



## Restore the Call: Wyoming Status Report for the Common Loon

The loon is a key biosentinel of aquatic integrity for lakes and nearshore marine ecosystems across North America. Supported by a grant from the Ricketts Conservation Foundation (RCF), which first proposed the idea, Biodiversity Research Institute (BRI) has initiated the largest conservation study for the Common Loon. The goal is to strengthen breeding populations in their existing range and to restore loons to their former breeding range, advancing our understanding of loon ecology and applying that knowledge to help restore the integrity of ecosystems where loons once thrived. In Wyoming, a state working group has been formed in collaboration with Yellowstone and Grand Teton National Parks, Wyoming Game and Fish Department, Bridger-Teton National Forest, and Caribou-Targhee National Forest.

*Wyoming's landscape is a study in contrasts, from shortgrass prairies and sagebrush steppes to the stunning peaks of the Rocky Mountains. Yellowstone National Park, known for its signature geysers, outstanding fishing, and iconic wildlife, is dedicated to preserving the state's natural environments and native species, such as the Common Loon.*

*Common Loons are listed as a Species of Greatest Conservation Need as determined by the Wyoming Game and Fish Department.*



# Status of Breeding Loon Population in Wyoming

## Western U.S. Breeding Population

In the western United States, Common Loons summer in Idaho, Montana, Washington, and Wyoming (Figure 1); in total, breeding populations are estimated at 102 territorial pairs. Wyoming's breeding population is disjunct and totals 17 territorial pairs. Breeding populations in nearby states include: northwestern Montana (75pairs) and Washington (18 pairs).

Based on scattered historical nesting records in California and Oregon, the western population of loons experienced a contraction of its breeding range. Common Loons in the western U.S. are known to overwinter from Washington south to the Baja Peninsula (Figure 1).

Data from a geolocator recently recovered from a breeding loon in Wyoming revealed that it overwintered off the southern tip of the Baja

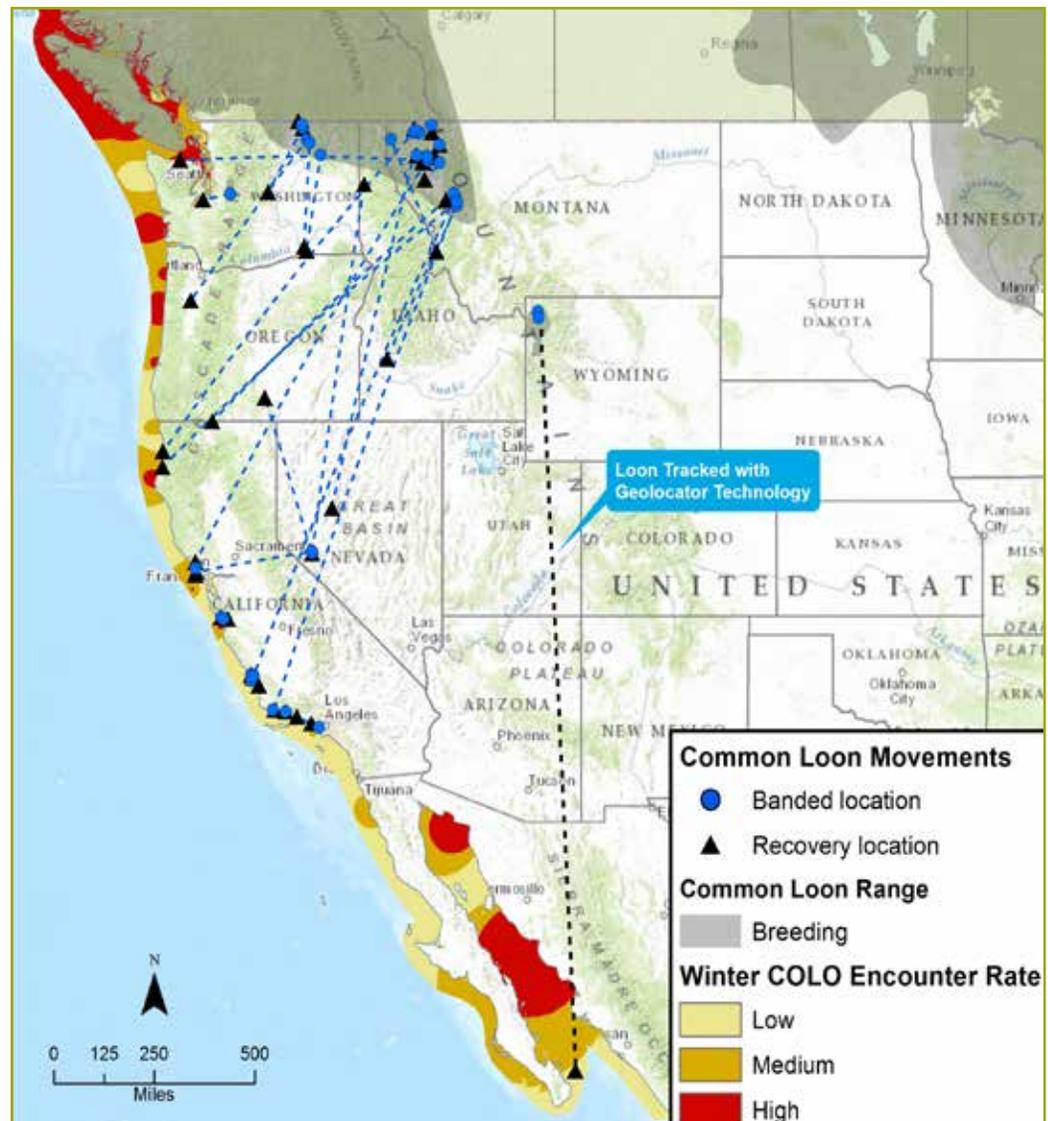
Peninsula, a migration of more than 2,400 km (Spagnuolo et al. 2016).

## Wyoming Breeding Population

With only 17 observed territorial pairs, the Wyoming loon population is one of the smallest in the species range. This population is not only the most southern loon population in the west, but it is also isolated from contiguous populations to the north by more than 220 miles. This makes immigration, and therefore dispersal and rescue from other populations unlikely.

These loons are distributed across: Yellowstone National Park—11 pairs; Caribou-Targhee National Forest—5 pairs; Bridger-Teton National Forest—1 pair; and Grand Teton National Park—only summering individuals present (Spagnuolo et al. 2016). Surveys in 2015 identified several lakes with over-summering individuals in the Wind River Range.

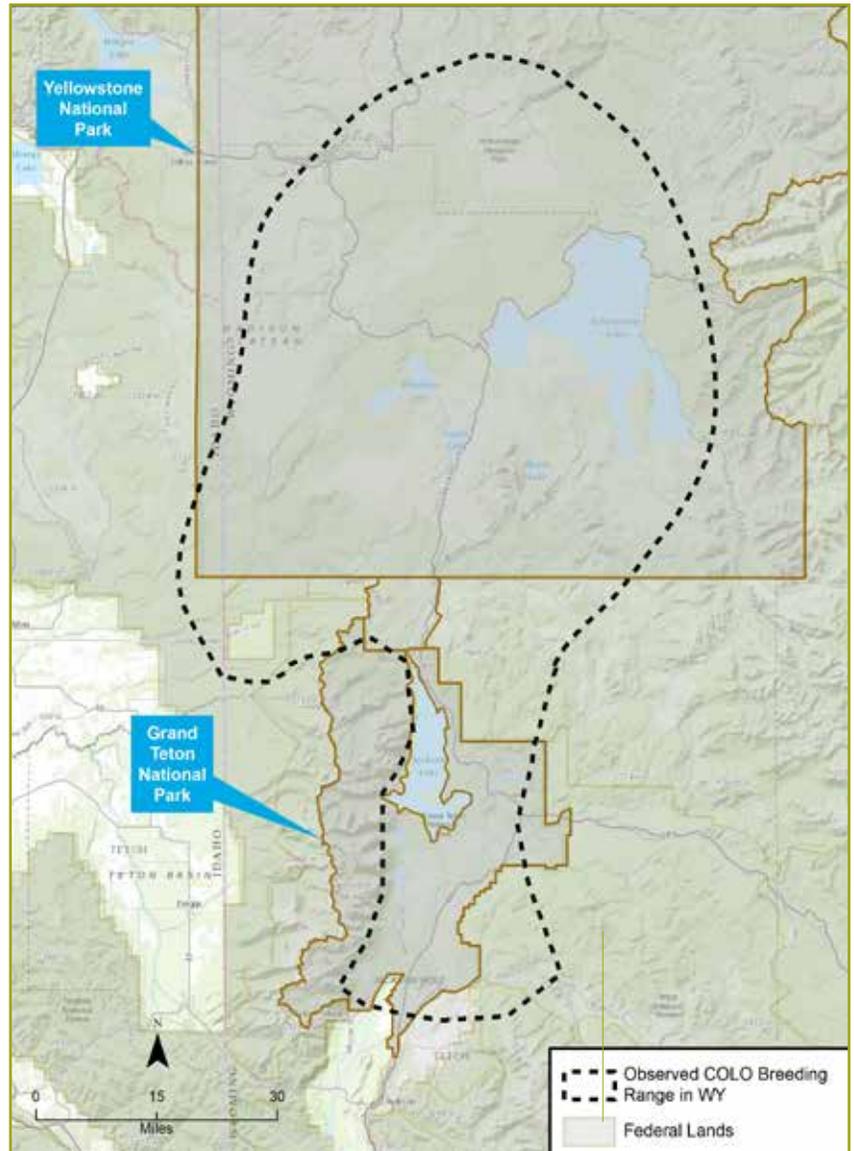
**Figure 1.** Breeding and wintering range for the Common Loon in the western United States. Movements of loons are based on recoveries and observation of individuals banded by BRI researchers. The winter range densities are taken from the National Audubon Society's Christmas Bird Count, 2002-2012. Data from birds/party hour are log transformed.





Above from top: Male and female loons equally share incubation duties, which last 27-30 days; Both pair members also share in attending to the needs of their young.

Below: Chicks are able to fend for themselves and attain flight at 11-12 weeks. Note the light grey bill and buffy-edged back feathers, which are characteristics of young of the year.



**Figure 2.** Generalized range of breeding Common Loons in northwestern Wyoming.

## Conservation Concerns

Loons are long-lived; they have relatively low fecundity and a poor ability to colonize new breeding areas. Given the small size and disjunct location of Wyoming's breeding loon population, it is at a particularly high risk of local extinction. Threats to this population include: loss of breeding habitat; direct human disturbance to nests and chicks; water level fluctuations (especially related to climate change); changes in prey abundance and composition; contaminants (e.g., lead and mercury); and winter hazards (e.g., marine oil spills and fishing nets). In Wyoming, the Common Loon is listed as a Species of Greatest Conservation Need.

# The Concern for Loons in the Yellowstone Ecosystem

Based on monitoring efforts by the National Park Service and Wyoming Game and Fish Department, we know that the Wyoming loon population declined in the middle of the last decade (Figure 3a). The number of territorial pairs has declined from a high of 21 observed pairs in 2006, to a low of 14 pairs in 2012 (Figure 3a; Spagnuolo et al. 2016).

The exact reasons for the decline are unknown, but human disturbance of nesting pairs and loss of breeding adults are suspected. Because the Common Loon has a life history pattern where individuals live long but produce few young, significant changes in the number of territorial pairs are symptomatic of chronic stressors (Evers 2007; Evers et al. 2010) and therefore provide an important predictor of aquatic integrity (Evers 2006).

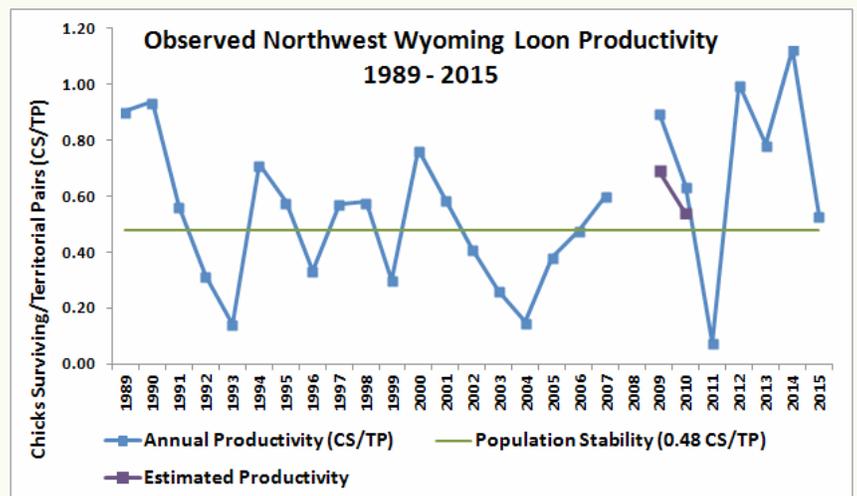
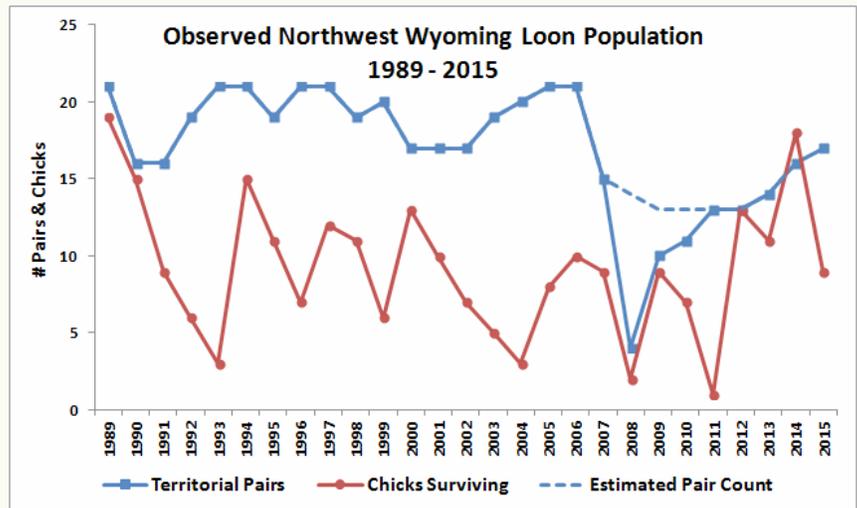
Typically, for long-lived birds, 20 percent of the breeding population produces 50 percent of the young, which is evident in the northwest Wyoming breeding population. Recently, this population has had excellent reproductive success as measured by the number of chicks surviving (CS) per territorial pairs (TP). This recent trend of high productivity suggests northwest Wyoming may see an increase in its population over the next few years.



Rafts have been proven to be an effective management tool in Common Loon reproductive studies on New England lakes and ponds. With rafts, hatching success increased by 51% on lakes with stable water levels and 119% on those with fluctuating systems (DeSorbo et al 2007).

**Figure 3a (top).** The number of territorial pairs in northwest Wyoming experienced a significant decline from peak levels. Recently, it appears the population is rebounding with new pairs forming. Note, surveys from 2008 to 2010 were not comprehensive.

**Figure 3b (bottom).** Based on comparisons with national models that indicate 0.48 fledged young per territorial pair is a reasonable benchmark for a sustainable population (Evers et al. 2010), productivity over the past decade indicates the Wyoming population has fluctuated around this threshold. Between 2012–2015 productivity has been well above 0.48 CS/TP and may suggest the adult population will increase in the coming years. Note surveys from 2008 to 2010 were not comprehensive.



## Common Loon Demographics

Much is known about the demographics of the Common Loon based on a 29-year monitoring program of color-marked individuals from across North America ( $n > 5,000$ ) and associated movement studies using satellite telemetry ( $n > 50$  individuals) by Biodiversity Research Institute (BRI).

For example, on average, individual loons produce 5-10 fledged young over a lifetime. This is based on a model using known national rates for fecundity of 0.24 fledged young per female (or 0.48 fledged young per territorial pair), average first year breeding at 6 years of age, 3-year-old survivorship of 48 percent, 3-20 year annual survivorship of 92 percent, and 20-30 year annual survivorship of 85 percent.

Models developed by BRI, with the U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service, indicate that a long-term average of 0.48 fledged young per territorial pair is a good benchmark for a sustainable loon population.

Typically, 18-20 percent of the summer adult population represents individuals that may be over-summering, but not attempting to breed (i.e., 3-5-year-olds).

Common Loons are poor colonizers; adults disperse an average of 1-2 miles from their previous breeding territory and fledged young disperse an average of 12 miles (although the record is just over 100 miles; Evers et al 2010).

Recreational pressures have been implicated in the decline of breeding loons. However, despite these declines, other studies report that loons can successfully breed with such disturbances. Evidence of the loon's ability to acclimate suggests that properly designed mitigation efforts and, more importantly, outreach initiatives can be successful in many instances (Evers 2007).



## Using Loons to Monitor Lake Quality

Protection of loon breeding habitat is critical to maintaining the integrity of loon populations and avoiding further habitat degradation. Because of the loon's top trophic-level position, high visibility, limited dispersal ability, and relatively slow replacement rate, it is widely used as an indicator species for tracking aquatic integrity (Evers 2006).

### Prey Populations Affect Loons

Changes in fish species composition and availability in Yellowstone National Park over the last two decades—loss of cutthroat trout (*Oncorhynchus clarki bouvieri*) to increasing populations of lake trout (*Salvelinus namaycush*)<sup>1</sup>—may have an adverse effect on piscivorous birds such as Ospreys and Bald Eagles (Baril et al. 2013); and possibly the Common Loon.

Visual predators, loons prefer foraging for smaller prey (e.g., cutthroat trout) closer to the water's surface. Lake trout swim in deeper water, an area breeding loons do not regularly utilize for food sources.

Loons in Wyoming appear to consume more invertebrate prey than do loons in other populations. It is suspected that some loon territories are on fishless lakes, or lakes with low fish biomass, however that these territories can experience high loon productivity.

### Lily Pads May Pose Problems

It appears lakes within Yellowstone National Park are increasingly eutrophic, resulting in more vegetation coverage on lakes used by Common Loons and Trumpeter Swans (*Cygnus buccinator*).

Harlequin and South Delusion Lakes are now nearly covered with lily pads by early July, essentially ending their use by breeding loons. Should currently-occupied breeding lakes, such as Lily Pad, Indian, and Loon, follow this trend, breeding loons will be displaced.



Aquatic plants are a vital part of the biological community of a lake. Unfortunately, they can overpopulate under eutrophic conditions, creating a serious problem for breeding loons. Diminishing populations of cutthroat trout (left) may also negatively affect loons.

### Two Breeding Species in Parallel Decline

Two decades ago, populations of Common Loons and Trumpeter Swans were larger than they are today. Both species create nests just above the water line, and because productivity has declined for both, one concern is that abnormal water level fluctuations and human disturbance are causing regular nest failures at some sites. Yellowstone National Park experienced



record visitation in 2015, therefore further management of human activities near sensitive breeding areas for loons, swans, and other wildlife will be needed.

<sup>1</sup>Yellowstone Resources and Issues Handbook 2012

## Actions Needed for a Sustainable Population

Evidence of the loon's ability to acclimate to changing conditions suggests properly designed conservation efforts can be beneficial in many instances (Evers 2007). Over the years, BRI's research has found the following actions to be successful or have potential for success:

### Monitoring

Use standardized survey methods to collect data on the number of territorial pairs, nesting pairs, location of nests, chicks hatched, and those surviving >6 weeks of age. A critical component of monitoring is determining causes of adult mortality, nest failures, and loss of chicks.

### Restoration and Management Plan

Create a territory-specific restoration and management plan using baseline data. Include compensation measures for: (1) loss of nests to water level fluctuations or predation (i.e., nest platforms); (2) loss of nests/chicks to human disturbance (i.e., temporary closures); (3) adverse impacts from

changes in prey or predator (e.g., Bald Eagles) populations; and (4) loss of territorial pairs (i.e., translocating loon chicks).

### Research

Understand habitat and resource utilization and assess potential adverse impacts from changing fish composition, especially in Yellowstone Lake. Capture and band loons to track individuals and determine health parameters including contaminant body burdens (e.g., mercury and lead). Determine inter- and intraseasonal movements through the use of geolocators and satellite transmitters. Assess the need and feasibility of translocating loon chicks.

### Outreach

Create greater awareness of the presence and requirements of loons in visitor centers at national parks and forests using dioramas, exhibits, communication pieces, and video and slide presentations. Provide information about nesting loons at lakes and trailheads.

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## Novel Loon Conservation Strategy



### Restore the Call Loon Conservation Study

In 2014 and 2015, BRI researchers successfully translocated 14 loon chicks—seven each year—from northern to southern Minnesota, captively rearing them in specially-designed pens. And, in 2015, BRI successfully moved seven loon chicks from New York lakes to Massachusetts, where they were captively reared. All chicks were safely released and all fledged. This work, part of the *Restore the Call* loon conservation study initiated in 2013, is being conducted in collaboration with state and federal agencies. For more information, visit: [www.briloon.org/restorethecall](http://www.briloon.org/restorethecall).

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**Photography:** Cover: Landscape by Flickr; Nesting loon by Jonathan Fiely. Page 3: Nesting loon, breeding loon pairs, juvenile loons by Daniel Poleschook. Page 4: Rafting loon nest by Jonathan Fiely. Page 5: Lake fisherman with loon by Daniel Poleschook. Page 6: Lily pads by Daniel Poleschook; Cutthroat trout by Pat Clayton; Trumpeter Swan by Trisha Shear. Page 7: Rearing pens and juvenile in pen by Michelle Kneeland.

Biodiversity Research Institute's mission is to assess emerging threats to wildlife and ecosystems through collaborative research and to use scientific findings to advance environmental awareness and inform decision makers.

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