WEST KITIKMEOT RESOURCES CORP

Appendix 22A

Marine Fish and Fish Habitat Baseline Report

Grays Bay Road and Port Project
Marine Fish and Fish Habitat Baseline Report

Prepared for:

West Kitikmeot Resources Corp

Prepared by:

Nunami Stantec Limited

March 2026

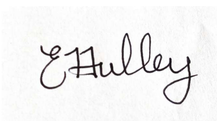
Project No.: 123514868

WEST KITIKMEOT RESOURCES CORP

Sign-off

This Report titled Grays Bay Road and Port Project: Marine Fish and Fish Habitat Baseline Report was prepared and reviewed by the following:

Prepared by:



Digitally signed by Hulley, Emily
Date: 2026.02.25 08:07:44 -08'00'

Signature

Emily Hulley, M.Sc., R.P.Bio
Aquatic Biologist, Associate

Printed Name

Twist, Brenton

Digitally signed by Twist, Brenton
Date: 2026.02.24 16:03:25 -08'00'

Signature

Brenton Twist, PhD, R.P.Bio
Marine Biologist

Printed Name

Reviewed by:

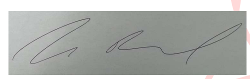
McCracken, Conor

Digitally signed by McCracken, Conor
Date: 2026.02.25 09:13:12 -08'00'

Signature

Conor McCracken, B.Sc., R.P. Bio
Senior Marine Biologist
Subject Matter Expert –
Fish and Fish Habitat (Pacific)

Printed Name



Digitally signed by Beland, Joseph
Date: 2026.02.26 15:59:20 -04'00'

Signature

Joseph Beland, M.M.M., R.P.Bio
Senior Marine Biologist
Subject Matter Expert (Canada) –
Marine Mammal and Sea Turtle

Printed Name

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Abbreviations

ADFG ..... Alaska Department of Fish and Game
CAFF ..... Conservation of Arctic Flora and Fauna
COSEWIC ..... Committee on the Status of Endangered Wildlife in Canada
CPUE ..... catch per unit effort
DEIS ..... Draft Environmental Impact Statement
DFO ..... Fisheries and Oceans Canada
DUC ..... Ducks Unlimited Canada
EBSA ..... Ecologically and Biologically Significant Areas
EIS ..... Environmental Impact Statement
FAO ..... Food and Agriculture Organization
GBEEC ..... Grays Bay Engineering and Environmental Consultants
GIS ..... Geographic Information System
GLCM ..... gray-level co-occurrence matrix
GN ..... Government of Nunavut
GOC ..... Government of Canada
HHWLT ..... higher high water large tide
IA ..... important areas
IA ..... Inuit Advisory Group
IS ..... Impact Statement
KCC ..... Klohn-Crippen Consultants Ltd.
LAA ..... Local Assessment Area
LLWLT ..... lower low water large tide
MMG ..... Minerals and Metals Group
MPA ..... Marine Protected Areas
NCRI ..... Nunavut Coastal Resource Inventory
NDWI ..... normalized difference water index
NOAA ..... National Oceanic and Atmospheric Administration
NTKP ..... Naonaiyaotit Traditional Knowledge Project

ONCS	Oceans North Conservation Society
PDA	Project Development Area
Project, the	Grays Bay Road and Port Project
RAA	Regional Assessment Area
ROV	Remotely Operated Vehicle
SARA	*Species at Risk Act*
SD	secure digital
TCWR	Tibbitt to Contwoyto Winter Road
UnID	Unidentified
USGS	United States Geological Survey
WKR	West Kitikmeot Resources Corporation
WWF	World Wildlife Fund Canada

Symbols and Units of Measure

%	percent
<	less than
>	greater than
°C	degrees Celsius
cm	centimetre
g	gram
kg	kilogram
km	kilometre
m	metre
m^3	square metre
mm	millimetre

1 Introduction

West Kitikmeot Resources Corporation (WKR) is an Inuit-owned, Inuit-led company focused on the advancement of the Grays Bay Road and Port Project (the "Project") in the Kitikmeot Region of Nunavut. The largest shareholder of WKR is a wholly-owned subsidiary of the Kitikmeot Inuit Association. The Project is proposed as a multi-user, multi-use transportation infrastructure to be located on a combination of Inuit Owned Land and Crown land in the Kitikmeot Region of western Nunavut. Subject to approval, the Project would result in the establishment of the first deep-water port in the Canadian Central Arctic at Grays Bay, as well as a 230 kilometre (km) all-season access road between Grays Bay and Jericho station near Contwoyto Lake. The Project will connect to the already approved Tibbitt to Contwoyto Winter Road (TCWR). The Project would allow for the establishment of shared infrastructure with many potential users, including the federal and territorial governments, communities, community members, resource companies, and defense agencies.

The Project's location and current design are based on siting studies and designs previously conducted by Minerals and Metals Group (MMG) for their Izok Corridor Project (a previous iteration of the Project), Government of Nunavut (GN), and Kitikmeot Inuit Association, who were the proponents of the Project until 2020. Due to these initial efforts, WKR benefits from designs, studies, and data previously undertaken by MMG, the Kitikmeot Inuit Association, and the GN. Many of the environmental studies are more than 10 years old; therefore, to support the preparation of an Environmental Impact Statement (EIS), some of the environmental studies have been supplemented with recent data.

1.1 Inuit Knowledge, Traditional Knowledge, and Community Knowledge

A considerable amount of Inuit Knowledge has been documented for the Project, which has substantially informed WKR's understanding of baseline environmental and socio-economic conditions in the Project development area (PDA). For the purposes of the Impact Statement (IS), focus is placed on the Inuit of the Kitikmeot Region, or Kitikmiut. The Project is located wholly within the Kitikmeot Region; as such, the region and its people are where key Project interactions and effects are most likely to occur.

Verified Inuit Knowledge and perspectives considered and integrated in the IS were shared through two primary Project-specific sources.

1. **Naonaiyaotit Traditional Knowledge Project (NTKP):** The Kitikmeot Inuit Association maintains a repository of Inuit Knowledge for the Kitikmeot Region within a Geographic Information System (GIS)-based database called the NTKP. The NTKP contains the collective body of documented and verified Inuit Knowledge of the Kitikmeot Region, including but not limited to knowledge of birds, fish, terrestrial and marine mammals, water quality, travel routes, gathering places, and heritage. The Kitikmeot Inuit Association compiled a Project-specific report called *Kitikmiut Knowledge of the Proposed Kogloktoakyok (Grays Bay) Port and Road Project* (Banci and Spicker 2024), which provides the majority of the Inuit Knowledge shared and integrated in the IS.

2. **Inuit Advisory Group (IAG)**: Initiated in 2018 by the previous Project proponent, WKR re-initiated the IAG in 2025. Through a series of IAG workshops, WKR and Inuit land users, Elders, and Knowledge Holders have met to discuss and document feedback and advice about the Project, including but not limited to dialogue about wildlife, fisheries, land use, archaeology, water, air quality, and access management. Through the IAG, multiple perspectives have been shared, allowing for the integration of knowledge systems (both Inuit Knowledge and Western science), resulting in a more informed and sustainable Project. At the time of filing, four IAG workshops had occurred (Grays Bay Engineering and Environmental Consultants (GBEEC) 2018a, 2018b; IAG 2025a, 2025b), with additional workshops planned for the future.

Pertinent baseline information from these sources of Inuit Knowledge is not presented further here; instead, this information is provided in the above-noted reports themselves, the ‘Baseline Conditions’ sections of each assessment section, and integrated in the Assessment of Potential Effects on Marine Fish and Fish Habitat sections where appropriate (Section 22.3). The same process was applied when integrating baseline information associated with applicable Traditional Knowledge and Community Knowledge shared in publicly available literature and through the Project-specific engagement program.

2 Scope and Objectives

This baseline report presents the existing conditions for Marine Fish and Fish Habitat in support of the environmental assessment process for (the Project). The broad definition of “fish” as defined by Fisheries and Oceans Canada (DFO) in the *Fisheries Act* has been used in this report and is inclusive of both finfish and invertebrates. Marine mammals are discussed within the Marine Mammal Baseline Report (Volume 8, Appendix 23A of the IS).

For this baseline report, fish species have been grouped into four categories:

- **Marine invertebrates** – exoskeleton-bearing aquatic invertebrates, including various species of molluscs, crustaceans, and echinoderms.
- **Anadromous/amphidromous fish** – fish that move between freshwater and saltwater. Anadromous fish hatch and rear in freshwater streams before migrating to the marine environment, where they spend most of their lives before returning to their natal streams as adults to spawn. Amphidromous fish will spawn and overwinter in freshwater streams but migrate into marine environments for several months each year to forage.
- **Pelagic fish** – fish that can be found in the midwater and upper layers where sunlight penetrates the water column. Pelagic fish include both coastal and oceanic species.
- **Demersal/Benthic fish** – reside near or on the seabed. Demersal fish range from shallow coastal waters to the deep continental shelf.

Historical and emerging data were used to assess species' presence, range, abundance, and distribution to understand the likelihood of potential effects from the Project. Relevant acts, guidance, and regulatory documents were used to inform impact assessment procedures (e.g., Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status reports; *Species at Risk Act* (SARA); *Fisheries Act* (R.S.C., 1985, c. F-14). These documents were used as a guideline to better understand existing regulations and management recommendations to help inform pre-construction field surveys, construction, operation, and monitoring activities.

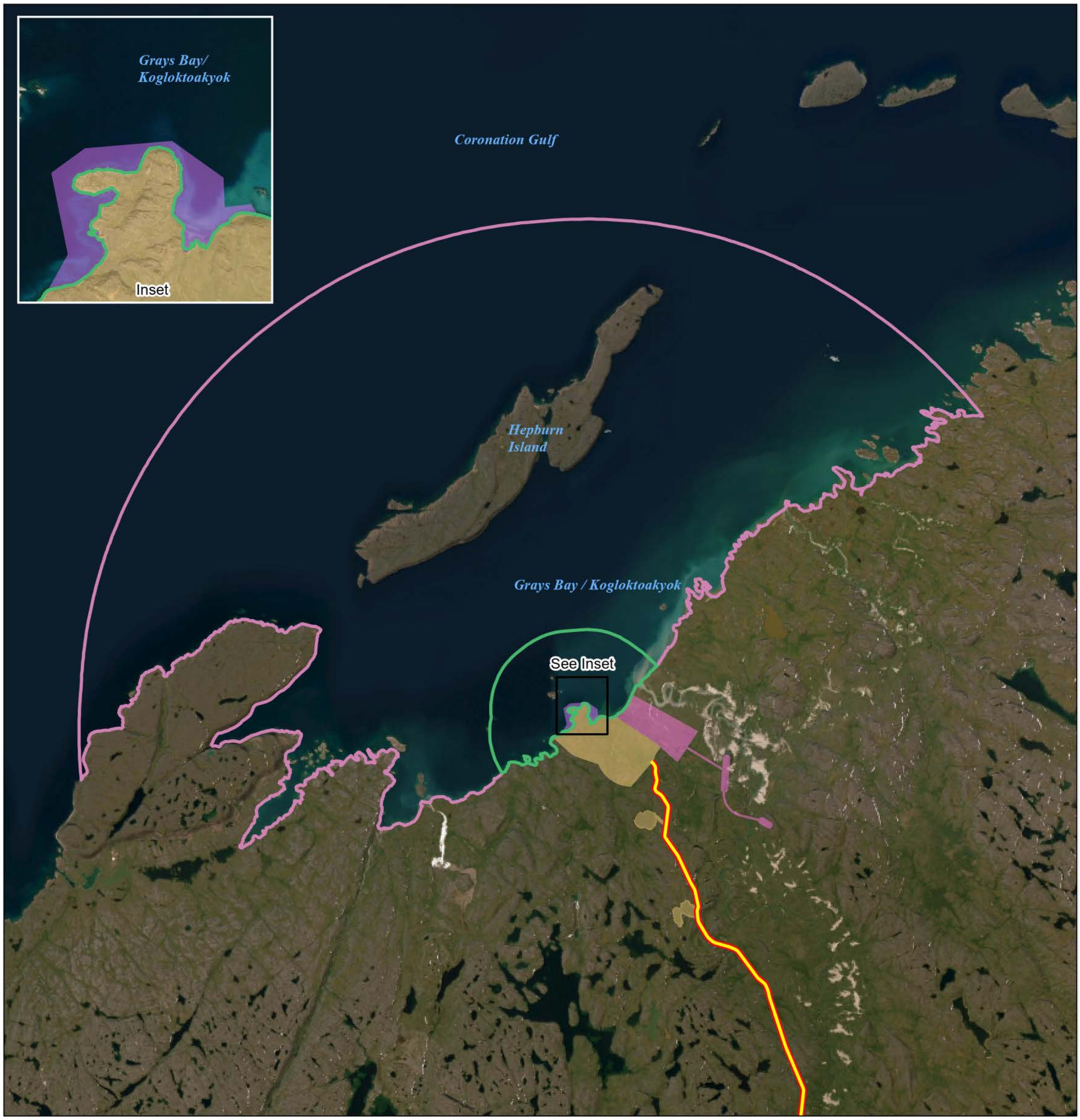
The objectives of the Marine Fish and Fish Habitat Baseline Report are to:

- Provide an overview of the existing information on marine fish and invertebrates for both nearshore and offshore areas as they relate to the Project.
- Describe fish species’ distribution, habitat preferences, and likelihood to occur within the Project assessment areas.

3 Description of the Assessment Areas

The local and regional assessment areas (LAA and RAA) represent the areas where data were collected to provide an understanding of the environment so that potential Project-specific effects and potential cumulative effects of the Project on Marine Resources can be assessed. The Project location and assessment areas are shown in Figure 3.1.

- The **Project Development Area (PDA)** encompasses the physical footprint of all Project components, including both permanent and temporary disturbances (e.g., extent of Project infrastructure, planned clearing, and laydown areas). The PDA includes six sub-areas based on the types of components to be developed: the Port (which is further divided into marine and landside infrastructure), Road, Aerodrome, Jericho Station, and Winter Road PDAs. The boundaries of the PDAs were created by applying buffers around where the Project components will be sited, and varies by each of the sub-areas depending on necessary flexibility for final siting of certain Project components based on conditions on the ground. For the Road PDA and Winter Road PDA, a 75 m buffer was applied to the roads centreline, for the Port PDA and the Aerodrome PDA, the areas were subdivided based on the conceptual Project component locations and then buffered approximately 1,000 m for the landside Port PDA, approximately 300 m for the marine Port PDA, and 500 m for the Aerodrome PDA. The Jericho Station PDA was buffered based on the existing development from the old Jericho Mine site that will be used for the Project and the need for additional space to accommodate the Project components that will be developed as part of the Project for this location. The Winter Road PDA will only exist annually between the beginning of February and end of March, will be built on land where the existing Jericho Station road ends, at the southeastern portion of Jericho Station, to the shoreline of Contwoyto Lake where it will connect to the TCWR. For the purposes of the impact assessment, the PDA is the same as the Site Study Area identified in the IS Guidelines.
- The **Local Assessment Area (LAA)** has been developed for marine resources to represent the area in which project-related effects can be predicted or measured with a level of confidence that allows for the assessment wherein there is a reasonable expectation that those effects could be of concern. The preliminary LAA for marine resources includes a one-km buffer around the PDA.
- The **Regional Assessment Area (RAA)** has been developed for marine resources to represent the area within which project-specific effects overlap with effects of other past, present, and reasonably foreseeable future projects. The RAA includes the LAA and a 20 km buffer around the PDA.



Local Assessment Area (LAA)
Regional Assessment Area (RAA)
Grays Bay Road

Project Development Area (PDA)

Aerodrome
Port (Landside Infrastructure)
Port (Marine-based Infrastructure)

0 2.5 5 Kilometres

(At original document size of 8.5x11) 1:250,000

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Notes
1. Coordinate System: WGS 1984 UTM Zone 12N
2. Data Sources: Government of Canada, Stantec, Earthstar Geographics

Project Location
~~West Kitikmeot~~ Region
Nunavut

Prepared by SL on 2025-12-09
TR by BT on 2025-12-09

Client/Project
123514868_036

West Kitikmeot Resources Corp
Grays Bay Road and Port

Figure No.
3.1

Title
Marine Fish and Fish Habitat Assessment Areas

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4 Summary of Methods

4.1 Desktop Assessment

A desktop assessment of existing background information was conducted to identify potential gaps in the marine fish and fish habitat datasets. This information was used to support Project planning and design and contributed to the preparation of the EIS. A review of available relevant information, including reports, documents, and data, was used to refine the fish and fish habitat field workplan. Documents reviewed during the desktop assessment included:

- High Lake Project (Wolfden 2006)
- Izok Corridor Project (MMG 2012)
- Grays Bay Road and Port Project (Elliot and Cross 2013)
- Grays Bay Engineering and Environmental Consultants (GBEEC) Environmental Baseline Studies Review and Gap Analysis (GBEEC 2017)
- Canadian Science Advisory Secretariat Publications
- Scientific peer-reviewed literature
- Publicly available online information on Grays Bay and the Coronation Gulf

Relevant information that may support the review of existing marine fish and fish habitat is also available in the Baseline Reports prepared for other valued components, including the following:

- Birds Baseline Report (marine birds; Section 17 Appendix 17A of the IS)
- Freshwater Fish and Fish Habitat Baseline Report (freshwater stages of anadromous species; Section 20 Appendix 20A of the IS)
- Marine Mammal Baseline Report (marine mammals; Section 23 Appendix 23A of the IS)
- Marine Water and Sediment Quality Baseline Report (water and sediment quality; Section 21 Appendix 21A of the IS)
- Vegetation Baseline Report (riparian vegetation; Section 15 Appendix 15A of the IS)

4.2 Field Surveys

In 2025, a marine fish and fish habitat field program was conducted over two time periods from July 16–22 and August 20–29 to obtain information on the marine resources and habitat in the LAA. The field program consisted of intertidal surveys, subtidal remotely operated vehicle (ROV) surveys and marine fish surveys through a variety of trapping methods outlined below. Fish were collected under a DFO *Licence to Fish for Scientific Purposes* (Licence #: S-25/26-1020-NU) issued pursuant to Section 52 of the Fishery (General) Regulations. All collection and handling of fish followed the terms and conditions of this licence, including documentation and reporting of all fishing activities, catch numbers, and any mortalities.

4.2.1 Intertidal Surveys

An intertidal habitat assessment was conducted within the LAA between the higher high water large tide (HHWLT) and the lower low water large tide (LLWLT) from July 17–22, 2025. Limited tidal prediction data are available for the Grays Bay region; however, based on predictions from Kugluktuk (tidal station 06290; GOC 2025) to the west and Cambridge Bay (tidal station 06240; GOC 2025) to the east, survey conditions were estimated to occur between 0.25 and 0.40 m tide heights. Reported HHWLT elevations are 0.63 m at Kugluktuk and 0.98 m at Cambridge Bay, with Grays Bay expected to fall within this range.

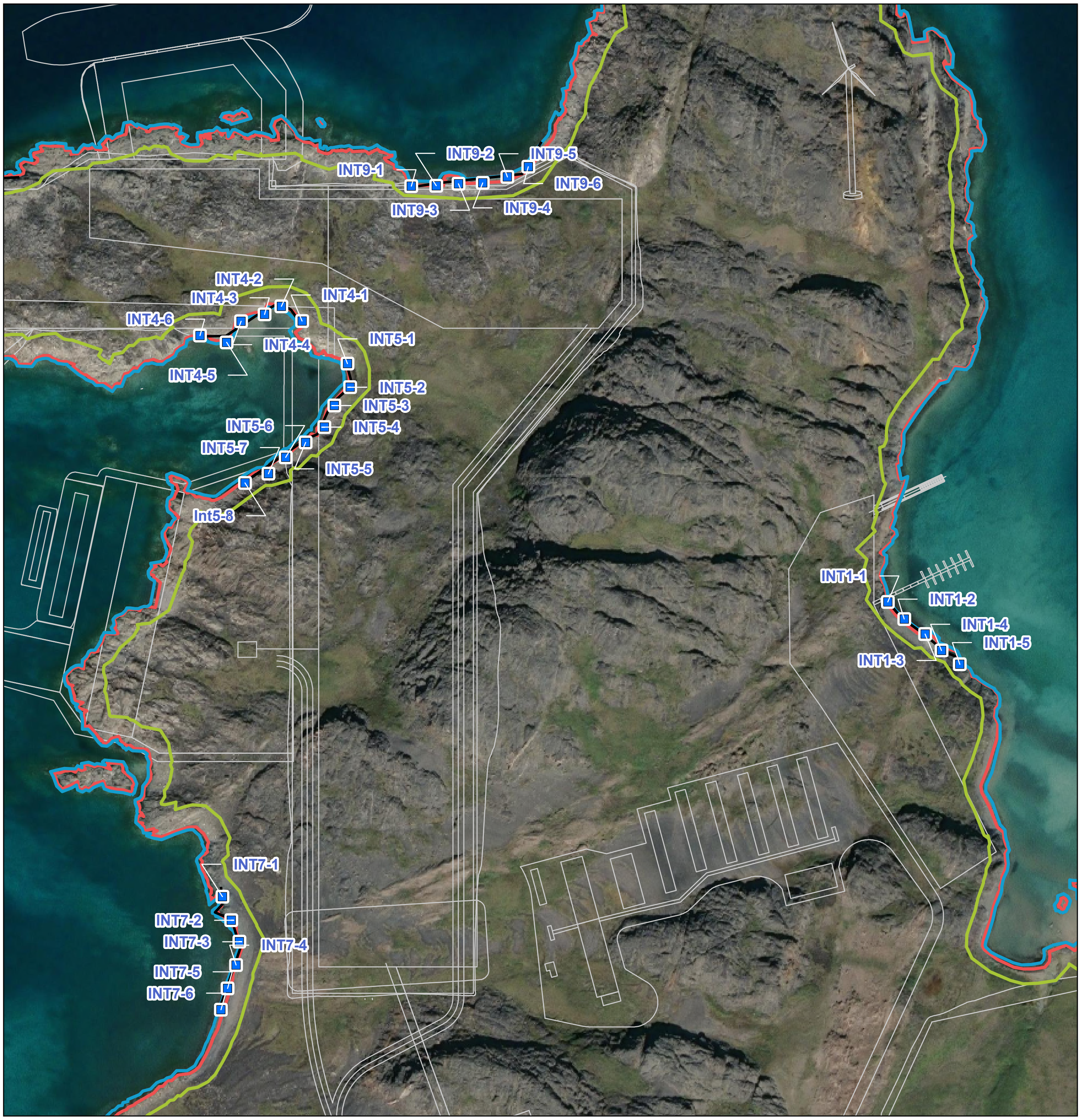
Given the narrow tidal range, transect lines of varying lengths were established parallel to the shoreline, positioned within the middle of the intertidal zone, and adjusted to follow shoreline contours (Figure 4.1; Appendix A.1). At each site, only one transect was completed across the intertidal zone due to the limited tidal exposure. Along each transect, 0.25 m² (0.5 x 0.5 m) quadrats were positioned at regular 20 m intervals, with the first quadrat randomly placed within the initial 10 m of the transect (Figure 4.1; Appendix A.1). Therefore, the number of quadrats assessed along each transect varied with the total transect length. Within each quadrat, substrate composition was quantified to the nearest percent following marine sediment classification standards (Table 4.1), and all organisms present were identified and counted. Where the substrate allowed (mud, sand, gravel), quadrats were dug down to 25 cm to identify any infaunal species present within the substrate.

Table 4.1 Substrate Classification Used for Surveys

Substrate Type	Substrate Size Range (mm)	Description
Bedrock	-	Solid, continuous rock outcrops
Boulder	>256	Large rocks
Cobble	64–256	Medium-sized stones
Gravel	2–64	Small stones and pebbles
Sand	0.0625–2	Fine particles
Mud	<0.0625	Very fine particles of silt, clay and mud
Shell	-	Intact or fragmented shells of mollusks (e.g., clams, mussels, snails) deposited on the substrate surface
Organics	-	Non-living plant material, including drift algae, detached macrophytes, and other decomposing vegetation

Note:

Based on Coastal/Estuarine Fish Habitat Description and Assessment Manual (Williams 1990), with additional categories for bedrock, shell and organic material.



Quadrat Survey Data Location

Completed Transects

Intertidal

Water Marks

High Water Mark

Low Water Mark

Marine Riparian

Port Infrastructure

0 50 100 Metres

(At original document size of 8.5x11) 1:5,000

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Notes
1. Coordinate System: WGS 1984 UTM Zone 12N
2. Data Sources: Government of Canada, Stantec, Vantor

Project Location
West Kitikmeot Region
Nunavut

Prepared by SL on 2026-02-10
TR by BT on 2026-02-10

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West Kitikmeot Resources Corp
Grays Bay Road and Port

Figure No.
4.1

Title
Intertidal Survey Locations in 2025

Transect locations were distributed across the LAA to provide coverage of proposed infrastructure areas and to capture the diversity of habitat types. Locations were adjusted in the field to provide representative coverage of habitat variability or to avoid unsafe survey conditions (e.g., steep bluffs). In areas where transects could not be completed and to fill in gaps between completed transect lines, qualitative surveys were conducted as an alternative. Qualitative assessments were conducted to document intertidal organisms, riparian vegetation within 15 m of the HHWLT, and general substrate composition over broader spatial scales.

4.2.2 Subtidal Surveys

Field Survey

To characterize subtidal habitats and species presence, ROV surveys were conducted from August 27–29, 2025 at multiple locations around the site. Stantec's Deep Trekker PIVOT ROV was used for the survey. The ROV features six magnetically coupled thrusters, external floodlights, a 220° rotating 4K camera for image and video capture, and an integrated sensor package measuring depth, heading, and altitude. The ROV was operated using batteries and a 100 m long tether. Surveys were run perpendicular to the shoreline, beginning in deeper offshore waters and proceeding landward towards the intertidal zone. ROV transects were completed in water depths ranging from 0 to 33 m (Appendix A.3). Transect locations were distributed throughout the LAA, with additional survey effort concentrated on areas of proposed infrastructure.

Due to technical issues with the ROV's global positioning system, each transect was initiated by deploying the ROV at a planned offshore start point and running a set compass bearing toward shore. The actual endpoint of each transect was recorded and subsequently used to document survey extent and positioning. Prevailing westerly winds and associated field challenges prevented the completion of several planned surveys on the northern and western sides of the LAA.

High-definition video was collected for each transect using the ROV's onboard camera with files stored directly to a secure digital (SD) card in the controller. Recording began at the start of each dive, continued for the duration of the transect, and was stopped and saved upon completion.

In addition to the ROV surveys, GoPro Hero 7 and Hero 12 cameras in underwater housings were mounted to select crab traps to document benthic substrate and habitat, and to record incidental observations of fish or crab species. Video footage was recorded in high-definition resolution for the duration of battery capacity and stored on SD cards for subsequent review.

Video Analysis

ROV and GoPro footage was reviewed post-survey to document habitat characteristics and species observations. Dominant and subdominant (when present) substrate type was classified following the marine sediment classification outlined above in Table 4.1. Transitions between different substrate types were recorded with associated depth and time. Marine species observations were identified to the lowest possible taxonomic level and recorded along with depth and time metadata. Fish and mobile invertebrates were counted, while algae and sessile invertebrates were estimated as percent cover across the time periods for which they were present.

4.2.3 Remote Sensing Surveys

Remote sensing methods were used to produce a detailed substrate and habitat classification map for intertidal (up to 15 m above HHWLT) and subtidal (where visible) regions of the LAA. Aerial imagery of the LAA at Grays Bay was collected from August 24–27, 2024, using an Evo Nano Series Multi-rotor drone with a flight height of 120 m, providing a spatial resolution of approximately 4 cm. In addition, multispectral satellite imagery (Skywatch) with a 30 cm spatial resolution was obtained. The red, green, and blue bands from the aerial imagery were used to produce a habitat classification map to identify dominant substrate and habitat classes. Habitat was classified according to the substrate types outlined in Table 4.1 with following modifications. A vegetation and water category was added, mud and sand were combined into a single fines class, and cobble and boulder substrates were combined into a single cobble/boulder class.

All imagery was reprojected, aligned, and clipped to the LAA boundary. Initial image segmentation was performed in eCognition software (Trimble Inc. 2025) to delineate homogeneous regions and identify representative sample areas for each class. A two-level hierarchical classification approach was then applied, with Level 1 distinguishing water, non-water, ice, and shadow areas, and Level 2 classifying physical habitat types including fines, gravel, cobble, and bedrock.

Several spectral indices were generated for both the drone and satellite imagery, where applicable, to enhance class separability (Table 4.2). An unsupervised classification was applied to the normalized difference water index (NDWI) layer to delineate water bodies from shore and terrestrial areas. Separate segmentation runs were then conducted for each clipped area in eCognition (Table 4.3). Feature space optimization in eCognition was used to refine the weighting scheme for optimal class separability, and initial segments were merged using rule-based logic to provide spatial and spectral coherence. The final classification was performed using a random forest model within eCognition, incorporating object-based features such as the standard deviation of spectral values, gray-level co-occurrence matrix texture (GLCM) metrics, and canny edge detection metrics.

Table 4.2 Remote Sensing Spectral Imagery Calculations

Index	Formula	Purpose
Normalized Difference Vegetation Index (NDVI)	$NDVI = \frac{NIR - Red}{NIR + Red}$	Vegetation detection
Normalized Difference Water Index (NDWI)	$NDWI = \frac{Green - NIR}{Green + NIR}$	Water and shore delineation
Red to Green Ratio (R/G)	$\mathrm{R/G} = \frac{\mathrm{Red}}{\mathrm{Green}}$	Surface composition contrast
Red to Blue Ratio (R/B)	$R/B = \frac{Red}{Blue}$	Sediment and mineral detection
Enhanced Vegetation Index (EVI)	$\mathrm{EVI} = 2.5 \times \frac{(\mathrm{NIR} - \mathrm{Red})}{(\mathrm{NIR} + 6 \times \mathrm{Red} - 7.5 \times \mathrm{Blue} + 1)}$	Enhanced vegetation sensitivity
Brightness Index (BI)	$BI = \sqrt{\frac{R^2 + G^2 + B^2}{3}}$	Surface brightness differentiation
Shadow Index (SI)	$SI = (1 - NIR)(1 - Green)(1 - Blue)$	Shadow and dark area identification

Table 4.3 Remote Sensing Parameter Segmentation

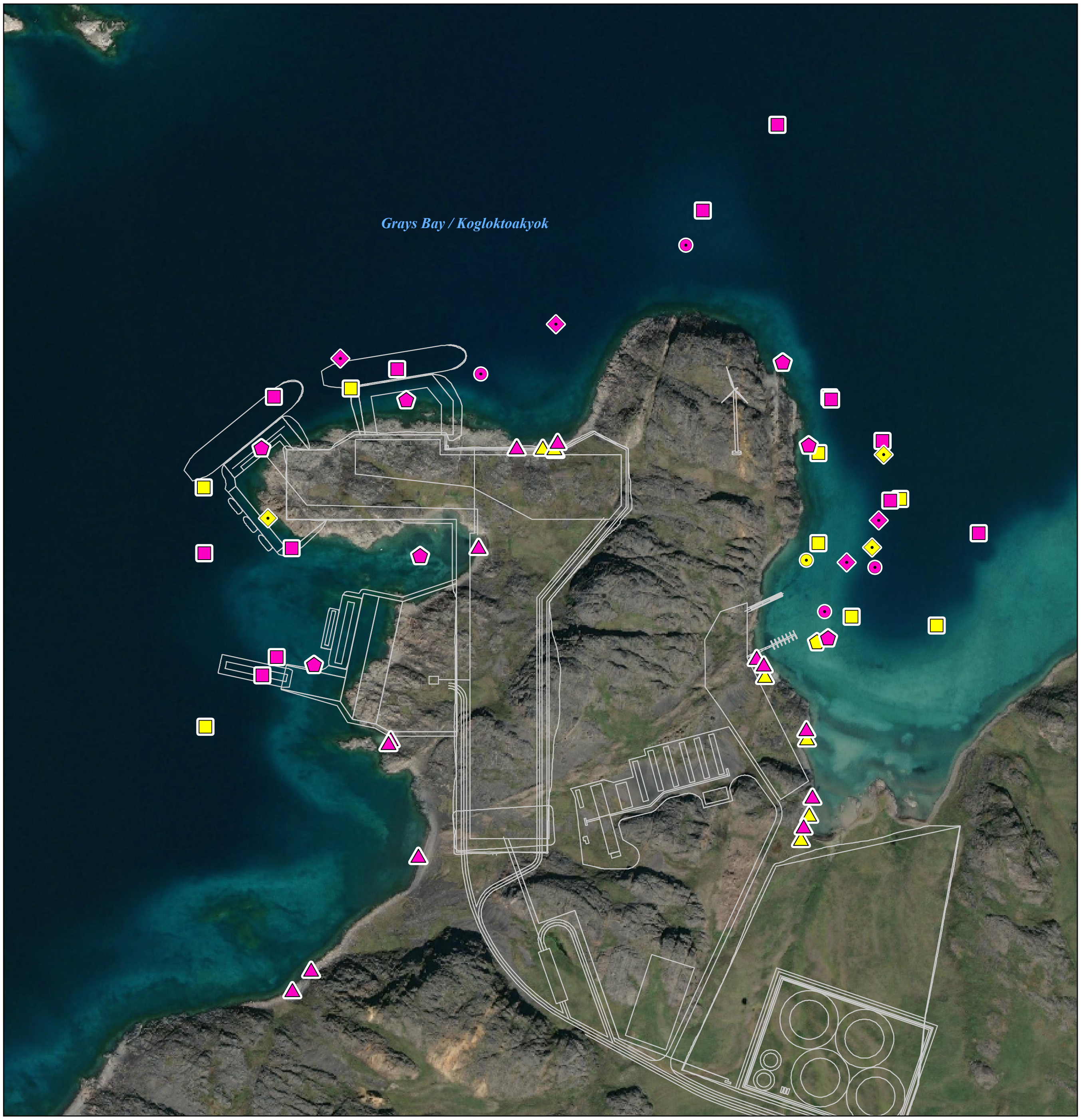
Parameter	Description	Value / Approach
Scale	Multiscale segmentation for class-specific precision	500 for bedrock, vegetation, and water; 100 for other classes
Shape	Shape vs. colour weighting	0.4
Compactness	Compactness vs. smoothness weighting	0.7 for large features; 0.2 for smaller communities
Layer Weights (Broad Scale)	NIR = 2, GLCM metrics = 2.5, Band Std. Dev = 0.5, Others = 1	Used for optimal segmentation
Layer Weights (Narrow Scale)	All bands = 1	Used for fine-scale segmentation

Notes:
NIR= Near-Infrared, GLCM= Gray-Level Co-occurrence Matrix

The classification output was refined in ArcGIS Pro to correct minor spatial inconsistencies. Due to incomplete coverage and interpretability issues, classification was not performed on the drone imagery. However, it served as ground-truth data and as a reference for sample selection in the satellite-based classification model.

4.2.4 Marine Fish Surveys

Traps were deployed across July 17–22, 2025 and August 20–26, 2025 as part of the marine fish and fish habitat program to quantify marine fish and invertebrates (specifically crustaceans such as crabs and prawns) within the LAA. Trapping gear included crab and minnow traps, fyke nets, gill nets, and beach seines. For each trap set, the first 10 individuals of each fish species were measured for length and weight, and for crabs, the carapace width of the first 10 individuals was recorded; all remaining individuals were counted. Catch data from all gear types were standardized as catch per unit effort (CPUE), expressed as the number of individuals per trap per hour for all trap types except beach seining, which was the number caught per m^3 of water seined. Traps were distributed throughout the LAA to provide representative coverage and were concentrated around proposed project footprint areas to characterize local habitat conditions (Figure 4.2).



Survey Type

- Beach Seine
- Crab and Minnow Trap
- Fyke Net
- Gill Net Floating
- Gill Net Sinking

Survey Month

- August
- July

Port Infrastructure

0 100 200 Metres

(At original document size of 8.5x11) 1:10,000

N

NUNAMI STANTEC LIMITED

WEST KITIKMEOT RESOURCES CORP

Notes

1. Coordinate System: WGS 1984 UTM Zone 12N

2. Data Sources: Government of Canada, Stantec, Vantor

Project Location
West Kitikmeot Region
Nunavut

Prepared by SL on 2026-02-10
TR by BT on 2026-02-10

Client/Project
123514868_146
West Kitikmeot Resources Corp
Grays Bay Road and Port

Figure No.
4.2

Title
Marine Fish Survey Locations in 2025

4.2.4.1 Crab and Minnow Traps

Danielson vinyl-coated octagon four door folding crab traps (61 × 61 × 33 cm) and Promar galvanized minnow traps (25 × 25 × 22 cm) were deployed at various locations within the LAA to target large invertebrates, and bait attracted smaller-bodied fish species (Figure 4.2). Both trap types were modified prior to deployment: the mesh opening of crab traps was reduced from 8.4 cm to 4.2 cm using twine to retain smaller crabs, while the funnel openings of minnow traps were enlarged to 5 cm to permit entry of larger crabs. Each minnow trap was paired with a crab trap, with the two traps positioned approximately 6 m apart.

All traps were baited with Prawn Candy–scented pellets, supplemented with incidental fish mortalities (mortalities reported in accordance with DFO licence) obtained from gill net sets. Standard soak duration was approximately 24 hours; however, some traps remained deployed for as little as 2.6 hours up to 47.5 hours due to weather-related constraints.

4.2.4.2 Fyke Nets

Fyke nets were deployed in shallow subtidal areas to target benthic fish species (Figure 4.2). Nets were set with the lead line oriented perpendicular to the shoreline, extending from the shallow subtidal zone. The lead line measured 15.24 m in length and 0.99 m in height. Two wings, each 7.26 m long and 0.99 m high, were positioned at approximately 45° angles from the lead line to guide fish into the trap.

The main net measured 3.8 m in length and consisted of a 1 × 1 m square opening leading through four hoops to the cod end. Netting had a mesh size of 0.635 cm. Fyke nets were set for overnight soaks, with soak durations ranging from 19.8 to 46.8 hours. Longer soak durations were due to weather preventing access to the coast, precluding nets from being recovered the following day.

4.2.4.3 Gill Nets

Two types of gill nets were deployed within the LAA: a sinking gill net and a floating gill net. Both the sinking and floating gill nets measured 91.2 m in length and 2.4 m in height, and were each composed of six 15.2 m panels with mesh sizes of 2.5 cm, 3.8 cm, 5.1 cm, 6.4 cm, 7.6 cm, and 8.9 cm (Figure 4.2). The floating gill net extended downward from the water surface, while the sinking gill net rested on the substrate and extended upward into the water column.

The floating gill net was deployed to target pelagic species, whereas the sinking gill net was intended to capture benthic, bottom-associated species. In addition, the range of mesh sizes was selected to capture multiple species and size classes. Nets were typically set from the shoreline at a perpendicular orientation to the coast. Soak times ranged from one to three hours. Based on initial catches, soak durations were subsequently reduced to minimize fish mortality, in concurrence with the DFO scientific licence conditions, by limiting the time individuals remained entangled.

4.2.4.4 Beach Seine

Beach seining was conducted in shallow subtidal areas along gently sloping beaches within the LAA (Figure 4.2). A 23 m long × 3.5 m deep seine net with 3 mm mesh was used. Each seine was operated by two people: one person remained on shore while the other waded in the water to a depth of approximately chest height. The net was then dragged a set distance parallel to shore, after which the shore-based person held position and the wading person pulled the net back to shore to close the loop and encircle fish.

The distance seined varied depending on beach length and the presence of in-water obstacles such as large boulders. Each seine set was assigned a quality rating from 1 to 5, with 5 indicating an optimal set (e.g., net fully deployed and hauled without issue) and 1 indicating a poor set (e.g., multiple stops due to snags, the net lifting from the bottom, or prolonged interruptions). Three seine sets were attempted at each site; however, at some locations, this was reduced to two where suitable beach conditions were limited.

5 Summary of Results

5.1 Desktop Assessment

5.1.1 Marine Habitat

The Arctic Ocean provides a variety of habitats for many marine species, including >2,000 species of algae, >5,000 marine invertebrate species, and >200 species of marine fish (Conservation of Arctic Flora and Fauna (CAFF) 2013). The RAA (the PDA and LAA are encompassed within the RAA; therefore, the RAA will be the only assessment area mentioned for comparison purposes herein) is located within the Coronation Gulf, which encompasses a large geographical area that supports a range of habitats from marine riparian through to intertidal and deep subtidal waters. Each of these habitats provide a unique ecological function and habitat requirements for many species. Marine fish and invertebrates rely on these habitats for food, shelter, nursing/rearing, and protection from predation. Marine habitats can also provide important ecological services such as carbon sequestration and nutrient recycling (Plummer et al. 2013). The following sections describe ecologically and biologically important areas, as well as the biological and physical characteristics of marine habitats that may be present within the RAA and their associated community assemblages.

The marine habitat around Grays Bay was previously described by Wolfden (2006) by completing an underwater video recording. At depths <2 m, substrates were predominantly bedrock or large boulders, and only filamentous algae were observed (Wolfden 2006). Further offshore, at depths of <5 m, rocks and boulders covered the seabed completely, with patches of seaweed (*Fucus distichus*) and filamentous algae attached to the substrate. Marine vegetation varied throughout the surveyed areas, from areas supporting widely scattered algae, to others which were very dense. In water depths >10 m, substrates observed consisted of silt with small rocks scattered across the surface. At a depth >20 m, there appeared to be a layer of filamentous algae over the sediment (Wolfden 2006).

5.1.1.1 Marine Protected Areas, Ecologically and Biologically Significant Areas, DFO Important Areas, and Species at Risk Critical Habitat

Marine Protected Areas (MPAs) are governed under the *Oceans Act* to protect and conserve marine species, habitats, and ecologically important ecosystems and to address the impact of climate change (DFO 2024a). In the Canadian Arctic, there are three MPAs: Anguniaqvia niqiqyuam (Ung-u-niak-via Ni-kig-e-um), Tarium Niryutait, and Tuvaijuittuq (DFO 2024a). These MPAs are located outside of the Coronation Gulf and the RAA and, therefore, are not discussed further.

Ecologically and Biologically Significant Areas (EBSAs) are areas that have relatively high ecological or biological significance compared to their surrounding areas (DFO 2021). EBSAs are established based on their uniqueness, importance for threatened species, life history, sensitivity to disturbance, biodiversity, and productivity. EBSA information is used to inform marine planning, including environmental assessments of marine-based activities and are broken down spatially in the Arctic, three of which are located partially within the Coronation Gulf: Bathurst Inlet, Lambert Channel, and Southern Victoria Island Coastline (DFO 2021). These three areas were also identified as areas of heightened ecological and cultural significance, providing important summer habitat for marine fish communities and serving as Arctic char feeding and migration corridors (Arctic Council 2009). While located in the Coronation Gulf, these three EBSAs and areas heightened ecological and cultural significance are outside of the Project RAA.

A DFO important area (IA) is a specialized EBSA that is specific to one species or feature (Rubidge et al. 2018). The boundaries of these areas are dependent on the species or feature they are specialized to. No DFO IAs were identified in the RAA or the Coronation Gulf (GOC 2024).

Critical habitat is identified for species listed as Endangered or Threatened under the SARA. There is no critical habitat for species at risk that overlaps with the RAA or the Coronation Gulf (DFO 2024b).

5.1.1.2 Sea Ice

Sea ice is the most influential feature in Arctic marine waters as it impedes surface mixing, influences heat and freshwater fluxes, and decreases light availability for primary producers (algae and phytoplankton). For most of the year, landfast ice (ice that is fastened to the coast) is present throughout the Arctic, reaching a thickness of two meters or more. Grays Bay and the RAA are ice-covered except for a relatively brief period between mid-July and early November (MMG 2012).

Sea ice is also a key component of Arctic Ocean habitats and is an ecosystem within itself (CAFF 2013). Species that live within the sea ice include over 20 species of crustaceans, Cnidaria, nematodes, Rotifera, and Acoela (CAFF 2013). Sea ice also provides a habitat for photosynthetic algae and diatom phytoplankton, which develop in the soft, porous layers on the underside of the ice. Ice algae begin to develop in April, with peak abundance in May (MMG 2012). Ice algae are essential for the development and survival of zooplankton species (e.g., calanoid copepods and amphipods), which are an important food source for marine fish, seabirds, and marine mammals (CAFF 2013).

Sea ice also provides a nursery habitat for larvae and juvenile marine invertebrates (e.g., Gastropoda and Polychaeta) and fish. Some species of marine fish are often found in association with sea ice, including polar cod (*Boreogadus glacialis*), Arctic cod (*Boreogadus saida*), and ice cod (*Arctogadus glacialis*). These fish use the cracks and crevices under the sea ice to avoid predators and forage on amphipods and copepods (CAFF 2013; MMG 2012).

5.1.1.3 Marine Riparian Vegetation

Riparian zones form the interface between aquatic and terrestrial environments and provide many important ecological functions related to fish and fish habitat. These areas help stabilize beaches and banks, reduce sediment inputs to the nearshore marine environment, and contribute to habitat complexity and refuge for marine fish species, particularly within migration corridors and estuaries near river mouths (Levings and Jamieson 2001). Riparian zones also play a key role in supporting primary production, nutrient cycling, and carbon sequestration in the nearshore marine environment (Darling et al. 2023). For the purpose of this baseline report, the marine riparian vegetation zone is considered to extend from the HHWLT to approximately 15 m inland into the adjacent terrestrial environment.

In support of the Vegetation Draft Environmental Impact Statement (DEIS), Project-specific landcover mapping was completed for the Vegetation RAA using GIS-based remote sensing and field verification. For a summary of baseline vegetation conditions, see Section 15.2 of the Vegetation DEIS (Volume 6, Section 15 of the IS), and detailed information in the Vegetation Baseline Report (Appendix 15A of the IS).

Dominant landcover classes within the marine riparian vegetation zone include Bedrock/Boulder Heath Tundra, Unvegetated Exposed Silt/Sand/Gravel, Tussock Sedge, and Cryoturbated Heath Tundra classes. Unvegetated Exposed Silt/Sand/Gravel, Heath Cryoturbated and Heath Graminoid are all considered landcover classes of limited distribution within the Vegetation RAA, which is the terrestrial PDA and a 30 km buffer (i.e., occupying less than 1% of the RAA) representing 0.5%, 0.4%, and < 0.1% of the Vegetation RAA, respectively.

The Bedrock/Boulder Heath Tundra and Cryoturbated Heath Tundra classes are both dominated by heath species (i.e., dwarf members of the Ericaceae or heath family). The Bedrock/Boulder Heath Tundra class occurs where soils are thin, bedrock/boulder exposures occur, and heath tundra vegetation cover becomes patchy. Thin dry soils support a dense cover of moss and lichen, while the Cryoturbated Heath Tundra class is characterized by hummocky microrelief (frost boils) caused by cryoturbation, commonly occurring on morainal till blankets and till veneers.

Unvegetated Exposed Sand/Silt/Gravel class occurs on fine, light grey, silty sediments of marine and glaciofluvial origin are common on mid to lower slopes and basins. Areas of exposed silt, sand, and gravel occur where wind, rain, and frost action maintain erosional processes. These actions result in exposures of finer substrates. Vegetation cover is limited due to these erosional processes, with low coverage dominated by herbaceous species.

Tussock Sedge is a wetland landcover class typically located on shallow, water receiving lower slopes and basins, where sub-surface flow of water occurs on top of the permafrost boundary. Vegetation is dominated by wetland herbaceous and shrub species. See Section 5.2.1.3 for discussion of typical vegetation species by landover class, and vegetation species observed in the marine riparian vegetation zone.

5.1.1.4 Kelp Forests

Kelp forests are highly productive and important components of cold-water marine ecosystems across the world’s temperate and arctic coastal waters. They provide a number of beneficial ecosystem services at both the local and global levels. These services include creating complex habitats, providing nursery grounds for juvenile fish and invertebrates, supplying food for marine species, protecting coastlines from erosion, filtering water, and sequestering carbon (Bluhm et al. 2022; Goldsmit et al. 2021; Lucas et al. 2007). Kelp forest complexes are composed of a variety of individual species of kelp within the order Laminariales (Bolton 2010; Goldsmit et al. 2021). In the Eastern Canadian Arctic, dominant species of kelp have been found to include sieve kelp (*Agarum clathratum*), winged kelp (*Alaria esculenta*), Arctic suction-cup kelp (*Laminaria solidungula*), rockweed (*Fucus distichus*), and sugar kelp (*Saccharina latissima*) (Bluhm et al. 2022; Goldsmit et al. 2021).

Kelp forests are typically found in intertidal and subtidal nearshore coastal areas in water depths up to 40 m. Kelp forests thrive in environments with hard substrate, high nutrient content, and clear water (allowing for light penetration) (Duggins et al. 1990). In the Arctic, kelp growth and distribution are inhibited by seasonal photoperiods (i.e., extended darkness in the winter months) and the presence of sea ice, which both reduces light availability for uptake and physically scours the coastline (Bluhm et al. 2022; Goldsmit et al. 2021). In spite of this, kelp forests can be found along 28% of marine coastlines globally, including in Grays Bay and potentially other areas within the RAA (Goldsmit et al. 2021). Kelp has been observed washed up or attached around the shoreline of Grays Bay, with rockweed recorded as the dominant species (Wolfden 2006). Inuit Knowledge further documents kelp (Akayat) in Grays Bay as washing ashore during storms and being eaten when necessary for survival (Banci and Spicker 2024).

5.1.1.5 Eelgrass Beds

Eelgrass (*Zostera* spp.) is a widely distributed and ecologically significant marine seagrass found in temperate and arctic marine environments around Canada. Six species of eelgrass are known to occur in Canada (Murphy et al. 2021). Eelgrass beds are typically found in intertidal or shallow subtidal areas with fine sediment, which allows extensive rhizome root systems to spread and uptake nutrients (Murphy et al. 2021; Phillips 1985). As a rooted plant, eelgrass beds contribute positively to coastal ecosystems by stabilizing otherwise mobile benthic sediment against erosion (Phillips 1985). Eelgrasses also capture, store, and sequester carbon dioxide from ocean waters and provide important habitat, including nursery habitat, for a wide range of marine organisms (Murphy et al. 2021). Like kelp, eelgrass distribution and success are strongly influenced by light and nutrient availability (Murphy et al. 2021). Sea ice can also adversely affect eelgrass by reducing available light or physically scouring shallow eelgrass beds (Murphy et al. 2021). Eelgrass distribution is not well mapped within Canadian Arctic waters but has been documented in the Coronation Gulf near Kugluktuk as well as near Cambridge Bay (Nunavut Coastal Resource Inventory (NCRI) 2010; Murphy et al. 2021). Eelgrass has not been historically documented in Grays Bay or within the RAA.

5.1.2 Marine Invertebrates

Over 5,000 species of marine invertebrates occur within the Arctic Ocean, representing 24 phyla across three distinct marine habitats (i.e., sea ice, pelagic, and benthic). More than 90% of marine invertebrates exist in the benthic realm (CAFF 2013). The dominant group is crustaceans (e.g., crab, shrimp), with over 1,500 species. Other species-rich taxonomic groups include molluscs (e.g., squid, snails, clams, and mussels), annelids (segmented worms), and bryozoans (moss animals) (CAFF 2013). These invertebrates comprise many of the lower trophic levels in the marine ecosystem, supporting populations of marine fish, marine mammals, and humans. Several invertebrate species are documented as a subsistence food source for Inuit people, including clams (tablaoyak), mussels (oviluk), crabs (pugugiak) and occasionally starfish, which are eaten frozen (Banci and Spicker 2024). Many species of marine invertebrates have documented occurrences or distribution ranges that overlap with the Coronation Gulf and LAA (Table 5.1).

Table 5.1 Marine Invertebrate Species Found within the Coronation Gulf and LAA

Group	Common Name	Scientific Name	COSEWIC Status	SARA Status	Coronation Gulf	LAA
Crustacean	Arctic lyre crab	*Hyas coarctatus*	Not listed	Not listed	✓	✓
	Deep sea king crab	*Lithodes maja*	Not listed	Not listed	✓	–
	Northern shrimp	*Pandalus borealis*	Not listed	Not listed	✓	–
	Snow crab	*Chionoecetes opilio*	Not listed	Not listed	✓	✓
	Toad crab	*Hyas araneus*	Not listed	Not listed	✓	–
Echinoderm	Brittle stars	*Ophiuroidea sp.*	Not listed	Not listed	✓	✓
	Green sea urchin	*Strongylocentrotus droebachiensis*	Not listed	Not listed	✓	✓
	Polar sea star	*Leptasterias polaris*	Not listed	Not listed	✓	–
	Sea urchin	*Strongylocentrotus sp.*	Not listed	Not listed	✓	✓
	Starfish	*Urasterias lincki*	Not listed	Not listed	✓	✓
Cnidaria	Cerianthid anemones	*Cerianthus sp.*	Not listed	Not listed	✓	✓
Mollusc	Arctic moonsnail	*Cryptonatica affinis*	Not listed	Not listed	✓	–
	Arctic whelk	*Buccinum polare*	Not listed	Not listed	✓	–
	Bivalve	*Astarte crenata*	Not listed	Not listed	✓	✓
	Blue mussel	*Mytilus edulis*	Not listed	Not listed	✓	–
	Boreal armhook squid	*Gonatus fabricii*	Not listed	Not listed	✓	–
	Cockles	*Clinocardium spp.*	Not listed	Not listed	✓	–
	Common whelk	*Buccinum undatum*	Not listed	Not listed	✓	–
	Gastropod	*Colus tortuosus*	Not listed	Not listed	✓	–
	Gastropod	*Velutina undata*	Not listed	Not listed	✓	–
	Hydrophanus whelk	*Buccinum hydrophanum*	Not listed	Not listed	✓	–
	Iceland cockle	*Clinocardium ciliatum*	Not listed	Not listed	✓	✓
	Iceland whelk	*Colus islandicus*	Not listed	Not listed	✓	–
	Icelandic scallop	*Chlamys islandica*	Not listed	Not listed	✓	–
	Ladder whelk	*Buccinum tenue*	Not listed	Not listed	✓	–
	Naked sea butterfly	*Clione limacina*	Not listed	Not listed	✓	–
	Northern horse mussel	*Modiolus modiolus*	Not listed	Not listed	✓	–
	Pale moonsnail	*Euspira pallida*	Not listed	Not listed	✓	–
	Smith's moonsnail	*Acrybia glacialis*	Not listed	Not listed	✓	–
	Thick lacuna	*Lacuna glacialis*	Not listed	Not listed	✓	–
	Tortoiseshell limpet	*Acmaea testudinalis*	Not listed	Not listed	✓	–
	Truncate softshell clam	*Mya truncata*	Not listed	Not listed	✓	–
	Turner's lacuna	*Aquilonaria turneri*	Not listed	Not listed	✓	–

Notes:

SARA – *Species at Risk Act.*

COSEWIC – Committee on the Status of Endangered Wildlife in Canada.

Sources: Macpherson (1971); Wolfden (2006); MMG (2012); Elliot and Cross (2013); NCRI (2015); Banci and Spicker (2024)

5.1.3 Marine Fish

Over 200 species of marine fish occur within the Canadian Arctic marine waters (Oceans North Conservation Society (ONCS), World Wildlife Fund Canada (WWF), Ducks Unlimited Canada (DUC) 2018). Marine species that have documented occurrences or distribution ranges that overlap with the Coronation Gulf and LAA have been arranged into three groups based on the area of the ocean that they inhabit: anadromous/amphidromous (fish move between freshwater and saltwater to spawn, forage, and overwinter), pelagic (open water), and demersal/benthic (bottom-dwelling) (Table 5.1). All of these groups are important and contribute to a healthy marine ecosystem. These species exhibit a wide variety of habitat preferences, life histories, and adaptations to their particular environments. The following sections provide information on species that have documented occurrences or distribution ranges that overlap with the Project assessment areas, including their distribution, habitat preferences, and likelihood to occur within the Project assessment areas.

Table 5.2 Marine Fish Species Found within the Coronation Gulf and LAA

Group	Common Name	Scientific Name	COSEWIC Status	SARA Status	Coronation Gulf	LAA
Anadromous/ Amphidromous	Arctic char	*Salvelinus alpinus*	Not listed	Not listed	✓	✓
	Arctic cisco	*Coregonus autumnalis*	Not listed	Not listed	✓	✓
	Arctic grayling	*Thymallus arcticus*	Not listed	Not listed	✓	–
	Broad whitefish	*Coregonus nasus*	Not listed	Not listed	✓	✓
	Chinook salmon	*Oncorhynchus tshawytscha*	Not listed	Not listed	✓	✓
	Chum salmon	*Oncorhynchus keta*	Not listed	Not listed	✓	✓
	Dolly varden (western Arctic populations)	*Salvelinus malma malma*	Special concern	Not listed	✓	–
	Inconnu	*Stenodus leucicthys*	Not listed	Not listed	✓	–
	Lake trout	*Salvelinus namaycush*	Not listed	Not listed	✓	✓
	Lake whitefish	*Coregonus clupeaformis*	Not listed	Not listed	✓	–
	Least cisco	*Coregonus sardinella*	Not listed	Not listed	✓	✓
	Rainbow smelt	*Osmerus mordax*	Not listed	Not listed	✓	–
	Round whitefish	*Prosopium cylindraceum*	Not listed	Not listed	✓	–
	Sockeye salmon	*Oncorhynchus nerka*	Not listed	Not listed	✓	✓
Pelagic	Arctic cod (Arctic marine population)	*Boreogadus saida*	Data deficient	Not listed	✓	–
	Arctic sand lance	*Ammodytes hexapterus*	Not listed	Not listed	✓	–
	Atlantic herring	*Clupea harengus*	Not listed	Not listed	✓	–
	Capelin	*Mallotus villosus*	Not listed	Not listed	✓	✓

Group	Common Name	Scientific Name	COSEWIC Status	SARA Status	Coronation Gulf	LAA
Pelagic (cont'd)	Greenland shark	*Somniosus microcephalus*	Not listed	Not listed	✓	–
	Pacific herring	*Clupea pallasii*	Not listed	Not listed	✓	–
	Polar cod	*Arctogadus glacialis*	Not listed	Not listed	✓	✓
	Toothed cod	*Acogaus gaciais*	Not listed	Not listed	✓	–
Demersal/ Benthic	Arctic flounder	*Liopsetta glacialis*	Not listed	Not listed	✓	✓
	Arctic shanny	*Stichaeus punctatus*	Not listed	Not listed	✓	–
	Atlantic wolfish	*Anarhichas lupus*	Special concern	Special Concern	✓	–
	Bering wolffish	*Anarhichas orientalis*	Data Deficient	Not listed	✓	–
	Fourhorn sculpin	*Myoxocephalus quadricornis*	Not listed	Not listed	✓	✓
	Fourline snakeblenny	*Eumesogrammus praecisus*	Not listed	Not listed	✓	–
	Greenland cod	*Gadus ogac*	Not listed	Not listed	✓	✓
	Longhead dab	*Limanda proboscidea*	Not listed	Not listed	✓	–
	Northern wolffish	*Anarhichas denticulatus*	Threatened	Threatened	✓	–
	Saffron cod	*Eleginus gracilis*	Not listed	Not listed	✓	✓
	Shorthorn sculpin	*Myoxocephalus scorpius*	Not listed	Not listed	✓	✓
	Spatulate sculpin	*Icelus spatula*	Not listed	Not listed	✓	✓
	Spotted wolffish	*Anarhichas minor*	Threatened	Threatened	✓	–
	Starry flounder	*Platichthys stellatus*	Not listed	Not listed	✓	✓
	Twohorn sculpin	*Icelus bicornis*	Not listed	Not listed	✓	✓

Notes:

SARA – *Species at Risk Act.*

COSEWIC – Committee on the Status of Endangered Wildlife in Canada.

COSEWIC/SARA Ranks:

Threatened: A species that is likely to become endangered if limiting factors are not reversed.

Special concern: A species particularly sensitive to human activities or natural events.

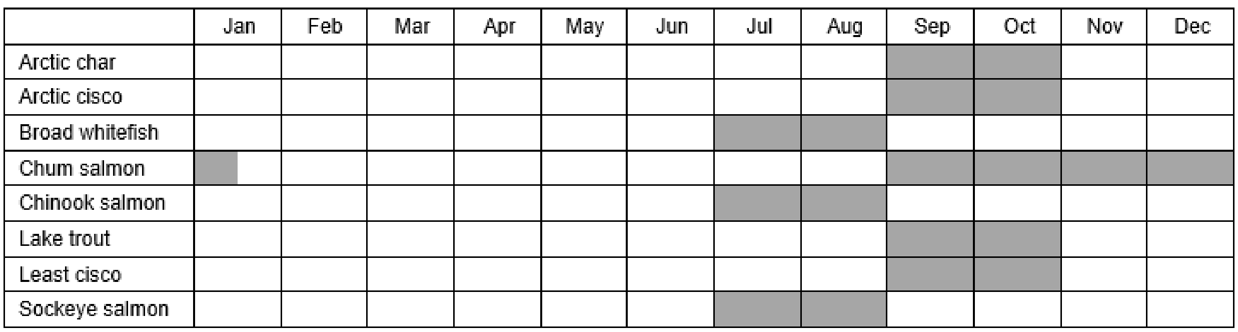
Data Deficient: A species that has insufficient scientific data to support a designation.

Sources: Coad and Reist (2004); Wolfden (2006); MMG (2012); Elliot and Cross (2013); NCRI (2015); ONCS WWF DUC (2018); McNicholl et al. (2019); Bilous et al. (2022); Banci and Spicker (2024); DFO (2024b, 2024c)

5.1.3.1 Anadromous/Amphidromous Fish

Anadromous fish hatch and rear in freshwater streams and rivers before migrating to the marine environment, where they spend most of their lives, returning to natal streams as adults to spawn. Amphidromous fish will cycle annually between freshwater and marine environments. Amphidromous fish will spawn and overwinter in freshwater streams and rivers, but migrate into marine environments for several months each summer to forage. Anadromous and amphidromous behaviour allows fish to access nutrient sources in productive marine environments that benefit the growth and size of individuals and the population overall. Migration between freshwater and marine environments positively influences energy stores, size, and reproductive outputs of fish that use this strategy. A summary of anadromous/amphidromous spawning timing for fish species found within the Coronation Gulf is included in Figure 5.1.

Figure 5.1 Spawning Timing for Anadromous/Amphidromous Fish



Note: Shaded cells indicate spawning windows

Arctic Char (Ekalukpik)

Arctic char (*Salvelinus alpinus*) belong to the Salmonidae family and exist in both landlocked and anadromous forms. The anadromous forms migrate to marine waters from the spring to fall, where they forage in shallow coastal and intertidal waters over the continental shelf (depths <100 m) (ONCS WWF DUC 2018). Arctic char return to freshwater streams and rivers in the summer and early fall to spawn (MMG 2012). According to Inuit Knowledge, Arctic char undertake two distinct migration runs, with large groups moving at different times. Females with spotted coloration migrate upriver first, followed by red-bellied males. These fish then enter lakes where spawning occurs in the fall, and they remain there over winter until spring (Banci and Spicker 2024).

Arctic char are abundant throughout the Canadian Arctic and are the northernmost anadromous fish species, with a circumpolar distribution north of 75ºN (Scott and Crossman 1973; ONCS WWF DUC 2018). Inuit Knowledge documents Arctic char migration up rivers around Grays Bay, including the Anialik River, Kennarctic River (Kogloktoakyok) and Wentzel River (Otkohikhalik), starting as soon as rivers open up with a large second run occurring in August (Banci and Spicker 2024) Spawning occurs in September or October over gravel or rocky shoals in lakes or slow-moving pools in rivers at depths of 1.0 to 4.5 m (Figure 5.1) (Scott and Crossman 1973). Eggs are buried in gravel and overwinter there before hatching the following spring, around April. Alevin emergence from gravel occurs following ice break up around mid-July. Juvenile Arctic char migrate downstream from rivers to marine waters to forage in the spring when the rivers and ocean are free from ice (Scott and Crossman 1973; Banci and Spicker 2024). Arctic char are carnivorous and feed on a variety of food sources, including zooplankton, insects, and other fish (including smaller char) (Scott and Crossman 1973).

Arctic char are an extremely important subsistence food source and resource for the Inuit and are the most harvested fish recorded in the Kitikmeot (Priest and Usher 2004), the main fish species for Ocean Inuit and Kiligiktokmiut (Banci and Spicker 2024), and the second most consumed country food after caribou in Nunavut (ONCS WWF DUC 2018). Average annual catch records for Arctic char in Kugluktuk and Cambridge Bay between 1996-1997 and 2001-2002 were 8,518 and 6,461 individuals, respectively (MMG 2012). The commercial Arctic char fishery in Cambridge Bay averaged approximately 41,000 kilograms (kg) per year from 1960 to 2003 (Day and de March 2004). The Draft Nunavut Land Use Plan emphasized the need for special management of the species and its habitat in areas near communities and those used by the commercial fishery (Nunavut Planning Commission 2021).

In previous studies, Arctic char have been captured in abundant numbers in Grays Bay (Wolfden 2006; Elliot and Cross 2013) and in the Coronation Gulf (MMG 2012; McNicholl et al. 2019; Bilious et al. 2022). In 2004 and 2005, Arctic char were the most abundant species captured in Grays Bay, with a total of 59 individuals captured. Arctic char had an average fork length of 586 mm, ranging from 245 mm to 850 mm (Wolfden 2006). In 2012, a total of 26 Arctic char were captured in Grays Bay, which was the third most abundant species captured during that program (Elliot and Cross 2013). Arctic char captured in 2012 were smaller than those from 2004 and 2005, with an average fork length of 161 mm (range from 120 to 310 mm) (Elliot and Cross 2013).

Arctic Cisco (Kapihillik)

Arctic cisco (*Coregonus autumnalis*) are found along the Arctic coast, from Bathurst Inlet to Point Barrow, Alaska (Harwood et al. 2008). They inhabit brackish waters of coastal lagoons and mouths of rivers and bays, entering freshwater areas only to spawn and overwinter (Harwood et al. 2008). Adults aged six to eight years old return to freshwater rivers from June–July to spawn in September and October (Figure 5.1). In the Beaufort Sea, spawning occurs in the major tributaries of the Mackenzie River, with well-oxygenated water over a gravel bottom (Bond 1982). Important feeding and rearing areas are located in bays and lagoons along the Beaufort Sea coast. Arctic cisco feed on nematodes, bivalves, copepods, acanthocephalans, and small fish (Harwood et al. 2008).

Arctic cisco are an important fish for subsistence fish harvesters. Harvesters from the Tuktoyaktuk Harbour area primarily harvest Arctic cisco during their out-migration in July and again in September when they return for overwintering (Bond 1982). Inuit Knowledge further notes that Arctic cisco are valued as a food source, with their flesh described as consistently white (Banci and Spicker 2024). In the Kugluktuk area, they are considered especially palatable in the fall prior to spawning, when the fish become fat and both flesh and eggs are consumed.

Arctic cisco have been captured in abundant numbers in the Coronation Gulf and were the most abundant fish species found near Kugluktuk (MMG 2012; McNicholl et al. 2019; Bilious et al. 2022). They have also been captured in Grays Bay (Wolfden 2006). Arctic cisco were the second most abundant species caught during the 2004 and 2005 surveys, following Arctic char. A total of 22 individuals were captured with an average fork length of 409 millimetres (mm), ranging from 350 to 480 mm (Wolfden 2006).

Broad Whitefish (Anakheek)

Broad whitefish (*Coregonus nasus*) are found in freshwater and brackish waters of arctic drainages. In North America, they are distributed from Perry River in the Northwest Territories, west in many river systems across the Canadian Arctic (e.g., Mackenzie, Coppermine, and headwaters of Yukon River) to Kuskokwim River in the Bering Sea drainage, Alaska, and offshore to Herschel Island in the Beaufort Sea (Scott and Crossman 1973). Similar to the other salmonid species, broad whitefish exhibit a wide range of life history strategies. Most are amphidromous and migrate between freshwater and nearshore marine waters; however, others will remain in freshwater riverine and lacustrine environments throughout their lives (United States Geological Survey (USGS) 2024). Broad whitefish are bottom feeders, feeding on molluscs, crustaceans, and aquatic insect larvae (Scott and Crossman 1973).

Broad whitefish spawn in freshwater river systems with sand and gravel beds. Migration to fall spawning areas begins in mid to late summer (July and August) (Figure 5.1), with some individuals travelling great distances to spawning sites (Scott and Crossman 1973; USGS 2024). Broad whitefish are broadcast spawners and release gametes into the water column over gravel beds. Following spawning, broad whitefish will migrate to overwintering areas in brackish waters, deep pools in rivers, lakes, or river deltas. Eggs remain in the gravel during the winter and hatch under ice the following spring in April and May. Larvae move downstream during ice break-up to feeding areas in nearshore estuaries (USGS 2024). Inuit Knowledge notes that broad whitefish are an important food source and that these large-bodied fish move upriver in the fall to deposit their eggs in sandy habitats, although they produce fewer eggs than Arctic cisco (Banci and Spicker 2024).Broad whitefish have been found in the Coronation Gulf near Kugluktuk (Wolfden 2006) as well as in Grays Bay (Elliot and Cross 2013). During field surveys conducted by Elliot and Cross (2013) in July 2012, two broad whitefish were caught in fyke nets in Grays Bay. The broad whitefish had fork lengths of 258 mm and 345 mm and weighed 180 g and 400 g, respectively.

Least Cisco (Qaaqsaq)

Least cisco (*Coregonus sardinella*) live in many inland waters, as well as arctic coastal waters from Bristol Bay to Bathurst Inlet and north to Victoria and Banks islands (Scott and Crossman 1973). Amphidromous forms migrate into freshwater systems in the late spring to summer to spawn in September and October (Figure 5.1) (Scott and Crossman 1973; Alaska Department of Fish and Game (ADFG) 2024). Eggs are broadcast over coarse substrates composed of sand or gravel in lentic (lakes or ponds) and lotic (riverine) environments. Following spawning, least cisco will migrate to overwintering areas in brackish waters of river deltas, open coasts, and freshwater lakes (USGS 2024). The eggs remain over winter at the bottom and hatch the following spring, descending downstream to feed and rear in estuaries and coastal environments that support whitefish populations (Scott and Crossman 1973; ADFG 2024).

Following the ice breakup in June–July, adult and juvenile least cisco began to migrate and feed along the coast. Juveniles do not migrate as far along the coast to feed as adults due to lower salinity and higher temperature preferences (USGS 2024). Least cisco are generalists and feed throughout the water column on zooplanktons such as copepods, mysids, and cladocerans (water fleas), as well as insects and small fish (Scott and Crossman 1973; ADFG 2024; USGS 2024).

Least cisco have been found in small numbers off the Coppermine River (Gillman and Kristofferson 1984) and Gjoa Haven in the Kitikmeot (Priest and Usher 2004). Only one least cisco was captured in Grays Bay during previous studies and was caught in July 2005 (Wolfden 2006).

Pacific Salmon (Chum, Chinook, Sockeye)

Pacific salmon (*Oncorhynchus* spp.) are anadromous fish which utilize both marine and freshwater environments. No Pacific salmon species have been caught during historical sampling programs previously completed in Grays Bay. However, records exist of Pacific salmon captured in both Kugluktuk and Cambridge Bay (Dunmall et al. 2024). While no documented occurrence (including spawning) of Pacific salmon was uncovered within the Project RAA, a general trend of range extension northwards (believed to be largely driven by climate change) has resulted in increased observations in the western Arctic region in recent years (Chila et al. 2021; Dunmall et al. 2024). As such, a summary of Pacific salmon species that may occur in the Coronation Gulf in the future has been included here for completeness. Pacific salmon, which may occur in low numbers in proximity to the Project RAA, include chum (*Oncorhynchus keta*), chinook (*O. tshawytscha*), and sockeye (*O. nerka*) salmon (Coad and Reist 2004).

Chum salmon are considered to be the most likely species of Pacific salmon to occur within the Project RAA (Chila et al. 2021). Chum salmon can be found primarily in the western Arctic Ocean and have been documented spawning as far east as the Mackenzie River in the Northwest Territories during the fall months (September to early January) (Scott and Crossman 1973). However, they are known to occur in low quantities as far as Queen Maud Gulf to the east of the Project RAA (Coad and Reist 2004; Scott and Crossman 1973). Adult chum salmon can be found across a variety of habitat types in the ocean, including open water far from the coastline at depths up to 60 m (Coad and Reist 2004; DFO 2016).

Chinook salmon are also considered to be a rare occurrence in the western Arctic. However, they are known to occur on both sides of Project RAA. At more southern latitudes, chinook spawning runs occur in the winter/spring months, with spawning in northern latitudes such as the Yukon River occurring between July and August (Scott and Crossman 1973). When not spawning, adult chinook salmon can be found offshore in the ocean to depths up to 375 m (Coad and Reist 2004).

Sockeye salmon have also been documented in low numbers in proximity to the Project RAA, including within Queen Maud Gulf to the east of the RAA (Coad and Reist 2004). In the Skeena River, sockeye begin spawning migration between May to October, with spawning occurring June–August (DFO 2003). Adult sockeye salmon are also pelagic marine fish and inhabit a range of marine habitat types, including both nearshore and offshore ocean waters (Scott and Crossman 1973).

Lake Trout (Ehok)

Lake trout (*Salvelinus namaycush*) are distributed across North America, ranging from the Laurentian Great Lakes to the Canadian Arctic (Scott and Crossman 1973). Lake trout are predominantly freshwater species; however, they have been observed using brackish and coastal marine environments in the Canadian Arctic (Swanson et al. 2010; Kissinger et al. 2016). Lake trout have been described as semi-anadromous in the West Kitikmeot region of Nunavut, where they migrate from freshwater to brackish water to feed in the summer (Swanson et al. 2010; Kissinger et al. 2016). Inuit Knowledge further records lake trout in Kennarctic River (Kogloktoakyok) and Wentzel River (Otkohikhalik), with them being documented as fished in the ocean at the mouths of these major rivers (Banci and Spicker 2024).

Lake trout prefer cold water (10 degrees Celsius) and primarily live in large, deep lakes. Lake trout are occasionally found in large rivers and shallower bodies of water. They are predaceous and feed on crustaceans, aquatic and terrestrial insects, and many species of fish (including smaller lake trout), and small mammals (Scott and Crossman 1973). In northern Canada, lake trout spawn in the fall from early September to October (Figure 5.1). Spawning occurs over boulder beds and rocky bottoms in lakes at depths <12 m (Scott and Crossman 1973). Eggs remain in the rocky incubator for many months and typically hatch in March or April, but can be as late as June. Within a month of hatching, lake trout will move deeper to forage and avoid predation, but in the north, lake trout can stay in inshore waters for months or even years (Scott and Crossman 1973).

Lake trout have been found in the Coronation Gulf in varying abundances (Priest and Usher 2004; Wolfden 2006; McNicholl et al. 2019; Bilious et al. 2022). Priest and Usher (2004) reported that average annual catches from Kugluktuk ranged from 416 to 1,214 individuals from 1996 to 2001. Lake trout have also been captured in Grays Bay, but in low abundance; one lake trout was captured in the fall of 2004 (Wolfden 2006).

5.1.3.2 Pelagic Fish

Pelagic fish can be found in the mid to upper reaches of the water column. In order to protect themselves from predation, pelagic fish often swim in large schools or shoals.

Arctic Cod (Hiugyuktok)

Arctic cod have a circumpolar distribution and inhabit marine waters across the Canadian Arctic and Alaska (MMG 2012; ONCS WWF DUC 2018). Arctic cod are found in cold ocean waters (0 to 4ºC) across a wide range of depths from shallow waters to over 1,300 m deep (DFO 1983; ONCS WWF DUC 2018). In nearshore coastal waters, abundance is highest during summer, when salinities are greatest, and lowest where conditions are more brackish (MMG 2012). Arctic cod are often observed in large age-segregated schools that may form under ice as protection against predators (Hop et al. 1997) or to feed (Moulton and Tarbox 1987). Schooling patterns affect local abundance, and the movement of large schools into coastal areas can be temporary (Craig and Haldorson 1981) or sustained (Glass et al. 1990).

Although Arctic cod are abundant throughout the Arctic, little is known about their spawning and early life stages (Chapmen et al. 2023). Arctic cod reach sexual maturity at 1 to 3 years of age, with males maturing earlier than females (DFO 1983; Chapman et al. 2023). Spawning in northern Canada occurs in late fall and winter under ice cover (DFO 1983). Hatching of eggs ranges from November–June, with peak hatching occurring from late January to May, depending on the season and region (Chapmen et al. 2023).

Arctic cod are a key component of the Arctic marine food chain and represent 75% of the energy transfer between plankton and vertebrates (ONCS WWF DUC 2018). Arctic cod consume planktonic and epibenthic fauna, including copepods, mysids, amphipods, smaller fish, and fish eggs (MMG 2012; ONCS WWF DUC 2018). They are an important food source for marine mammals, birds, and fish, specifically narwhal, which predominately feed on the abundance of Arctic cod (ONCS WWF DUC 2018).

Arctic cod are also an important food source for humans and are harvested by many Inuit communities (Banci and Spicker 2024). In the Kitikmeot, Arctic cod was the fourth most harvested fish (Priest and Usher 2004), with average annual catches of 768 individuals in 1996-1997 and 56 individuals in 2001-2002 from Kugluktuk and Cambridge Bay (MMG 2012).

Previous field investigations did not capture Arctic cod in Grays Bay (Wolfden 2006; Elliot and Cross 2013; MMG 2012); however, the “Canada’s Arctic Marine Atlas " documents occurrences of the species within the vicinity of the RAA (ONCS WWF DUC 2018).

Polar Cod

Polar cod, also known as ice cod, can be found widely distributed throughout the Arctic Ocean (Mecklenburg et al. 2018). Polar cod are endemic to the Arctic Ocean and can be found in nearshore and offshore environments over continental shelves and slopes in both ice-covered and ice-free ocean waters from 5 to 930 m deep (Mecklenburg et al. 2018). Polar cod are also known to occur in nearshore shallow environments during spawning events (Mecklenburg et al. 2018). Polar cod are considered a cold-water thermal specialist and are rarely found in water temperatures above 3°C (Aschan et al. 2009).

Little information exists on the spawning habits of polar cod, but it is generally assumed that spawning occurs in nearshore environments during winter months under sea ice (Aschan et al. 2009). This temporal estimation may vary with latitude; however, some historical trawling catch data in the East Siberian Sea identified polar cod fry in nearshore environments in October, suggesting summer spawning (Aschan et al. 2009). Polar cod have a wide diet ranging from small invertebrates to larger fishes (>16 centimetres [cm]) and crustaceans in deep water (Aschan et al. 2009).

No polar cod were caught in previous studies in Grays Bay. However, the species is likely to occur within the Project RAA and is well distributed in the surrounding area, including Coronation Gulf (Coad and Reist 2004).

Arctic Sand Lance

Arctic sand lance (*Ammodytes hexapterus*) are distributed across the North American Arctic Ocean, ranging from Hudson Bay in the east through the Chukchi and Bering seas in the west, and extending southward into the western Pacific off the coast of Japan (Orr et al. 2015; Baker et al. 2022). Evidence suggests their range has expanded northward in recent years in response to warming ocean conditions (Baker et al. 2022). This species is morphologically similar to Pacific Sand Lance (*Ammodytes personatus*), differing only in subtle characteristics such as fin depth and length, with overlap in distribution occurring only in the eastern Bering Sea.

Few studies have studied the ecology of Arctic Sand Lance specifically; however, sand lances in general are known to alternate between a pelagic schooling phase in summer and a benthic phase in winter, during which they bury in the sediment (van Deurs et al. 2011; Baker et al. 2019). In general, sand lances also exhibit a diurnal cycle during summer months, foraging during the day and burying at night (Baker et al. 2023). For Arctic Sand Lance, recent research suggests that at high latitudes, this diurnal cycle may be reduced or absent during periods of continuous summer daylight (Baker et al. 2022).

As a forage fish in the summer, sand lances in general feed on phytoplankton and zooplankton and play a crucial role in marine ecosystems as links between plankton and higher trophic levels (Robards et al. 1999).

Previous field investigations did not capture Arctic sand lance in Grays Bay (Wolfden 2006; Elliot and Cross 2013; MMG 2012). However, Inuit Knowledge has documented this species in the Kitikmeot region, with them observed being chased by Arctic char at the water surface (Banci and Spicker 2024).

Capelin (Angmagiak)

Capelin (*Mallotus villosus*) belong to the Osmeridae (smelt) family. Capelin have a circumpolar distribution and are abundant within their Canadian Arctic range (ONCS WWF DUC 2018). Capelin are found in both shallow and deep cold-water oceans (< 4ºC), including at depths >750 m in coastal areas and on offshore banks (ADFG 2005; ONCS WWF DUC 2018).

Capelin spend most of their lives offshore, migrating inshore only to spawn. Spawning typically occurs on coarse sand and gravel substrates during mid-May to late July at depths <75 m and when surface water temperatures are between 5 to 10ºC (ADFG 2005); however, demersal (seabed) spawning at depths of 280 m has been observed (ADFG 2005; ONCS WWF DUC 2018). In the Kitikmeot region, Inuit Knowledge describes capelin spawning in July, when millions of eggs can be observed along sandy shorelines, particularly in suitable beach habitats (Banci and Spicker 2024). Sexual maturity is reached when fish are between 1 and 4 years old (typically around 3), with females maturing earlier than males. Capelin are semelparous and do not survive the spawning event (ADFG 2005; ONCS WWF DUC 2018).

Capelin are a high-energy food source and play an important role in the Arctic marine food web. They are the main forage species for large predatory fishes (e.g., cod, herring, Arctic char, halibut), seabirds (e.g., common and thick-billed murres), and marine mammals (e.g., beluga whales, humpback whales) (ADFG 2005; ONCS WWF DUC 2018). Predation of capelin are highest during their spawning events when they aggregate in large numbers (ADFG 2005). Capelin are also traditionally and commercially harvested by humans (ADFG 2005; ONCS WWF DUC 2018). Capelin are a food source for the Inuit, where they would be harvested during spawning, when close to shore, be dried and eaten, or used as dog food to last throughout the winter (Banci and Spicker 2024).

Capelin have been captured in Grays Bay during previous studies (Elliot and Cross 2013) and were the fourth most abundant species captured in fyke nets deployed in July 2012 (a total of 20 individuals captured). Capelin captured had an average fork length of 115 mm, ranging from 104 to 140 mm, and an average weight of 9.8 g (Elliot and Cross 2013). Capelin have only been observed in Grays Bay in July (GBEEC 2017), likely coinciding with their spawning period.

Pacific and Atlantic Herring (Etok)

Pacific herring (*Clupea pallasi*) and Atlantic herring (*Clupea harengus*) inhabit shallow coastal areas over the continental shelf, as well as depths up to 475 m and 364 m, respectively (ONCS WWF DUC 2018). Both species are found in the northern latitudes of their respective oceans (Pacific and Atlantic) as well as in the Arctic Ocean. Atlantic herring are one of the most abundant marine fish species on the planet (ONCS WWF DUC 2018).

Atlantic and Pacific herring move in large schools between spawning, foraging, and wintering areas. Adult herring exhibit a diel vertical migration pattern, remaining in deeper waters during the day and moving to shallower waters at night to feed. Both species feed on zooplankton and phytoplankton, including crustaceans, copepods, and small fish (ONCS WWF DUC 2018; National Oceanic and Atmospheric Administration (NOAA) Fisheries 2023, 2024).

Herring reach sexual maturity between 3 and 4 years and migrate into estuaries, intertidal, and shallow subtidal zones. Eggs are deposited onto rock, gravel, and sand substrates or aquatic vegetation (DFO 1984; NOAA Fisheries 2023, 2024). Egg development is temperature-dependent, with larvae transitioning into juveniles within two to three months. Juveniles remain in shallow bays, channels, and inlets, where they feed and grow before moving into deeper waters (NOAA Fisheries 2023; DFO 1984).

Atlantic and Pacific herring are an important food source for many species of birds, fish and marine mammals (ONCS WWF DUC 2018). Demersal/benthic fish, including flounder, haddock, cod, and red hake, feed on herring eggs (NOAA Fisheries 2024). Pacific herring are an important fish species and are consumed by Inuit communities in the Inuvialuit Settlement Region (ONCS WWF DUC 2018).

Previous field investigations did not capture Pacific or Atlantic herring in Grays Bay (Wolfden 2006; Elliot and Cross 2013; MMG 2012); however, during marine fish surveys in Kugluktuk in 2017, Pacific herring were the fourth most abundant species captured (13 individuals) (McNicholl et al. 2019; Bilous et al. 2022).

5.1.3.3 Demersal/Benthic Fish

Benthic or demersal fish reside near or along the seabed and are commonly referred to as groundfish species. In marine waters, demersal fish inhabit a variety of bottom habitats ranging from sandy, silty areas to rocky reefs and in depths ranging from shallow coastal waters to the deep continental shelf (Bensam 2000).

Greenland Cod

Greenland cod (*Gadus ogac*) are a benthic fish that inhabits inshore waters and continental shelves in depths up to 200 m (Nielsen and Andersen 2001; Food and Agriculture Organization (FAO) 2025). Greenland cod can tolerate low salinities and a wide range of temperatures, allowing it to inhabit coastal Arctic waters from West Greenland to east of Point Barrow in the Beaufort Sea (Nielsen and Morin 1993; FAO 2025).

Greenland cod reach sexuality maturity at 3 to 4 years of age and spawn once a year in shallow waters from February to May (peak spawning in late March to early April) (FAO 2025). The diet of Greenland cod are very similar to Atlantic cod and includes capelin, polar cod, small flounder, squid, crab, shrimp, euphausiid shrimp, polychaetes, and echinoderms (Nielsen and Andersen 2001; FAO 2025).

In previous studies, Greenland cod have been captured in Grays Bay (Elliot and Cross 2013) as well as in the Coronation Gulf (McNicholl et al. 2019; Bilious et al. 2022) in low abundances. Only one Greenland cod was captured in Grays Bay in July 2012 (Elliot and Cross 2013), and one individual from sampling in Kugluktuk in 2017 (McNicholl et al. 2019; Bilous et al. 2022).

Saffron Cod (Hiugyuktok)

Saffron cod (*Eleginus gracilis*) live in brackish and marine waters of the Beaufort Sea east to Bathurst Inlet (Walters 1955; Wolotira 1985). Saffron cod can be found in nearshore and offshore areas, but typically inhabit cold water areas with depths <60 m (Wolotira 1985). Seasonal migration varies by life stage; juveniles do not undertake seasonal migrations and remain in shallow waters throughout the year. Adult migration is associated with feeding, spawning, and changes in water temperature (Wolotira 1985). Offshore movements of adult saffron cod occur in spring and early summer when nearshore waters warm and become diluted by ice breakup. Adult saffron will remain in the cold, high-salinity waters of the open sea until fall (Wolotira 1985). In the fall, as water temperatures decrease, saffron cod migrate inshore into shallow, silty areas along the coast or in estuaries and continue to forage. Saffron cod are epibenthic feeders and feed on crustaceans, worms, juveniles or small fish (Wolotira 1985).

Saffron cod move into very shallow areas (2-10 m) with sandy and pebbly substrate and high salinity waters under strong tidal influence to spawn in early winter when water temperatures are <1ºC (Wolotira 1985). Demersal spawning typically occurs in January but can vary from late December to early March, depending on region and weather conditions (Figure 5.1). Following spawning, saffron cod return to shallow, silty estuaries and resume foraging. Eggs hatch in early spring (April to May) (Wolotira 1985).

Saffron cod have been found in the Coronation Gulf near Kugluktuk (Gillman and Kristofferson 1984; Klohn-Crippen Consultants Ltd. (KCC) 1993; Wolfden 2006), as well as in Grays Bay (Wolfden 2006; Elliot and Cross 2013), with the catch abundance varying greatly between the studies. Gillman and Kristofferson (1984) caught only a small number of saffron cod off the Coppermine River, whereas KCC (1993) caught relatively high numbers of saffron cod near Kugluktuk. Similarly, in Grays Bay, only one saffron cod was caught in late August during the 2004 and 2005 surveys completed by Wolfden (2006), compared to Elliot and Cross (2013), where saffron cod represented over 90% of the total species caught in late July, with 1,337 individuals captured. Saffron cod caught in Grays Bay in 2013 had an average fork length of 99 mm (ranging from 71 to 182 mm) and a bulk weight of 6.3 g (Elliot and Cross 2013).

Arctic Flounder (Natangnak)

Arctic flounder (*Liopsetta glacialis*) predominantly inhabits shallow coastal marine waters over predominantly soft sediment; however, Arctic flounder are anadromous and are also capable of migrating up rivers (Zonn et al. 2017).

Arctic flounder become sexually mature at 4 to 5 years of age and typically spawn between December and February at temperatures of -1.5°C (Aronovich et al. 1975). The diet of Arctic flounder is typically composed of benthic invertebrates, including molluscs, crustaceans, worms, and some small fish (Zonn et al. 2017).

Arctic flounder were previously caught in low numbers (three individuals) in Grays Bay during 2012 marine ecological baseline surveys and in Coronation Gulf (one individual) in 2017 (Elliot and Cross 2013; McNicholl et al. 2019). They have also been captured in large quantities in Argo Bay, near the RAA (Bilous et al. 2022).

Starry Flounder (Natangnak)

Starry flounder (*Platichthys stellatus*) is the most widely distributed flounder species. They can be found in protected coastal bays and inlets to deep water environments of the Pacific and Arctic Oceans (Orcutt 1950). Starry flounder are anadromous and are known to migrate up streams and rivers. This species' substrate preference is typically soft sand; however, it has also been documented on gravel, hard sand, and mud (Orcutt 1950).

At more temperate latitudes, peak spawning of starry flounder occurs in the winter months (November to January) in water temperatures averaging 11°C (Orcutt 1950). Prior to spawning, a seasonal vertical migration occurs, allowing spawning to take place in shallow nearshore marine waters (Birtwell et al. 1993; Orcutt 1950). Starry flounder are known to consume a variety of benthic invertebrates, including worms, clams, and crabs (Orcutt 1950).

Starry flounder have been captured in low to moderate quantities in Grays Bay (5 individuals) and the Coronation Gulf (15 individuals) (Elliot and Cross 2013; McNicholl et al. 2019).

Spatulate Sculpin

Spatulate sculpin (*Icelus spatula*) can be found across the coast of Nunavut and in polar waters from Alaska to the Atlantic Ocean (Coad and Reist 2004; Tokranov and Orlov 2007). This species' depth distribution is typically between 12 m and 365 m (obtained from benthic trawl data in the Sea of Okhotsk); however, evidence that this species can inhabit depths of up to 930 m has been documented (Tokranov and Orlov 2007; Coad and Reist 2004).

Dietary studies on the spatulate sculpin indicate its diet is primarily composed of shrimps, amphipods, and polychaete worms (Tokranov and Orlov 2007). Currently, available information indicates that this species likely reproduces in a single batch, spawning in August or September (Tokranov and Orlove 2007; Wolfden 2006).

Spatulate sculpin have historically been caught in very low quantities (two individuals) in Grays Bay benthic trawls in 2004 (Wolfden 2006).

Twohorn Sculpin

Twohorn sculpin (*Icelus bicornis*) is a benthic-dwelling fish found throughout the Arctic Ocean, including throughout the Beaufort Sea across northern Nunavut to Hudson Bay (NCRI 2015; Coad and Reist 2004). This species tolerates a wide range of benthic habitats from mud and sand to rock or algae, and depth ranges from shallow waters to 930 m deep. Juveniles are typically found in shallower waters (40 m – 60 m) (Chernova et al. 2014, 2021; NCRI 2015).

Twohorn sculpin primarily consume benthic and planktonic invertebrates, including polychaetes, crustaceans, and some large amphipods (NCRI 2015).

Twohorn sculpin have been captured historically in low quantities in Grays Bay (four individuals in 2012) and Browns Harbour (one individual in 2014) (Bilous et al. 2022; Elliott and Cross 2013).

Fourhorn Sculpin

Fourhorn sculpin (*Myoxocephalus quadricornis*) are widely distributed in polar ocean waters, including the Pacific Ocean from the Bering Sea north through the Beaufort Sea and into Hudson Bay (Coad and Reist 2004; Dickman 1995). This species inhabits marine and brackish coastal waters between 0 m - 20 m depth and is known to intermittently migrate up rivers and streams into freshwater environments (Dickman 1995). The marine form of this species does not permanently reside in freshwater, and riverine migrations are typically short-term in nature (Dickman 1995).

Fourhorn sculpin spawning occurs over gravel or sand substrate in shallow marine waters during the winter months. Their diet primarily consists of small invertebrates, including crustaceans, worms, mollusks, midges, and small fish (Dickman 1995).

Fourhorn sculpin have been captured in moderate quantities (56 individuals) in Grays Bay during 2012 surveys, and in low quantities near Kugluktuk (three individuals in 2017) (Elliott and Cross 2013; McNicholl et al. 2019).

Wolffish (Akuahak)

Four species of wolffish (*Anarhichas spp*.) occur in Canadian Arctic waters: Atlantic wolffish *(A. lupus*), Bering wolffish (*A. orientalis*), northern wolffish (*A. denticulatus*), and spotted wolffish (*A. minor*) (DFO 2020). Within Canadian waters, Atlantic, northern, and spotted wolffish are most abundant in the Atlantic Ocean, where their primary distributions occur (Coad and Reist 2004; COSEWIC 2012). However, individuals of spotted and Atlantic wolffish have also been recorded in the western Canadian Arctic, including Cambridge Bay and Bathurst Inlet (NCRI 2015), and historical records exist for northern wolffish in the Beaufort Sea–Amundsen Gulf region (Coad and Reist 2004). The Bering wolffish has a more western distribution in both the northwestern and northeastern Pacific Ocean, but has limited Canadian Arctic records, including Bathurst Island and Argo Bay in the Amundsen Gulf (COSEWIC 2002; Bilous et al. 2022). All four species are currently assessed by COSEWIC, with northern and spotted wolffish listed as Threatened, Atlantic wolffish as Special Concern, and Bering wolffish as Data Deficient. Under SARA Schedule 1, the first three species are listed, while the Bering wolffish is not (DFO 2024c).

Wolffish are primarily benthic, inhabiting cool, deep waters across a variety of bottom types from sand to rocky outcrops, although they may also spend some time in the water column (COSEWIC 2012). Eggs are laid on the seafloor and guarded by adults, with juveniles hatching at a relatively large size and remaining close to the seafloor (Keats et al. 1985; COSEWIC 2001). Depth preferences vary by species: northern wolffish typically occupy the deepest waters (500–1,000 m, occasionally shallower), spotted and Atlantic wolffish are generally found between 100–600 m but may use nearshore and coastal areas seasonally, and Bering wolffish are most often associated with shallower Arctic and subarctic waters (COSEWIC 2000; 2001; 2002; 2012). Their diet consists mainly of benthic invertebrates, including crustaceans, molluscs, and echinoderms, but can also include pelagic fish and jellyfish (Simpson et al. 2013; COSEWIC 2012).

Inuit Knowledge further documents wolffish all along the coast near Bathurst, Arctic Sound, and Cambridge Bay, where they are noted to have thick skin and a strong taste; their skin was also traditionally used for bow and arrow cases (Banci and Spicker 2024). Given these distributions and depth preferences, Bering wolffish are the most likely species to occur in the Grays Bay region.

5.2 Field Surveys

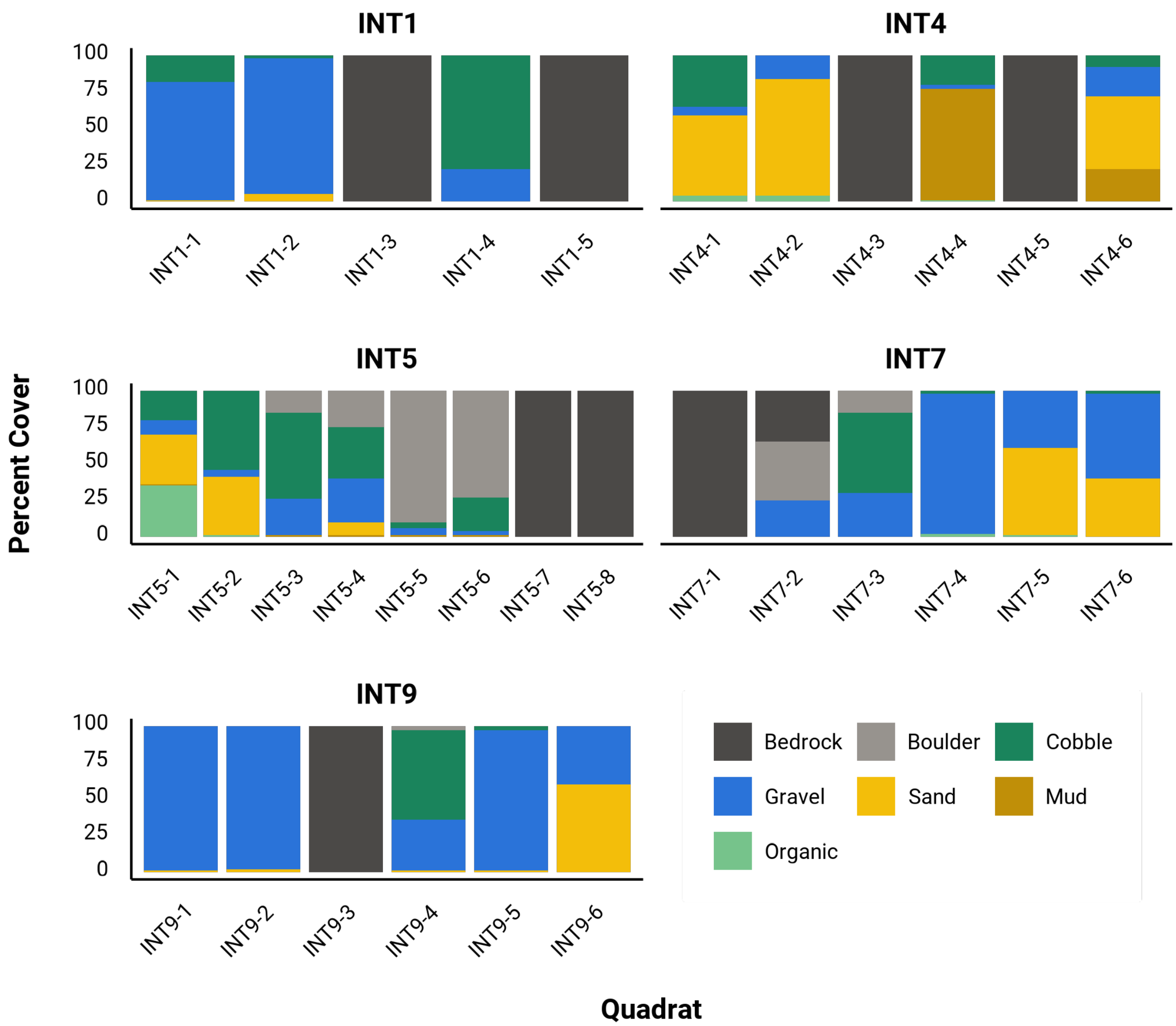
5.2.1 Intertidal Surveys

In 2025, five intertidal transects were completed across transects varying from 85– 150 m in length (Figure 4.1; Appendix A.1; Appendix B.1 - Photos 1 to 44). The total number of quadrats completed varied by transect length from 5–8 resulting in a total of 32 quadrats being completed.

5.2.1.1 Substrate Composition

Substrates within the site varied from bedrock-dominated areas to those primarily composed of mud (Figure 5.2). On the eastern side of the LAA, On the eastern side of the LAA, INT1 began with pebble-dominated substrate, transitioned into bedrock, and included a section dominated by boulders (Appendix B.1 – Photos 1 to 7). Along the northern side of the LAA, INT9 was composed mostly of pebbles with some cobble, included bedrock in the middle portion, and ended in sand (Appendix B.1 – Photos 33 to 36). Moving west, INT4 was characterized mainly by sand and mud, with an intervening section of bedrock (Appendix B.1 – Photos 8 to 14), while INT5 started with a mix of sand, pebbles, and cobbles, followed by boulders and sand, and ending with bedrock (Appendix B.1 – Photos 15 to 25). In the southwestern corner of the LAA, INT7 started on bedrock and shifted into a combination of bedrock and boulders, eventually transitioning into pebble-dominated substrate and finishing with a mix of sand and pebbles (Appendix B.1 – Photos 26 to 32).

Figure 5.2 Substrate Cover Across Intertidal Quadrats



Several quadrats also contained organic matter, with the largest amount observed in quadrat 1 of INT5 (Appendix B.1 – Photo 15). This organic matter was primarily composed of unattached drift rockweed. Similar material was evident on gently sloping beach areas around the LAA above the high intertidal, where large piles of drift algae were documented, mainly consisting of decomposing rockweed (*Fucus distichus*) and occasional sugar kelp (*Saccharina latissima*). Blue mussel shells (*Mytilus edulis*) were also observed within these drift algae piles (Appendix B.1 – Photos 38 and 39).

5.2.1.2 Intertidal Biological Assemblages

The only living organisms observed during intertidal surveys were found in three quadrats along the INT5 transect. A small cluster of unknown fish or invertebrate eggs were observed on cobble in quadrat 1 (Appendix A.2; Appendix B.1 – Photo 23), rockweed was observed at 1% cover on bedrock in quadrat 7 (Appendix A.2; Appendix B.1 – Photo 21) and, unknown filamentous green algae (Phylum Chlorophyta) was observed at 2% cover on bedrock in quadrat 8 (Appendix A.2; Appendix B.1 – Photo 22). Where the substrate allowed (mud, sand, gravel), quadrats were dug, but no organisms were found in the sediment of any of the 11 quadrats excavated (out of 31 total) (Appendix B.1 – Photo 36). Assessment of intertidal habitat was also conducted in other areas around the transects by walking the coastline and making observations (qualitative survey). The only additional marine organisms observed in the intertidal zone were rare occurrences of filamentous green algae and rockweed.

5.2.1.3 Marine Riparian Vegetation

In the area above the intertidal surveys, qualitative surveys were completed to document and photograph any riparian vegetation growing within 15 m of the high intertidal zone (Marine Riparian - Figure 4.1; Appendix B.1 – Photos 41 to 46). This information was then used to qualitatively compare observed vegetation to inland vegetation landcover classes defined in the vegetation technical data report (Section 15 Appendix 15A of the IS).

On the west side of the LAA, the marine riparian vegetation zone was comprised of predominantly exposed bedrock with minimal vegetation establishment (predominantly Bedrock/Boulder Heath Tundra), with small areas of herbaceous and dwarf shrub establishment on sheltered gravels (predominantly Unvegetated Exposed Sand/Silt/Gravel). Typical vegetation in the Bedrock/Boulder Heath Tundra class includes heath species, mosses and lichens in sheltered areas. Typical vegetation within the Unvegetated Exposed Sand/Silt/Gravel class includes moss campion (*Silene acaulis*) and three-toothed saxifrage (*Saxifraga tricuspidata*). Graminoids tolerant of wind and dry conditions can also establish, including short-leaved fescue (*Festuca brachyphylla*), purple reedgrass (*Calamagrostis purpurascens*), and weak arctic sedge (*Carex supina*) (Appendix B.1 – Photos 41 and 42).

The north and northeast side of the LAA had similar conditions to the west; however had occasional broader areas of denser vegetation in sheltered drainages/slopes (predominantly Tussock Sedge in wetland areas and Cryoturbated Heath Tundra in drier areas). Typical vegetation within the Cryoturbated Heath Tundra class is dominated by ground shrubs on undisturbed soil between frost boils, and lichens on exposed soil caused by cryoturbation (Appendix B.1 – Photos 42 and 43). Prominent heath species include northern Labrador tea (*Rhododendron tomentosum*), bog bilberry (*Vaccinium uliginosum*), mountain cranberry (*V. vitis-idaea*), and black crowberry (*Empetrum nigrum*). Common prostrate shrubs include glandular birch (*Betula glandulosa*), tea-leaved willow (*Salix planifolia*) and grey-leaved willow (*S. glauca*). Lichens include Iceland lichens, snow lichens (*Flavocetraria* spp.), and club lichens (*Cladonia* spp.). Vegetation within the Tussock Sedge including tussock cottongrass (*Eriophorum vaginatum*), round-fruited sedge (*Carex rotundata*), wide-leaved polargrass (*Arctagrostis latifolia*), and a variety of shrubs including glandular birch, grey-willows and heaths.

In the southeast of the LAA, where the marine riparian vegetation zone was more sheltered, vegetation established was increased in protected crevices of exposed bedrock, where the Bedrock/Boulder Heath Tundra class had higher vegetation established. Gravels with sparse herbaceous and dwarf shrubs between bedrock outcrops (Unvegetated Exposed Silt/Sand/Gravel) with pockets of taller willows established in protected areas. In the area where a small creek drains to the ocean, an area of Tussock Sedge landcover class is present, where high cover of herbaceous and dwarf shrub is established, including patches of grasses along the active shoreline

5.2.2 Subtidal Surveys

A total of six ROV transects were completed within the LAA in July and August 2025, covering a combined distance of 1.36 km and recording a total of 1 hour and 36 minutes of video footage (Appendix A.3; Appendix B.2 – Photos 1 to 32). In addition, eight GoPro footage drops mounted on crab traps were completed at locations around the site across July and August 2025 (Appendix B.2 – Photos 33 to 43).

5.2.2.1 Subtidal Substrate Composition

The subtidal substrate was primarily fine mud across all depth ranges studied (Table 5.3; Table 5.4 and Figure 5.3). In the shallow subtidal (0–5 m), this fine mud substrate was dominant but included increasing proportions of gravel, cobble, boulders, and bedrock toward shallower depths, with bedrock and boulders becoming dominant above 2 m. Below 5 m, the substrate was again dominated by mud, with progressively fewer patches of cobble and gravel observed down to 20 m. At depths > 20 m, this mud substrate transitioned to a higher proportion of fine gravel covering the surface, with boulders also present in some areas. What appeared to be bivalve siphons and numerous burrow holes were present across the entire depth range observed (Appendix B.2 – Photo 17). At one GoPro location (GoPro5) in the southeastern LAA, between 10–20 m depth, what appeared to be bivalve spawning was observed (Appendix B.2 – Photo 38).

Table 5.3 Subtidal Substrate Percentage from ROV by Depth Range

Depth	Substrate	Dominant Substrate (%)	Subdominant Substrate (%)
0-5 m	Mud	***84.9***	1.0
	Gravel	–	***50.4***
	Cobble	2.6	28.9
	Boulder	6.5	–
	Bedrock	6.0	3.4
5-10 m	Mud	***100***	–
	Gravel	–	11.2
	Cobble	–	***22.8***
10-20 m	Mud	***100***	–
	Gravel	–	***5.5***
	Cobble	–	2.5
20+ m	Mud	33.3	***66.7***
	Gravel	***66.7***	33.3

Notes:

Values represent the percentage of observation time (from ROV footage) during which each substrate type was recorded as dominant or subdominant within the depth range.

Bold italicized values indicate the most common dominant or subdominant substrate within each depth range.

– Not recorded in that depth range

Table 5.4 Subtidal Substrate from GoPro by Depth Range

Depth	Site	Latitude	Longitude	Dominant Substrate	Subdominant Substrate
0-5 m	GoPro4	67.804968	-110.851713	Mud	Gravel
5-10 m	GoPro1	67.802533	-110.850416	Mud	–
10-20 m	GoPro2	67.803764	-110.845418	Mud	–
	GoPro5	67.805789	-110.85126	Mud	Gravel
	GoPro8	67.801686	-110.873566	Mud	–
20+ m	GoPro3	67.804253	-110.848889	Mud	–
	GoPro6	67.805942	-110.870055	Mud	–
	GoPro7	67.804477	-110.875855	Mud	Boulder

Notes
1. Coordinate System: WGS 1984 UTM Zone 12N
2. Data Sources: Government of Canada, Stantec, Vantor

Substrate Category
- Bedrock, Cobble
- Bedrock, Mud
- Boulder, Cobble
- Cobble, Gravel
- Gravel, Mud
- Mud
- Mud, Bedrock
- Mud, Cobble
- Mud, Gravel

Substrate GoPro Site
- Mud
- Mud, Boulder
- Mud, Gravel
- Port Infrastructure

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Metres
(At original document size of 8.5x11) 1:10,000

N

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WEST KITIKMEOT RESOURCES CORP

Project Location
West Kitikmeot Region
Nunavut

Prepared by SL on 2026-02-10
TR by BT on 2026-02-10

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123514868_131
West Kitikmeot Resources Corp
Grays Bay Road and Port

Figure No.
5.3

Title
Subtidal Survey Locations and Substrate Coverage in 2025

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5.2.2.2 Subtidal Biological Assemblages

A variety of species were documented in the subtidal through ROV and GoPro footage, ranging from benthic invertebrates and algae to jellyfish, fish, and crabs (Table 5.5; Appendix A.4; Appendix B.2 – Photos 33 to 43). Below 20 m, brittle stars (Class Ophiuroidea) were abundant across the seafloor, which was often covered by dense diatom mats (Class Bacillariophyceae) (Appendix B.2 – Photo 11). At these depths, hundreds of tube-dwelling anemones, Northern Tube Anemone (*Pachycerianthus borealis*), occurred in patches along the northwestern side of the LAA (ROV10 and GoPro7), and sea whips (*Halipteris willemoesi*) were occasionally observed extending from the substrate (Appendix B.2 – Photos 11 to15, and 43). Rockweed was documented to depths of 13 m, where it was abundant on shallow subtidal rocks (Appendix B.2 – Photos 6). Sugar kelp was also present on rocky substrates, primarily at depths shallower than 5 m, with a few individuals observed at approximately 12 m. Unlike rockweed, sugar kelp occurred at lower densities and did not form dense beds. Arctic lyre crabs (*Hyas coarctatus*) were observed below 15 m, along with two unidentified crabs at 14 m. Fish observations included starry flounder (*Platichthys stellatus*) between 5–20 m depth, Greenland cod (*Gadus ogac*) at 0–5 m and 10–20 m, Arctic shanny (*Stichaeus punctatus*) between 10–20 m, and unidentified small, elongated fish below 17 m. A ringed seal (*Pusa hispida*) was also observed on several occasions on GoPro5 footage at 10–20 m on the northeastern tip of the LAA (Appendix B.2 – Photos 39).

Table 5.5 Marine Species Observed During Subtidal ROV and GoPro Surveys

Group	Common name	Scientific name	0-5 m	5-10 m	10-20 m	20+ m
Mammal						
Seal	Ringed seal	*Pusa hispida*	–	–	X	–
Fish						
Benthic Fish	Arctic shanny	*Stichaeus punctatus*	–	–	X	–
	Greenland cod	*Gadus ogac*	X	–	X	–
	Starry flounder	*Platichthys stellatus*	–	X	X	–
	UnID fish	Phylum Chordata	–	X	X	X
Invertebrate						
Chordata	UnID tunicate	Class Ascidiacea	–	–	X	–
Cnidaria	Arctic combjelly	*Mertensia ovum*	–	X	X	X
	Lion's mane jelly	*Cyanea capillata*	X	X	–	–
	Northern tube anemone	*Pachycerianthus borealis*	–	–	–	X
	Sea whip	*Halipteris willemoesi*	–	–	–	X
	UnID anemone	Class Anthozoa	–	X	–	X
Crustacea	Arctic lye crab	*Hyas coarctatus*	–	–	X	X
	UnID crab	Order Decapoda	–	–	X	–
Echinodermata	Brittle star	Class Ophiuroidea	–	–	–	X
	Green urchin	*Strongylocentrotus droebachiensis*	–	–	–	X

Group	Common name	Scientific name	0-5 m	5-10 m	10-20 m	20+ m
Algae						
Brown Algae	Rockweed	*Fucus distichus*	X	X	X	–
	Sugar kelp	*Saccharina latissima*	X	–	X	–
Diatom	Diatom mat	Class Bacillariophyceae	–	–	X	X
	UnID filamentous brown algae or chain diatoms	UnID algae/ diatom	X	–	–	–

Notes:
X= species present
UnID= Unidentified

5.2.3 Remote Sensing Surveys

Remote sensing techniques were used to classify 84,332 m² of intertidal and riparian vegetation zone (up to 15 m above HHWLT) area (intertidal 11,455 m²; riparian vegetation zone 72,877 m²) and 692,004 m² of subtidal area within the LAA (Table 5.6; Figure 5.4).

Table 5.6 Remote Sensing Habitat Analysis Results

Habitat Class	Area (m²)	Area (% of total area)
Intertidal + riparian vegetation zone		
Fines	8,878	10.5
Gravel	4,881	5.8
Cobble/Boulder	8,824	10.5
Bedrock	50,837	60.3
Vegetation	10,913	12.9
TOTAL AREA	84,332	
Subtidal		
Fines	64,973	9.4
Gravel	1,942	0.3
Cobble/Boulder	7,104	1.0
Bedrock	43,052	6.2
Water	574,933	83.1
TOTAL AREA	**692,004**	

Port Layout

Port Layout

GBRP Water Marks

High Water Mark

Low Water Mark

Marine Riparian

Project Development Area

Habitat Classification

class

Bedrock

Cobble/Boulder

Fines

Gravel

Subtidal Bedrock

Subtidal Cobble/Boulder

Subtidal Fines

Subtidal Gravel

Vegetation

Water

0 100 Metres

(At original document size of 8.5x11) 1:10,000

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NUNAMI STANTEC LIMITED

WEST KITIKMEOT RESOURCES CORP

Project Location
West Kitikmeot Region
Nunavut

Prepared by SN on 2025-10-16
TR by CM on 2025-10-16

Client/Project 123514868_157

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Grays Bay Road and Port

Figure No. 5.4

Page No. 1

Title

Remote Sensing Habitat Classification

Notes

1. Coordinate System: WGS 1984 UTM Zone 12N

2. Data Sources: Government of Canada, Stantec, Esri, Maxar, Earthstar Geographics, and the GIS User Community, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

\\ Revised: 2025-10-31 By: snanda

In the intertidal zone and riparian vegetation zone, the predominant substrate was bedrock, covering 60.3% of the total area. Bedrock was near-continuous along the northern and northeastern portions of the LAA, transitioning to more fragmented occurrences elsewhere around the site. Vegetation, which included both rooted plant cover and drift algal material on the substrate, accounted for 12.9% of the total intertidal area. High vegetation cover was concentrated along the southeastern shoreline, with smaller patches distributed throughout the northeastern and northern sections. Fines (combined sand and mud) and accounting for 10.5% of the total intertidal area occurred mainly within sheltered bays on both the eastern and western sides of the LAA. Gravel and cobble/boulder substrates were also interspersed throughout the intertidal zone.

In the subtidal zone, water was the predominant classification (83.1%), representing areas where the underlying substrate could not be resolved due to water column interference. Among classified substrates, fines were dominant, covering 9.4% of the subtidal area, primarily within the bays in the western sides. Bedrock was the second most common substrate (6.2%), occurring adjacent to intertidal bedrock features and along a shallow bedrock shelf at the entrance to the western bay and in the southwest of the LAA. Cobble/boulder and gravel substrates comprised a smaller portion of the subtidal area and were distributed intermittently throughout the LAA. No vegetation was detected through these remote sensing techniques within the subtidal environment.

5.2.4 Marine Fish Surveys

In 2025, a total of 156 individual marine fish from 15 species were caught across the sampling locations using fyke nets, gill nets, and minnow traps (Table 5.7; Appendix B.3 – Photos 1 to 40). Greenland cod were the most abundant species captured (43 individuals), followed by Arctic cisco (*Coregonus autumnalis*) and Arctic char (*Salvelinus alpinus*) with 32 and 26 individuals caught, respectively. In addition, 35 individual marine invertebrates of 6 species were caught across the sampling locations using crab traps and minnow traps (Table 5.7). Arctic lye crab were the most abundant invertebrate species captured, with 30 individuals caught.

Arctic char and Greenland cod were the largest species caught during the sampling program (Figure 5.5; Appendix A.5). The largest Arctic char measured 750 mm fork length and weighed 4.4 kg, while the largest Greenland cod reached 670 mm total length and 6.7 kg. Both species also showed the widest size ranges; Greenland cod were captured from as small as 90 mm and 46 g up to the largest specimen noted above, and Arctic char ranged from 265 mm and 170 g to the maximum size recorded. Arctic cisco ranged from 327 to 480 mm fork length and up to approximately 1 kg in weight.

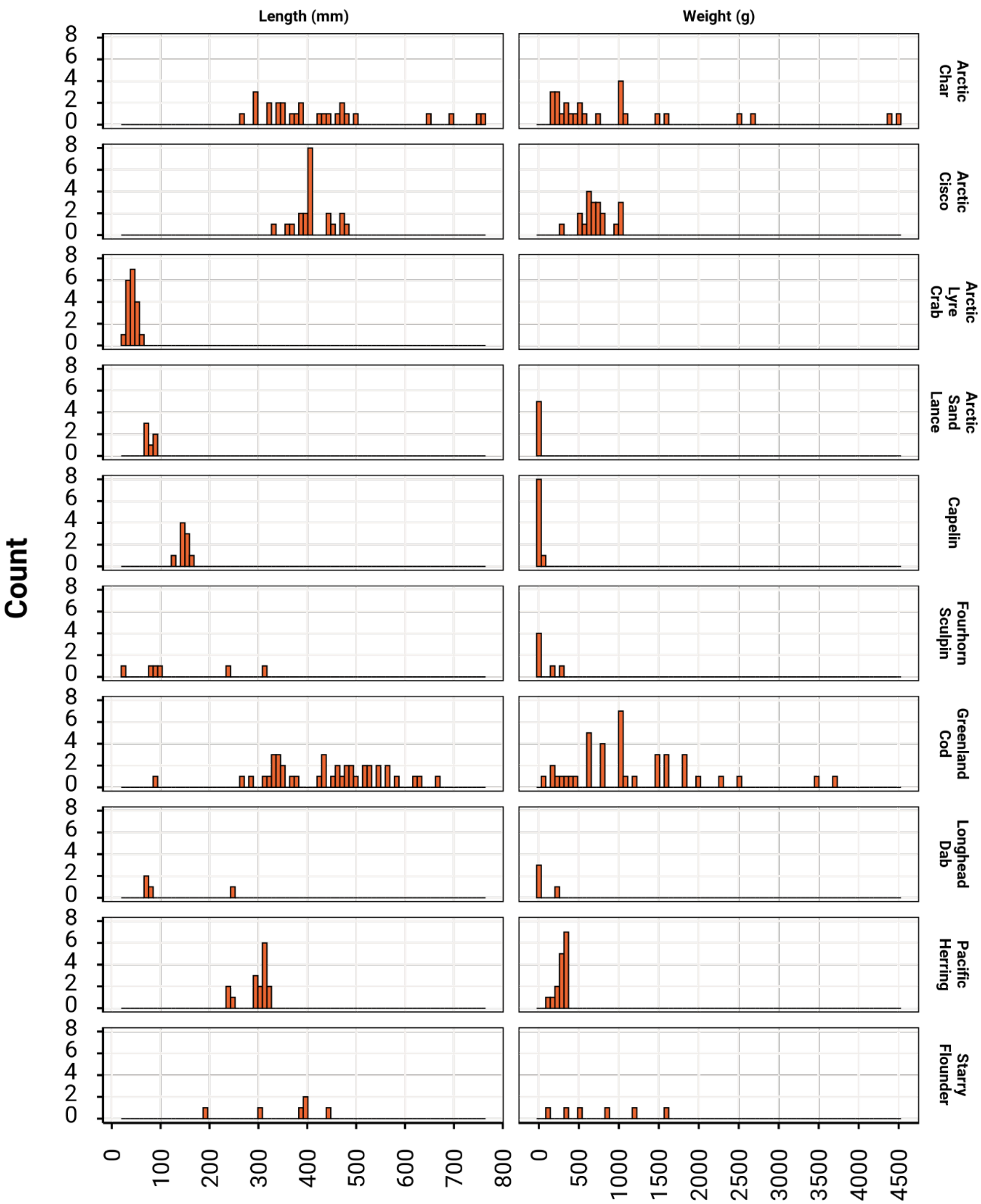
Pelagic forage species displayed narrower size ranges. Arctic sand lance (*Ammodytes hexapterus*) were the smallest of these pelagic fish captured, measuring 49–74 mm total length and weighing <3 g. Capelin (*Mallotus villosus*) ranged from 129–167 mm fork length and 19–34 g, while Pacific herring (*Clupea pallasii*) were the largest of these three and showed the greatest size variation, ranging from 239–370 mm fork length and 140–370 g in weight. Among flatfish, starry flounder were the largest, ranging from 125–440 mm in length and 90–1,600 g in weight. Longhead dabs (*Limanda proboscidea*) were generally small, with most individuals 66–76 mm and 3–5 g, except for one larger specimen at 244 mm and 226 g. Of the remaining fish species, only the fourhorn sculpin (*Myoxocephalus quadricornis*) was represented by more than three individuals, ranging from small juveniles at 24 mm and 1 g to large adults at 309 mm and 278 g. For invertebrates, Arctic lyre crab exhibited carapace widths ranging from 28–60 mm.

Table 5.7 Total Fish and Invertebrates Caught

Common name	Scientific Name	Total Caught	Trapping Method
Fish			
Greenland cod	*Gadus ogac*	43	Fyke Net, Gill Net
Arctic cisco	*Coregonus autumnalis*	32	Gill Net
Arctic char	*Salvelinus alpinus*	26	Gill Net
Pacific herring	*Clupea pallasii*	16	Gill Net
Capelin	*Mallotus villosus*	9	Gill Net
Arctic sand lance	*Ammodytes hexapterus*	6	Beach Seine
Fourhorn sculpin	*Myoxocephalus quadricornis*	6	Beach Seine, Fyke Net, Gill Net
Starry flounder	*Platichthys stellatus*	6	Beach Seine, Gill Net
Longhead dab	*Limanda proboscidea*	4	Beach Seine,
Arctic shanny	*Stichaeus punctatus*	2	Minnow Trap
UnID snailfish	*Family Liparidae*	2	Beach Seine
Fourline snakeblenny	*Eumesogrammus praecisus*	1	Minnow Trap
Lake trout	*Salvelinus namaycush*	1	Gill Net
Saffron cod	*Eleginus gracilis*	1	Gill Net
UnID sculpin	Family Cottidae	1	Beach Seine
Invertebrate			
Arctic lyre crab	*Hyas coarctatus*	30	Crab Trap, Minnow Trap
Baltic isopod	*Saduria entomon*	1	Minnow Trap
Green sea urchin	*Strongylocentrotus droebachiensis*	1	Crab Trap
UnID amphipods	Order Amphipoda	1	Minnow Trap
UnID jelly	Class Scyphozoa	1	Minnow Trap
UnID polychaete	Class Polychaeta	1	Minnow Trap

Note:
UnID= Unidentified

Figure 5.5 Size and Weight of Fish Caught During Marine Fish Surveys Conducted in 2025.



Note: Only species with more than three measurements are shown.

5.2.4.1 Crab and Minnow Traps

A total of 21 crab trap sets and 18 minnow trap sets were completed across the 16 sites in July and August 2025 (Figure 5.6; Appendix A.6; Appendix B.3 – Photos 1 to 10). In July, nine crab traps were set, with catches recorded at only two sites. In August, 12 crab traps were deployed, but none captured any organisms. Minnow traps were comparatively more successful, with catches in 5 of 8 traps in July and 2 of 10 traps in August.

Arctic lyre crabs were the most frequently caught species, occurring in 5 of the 39 traps deployed (Appendix B.3 – Photos 3 and 11). The highest CPUE in a crab trap was recorded at site CR10, with 1.22 crabs/hour in a crab trap. Most captures occurred at sites on the eastern side of the LAA (CR9, CR10, CR15), with only a single trap yielding crabs on the western side (CR11). An additional observation of an Arctic lyre crab was made in GoPro footage at site CR14 on the eastern side in August (Appendix A.4; Appendix B.3 – Photo 11), where a crab was recorded on top of the trap, but none were recovered inside when the trap was retrieved. All individuals were caught or observed between 14 and 25 m depth in traps baited with fresh fish and were captured during both July and August surveys. Crabs were collected in both minnow and crab traps and ranged in carapace width from 18 – 60 mm (Figure 5.5; Appendix A.5).

Other invertebrates included a single green sea urchin caught in a crab trap on the western side of the project area (Appendix B.3 – Photo 4). On the eastern side, minnow traps captured small invertebrates such as isopods, amphipods, polychaete worms, and jellyfish at depths between 2–25 m (Appendix B.3 – Photos 2,7,8, and 9).

Two benthic fish species were also caught in minnow traps on the western side. An Arctic shanny was captured at a depth of 4.2 m and measured 55 mm total length (Appendix A.5; Appendix B.3 – Photo 6). A fourline snakeblenny (*Eumesogrammus praecisus*) was caught at a depth of 30.8 m and measured 114 mm total length (Appendix A.5; Appendix B.3 – Photo 10). In addition, GoPro footage from a crab trap (CR11) on the northwestern tip of the LAA in July recorded a Greenland cod in the trap, however, the fish was not present in the trap when it was recovered (Appendix A.4; Appendix B.3 – Photo 5).

Notes
1. Coordinate System: WGS 1984 UTM Zone 12N
2. Data Sources: Government of Canada, Stantec, Vantor

Crab Trap Sampling Location
- Crab and Minnow Trap - July
- Crab and Minnow Trap - August

Survey Month
- July
- August

CPUE Value
(CPUE per hour in point label)
- 0.001 - 0.005
- 0.0051 - 0.010
- 0.41 - 0.60
- 0.100 - 0.250

Survey Taxon
- Arctic Lyre Crab
- Arctic Shanny
- Baltic isopod
- Fourline Snakeblenny
- Green Sea Urchin
- UnID Amphipods
- UnID Jelly
- UnID Polychaete
- Port Infrastructure

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Metres
(At original document size of 8.5x11) 1:10,000

N

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WEST KITIKMEOT RESOURCES CORP

Project Location
West Kitikmeot Region
Nunavut

Prepared by SL on 2025-10-30
TR by BT on 2025-10-30

Client/Project
123514868_127
West Kitikmeot Resources Corp
Grays Bay Road and Port

Figure No.
5.6

Title
Crab and Minnow Trap Locations and Catches in 2025

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Table 5.8 Abundance and (CPUE) of Fish and Invertebrates Captured During Crab Trap and Minnow Trap Surveys

	July						August		
	Minnow				Crab		Minnow		
Species	**CR3**	**CR8**	**CR9**	**CR10**	**CR10**	**CR11**	**CR11**	**CR11**	**CR15**
Arctic lyre crab	–	–	1 (0.06)	2 (0.12)	21 (1.22)	–	2 (0.38)	–	4 (0.19)
Arctic shanny	1 (0.04)	–	–	–	–	–	–	–	–
Baltic isopod	–	1 (0.03)	–	–	–	–	–	–	–
Fourline snakeblenny	–	–	–	–	–	–	–	1 (0.05)	–
Green sea urchin	–	–	–	–	–	1 (0.38)	–	–	–
UnID amphipod	1 (0.02)	–	–	–	–	–	–	–	–
UnID jelly	1 (0.02)	–	–	–	–	–	–	–	–
UnID polychaete	–	–	–	–	–	–	1 (0.38)	–	–
Total	3 (0.09)	1 (0.03)	1 (0.06)	2 (0.12)	21 (1.22)	1 (0.38)	3 (1.14)	1 (0.05)	4 (0.19)

Notes:
Values show total abundance, with CPUE (the number of fish caught per hour) in brackets.
UnID= Unidentified.
– indicates no catch recorded for this species.

5.2.4.2 Fyke Nets

A total of 10 fyke nets were deployed across 7 sites during the July and August 2025 surveys (Figure 5.7; Appendix A.7; Appendix B.3 – Photos 12 to 17). In July, three fyke nets were deployed, all on the eastern side of the port due to weather limitations, and only one of these sites yielded a catch. Two of the July sites (FYK1 and FYK2) had extended soak times of approximately 46 hours because adverse weather prevented crews from retrieving the nets as scheduled. In August, fyke nets were deployed at all seven sites distributed along the western, northern, and eastern sides of the LAA. All seven fyke nets deployed in August yielded catch. All fyke nets were set in shallow water with bottom depths of the cod end opening between 2 and 6.2 m and the lead line extending into shore (Appendix B.3 – Photos 12 and 13).

Greenland cod and fourhorn sculpin were the only fish species captured in the fyke nets. Greenland cod were caught at nearly all locations, with the exception of FYK8 on the northeastern tip of the LAA (Appendix B.3 – Photos 14 to 16). FYK8 was unique in that it was the only location to capture fourhorn sculpin. A single individual fourhorn sculpin, measuring 309 mm in total length and 278 g in weight, was caught (Appendix B.3 – Photos 17). Greenland cod were most abundant in the northwestern area, with a CPUE of 0.5 fish/hour in FYK4 and 0.23 at the adjacent site FYK3. On the eastern side, FYK1 and FYK2 yielded CPUE of 0.25 and 0.13 fish/hour in August, and FYK2 was the only net to capture Greenland cod in both July and August, with a CPUE of 0.09 fish/hour in July after a 45.9-hour soak. The lowest catches were recorded at FYK5 and FYK6 on the western side, both with CPUE values below 0.05 fish/hour. Sizes of Greenland cod caught in gill nets ranged from small individuals of 90 mm and 46 g to large adults of 670 mm and 3,700 g in total length and weight (Figure 5.5; Appendix A.5).

Table 5.9 Abundance and (CPUE) of Fish Collected During Fyke Net Sets

Species	July	August						
	FYK2	**FYK1**	**FYK2**	**FYK3**	**FYK4**	**FYK5**	**FYK6**	**FYK8**
Greenland cod	4 (0.09)	6 (0.25)	3 (0.13)	5 (0.23)	11 (0.50)	2 (0.09)	1 (0.05)	–
Fourhorn sculpin	–	–	–	–	–	–	–	1 (0.04)
Total	4 (0.09)	6 (0.25)	3 (0.13)	5 (0.23)	11 (0.50)	2 (0.09)	1 (0.05)	1 (0.04)

Notes:
Values show total abundance, with CPUE (the number of fish caught per hour) in brackets.
– indicates no catch recorded for this species.

Notes
1. Coordinate System: WGS 1984 UTM Zone 12N
2. Data Sources: Government of Canada, Stantec, Vantor

Fyke Net Sampling Location
- Fyke Net - July
- Fyke Net - August

Survey Month
- July
- August

CPUE Value
(CPUE per hour in point label)
- 0.001 - 0.005
- 0.0051 - 0.010
- 0.41 - 0.60
- 0.100 - 0.250

Survey Taxon
- Fourhorn Sculpin
- Greenland Cod
- Port Infrastructure

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5.7

Title
Fyke Net Locations and Catches in 2025

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5.2.4.3 Gill Nets

A total of 14 gill net sets (eight floating and six sinking) were completed in 2025 across six gill net sites during the July and August surveys (Figure 5.8; Appendix A.8; Appendix B.3 – Photos 18 to 30). In July, four gill nets were deployed, consisting of three floating nets and one sinking net, and all of these captured fish. Most of the July deployments occurred on the eastern side of the LAA, as adverse weather conditions limited access to the western side. In August, gill nets were deployed more broadly around the LAA, with ten nets set in total, including five floating and five sinking nets distributed along the western, eastern, and northern sides. Only one of these ten nets (GN2-S) failed to capture any fish.

Gill nets yielded the highest catch numbers and species diversity of all trapping methods, with 101 fish representing nine different species. Floating and sinking gill nets captured largely similar species. Sinking nets fished at maximum depths between 2.2 and 12.2 m, while floating nets consistently sampled the top 2.4 m of the water column but extended out over depths of up to 38 m bottom depth.

Arctic cisco was the most abundant species captured Appendix B.3 – Photo 22). It was caught in both sinking and floating nets during both July and August surveys, and was distributed across western, eastern, and northern areas of the LAA. The highest CPUE values for Arctic cisco were observed in July at GN1 on the western side, with 5.4 fish/hour in the sinking net and 1.5 fish/hour in the floating net. In August, CPUE values were lower, ranging from 0.38 to 0.99 fish/hour. Individuals ranged in size from 327 mm fork length and 289 g to 480 mm fork length and 1,000 g (Figure 5.5; Appendix A.5). This species also experienced the highest mortality rate in gill nets with a mortality of 16 out of 42 caught (38.1% mortality rate).

Arctic char were the second most abundant species, with 26 individuals captured (Appendix B.3 – Photos 23 and 26). This species was distributed widely, being caught at 10 of the 14 net sets, in both floating and sinking nets, and during both July and August surveys. Arctic char were more frequently captured in floating nets. The highest CPUE was recorded in July on the western side at GN5 (floating net) with 6.7 fish/hour, followed by GN3 (floating net) in August with 3.9 fish/hour. The lowest CPUE was recorded in August at GN2, where the floating net on the western side captured only 0.21 fish/hour. These were the largest fish species caught, ranging from a maximum size caught of 760 mm in fork length and a weight of 4,500g to the smallest size caught of 340 mm in fork length and a weight of 360 g (Figure 5.5; Appendix A.5). A total of three Arctic char mortalities were recorded out of 26 catches (11.5% mortality rate).

Notes
1. Coordinate System: WGS 1984 UTM Zone 12N
2. Data Sources: Government of Canada, Stantec, Vantor

Gill Net Sampling Location
- Gill Net - July
- Gill Net - August

Survey Month
- July
- August

CPUE Value
(CPUE per hour in point label)
- 0.001 - 0.005
- 0.0051 - 0.010
- 0.41 - 0.60
- 0.100 - 0.250

Survey Taxon
- Arctic Char
- Arctic Cisco
- Capelin
- Fourhorn Sculpin
- Greenland Cod
- Lake Trout
- Pacific Herring
- Saffron Cod
- Starry Flounder
- Port Infrastructure

0 100 200 Metres
(At original document size of 8.5x11) 1:7,500

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5.8

Title
Gill Net Locations and Catches in 2025

\\Ca0002-ppfss05\geomatics\Clients\Nunami_Stantec\GBRP\Figures\123514868_129_GillNets_SamplingLocations.pagx Revised: 2026-02-05 By: slemay

Pelagic schooling fish caught in gill nets included capelin and Pacific herring, with a total of 16 and 9 individuals captured, respectively (Appendix B.3 – Photos 20, 21, and 24. Herring were caught only in July in both sinking and floating nets on the eastern side of the LAA (GN1 and GN2). Because few gill nets were deployed on the north and west sides during July, it is difficult to conclude whether their presence was limited to the eastern side of the LAA. CPUE for herring ranged from 0.8 to 1.6 fish/hour across the two sites. Capelin were also captured only on the eastern side of the LAA, but were present in both July and August in both floating and sinking nets. The highest CPUE values for capelin were recorded in sinking nets, with 1.0 fish/hour in July and 0.98 fish/hour in August. Of note, capelin captured in July exhibited lateral ridges (“spawning carina”) along both sides of the body, a feature found only in males during the spawning season. These ridges were absent in the two capelin captured in August. In terms of size, herring were the larger species, ranging from 239–325 mm in fork length and 140–370 g in weight, while capelin were smaller, ranging from 129–167 mm in fork length and 19–34 g in weight (Figure 5.5; Appendix A.5). One herring mortality was recorded out of the 16 total caught yielding a 6.25% mortality rate.

A total of 11 Greenland cod were captured, all in sinking gill nets deployed in August Appendix B.3 – Photo 28). This species was caught at locations distributed across the LAA (north, west, east, and south) and occurred in 4 of the 5 sinking nets deployed that month. The highest CPUE was recorded at the northeastern site (GN7 sinking) with 2.8 fish/hour, while the remaining sites ranged between 0.57 and 0.98 fish/hour. The absence of Greenland cod in July may be partly explained by the limited effort, as only a single sinking gill net was deployed during that survey period, despite Greenland cod being caught at the site in fyke nets at that time. Sizes of Greenland cod caught in gill nets ranged from 327–560 mm in total length and 600–2,500 g in weight (Figure 5.5; Appendix A.5).

Four starry flounder were caught across July and August in both floating and sinking gill nets (Appendix B.3 – Photos 19 and 30). All individuals were captured on the eastern side or the northeastern tip of the LAA. CPUE was highest at the northeastern site (GN7 sinking) in August at 0.79 fish/hour. On the eastern side (GN1), CPUE was 0.22 and 0.26 fish/hour for floating and sinking nets, respectively, in July. Starry flounder caught in gill nets ranged from 390–440 mm in total length and 860–160 g in weight (Figure 5.5; Appendix A.5).

A small number of other species were also captured in gill nets, all on the eastern side of the LAA in August. A single fourhorn sculpin was caught in a sinking gill net (GN1), measuring 309 mm in total length and weighing 278 g (Appendix A.5; Appendix B.3 – Photo 27). A lake trout (*Salvelinus namaycush*) was also captured in a sinking gill net (GN1), measuring 422 mm in fork length and weighing 1000 g (Appendix A.5; Appendix B.3 – Photo 25). Finally, a saffron cod (*Eleginus gracilis*) was caught in a floating gill net (GN2), measuring 125 mm in length and weighing 19 g (Appendix A.5; Appendix B.3 – Photo 29). The saffron cod appeared to have been in a state of decomposition and was likely dead prior to becoming entangled in the net.

Table 5.10 Abundance and (CPUE) of Fish Collected During Gill Net Surveys

Species	July				August							
	GN1F	**GN1S**	**GN2F**	**GN4F**	**GN1F**	**GN1S**	**GN3F**	**GN3S**	**GN5F**	**GN5S**	**GN7F**	**GN7S**
Arctic char	3 (0.66)	4 (1.00)	1 (0.21)	5 (6.70)	5 (1.90)	1 (0.49)	4 (3.90)	-	1 (0.50)	1 (0.57)	1 (0.41)	-
Arctic cisco	7 (1.50)	21 (5.40)	-	-	1 (0.38)	-	-	-	2 (0.99)	1 (0.57)	-	1 (0.39)
Capelin	2 (0.44)	4 (1.00)	1 (0.21)	-	-	2 (0.98)	-	-	-	-	-	-
Fourhorn sculpin	-	-	-	-	-	1 (0.49)	-	-	-	-	-	-
Greenland cod	-	-	-	-	-	2 (0.98)	-	1 (0.73)	-	-	-	7 (2.80)
Lake trout	-	-	-	-	-	1 (0.49)	-	-	-	-	-	-
Pacific herring	4 (0.88)	4 (1.00)	8 (1.60)	-	-	-	-	-	-	-	-	-
Starry flounder	1 (0.22)	1 (0.26)	-	-	-	-	-	-	-	-	-	2 (0.79)
Total	17 (3.75)	34 (8.76)	10 (2.05)	5 (6.67)	6 (2.28)	7 (3.41)	4 (3.93)	1 (0.73)	3 (1.49)	2 (1.14)	1 (0.41)	10 (3.95)

Notes:

Values show total abundance, with CPUE (the number of fish caught per hour) in brackets.

– indicates no catch recorded for this species.

5.2.4.4 Beach Seine

A total of 26 beach seine sets were completed across the seven sites in 2025 over the July and August surveys (Figure 5.9; Appendix A.9; Appendix B.3 – Photos 31 to 40). Beach seining was conducted on gently sloping beaches with sandy to cobble substrates. In July, seven sets were conducted at three sites, with fish captured in two seines at a single site (BS1). Due to adverse weather conditions, beach seining in July was limited to northern and eastern areas of the LAA. In contrast, 19 sets were completed in August across all seven sites, with fish captured in five seines at four different sites (BS1, BS4, BS5, BS8). The area sampled per site ranged from 198 m^3 at BS2 in July to 1,508 m^3 at BS1 in August.

Across all beach seine sets, a total of 19 fish were captured, representing six species. This included nine individuals from three species in July and 10 individuals from four species in August.

Arctic sand lance (*Ammodytes hexapterus*) was the most frequently captured species, with six individuals collected from two seines on the western side (BS4 and BS8) in August only (Appendix B.3 – Photos 36 and 40). CPUE values for this species ranged from 0.008 fish/m^3 at BS8 to 0.080 fish/m^3 at BS4. Individuals ranged in size from 69–92 mm total length and 1–2 g in weight (Figure 5.5; Appendix A.5). No beach seines were conducted on the western side in July, so it remains uncertain whether sand lance were present earlier in the season.

Flatfish species captured included four longhead dab (*Limanda proboscidea*), all from a single site in a shallow bay on the southeast side of the LAA (BS1) in July, and two starry flounder captured in August from southern bays on both the eastern (BS1) and western (BS5) sides (Appendix B.3 – Photos 32, 34 and 38). CPUE for longhead dab was 0.017 fish/m^3, while starry flounder had lower CPUE values of 0.002 fish/m^3 at BS1 and 0.003 fish/m^3 at BS5. Among the longhead dab, one adult measured 245 mm in total length and weighed 226 g, while three juveniles ranged from 66–76 mm in total length and 3–5 g in weight (Figure 5.5; Appendix A.5). The two starry flounder included a larger individual from the western side (BS5) at 188 mm total length and 500 g, and a smaller individual from the eastern side (BS1) at 188 mm total length and 90 g (Appendix A.5).

A total of four fourhorn sculpins were captured in July in a beach seine at BS1, a shallow bay on the southeast side of the LAA (Appendix B.3 – Photo 33). In addition, one juvenile unidentified sculpin (family Cottidae) was caught in August on the western side (BS4) (Appendix B.3 – Photo 37). The CPUE for fourhorn sculpins and unidentified sculpin were both 0.017 fish/m^3. Fourhorn sculpins were small in size, ranging from 24–102 mm in total length and 1–8 g in weight. The unidentified sculpin measured 35 mm and weighed 1 g (Figure 5.5; Appendix A.5).

Finally, two unidentified snailfish (family Liparidae) were captured, one in July at BS1 on the eastern side and one in August at BS8 on the western side (Appendix B.3 – Photos 35 and 39). CPUE was higher in August (0.008 fish/m^3) compared to July (0.004 fish/m^3). Both individuals were small, with the BS1 snailfish measuring 40 mm and 2 g, and the BS8 individual measuring 45 mm and 1 g (Appendix A.5).

Notes
1. Coordinate System: WGS 1984 UTM Zone 12N
2. Data Sources: Government of Canada, Stantec, Vantor

Beach Seine Sampling Location
- Beach Seine - July
- Beach Seine - August

Survey Month
- △ July
- ⬠ August

CPUE Value
(CPUE per 100 m³ in point label)
- 0.001 - 0.005
- 0.0051 - 0.010
- 0.011-0.025
- 0.026 - 0.05

Survey Taxon
- Arctic Sand Lance
- Fourhorn Sculpin
- Longhead Dab
- Starry Flounder
- UnID Sculpin
- UnID Snailfish
- Port Infrastructure

0 100 200 Metres
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5.9

Title
Beach Seine Locations and Catches in 2025

Table 5.11 Abundance and (CPUE) of Fish Collected During Beach Seine Surveys in 2025

Species	July	August			
	BS1	**BS1**	**BS4**	**BS5**	**BS8**
Arctic sandlance	–	–	5 (0.080)	–	1 (0.008)
Fourhorn sculpin	4 (0.017)	–	–	–	–
Longhead dab	4 (0.017)	–	–	–	–
Starry flounder	–	1 (0.002)	–	1 (0.003)	–
UnID sculpin	–	–	1 (0.017)	–	–
UnID snailfish	1 (0.004)	–	–	–	1 (0.008)
Total	9 (0.038)	1 (0.002)	6 (0.097)	1 (0.003)	2 (0.017)

Notes:
Values show total abundance, with CPUE (the number of fish caught per m^3) in brackets.
UnID= Unidentified.
– indicates no catch recorded for this species.

6 Summary Discussion

Previous surveys have been conducted at Grays Bay, including marine habitat and fish surveys by in 2004 and 2005 (Wolfden 2006), and fish and invertebrate surveys in 2012 (Elliot and Cross 2013). Results from these earlier surveys are summarized and compared with the 2025 surveys in the following Sections 6.1 (Fish Habitat) and 6.2 (Marine Fish).

6.1 Fish Habitat

Intertidal and subtidal surveys were conducted in 2004 (Wolfden 2006) and again in 2025 (see Sections 5.2.1 and 5.2.2) to document marine fish habitat characteristics around Grays Bay (Table 6.1). The 2004 surveys included 12 intertidal sampling stations and subtidal surveys completed by SCUBA divers equipped with an underwater video camera (Wolfden 2006). In 2025, quantitative intertidal transect surveys were conducted at five locations, along with qualitative assessments across shorelines within the LAA, while subtidal conditions were characterized through a series of ROV transects and GoPro camera drops (see Sections 5.2.1 and 5.2.2).

Intertidal surveys in 2024 documented a wide range of sediment types from bedrock to soft sediments of sand and mud (Wolfden 2006; Table 6.1). Three types of attached algae were reported, including rockweed, an unidentified green encrusting alga, and a brown filamentous alga. The encrusting green and filamentous brown algae were recorded at abundances of up to 70–80% cover at some locations In addition, seven unidentified amphipods were also recorded across the sampling stations in the intertidal. In comparison, intertidal surveys conducted in 2025 documented a similarly wide array of substrate and habitat types across the intertidal region of Grays Bay (see Section 5.2.1; Table 6.1). However, far fewer organisms were observed, with only rare occurrences of filamentous green algae and rockweed, and no amphipods were recorded. In both 2004 and 2025, large piles of drift algae were observed in and above the intertidal zone, consisting primarily of rockweed with some sugar kelp (Table 6.1).

Subtidal habitat in 2004 consisted primarily of boulders and bedrock in the shallow subtidal, transitioning to cobbles and boulders around 2 m depth and to soft silt sediments with increasingly scattered gravel and cobble below 10 m depth (Wolfden 2006; Table 6.1). Rockweed and filamentous algae were observed attached to hard substrate shallower than 10 m. At depths greater than 10 m, green sea urchins, brittle stars, and starfish were common, along with bivalve siphons and a surface mat of filamentous algae. Observations made during marine surveys in 2025 were generally consistent with those made in 2004, both in terms of substrate composition and species present (see Section 5.2.2; Table 6.1). However, large starfish (*Urasterias lincki*) were not observed in 2025. A benthic diatom mat was also noted starting around depths of 20 m and becoming dominant over the seafloor in both survey years. Sugar kelp was documented in the shallow subtidal attached to hard substrate boulders or cobbles, which was not documented in 2004. Patches of sea anemones were also observed below 10 m depth in both years (Table 6.1).

Table 6.1 Fish Habitat Recorded at Grays Bay in 2004 and 2025

Habitat	2004†		2025*	
	Substrate	**Organisms**	**Substrate**	**Organisms**
Intertidal	Bedrock, boulder, cobble, gravel, sand, and fine mud are distributed around the site	Encrusting green algae, filamentous brown algae, rockweed, and small numbers of amphipods. Large piles of drift rockweed	Bedrock, boulder, cobble, gravel, sand and mud are distributed around the site.	Rare occurrences of filamentous green algae and rockweed. No other species observed. Piles of drift algae are scattered around Grays Bay on gently sloping gravel to cobble beaches, consisting primarily of rockweed and occasional sugar kelp.
0-5m	Boulder and bedrock transitioning to cobble and boulders <2 m	Rockweed and filamentous algae attached to hard substrate	Bedrock and boulders in the shallow zone transitioning to dominant fine mud substrate	Rockweed and filamentous algae/diatom chains attached to hard substrate. Patches of sugar kelp.
5-10	Fine mud (reported as silt) with increasing amounts of gravel and cobble compared to 10–20 m	N/A	Fine mud substrate. with scattered cobble and gravel patches.	Rockweed and filamentous algae/diatom chains attached to hard substrate.
10-20 m	Fine mud (reported as silt) with scattered gravel and cobble	Green sea urchins and large starfish (*Urasterias lincki*) are common. Patches of cerianthid anemones in some areas	Fine mud substrate with fewer scattered cobble and gravel patches compared to 5–10 m	Rockweed and sugar kelp present at shallower depths. Patchy diatom mat over the substrate surface at deeper depths.
20+ m	Fine mud (reported as silt) with scattered gravel and cobble	Mat of diatoms (reported as filamentous algae) over substrate. Brittle stars and large bivalve siphons.	Mix of gravel and fine mud substrate.	Dense diatom mat abundant across substrate. High numbers of brittle stars and patches of sea anemones, sea whips and green urchins documented in places on the seafloor.

Note:

N/A- Not available- no information describing organisms at this depth mentioned in report

Sources: † Wolfden (2006); * Current study (Sections 5.2.1 and 5.2.2)

6.2 Marine Fish

Fish and invertebrate surveys were conducted at Grays Bay in 2004–2005 (Wolfden 2006), 2012 (Elliot and Cross 2013), and 2025 (see Section 5.2.4) using a range of sampling methods (Table 6.2 and Table 6.3). In 2004 and 2005, sampling focused on marine fish and invertebrates using gill nets and bottom trawls (Wolfden 2006). Eight bottom trawls were completed with a flounder trawl, and 32 (27 in 2004 and 4 in 2005) floating gill nets were deployed perpendicular to shore. In 2012, sampling methods included fyke nets, crab traps, and gill nets (Elliot and Cross 2013). Ten fyke nets were deployed earlier in the season (July 28–31, 2012) in sheltered bays southwest and southeast of the current 2025 LAA. Later in the season (August 30–September 5, 2012), 14 crab traps and 8 floating and 8 sinking gill nets were deployed along the 10 and 20 m depth contours. Trapping effort in 2025 employed the broadest range of gear types, including 10 fyke nets, 22 crab traps, 18 minnow traps, 26 beach seines and 14 gill nets. This diversity of gear types allowed for sampling of a wider range of habitats and fish size classes than in previous years.

Invertebrate catches were highest in 2005 (252 individuals) and 2012 (120 individuals) compared to 39 individuals in 2025 (Table 6.2). However, species diversity was greatest in 2025, with six species recorded compared to four in 2005 and two in 2012. In 2005, bottom trawling collected a variety of invertebrates, including clams, urchins, and starfish (Wolfden 2006). Green sea urchins were caught in large numbers that year, likely due to the trawling method used. In 2012, Arctic lyre crabs and green sea urchins were captured in both crab traps and sinking gill nets set along the seafloor (Elliot and Cross 2013). Arctic lyre crabs were caught in similar numbers in 2012 (35 individuals) and 2025 (34 individuals), while no crab trapping was conducted in 2005. Five large starfish were collected during bottom trawling in 2005 but were not captured in later surveys.

A total of 6 fish species were recorded in 2004–2005, 8 in 2012, and 15 in 2025 (Table 6.3). In 2004, 76 fish from 4 species (Arctic char, Arctic cisco, lake trout, and unidentified cod) were caught in 27 gill net sets deployed between August 26 and September 2 (Wolfden 2006). In 2005, a reduced effort of 4 gill nets resulted in 10 fish from 4 species (Arctic char, Arctic cisco, least cisco, and saffron cod) being captured, as well as 2 spatulate sculpins (*Icelus spatula*) collected in bottom trawls. Fyke nets in 2012 yielded the highest overall fish catch, with 1,450 individuals from 8 species, the majority of which were saffron cod (1,337 individuals) (Elliot and Cross 2013). In 2025, 156 individuals were captured across the range of trap types deployed, including several new species not previously recorded at Grays Bay, such as Arctic sand lance, Arctic shanny, longhead dab, fourline snakeblenny, and Pacific herring (see Section 5.2.4).

Across all years, Arctic char and Arctic cisco were captured in high numbers except for Arctic cisco in 2012. Small numbers of other Anadromous/amphidromous fish species were caught across the years, including lake trout caught in 2004 and 2025, broad whitefish caught in 2012 and a least cisco caught in 2012. Saffron cod were caught in large numbers in 2012 using fyke nets, but in 2025, only a single dead individual was recovered from a gill net. It should be noted, however, that the fyke nets set in 2012 were deployed in protected bays to the southwest and southeast of Grays Bay, whereas the fyke nets in 2025 were set within the LAA. Several species were more abundant in recent years. Capelin were captured only in 2012 and 2025, while Pacific herring were observed only early in the 2025 season (July). Arctic sand lances were also captured in 2025, later in the season (August), but had not been recorded in earlier surveys. These differences may be attributed in part to variation in trapping methods and locations across years. However, there is also evidence of northward range expansions of several species due to warming conditions in the Arctic, including Arctic sand lance, capelin, and Pacific herring, which may also explain their occurrence in the recent survey (Yasumiishi et al. 2020; Baker et al. 2022).

Table 6.2 Invertebrate Species Caught Around Grays Bay in 2005, 2012 and 2025

Common name	Scientific Name	Trapping Method	2005 July†	2012 August‡	2025 July*	2025 August*
Arctic lyre crab	*Hyas coarctatus*	Crab Trap, Gill Trap, Minnow Trap	-	35	30	4
Baltic isopod	*Saduria entomon*	Minnow Trap	-	-	1	-
Clam	*Astarte crenata*	Trawl	1	-	-	-
Green sea urchin	*Strongylocentrotus droebachiensis*	Crab Trap, Gill Trap, Trawl	245	85	1	-
Iceland cockle	*Clinocardium ciliatum*	Trawl	1	-	-	-
Polychaete	*Bylgides sarsi*	Minnow Trap	-	-	-	-
Starfish	*Urasterias lincki*	Trawl	5	-	-	-
UniD amphipods	Order Amphipoda	Minnow Trap	-	-	1	-
UnID jellyfish	Class Scyphozoa	Minnow Trap	-	-	1	-

Notes:
UnID= Unidentified
Sources: † Wolfden (2006); ‡ Elliot and Cross (2013); * Current study (Sections 5.2.1 and 5.2.2)

Table 6.3 Fish Species Caught Around Grays Bay in 2004, 2005, 2012 and 2025

Common name	Scientific Name	Trapping Method	2004 August†	2005 July†	2012 July‡	2025 July*	2025 August*
Anadromous/ Amphidromous							
Arctic char	*Salvelinus alpinus*	Fyke Net, Gill Net	53	6	26	13	13
Arctic cisco	*Coregonus autumnalis*	Gill Net	20	2	-	28	4
Broad whitefish	*Coregonus nasus*	Fyke Net	-	-	2	-	-
Lake trout	*Salvelinus namaycush*	Gill Net	1	-	-	-	1
Least cisco	*Coregonus sardinella*	Gill Net	-	1	-	-	-
Pelagic							
Arctic sand lance	*Ammodytes hexapterus*	Beach Seine	-	-	-	-	6
Capelin	*Mallotus villosus*	Fyke Net, Gill Net	-	-	20	7	2
Pacific herring	*Clupea pallasii*	Gill Net	-	-	-	16	-
Demersal/Benthic							
Arctic Shanny	*Stichaeus punctatus*	Minnow Trap	-	-	-	2	-
Arctic flounder	*Liopsetta glacialis.*	Fyke Net	-	-	3	-	-
Fourhorn cculpin	*Myoxocephalus quadricornis*	Beach Seine, Fyke Net, Gill Net	-	-	56	4	2
Fourline snakeblenny	*Eumesogrammus praecisus*	Minnow Trap	-	-	-	-	1
Greenland cod	*Gadus ogac*	Fyke Net, Gill Net	-	-	1	4	39
Longhead dab	*Limanda proboscidea*	Beach Seine	-	-	-	4	-
Saffron cod	*Eleginus gracilis*	Fyke Net, Gill Net	-	1	1,337	-	1
Spatulate sculpin	*Icelus spatula*	Trawl	-	2	-	-	-
Starry flounder	*Platichthys stellatus*	Beach Seine, Fyke Net, Gill Net	-	-	5	2	4
UnID cod	Family Gadidae	Gill Net	2	-	-	-	-
UnID sculpin	Family Cottidae	Beach Seine	-	-	-	-	1
UnID snailfish	Family Liparidae	Beach Seine	-	-	-	1	1

Note:
UnID= Unidentified
Sources: † Wolfden (2006); ‡ Elliot and Cross (2013); * Current study (See Sections 5.2.1 and 5.2.2)

7 References

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