

Prepared in cooperation with the Minnesota Department of Natural Resources and Minnesota Pollution Control Agency

Restoration of *Gavia immer* (Common Loon) in Minnesota—2024 Annual Report

Open-File Report 2025–1029

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By William S. Beatty, Kelly Amoth, Luke J. Fara, Brian R. Gray, Kristin Hall, Steven C. Houdek, Jayden Jech, Kevin P. Kenow, Michael Wellik, and Steven Yang

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Conversion Factors

International System of Units to U.S. customary units

Multiply	By	To obtain
	Length	
meters (m)	3.281	feet (ft)

Abbreviations

ANP	artificial nest platform
MN DNR	Minnesota Department of Natural Resources

Restoration of *Gavia immer* (Common Loon) in Minnesota—2024 Annual Report

By William S. Beatty,¹ Kelly Amoth,² Luke J. Fara,¹ Brian R. Gray,¹ Kristin Hall,³ Steven C. Houdek,¹ Jayden Jech,³ Kevin P. Kenow,¹ Michael Wellik,¹ and Steven Yang²

Abstract

In cooperation with the Minnesota Department of Natural Resources, the U.S. Geological Survey monitored 98 common loon (*Gavia immer*) focal territories and an additional 37 nonfocal territories in 2024 across 53 study lakes in Minnesota. Focal territories were those territories from which study inferences will be made, whereas nonfocal territories were observed to monitor common loon dynamics in territories adjacent to focal territories. In collaboration with lake associations and private citizens, we deployed 44 artificial nesting platforms within 44 treatment territories, and the remaining 54 focal territories were controls. We completed territorial surveys from April 29 to August 9, 2024, to evaluate occupancy, nest success, and chick survival. We attempted to visit each territory once a week. At least one nest attempt was observed in 41 of 54 control territories. Precisely one nest attempt was observed in 30 control territories, two nest attempts (first attempts failed) were observed in 9 control territories, and three nest attempts (first and second attempts failed) were observed in 2 control territories. At least one nest attempt was observed in 33 of 44 treatment territories. Precisely one nest attempt was observed in 25 treatment territories, two nest attempts (first attempts failed) were observed in 7 treatment territories, and three nest attempts (first and second attempts failed) were observed in 1 treatment territory. In treatment territories, 8 nests were on an artificial nesting platform; the remaining nest locations were natural. Chicks or other evidence of hatching were observed in 26 of 54 (48.1 percent) control territories and 21 of 44 (47.7 percent) treatment territories, with 7 of those successful treatment nests on an artificial nesting platform. This report includes no formal analysis, but we plan to analyze data after collection of all field data in subsequent years.

Introduction

The *Deepwater Horizon* oil spill occurred from April 20 to September 19, 2010, and released approximately 5.0 million barrels of oil into the Gulf of Mexico (McNutt and others, 2012), which prompted a Natural Resources Damage Assessment to evaluate damage from the oil spill (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The common loon (*Gavia immer*) was one of many bird species injured from the spill with the estimated number of common loons injured ranging from 561 to 910 (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). In the context of a Natural Resources Damage Assessment, injury is a “measurable adverse change, either long- or short-term, in the chemical or physical quality or the viability of a natural resource” (43 CFR part 11.14(v)). Thus, natural resource injury can include mortality or lost reproduction (43 CFR part 11.62(f)). Deepwater Horizon Open Ocean Trustee Implementation Group funded the “Restoration of Common Loon in Minnesota” project to restore common loons lost from the *Deepwater Horizon* oil spill. The project has three objectives (Open Ocean Trustee Implementation Group, 2019):

1. Acquire and protect critical lakeshore nesting and foraging habitat.
2. Enhance common loon habitat and increase lake stewardship.
3. Reduce lead exposure through advocacy of nontoxic fishing tackle.

In this report, we describe activities under the “Restoration of Common Loon in Minnesota” project for calendar year 2024. Specifically, we report progress on monitoring benchmarks defined in the Monitoring and Adaptive Management Plan (Open Ocean Trustee Implementation Group, 2019), which are (1) baseline status of lakes (objective 2); (2) length of linear shoreline acquired (objective 1); (3) number of artificial nesting platforms (ANPs) deployed (objective 2); (4) number of ANPs occupied (objective 2); (5) number of lake associations recruited to participate in a loon-friendly lake program

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(objective 2); (6) number of intervention activities to promote environmentally friendly fishing gear (objective 3); and (7) common loon presence/absence, territory occupancy, and nest productivity (objective 2). No formal analysis is included because this is an ongoing project.

Methods

Breeding common loons were monitored on territories in north-central Minnesota in 2021 (Beatty and others, 2022), 2022 (Beatty and others, 2023), and 2023 (Beatty and others, 2024). The study design resembled a before-after control-impact design. Pretreatment (that is, “before”) data were collected in 2021 and 2022 (Beatty and others, 2022, 2023). In 2023, we identified 99 focal territories from the sample of territories monitored in 2021 and 2022 (Beatty and others, 2024). Focal territories were territories from which inferences will be made for the study. We assigned 54 of these focal territories as control with the remaining 45 identified as treatment (that is, “impact”) units (Beatty and others, 2024). Focal territories and the status of each focal territory (control or treatment) will remain constant throughout the study with limited exceptions (discussed later in this section). Treatment was deployment of an ANP into a focal territory, which occurred early in the breeding season in 2023 (Beatty and others, 2024). Control territories did not receive an ANP. Thus, 2023 represented the first year of data collection with ANPs (that is, “after”).

Breeding common loons were monitored on territories in north-central Minnesota in 2024 across 53 lakes (table 1, fig. 1), which was the second year of treatment data collection and fourth consecutive year overall. We monitored focal territories and nonfocal territories. Nonfocal territories were territories that did not meet our criteria (Beatty and others, 2023) for focal territory but were on the same lake as a focal territory. We monitored nonfocal territories to track common loon dynamics on lakes with focal territories, which allowed us to identify the status of focal territories with more certainty. We worked with private citizens and lake associations to deploy ANPs to 44 treatment territories before an effective deployment date (discussed later in this section). ANPs were deployed in approximately the same location in the same treatment territories in 2023 and 2024. In late 2023, one treatment focal territory was recategorized as a nonfocal territory (Crow Wing County Island Lake–South) because the ANP was placed in an unsuitable area, which reduced the number of focal territories from 99 to 98 and the number of treatment territories from 45 to 44 (Beatty and others, 2024).

We identified an effective deployment date for ANPs of May 10, 2024, which was earlier than 2023. ANPs deployed before the date were categorized as effectively available to common loons as a nesting site, whereas ANPs deployed after the date were categorized as effectively not available to common loons as a nesting site. We selected an earlier effective deployment date in 2024 compared to 2023 because ice-out occurred early to mid-April in most surveyed lakes in 2024. In contrast, ice-out occurred in late April to early May in most surveyed lakes in 2023. Additionally, the earliest observed nesting attempt in 2024 occurred on May 3 and a preliminary analysis indicated that 20 percent of nests were initiated by May 10, 2024. Thus, May 10 was an acceptable effective deployment date because it balanced nesting common loon phenology and ANP deployment logistics (Beatty and others, 2024). Furthermore, the effective deployment date in 2024 also aligns with general common loon nesting phenology, which typically starts nest construction in mid-May (Paruk and others, 2021).

We surveyed 53 lakes across seven counties in north-central Minnesota, which was 3 fewer lakes than surveyed in 2023. We did not survey Unnamed Lake in Becker County (not shown) in 2024 because it was identified as a multilake territory and categorized as a nonfocal territory in 2023. A multilake territory is a territory in which a breeding loon pair use multiple lakes during the breeding season. A parcel on Wabedo Lake (not shown) was under consideration for acquisition for this project in 2023. Thus, we surveyed Wabedo Lake in 2023, but we did not survey this lake in 2024 because the parcel was dropped from consideration for acquisition. Finally, we did not survey Island Lake in Crow Wing County (not shown) because the ANP was placed in an unsuitable area in 2023, and the lake was entirely removed from the study.

We surveyed each territory by way of motorboat, kayak, canoe, or shoreline observation (Beatty and others, 2022). We circumnavigated larger lakes and frequently stopped to scan for common loons. Information was collected on common loons and environmental variables that could affect loon or nest detection (Beatty and others, 2022). We defined a nest attempt as an adult loon observed incubating on a nest with or without visual confirmation of egg(s) or observation of a nest bowl with eggs from the current year. All data from surveys were recorded in an ArcGIS Survey123 version 3.19 application (Environmental Systems Research Institute, Inc., Redlands, California, United States). We visited loon territories every 3–13 days (mean=6.9 days) from April 29 to July 12, 2024, to collect information on territory occupancy, nesting, and chick survival (Beatty and others, 2022, 2023). Each territory was surveyed twice from July 29 to August 9, 2024, to document chick presence to estimate survival.

Table 1. Lakes in a seven-county region in north-central Minnesota that were surveyed to collect information on common loon (*Gavia immer*) territory occupancy, nest success, and chick survival in 2024.

Lake	Lake
Atkin County	Cass County—Continued
Big Sandy Lake	Town Line Lake
Clear Lake	Widow Lake
Dam Lake	Woman Lake
Gun Lake	Crow Wing County
Long Lake	Barbour Lake
Waukenabo Lake	Big Trout Lake
Becker County	Butterfield Lake
Big Sugar Bush Lake	Cross Lake
Blueberry Lake	Dolney Lake
Knutson Lake	Goodrich Lake
Lake Maud	Hartley Lake
Nelson Lake	Little Ox Lake
Beltrami County	Little Rabbit Lake
Stump Lake	Mitchell Lake
Cass County	Mollie Lake
Birch Lake	Moody Lake
Boxell Lake	Mud Lake
Dade Lake	Pleasant Lake
Four Point Lake ¹	Scott Lake
Lake Hattie	Velvet Lake
Horse Lake	Hubbard County
Horseshoe Lake	Crooked Lake
Howard Lake	Daisy Lake
Island Lake	Lord Lake
Little Thunder Lake	Itasca County
Long Lake	Lake Alice
Lost Lake	Deer Lake
Lake Margaret	Ox Hide Lake
Mud Lake	Thistledew Lake
Thunder Lake	

¹Four Point Lake was listed as Five Point Lake in previous reports. In the U.S. Geological Survey Geographic Names Information System, this lake is listed as Four Point Lake but it is locally known as Five Point Lake according to signs and local residents.

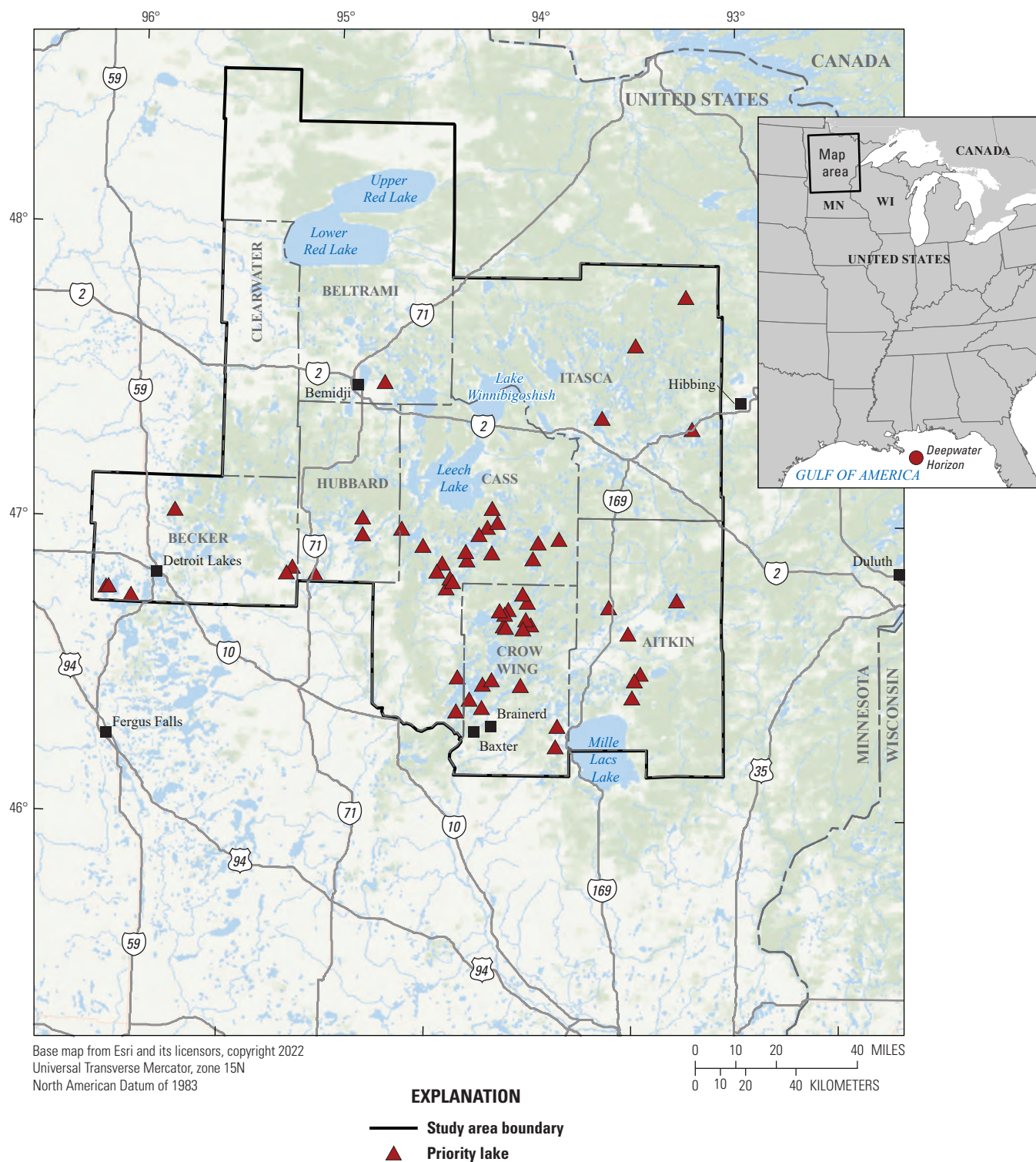


Figure 1. Lakes ($n=53$) monitored for common loon territory occupancy, nesting, and chick survival in 2024 to evaluate the effects of artificial nesting platforms on reproductive success in north-central Minnesota.

Results

We monitored 126 territories in 2021 (Beatty and others, 2022), 132 territories in 2022 (Beatty and others, 2023), and 141 territories in 2023 (Beatty and others, 2024). In 2024, we monitored 135 territories, including 54 focal control territories and 44 focal treatment territories (Beatty and others, 2025). In addition, we monitored 19 nonfocal territories that had at least one nontreatment ANP in 2024 or a previous year, as well as 8 territories discovered in 2022 or 2023. ANPs in nonfocal territories were placed by private citizens and lake associations outside the scope of the before-after control-impact study design. We also monitored three nonfocal territories that were multilake territories adjacent or near focal territories. Finally, we monitored seven territories that were near parcels under consideration for acquisition.

In the sample of 98 focal territories, we observed at least one nest attempt in 41 of 54 control territories and 33 of 44 treatment territories. A second nest attempt after a failed initial attempt was observed in 9 control territories and 7 treatment territories. A third nest attempt after a failed second attempt was observed in 2 control territories and 1 treatment territory. In treatment territories, 8 nests were on an ANP; the remaining nest locations were on natural substrates.

Chicks or other evidence of hatching were observed in 26 of 54 control territories and 21 of 44 treatment territories, with 7 of those successful treatment nests occurring on an ANP. In 2023, one nest attempt, which was successful, was on an ANP (Beatty and others, 2024). This report includes no formal analysis, but we plan to analyze data after collection of all field data in subsequent years.

Benchmarks to Evaluate Project Progress

The Monitoring and Adaptive Management Plan (Open Ocean Trustee Implementation Group, 2019) provides parameters to assess project progress, and we report on all parameters in the following sections.

Parameter 1—Baseline Status of Lakes

Parameter 1 represents a reporting metric for objective 2, which is to enhance common loon habitat and increase lake stewardship. Completion of parameter 1 is detailed in the 2021 annual report (Beatty and others, 2022).

Parameter 2—Length of Linear Shoreline Acquired

Parameter 2 represents a reporting metric for objective 1, which is to acquire and protect critical lakeshore nesting and foraging habitat. In 2024, three parcels completed the Minnesota Department of Natural Resources (MN DNR) acquisition process with one parcel each on Barbour Lake (434.3 meters [m]) and Big Trout Lake (192.0 m) in Crow Wing County and Clear Lake (1,037.8 m) in Aitkin County. The total length of linear shoreline acquired as of the end of 2024 was 1,664.1 m. In addition, MN DNR, U.S. Fish and Wildlife Service, and U.S. Geological Survey staff considered one additional parcel for lakeshore habitat acquisition. The U.S. Fish and Wildlife Service provided approval for this additional parcel prior to MN DNR internal processing. The parcel under consideration for acquisition as of the end of calendar year 2024 contained a total of 8,839.2 m of shoreline. Thus, the final value for this parameter may be more than the amount of shoreline acquired as of 2024.

Parameter 3—Number of Deployed Artificial Nest Platforms

Parameter 3 represents a reporting metric for objective 2, which is to enhance common loon habitat and increase lake stewardship. We worked with private citizens and lake associations to deploy 44 ANPs to 44 focal treatment territories in 2024. May 10, 2024, was the effective deployment date whereby ANPs deployed on or before this day were considered available to nesting loons and ANPs deployed after this date were considered not available to nesting loons. One ANP (Hattie Lake–Sand Point North) was deployed May 20, 2024, so it was not considered available to nesting loons, whereas the remaining ANPs were deployed before the effective deployment date. Thus, we deployed 43 of 44 (95 percent) ANPs by May 10, 2024. The ANP deployed late was considered not available to breeding pairs. In addition, the MN DNR worked with private lake associations and private citizens to deploy seven ANPs for education and outreach, which were not part of the before-after control-impact study design.

Parameter 4—Number of Occupied Artificial Nest Platforms

Parameter 4 represents a reporting metric for objective 2, which is to enhance common loon habitat and increase lake stewardship. We observed 8 nests on deployed ANPs for an occupancy rate of 8/43 (18.6 percent) with 7 of these resulting in successful nests, which represents an increase from the occupancy rate of 1/42 in 2023 (Beatty and others, 2024).

Parameter 5—Number and Locations of Recruited Lake Associations

Parameter 5 represents a reporting metric for objective 2, which is to enhance common loon habitat and increase lake stewardship. The Loon Friendly Lake Registry program provides support to lake associations to develop lake management plans and encourages lake associations to appoint a liaison to support loon friendly activities on the lake. In addition, participants in the Loon Friendly Lake Registry are provided plans to enhance loon productivity and encourage monitoring of loon activity as part of an ongoing MN DNR community science project, the Volunteer Loon Watcher Survey. The MN DNR provided support to more than 50 active lake associations in calendar year 2024 to develop and update lake management plans as part of the Loon Friendly Lake Registry program.

Parameter 6—Number of Intervention Activities to Promote Use of Environmentally Friendly Fishing Gear

Parameter 6 represents a reporting metric for objective 3, which is to reduce lead exposure through advocacy of nontoxic fishing tackle. The Minnesota Pollution Control Agency's cooperative agreement ended on June 30, 2024. Thus, the reported activities herein represent accomplishments for the first 6 months of 2024. The Get the Lead Out program has continued as a program at Minnesota Pollution Control Agency, and the program will continue its outreach and education efforts with funding from the State of Minnesota.

The Get the Lead Out program conducted 37 in-person education programs in 2024. Education and outreach programs included presentations to students (kindergarten through high school), summer day camps, and tabling at community events and sports shows. The "We Are Water" traveling exhibit included a piece on the Get the Lead Out program. Another component of these outreach programs is the distribution of sample packs of lead-free fishing tackle to the public. In 2024, the program distributed more than 3,200 sample packs of lead-free fishing tackle across Minnesota.

Parameter 7—Presence/Absence, Territory Occupancy, and Nest Productivity

Parameter 7 represents a reporting metric for objective 2, which is to enhance common loon habitat and increase lake stewardship. We monitored 98 focal territories on 53 lakes in 2024 and observed at least one loon on one sampling occasion in all territories. An occupied territory was defined as a sampling unit that had a pair of loons present on at least three sampling occasions between April 29 and July 12, 2024, or an observation of a subsequent stage in the reproductive process (for example, nesting, chicks). We observed 40 of 44 treatment

territories and 51 of 54 control territories as occupied in 2024. Chicks or other evidence of hatching were observed in 26 of 54 control territories and 21 of 44 treatment territories, with 7 of those successful treatment nests occurring on an ANP.

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