

Prepared in cooperation with the U.S. Fish and Wildlife Service

Red-throated Loon (*Gavia stellata*) Use of Nearshore Marine Habitats—Results from a 2019 Pilot Study in Northern Alaska



Open-File Report 2021–1029

Cover: An adult red-throated loon (*Gavia stellata*) on its breeding lake in northern Alaska. Photograph by Ryan Askren, USGS Alaska Science Center.

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Conversion Factors

U.S. customary units to International System of Units

Multiply	By	To obtain
Length		
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
Area		
square mile (mi ²)	2.590	square kilometer (km ²)
Flow rate		
cubic foot per second (ft ³ /s)	0.02832	cubic meter per second (m ³ /s)

International System of Units to U.S. customary units

Multiply	By	To obtain
Length		
meter (m)	3.281	foot (ft)
meter (m)	1.094	yard (yd)
kilometer (km)	0.6214	mile (mi)
kilometer (km)	0.5400	mile, nautical (nmi)
Area		
square kilometer (km ²)	0.3861	square mile (mi ²)
Flow rate		
meter per year (m/yr)	3.281	foot per year ft/yr)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$^{\circ}\text{F} = (1.8 \times ^{\circ}\text{C}) + 32$$

Red-throated Loon (*Gavia stellata*) Use of Nearshore Marine Habitats—Results from a 2019 Pilot Study in Northern Alaska

By Brian D. Uher-Koch¹, Christopher J. Latty², and Joel A. Schmutz¹

Abstract

Red-throated loons (*Gavia stellata*) are a species of conservation concern in Alaska due to recent evidence of a population decline on the Arctic Coastal Plain (ACP) in northern Alaska. In 2019, the U.S. Geological Survey and the U.S. Fish and Wildlife Service conducted a pilot study to evaluate diet and use of nearshore foraging areas as possible drivers of the population decline. We collected fat biopsies to examine diet of breeding red-throated loons using previously outlined methods. We also deployed GPS-Ultra High Frequency transmitters on red-throated loons for an initial understanding of detailed offshore marine habitat use during the breeding season. A broader research project on marine habitat use and fish diet of breeding red-throated loons will begin in 2021 on the Canning River Delta and in Foggy Island Bay, Alaska.

Introduction

Red-throated loons (*Gavia stellata*) are a species of conservation concern in Alaska due to recent evidence of a decline in the population breeding on the Arctic Coastal Plain (ACP) in northern Alaska (Wilson and others, 2018; Amundson and others, 2019). Concurrently, populations of two sympatric loon species, the yellow-billed loon (*G. adamsii*) and Pacific loon (*G. pacifica*), are either stable or increasing on the ACP (Wilson and others, 2018; Amundson and others, 2019), highlighting the need to determine specific drivers of the population decline in red-throated loons. Because red-throated loons are sensitive to changing marine conditions and have high survival rates (Schmutz, 2014), it is important to determine the factors influencing reproductive success. One possible driver of low productivity includes changes in marine ecosystem forage conditions.

Red-throated loons nest on freshwater lakes but primarily rely on marine fish prey to feed themselves and their chicks, unlike sympatric yellow-billed and Pacific loons which typically rely on freshwater fish and invertebrates for prey (Reimchen and Douglas, 1984; Eriksson and others, 1990; Uher-Koch and others, 2014). Thus, changes in nearshore fish communities may contribute to population decline of red-throated loons due to habitat deterioration or if preferred prey are less abundant or of lower quality (Dickson, 1992). Ongoing research has revealed long-term shifts in Beaufort Sea fish community composition and catch rates (Green and others, 2019), which has the potential to limit red-throated loons' ability to meet energetic needs during incubation and chick rearing. Therefore, identifying fine-scale habitat use, estimating loon energetic costs of flight and diving (for example, flying to/from marine foraging areas or during foraging bouts), and examining their diet will allow assessment of how marine conditions impact loon breeding success. To reduce uncertainty about possible drivers of the population decline of red-throated loons on the ACP, and to inform oil and gas exploration and development in onshore and offshore areas of northern Alaska, the Bureau of Ocean Energy Management prioritized an understanding of red-throated loon habitat in the nearshore marine environment of northern Alaska in 2020 (Bureau of Ocean Energy Management, 2019).

The 2019 Pilot Study

In 2019, the U.S. Geological Survey and the U.S. Fish and Wildlife Service conducted a pilot study on the Canning River Delta on the western coastal plain of the Arctic National Wildlife Refuge to evaluate the site and field protocols for future work. Specifically, the pilot study began efforts to evaluate marine habitat use by this species through deployment of GPS tags. The specific pilot study objectives were to:

1. Collect fat biopsy samples from adult red-throated loons for fatty acid analyses to identify prey types consumed during nesting and chick-rearing.

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2. Deploy GPS-Ultra High Frequency (UHF) transmitters on adult red-throated loons to test the feasibility of this technique and obtain preliminary movement data to be used to design a larger study on the foraging locations and fine-scale habitat use by loons in the Beaufort Sea.

Methods and Results

From June 26 to 29, 2019, we searched areas on the Canning River Delta for loon nests. We captured four nesting adult red-throated loons using bow-net traps (Salyer, 1962).

We collected fat biopsies from captured loons to examine diet of breeding red-throated loons using previously outlined methods (Owen and others, 2010). We wanted to determine the effectiveness of the transmitters prior to a larger scale study, so we only deployed three glue-on GPS-UHF transmitters on adult red-throated loons. We only obtained fine-scale resolution data from one loon due to nest or base-station failure. Raw data locations show offshore foraging locations in the Beaufort Sea (fig. 1). In future work, transmitters will also log dive duration to determine energy expenditure of loons during foraging trips.

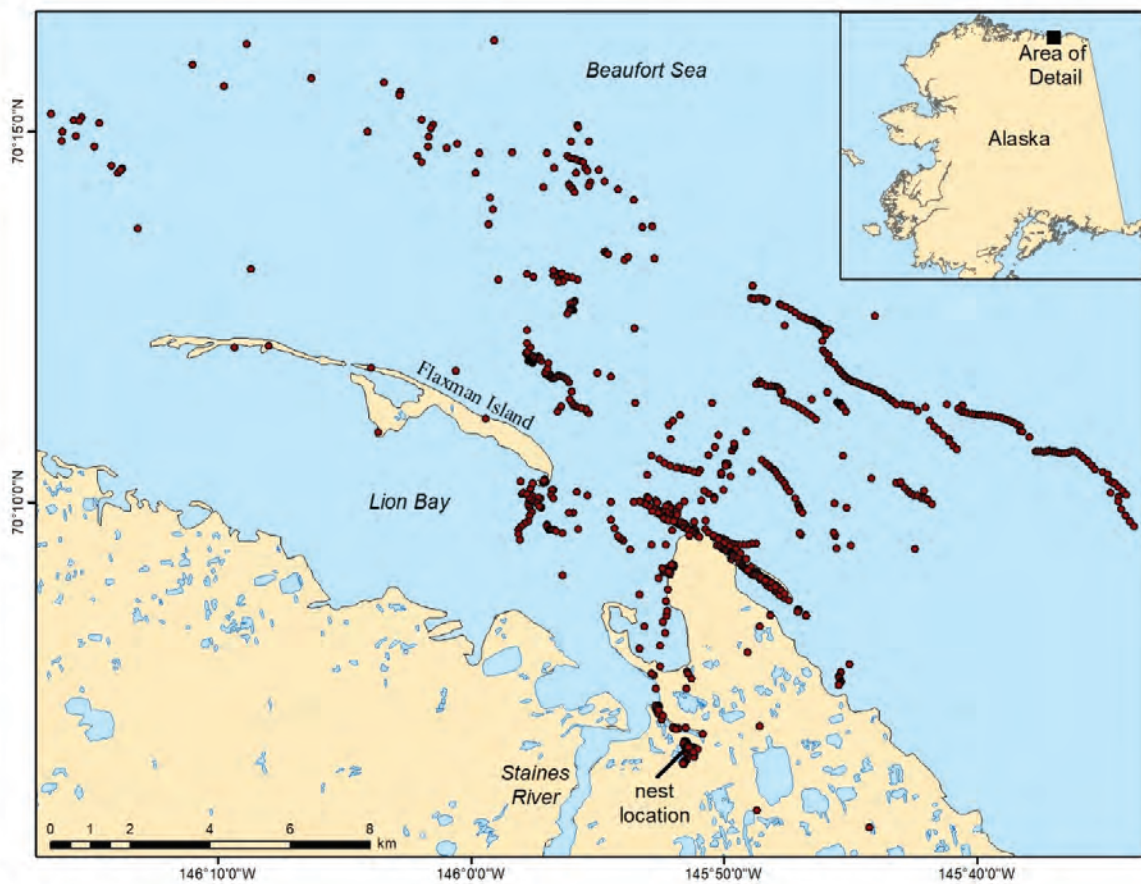


Figure 1. GPS locations (maroon dots) of one adult breeding red-throated loon (*Gavia stellata*) near the Canning River Delta in northern Alaska. GPS locations were collected approximately every 5 minutes from June 26 to July 13, 2019 and have not been filtered.

Summary and Next Steps

We plan to continue collecting data on breeding red-throated loons at the Canning River Delta during three field seasons, from 2021 to 2023. This effort will include deploying additional GPS transmitters. The addition of Global System for Mobile Communications (GSM) transmitting capabilities to these GPS transmitters in 2021 will improve data acquisition and increase sample size of marine locations. We also plan to deploy cameras at loon nests to identify nest fates and determine sources of nest failure (for example, predation).

Renewed interest in nearshore oil development and production in the Beaufort Sea has created a need to identify potential impacts on wildlife in the region. The proposed Liberty Development Project would include the construction of an artificial island in Foggy Island Bay (Hilcorp Alaska, 2017), an area likely used by breeding red-throated loons. We plan to add Foggy Island Bay, approximately 60 km to the west of the Canning River Delta, as a second coastal and nearshore marine study site in 2021. GPS locations from breeding loons in Foggy Island Bay area will be used to identify foraging locations and important marine habitats prior to industrial development.

This research is informed by ongoing and future nearshore fish community work in the Beaufort Sea that provides an understanding of spatial and temporal variation in relevant fish communities by revisiting historic sample sites. That project, “Nearshore fish surveys in the Beaufort Sea: Examining long-term community change and the role of nearshore habitats,” is led by Vanessa von Biela (USGS Alaska Science Center) and will build upon existing datasets to inform our understanding of changes in fish species abundance, distribution, and species diversity along the coast of the ACP (Bureau of Ocean Energy Management, 2021). We plan to use this information to examine the relationship between fish prey abundance, fish energy density, and loon reproductive success.

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