

Sea Duck Joint Venture
Annual Project Summary
FY2022 (October 1, 2021 – September 30, 2022)

Project #: 168

Project Title: Characterization of the migratory patterns, connectivity, philopatry and timing of the western North American Harlequin duck (*Histrionicus histrionicus*) population throughout the annual cycle.

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Partners: John Bower, Western Washington University, jbower@wwu.edu. John McLaughlin, Western Washington University, jmcl@wwu.edu. David Douglas, United States Geological Survey, ddouglas@usgs.gov.

Project Description: The Harlequin duck was recently added to the Sea Duck Joint Venture's (SDJV) list of species of management concern and is included in the FY2022 SDJV Notice of Funding Opportunity as a high priority species because of "historical or current declines and concerns about harvest potential or habitat limitations." Contributing to and further refining our understanding of population delineation, migratory connectivity, and habitat utilization of priority sea duck species is considered by the SDJV to be among its priority scientific needs. The ways in which the different breeding and non-breeding portions of the North American Harlequin duck population are geographically connected throughout the various stages of their annual migratory cycle are poorly understood for the western portion of the species' range. The primary objective of this study is to enhance our collective understanding of Harlequin duck migratory ecology among the western North American population.

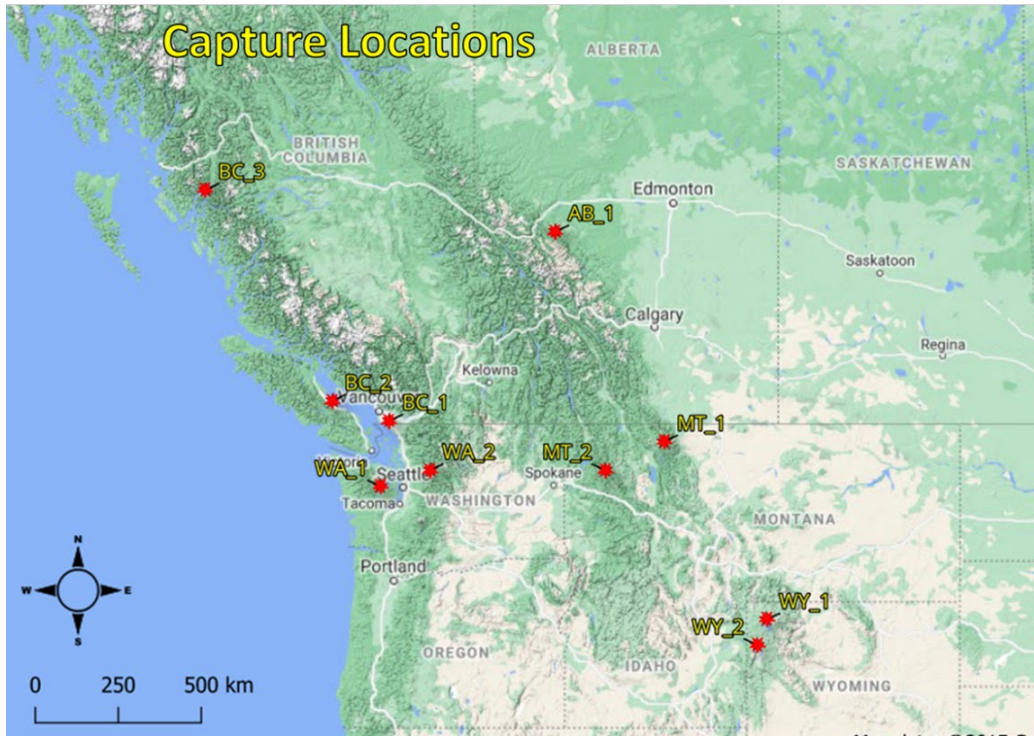
Beginning in 2014, representatives from the Washington Department of Fish and Wildlife, the National Park Service, Montana Fish, Wildlife, and Parks, the Biodiversity Research Institute, Environment and Climate Change Canada, Bighorn Wildlife Technologies, and the Wyoming Game and Fish Department initiated a collaborative Harlequin duck tagging effort. Researchers from Environment and Climate Change Canada conducted marine captures off the coast of British Columbia in 2014 and 2015; capture areas included White Rock, Hornby Island, and

Kitimat. In addition, spring captures were conducted on breeding streams each year between 2016 and 2019 on the McLeod River in Alberta, in Glacier National Park and elsewhere throughout Northwest Montana, throughout the Cascade and Olympic Mountains of Washington, and in Grand Teton and Yellowstone National Parks, Wyoming. A small subset of historical telemetry data collected by the Alaska Department of Fish and Game from birds captured in Prince William Sound in 2001 and 2002 was also incorporated. In all, 113 male and 20 female Harlequin ducks were captured and implanted with PTT tags. Birds were tracked for varying degrees of time ranging from several weeks to just under 2 years. The intention of this project is to complete a spatial analysis of this telemetry dataset and compose a report which will be submitted for publication and be used to satisfy the requirements for my Master of Science degree.

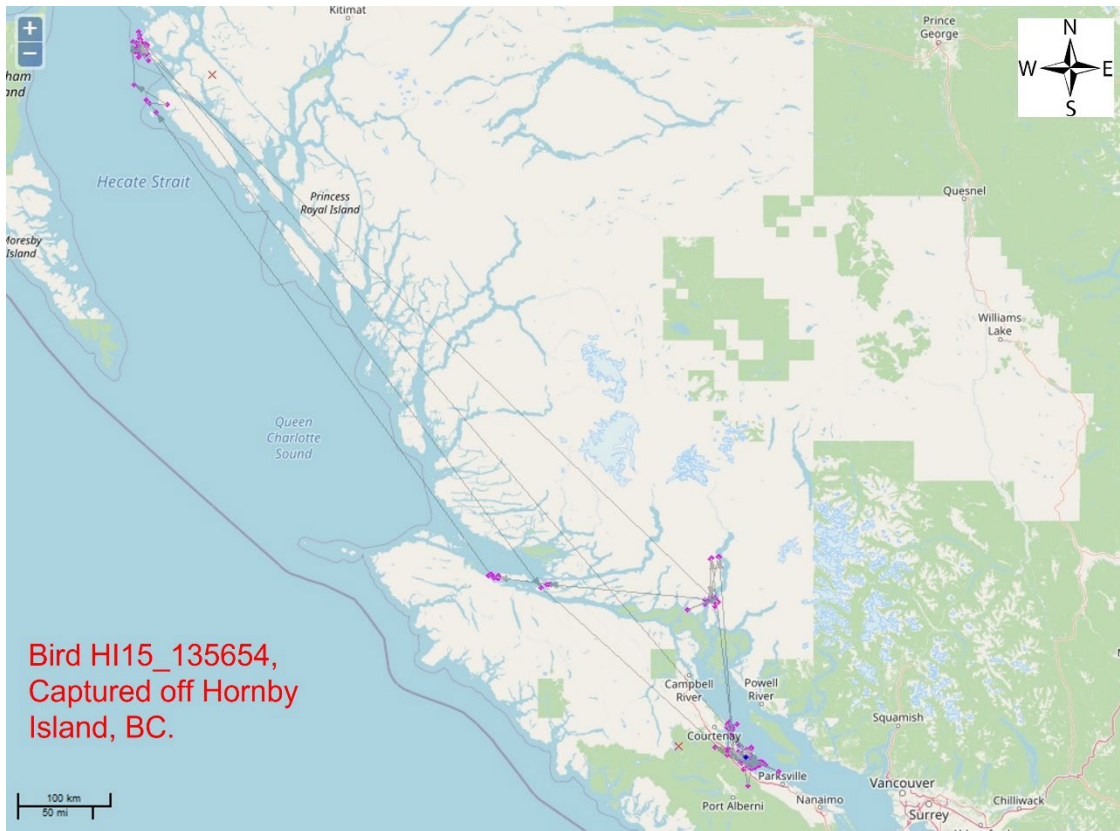
Project Objectives:

1. Characterize and quantify the degree of migratory connectivity among individuals throughout the various stages of the annual cycle.
2. Map migration routes and geographic regions of significance that serve as important breeding, over-wintering, stop over, and moulting habitat.
3. Quantify the degree of philopatry associated with the aforementioned regions of significance.
4. Chronicle the temporal sequence of the annual migration.
5. Compare locational data among paired birds in an effort to ascertain timing and location of pair reunion prior to/during the breeding season and length of time spent together on breeding grounds.

Preliminary Results:



This map shows the approximate locations of the Harlequin duck capture sites.



This map shows the telemetry data for one of the birds captured in British Columbia.

Project Status: The previous academic year (2021-2022) was dedicated to satisfying the course requirements for my MSc. degree, which has been successfully completed. The upcoming academic year (2022-2023) will be entirely dedicated to completing my thesis. Thus far I have been able to compile all of the telemetry data from each of the PI's. The data has been formatted, summarized, and uploaded into Movebank, where it has been filtered using a Douglas filter and is currently in the process of undergoing a final QC check to correct any omission/commission errors generated by the filter. When this process has been completed, the spatial analysis of the data can begin.

Project Funding Sources (US\$). Complete only if funded by SDJV in FY21. This is used to document: 1) how SDJV-appropriated funds are matched, and 2) how much partner resources are going into sea duck work. You may include approximate dollar value of in-kind contributions in costs. Add rows as needed for additional partners.

SDJV (USFWS) Contribution	Other U.S. federal contributions	U.S. non-federal contributions	Canadian federal contributions	Canadian non-federal contributions	Source of funding (name of agency or organization)
\$60,000			Environment and Climate Change Canada: \$12,000		Western Washington University: \$9000

Total Expenditures by Category (SDJV plus all partner contributions; US\$). Complete only if project was funded by SDJV in FY21; total dollar amounts should match those in previous table.

ACTIVITY	BREEDING	MOLTING	MIGRATION	WINTERING	TOTAL
Banding (include only if this was a major element of study)					
Surveys (include only if this was a major element of study)					
Research					\$81,000