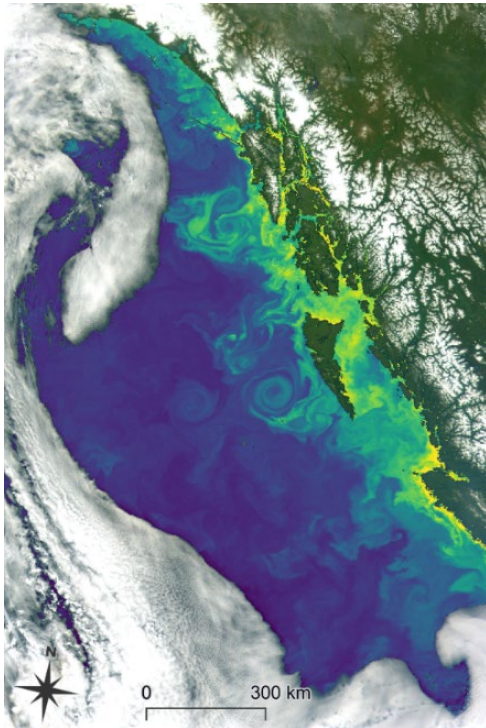




BIOPHYSICAL AND ECOLOGICAL OVERVIEW OF THE OFFSHORE HAIDA GWAII NETWORK ZONES



A large Haida Eddy off **Duu Gúusd** **Daawxuusda** the west coast of Haida Gwaii. Satellite chlorophyll-a image captured by the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) on June 13, 2002.



Figure 1. The Offshore Haida Gwaii Network Zones: **Gangxid Kun Sgaagiidaay** Cape St. James (Zone 505), **Gwaii Haanas Extension**¹ (Zone 504), **Ginda Kun Sgaagiidaay** Offshore Continental Slope South (Zone 503), **Sasga K'ádgwii** Offshore Continental Slope North (Zone 502), **Offshore Northwest Dixon**² (Zone 506), **Tsaan Kwaay** Offshore Learmonth Bank (Zone 501), and **Kadlee** Offshore Celestial Reef (Zone 500). Two Haida dialects are provided: **Xaad Kil** in blue text, and **Xaayda Kil** in green text. The Northern Shelf Bioregion boundary is shown with a dashed line.

¹Gwaii Haanas Extension encompasses two Protection Management Zones in the Haida Gwaii Marine Plan. **Gwiigu Gawga Sgaagiidaay** West Gwaii Haanas Offshore Shelf Representation North and **Gawgaay.ya Sgaagiidaay** West Gwaii Haanas Offshore Shelf Representation South. Work to Confirm the name of the amalgamated site is to be completed during the designation process.

² Work to confirm the name for the Northwest Dixon zone will be completed during the designation process.

Context:

The Offshore Haida Gwaii Network Zones were delineated as part of the Northern Shelf Bioregion Marine Protected Area (MPA) Network planning process and represent candidate areas of importance to protect by the network planning partners (Canada, Province of British Columbia, Council of the Haida Nation and 14 other First Nations). This Biophysical and Ecological Overview Science Advisory Report and associated Research Document were co-authored and co-produced with the Council of the Haida Nation. These publications summarize the knowledge and existing data available on the ecosystems present within the seven zones.

Fisheries and Oceans Canada (DFO) Oceans Program requested that Science Branch provide a biophysical and ecological overview of the Offshore Haida Gwaii Network Zones as a first step in the regulatory process for MPA designation under the Oceans Act. The advice arising from this Regional Peer Review (RPR) will assist managers in refining conservation objectives and area boundaries (if required) and will inform subsequent steps of the Oceans Act MPA designation process. The information will also inform subsequent advice on monitoring indicators, protocols and strategies, identification of information gaps requiring further research, and development of management and monitoring plans for the sites.

This Science Advisory Report is from the November 8-9, 2022, regional peer review on the Biophysical and Ecological Overview of the Pacific Region Offshore Haida Gwaii Network Zones. Additional publications from this meeting will be posted on the [Fisheries and Oceans Canada \(DFO\) Science Advisory Schedule](#) as they become available.

SUMMARY

- This report and the associated Research Document were co-authored and co-produced with the Council of the Haida Nation.
- Haida knowledge and language was woven throughout from the Haida Marine Traditional Knowledge Study and the Haida language authorities. This does not represent the totality of Haida knowledge.
- Throughout the document where possible, names of places and species are provided in two dialects of Haida, **Xaad Kíl** and **Xaayda Kil**, and English in italics. To differentiate between the two Haida dialects, **Xaad Kíl** is in blue text, and **Xaayda Kil** is in green text.
- The Offshore Haida Gwaii Network Zones (OHGNZ) are a group of seven offshore marine zones off **Duu Gúusd Daawxusda** the west coast of Haida Gwaii and in **Siigee Dixon Entrance** in the Pacific Region. Four zones (Zones 505, 504, 503 and 502) are located on the continental slope offshore of **Duu Gúusd Daawxusda** and cover a large depth range. Three zones are located in **Siigee** on the continental shelf and have the shallowest depth distribution (Zones 506, 501 and 500; see Figure 1).
- Spatial data regarding the oceanography, ecology, species distribution, human use, and projected changes to environmental variables and groundfish distributions with climate change of the OHGNZ were compiled and summarized.
- The OHGNZ cover areas of steep terrain and transition from shelf to slope to bathyal plain habitat with distinct oceanographic and ecological processes, unique ecosystem features, and biodiverse assemblages of marine species. Species groups and/or species of ecological and cultural conservation importance that occur in the OHGNZ include: corals and sponges, groundfish (including at least 26 **K'ats Sgaadang.nga** rockfish species), at least 13 marine mammal species, **'Waahúu Tang.gwan Siiga** Leatherback Sea Turtle, and at least 36 species of **Xediit Siigaay xidid** marine birds.

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- The zones overlap, or are in close proximity to, seven Ecologically and Biologically Significant Areas (EBSAs), have strong current and eddy action, overlap with two rocky outcrops (**Tsaan Kwaay Learmonth Bank** and **Kadlee Celestial Reef**), and include the only documented seamount in the Northern Shelf Bioregion. More information on the uniqueness of these zones and projected impacts of climate change are provided in the “Climate Change Impacts” and “Conservation Significance” sections and Table 1 in this report, and the accompanying Research Document³.
- Knowledge gaps and uncertainties have been identified to the best of the authors’ knowledge to help in prioritizing future research.
- The OHGNZ were selected as part of the Marine Protected Area Network in the Northern Shelf Bioregion and are ecologically connected to a variety of bathymetric features and marine populations both within and outside of the region through oceanographic processes. Consequently, there are science recommendations herein that may inform future alterations to zone boundaries (e.g., inclusion of entire bathymetric features and ecosystem representativity).

INTRODUCTION

Haida Language and Knowledge

The analysis and information presented in this report and associated Research Document³ reflect a collaborative process between the Government of Canada and the Council of the Haida Nation. Throughout this report where possible, names of places and species are provided in two dialects of the Haida language, **Xaad Kil** and **Xaayda Kil** and English. To differentiate between the two Haida dialects in the report, **Xaad Kil** is in blue text and **Xaayda Kil** is in green text. The lack of a **Xaad Kil** or **Xaayda Kil** equivalent should not be interpreted as the word does not exist. This document should not be used as a language reference. English names are provided in italics the first time the Haida names are given, and Haida names are shown in bold.

In addition to the biophysical and ecological overview, this document also recognizes and highlights some of the relationships with marine life and harvesting practices continued by the Haida Nation. The Haida knowledge presented in this report should not be considered complete. It is only an indication of some of the traditional Haida marine knowledge that has been recorded and published about the habitats and species found in these zones and around Haida Gwaii. Despite the fact that a substantial amount of information has been documented during various studies, it is important to recognize that this report in no way represents the totality of Haida knowledge regarding marine species and the marine environment.

Haida Gwaii and the Offshore Haida Gwaii Network Zones

Xaadáa Gwáay Xaayda Gwaay.yaay *Haida Gwaii* is the homeland of the Haida Nation. Physically, it is an archipelago on the edge of the continental shelf on the west coast of British Columbia. Stewardship of Haida Gwaii marine areas by the Haida Nation has been ongoing since time immemorial and the Council of the Haida Nation (CHN) has been involved in marine

³ Katherine H. Bannar-Martin, Skil Jáada Vanessa Zahner, Kil Hltaanuwaay Tayler Brown, Chris McDougall, Carolyn K. Robb, Lily Burke, Charles G. Hannah, Cynthia Bluteau, Andrea Hilborn, Josephine C. Iacarella, Erika K. Lok, Amy Liu, Beatrice Proudfoot, Akash R. Sastri, Cooper Stacey, Emily M. Rubidge. *In prep.* Biophysical and Ecological Overview of the Offshore Haida Gwaii Network Zones. Can. Sci. Advis. Sec. Res. Doc.

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planning processes since the 1990s, including the development of the Haida Marine Traditional Knowledge Study, the basis of much of the CHN's marine planning work. The CHN has collaborated in regional planning initiatives in the Northern Shelf Bioregion (NSB) in partnership with many other coastal First Nations, the Government of Canada, and/or the Province of British Columbia (BC).

Building from the efforts of the Pacific North Coast Integrated Management Area plan and the Marine Plan Partnership (MaPP) initiatives, the Government of Canada, Province of British Columbia, Council of the Haida Nation and 14 other First Nations have worked together to develop a proposed [Marine Protected Area Network](#) within the Northern Shelf Bioregion (NSB MPAn). The tripartite technical team developed the NSB MPAn scenario following a systematic conservation planning approach (Margules and Pressey 2000). This planning involved several steps, including developing MPA Network goals (Canada - British Columbia Marine Protected Area Network Strategy 2014), setting network conservation objectives, selecting conservation priorities (Gale et al. 2019; DFO 2017), compiling existing spatial data, and setting spatial conservation targets and design strategies (Martone et al. 2021; DFO 2019). Finally, zones for the network scenario were selected and revised using these inputs together with analytical outputs from the Marxan decision-support tool, internal review by the governance partners, and stakeholder input. The MPA Network Technical Team (MPATT) developed a draft [Network Action Plan](#) that includes the proposed network scenario. The Network Action Plan details the draft conservation objectives for each zone in the network. It also identifies zone-specific human "activities of concern" that may impact conservation priorities and potentially interfere with meeting zone-specific and network-level objectives. The boundaries of the seven zones (numbered 500 through 506) representing the Offshore Haida Gwaii Network Zones (OHGNZ) are the subject of this report and are a subset of the NSB MPAn scenario sites, and therefore contribute to the overall MPA Network goals and objectives.

The OHGNZ are located along [Duu Gúusd Daawxuusda](#) the west coast of Haida Gwaii in [Chaan Tang.gwan](#) the Pacific Ocean from the southern point of [Gangxid Kun](#) Cape St. James to the northern end of [K'iis Gwáay](#) Langara Island and East into [Siigee](#) Dixon Entrance to the eastern boundary of the Haida Gwaii subregion. While four of the seven zones are mostly offshore and in deeper water, the OHGNZ encompass considerable physical and biological variation. The aggregate is characterized by many oceanic ridges, steep sloping walls, troughs, rocky outcrops, and the only known seamount in the NSB. The offshore zones along [Duu Gúusd Daawxuusda](#) the west coast support many different species including: [Xaguu Xaaguu](#) Pacific Halibut, various [K'ats Sgaadang.nga](#) rockfish and groundfish, various whales, ['Waahúu Tang.gwan Siiga](#) Leatherback Sea Turtles, [Káay Kay](#) Steller Sea Lions, [Skul](#) Pacific White-Sided Dolphins, [Xediit Siigaay xidid](#) marine birds, as well as corals and sponges. The zones within [Siigee](#) represent two prominent bathymetric features, [Tsaan Kwaay](#) Learmonth Bank and [Kadlee](#) Celestial Reef. These zones also support many species of conservation concern and species at risk, including a variety of [K'ats](#) rockfish, whales, and [Xediit](#) marine birds.

Objectives

This document provides a biophysical and ecological overview of the seven OHGNZ and includes an integrated consideration of the cultural and social importance of the region and its animals for the Haida Nation. The following aspects of the OHGNZ are summarized:

1. Oceanographic Setting - Regional Patterns
2. Offshore Continental Slope Network Zones off [Duu Gúusd Daawxuusda](#)
 - a. Oceanography

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- b. Ecosystem Heterogeneity
- c. Biological Diversity
- 3. **Síigee** Network Zones
 - a. Oceanography
 - b. Ecosystem Heterogeneity
 - c. Biological Diversity
- 4. Ecological Connectivity
- 5. Human Use of Area and Activities of Concern
- 6. Climate Change Impacts
- 7. Conservation Significance of Area

ANALYSIS

Data and Methods

Spatially explicit regional and local data applicable to the OHGNZ were compiled from a variety of sources, including Fisheries and Oceans Canada (DFO) data and publications, and the Haida Marine Traditional Knowledge Study. Spatial overlay analyses were used to summarize species occurrences, environmental variables, climate change projections, and human activities across the OHGNZ and compare the seven zones to each other and the surrounding area. The data used to inform this process were generated through a variety of research programs and a literature review synthesized by the group of co-authors and collaborators. Species and site-specific Haida knowledge shared by Elders and knowledge holders is included throughout this report and accompanying Research Document³.

Oceanographic Setting - Regional Patterns

The marine waters of the OHGNZ are characterized by variable currents, as the currents coming across the North Pacific diverge offshore of Haida Gwaii. The area has high seasonal variability, the result of changes in large-scale atmospheric weather patterns. In winter the Aleutian Low dominates, whereas the North Pacific High dominates in the summer months, resulting in different mean wind patterns. Winter winds generally blow from the south along the coast and summer winds are usually from the northwest. The El Niño Southern Oscillation also plays an important role in the Northeast Pacific on a two- to seven-year timescale.

Eddies occur frequently in the OHGNZ, resulting in extensive mixing of water from the continental shelf, the California Undercurrent and the subtropical and subpolar gyres represented by the Subarctic Current and the North Pacific current, respectively (Figure 1). The California Undercurrent and its extension north to Alaska delivers relatively warm, high salinity, nutrient-rich, low oxygen water from the equatorial Pacific to Alaska along the upper continental slope.

The OHGNZ are bathymetrically complex, encompassing a wide range of ocean floor depths and geomorphic units, resulting in a heterogeneous benthic environment. The three deepest OHGNZ are the three southernmost offshore continental slope zones off **Duu Gúusd Daawxuusda** the West Coast of Haida Gwaii (505, 504, 503; Figure 1), with maximum depths reaching 2900 m. The three northernmost zones in **Síigee Dixon Entrance** have the shallowest

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(20 - 410 m) depth distribution (506, 501, 500). Based on the water properties and the large-scale oceanography, the OHGNZ can be subdivided into two groups: the four Offshore Continental Slope Zones off **Duu Gúusd Daawxusda** (505, 504, 503, 502), and the three continental shelf zones in **Siígee** (506, 501, 500). The specific oceanographic and ecological settings of these zone groupings are summarized below.

The oxygen minimum zone also forms part of the OHGNZ, resulting in hypoxic oxygen conditions ($< 62.5 \mu\text{M}$) between 480 and 1700 m depths. The vertical oxygen distribution is quite similar in **Duu Gúusd Daawxusda** the west coast of Haida Gwaii below 500 m, and above this depth, sites further north along the coast have progressively more dissolved oxygen. This variation in oxygen levels most likely results from the progressive dilution of nutrient- and oxygen-poor waters transported northwards by the California undercurrent. The highest oxygen values are in the upper 100 m and occur at Zone 505 in the south and Zone 500 in **Siígee**, the two zones with the strongest connections to the continental shelf.

Offshore Continental Slope Network Zones off **Duu Gúusd Daawxusda**

Four zones occur in the Offshore Continental Slope off **Duu Gúusd Daawxusda** the west coast of Haida Gwaii (Figure 1): **Gangxid Kun Sgaagiidaay** Cape St. James (Zones 505), Gwaii Haanas Extension (Zone 504), **Ginda Kun Sgaagiidaay** Offshore Continental Slope South (Zone 503), and **Sasga K'ádgwii** Offshore Continental Slope North (Zone 502).

Oceanography

These four zones ensure that steep slope habitats on the westernmost edge of the Northern Shelf Bioregion are represented in the MPA Network. Consequently, the depth profile, particularly of Zone 502 to 505, is wide and spans the continental shelf, slope, and troughs present offshore of Haida Gwaii. The deepest zone is Gwaii Haanas Extension (504), with a maximum depth of 2900 m and a mean depth of 2009 m. Due to the depth of Zone 504, there is a paucity of data describing its ecology and physical environment as the majority of DFO surveys and research to date have been occurred above 1500 m depth.

The continental slope includes all outside waters between 200 m and 2000 m depth on the westernmost edge of the OHGNZ. The slope is characterized by a series of steeply crenulated canyons and gullies that extend downslope from the shelf break west to the Queen Charlotte Fault valley. Under modern oceanographic conditions, little to no sediment is delivered from Haida Gwaii to the shelf edge to feed the canyons (Barrie et al. 2021). Any active sedimentation that occurs is likely a result of slope processes, including landslides and turbidity currents, as evidenced by slide blocks and debris fields in multibeam data (Barrie et al. 2013, 2021). Canyons terminate at the base of the fault valley, where fault processes can be episodically active. While the majority of these Zones (505, 503, and 502) occur primarily in the slope depth range, Zone 504 (with a maximum depth of 2900 m) also has a large proportion of its area in the upper bathyal plain.

At the southern end of Haida Gwaii, around **Gangxid Kun** Cape St. James, Haida Eddies are formed each winter, advecting nutrient-rich coastal water into the Gulf of Alaska and often to **Sgaan Kinghlas** Bowie Seamount (Figure 1). The Haida Eddies are expected to affect marine ecosystems in **Duu Gúusd Daawxusda** the west coast by carrying nutrients and plankton-rich surface water into the area, and transporting heat and nutrients 100s of kms into the open North Pacific Ocean.

Geomorphic Heterogeneity

Gangxid Kun Sgaagiidaay Cape St. James (Zones 505) and **Sasga K'ádgwii Offshore Continental Slope North** (Zone 502) have the greatest number of differing geomorphic units, encompassing the continental shelf to the toe of the continental slope, and similar habitat heterogeneity within that expanse. Gwaii Haanas Extension (Zone 504) and **Ginda Kun Sgaagiidaay Offshore Continental Slope South** (Zone 503) have very similar geomorphic units, both being offshore areas of ridges, canyons and steep slopes located off the western edge of Haida Gwaii.

Sasga K'ádgwii (Zone 502) overlaps the only currently documented seamount in the NSB - SAUP 5494 (formal name is pending). Recent summer surveys measured its summit depth at 840 m. The summit occurs within Zone 502, but the seamount extends north and south of the boundary. Compared to the other 64 seamounts in the Pacific Region, SAUP 5494 is unique for its flat top and proximity to shore, occurring on the continental slope (Du Preez and Norgard 2022). However, the most notable characteristic of SAUP 5494 is that its origin and composition may be unlike any of the other seamounts. The surface of SAUP 5494 appears to be predominantly mud, with sparse black basalt and light-coloured carbohydrate rocks (Northeast Pacific Deep-Sea Diversity Expedition Pac2022-035) which influences the biological community inhabiting the area. The community observed in 2022 on SAUP 5494 appeared to be dominated by scavengers and deposit feeders, including sea pigs, brittle stars, snails, deep sea snailfish, deep sea sole, stalked barnacles, tunicates, corals, jellyfish, **Huuga Tanner Crabs**, sea pens, anemones, deep sea skates and Northern Fur Seals (Northeast Pacific Deep-Sea Diversity Expedition Pac2022-035).

Biological Diversity

The continental slope includes areas of localized seasonal upwellings, which increase and concentrate prey and/or primary production for a variety of surface and near-surface species, including **Xedíit Siigaay xidid marine birds** and plankton communities. These areas of habitat heterogeneity and productivity offer habitat and refuge to a wide variety of **K'ats Sgaadang.nga rockfish** (*Sebastes* spp.) and have very different species assemblages to the adjacent continental shelf regions. The zones of the Offshore Continental Slope or **Duu Gúusd Daawxusda** provide habitat for biodiverse assemblages of species spanning plankton, cold-water coral, sponges, sea pens, crustaceans, groundfish (including **K'ats Sgaadang.nga rockfish**), pelagic fish, sharks and rays, marine mammals, a reptile and **Xedíit Siigaay xidid marine birds**. This list is not exhaustive and is limited to the data available at the time of writing. A condensed overview of the notable trends in biological diversity is provided below.

Zooplankton biodiversity is dominated by euphausiids, medium- and large-calanoïd copepods, cnidarians/ctenophores and chaetognaths, and pteropods to a lesser extent. Euphausiids dominated the mean spring biomass along **Duu Gúusd Daawxusda** and are important in the diet of **SGidaanáa Sginn xaana Ancient Murrelets** (Gaston 1994) and juvenile **Tsíi.n Chiina salmon**. Euphausiids dominate the biomass in all of the HGONZ and are more important along **Duu Gúusd Daawxusda** in the summer and fall. Small jellyfish (Cnidarians) and ctenophores dominate the biomass of non-crustacean zooplankton during summer along **Duu Gúusd Daawxusda**. Salp biomass is negligible in **Siígee Dixon Entrance** but important to total and non-crustacean zooplankton biomass along the **Duu Gúusd Daawxusda**, especially in the summer.

The OHGNZ provide important habitat for a variety of coral and sponge groups, including soft corals, gorgonian coral, black coral, stony corals, hydro corals, calcareous sponges, demosponges, **Gin gii hik'uuwaansdlagangs glass sponges** and sea pens. Research surveys

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have documented all of these groups of corals and sponges in each of the zones, except for Gwaii Haanas Extension (Zone 504), for which there are only occurrence records for coral, glass sponges, and gorgonian sponges. However, fewer research datasets are available for Zone 504, given its depth. At least six crustacean species that were selected as MPAN Conservation Priorities are known to occur within the OHGNZ. Of these, at least six crustacean species are known to occur in the Offshore Continental Slope Network Zones off **Duu Gúusd Daawxuusda**: **Huuga** Deepwater Grooved Tanner Crab, **K'ust'áan** Dungeness Crab, Sidestripe Shrimp, Smooth Pink Shrimp, Spiny/Northern Pink Shrimp, Spot Prawn, and **Huuga** Deepwater Grooved Tanner Crab, **Núu Naw** Giant Pacific Octopus, Opal Squid, and Sunflower Sea Star have also been observed in **Duu Gúusd Daawxuusda**, with additional observations in **Síigee**. The presence of *Pycnopodia* may be particularly important in these deeper offshore areas if they have persisted through the mass die-off of this species from sea star wasting disease in coastal areas. The coastal populations have declined more than 90% and the species was listed as Critically Endangered on the IUCN Red List (Gravem et al. 2021).

Both bony and cartilaginous fish species are found in the OHGNZ. Bony fishes have been grouped as follows: groundfish (**K'ats Sgaadang.nga** rockfish, flatfish, roundfish, and other), and pelagic fish (forage fish, **Tsii.n Chiina** salmonids, and other). Cartilaginous fishes have been separated into demersal fish (**K'aad aw K'aaxada awga** sharks, **Ts'iit'aa Ts'iiga** skates, and **Sgagwiid Kaaun** rattfish) and pelagic **K'aad aw K'aaxada awga** sharks. Within the Offshore Continental Slope Network Zones off **Duu Gúusd Daawxuusda**, high diversity of fishes occur in all groupings, with groundfish particularly well represented. **Sasga K'ádgwii** (Zone 502) has the highest fish species diversity (58 species), and the highest groundfish species diversity of the OHGNZ. Groundfish and benthopelagic fish are found ubiquitously throughout the OHGNZ and the depth ranges present in the Offshore Continental Slope Network Zones off **Duu Gúusd Daawxuusda** favours high diversity of **K'ats Sgaadang.nga** rockfish species. **K'ats Sgaadang.nga** rockfish species of particular importance to the Haida Nation for cultural use and food security that fulfill cultural conservation objectives include: Shortspine and Longspine Thornyhead, **K'aalts'adaa** Rougheye/Blackspotted, Rosethorn, **SĠan SĠann** Yelloweye, Yellowmouth, Yellowtail, Shortraker, Widow, and Darkblotched Rockfish ([Network Action Plan](#)). **K'ats Sgaadang.nga** rockfish species of conservation concern that occur throughout the OHGNZ and in the Offshore Continental Slope Network Zones off **Duu Gúusd Daawxuusda** include Bocaccio, **Kaa** Canary Rockfish, Quillback Rockfish, **SĠan SĠann** Yelloweye Rockfish, and Yellowmouth Rockfish. Forage fish are poorly represented in the OHGNZ, likely due to a combination of data availability and the depth range of the zones.

The Offshore Continental Slope Network Zones (Zones 502-505) off **Duu Gúusd Daawxuusda** are home to at least 11 cetacean species, two pinnipeds and one **'Wahúu Tang.gwan Siiga** sea turtle species, all of which have been identified as ecological conservation priorities in the NSB. The abundance and distribution of Cetacean species is shaped mainly by the distribution and abundance of their food resources, which are indirectly related to oceanographic features and environmental conditions (Bowen and Siniff 1999). Areas with physical geography that enhances primary productivity and prey biomass or makes prey more accessible at the surface are likely to be important habitat for cetaceans (Gomez et al. 2020), including the highly productive plankton aggregation areas within the Shelf Break EBSA (overlapping Zones 502 to 505). The Offshore Continental Slope Network Zones off **Duu Gúusd Daawxuusda** provide important habitat for Blue Whales (*Balaenoptera musculus*), **Sgagúud Kun Xyapxyandal** Fin Whales (*Balaenoptera physalus*), Sei Whales (*Balaenoptera borealis*), **Kún Kun** Grey Whales (*Eschrichtius robustus*), **Sgagúud SĠap** Humpback Whale (*Megaptera novaeangliae*), transient killer whales (aka Bigg's Killer Whales), **Kún kaj Gajaaw Kun kaajii Gaajaawuu** Sperm Whales (*Physeter macrocephalus*), **Káay Kay** Steller Sea Lions, and **'Wahúu Tang.gwan Siiga**

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Leatherback Sea Turtles. Whales are culturally important to Haidas and are included in many stories. The Haida name for Orca is **SGáan Sgaana**, the same Haida word as for *Supernatural Being*. While whales were not typically hunted by Haidas, **Káay Kay** sea lions were hunted for their meat and oil in past generations.

Haida Gwaii supports globally, nationally, and regionally important aggregations of **Xediit Siigaay xidid** marine birds, including **Sk'áay Sk'aay** albatrosses, petrels, shearwaters, waterfowl, and shorebirds. At least 35 species of **Xediit Siigaay xidid** have been observed within the OHGNZ, however, experts consider that this species list underrepresents the species that use these habitats. All but nine of the documented lists of species are considered conservation priorities within the NSB (Gale et al. 2019). Twenty-seven **Xediit Siigaay xidid** species are found in the Offshore Continental Slope Network Zones off **Duu Gúusd Daawxuusda**. **Xediit Siigaay xidid** marine bird abundance, distribution, and species richness is associated with areas of high productivity and bathymetric features that result in concentrations of prey, as well as proximity to breeding colonies (Clarke and Jamieson 2006; Kenyon et al. 2009). **Xediit Siigaay xidid** can be valuable indicators of ocean health because their breeding habitats on land remain relatively stationary, while the availability of their food resources is temporally and spatially dynamic (Sydeman et al. 2015, 2021). Species such as **Sk'áay Sk'aay** albatrosses, petrels, shearwaters, and fulmars travel vast distances across the Pacific during their non-breeding periods to utilize the marine resources along the continental shelf and shelf break, over seamounts, and other areas with steep bathymetry along Haida Gwaii and the BC coast (Kenyon et al. 2009). Habitats on **Duu Gúusd Daawxuusda** are known to support these species for significant proportions of their annual cycle (Beal et al. 2021). **Siigaay xidid** concentrations adjacent to **Gangxid Kun Sgaagiidaay** Cape St. James (Zone 505) are particularly diverse with globally and nationally significant numbers of at least seven species of **Siigaay xidid**, including large aggregations of shearwaters observed in the waters near the Haida Eddy (Clarke and Jamieson 2006). **Gangxid Kun Sgaagiidaay** (Zone 505) has the highest **Siigaay xidid** marine bird species richness of all the zones, at 23 species.

Siigee Network Zones

Three zones occur in the **Siigee** grouping (Figure 1): *Offshore Northwest Dixon* (Zone 506), **Tsaan Kwaay** *Offshore Learmonth Bank* (Zone 501), and **Kadlee** *Offshore Celestial Reef* (Zone 500).

Oceanography

Siigee Dixon Entrance, in northern Haida Gwaii, is a roughly 50 km wide strait that supports complex water circulation driven by topography, tidal rectification, freshwater input, and inflows from the continental slope. Two eddies (gyres) dominate the surface circulation in **Siigee**. The Rose Spit Eddy, a cyclonic (anti-clockwise rotating) eddy, occupies the eastern end of **Siigee** near **Kadlee Celestial Reef** (Zone 500). A second, anti-cyclonic eddy, is also often present at the western end of **Siigee** over **Tsaan Kwaay Learmonth Bank** (Zone 501).

The three **Siigee** zones exist on the continental shelf, in marine waters up to 200 m in depth. Limited geological surveys have occurred on the shelf west of Haida Gwaii, and existing data suggest that it is primarily characterized by exposed bedrock.

Geomorphical Heterogeneity

Zones 500, 501 and 506 are very similar to each other, all located on the continental shelf within **Siigee Dixon Entrance**, with crests, lesser depressions, gentle slopes and troughs for Zone 506 and Zone 500.

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Two pronounced bathymetric features, rocky outcrops, occur in **Siigee**: **Tsaan Kwaay Learmonth Bank** (overlapped by Zone 501) and **Kadlee Celestial Reef** (overlapped by Zone 500), both with high benthic and taxonomic diversity. **Tsaan Kwaay** rises from 480 m up to 25 m depth and is sometimes encircled by a clockwise eddy. The associated combination of habitat heterogeneity and currents has created a seascape that hosts high demersal fish abundance high in **K'ats rockfish** species, an abundance of corals and sponges, and multiple substrates for biogenic structures. **Tsaan Kwaay** has also been designated as an EBSA and is an important feeding area (Alcids), migration route (**Kún Grey Whales**), or area of aggregation (**Sgagúud Fin Whales** and coral). **Kadlee** is a productive fishing ground (e.g., **Táayii Coho Salmon**). To date, there has been little high-resolution biological and bathymetric sampling of the area, and no focused research program is currently fulfilling knowledge gaps about the area.

Biological Diversity

Chlorophyll values (Chl-a) spanning 2003 to 2021 are highest in the northern zones of **Tsaan Kwaay Offshore Learmonth Bank** (Zone 501) and **Kadlee Offshore Celestial Reef** (Zone 500). These regions also had the highest variability in the timing of annual peak Chl-a, which occurred from April through June for **Tsaan Kwaay**, and May through June for **Kadlee**.

The maximum mean annual zooplankton biomass in **Siigee** occurs in the spring (April, May, June) and is dominated by medium-sized calanoid copepods, gelatinous plankton (cnidarians and ctenophores), euphausiids, and chaetognaths. Small jellyfish (Cnidarians) and ctenophores dominate the biomass of non-crustacean zooplankton during spring in **Siigee**.

Similar to Offshore Continental Slope Network Zones off **Duu Gúusd Daawxuusda**, all major groupings of corals and sponges (soft corals, black coral, stony corals, hydro corals, sea pens, calcareous sponges, demosponges, and **Gin gii hik'uuwansdlagangs glass sponges**) are documented in the three zones of **Siigee** and are particularly prevalent in **Tsaan Kwaay Learmonth Bank** and **Kadlee Celestial Reef**. Six crustacean species that were selected as MPA network Conservation Priorities are known to occur within the **Siigee** zones (**Huuga Deepwater Grooved Tanner Crab** and **K'ust'áan Dungeness Crab**), one **Daga 'iwaans prawn**, and three shrimp species). Zone 501 has no documented crustacean species occurrences. While there is no documented occurrence within the **Siigee** zones, **Núu Giant Pacific Octopus** (*Enteroctopus dofleini*) are found near Zones 506, 501, and 500. Sunflower Sea Star (*Pycnopodia helianthoides*) has a high density of observations in Zone 500. Additional records of Sunflower Sea Star occurrences are in proximity to Zones 502 and 501. **Gúudangee Red Urchins** (*Mesocentrotus franciscanus*) are found between Zones 506 and 501, but no records occur within any of the Offshore Haida Gwaii Network Zones.

The fish biodiversity present in the **Siigee** zones is very similar to that of the Offshore Continental Slope Network Zones off **Duu Gúusd Daawxuusda**, detailed above. Zone 500 has the highest fish species diversity of **Siigee** (46 species), and Zone 501 has the second highest groundfish species density modelled for the OHGNZ.

The **Siigee** grouping of zones is home to at least 11 cetacean species and one **'Wahúu** sea turtle species, all of which have been identified as ecological conservation priorities in the NSB. Within the **Siigee** zones, important habitat exists for Blue Whales (*Balaenoptera musculus*), **Sgagúud Fin Whales** (*Balaenoptera physalus*), Sei Whales (*Balaenoptera borealis*), **Kún Grey Whales** (*Eschrichtius robustus*), **Sgagúud Humpback Whale** (*Megaptera novaeangliae*), Resident Orcas (*Orcinus orca*), **Kún kaj Gajaaw Sperm Whales** (*Physeter macrocephalus*), and **'Wahúu Leatherback Sea Turtles**.

Twenty-seven of the 35 **Xediit** species documented in the OHGNZ and found in the **Siigee** zones. Although **Xediit marine bird** abundance and distribution have been documented in the

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terrestrial and nearshore areas of Haida Gwaii, there is a need for information on their abundance, distribution, population trends, and foraging and movement ecology in the OHGNZ. **Tsaan Kwaay** Offshore Learmonth Bank Zone 501 is known for high concentrations of zooplankton prey and alcids, many likely from nearby colonies on **K'iis Gwáay** Langara Island. **Kadlee** Offshore Celestial Reef Zone 500 hosts a wide diversity of **Xediit**, including shearwaters, alcids, loons, and waterfowl.

Ecological Connectivity

The OHGNZ are part of the wider dynamic ocean and are connected to marine features both within and outside of the NSB. As noted, these zones were selected to function as part of a network of MPA sites throughout the NSB, and therefore complement other zones proposed for protection to meet a variety of ecological and cultural conservation objectives within the NSB. Ecological connectivity – the exchange of individuals, genes and/or nutrients between the network zones and the surrounding habitat – is particularly likely with ecosystems in close proximity to the OHGNZ and highly influenced by dominant oceanographic currents and eddies. For example, the OHGNZ are likely ecologically connected to nearby unprotected cold seeps, mud volcanoes, and additional seamounts (e.g., NEPDEP 57 and 58 seamounts in the Tuzo Wilson complex ~6 km south of Zone 505). The dynamics of large oceanographic systems such as Haida Eddies that move water and associated nutrients and plankton also likely support connectivity between the coast, OHGNZ and features further afield, possibly all the way to **SGaan Kinghlas**–Bowie Seamount.

Human Use and Activities of Concern

Haidas have been intimately connected with the marine environments surrounding **Xaayda Gwaay Xaaydaga Gwaay.yaay** Haida Gwaii and all the marine animals since the beginning of time. “Haida culture is intertwined with all creation in the land, sea, air and spirit worlds. Life in the sea around us is the essence of our well-being, and so our communities and culture” (Haida Marine Traditional Knowledge Study 2011). The Haida value of **Ginn 'wáadluwan gud .ahl kwáagiidang Gina 'waadluxan gud ad kwaagid** *everything depends on everything else* asserts that everything holds an important role within the ecosystems, and it is crucial to maintain **Agan t'ats'gang Giid tlljuus** *balance*. Historical and contemporary Haida use of important marine species and the offshore areas are therefore inseparable from the ecology and are thus interwoven throughout this report and accompanying Research Document³.

While every species is intrinsically valuable, certain species are also irreplaceable food sources and/or are tightly tied to continuing Haida cultural traditions, stories, ceremonies, and language. Culturally important species briefly described in the research document include fish: e.g., **Tsii.n Chiina** salmon, **Xaguu Xaaguu** Pacific Halibut, **Skil Skil** Black Cod/Sablefish, **Skáaynang Skaynang** Lingcod, **'iináng iinang** Pacific Herring, **Sáaw Saaw** Eulachon, **K'ats Sgaadang.nga** rockfish; **Xediit Siigaay xidid** marine birds (e.g., **SGidaanáa Sginn xaana** Ancient Murrelets), and whales. Cultural use and relationships with non-human beings are integral to the Haida way of life. This report and accompanying Research Document³ are intended to highlight some aspects of the cultural importance of the OHGNZ.

Currently, the waters in and around Haida Gwaii support commercial fisheries for all **Tsii.n Chiina** salmon species, **Xaguu Xaaguu** Pacific Halibut, **Skil Skil** Sablefish, many other groundfish species, Albacore Tuna, **K'ust'áan K'uust'an** Dungeness Crab, **Gúudangee Guuding.ngaay** Red Sea Urchin, **skáw t'l'áahljuu Skaawal** Geoduck, **K'amaahl K'aamahl** Razor Clams, **Daga 'iwaans GuudagiiGayd** prawn and shrimp. Within the OHGNZ, nine different commercial fisheries have operated since at least 2012: groundfish trawl (bottom and

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midwater), **Xaguu Xaaguu** hook and line, **Xaguu Xaaguu** and **Skil Skil** hook and line combined, **Skáaynang Skaynang** *Lingcod* hook and line, **K'ats Sgaadang.nga** *rockfish* outside hook and line, **Skil Skil** by trap, tuna troll, and **Tsii.n Chiina** troll. The impacts of commercial fishing can include localized depletion of marine resources, and for fishing gear that contacts the bottom, destruction of sensitive benthic habitats, such as coral and sponge reefs. Large vessels also introduce vessel noise and the potential for oil spills and marine litter. While most fishing occurs outside of the OHGNZ, all the zones are fished to some extent.

Fishing, ecotourism and people visiting residents of Haida Gwaii are the primary reasons for tourism. Recreational fisheries occur throughout the coastal regions and freshwater systems of Haida Gwaii, providing a source of tourism. Anglers typically target **T'áaw'un Taagunn** *Chinook Salmon* and **Táayii Taay.yii** *Coho Salmon*, **Xaguu Xaaguu** *Pacific Halibut*, **Skáaynang Skaynang** *Lingcod*, and **K'ats Sgaadang.nga** *rockfish* species. Most of this activity is concentrated around **K'iis Gwáay** *Langara Island* (near Zone 501) and along the north and west coast of Haida Gwaii, where there are several fishing lodges and charter boat operations. Although the impacts of tourism on the marine environment are likely minimal, tourism increases vessel traffic, which is a potential source of ocean noise and water pollution.

Vessel traffic in the OHGNZ consists of commercial (shipping and fishing), recreational (cruise ships, recreational boating and recreational fishing) and government (research and Coast Guard) vessels. The largest vessels to utilize the offshore marine waters of Haida Gwaii are cargo vessels (container ships, bulk carriers, vehicle carriers, and other cargo ships), cruise ships and tankers. Shipping and cruise ship traffic in this part of the NSB transit along a Pacific Northwest Route (Southeast Alaska, Washington, and British Columbia ports) or along a Great Circle Route to Asia. The Voluntary Protection Zone (VPZ), a unique and significant collaboration between the Council of the Haida Nation, Government of Canada, and maritime shipping industry, along with other advisors and partners, was established on September 1, 2020, and remains in effect until further notice. The VPZ applies to large vessels (≥ 500 tons gross tonnage, except for tugs, barges, and fishing vessels), adherence is voluntary, and is designed to keep such large vessels offshore (12-50 nm from shore).

Within the OHGNZ, potential ocean energy sources include offshore oil and gas (tenures, wells and prospection), wave and wind energy areas, or areas of high wave power. The possibility of future ocean energy development has environmental implications through associated vessel traffic and environmental pressures.

Documented sources of pollutants within Haida Gwaii's marine waters are sewage discharges into coastal waters from septic fields, municipal outfalls, vessels and float camps (MaPP 2015). Small and large vessels are sources of water pollution through the discharge of oily bilge water, sewage and litter, and large vessel ballast water. Vessel traffic is a key concern as a source of pollutants, particularly in the form of oil spills. Furthermore, the development of infrastructure, such as oil pipelines and natural gas facilities, could result in increased risks from increasing vessel traffic and associated pollutant discharge (oil, bilge, cargo) and ocean noise. All sources of marine pollution and contamination can negatively impact marine life and directly jeopardize individual species' health and habitats, however pollutants from large vessels are the most likely sources of marine pollution in the OHGNZ.

Climate Change Impacts

Climate change is altering the ocean's distribution of heat, alkalinity and oxygen. These changes will have notable consequences for marine life, affecting their distribution, fitness and survival, and phenology. The waters of the Northern Shelf Bioregion are warming and have

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been since at least 1981. Additionally, a warming trend is projected into 2070 by two separate climate change models and emissions scenarios³. As air and water temperatures rise, the dissolved oxygen content of the ocean declines, and oxygen demand from organisms increases; further, increased atmospheric carbon dioxide levels increase the acidity of oceanic waters as it is absorbed, lowering the pH. Marine species are generally expected to shift their habitats towards deeper, colder waters at higher latitudes, where their physiological tolerances and dispersal abilities allow. However, oxygen loss at depth (300-1000 m) is also projected to negatively impact marine species and may cause some species to shift to shallower depths (Thompson et al. 2023).

Spatial overlays of the outputs from two regional models (Northeastern Pacific Canadian Ocean Ecosystem Model [NEP36]; Holdsworth et al. 2021) and British Columbia continental margin model (BCCM; Peña et al. 2019) of projected environmental variables changing under two climate change scenarios (Representative Concentration Pathway [RCP] 8.5 and RCP 4.5) were used to compare projected climate change conditions across the OHGNZ. RCP 4.5 is a moderate scenario in which emissions peak around 2040 and then decline. RCP 8.5 is the highest baseline emissions scenario in which emissions continue to rise throughout the twenty-first century. Changes in seasonal surface layer and bottom layer temperature, bottom layer aragonite saturation, and bottom layer dissolved oxygen were calculated between the historic (BCCM: 1981-2010; NEP36: 1986-2005) and projected future (BCCM: 2041-2070; NEP36: 2046-2065) time periods. Deleterious changes (above threshold values) in water temperature were projected for Zones 500, 501, and 506 in the bottom layer ($> 1^{\circ}\text{C}$) and all zones throughout the year in the surface layer ($> 2^{\circ}\text{C}$). Average aragonite saturation levels below the threshold value of 1, a measure of unsaturation and ocean acidification, were projected for all zones throughout the year in the bottom layer for both models and both climate change scenarios. Dissolved oxygen below $62.5\ \mu\text{mol/L}$ (hypoxia) is projected for the bottom layer of Zones 505, 504, 503, and all Offshore Continental Slope Network Zones off **Duu Gúusd Daawxuusda** throughout the year.

Using modelled distribution data of 34 groundfish species across the OHGNZ under the aforementioned climate change models and scenarios, groundfish are projected to go deeper to avoid higher temperatures, stay the same, or go shallower to maintain ideal oxygen levels for their physiology. The largest changes in both species gains and species losses are expected in Zone 502. A similar trend is noted in Zone 503 where large species gains occur on the continental shelf portion of the zone. Given that these zones span a large depth range, the climate change models forecast shifts in distributions across the zones but no loss of species overall, and an increase in species diversity at certain depths, especially at the mid-depths characterizing the continental shelf. Consequently, the three relatively shallower zones found in **Síigee** (Zones 500, 501 and 506) gain the greatest projected groundfish diversity and species richness. Diversity is increasing at mid-depths (100-300 m), and given that these zones were designed across a large depth range, species can redistribute across the zones and overall, not be lost. This highlights the value of an MPA network design that may buffer against climate change impacts.

Conservation Significance of Area

The seven zones that comprise the OHGNZ are part of a greater network of existing and proposed MPA sites within the Northern Shelf Bioregion. Through the MPA Network planning process, sites were identified for protection based on various factors, including their contribution to capturing a representation of the network's Ecological Conservation Priorities (E-CPs) and Cultural Conservation Priorities (C-CPs). E-CPs for the NSB include species considered

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vulnerable, ecologically important, or of conservation concern, as well as climate refugia, degraded areas, representative habitats, and EBSAs. The design strategies for the MPA Network process also include ecological conservation targets, which are quantitative estimates of how much each spatial feature representing an E-CP should be included in the network. First Nations partners identified C-CPs as one way of representing culturally and spiritually important areas in the network. Informed by Indigenous knowledge and cultural data collected by individual First Nations, C-CPs helped each Nation ensure that areas of high cultural and/or spiritual value in their territories were considered in the Network development process, recognizing that all areas in a Nation's territory are culturally significant. C-CPs include areas important for traditional fishing, hunting and gathering, as these areas have been identified as important for the continuity of knowledge transfer from Elders to youth, culturally significant species, and for overall cultural and spiritual well-being of Nations. The C-CPs identified in this planning process are for the territories of partner First Nations in the planning process, and do not capture the interests of all First Nations communities in the NSB.

Summary results for the spatial coverage of E-CPs and C-CPs in each of the Offshore Haida Gwaii Network Zones are provided in the accompanying Research Document³. Overall, the OHGNZ provides high spatial coverage (10-17%) for the following species features: **Waa húu Tang.gwan Siiga** *Leatherback Sea Turtle*, **Huuga Huuga** *Deepwater Grooved Tanner Crab*, Blue Whales, black coral, Sei Whales, **Kún kaj Gajaaw Kun kaajii Gaajaawuu** *Sperm Whales*, shelf fishes, Roughtail Skate and Longspine Thornyhead. The OHGNZ provides the highest spatial coverage (11-54%) for the following habitat features: the Continental Slope (ecosections, geomorphic and biophysical units), EBSAs (Shelf Break, Cape St. James, Learmonth Bank, Seamount, Haida Eddy), and ocean subregions (**Duu Gúusd Daawxuusda** Upwelling⁴ and Cape St. James Tidal Mixing). Each zone in the Offshore Haida Gwaii Network Zones overlap areas with at least moderate Haida cultural conservation priorities, and **Gangxid Kun Sgaagiidaay** and **Sasga K'ádgwii** have very high Haida cultural conservation priorities. Additional, features that have been observed on or near the continental slope, but currently have not been documented within the OHGNZ, include cold seeps, mud volcanoes, and other seamounts, and the **SGaan Kinghlas**-Bowie Seamount Marine Protected Area, which is offshore to the west of Haida Gwaii and ecologically connected to the OHGNZ.

⁴ "the official name" of West Coast Queen Charlotte Islands Upwelling Region is 13 years outdated and intentionally not used in this report.

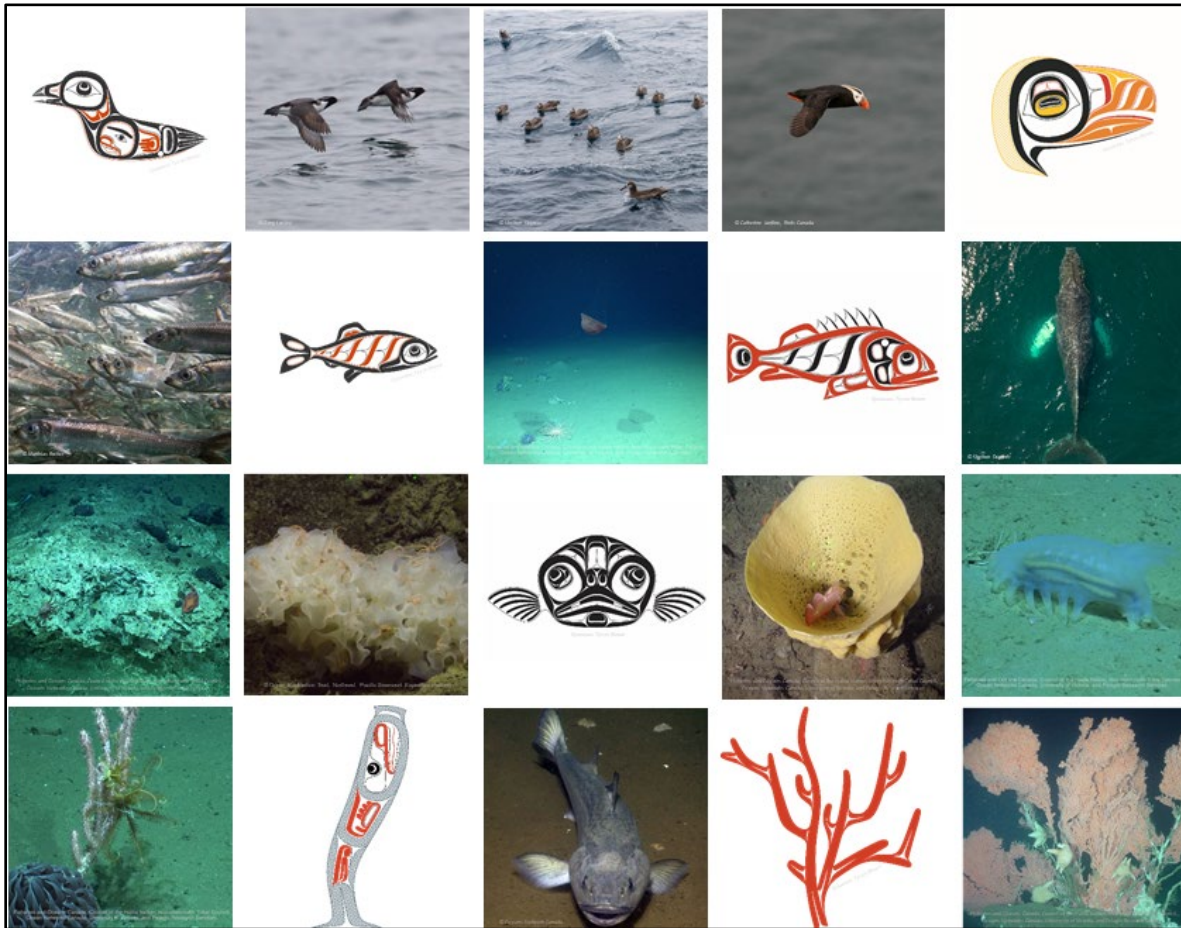


Figure 2. Some of the ecological diversity found within the OHGNZ. From top-left to bottom-right: Haida formline of **SGidaanáa Sginn xaana** Ancient Murrelet (*Synthliboramphus antiquus*); **SGidaanáa Sginn xaana**; **Sk'áay** Black-footed Albatross (*Phoebastria nigripes*) over the pinnacle of SAUP 5494 seamount (Zone 502); **Kwa.anaa Kuuxaana** Tufted Puffin (*Fratercula cirrhata*); Haida formline of **Kwa.anaa Kuuxaana**; **'iináng iinang** Herring (*Clupea pallasii*); Haida formline of **'iináng iinang**; **Poralia** jelly (*Poralia rufescens*) over muddy bottom of seamount SAUP 5494 (Zone 502); Haida formline of **K'ats Sgaadang.nga** Rockfish; **Sgagúud Sgap** Humpback Whale (*Megaptera novaeangliae*); Scarlet King Crab (*Lithodes couesi*) and Thornyhead (*Sebastolobus* spp.) on carbonate structure on SAUP 5494 seamount (Zone 502); **Gin gii hlk'uuwaansdlagangs** glass sponge (class Hexactinellida); Haida formline of **Skil Skil** Sablefish (*Black Cod*, *Anoplopoma fimbria*); **Demosponge** (*Mycale* sp.) with a Sharpchin Rockfish (*Sebastes zacentrus*) on the rocky outcrop **Tsaan Kwaay** Learmonth Bank (Zone 501); Sea pig (*Scotoplanes* sp.) on muddy bottom of SAUP 5494 seamount (Zone 502); Pom Pom Anemone (*Liponema brevicorne*), **Paragorgia** coral (*Paragorgia cf. jamesi*) with **crionids** (*Florometra serratissima*) on SAUP 5494 seamount (Zone 502); Haida formline of **Gin gii hlk'uuwaansdlagangs**; **Skil Skil**; Haida formline of red tree coral; red tree coral (family Primnoidae) and sea stars (*Hippasteria* spp.) on the rocky outcrop **Tsaan Kwaay** Learmonth Bank (Zone 501). Images from Greg Lasley, Shelton Dupreez, Catherine Jardine, Matthias Breiter, Northeast Deep-Sea Diversity Expedition Partners (Fisheries and Oceans Canada, Council of the Haida Nation, Nuuchahnulth Tribal Council, Ocean Networks Canada, University of Victoria, Pelagic Research Services), and Oceans Exploration Trust, Northeast Pacific Seamount Expedition Partners (Council of the Haida Nation, Fisheries and Oceans Canada, Ocean Networks Canada, Oceana). Haida formlines by **Ijuuwaas** Tyson Brown.

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Highlights describing the conservation significance of the OHGNZ are briefly summarized by zone in the bullets below.

Gangxid Kun Sgaagiidaay (Zone 505)

- High habitat heterogeneity – one of three replicate representative bands of slope habitats across depth strata from toe of slope to nearshore when coupled with the ‘strict protection’ zone in the Gwaii Haanas National Marine Conservation Area Reserve (NMCAR) and Haida Heritage Site (HHS)
- Captures portion of Cape St. James, Shelf Break and Continental Slope EBSAs and includes the Haida Eddy EBSA
- Representation of multiple groundfish and slope **Sgaadang.nga** rockfish species
- Representation of a range of cold-water corals and sponges
- Representation of both Continental Slope Ecoregion and the Cape St. James Tidal Mixing Region – Upper Ocean Subregion
- Overlaps with areas of very high (**Gangxid Kun Cape St. James**) and high (South Moresby Trough) Haida cultural conservation priorities

Gwaii Haanas Extension (Zone 504)

- High habitat heterogeneity – one of three replicate representative bands of slope habitats across depth strata from toe of slope to nearshore when coupled with the ‘strict protection’ zone in Gwaii Haanas NMCAR and HHS
- Captures portion of Shelf Break and Continental Slope EBSAs and includes the Haida Eddy EBSA
- Representation of both Continental Slope Ecoregion and the **Duu Gúusd Daawxusda** Upwelling Region – Upper Ocean Subregion

Ginda Kun Sgaagiidaay (Zone 503)

- Captures portion of Shelf Break and Continental Slope EBSAs and includes the Haida Eddy EBSA
- Captures western portion of a large bathymetric feature located in the eastern part and extends westward to the base of the continental slope
- Representation of multiple groundfish and slope **Sgaadang.nga** rockfish species
- Representation of a range of cold-water corals and sponges
- Representation of both Continental Slope Ecoregion and the Coastal Mixing Region - Upper Ocean Subregion
- Overlaps with areas of high Haida cultural conservation priorities (**Ginda Kun Kindakun**, and **Ginda Kun** to slope)

Sasga K'ádgwii (Zone 502)

- High habitat heterogeneity – one of three replicate representative bands of slope habitats across depth strata from toe of slope to nearshore when coupled with existing Rockfish Conservation Area (**Sasga Frederick Island**)
- Captures a portion of Shelf Break, Continental Slope, and seamount EBSAs

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- Representation of multiple groundfish and slope **K'ats** rockfish species
- Representation of a range of cold-water corals and sponges
- Representation of both Continental Slope Ecoregion and the Southeast Alaska Mixing Region – Upper Ocean Subregion
- Captures summit and portion (33%) of only known seamount in the Northern Shelf Bioregion, which is ecologically unique among seamounts
- Overlaps with an area of high Haida cultural conservation priority (**Sasga** to slope)

Offshore Northwest Dixon (Zone 506)

- Representation of multiple slope **K'ats** rockfish species
- Captures portions of identified shelf fish and invertebrate biomass hotspots
- Representation of both Dixon Entrance Ecoregion and the Southeast Alaska Mixing Region - Upper Ocean Subregion

Tsaan Kwaay (Zone 501)

- Captures southern portion of Learmonth Bank EBSA
- Representation of multiple groundfish and **K'ats** rockfish species
- Representation of both Dixon Entrance Ecoregion and the Southeast Alaska Mixing Region – Upper Ocean Subregion
- Overlaps with an area of high Haida cultural conservation priority (**Tsaan Kwaay**)

Kadlee (Zone 500)

- Captures southern portion of **Kadlee** benthic feature
- Captures portions of identified shelf invertebrate biomass and diversity hotspots
- Representation of multiple groundfish and shelf **K'ats** rockfish species
- Representation of both Dixon Entrance Ecoregion and the Dixon Entrance Coastal Flow Region - Upper Ocean Subregion
- Overlaps with an area of high Haida cultural conservation priority (**Kadlee**)

Summary Table

The following summary table is a high-level summary of the unique attributes of each zone within the OHGNZ.

Table 1. Accompanying Research Document³ summary highlights for each zone within the Offshore Haida Gwaii Network Zones.

Zone (area)	Oceanographic Setting	Ecological Setting	Human Use	Climate Change and Conservation
Gangxid Kun Sgaagiidaay Cape St. James Zone 505 (531.12 km ²)	<ul style="list-style-type: none"> Haida Eddies typically form near Gangxid Kun Cape St. James during winter. They carry warmer, less saline water, and nutrients over hundreds of kilometers into the Gulf of Alaska. They have sizes in the order of 100 km with a core depth of about 1000 m Coldest summertime surface waters Upwelling-favourable winds less frequent compared to further south along BC coast With Zone 500, has highest oxygen in upper 100 m given its connections with the shelf Surface Chl-a remains low year-round 	<ul style="list-style-type: none"> Overlap with Cape St. James, Shelf Break and Continental Slope EBSAs and includes the Haida Eddy EBSA Corals and sponges, Sgaadang.nga rockfish (Shortspine Thornyhead, Yellowmouth, Darkblotched, Pacific Ocean Perch), groundfish (Skil Sablefish, Xaaguu Pacific Halibut, T'aal Arrowtooth flounder, Spiny Dogfish), marine mammals (Sperm, Kun Xyapxyandal Fin, Sei, Blue, and Sgap Humpback whales; Northern Right Whale Dolphin, Kay Steller Sea Lion, Skul Pacific White-Sided Dolphin, K'aang Dall's Porpoise), Tang.gwan Siiga Leatherback Sea Turtle, Siigaay xidid marine birds (Sk'aay Albatross, gulls, small alcids, storm petrels, and shearwaters and fulmars) 	<ul style="list-style-type: none"> High cultural and historical value, including important Haida spiritual relationship to area and an area that provides food security, including Xaaguu Pacific Halibut and various Sgaadang.nga rockfish (Shortspine Thornyhead, Yellowmouth Rockfish, Darkblotched Rockfish) 	<ul style="list-style-type: none"> Projected sea surface temperature changes > 2°C Sea bottom aragonite undersaturation Hypoxic water (historically and predicted) Linkage to existing 'strict protection zone' in Gwaii Haanas NMCAR and HHS (toe of slope to nearshore) E-CPs: Continental Slope Ecosession, Slope and Trough Biophysical Units, a range of Geomorphic units, the Cape St. James Tidal Mixing Region, corals and sponges. C-CPs: South Moresby Trough (High importance), and Gangxid Kun Cape St. James (Very High importance)
Gwaii Haanas Extension Zone 504 (1072.07 km ²)	<ul style="list-style-type: none"> Upwelling-favourable winds less frequent compared to further south along BC coast during summer North-flowing Haida current forms on along this coast 	<ul style="list-style-type: none"> Overlap portion of Shelf Break and Continental Slope EBSAs and includes the Haida Eddy EBSA Various whales (Kun kaajii Gaajaawuu Sperm, Sei, 	<ul style="list-style-type: none"> High cultural and historical value, including important Haida spiritual relationship to area 	<ul style="list-style-type: none"> Projected sea surface temperature changes > 2°C Sea bottom aragonite undersaturation Hypoxic water (historically and predicted)

**Biophysical and Ecological Overview of the
Offshore Haida Gwaii Network Zones**

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Zone (area)	Oceanographic Setting	Ecological Setting	Human Use	Climate Change and Conservation
Ginda Kun Sgaagiidaay <i>Offshore Continental Slope South</i> Zone 503 (830.90 km ²)	<ul style="list-style-type: none"> • Upwelling-favourable winds less frequent compared to further south along BC coast during summer • North-flowing Haida current forms on along this coast during the colder months from October to April due to the prevailing winds • Surface Chl-a below 3 mg m-3 year-round • No unique zooplankton sampling events in this Zone 	<ul style="list-style-type: none"> • Overlap portion of Shelf Break and Continental Slope EBSAs and includes the Haida Eddy EBSA • Corals and sponges, Sgaadang.nga rockfish (Longspine Thornyhead, Shortspine Thornyhead, Shortraker, Widow, Yellowmouth, Rougheyeye/Blackspotted, Bocaccio), groundfish (Skil Sablefish, Dover Sole), whales (Kun kaajii Gaajaawuu Sperm, Sei, Blue, Kun Xyapxyandal Fin, Sgap Humpback), Tang.gwan Siiga Leatherback Sea Turtle 	<ul style="list-style-type: none"> • Hosts all 9 commercial fishing licenses (groundfish bottom trawl and groundfish midwater trawl; halibut, halibut and sablefish, lingcod, and rockfish hook and line; sablefish trap; tuna troll and salmon troll) • High cultural and historical value, including important Haida spiritual relationship to area and an area that provides food security, including Xaaguu Pacific Halibut, various Sgaadang.nga rockfish (Longspine Thornyhead, Shortspine Thornyhead, Shortraker, Widow, Yellowmouth, Rougheyeye/Blackspotted), and Skil Sablefish. 	<ul style="list-style-type: none"> • High spatial coverage for both species and habitat E-CP features: Continental Slope Ecosession, Slope Biophysical Unit, and the West Coast HG Upwelling Region. • Linkage to existing 'strict protection zone' in Gwaii Haanas NMCAR & HHS (toe of slope to nearshore) • Projected sea surface temperature changes > 2°C • Sea bottom aragonite undersaturation • Hypoxic water (historically and predicted) • E-CPs: Continental Slope Ecosession, Slope and Trough Biophysical Units, Coastal Mixing Region, corals and sponges. • C-CPs: Ginda Kun Kindakun (High importance), Ginda Kun to Slope (High importance)
Sasga K'adgwii	<ul style="list-style-type: none"> • Upwelling-favourable winds less frequent compared to further south along BC coast during summer 	<ul style="list-style-type: none"> • Overlap with portion of Shelf Break, Continental Slope, and seamount EBSAs 	<ul style="list-style-type: none"> • Recreational groundfish fishery • Closest to recreational tourism activities 	<ul style="list-style-type: none"> • Projected sea surface temperature changes > 2°C • Sea bottom aragonite undersaturation

**Biophysical and Ecological Overview of the
Offshore Haida Gwaii Network Zones**

Pacific Region

Zone (area)	Oceanographic Setting	Ecological Setting	Human Use	Climate Change and Conservation
<i>Offshore Continental Slope North Zone 502</i> (901.06 km ²)	<ul style="list-style-type: none"> • North-flowing Haida current forms on along this coast during the colder months from October to April due to the prevailing winds • Surface Chl-a typically below 3 mg m⁻³ year-round 	<ul style="list-style-type: none"> • Seamount (SAUP 5494) • Highest fish species richness, modeled and actual • Corals, K'ats rockfish (Longspine Thornyhead, Shortraker, Shortspine Thornyhead, Bocaccio, Darkblotched, Widow, Pacific Ocean Perch), groundfish (Rex Sole, Skil Sablefish, Xaguu Pacific Halibut), whales (Kún kaj Gajaaw Sperm, Sei, Blue, Sgagúud Fin, Humpback), 'Waahúu Leatherback Sea Turtle, Sk'áay Albatross, small alcids, Kwa.anaa puffins 	<ul style="list-style-type: none"> • High cultural and historical value, including important Haida spiritual relationship to area and an area that provides cultural use and food security, including Xaguu Pacific Halibut, various K'ats rockfish (Longspine Thornyhead, Shortraker, Shortspine Thornyhead, Darkblotched, Widow) and Skil Sablefish 	<ul style="list-style-type: none"> • Largest range of projected groundfish species richness changes • Linkage to existing Rockfish Conservation Area (toe of slope to nearshore) ensuring multiple depth ranges available within protected zones if species move as predicted under climate change scenarios • E-CPs: Continental Slope ecosection, Slope, Shelf and Trough Biophysical Units, SE Alaska Mixing and Coastal Mixing Regions, corals and sponges, and the only known seamount in the NSB • C-CPs: area of high Haida cultural conservation priority (Sasga to slope)
<i>Offshore Northwest Dixon Zone 506</i> (267.86 km ²)	<ul style="list-style-type: none"> • Upwelling-favourable winds less frequent compared to further south along BC coast during summer • North-flowing Haida current forms on along this coast during the colder months from October to April due to the prevailing winds • Surface Chl-a typically below 3 mg m⁻³ year-round, except during bloom conditions usually in May 	<ul style="list-style-type: none"> • Shelf invertebrate and fish species; including various K'ats rockfish (Darkblotched, Widow, Shortraker, Shortspine Thornyhead, Redstripe, Yellowmouth, Rosethorn, K'aalts'adaa Rougheye/Blackspotted, Bocaccio, SGan Yelloweye, Pacific Ocean Perch), corals, sponges, Rex Sole, Dover Sole, Walleye Pollock, Kyaa.n Pacific 	<ul style="list-style-type: none"> • Recreational groundfish fishery • Closest to recreational tourism activities • Has high cultural and historical value, including important Haida spiritual relationship to area and an area that provides food security, including Xaguu Pacific Halibut, various K'ats rockfish (Longspine Thornyhead, Shortraker, Shortspine Thornyhead, 	<ul style="list-style-type: none"> • Projected sea surface temperature changes > 2°C • Projected sea bottom temperature changes > 1°C • Sea bottom aragonite undersaturation • High projected groundfish species richness gains

Biophysical and Ecological Overview of the
Offshore Haida Gwaii Network Zones

Pacific Region

Zone (area)	Oceanographic Setting	Ecological Setting	Human Use	Climate Change and Conservation
<p>Tsaan Kwaay <i>Offshore Learmonth Bank Zone</i> 501 (152.03 km²)</p>	<ul style="list-style-type: none"> • Tsaan Kwaay <i>Learmonth Bank</i> and Kadlee <i>Celestial Reef</i> are the most prominent marine features in Siigee <i>Dixon Entrance</i> and are the largest rock outcrops. Multibeam bathymetry data covers most of Tsaan Kwaay <i>Learmonth Bank</i>, showing a highly faulted and fractured granodiorite bedrock surface • Deep water enters Siigee <i>Dixon Entrance</i> mostly through this region and flows eastwards given the shallow 20-m sill separating Siigee <i>Dixon Entrance</i> from Kandaliigwii <i>Hecate Strait</i> near Kadlee <i>Celestial Reef</i> • An anti-cyclonic (clockwise) eddy is often present in this area. The primary surface flow pathway is south near K'iis Gwaay <i>Langara Island</i> 	<p><i>Cod</i>, Skáaynang <i>Lingcod</i>, Xaguu <i>Pacific Halibut</i>, Big Skate, Sgagúud <i>Fin Whale</i>, Blue Whale, Xediit <i>marine birds (Sk'áay Albatross)</i>, 'Waahúu <i>Leatherback Sea Turtles</i>, and Daga 'iwaans <i>prawns and shrimp (Smooth Pink, Sidestripes, and Spot Prawn)</i>.</p> <ul style="list-style-type: none"> • Overlap with Learmonth Bank EBSA • Corals, K'ats <i>rockfish (Tiger, K'aalts'adaa Rougheyeye/Blackspotted, Rosethorn, Yellowmouth, SGan Yelloweye, Silvergray, Yellowtail)</i>, Skáaynang <i>Lingcod</i>, Xaguu <i>Pacific Halibut</i>, whales (Minke, Blue, Sgagúud <i>Fin</i>), Xediit <i>marine birds (Sk'áay Albatross, Storm Petrel, Kwa.anaa Puffins)</i> 	<p>Darkblotched, Widow) and Skil <i>Sablefish</i></p> <ul style="list-style-type: none"> • High cultural and historical value, including important Haida spiritual relationship to area and an area that provides cultural use and food security, including various K'ats <i>rockfish (Tiger, K'aalts'adaa Rougheyeye/ Blackspotted, Rosethorn, Yellowmouth, SGan Yelloweye, Silvergray, Yellowtail)</i> and Skáaynang <i>Lingcod</i>. 	<ul style="list-style-type: none"> • Projected sea surface temperature changes > 2°C • Projected sea bottom temperature changes > 1°C • Sea bottom aragonite undersaturation • High projected groundfish species richness gains • E-CPs: Dixon Entrance Ecoregion; Shelf and Trough Biophysical Units; SE Alaska Mixing Region; Corals and sponges • C-CP: Tsaan Kwaay <i>Learmonth Bank</i> (High importance)

**Biophysical and Ecological Overview of the
Offshore Haida Gwaii Network Zones**

Pacific Region

Zone (area)	Oceanographic Setting	Ecological Setting	Human Use	Climate Change and Conservation
Kadlee <i>Offshore Celestial Reef</i> Zone 500 (219.91 km ²)	<ul style="list-style-type: none"> • Winter SST is typically 6-7 °C; this and Kadlee (Zone 500) have coldest winter SST • Upwelling-favourable winds less frequent compared to further south along BC coast during summer • Highest satellite-measured surface Chl-a throughout the year, similar to Kadlee (Zone 500), and highest variability in timing of annual maximum • Region with the greatest number of zooplankton sampling events 	<ul style="list-style-type: none"> • Shelf large-scale Biophysical Unit • Species assemblages associated with Kadlee Celestial Reef and shelf • Corals and sponges, K'ats rockfish (Shortspine Thornyhead, K'aalts'adaa Rougheyeye/Blackspotted, Darkblotched), groundfish (Dover Sole, Rex Sole, Kyaa.n Pacific Cod, Skil Sablefish, Xaguu Pacific Halibut), Big Skate, whales (Northern Resident Killer Whales, Blue, Sgagúud Fin), Xediit marine birds (storm petrel, shearwaters and fulmars, small alcids) 	<ul style="list-style-type: none"> • Hosts all 9 commercial fishing licenses (groundfish bottom trawl and groundfish midwater trawl; halibut, halibut and sablefish, lingcod, and rockfish hook and line; sablefish trap; tuna troll and salmon troll) • Recreational groundfish fishery • Highest vessel activity • High cultural and historical value, including important Haida spiritual relationship to area and an area that provides cultural use and food security, including Xaguu Pacific Halibut, and various K'ats rockfish (Shortspine Thornyhead, 	<ul style="list-style-type: none"> • Projected sea surface temperature changes > 2 °C • Projected sea bottom temperature changes > 1 °C • High projected groundfish species richness gains • E-CPs: Síigee Dixon Entrance Ecoregion; Dixon Entrance Coastal Flow Region; Corals and sponges • C-CP: Kadlee Celestial Reef (High importance)

Biophysical and Ecological Overview of the
Offshore Haida Gwaii Network Zones

Pacific Region

Zone (area)	Oceanographic Setting	Ecological Setting	Human Use	Climate Change and Conservation
	<ul style="list-style-type: none"> • Upwelling-favourable winds less frequent compared to further south along BC coast during summer • With Gangxid Kun Sgaagiidaay (Zone 505), has highest oxygen in upper 100 m given its connectivi with the coast • Highest satellite-measured surface Chl-a throughout the year, similar to Tsaan Kwaay (Zone 501), and highest variability in timing of annual maximum 		<p>K'aalts'adaa <i>Rougheye/Blackspotted, Darkblotched)</i></p>	

Sources of Uncertainty

The seven sites of the OHGNZ do not occur in isolation and do not present the totality of ecological variation or habitats or species of interest within **Xaadáa Gwáay XaaydaGa Gwaay.yaay Haida Gwaii**'s marine waters or the Northern Shelf Bioregion. Additionally, with increased research and surveys in the area it is expected that additional underwater features will be discovered of ecological and conservation importance. More detailed sources of uncertainty are bulleted below:

- The species inventory for the zones is likely to grow as further biological surveys discover additional species occurring in these zones, including those of conservation interest. Research surveys are increasing in the area, but the offshore region is largely underrepresented in visual surveys and oceanographic sampling.
 - Taxonomic diversity outlined in the research document is largely limited to fish, mammal, reptile, and bird species. Our knowledge of invertebrate and plant populations is incomplete due to a lack of survey data. Data that is available is locally-specific to particular features, such as **Tsaan Kwaay Learmonth Bank** and **Kadlee Celestial Reef** and the recently surveyed seamount SAUP 5494.
 - All zones have data gaps. In particular, Gwaii Haanas Extension (Zone 504) has had less survey effort to date because of its depth and relative remoteness, consequently our knowledge of its benthic terrain and biodiversity is limited, and model results are limited to the smallest portion of its extent.
- Most multibeam mapping is limited to a depth of 1700 m and as such large portions of the offshore continental slope zones are unmapped.
 - High resolution multibeam data may reveal additional important bathymetric features that are harder or impossible to detect with lower resolution data, including cold seeps (an EBSA), mud volcanoes, seamounts (an EBSA) and other habitats of biological and ecological significance.
- Both recreational fishing and **Tsí.n Chiina salmon** catch data are summarized and provided at the broad spatial scale of Pacific Fishery Management Areas and cannot be used to accurately understand fishing impacts at finer scales, such as the OHGNZ, or to analyze the distribution of fishing effort by habitat type or bathymetric depth.
- Climate change scenarios are alternative projections of how the future might unfold and the possibility that any single scenario will occur as described is highly uncertain.
 - Summaries of two different climate change scenarios (Representative Concentration Pathways [RCP] 4.5 and RCP 8.5), under two different climate models (British Columbia Continental Margin Model and the Northeastern Pacific Canadian Ocean Ecosystem Model) were provided. At the relatively short time scales of the forecasts, the projected differences for marine environmental variables (temperature, aragonite, oxygen) or groundfish species distribution changes (see Thompson et al. 2023 and accompanying Research Document³) between the RCP 4.5 and 8.5 scenarios are small.
 - The zones within the OHGNZ are in an impacted state, (i.e., subject to anthropogenic disturbance), and scientific observations and data were recorded within a small window of time. Consequently, there is implicit uncertainty in the data presented, given that (1) natural variation, (2) recovery from anthropogenic disturbances with protection, and (3) exposure to a projected warming environment, may result in redistributions of species and changes to their habitats.

CONCLUSIONS AND ADVICE

This science advice, and the accompanying Research Document³, provide an oceanographic, ecological, and cultural overview of the OHGNZ, which are being considered for designation as *Oceans Act* MPAs. The documents evaluate, describe, and map key physical, biological, cultural and spiritual characteristics, key habitat types, and ecologically and/or culturally significant species and species of conservation concern of the OHGNZ. They also identify known areas of overlap with potential anthropogenic stressors and species and habitats of interest within the OHGNZ. The information provided here and in the accompanying Research Document³ will help inform next steps and guide the management and monitoring of the OHGNZ.

The following areas of research are recommended to be prioritized to fill knowledge gaps and achieve maximum conservation benefit.

As part of the adaptive management process, this work could be used to assess and potentially adjust the current proposed MPA boundaries. Of particular significance is the incomplete spatial protection of a bathymetric feature (i.e., protection of an entire ecosystem unit) and the associated compliance issues, which do not align with global best practice (e.g., the protection of entire seamounts; Johnston and Santillo 2004; Davies et al. 2007; Clark et al. 2011; Clark and Dunn 2012; Wedding et al. 2013).

- This recommendation applies (but is not limited) to **Tsaan Kwaay Learmonth Bank** (Zone 501; i.e., northern extent towards border-disputed region, southern extent through the bank, and a buffer for trawling) and SAUP 5494 Seamount (Zone 502). To achieve maximum conservation benefit, an updated network scenario could consider capturing ecological features in their entirety (e.g. **Tsaan Kwaay** (Zone 501), **Kadlee Celestial Reef** (Zone 500), seamounts (Zones 505 and 502).
- Related to the incomplete spatial protections of a bathymetric feature, **Tsaan Kwaay Learmonth Bank** (Zone 501) may provide a unique opportunity for a multi-lateral agreement related to a transboundary protected area between the Haida Nation, USA, and Canada (especially within the border disputed region).

To improve efficiency in conservation efforts, an updated network scenario could consider capturing identified conservation priorities that are immediately adjacent to, but outside of the current planning area. The concern is related to gaps in representativity of habitats in and adjacent to the OHGNZ, including:

- NEPDEP 57 and 58 seamounts in the Tuzo Wilson complex, which are ~6 km south of Zone 505 and are the subject of two current Requests for Information and Science Advice (RISA), requesting multibeam mapping and an update to the biophysical overview and identification of the natural boundaries for the complex.
- Coverage of Zone 501 could be extended to include all of **Tsaan Kwaay Learmonth Bank** to protect the fish and coral habitat that are in the nearby basin (i.e., the inclusion of important habitat types such as the basin erratic boulder fields or nearby areas that are bottom trawled).
- Cold seeps are identified as groundfish Essential Fish Habitat in the USA (e.g., Grupe et al. 2015; Pacific Fishery Management Council 2022) and as EBSAs in Canada (DFO 2018). The present set of OHGNZ boundaries do not include any of the known cold seeps on **Duu Gúusd Daawxusda** the west coast of Haida Gwaii.

Many components required to implement effective management and zone- and network-level monitoring plans are unknowable at this time. Baseline monitoring and research to fill these knowledge gaps could be prioritized (in order of relative importance: high resolution mapping of the seafloor and water column, oceanographic sampling, visual surveys, and other research).

This report, and associated documents, were co-authored by the Council of the Haida Nation and Fisheries and Oceans Canada as part of the co-management of protected areas within Haida marine waters. It is recommended that knowledge sharing and co-creation become integral components of all conservation work.

OTHER CONSIDERATIONS

This overview was co-authored by the Council of the Haida Nation and Fisheries and Oceans Canada as part of the co-development of this biophysical and ecological overview. Knowledge sharing and co-creation are an integral component of these research products. The authors and participants in this CSAS process supported and recommended the Council of Haida Nation logo be added to all products from this process to officially acknowledge their co-authorship and knowledge production.

The need for MPA supporting documents will only grow following the unprecedented establishment of protected areas currently underway. It should be noted that there are differences in the processes used by different regions and practitioners within Canada and that the processes (and use of terms) are changing over time. An effort to standardize practices where appropriate - while still promoting development and innovations - was viewed as a positive way forward. That said, this biophysical and ecological overview is also different from others in the region because the seven zones representing the OHGNZ were: (1) identified as individual zones that work in complement with other individual existing and potential MPAs to contribute to conservation objectives at the MPA Network scale; (2) chosen to meet network level ecological conservation priorities, cultural conservation priorities, and draft zone-specific conservation objectives, a step that usually follows the creation of a Biophysical Report for an area of interest for an *Oceans Act* MPA; and (3) already documented to have “activities of concern” or activities that may affect conservation objectives at the zone level.

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SOURCES OF INFORMATION

This Science Advisory Report is from the November 8-9, 2022, regional peer review on the Biophysical and Ecological Overview of the Pacific Region Offshore Haida Gwaii Network Zones. Additional publications from this meeting will be posted on the [Fisheries and Oceans Canada \(DFO\) Science Advisory Schedule](#) as they become available.

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