable to drought are experiencing the effects of drying.

This flyway scale analysis is providing the IWJV partnership crucial information necessary to deliver targeted public-private lands conservation. Wetland resiliency maps are available to partners for key waterbird sites to accelerate the preservation of continental migration networks.

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Maps are available to partners for watersheds associated with key regional, international, and hemispherically important waterbird sites in the Pacific Flyway:

Summer Lake Basin	Warner Valley	Carson Sink	Ruby Valley
Harney Basin	Alkali Lakes	Walker Lake	Great Salt Lake
Lake Abert	Eagle Lake	Mono Lake	Sevier Lake
Tule Lake Basin	Honey Lake	Owens Lake	Willcox Playa
Goose Lake	Pyramid Lake	Humboldt Sink	

ACCESS AND DOWNLOAD MAPS AND DATA AT: https://tinyurl.com/wetlandmaps

Photo by Patrick Donnelly
Goose Lake, California/Oregon

SOURCE

Donnelly, J.P., King, S.L., Silverman, N.L., Collins, D.P., Carrera-Gonzalez, E.M., Lafón-Terrazas, A., Moore, J.N. (2020). Climate and human water use diminish wetland networks supporting continental waterbird migration. Global Change Biology. https://doi.org/10.1111/gcb.15010