

2023 FIELD REPORT

SALISH SEA GULL PROJECT



A colour-banded juvenile Glaucous-winged Gull.

credit: Josh Green



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

2023 FIELD SUMMARY

- Completed fourth year of research on gulls as indicators of the health of the Salish Sea.
- Fieldwork conducted at 60 sites across coastal BC: 42 sites in the Salish Sea and 18 sites outside of the Salish Sea.
- 195 gulls tagged with unique colour band combinations: 184 Glaucous-winged Gulls and 11 California Gulls.



credit: Josh Green



credit: Josh Green

- Blood and feather samples collected from 181 Glaucous-winged Gulls for ongoing physiological, genetic, and contaminant analyses.
- Deployed 10 new GPS tracking tags on California Gulls.

PROGRAM OVERVIEW

The Salish Sea is an important habitat for several species of gulls. Glaucous-winged Gulls (*Larus glaucescens*) and California Gulls (*Larus californicus*) are abundant, generalist foragers that occupy coastal habitats in both urban and natural areas throughout the year making them effective indicators of ecosystem health. Glaucous-winged Gulls are the largest and most abundant species of gull present year-round in the Salish Sea, and the residents are joined in winter by large numbers of migrants from Alaska and elsewhere. California Gulls stop-over in the Salish Sea on their migration to take advantage of ephemeral food sources, notably herring spawn, before dispersing to breed inland on freshwater lakes.



credit: Josh Green

View of Mount Baker from southern Vancouver Island, British Columbia.

The Salish Sea Gull Project is part of Environment and Climate Change Canada's Salish Sea Marine Bird Monitoring and Conservation Program. Our research assesses the health and habitat use of marine birds in this highly human-impacted area focusing on the movements, diets, and contaminant levels of gull species in the Salish Sea.

The project started in 2020 and is a collaboration between Environment and Climate Change Canada (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-Méthé (University of British Columbia), Dr. Theresa Burg (University of Lethbridge), as well as Drs. Keith Hobson and John Elliott (ECCC).

PROJECT OUTREACH

Those involved in the Salish Sea Gull Project respectfully acknowledge that this work takes place on the traditional, ancestral, and unceded territories of the Coast Salish Peoples. 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 hope that this project can continue to provide opportunities for meaningful collaboration and engagement with the Coast Salish Peoples, and support information gathering and sharing that is relevant and useful for the continued stewardship of their territory in a good way.

This year, researchers met with Guardians and members from the Tla'amin Nation, Wei Wai Kum First Nation, Haida Nation, and the 'Namgis First Nation. We would like to express our gratitude to the many Indigenous Nations who offered access to their lands as well as 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.

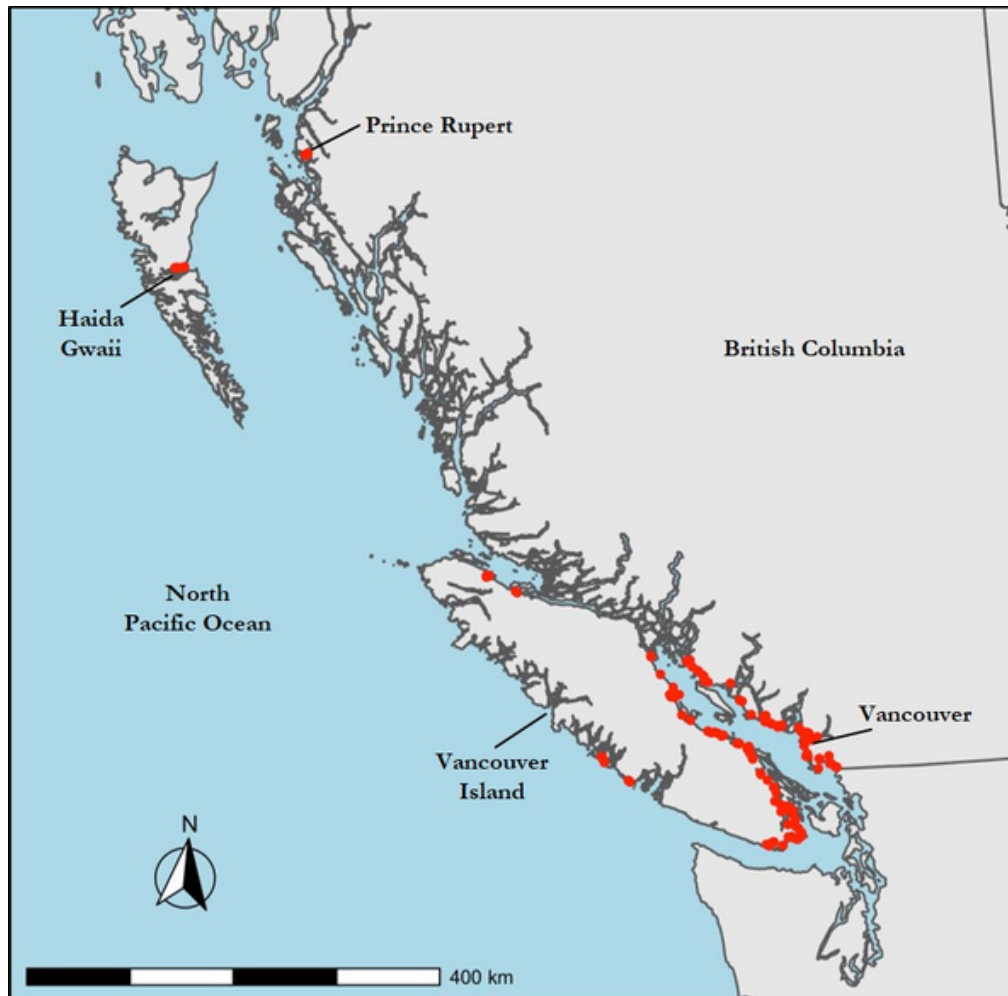


credit: Anneka Vanderpas

ECCC researcher delivering a presentation to elementary school students at 'Namgis First Nation T'lis̓alagi'lakw School.

FIELD METHODS

From early January to early March 2023, two teams of ECCC researchers visited a total of 60 capture sites: 42 sites within the Salish Sea and 18 sites outside the Salish Sea, including Tofino, Ucluelet, Port Hardy, Port McNeill, Prince Rupert, and Haida Gwaii (see Map 1). We included sites outside of the Salish Sea to expand the range of environmental conditions experienced by gulls sampled in our study. Our sites included a variety of habitat types, including natural beaches, urban areas, as well as the Vancouver and Nanaimo Landfills.



Map 1. Location of the Salish Sea Gull Project winter 2023 sampling sites in British Columbia, Canada.

Adult and juvenile Glaucous-winged Gulls (n=184) as well as adult California Gulls (n=11) were captured using leg-hold noose line traps (see Table 1). For all captured birds, we measured and collected blood and feather samples for physiological, genetic, and contaminant analyses. California Gulls were only captured at the Nanaimo Landfill to deploy GPS tracking tags.

Table 1. Number of gulls captured and colour-banded by region in the winter 2023 field season.

REGIONS	SITES	GULLS
Metro Vancouver	13	40
Sunshine Coast	7	20
Victoria to Saanich Peninsula	4	9
Nanaimo to Campbell River	13	33
Cowichan Valley	3	7
North Island	4	13
West Island	6	23
North Coast and Haida Gwaii	8	35
Landfills	2	15
Totals	60	195



credit: Neena Prada

A second year Glaucous-winged Gull, identifiable by brown and white mottling, grey plumage on mantle, and a mostly black bill.

Each captured gull was banded with a unique combination of three colour bands and a numerical metal band. This protocol enables us to recognize individuals that we re-sight, helping us to understand the movements, site fidelity, and age-specific survival of this species across the Salish Sea. Colour-banded gull sightings can be reported to the Canadian Bird Banding Office and/or by completing this form for the ECCC research team.

**SEE A
COLOUR-BANDED
GULL?**
Let us know!

- 1.** Snap a photo.
- 2.** Take note of the time and location.
- 3.** Let us know!

credit: Sara Couper, Idea Camp Communications Inc.

 <https://forms.office.com/r/i9PG9zHCfs>

Use the live QR code in the above image or share this link with family and friends to report colour-banded gull sightings!

PRELIMINARY RESULTS: BANDING & GPS DATA

We have completed four years of winter sampling on the Salish Sea Gull Project. In total, we have sampled 619 Glaucous-winged Gulls, colour-banded 351 individuals, and deployed 34 GPS tags, of which a quarter are still transmitting (see Table 2). In 2022 and 2023 we colour-banded 25 California Gulls, and deployed 20 GPS tags, of which 80% are still transmitting (see Table 3).

Table 2. Totals for 4 years (2020-2023) of the Glaucous-winged Gull (GWGU) component of the Salish Sea Gull Project.

YEAR	SITES	GWGU	GPS TAGS DEPLOYED	GPS TAGS STILL TRANSMITTING
2020	26	64	14	1
2021	78	188	17	5
2022	64	183	3	3
2023	60	184	0	n/a
Totals	228	619	34	9

Table 3. Totals for 2 years (2022-2023) of the California Gull (CAGU) component of the Salish Sea Gull Project.

YEAR	CAGU	GPS TAGS DEPLOYED	GPS TAGS STILL TRANSMITTING
2022	14	10	8
2023	11	10	9
Totals	25	20	17

Our year-round tracking data suggest that Glaucous-winged Gulls have relatively fixed migration strategies. The majority (>75%) of tagged gulls remain in the Salish Sea throughout the year. Of the nine Glaucous-winged Gulls with tags still transmitting, seven have remained within small home ranges in the one to three years after tagging.

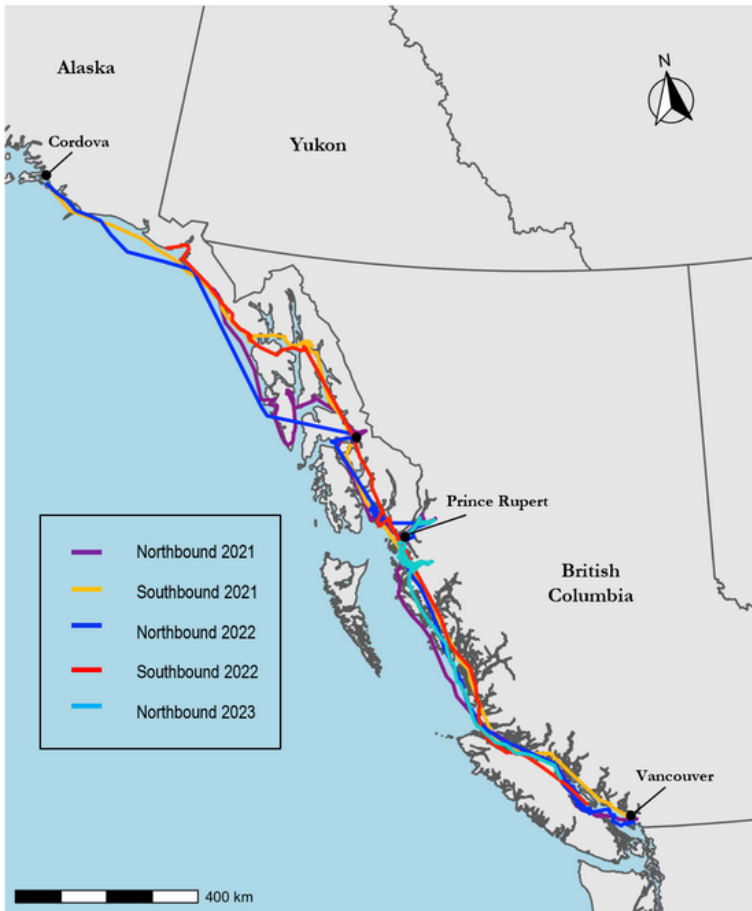
However, two Glaucous-winged Gulls made long-distance migrations north or south: one individual tagged in the Salish Sea travelled north to breed in Alaska in three consecutive years (see Map 2), while the other individual tagged in Tofino spent the summer breeding season on the west coast of Vancouver Island and wintered in California (see Map 3).



credit: Liam Ragan

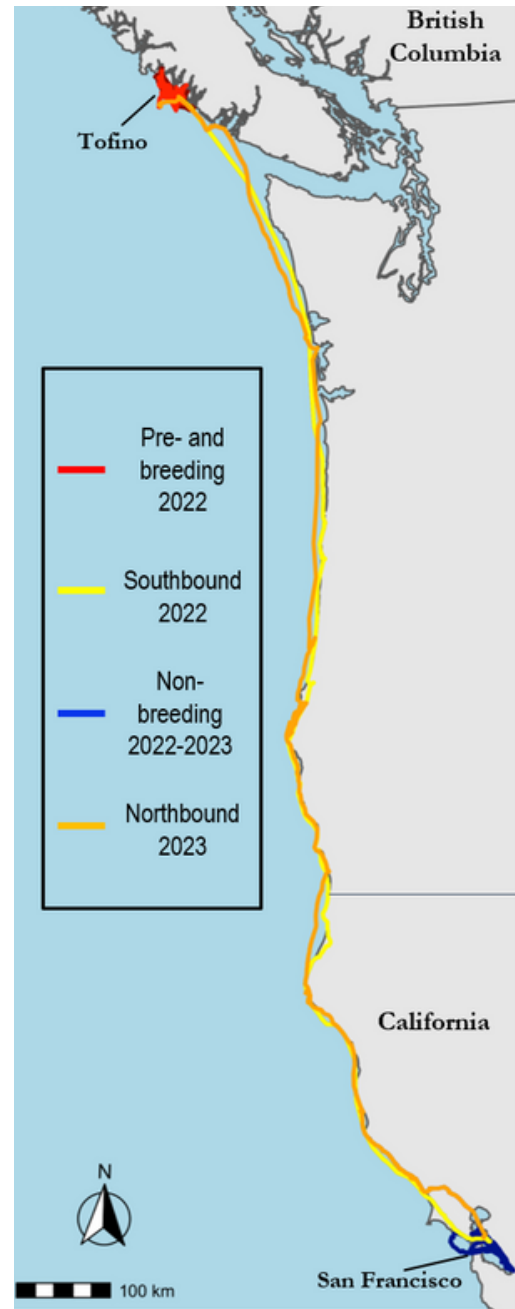
A first winter Glaucous-winged Gull with colour-bands (green over yellow on the left leg, and white over metal on the right leg) catching a herring.

GPS tracked California Gulls (n = 20) were observed in areas of herring spawn off the east coast of Vancouver Island in March before leaving for breeding grounds in Alberta, Saskatchewan, and Montana. These birds wintered in southern California and refueled in the Salish Sea on route to their breeding sites (see Map 4).



Map 2 (left). Year-round movements of a Glaucous-winged Gull tagged at the Vancouver Landfill in Delta, BC. For three years, this individual departed the Salish Sea towards northern breeding grounds near Cordova, Alaska. On its northbound migration it consistently stopped at key sites with abundant forage fish in the Salish Sea (herring spawn) and near Prince Rupert on the Nass River (eulachon spawn).

For additional GPS tagging details please refer to [Hannah Hall's Master of Science Thesis](#) from Simon Fraser University.



Map 3 (right). Year-round movements of a Glaucous-winged Gull tagged in Tofino, BC. After tag deployment on February 22, 2022, this individual remained on the west coast of Vancouver Island throughout the breeding season. It migrated south in the fall (October 22nd – 31st, 2022) to overwinter in southern California and subsequently returned to Tofino after a week-long migration (February 10th – 18th, 2023).



Map 4. Year-round movements of two California Gulls tagged at the Nanaimo Landfill, BC. After tag deployment in March 2022 both individuals remained in the Salish Sea for the herring spawn. In early spring, one individual moved to breed near north-east of Calgary, Alberta (red track), while the other migrated to Montana (blue).

Both gulls left their breeding grounds in late summer and returned to the San Francisco Bay area, California by December. Interestingly, one individual (blue track) returned to its breeding site in Montana for a second year, but instead took an inland route that did not involve travelling through the Salish Sea.

PRELIMINARY RESULTS: HEALTH INDICATORS

Our previous analyses suggested that there is little variation in health indicators of adult Glaucous-winged Gulls captured in different regions and habitat types. To expand on these findings, in 2023 we sampled sites along the northern coast of British Columbia, with captures in Prince Rupert and Haida Gwaii. This region is historically less impacted by human activity than southern sites and will help us compare the health of gulls in different regions.

In 2023, we also sampled different age groups of Glaucous-winged Gulls (first year, second year, third year, fourth year, and adult), with preliminary results showing relatively little variation in physiological health indicators with age. As shown in Figure 1 below, note how the age classes cluster together, with little separation. Not surprisingly, the least experienced birds, juvenile gulls in their first winter, had lower health metrics (body condition, aerobic capacity) compared to individuals in all other age classes.

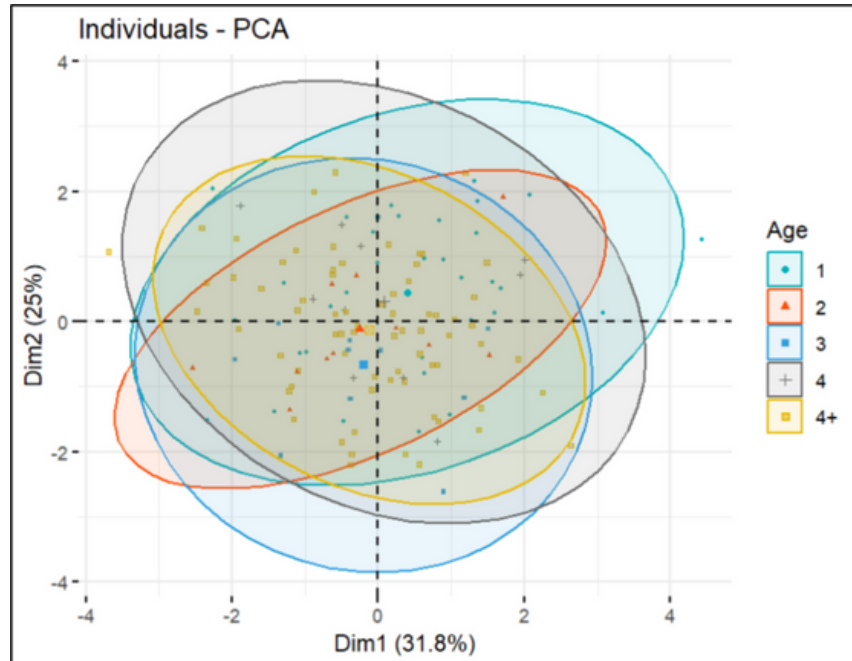


Figure 1. Biplot of principal component analysis (PCA) results for individual Glaucous-winged Gulls from each age group. Individual positions on the plot are based on PCA conducted on five physiological measurements of health including: glucose, hematocrit, hemoglobin, OXY, and d-ROMs levels. Note: circles represent 95% concentration ellipses.

FUTURE FIELDWORK AND ANALYSIS

Data from the first 2 years of the Salish Sea Gull Project (2020, 2021) were recently analyzed in [Hannah Hall's Masters of Science thesis](#) (supervised by Dr. Tony Williams, Simon Fraser University) and will form part of an ongoing veterinary research project by Neena Pradal from Université de Paul Sabatier, France (co-supervised by Dr. Tony Williams, Simon Fraser University and Dr. Mark Hipfner, ECCC).

In winter 2024, we plan to complete a final year of sampling for physiological, genomic, and toxicological studies at sites in the Salish Sea, the northern coast of British Columbia, and the north and west coasts of Vancouver Island. We will also complete another season of GPS tagging of Glaucous-winged Gulls. Once sampling is complete, we will use our five-year dataset to investigate relationships between habitat use, diet (via stable isotope analysis), physiological health, age, and contaminant levels. The genomics data will enable us to determine the provenance of gulls that winter in the Salish Sea (i.e., where they come from), establish the extent to which gull populations are structured (i.e., their connectivity), and determine the extent of hybridization. We will also complete detailed analyses of GPS data to delineate year-round movements and identify key habitat areas for emergency response planning. We hope to continue studies of age-specific survival rates indefinitely.



credit: Anneka Vanderpas

Field site in Haida Gwaii, British Columbia.

THANK YOU



The Salish Sea Gull Project research team would like to express their gratitude to the following for their support:

Thank you to the 'Namgis First Nation, Gwa'sala-'Nakwaxda'xw Nations, Kwakiutl First Nation, Council of the Haida Nation, Skidegate Band Council, Metlakatla First Nation, Lax Kw'alaams Band, Wei Wai Kum First Nation, K'ómoks First Nation, Tla'amin Nation, T'Sou-ke First Nation, Tsawout First Nation, Tsartlip First Nation, Cowichan Tribes, Lyackson First Nation, Snuneymuxw First Nation, Ucluelet First Nation, Ahousaht First Nation and Maaqutusiis Hahoulthee Stewardship Society, Musqueam Indian Band, Squamish Nation, Tsleil-Waututh Nation, Tsawwassen First Nation, 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: Prince Rupert, Port Edward, Daajing Giids, Skidegate, 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 and Sunshine Coast municipalities: West Vancouver, Vancouver, Richmond, Burnaby, Delta, White Rock, Surrey, Port Moody, Gibsons, Sechelt, and Powell River for the opportunity to work in local parks and beaches. Thank you to the Nanaimo Landfill and Vancouver Landfill.

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 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. Aneka 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, 10667R and Animal Care #23MH03).



Dr. Mark Hipfner
Mark.Hipfner@ec.gc.ca



Nik Clyde
Nik.Clyde@ec.gc.ca