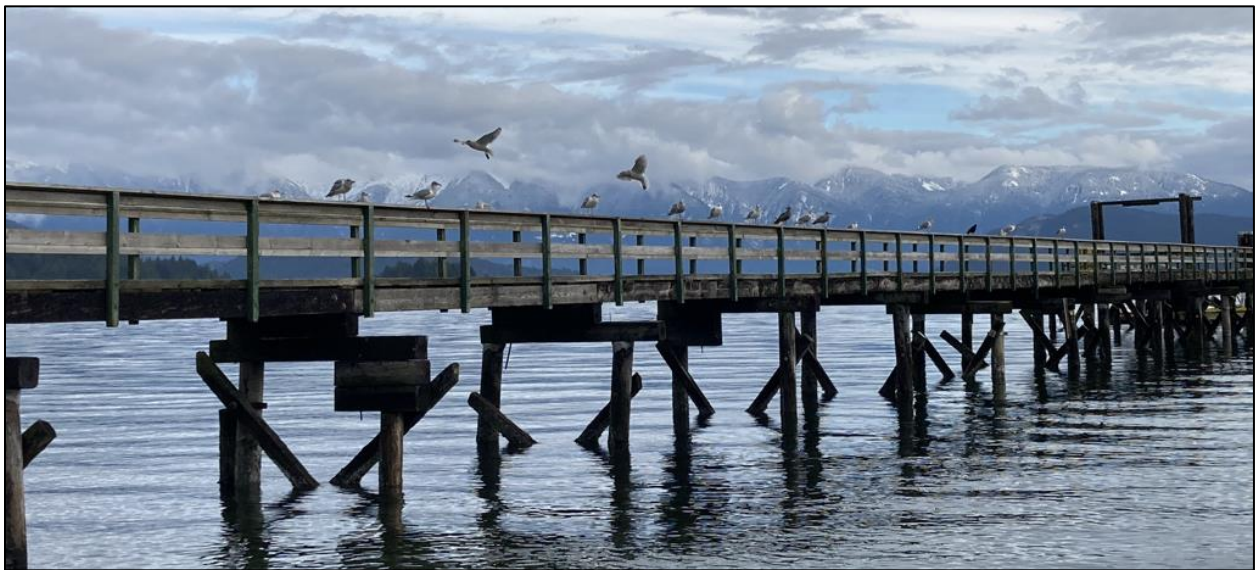




# 2021 Field Report



Environment and  
Climate Change Canada

Environnement et  
Changement climatique Canada



## PROJECT OVERVIEW

The Salish Sea is a globally important area for wintering marine birds and is under increasing pressure from industrial development and marine traffic. To understand the impact of anthropogenic stressors in the Salish Sea, we are using Glaucous-winged Gulls (*Larus glaucescens*) as an indicator species of marine food-web health, including the prevalence of contaminants. We chose Glaucous-winged Gulls because they are a generalist top predator and a common resident in winter and summer.

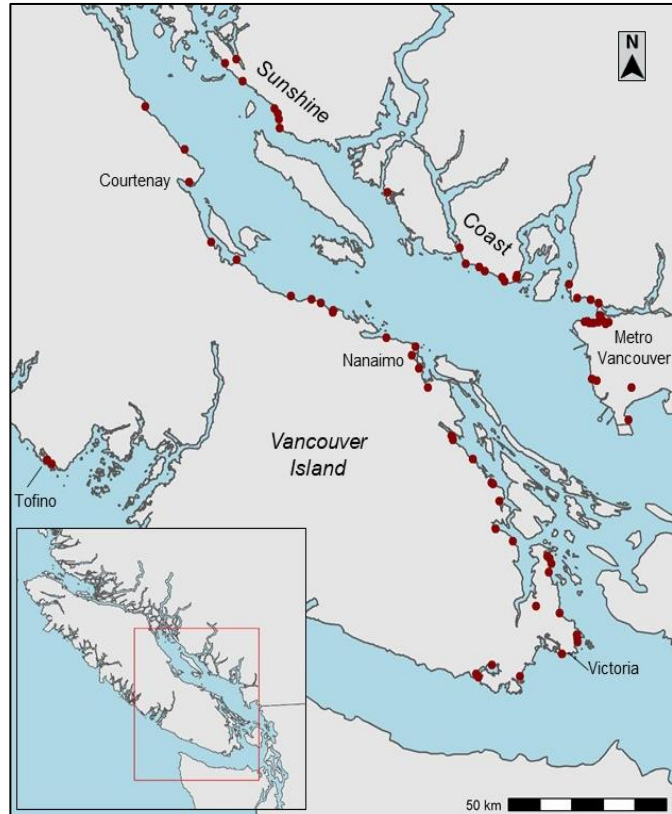
Our objectives are to 1) quantify the movements and habitat use of migrant and resident gulls, 2) assess the effects of diet and habitat use on contaminant exposure, and 3) determine the genetic structure of the population, including rates of hybridization.

This project is a collaboration between Dr. Mark Hipfner from the Wildlife Research Division (WRD) of Environment and Climate Change Canada (ECCC), Dr. Tony Williams and M.Sc. candidate Hannah Hall from the Centre for Wildlife Ecology at Simon Fraser University (SFU), and Dr. Theresa Burg from the University of Lethbridge. The project also involves researchers from the Ecotoxicology and Wildlife Health Division of ECCC, and Fisheries and Oceans Canada.

## METHODS

Winter 2021 was our second field season of capturing and sampling Glaucous-winged Gulls. Between January 6<sup>th</sup> and February 19<sup>th</sup>, two field teams consisting of WRD (Nik Clyde, Anneka Vanderpas, Josh Green, Alice Domalik, Vivian Pattison) and SFU (Hannah Hall) personnel visited 73 coastal sites in the Salish Sea. This included waterfront areas and beaches in Metro Vancouver, the Sunshine Coast, and Vancouver Island (see Map 1, above). To compliment natural areas, the teams also visited the Vancouver Landfill, Hartland (Victoria) Landfill, Nanaimo Landfill, and the Salish Soils Inc. composting facility in Sechelt.

We captured adult and juvenile Glaucous-winged Gulls using baited leg-hold noose line traps and pneumatic CO<sub>2</sub> net launchers. We used noose lines at capture sites such as beaches with freshwater outflow, where gulls tend to congregate to bathe and drink. At these sites, we used bait to attract gulls to the lines where a slip-noose would then tighten around their leg as they pulled away. We used a net launcher in situations where noose lines were not effective, for example, gulls at landfills were uninterested in bait due to the abundance of nearby food. We immediately removed captured gulls from nooses, or the net, and placed them in bird bags for processing.



Map 1. Location of sampling sites visited in Winter 2021 across the Salish Sea, British Columbia, Canada.

We banded, measured, and collected blood and feather samples from adult gulls for genetic, contaminant, and physiological analyses. In addition, 17 adult gulls received a GPS tag to provide fine-scale data on movement patterns and habitat use. We attached solar-powered GPS tags, which can provide up to three years of data, using a leg-loop harness. Each tag weighs 25g, or 3% of a gull's body weight. After processing, we immediately released gulls at the location of capture.

### ***Fieldwork Locations***

In the 2021 season, two field teams sampled 188 Glaucous-winged Gulls at seven regions across the Salish Sea (see Table 1, below). In Metro Vancouver, we captured gulls at various sites in West Vancouver, Vancouver, Richmond, and Delta as well as at the Vancouver Landfill. We deployed four GPS tags and collected blood and feather samples from 42 Glaucous-winged Gulls for genetic, contaminant, and physiological analyses.

We travelled to the Sunshine Coast and captured gulls in Gibsons, Roberts Creek, Sechelt, Powell River, and Lund. We deployed four GPS tags and collected blood and feather samples from 37 adult and juvenile Glaucous-winged Gulls on the Sunshine Coast.



*Willingdon Beach Park, Powell River, British Columbia.*

A second field team visited locations across the western, southern and eastern coasts of Vancouver Island. We revisited capture sites in Sooke, Metchosin, Victoria, Oak Bay, Saanich, North Saanich, Sidney, and Nanaimo as well as the Hartland (Victoria) and Nanaimo Landfills. We also visited new capture sites in the municipalities of Tofino, Ucluelet, North Cowichan, Ladysmith, Lantzville, Parksville, Qualicum Beach, Courtenay, and Comox.

In total, we deployed nine GPS tags and collected blood and feather samples from 109 Glaucous-winged Gulls on Vancouver Island. Our expanded geographic coverage will allow us to assess variation in contaminant levels as well as habitat choices of Glaucous-winged Gulls.



Table 1. Number of Glaucous-winged Gulls (GWGU) sampled and number of GPS tags deployed on adult GWGU by region in the Salish Sea during Winter 2021 (January 6<sup>th</sup> – February 19<sup>th</sup>).

Salish Sea Regions	GWGU Sampled	GPS Tags Deployed
Metro Vancouver	42	4
Sunshine Coast	37	4
West Coast of Vancouver Island	11	0
Capital Region, Vancouver Island	37	4
Cowichan Valley, Vancouver Island	19	1
Nanaimo Region, Vancouver Island	34	4
Comox Valley, Vancouver Island	8	0
<b>TOTAL</b>	<b>188</b>	<b>17</b>

### COVID-19 Safe Fieldwork

We conducted all fieldwork in accordance with the appropriate federal, provincial, and municipal permits and COVID-19 safety protocols. Teams completed health check-ins before shifts, took personal preventive measures, and followed enhanced disinfecting protocols. Despite the additional safety measures required due to COVID-19, teams were able to complete a safe, enjoyable, and successful field season.



Team members capturing a Glaucous-winged Gull in West Vancouver.



Release of a Glaucous-winged Gull in Vancouver.

## **RESULTS**

### ***Winter Habitat Use***

In 2020, we fitted 14 adults with GPS tags to track the movements of migrant and resident Glaucous-winged Gulls. Six of these GPS tags continue to transmit location data.

In 2021, we resighted two individuals tagged in 2020: one at Garry Point Park in Richmond (tagged at the same location) and another recaptured at Willingdon Beach Park in Powell River. Both gulls appeared to be in excellent health and were behaving normally.

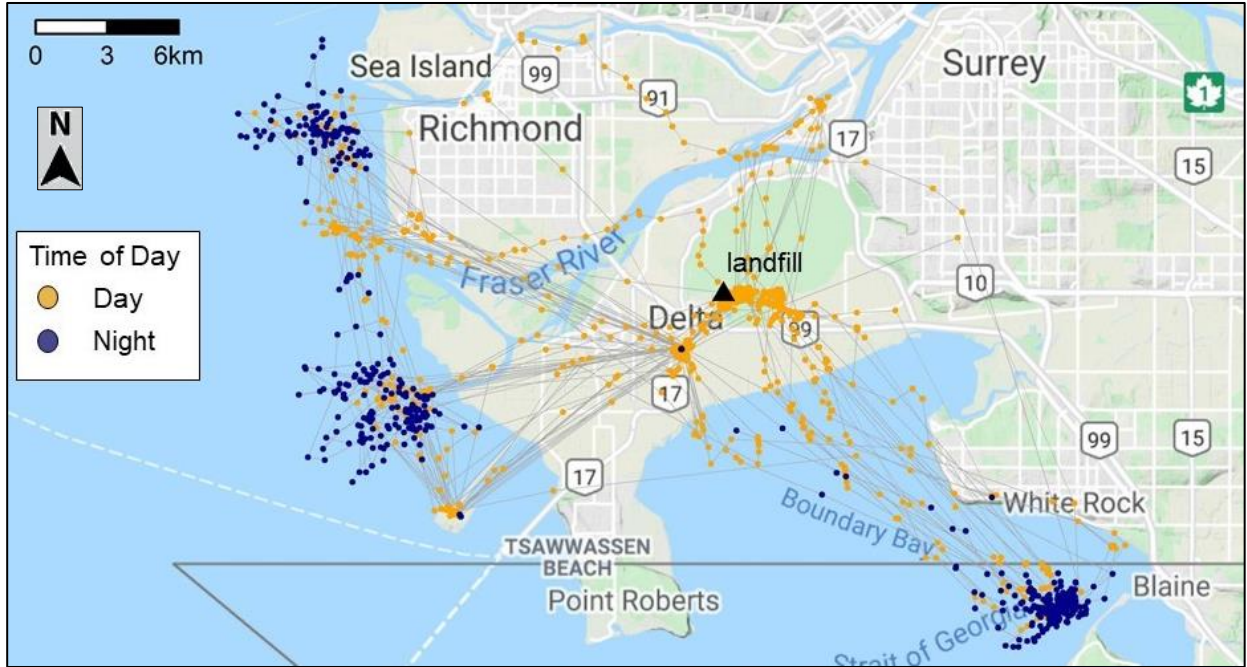


*Oyster Farm in Fanny Bay, Vancouver Island, British Columbia.*

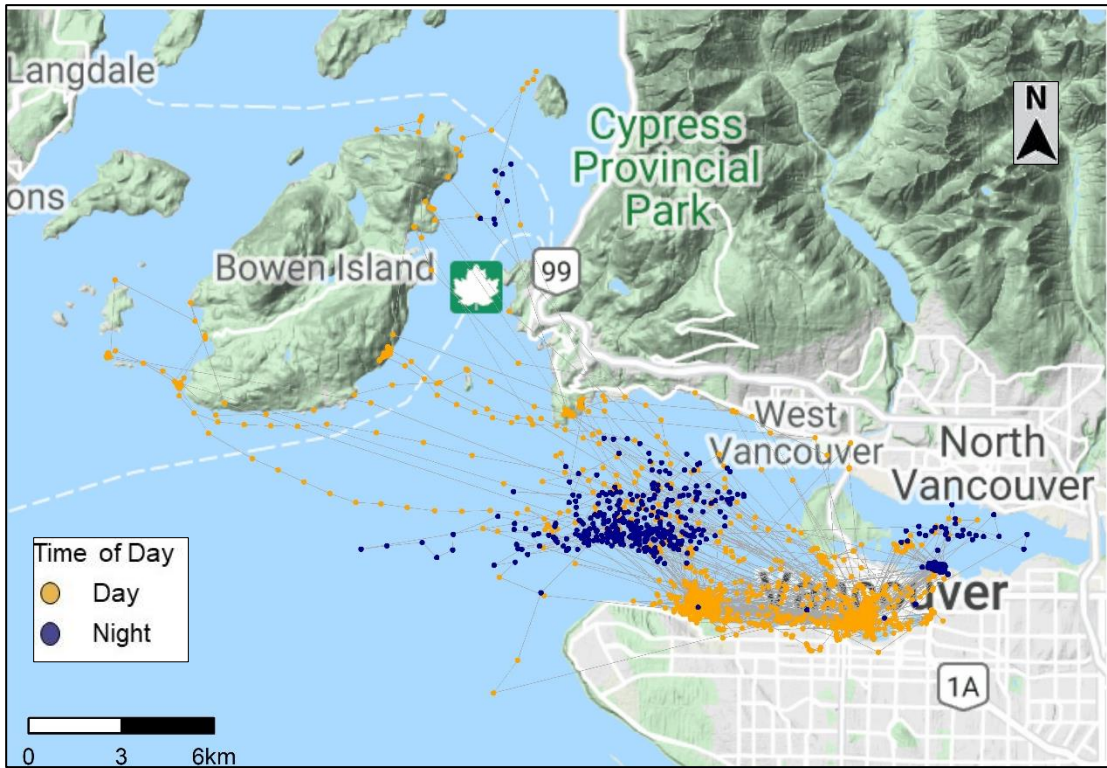
Glaucous-winged Gulls that winter in the Salish Sea are both local breeding birds (residents) and birds that have migrated into the area from northern BC and Alaska. Gulls feed on both natural prey at mudflats and estuaries as well as anthropogenic food sources in urban areas, landfills, and agricultural fields. However, preliminary analyses suggests that migrant gulls use more diverse food sources and have larger winter home ranges than resident gulls.

For example, migrant Gull 1124, initially tagged at the Vancouver Landfill, relied heavily on the landfill, but also used agricultural fields in Delta and the mudflats of Sturgeon Bank in Richmond (see Map 2, below). In contrast, resident Gull 1130, captured at Spanish Banks Beach in Vancouver used highly urbanized beaches and marinas (see Map 3, below). All gulls use offshore areas to roost at night, presumably to avoid potential predators.





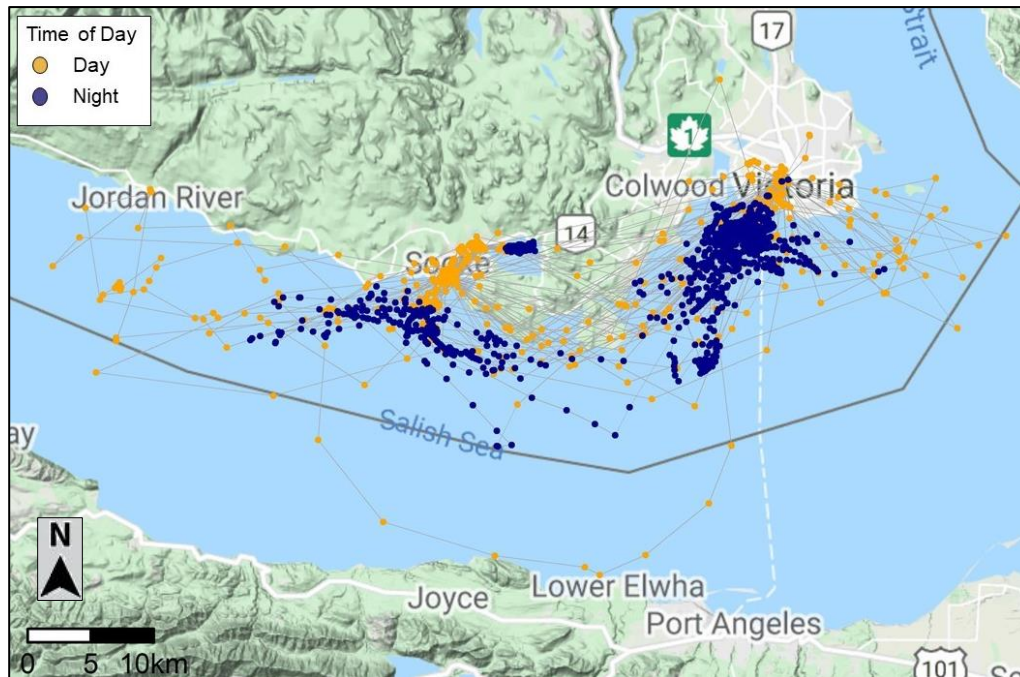
Map 2. GPS tracking data of migrant Glaucous-winged Gull 1124 tagged at the Vancouver Landfill in Delta, BC, Winter 2021.



Map 3. GPS tracking data of resident Glaucous-winged Gull 1130 tagged at Spanish Banks Beach in Vancouver, BC, Winter 2021.

## Migratory Movements

Resident Glaucous-winged gulls show high site fidelity over the year, meaning that they breed and overwinter in similar locations. Gulls begin arriving at their breeding locations, usually nearby islands or rooftops, in mid-March. The gull shown in Map 4 (below) spent both the non-breeding period (February-May) and the breeding period (May-September) near Victoria and Sooke in 2020. This gull never travelled farther than 60km from the capture site. We will conduct detailed analyses to understand the key habitat types used by resident gulls in the non-breeding and breeding season.



Map 4. Non-breeding season GPS tracking data of a Glaucous-winged Gull tagged near Victoria, BC in Winter 2020.

Migratory Glaucous-winged gulls leave the Salish Sea in March and move north towards their breeding grounds. The timing of departure may be linked to the availability of ephemeral food sources at stopover sites such as herring and eulachon fish species.

For example, Gull 1124 left the Salish Sea on March 12<sup>th</sup>, 2021 (see Map 5, below). After following a coastal route along Vancouver Island and the Central Coast, it arrived at the Nass River, near Prince Rupert, on March 20<sup>th</sup>. Gull 1124 stayed on the Nass River for 15 days, where it may have been feeding on spawning eulachon, before continuing its northward migration on April 4<sup>th</sup>. It arrived in the Copper River Delta, near Cordova, Alaska on April 17<sup>th</sup>. The Delta supports a large number of Glaucous-winged Gulls, which breed in colonies on the many barrier islands in the area.



Map 5. GPS track of Glaucous-winged Gull 1124 from Metro Vancouver to the Copper River Delta, near Cordova, Alaska. The gull left its overwintering site in southern BC on March 12<sup>th</sup>, 2021 and arrived at the Nass River in time for the eulachon-spawning run before arriving at its northern breeding grounds in Alaska on April 17<sup>th</sup>, 2021.

**FUTURE FIELDWORK AND ANALYSES**

Data collection and analyses will continue over 2021-2023. WRD researchers will use stable isotope analyses to create a food-web model for the Salish Sea, using gulls as an indicator species to assess the effects of diet, habitat use, and exposure to contaminants. SFU Professor Tony Williams and M.Sc. student Hannah Hall will assess overall health of Glaucous-winged Gulls using physiological and contaminant analyses. Williams and Hall will also analyse the movements of resident and migrant Glaucous-winged Gulls to understand specific habitat requirements. Dr. Theresa Burg at the University of Lethbridge will conduct assessments of the genetic structure and rates of hybridization of Glaucous-winged gulls. Collectively, this research will support the management of a sustainable ecosystem and future conservation planning in the Salish Sea.



In winter 2022, we will expand our sampling to include other species of gulls in the region such as California Gulls and Ring-billed Gulls. We will deploy satellite tags on California Gulls to assess their foraging patterns and habitat use, particularly the importance of the herring spawn. We will collect additional blood and feather samples for genetic, contaminant, and physiological analyses as well as examine inter-annual variation in movement patterns from GPS tagged birds.



*Juvenile Glaucous-winged Gulls in Sooke, Vancouver Island, British Columbia.*

## **FUNDING AND ACKNOWLEDGMENTS**

Environment and Climate Change Canada provided funding for this project. Anneka Vanderpas (ECCC, WRD) and Hannah Hall (SFU) coordinated with Indigenous Communities, Municipalities, Districts, and the Province of British Columbia. This project would not have been successful without the support from the following groups:

We would like to thank Tsleil-Waututh Nation, Ucluelet First Nation, and Lyackson First Nation for the opportunity to work within their traditional territories.

Thank you to the Capital Regional District, the Cowichan Valley Regional District, the Regional District of Nanaimo, the Comox Valley Regional District, the Alberni-Clayoquot Regional District, the Metro Vancouver Regional District, the Sunshine Coast Regional District, and the qathet Regional District for supporting our work in regional parks. As well as the Ministry of Forests, Lands, Natural Resource Operations and Rural Development for the chance to work in the West and South Coast Region Conservation Lands of British Columbia.

Moreover, thank you to the municipalities of Sooke, Metchosin, Langford, Colwood, Esquimalt, View Royal, Victoria, Oak Bay, Saanich, Central Saanich, North Saanich, Sidney, North Cowichan, Ladysmith, Campbell River, Nanaimo, Lantzville, Parksville, Qualicum Beach, Courtenay, Comox, Tofino, Ucluelet, West Vancouver, Vancouver, Richmond, Delta, Gibsons, Sechelt, and Powell River for the opportunity to work in local parks and beaches. Thank you to the Hartland Landfill, the Nanaimo Landfill, the

Vancouver Landfill, and Salish Soils Inc. for the chance to visit these sites. Furthermore, we would like to thank Swan Lake Christmas Hill Nature Sanctuary, the Cumberland Landfill, and the Sechelt Landfill.

All work was carried out with the appropriate permits and permissions and was reviewed and approved by the ECCC Committee for Animal Care.

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