2024

FIELD REPORT

SALISH SEA GULL PROJECT

Environment and Climate Change Canada | Environnement et Changement climatique Canada

Photo credit: Scott Pearson

2024
FIELD SUMMARY

Photo credit: D'Arcy Hamilton

ECCC researcher preparing a gull blood sample for analysis in the field. Futher analyses are completed in a laboratory setting.

- Completed 5th year of research on gulls as indicators of the health of the Salish Sea.
- Conducted field work at 72 sites across coastal BC: 59 sites in the Salish Sea and 13 sites outside of the Salish Sea.
- Banded 222 Glaucous-winged Gulls with unique colour band combinations.
- Collected blood and feather samples from 222 Glaucous-winged Gulls for ongoing health, genetic, and contaminant analyses.
- Deployed GPS tracking tags on 28 adult Glaucous-winged Gulls.

PROGRAM OVERVIEW

Why and Who

The Salish Sea is an important wintering area for many species of marine birds that is facing increasing pressure from urbanization, population growth, and marine transportation. The Salish Sea Gull Project is part of the Salish Sea Marine Bird Monitoring and Conservation Program: a 5-year program to monitor marine birds as indicators of the health of the Salish Sea and to collect baseline data for conservation planning. Gull species are protected under the Migratory Birds Convention Act of 1994 and are identified as a stewardship priority by Environment and Climate Change Canada (ECCC).

Our research assesses the health of marine birds in this highly human-impacted area focusing on the survival rates, movements, habitats, diets, pathogens and diseases, as well as contaminant levels of gull species in the Salish Sea.

The Glaucous-winged Gull is one of the largest species of gull to occupy coastal habitats in both urban and natural areas in the northeastern Pacific from Oregon to Alaska. Along the coast of British Columbia, Glaucous-winged Gulls are abundant, generalist foragers that include variable amounts of both natural marine and human foods in their diets, making them excellent monitors and indicators of ecosystem health.

This project is a collaboration between ECCC and academia, led by Dr. Mark Hipfner (ECCC) in collaboration with Dr. Tony Williams (Centre for Wildlife Ecology, Simon Fraser University), Drs. Amy Wilson and Marie Auger-Methé (University of British Columbia), Dr. Theresa Burg (University of Lethbridge), as well as Drs. Keith Hobson and John Elliott (ECCC).

Photo credit: Anneka Vanderpas

PROJECT OUTREACH

First Nation Engagement and Collaboration

All of us involved in the Salish Sea Gull Project respectfully acknowledge that this work takes place on the traditional, ancestral and unceded territories of Indigenous Peoples in coastal British Columbia. As visitors and public servants, we have a responsibility to the land and to the people who have stewarded these lands since time immemorial.

We strive for meaningful engagement with First Nations in hopes this project can provide opportunities to build deeper relationships and to support information sharing that is purposeful for stewardship and reconciliation.

This year, researchers met with Guardians and Environmental Monitors from the Musqueam Indian Band, Squamish Nation, Tla'amin Nation, Songhees Nation, Gwa'sala-Nakwaxda'xw Nations, Lax Kw'alaams Band, and the Haida Nation. All of these collaborators provided invaluable insight along with fieldwork assistance.

We were invited to take part in the Indigenous Marine Technician Certificate Program (IMTCP) provided by Nanwakolas Council and Vancouver Island University in Campbell River. Students spent a day in the field with researchers learning transferable field skills including species identification, bird handling and capture techniques, as well as tissue sampling and GPS tagging of Glaucous-winged Gulls.

We would like to express our sincerest gratitude to the many First Nations who reviewed our request, offered access to their lands, as well as their fieldwork assistance. To become involved in future field seasons, or if you would like more information on this project, please contact Mark.Hipfner@ec.gc.ca.

Photo credit: Anneka Vanderpas

Photo credit: Anneka Vanderpas

PROJECT OUTREACH

Community Events

While travelling for fieldwork, researchers presented updates on the Salish Sea Gull Project to communities. Thank you to the municipalities of Daajing Giids, Lions Bay, Metchosin, Saanich, and White Rock for offering your space and hosting us. Thank you as well to the Whale Museum in Washington State for speaking with Dr. Mark Hipfner on your Salish Sea Association of Marine Naturalists (SSAMN) podcast, available here.

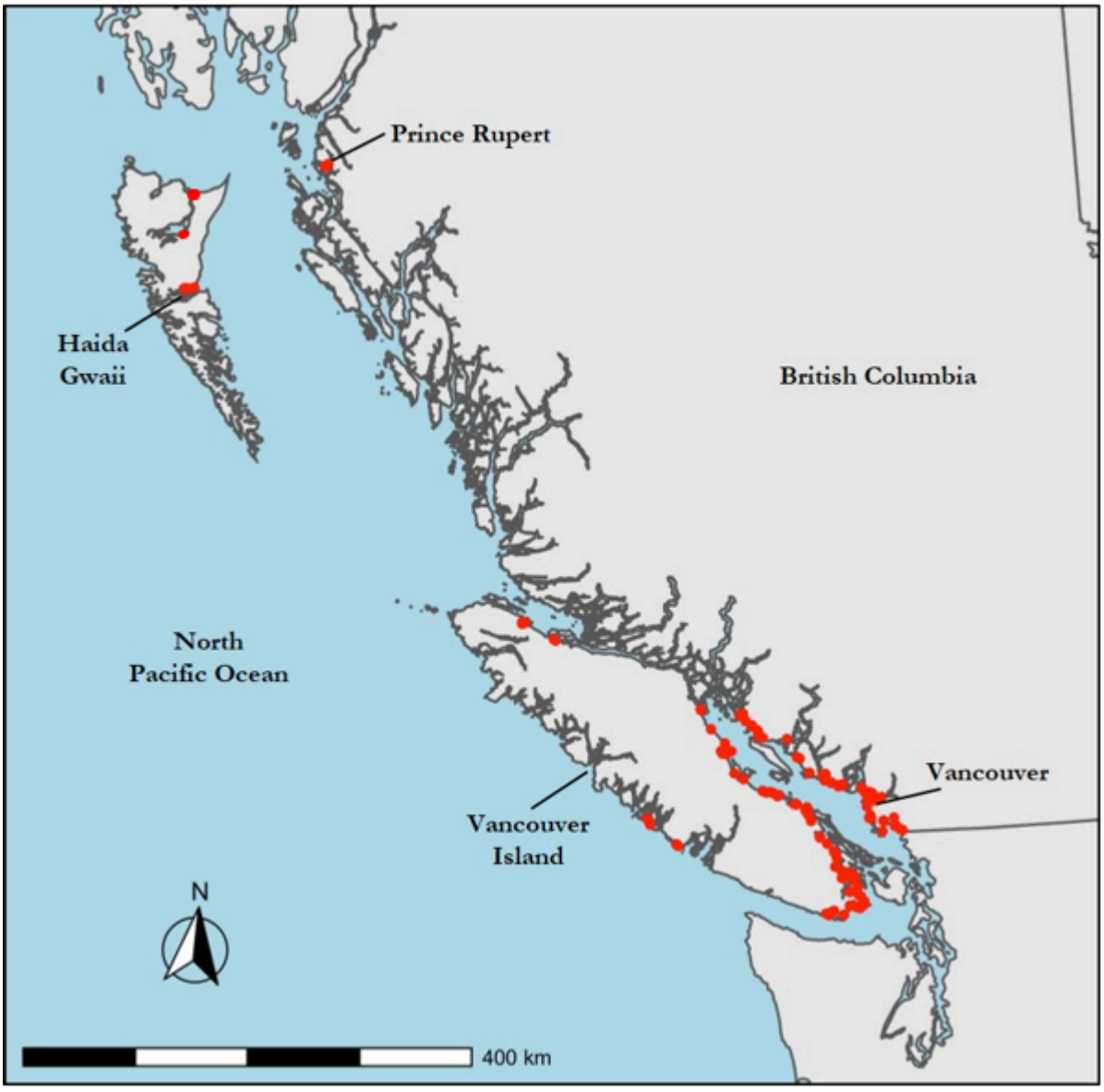
Photo credit: Tessa Craig

Tessa Craig (MSc, Simon Fraser University) and Anneka Vanderpas (Marine Outreach Coordinator, ECCC) providing updates on the Salish Sea Gull Project to the community of Lions Bay, British Columbia.

If your community is interested in learning more about the Salish Sea Gull Project via virtual presentations and/or in-person events, please contact Mark.Hipfner@ec.gc.ca for availability (based on capacity and scheduling considerations).

PROJECT AREA

Map of Sites



Map 1. Locations of the Salish Sea Gull Project winter 2024 sampling sites in British Columbia (BC), Canada. Sampling sites are focused in the Salish Sea, along the eastern coast of Vancouver Island and southwestern coast of BC. Comparison sites outside of the Salish Sea are located along the west and north coasts of Vancouver Island as well as the north coast of BC, including Haida Gwaii.

FIELD METHODS

Site Selection and Sampling

From January to March 2024, ECCC conducted field research to assess the survival rates, movements, habitats, diets, pathogens and diseases, and contaminant levels of Glaucous-winged Gulls wintering in the Salish Sea. Two teams of ECCC researchers visited a total of 72 sites: 59 sites within the Salish Sea and 13 sites outside the Salish Sea, including Tofino, Ucluelet, Port Hardy, Port McNeill, Prince Rupert, as well as Sandspit, Skidegate, Daajing Giids, Port Clements, and Masset in Haida Gwaii (see Map 1, previous page).

Sampling at the external sites enables us to compare the health of gulls under the different environmental conditions that prevail within vs. outside of the Salish Sea. In all geographic regions, we sampled gulls in a variety of habitat types, including natural beaches, urban areas, as well as the Vancouver Landfill to explore variation among habitat types.

Researchers used leg-hold noose line traps to capture 110 adults and 112 juvenile Glaucous-winged Gulls (total, n = 222) in 2024 (see Table 1). For all captured birds, we measured and collected blood and feather samples for health, genetics, diet, as well as pathogen, parasite and contaminant analyses.

Table 1. Number of gulls captured and colour-banded by region in the winter 2024 field season.

REGIONS	SITES	GULLS
Metro Vancouver	23	65
Sunshine Coast	9	22
Juan de Fuca to Saanich Peninsula	5	15
Nanaimo to Campbell River	13	33
Cowichan Valley	5	14
North Vancouver Island	2	10
West Vancouver Island	3	11
North Coast and Haida Gwaii	11	48
Landfills	1	4
Totals	**72**	**222**

FIELD METHODS

Site Selection and Sampling

Of the adult gulls captured, a subset of 28 birds received a rechargeable solar GPS tag to track movements and habitat use over time. Tags are meant to retrieve data for 2 – 5 years before they deteriorate from environmental conditions and fall off the bird. This year, we also took a small blood sample from GPS tagged birds to directly connect movement data with blood sample analyses.

Photo credit: Sonya Pastran

An adult Glaucous-winged Gull with a leg-loop harness mounted rechargeable solar GPS tag and colour bands (white over grey on the left leg, and white over a metal band on the right leg). This gull received a GPS tag in February 2024 and was re-sighted by an ECCC researcher from the Salish Sea Gull Project. Photos provide valuable information to sightings data, to verify colour band combination, as well as the status of the bird's physical condition.

For a first-hand account of ECCC's Salish Sea Gull project field methods, watch the City of White Rock's video of the research team in action: **Gull Research Project in White Rock (youtube.com)**. Thank you to the City of White Rock for sharing and providing this footage!

Click to see the field video!

COMMUNITY SCIENCE

Gull Colour Band Re-Sightings Form

Since 2022, each gull captured has been banded with a unique combination of three colour bands and a numerical federal metal band. Gulls are banded with two colour bands on their left leg and one colour band over a metal band on their right leg. The colour bands enable observers to recognize individual gulls and provide valuable re-sighting data when reported to the ECCC research team through the online form and/or the Canadian Bird Banding Office.

Data collected from the colour-band re-sighting form helps us understand the movements, site fidelity, and age-specific survival of gull species over time across the Salish Sea and beyond. Recently, a gull banded in Port Hardy, British Columbia, in February 2022, was reported on Mandarte Island, near Victoria, British Columbia, in June 2024, preparing its nest for the breeding season! The form data has even allowed us to cross international borders, with several sightings and reports of colour-banded gulls from Washington State and Alaska, USA.

Since the writing of this report, we have received more than 600 sightings of colour-banded gulls. Sightings like yours have a tremendous impact on our research, and photographs of your sightings further the value of your reports as we can verify band colours to our database and assess age-related conditions such as the rate of molt and breeding success.

Thank you to the community members who have and continue to contribute to the gull colour-band re-sightings form. Please feel welcome to share the poster on the next page, with the live QR code and form link to report colour-banded gull sightings in your area!

Report sightings here:
https://forms.office.com/r/i9PG9zHCfs

Photo credit: Chantal Jacques and John Costello

An adult Glaucous-winged Gull with colour band combination red over red on its left leg, and white over metal on its right leg.

See a colour-banded gull?

Let us know!

Vous avez vu un goéland avec des bagues colorées ?

On veut le savoir !

- **Snap a photo (with colour bands on the legs visible).**
- **Take note of the time and location.**
- **Share your data with us and contribute to science!**

We acknowledge this work takes place within the unceded territory of many First Nations who have lived on this land since time immemorial.

- **Prenez une photo (avec les bagues de couleur visibles aux pattes).**
- **Notez l'heure et le lieu.**
- **Partagez vos données avec nous et contribuez à la science !**

Nous reconnaissons que ce travail se déroule sur le territoire non cédé de nombreuses Premières nations qui vivent sur cette terre depuis des temps immémoriaux.

In partnership with / En partenariat avec

SFU SIMON FRASER UNIVERSITY

UBC THE UNIVERSITY OF BRITISH COLUMBIA

University of Lethbridge

Environment and Climate Change Canada | Environnement et Changement climatique Canada

Canada

We have received numerous photos of colour-banded gulls from dedicated photographers following gulls on their daily journeys – such as these heartwarming sightings of colour-banded adult gulls with their young in downtown Vancouver, July 2024.

Thank you to the community of photographers who have taken the time to share their photos and report colour-banded gull sightings!

Photographs on this page by Kevin Krebs

PRELIMINARY RESULTS

Banding and GPS Tag Data

In 2024, we completed five years of the Salish Sea Gull Project winter sampling. In total we visited 300 sites in the Salish Sea and beyond, we sampled 841 Glaucous-winged Gulls, colour-banded 573 individuals and deployed 62 GPS tags (see Table 2).

Community science data received through the gull colour-band re-sighting form has helped researchers better understand movements from different age classes of gull species, in a minimally invasive and cost-effective method. Of the 600 sightings reported to the end of July 2024, we have received 568 sightings within the Salish Sea and 32 sightings outside of the Salish Sea. Sightings are concentrated in populated areas such as southern Vancouver Island (Juan de Fuca to Saanich Peninsula) and Metro Vancouver (see Figure 1).

We understand there are geographic distribution limitations to this type of data collection, but nonetheless it is a useful tool to understand the short-term and long-term habitat use and movements of gull species to inform conservation management planning and emergency response preparedness. Over time, we will develop an estimate of age-specific survival rates, the most important population-level demographic metric.

Table 2. Totals for 5 years (2020-2024) of the Glaucous-winged Gull (GWGU) component of the Salish Sea Gull Project.

YEAR	SITES	GWGU	GPS TAGS DEPLOYED
2020	26	64	14
2021	78	188	17
2022	64	183	3
2023	60	184	0
2024	72	222	29
Totals	**300**	**841**	**63**

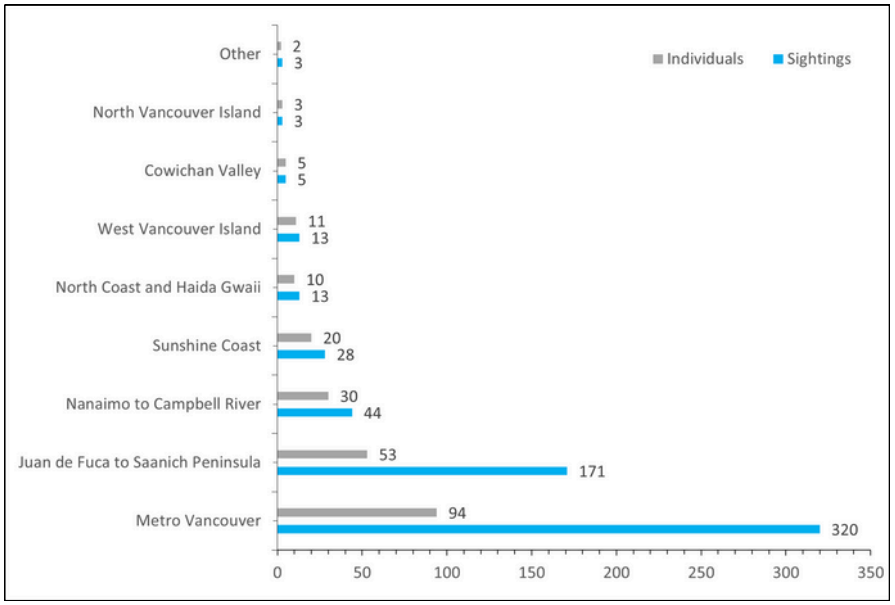


Figure 1. Glaucous-winged Gull Colour-Band Re-Sightings Form data from April 2022 to July 2024 (n = 600). The top (grey) bars represent the number of individual gulls sighted by region and the lower (blue) bars represent total number of gull sightings recorded by region in the online form.

PRELIMINARY RESULTS

Banding and GPS Tag Data

In the first four years, the GPS tag data shows that the majority (>75%) of the Glaucous-winged Gulls tagged here in winter are year-round Salish Sea residents. These year-round residents generally maintain small home ranges, but most also make short-distance movements to visit ephemeral food source events, such as herring spawns. However, some individuals make longer trips, moving outside of the Salish Sea, including to California, before returning to British Columbia to breed (n = 1), and travelling north to Alaska to breed (n = 3).

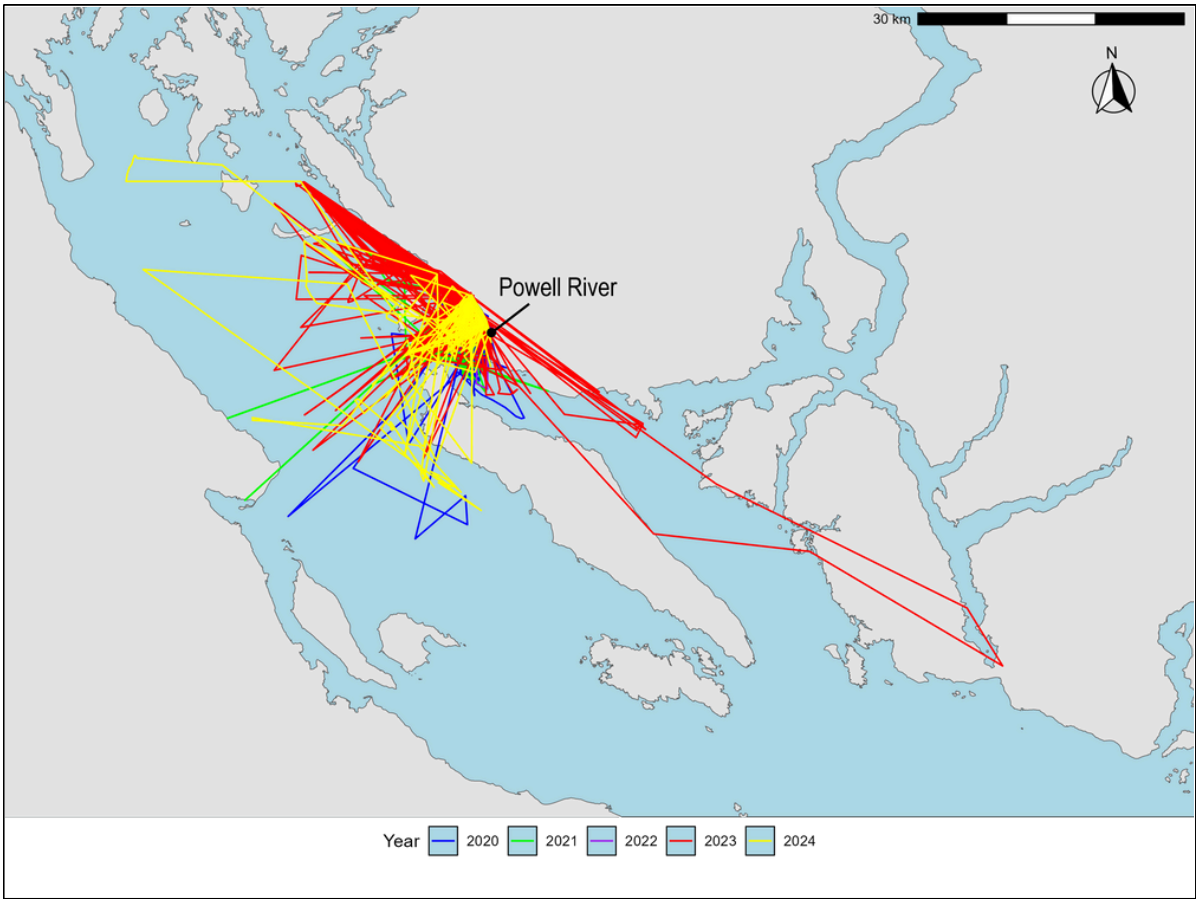
Our GPS tag data shows that Glaucous-winged Gulls from the Salish Sea select different movement strategies: some being year-round residents, some may move longer distances but return, and some are true migrants.

Photo credit: Chantal Jacques and John Costello

PRELIMINARY RESULTS

Banding and GPS Tag Data

One gull GPS tagged in the first year of the project (winter 2020) is resident "Willy" (it was tagged at Willingdon Beach Park, Powell River) who continues to provide valuable movement data. The following year, Willy was re-captured at the same location and after inspection by researchers it was found to be in good body condition with weight gain. In five years of GPS tag data collection, the gull has shown high site-fidelity to the waters surrounding Powell River, highlighting the importance of the Salish Sea marine environment, coastal habitat, and food sources for this species year-round (see Map 2).

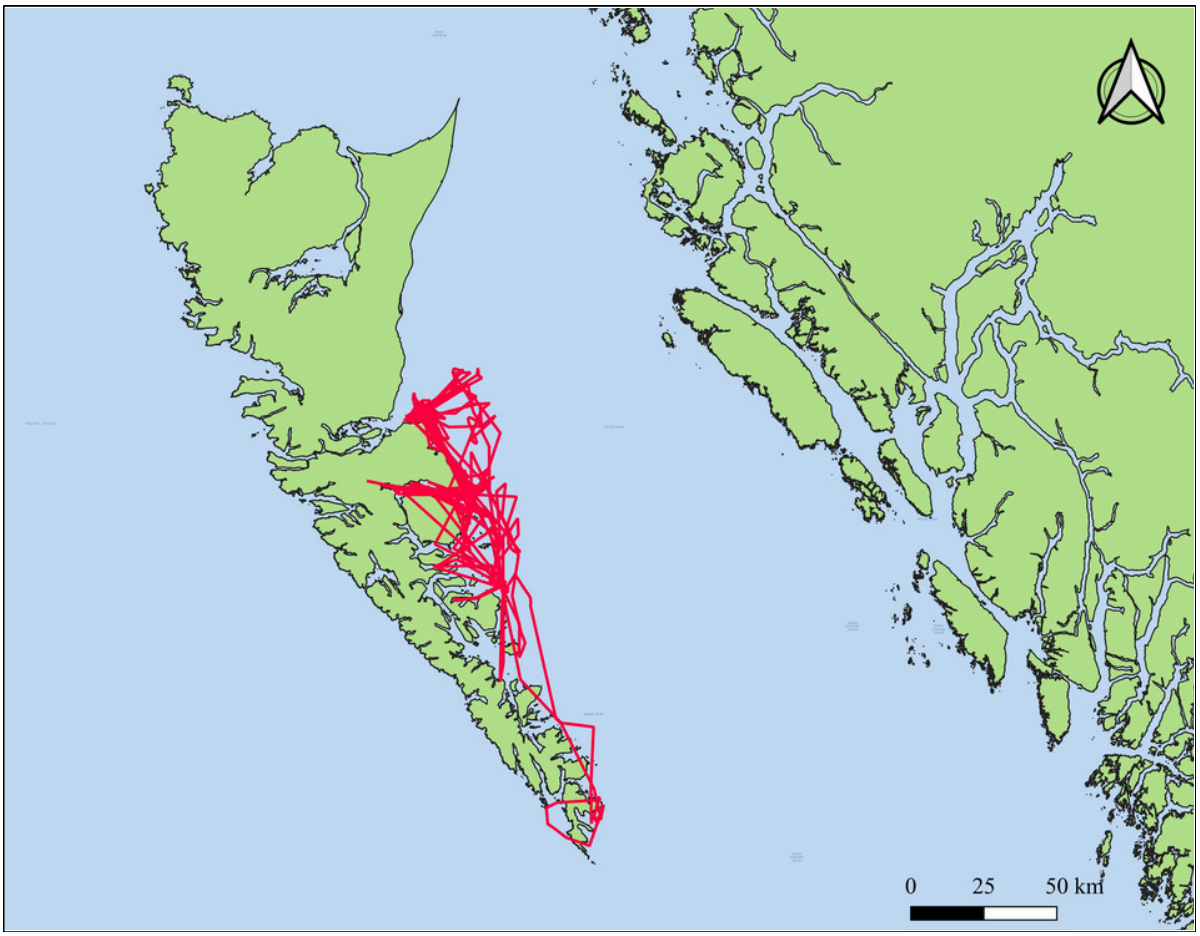


Map 2. Year-round movements of Willy, a Glaucous-winged Gull tagged in Powell River, BC in 2020. The GPS tag continues to transmit valuable data showing the importance of the Salish Sea ecosystem. As seen in the map, movements from different years are characterized by different colours.

PRELIMINARY RESULTS

Banding and GPS Tag Data

In winter 2024, we visited Prince Rupert and communities in Haida Gwaii, where we deployed 6 GPS tags on adult Glaucous-winged Gulls for the first time along the North Coast to establish detailed habitat and movement patterns. In February 2024, we deployed a GPS tag on a gull in Sandspit, where soon after it travelled more than 150km to the southern tip of Haida Gwaii (see Map 3). By mid-April, the gull began frequenting an islet near Sandspit, revealing early nesting behaviours. We will continue to watch this gull's movements, and if the gull remains faithful to the islet it may indicate a successful breeding case.



Map 3. Movements between February and May 2024 of a Glaucous-winged Gull tagged in Sandspit, Haida Gwaii, BC. After making a trip southward, this individual is engaging in early nesting behaviours off the coast of Sandspit.

PRELIMINARY RESULTS

Health and Population Indicators

Blood sample analyses from Hannah Hall's Master of Science research suggested there is little variation in health indicators of adult Glaucous-winged Gulls captured in different regions and habitat types within the Salish Sea compared to the west coast of Vancouver Island. To build upon this research, we visited the north coast of Vancouver Island as well as Haida Gwaii and Prince Rupert in years three to five.

In 2023, we sampled different age classes of Glaucous-winged Gulls (first year, second year, third year, fourth year, and adult) for the first time. Preliminary results showed relatively little variation in health indicators with age, although juvenile gulls in their first winter had slightly lower health metrics (body condition, aerobic capacity) overall, as explained in detail by Dr. Neena Pradal's Veterinary Thesis. We plan to continue to explore these findings with the data collected in 2024.

Preliminary results from genetic analyses in Dr. Theresa Burg's laboratory at the University of Lethbridge of eggshell fragments collected at breeding colonies from British Columbia (BC) to Alaska show Glaucous-winged Gulls segregate into three genetic groups – southern/lower BC, southeast Alaska/northern BC, and the Gulf of Alaska/Aleutian Islands, which suggests that birds from each of the three regions have restricted movements (see Figure 2). Notably, throughout this study, we have captured individuals wintering along coastal BC from all three of the distinct groups, with residents in southern BC predominantly captured – also consistent with our GPS tagging results.

Photo credit: D'Arcy Hamilton

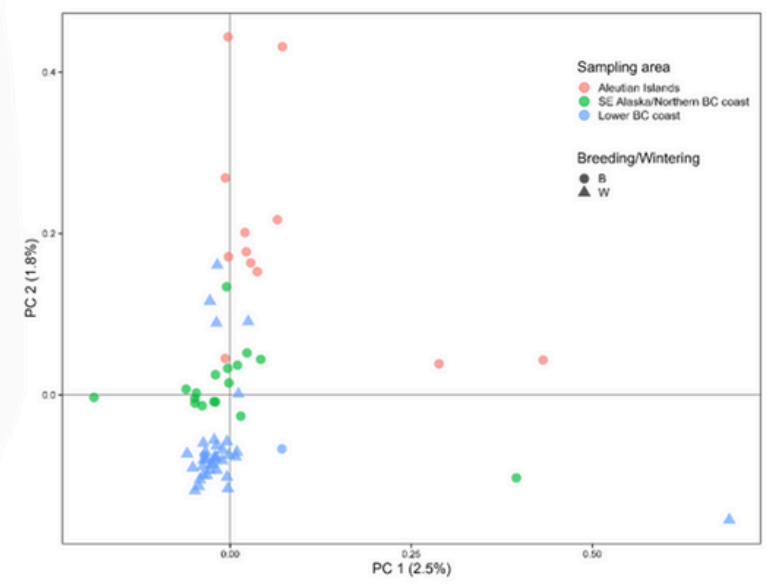


Figure 2. Principle Component Analysis of breeding and wintering gulls showing three distinct genetic groups of gull species present throughout British Columbia. Figure by Ash Mosabeb-Omran and Luca Montana.

FUTURE FIELDWORK AND ANALYSIS

This was the fifth and final year of winter fieldwork capturing and GPS tagging Glaucous-winged Gulls in the Salish Sea, the northern coast of BC, and the north and west coasts of Vancouver Island for movement, health, genetic, pathogen and disease, and contaminant analyses. We hope to continue the colour-banding and resighting program to further understand habitat use and age-specific survival rates across coastal BC over time.

Currently, a five-year summary of health analyses is underway at Simon Fraser University in Dr. Tony Williams' laboratory led by MSc student Tessa Craig. Additional health analyses are being completed at the University of British Columbia with Dr. Marie Auger-Methé and wildlife veterinarian Dr. Amy Wilson, as well as PhD student Shabnam Shadloo, focusing on rates of infection with Toxoplasmosis gondii and the effects of this pathogen on the behaviour of Glaucous-winged Gulls. Future blood analyses will also look at the prevalence of Highly Pathogenic Avian Influenza (HPAI) in wintering gull species sampled pre- and post- significant outbreak events.

Other work currently underway includes isotopic analyses on blood and prey of wintering gull species by Dr. Keith Hobson at ECCC's national laboratory in Ottawa to inform our understanding of marine food-web structure in the Salish Sea. Additionally, with ECCC's Dr. John Elliott, we are investigating contamination of marine ecosystems with a suite of chemicals including heavy metals and the "forever chemicals" (PFAS) using gull blood samples collected within and outside of the Salish, to inform public health risk. Dr. Theresa Burg's laboratory at the University of Lethbridge will complete genetic analyses from our five-year dataset to determine population structure, rates of hybridization, and provenance of winter gull species in the Salish Sea.

Photo credit: Chantal Jacques and John Costello

After complete analyses of movement data from GPS tagging adult gulls, as well as health, genetic, and contaminants from blood/feather sampling different age groups of gulls, we will have an in depth understanding of how and why gull species utilize coastal environments, how they indicate the overall health of the ecosystem and in turn human health, and we will identify key habitat areas to inform emergency response and conservation management planning.

Photo credit: Chantal Jacques and John Costello

THANK YOU

The Salish Sea Gull Project research team would like to express their sincerest gratitude to the many people, groups, and communities for their support:

Thank you to the Council of the Haida Nation, Skidegate Band Council, Metlakatla First Nation, Lax Kw'alaams Band, 'Namgis First Nation, Gwa'sala-'Nakwaxda'xw Nations, Kwakiutl First Nation, Nanwakolas Council, Wei Wai Kum First Nation, K'ómoks First Nation, Songhees Nation, Tseycum First Nation, T'Sou-ke Nation, Tsawout First Nation, Tsartlip First Nation, Cowichan Tribes, Malahat Nation, Lyackson First Nation, Snuneymuxw First Nation, Ucluelet First Nation, Ahousaht First Nation and Maaqutusiis Hahoulthee Stewardship Society, Tla'amin Nation, shíshálh Nation, Musqueam Indian Band, Squamish Nation, Tsleil-Waututh Nation, Tsawwassen First Nation, and Semiahmoo First Nation for the opportunity to work within their traditional territories.

Thank you to the North Coast Regional District, Regional District of Mount Waddington, Capital Regional District, Cowichan Valley Regional District, Regional District of Nanaimo, Comox Valley Regional District, Strathcona Regional District, Alberni-Clayoquot Regional District, Metro Vancouver Regional District, Sunshine Coast Regional District, and the qathet Regional District for supporting our work in regional parks. Thank you to the Ministry of Water, Land and Resource Stewardship for the chance to work in the West and South Coast Conservation Lands of British Columbia.

Thank you also to the Vancouver Island municipalities: Sooke, Metchosin, Langford, Colwood, Esquimalt, View Royal, Victoria, Oak Bay, Saanich, North Saanich, Sidney, North Cowichan, Ladysmith, Campbell River, Nanaimo, Lantzville, Parksville, Qualicum Beach, Courtenay, Comox, Tofino, Ucluelet, Port Hardy, and Port McNeill. As well as Metro Vancouver, Sunshine Coast, and North Coast municipalities: West Vancouver, North Vancouver, Vancouver, Richmond, Burnaby, Delta, White Rock, Surrey, Port Moody, Gibsons, Sechelt, Powell River, Prince Rupert, Port Edward, Masset, Daajing Giids, and Skidegate for the opportunity to work in local parks and beaches. Thank you as well to the Nanaimo Landfill and Vancouver Landfill for providing safety training and coordinating field days at your sites.

Furthermore, we would like to thank the Raptors, also known as the Pacific Northwest Raptors Ltd., for their expertise. An additional thank you to Sara Couper with Idea Camp Communications and the Town of Qualicum Beach for their previous community engagement and outreach support.

This project was funded by the Government of Canada in response to recommendation 3 from the National Energy Board's (NEB) Reconsideration Report for the Trans Mountain Pipeline Expansion (TMX) Project. Anneka Vanderpas (ECCC) coordinated with Indigenous communities, municipalities, districts, and the Province of British Columbia. All work was conducted under the appropriate federal permits (banding #10667F, 10667AA and Animal Care #24MH03).

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