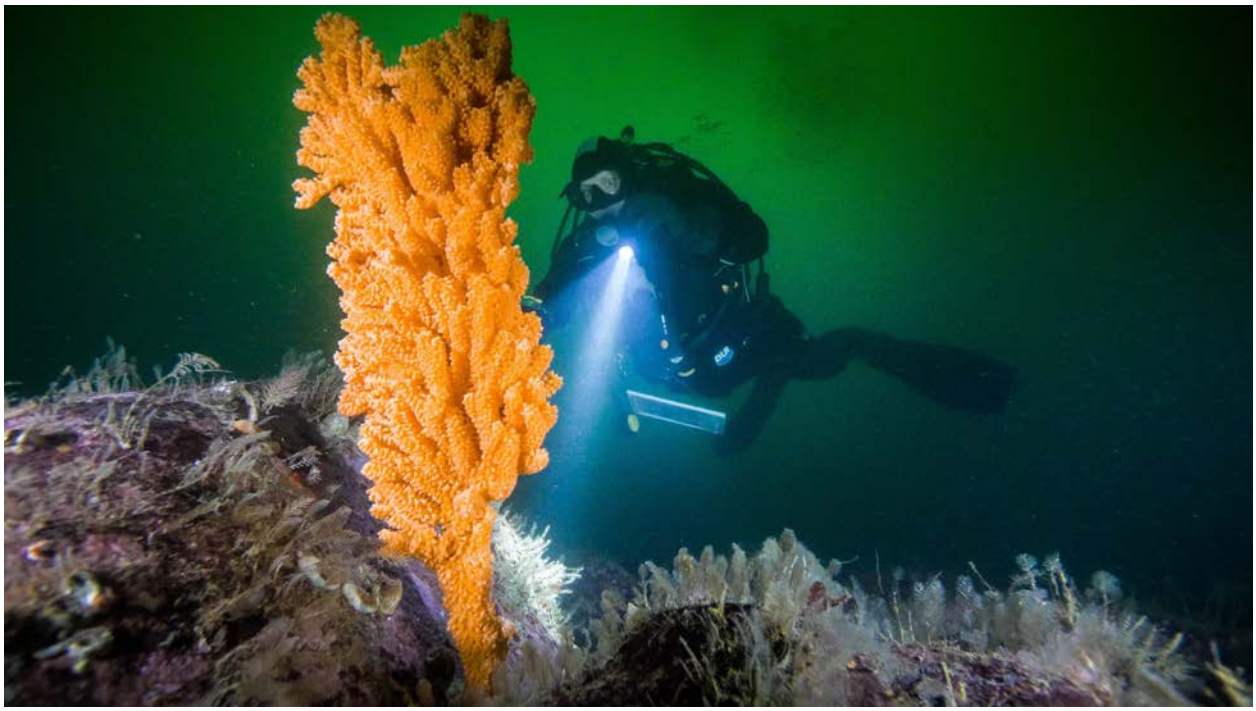
# Biodiversity Assessment of the Hoeya Sill in Knight Inlet, British Columbia



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Prepared for Nanwakolas Council by the Hakai Institute

Angeleen Olson[1], Kyle Hall, Zachary Monteith, Ondine Pontier, Carolyn Prentice, Margot Hessing-Lewis[2]

[1]Contact: angeleen.olson@hakai.org, Nearshore Ecology, Hakai Institute

[2]Contact: margot@hakai.org, Nearshore Ecology, Hakai Institute

# Summary

The Hakai Institute conducted biodiversity surveys of the Hoeya Sill in Knight Inlet, British Columbia (BC), Canada using scuba surveys and environmental DNA (eDNA) analysis between Sept 22 - 24, 2020. Four areas were surveyed via scuba from 17.2 - 19.9 m maximum depth. eDNA water samples were collected during dives at multiple depths. These eDNA samples are being prioritized at the Hakai Institute's genome lab set to be finished in early 2021. A total of n = 134 species, or organisms to lowest taxonomic resolution, were found at sites in the sill. Deep-associated species such as *Primnoa pacifica* gorgonian corals, basket stars (*Gorgonocephalus eucnemis*), and glass boot sponges (*Rhabdocalyptus dawsoni)* were observed at unusually shallow depths (16 m). This phenomenon is called 'deepwater emergence', whereby fjord systems can facilitate deep water benthic communities. Additionally, at the Hoeya Sill, seastar diversity was high. The area supported less-common species like the gunpowder star (*Gephyreaster swifti*) and cookie star (*Ceramaster patagonicus*). Observations of large healthy (up to 64cm in diameter) *Pycnopodia helianthoides*, sunflower stars, were recorded in abundance at the Hoeya Sill, which have also been rare on the coastlines of the Pacific Northeast. Individuals showed little seastar wasting disease despite a 96% decline in sunflower population elsewhere in BC inferring a potential refugia from the disease.

# Background

Knight Inlet is a long (105 km), narrow (2.9 km) fjord branching off Johnstone Strait and carving eastwards into the mainland of BC. Klinaklini and Franklin rivers are the main headwaters of the inlet, discharging vast amounts of glacial freshwater (410 $m^3$ $s^{-1}$) into the inlet (Trites 1955). While most of the channel is deep (max. depth 540 m), an underwater ridge bridges 2 distinct regions of the inlet - the shallow Outer Basin to the west and the deep Inner Basin to the northeast. This underwater ridge, the Hoeya Sill, is a distinct shallow geological feature (65 m max depth) between north Hoeya Head and southern Prominent Point, where unique hydrodynamics such as internal gravity waves are generated. It has been suggested that the sill maintains a high diversity of fauna likely maintained by the unique hydrodynamics of the area (McDaniel & Swanston 2013). Several dive expeditions have taken place to investigate the biology at the Hoeya Sill. McDaniel and Swanston (2013) discovered the presence of several deep-water associated animals. Among the most notable species are large, structure-forming red-tree gorgonian corals (*Primnoa pacifica*) at depths of only 12 m. These are known for residing in 150 m - 250 m depths (Stone et al. 2014).

In September 2020, the Hakai Insitute's Nearshore Ecology team were commissioned to conduct a biodiversity assessment of the Hoeya Sill by the Nanwakolas Council. The assessment aims to inform decisions on a proposed Indigenous Marine Protected Area.

# Survey Locations

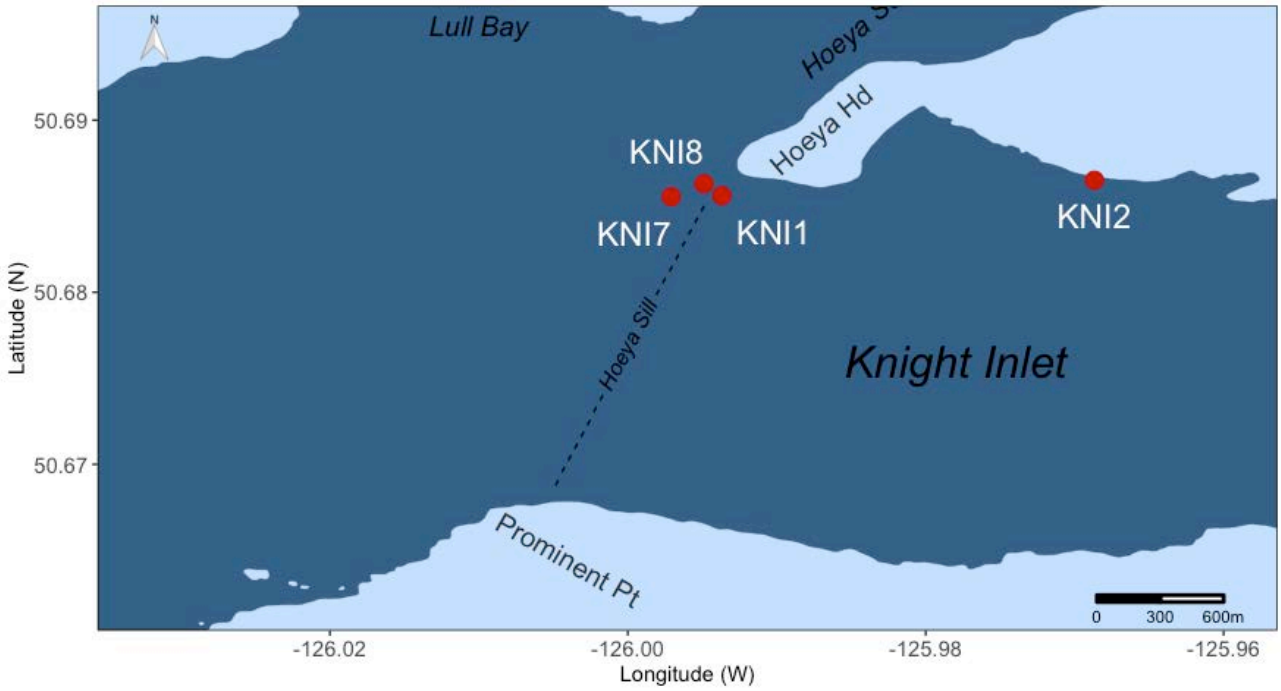



**Figure 1.** Map of survey locations (red dots) at the Hoeya Sill, Knight Inlet. Dashed lines indicate the approximate location of the sill running from Hoeya Head to Prominent Point.

The Hoeya Sill presents challenging scuba diving conditions due to strong tidal currents and sudden drop offs to deep depths. We targeted two slack currents per day to ensure safe diving conditions, and constrained dive depths to ~ 18m. These depths allowed us to maximize time spent at depth during surveys for more detailed assessments, while capturing both the upper limit of deeper biodiversity and biodiversity at shallow depths. Four sites were surveyed on the north side of the Hoeya Sill (Fig. 1, Table 1). Dive sites were chosen based on the general guidelines: 1) inside the proposed Hoeya Sill marine protected area to assess biodiversity, 2) established dive sites, and 3) a diversity of habitats (deep to steep walls).

**Table 1.** Site locations of scuba surveys located at Hoeya Sill. Depth is maximum dive depth (chart datum).

| Site | Date Surveyed | Latitude (°N) | Longitude (°W) | Depth (m) | Primary Substrate |
|---|---|---|---|---|---|
| KNI1 | 2020-09-22 | 50.685613 | -125.993685 | -17.2 | cobble |
| KNI 2 | 2020-09-22 | 50.686506 | -125.968675 | -18 | bedrock, boulder |
| KNI 7 | 2020-09-24 | 50.68555 | -125.997083 | -19.9 | boulder |
| KNI 8 | 2020-09-24 | 50.686302 | -125.994887 | -18 | boulder |

## Habitat Descriptions

**KNI1** - Substrate was dominated by cobbles embedded in sand with some boulders present. Slope was 10-20°. Halocline was deep with glacial till reaching down to ~13m. Below 18m, the current appeared strong enough to move boulders. Biological cover included encrusting corallines, colonial hydroids, and seastar aggregations.

**Photo 1.** Substrate of KNI1 at 17 m depth. Bottom left: A diver's slate for scale.

**KNI2 -** Steep wall approximately 0.5 km east of Hoeya Head. Substrate was primarily boulders next to a bedrock wall. Biological cover included seastars at greater depths, and barnacles and mussel beds in the intertidal.

**Photo 2.** Habitat at KNI2 at 15 m depth where boulders were the dominant substrate. Photo shows divers conducting a 30 m seastar transect.

**KNI7** - Habitat consisted of 95% medium boulders (1 - 3 m in size) and 5% shell hash. Low gradient slope (5°). Biological cover consisted of primarily hydroids, feather stars, and encrusting coralline algae.

**Photo 3.** 15m depth at KNI7. Boulders were the dominant substrate. Divers for scale.

**KNI8** - Boulder field consisting of large boulders (ranging from 3 - 7 m across) and shell hash with a low gradient slope (5°). Biological cover consisted of primarily hydroids, feather stars, and encrusting coralline algae.

**Photo 4.** Large boulders scoured the bottom of KNI8 at 18 m depth.

# Biodiversity Assessment

## Survey Methods

Scuba surveys were conducted off the *MV K2*. We used a Roving Diver Technique to record biodiversity at the Hoeya Sill. We chose this method of positive identification to provide the most efficient observations of biodiversity in the area. Surveys were conducted over an approximate oblique depth transect when slopes were gradual. Divers recorded the presence of species, depth, habitat, abundance, and any anthropogenic disturbances. Absence data relative to McDaniel et al (2013) was recorded, but not presented in this report.

Focal transects were conducted for seastar and fish densities at KNI2 at two depths: 8 m and 15 m. Seastar species and size were recorded over a 30 m x 2 m transect swath. A wasting disease score (0-4) was given to individual seastars based on severity of wasting. Fish were recorded over the same 30 m transect, but over a larger area: 4 m wide x 4 m high transect volume.

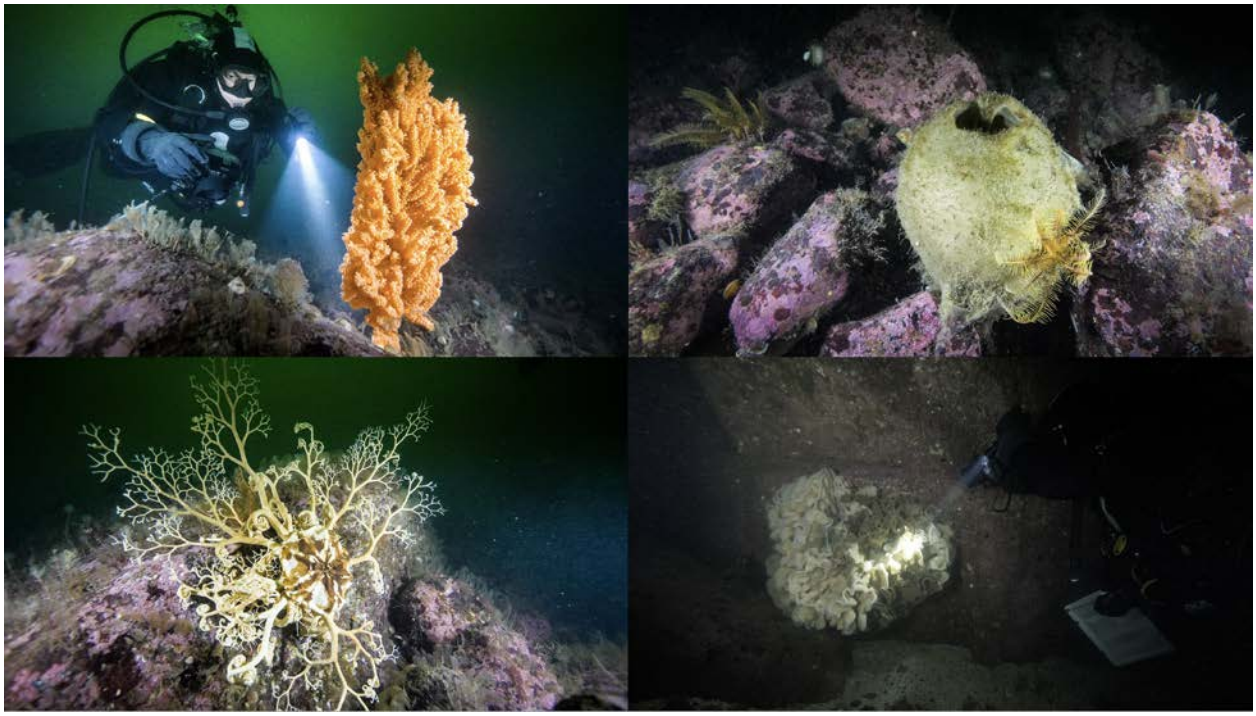
Environmental DNA (eDNA) water samples were also collected during dives at maximum depth, mid-column, and at the surface in 1L bottles. Each depth had 3 replicate samples taken for up to n = 9 samples per site. Water samples were filtered with Sterivex and fixed with Longmires solution until lab processing at the Hakai Institute genomics lab on Quadra Island for winter 2020.

**Left:** Scuba divers at Hoeya Head**. Right:** Collecting eDNA water samples at the surface.

## Biodiversity Results

A total of 134 species were recorded over 4 dives at the Hoeya Sill in September 2020 (see Table 2 in Species List). To assess the 'commonness' of each species, we summed the frequency of presence across all 4 sites: *common* = present at > 2 sites, *moderately common* = 2 sites, and *rare* = 1 site. While some density-specific transect surveys were conducted to target specific taxa, divers also noted the relative abundance of species. Lastly, we include a column to indicate if species were also observed in previous dives in the area by McDaniel and Swanston 2013 (see Observed Previously = 'x' in Table 2).

Our surveys indicate high diversity at the Hoeya Sill across phyla (Table 1). We found the deepwater emergence of Cnidarian species that are not generally observed at shallow depths. We recorded red-tree gorgonian corals (*Primnoa pacifica*) between 16 - 19.9 m depths at KNI7. At this site, they were relatively abundant with >10 individuals observed at the maximum survey depth of 19.9 m. At the shallow range edge (16m), they were present, but at lower densities. We did not find them at the majority of our sites (Fig. 1) suggesting they are patchily distributed and/or the majority are deeper than we surveyed (e.g., deeper than 18m). Additional deep-water associated species such as basket stars (*Gorgonocephalus eucnemis*), boot sponges (*Rhabdocalyptus dawsoni)*, and cloud sponges (*Aphrocallistes vastus*) were also observed at the sill. The sill was rich in pink branching hydrocorals (*Stylaster verrillii),* and ostrich plume *(Aglaophenia spp.)* and sea fir *(Thuiaria spp.)* hydroids - found at every site in high abundance.



**Top left:** Red-tree gorgonian coral (*P. pacifica*)**. Top right:** Sharp lipped boot sponge (*R. dawsoni*)*.*
**Bottom Left:** Basket star (*G. eucnemis).* **Bottom Right:** Diver observing a cloud sponge (*A. vastus).*

Common **large mobile invertebrates** surveyed were multiple species of seastars, Coonstripe shrimp (*Pandalas danae*), decorator crabs (*Chorilia longipes, Oregonia gracilis),* red-veiled chitons (*Placiphorella rufa*), and aeolid nudibranchs (*Flabellina* spp.). Seastars were particularly specious and high in abundance at the sill (see Table 1). Most notably, aggregations of large (radius: mean = 12.7 ± 6.3 cm, max = 32 cm) sunflower stars (*P. helianthoides*) were commonly observed with a mean density of 0.5 individuals per $m^2$. The full size spectrum of sunflower stars at Hoeya Sill (Fig. 2) is a relatively rare finding on the Northeast Pacific coast. Sunflower seastars have shown an unprecedented decline starting in 2015 due to wasting disease. BC specificalled had a 96% decline in population abundance (Harvell et al. 2019). On exposed outer coastlines, anecdotal observations report primarily juvenile populations of small sunflower stars.

Adult *Pycnopodia helianthoides*

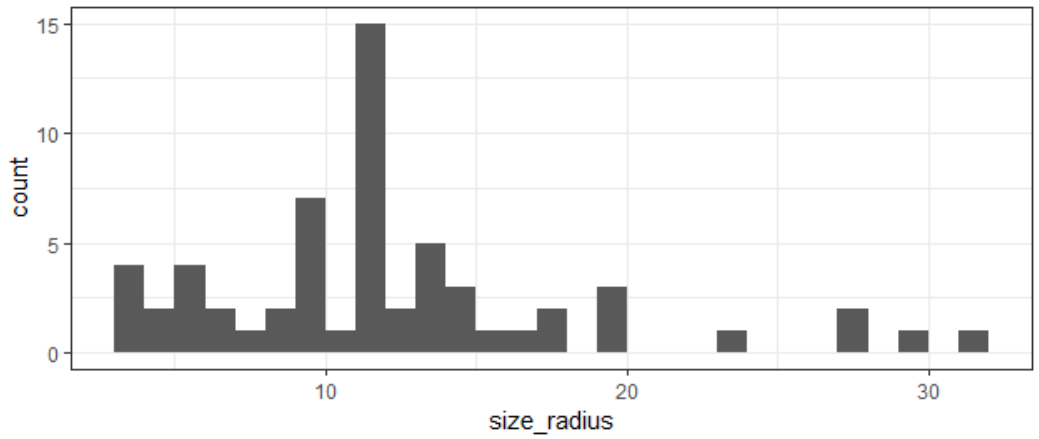
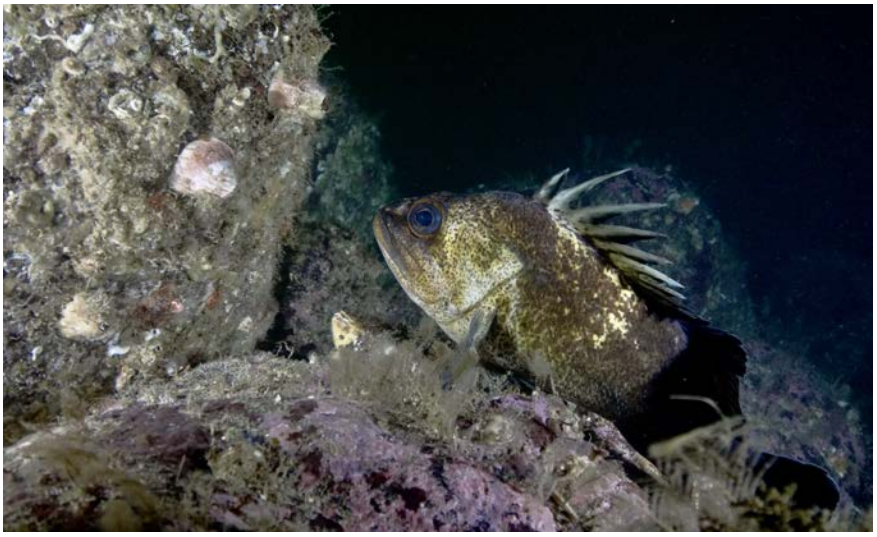



**Figure 2.** Size distribution of sunflower stars (*P. helianthoides*) at KNI2 over a 120 $m^2$ area. The x-axis represents the size (radius: longest arm to center of body) of an individual in centimeters. The grey bars represent the total count of individuals seen at a specific size (y-axis).

Rockfish were the most common species of **fish** at Hoeya Sill, including quillback rockfish (*Sebastes maliger*), yellowtail rockfish (*S. flavidus*), and copper rockfish (*S. caurinus*). A large school of young-of-the-year black (*S. melanops*) and yellowtail (*S. flavidus*) rockfish species-complex was observed at the Sill as well; otherwise juveniles were rare. Moderately common fish species observed were the buffalo sculpin (*Enophrys bison*) and starry flounder (*Platichthys stellatus*). From the transect surveys at KNI2, yellowtail rockfish were seen in schooling abundances (mean count = 125 transect$^{-1}$, 0.26 per m$^3$; mean size: 24 cm total length). On average, quillback rockfish were 30 cm and copper rockfish were 31 cm.



Quillback rockfish (*Sebastes maliger*)

Red irish lord (*Hemilepidotus hemilepidotus*)

**Algae and seagrasses** were not a diverse biota group at the areas surveyed at the Hoeya Sill. Agarum, filamentous red algae, and Ulva spp. were moderately common in shallower depths. Deep water and glacial till likely limit their persistence to intertidal or shallow subtidal areas.

# Species List

**Table 2. Species observed at the Hoeya Sill in 2020.** Relative commonness indicates how common species were across sites surveyed: rare, moderate, or common. Relative abundance was qualitatively noted by divers. Observed Previously indicates if species have been previously observed at the Hoeya Sill (e.g., McDaniel & Swanston 2013).

| Species | Common Name | Relative Commonness | Relative Abundance | Observed Previously |
|---|---|---|---|---|
| **ALGAE - SEAWEEDS** | | | | |
| *Ulva sp.* | sea lettuce | moderate | high | x |
| *Fucus distichus evanescens* | rockweed | rare | | x |
| *Alaria marginata* | broad winged-kelp | moderate | | x |
| *Saccharina latissima* | sugar wrack kelp | rare | | x |
| *Callophyllis sp.* | beautiful leaf seaweed | rare | | x |
| *Corallinophycideae spp.* | crustose corallines | common | high | |
| *Agarum clathratum* | sieve kelp | rare | | |
| *Ralfsia* sp. | brown kelp | rare | | |
| *Pterothamnion* sp. | filamentous red algae | rare | | |
| *Acrosiphonia sp.* | green algae | rare | | |
| red algae unknown | red algae | rare | | |
| **ANNELIDA - SEGMENTED WORMS** | | | | |
| *Serpula columbiana* | red trumpet calcareous tubeworm | moderate | | x |
| *Diopatra ornata* | ornate tubeworm | moderate | | x |
| *Megalomma sp.* | twin-eyed feather-duster | rare | | x |
| *Myxicola infundibulum* | slime-tube feather-duster | rare | | x |
| *Serpula sp.* | calcareous tubeworm | rare | | |
| *Terabellida sp.* | spaghetti worm | rare | | |
| **ARTHROPODA - CRABS, SHRIMPS, BARNACLES, etc** | | | | |
| *Eualus townsendi* | Townsend's eualid | rare | | x |

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|---|---|---|---|---|
| *Lebbeus grandimanus* | candy stripe shrimp | rare | | x |
| *Pandalus danae* | coonstripe shrimp | common | high | x |
| *Pugettia gracilis* | graceful decorator crab | rare | | x |
| *Chorilia longipes* | longhorn decorator crab | common | | x |
| *Cryptolithodes typicus* | butterfly crab | moderate | | x |
| *Lopholithodes mandtii* | Puget Sound king crab | moderate | | x |
| *Elassochirus tenuimanus* | widehand hermit | common | | x |
| *Elassochirus gilli* | orange hermit crab | rare | | x |
| *Balanus glandula* | common acorn barnacle | moderate | | x |
| *Balanus rostratus* | rostrate barnacle | moderate | | x |
| *Balanus nubilus* | giant acorn barnacle | rare | | x |
| *Oregonia gracilis* | slendor decorator crab | common | | |
| *Eualus butleri* | sponge eualid | moderate | | |
| *Scyra acutafrons* | sharp-nosed crab | rare | | |
| *Placetron wosnessenskii* | Scaled Crab | rare | | |
| **BRACHIOPODA - LAMPSHELLS** | | | | |
| *Laqueus vancouveriensis* | California lamp shell | moderate | | x |
| *Terebratalia transversa* | transverse lamp shell | moderate | | x |
| *Terebratulina unguicula* | snake's head lamp shell | moderate | | x |
| *Hemithiris psittacea* | black lamp shell | common | | x |
| *Laqueus californicus* | California lampshell | rare | | x |
| **BRYOZOA - MOSS ANIMALS** | | | | |
| *Schizoporella japonica* | orange encrusting bryozoan | moderate | | x |
| *Microporina borealis* | stick bryozoan | rare | | x |
| **CHORDATA - TUNICATES** | | | | |
| *Ascidia paratropa* | glassy tunicate | moderate | | x |
| *Halocynthia aurantium* | pacific sea peach tunicate | rare | | |

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|---|---|---|---|---|
| *Corella sp.* | unknown corella | rare | | |
| *Didemnum sp.* | colonial tunicate | rare | | |
| **CNIDARIA - ANEMONES, CORALS, HYDROIDS** | | | | |
| *Cribrinopsis fernaldi* | snakelock anemone | rare | | x |
| *Urticina grebelnyi* | painted anemone | moderate | | x |
| *Epizoanthus scotinus* | orange zoanthid | moderate | | x |
| *Ptilosarcus gurneyi* | orange sea pen | rare | | x |
| *Primnoa pacifica* | red-tree gorgonian coral | rare | high | x |
| *Stylaster verrilli* | branching pink hydrocoral | common | high | x |
| *Aglaophenia spp.* | ostrich plume hydroids | common | high | x |
| *Thuiaria spp.* | embedded sea fir hydroids | common | high | x |
| *Plumularia sp.* | delicate plume hydroid | common | high | x |
| *Similiclava nivea* | white hydroid | rare | | x |
| *Thuiaria thuja* | bottlebrush hydroid | moderate | high | x |
| *Grammaria sp.* | spindly embedded hydroid | rare | | x |
| *Ceriantheopsis sp.* | tube-dwelling anemone | rare | | |
| *Urticina eques* | white spotted rose anemone | rare | | |
| *Pachycerianthus fimbriatus* | burrowing anemone | rare | | |
| *Urticina crassicornis* | mottled anemone | rare | | |
| *Sertulariid sp.* | sertulariid hydroid | moderate | | |
| *Plumulariid sp.* | plumulariid hydroid | rare | | |
| *Rhizocaulus sp.* | Rhizocaulus hydroid | rare | | |
| **ECHINODERMATA - SEASTARS, URCHINS, SEA CUCUMBERS** | | | | |
| *Evasterias troschelii* | mottled star | common | high | x |
| *Mediaster aequalis* | vermilion star | common | | x |
| *Gephyreaster swifti* | gunpowder star | common | | x |
| *Ceramaster patagonicus* | cookie star | common | | x |

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|---|---|---|---|---|
| *Pteraster militaris* | wrinkled star | common | | x |
| *Pteraster tesselatus* | slime star | rare | | x |
| *Henricia leviuscula* | blood star | common | | x |
| *Henricia sanguinolenta* | fat blood star | rare | | x |
| *Pycnopodia helianthoides* | sunflower star | common | high | x |
| *Crossaster papposus* | rose star | common | high | x |
| *Solaster dawsoni* | morning sun star | common | high | x |
| *Solaster stimpsoni* | striped sun star | common | high | x |
| *Solaster endeca* | northern sun star | common | high | x |
| *Solaster paxillatus* | orange sun star | rare | high | x |
| *Gorgonocephalus eucnemis* | basket star | rare | | x |
| *Florometra serratissima* | feather star | moderate | | x |
| *Strongylocentrotus droebachiensis* | green sea urchin | common | high | x |
| *Strongylocentrotus pallidus* | white sea urchin | moderate | | x |
| *Parastichopus californicus* | giant sea cucumber | rare | | x |
| *Cucumaria miniata* | red sea cucumber | moderate | | x |
| *Psolus chitinoides* | creeping pedal sea cucumber | common | | x |
| *Synallactes challengeri* | long-spined sea cucumber | rare | | x |
| *Strongylocentrotus purpuratus* | purple sea urchin | rare | | |
| *Ceramaster arcticus* | arctic cookie star | rare | | |
| **FISHES** | | | | |
| *Aulorhynchus flavidus* | tubesnout | rare | | x |
| *Platichthys stellatus* | starry flounder | moderate | | x |
| *Chirolophis decoratus* | decorated warbonnet | rare | | x |
| *Sebastes caurinus* | copper rockfish | common | medium | x |
| *Sebastes maliger* | quillback rockfish | common | high | x |
| *Jordania zonope* | longfin sculpin | rare | | x |
| *Hemilepidotus hemilepidotus* | red irish lord | rare | | x |

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|---|---|---|---|---|
| *Enophrys bison* | buffalo sculpin | moderate | | x |
| *Rhacochilus vacca* | pile perch | rare | | |
| *Sebastes flavidus* | yellowtail rockfish | moderate | high | |
| *Cottoidea spp.* | unknown sculpins | rare | | |
| *Sebastes melanops- flavidus complex* | YOY black-yellowtail rockfish complex | rare | medium | |
| **MARINE MAMMALS** | | | | |
| *Phocoena phocoena* | Harbour porpoise | rare | | x |
| *Megaptera novaeangliae* | Humpback whale | rare | | x |
| *Phoca vitulina richardsi* | Pacific harbour seal | rare | | x |
| **MOLLUSCA - SNAILS, CHITONS, BIVALVES** | | | | |
| *Tonicella undocaerulea* | blue-lined chiton | moderate | | x |
| *Tonicella lineata* | lined chiton | common | | x |
| *Mopalia muscosa* | mossy chiton | rare | | x |
| *Cryptochiton stelleri* | giant Pacific chiton | rare | | x |
| *Placiphorella rufa* | red veiled chiton | common | | x |
| *Clinocardium nuttallii* | Nuttall's cockle | rare | | x |
| *Diadora aspera* | rough keyhole limpet | rare | | x |
| *Chlamys hastata* | spiny pink scallop | moderate | | x |
| *Ceratostoma foliatum* | leafy hornmouth | moderate | | x |
| *Nucella lamellosa* | wrinkled dogwinkle | moderate | | x |
| *Calliostoma variegatum* | variable topsnail | moderate | | x |
| *Fusitriton oregonensis* | Oregon triton | common | | x |
| *Trichotropis cancellata* | checkered hairysnail | rare | | x |
| *Triopha catalinae* | clown nudibranch | moderate | | x |
| *Tochuina gigantea* | orange-peel nudibranch | rare | | x |
| *Enteroctopus dofleini* | giant Pacific octopus | rare | | x |
| *Tonicella insignis* | white-lined chiton | rare | | |

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|---|---|---|---|---|
| *Flabellina* spp. | aeolid nudibranch | common | high | |
| *Cranopsis cucullata* | ribbed keyhole limpet | moderate | | |
| *Tripolax trifida* | three-rib chiton | rare | | |
| *Lottia pelta* | shield limpet | rare | | |
| *Lottia scutum* | true limpet | rare | | |
| *Mytilus trossulus* | pacific blue mussel | rare | | |
| *Mopalia sp.* | hairy chiton | rare | high | |
| *Dirona pellucida* | gold dorid | rare | | |
| *Dendronotus sp.* | dendronotus nudibranch | rare | | |
| *Cadlina modesta* | modest cadlina | rare | | |
| *Tochuina tetraquetra* | giant orange tochuina | rare | | |
| *Himatina trophina* | red-gilled nudibranch | rare | | |
| *Tripoplax trifida* | three-rib chiton | rare | | |
| **PORIFERA - SPONGES** | | | | |
| *Rhabdocalyptus dawsoni* | sharp-lipped boot sponge | rare | high | x |
| *Aphrocallistes vastus* | cloud sponge | rare | | x |
| *cf. Suberites* | peach ball sponge | rare | | |

## Anthropogenic Disturbances

At sites near Hoeya Head, divers observed fishing gear, as well as damage to benthic communities due to fishing gear in multiple locations (KNI2, KNI7, KNI8). Fishing gear included downrigger equipment (e.g., cannon balls, downrigger planer) snagged and/or stuck in rocky substrates, as well as fishing line tangled in rocky substrates, and, around *P. pacifica* individuals. Tangled *P. pacific* individuals appeared dead or dying, and in some cases appeared to have been pulled over by the fishing gear. Similarly, McDaniel & Swanston (2013) noted that animals were entangled in fishing monofilament and fishing debris was scattered on the ocean floor. Benthically-associated animals are at risk of any bottom-contact gear from fisheries. Currently in BC, fisheries that can damage benthic communities are bottom trawls, longlines, and prawn traps.

# Conclusion

During our surveys, we found deep-water species that are normally rare at shallow depths such as basket stars, cloud sponges, and red-tree gorgonian gorgonian corals. While we found *P. pacfica* gorgonian corals as shallow as 16 m off Hoeya Head, we observed the highest densities at 19.9 m. This indicates that their preferred habitat may be deeper than the maximum depths that we primarily surveyed at the sill (<18 m), and that our finding of a patchy distribution may reflect survey design. Given our observations of gorgonians between 16 - 19.9 m chart datum at KNI7, their full habitat extent should be considered throughout this bathymetric range at the Hoeya Sill, with variation in density dependent on depth and other localized factors. In the near vicinity of our surveys, previous observations of gorgonians occurred as deep as 30 m (Lull Bay) and as shallow as 12 m (Hoeya Sill) (McDaniel & Swanston 2013). As such, our surveys provide additional evidence that gorgonians can occupy depths between 12 and 30 m at the Hoeya Sill, but documentation of their full areal extent and patterns of abundance with depth demand additional survey effort.

ROV (Remote Operated Vehicles) or technical deep dives would be necessary to elucidate a more comprehensive geographic extent of gorgonian corals in this area. Additionally, we did not survey the southern reach of the Hoeya Sill and thus encourage further investigation there at Prominent Point. Given the presence of fishing gear and evidence of damage within the bathymetric zone we surveyed, we suggest that future surveys assess the density of these species to better understand their population size, and document changes in their populations associated with benthic disturbance.

Presence-only survey methods are inherently biased towards larger species - there may be more diversity of smaller, more cryptic species that were missed in these surveys. In addition, there are limitations in taxonomic resolution of solitary sponges, encrusting colonial sponges, bryozoans, encrusting corallines, and filamentous red algae due to their lack of distinguishing characteristics and which make identification without genetic sequencing near impossible. For this reason, we recommend that future sampling barcode these species to aid with their identification. Going forward, barcoding information from specific species can be compared to environmental DNA, which can target a broader suite of species in an area.

# Crew Information

This Hakai Nearshore Ecology team has spent the last 5 consecutive years conducting biological research on BC's Central Coast waters. Our expertise resides in coastal ecosystem biodiversity and function - particularly in kelp forest, seagrass, rocky reef, and rocky intertidal systems. Divers were Zachary Monteith (BSc Biology), Ondine Pontier (BSc Biology), Kyle Hall (BA

Anthropology), and Grant Callegari (Photographer). Dive supervisors and eDNA processors were Angeleen Olson (BSc Env Sc, MSc Biology) and Carolyn Prentice (BSc Biology, M Resource Management). Species photos are by Grant Callegari. We thank Henry Choong at the Royal BC Museum for expertise in hydroid identification.

# References

Harvell, C.D., Montecino-Latorre, D., Caldwell, J.M., Burt, J.M., Bosley, K., Keller, A., Heron, S.F., Salomon, A.K., Lee, L., Pontier, O. and Pattengill-Semmens, C., 2019. Disease epidemic and a marine heat wave are associated with the continental-scale collapse of a pivotal predator (*Pycnopodia helianthoides*). *Science advances*, *5*(1), p.eaau7042.

McDaniel and Swanston 2013. Observations on the Gorgonian Coral *Primnoa pacifica* at the Knight Inlet sill, British Columbia 2008 to 2013. Technical report.

Stone, R. P., M. M. Masuda, and J. F. Karinen. 2014. Assessing the ecological importance of red tree coral thickets in the eastern Gulf of Alaska. ICES J. Mar. Sci. 72:900–915. https://doi.org/10.1093/icesjms/fsu190

Thompson, R.E. 1981. Oceanography of the British Columbia Coast. Canadian Special Publications of Fisheries and Aquatic Sciences 56: 291 pp.