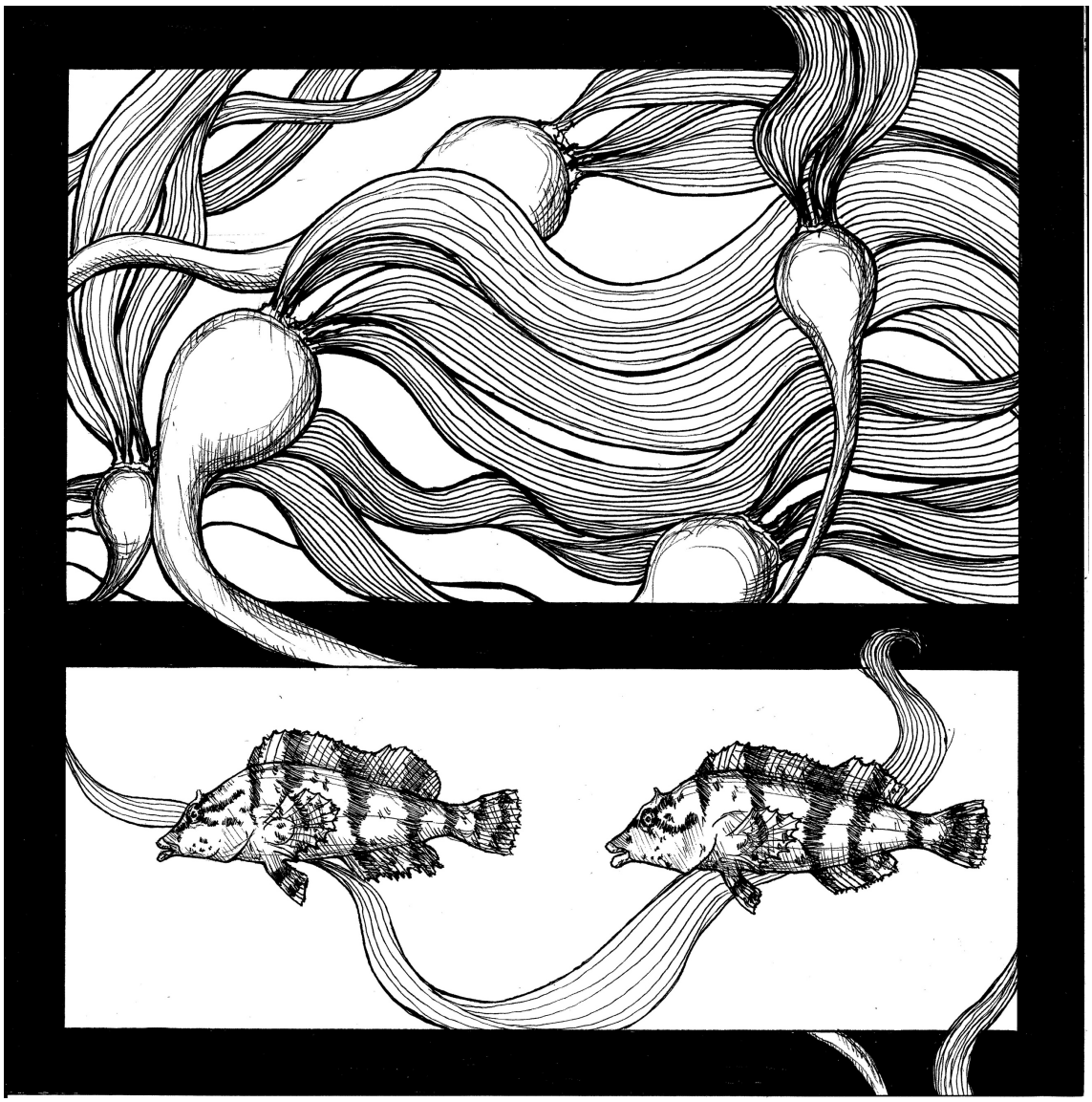


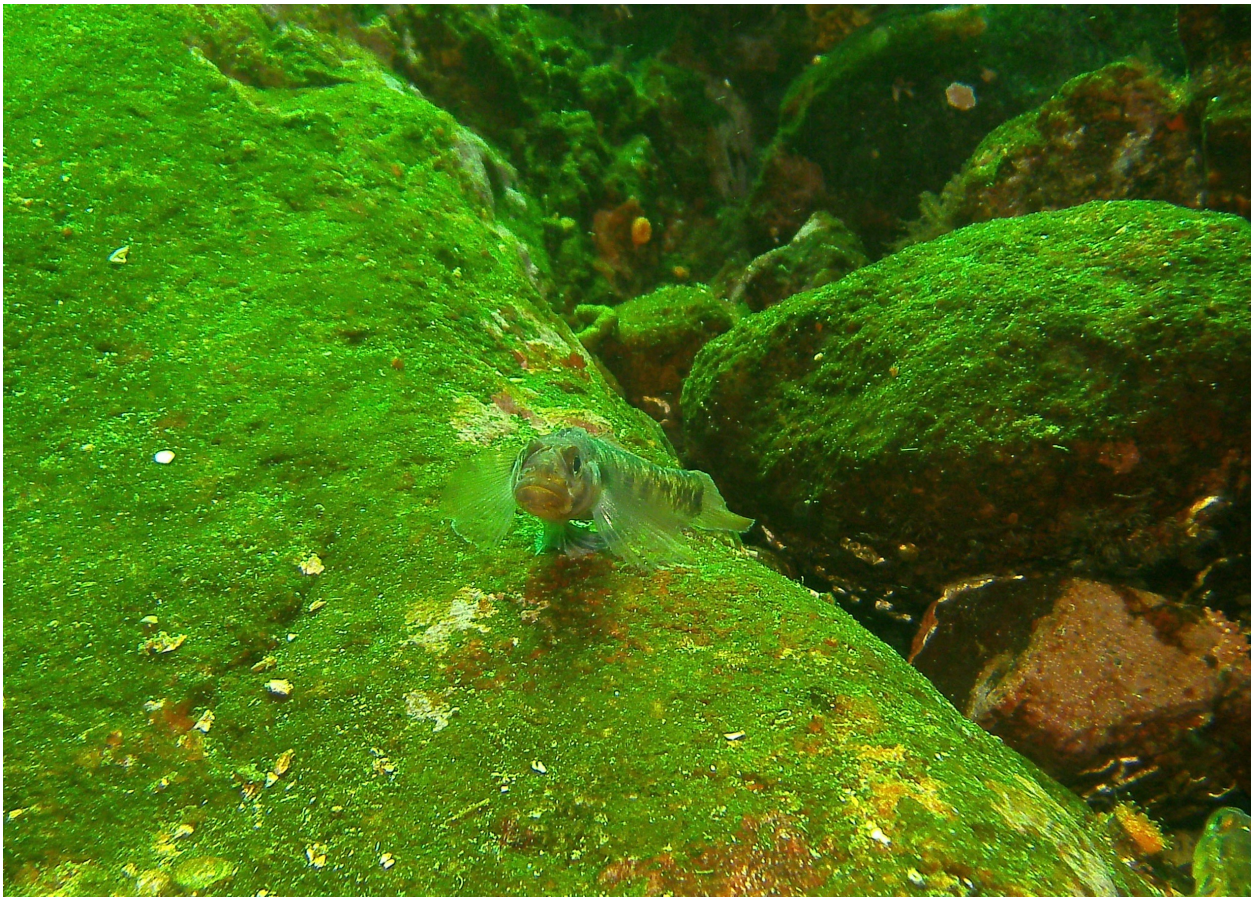
SUBTIDAL BIODIVERSITY PROGRAM

2020 REPORT

Sabina Leader Mense

MARINE STEWARDSHIP INITIATIVE
FRIENDS OF CORTES ISLAND SOCIETY

Welcome… to the Subtidal!



Rhinogobiops nicholsii, the blackeye goby, is the first subtidal creature to consistently welcome us to the subtidal realm. We always grin and bow to show our respect to this wee warrior from the subtidal for his assertive and defiant welcomes!

SUBTIDAL BIOdiversity Program
2020 Report

I. Project Overview

During the winter of 2014/2015, twelve subtidal study sites were established by a team of two professional divers on/around Cortes Island; the Cortes mainland and offshore rocky reefs, islets and islands.
Consistent physical *landscape components* were identified to describe distinct subtidal habitats, which in turn, were used to describe distinct *biological communities*.
Study sites have been dived every winter since and the data collected forms a baseline of information which allows for comprehensive future monitoring of our local subtidal environment. This is a *long-term environmental monitoring program*.
Appendix 1. includes all twelve subtidal study site station sheets.

In the winter of 2016/2017 the Campbell River Community Foundation funded the purchase of a SEALIFE DC1400 underwater camera that facilitated our Subtidal Biodiversity community outreach work; *a picture is worth a thousand words!*

In 2019 FOCI joined the Salish Sea BIOdiversity Initiative… a regional, cross-border initiative to document the biodiversity of the Salish Sea. We have since collated all local observations of marine life, to date/2020, into a master inventory of marine species for Cortes Island. The Subtidal Biodiversity Program contributing essential subtidal records. Appendix 2. presents this master inventory by taxonomic phyla.

"How inappropriate to call this planet Earth, when clearly it is Ocean."
Arthur C. Clarke

II. Landscape Components

In the glaciated landscapes of our region, we identified consistent physical landscape components at our subtidal study sites that described distinct subtidal habitats; individual study sites displayed one or more landscape components; (*) indicating the primary component.
The physical landscape components we identified were:

VF VERTICAL FACE

- vertical rock faces from 3 – 27m in vertical heights at varying depths; several of which show notable glacial grooves and striae: Video reference VF

HL HORIZONTAL LEDGE

- horizontal/planar rock surfaces of varying widths & lengths occurring at varying depths

ST STAIRCASE

- where vertical faces and horizontal ledges consistently alternate with increasing depth, a distinct staircase is created; strong horizontal cracks/fractures occur where the two meet

RS ROCK SLOPE

- neither vertical face nor horizontal ledge, rocky slopes are often continuous with the main shoreline and extend seaward; bare or often overlain with sediment/s

RF ROCKFALL

- boulders > 1m diameter, piled atop/aside one another; often at the base of vertical rock faces, above or below the waterline: Video reference RF

CO COBBLE

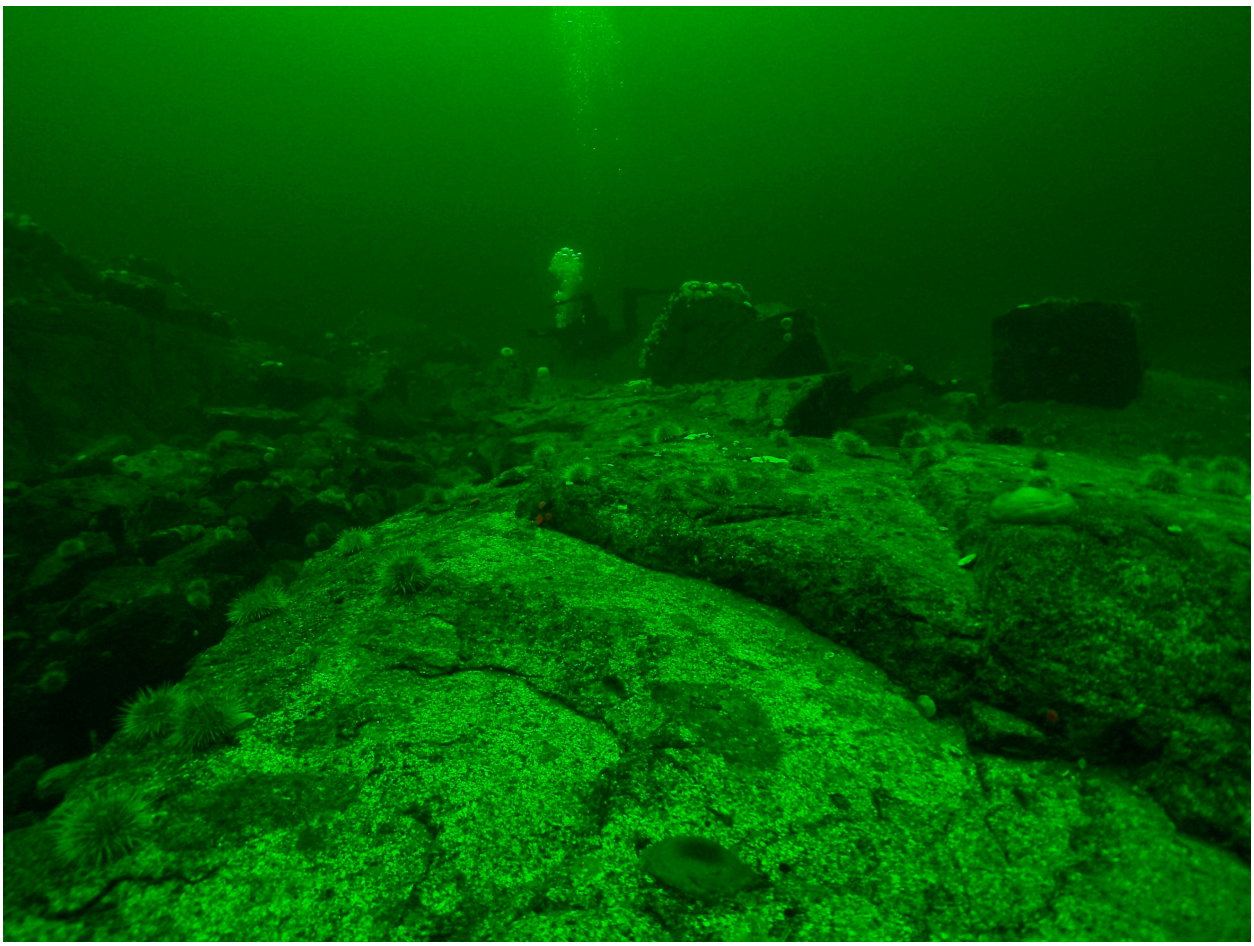
- rocks < 30cm. diameter that are "cobbled" over one another, solid rock or soft sediments; creating interstitial space

SS SOFT SEDIMENT

- sediments granular in size; sand, mud, sandshell overlying solid rock and in turn, often overlain by larger rock sediments, cobble and boulder: Video reference SS

VF VERTICAL FACE

- vertical rock faces from 3 – 27m in vertical heights at varying depths; several of which show notable glacial grooves and striae



RS ROCK SLOPE

- neither vertical face nor horizontal ledge, rocky slopes are often continuous with the main shoreline and extend seaward; bare or often overlain with sediment/s

III. Biological Communities

Consistent, large-scale biological communities of marine species were identified for several of the subtidal habitats described by the landscape components.
The marine species/biological communities we identified were:

VF VERTICAL FACE

- *vertical rock faces from 3 – 27m in vertical heights at varying depths; several of which show notable glacial grooves and striae*

The continuous 27m vertical rock face at one of our study sites allowed us to describe a distinct zonation of upper & lower vertical rock face biological communities, that were consistent with our observations of marine species at all our other study sites showing the vertical face landscape component.

UPPER VF 3M – 15M

Balanus nubilus the giant barnacle, occurred singly or in large clumps, individuals vying for the best placement to filter feed in the currents. Dead *B. nubilus* shells provided homes for decorated warbonnet *Chirolophis decoratus*, pygmy rock crab *Cancer oregonensis* and grunt sculpin *Rhamphocottus richardsonii*. *Scyra acutifrons* the bent-nosed crab and the heart crab *Phyllolithodes papillosus* occupied the spaces between concentrations of *B. nubilus*.
The short plumose anemone *Metridium senile* was the dominant sea anemone, often with >50% coverage of the vertical rock face and we observed juvenile rockfish *Sebastes* sp. taking cover in the *M. senile*. Between/beneath the canopy of *M. senile*, a tapestry of multiple species were consistently observed: encrusting sponges of several species laced with daisy brittle stars *Ophiopholis aculeatea*, breeding aggregations of the sea mouse nudibranch *Aeolidia papillosus* , the cup coral *Balanophyllia elegans* and the blue topsnail *Calliostoma ligatum*. Armoured sea cucumbers *Psolus chitinoides*, occupied narrow ledges open to current.

LOWER VF 15M – 30M

Several hydroid species: *Abietinaria* spp., *Grammaria* spp., *Plumularia* spp. dominated the lower vertical rock faces. *Dirona pellucida* the golden dironid nudibranch was consistently present among them; a known hydroid predator!
Ascidians *Halocynthia igaboja* the bristly tunicate and *H. aurantium* the sea peach occurred alongside *Fusitriton oregonensis* the Oregon triton, the lacy ball sponge *Leucosolenia eleanor* and the spiny red star *Hippasteria spinosa*.
At depth, several species of anemone were found: both species of swimming anemone, *Stomphia didemon* and *S. coccinea*, the giant plumose anemone *Metridium farcimen* and the beautiful crimson star *Cribrinopsis fernaldi.* Where the vertical rock faces were undercut, the zoanthid *Epizoanthus scotinus* would invariably be found and the feather star *Florometra serratissima* occupied the lowest reaches of the rock faces.

These marine species were consistent with the upper and lower vertical face landscape components but not every species occurred at every study site with this designation.

The short plumose anemone, *Metridium senile*,
provides cover for juvenile rockfish, *Sebastes* sp.

The pygmy crab, *Glebocarcinus oregonensis*,
shelters in a dead giant barnacle shell, *Balanus nubilus*.

ST STAIRCASE

- *where vertical faces and horizontal ledges consistently alternate with increasing depth, a distinct staircase is created; strong horizontal cracks/fractures occur where the two meet*

One of our study sites displayed a classic staircase landscape component with 3 steps between 3m and 15m depths. The strong horizontal cracks/fractures observed at 7.5m and 12m measured ~10cm. high x ~30cm. deep and ran from 2- to 4m. in length. These cracks provided habitat for the hairy-spined crab *Acantholithodes hispidus*. Our initial observations of this crab were restricted to this study site; only several dives & several seasons later did we observe *A. hispidus* at two additional study sites in similar crack/fracture habitat; interestingly at one site these cracks were vertical!
This is a textbook example of a… *species specific* habitat.
Interestingly, we observed one individual *A. hispidus* consuming a juvenile rose star *Crossaster papposus*, while hunkered back in the crack recesses.

RS ROCK SLOPE

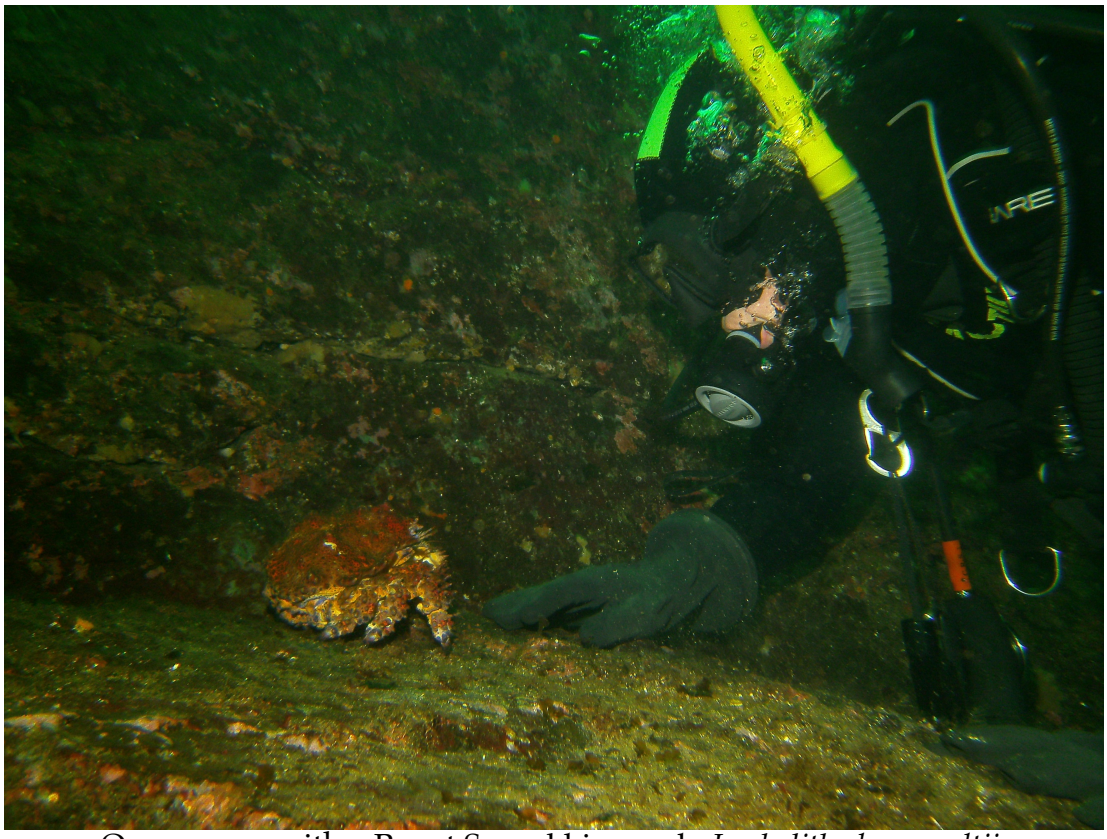
- *neither vertical face nor horizontal ledge, rocky slopes are often continuous with the main shoreline and extend seaward; bare or often overlain with sediment/s*

Consistently this habitat was characterized by our larger, motile invertebrate species: *Apostichopus californicus* the giant sea cucumber and largest of our local sea cucumbers, is a detritus feeder and ranges widely over our rock slopes feeding on deposits of organic material on surfaces of rock, kelp or soft sediments.
Predatory starfish, *Mediaster aequalis, Solaster* spp., *Henricia* spp., and *Dermasterias imbricata* frequent this habitat alongside a very diverse population of lithode crabs including rhinoceros crab *Rhinolithodes wosnessenskii*, heart crab *Phyllolithodes papillosus* and Puget Sound king crab *Lopholithodes mandtii.*
The giant rock scallop *Crassadoma gigantea* was also commonly observed on the rock slope.

RF ROCKFALL

- *boulders > 1m diameter, piled atop/aside one another; often at the base of vertical rock faces, above or below the waterline*

The interstitial space created by a rockfall was consistently occupied by adults of several species of rockfish: *Sebastes nigrocinctus* tiger rockfish, *S. caurinus* copper rockfish, *S. maliger* quillback rockfish, *S. nebulosus* china rockfish and *S. melanops* black rockfish.
The undercut surfaces of the boulders, in locations swept by low to moderate currents, were colonized by the orange zoanthid *Epizoanthus scotinus*.



One-on-one with a Puget Sound king crab, *Lopholithodes mandtii,*
on a rocky slope at 15m below the surface… and what a face!!

CO COBBLE

- *rocks < 30cm. diameter that are "cobbled" over one another, solid rock or soft sediments; creating interstitial space*

Cobble increases rock surface area and creates three dimensional interstitial space; critical habitat that provides:

1. surface area for colonization by encrusting species of marine fauna & flora *that support associated grazing by marine herbivores and carnivores…*

The encrusting marine algae *Ralfsia* spp. and *Hildenbrandia* spp. support Merten's chiton *Lepidozona mertensii* and several species of *Mopalia* chitons, with the crustose corallines *Lithothamnion* spp. supporting the lined chiton *Tonicella lineata* and *Acmaea mitra* the whitecap limpet.

Extensive encrustations of low-growing sessile animals: sponges, bryozoans and hydroids, support notable cobble carnivores. *Diodora aspera* rough keyhole limpet feeds on sponges, the abundant blue topsnail *Calliostoma ligatum* feeds on hydroids, the yellow-rimmed nudibranch *Cadlina luteomarginata* subsists on sponges and *Mopalia ciliata* hairy chiton feeds on sponges, hydroids and bryozoans.

2. interstitial space for filter feeders *to actively extend filtering mechanisms into…*

Three sea cucumber species, *Cucumaria* spp., were consistently observed in/under cobble with tentacles extended to capture plankton.

The transverse lamp shell *Terebratalia transversa* and northern compact wormsnail, *Vermetus compactus* both use highly specialized feeding apparatus to filter plankton from the currents flowing through the interstitial space.

Several species of tubeworms, *Serpula columbiana* red-trumpet calcareous tubeworms and *Pileolaria* spp. dwarf calcareous tubeworms were also consistently observed filter feeding in cobble habitat.

3. secure habitat for juvenile marine species *seeking relief from strong currents and predation…*

We were delighted to consistently observe juvenile rockfish, *Sebastes spp.*, in the cobble habitat in/around Cortes Island; the cobble providing a *critical* nursery area for these *critical* fish species presently being managed for conservation.

SS SOFT SEDIMENT

- *sediments granular in size; sand, mud, sandshell overlying solid rock and in turn, often overlain by larger rock sediments, cobble and boulder*

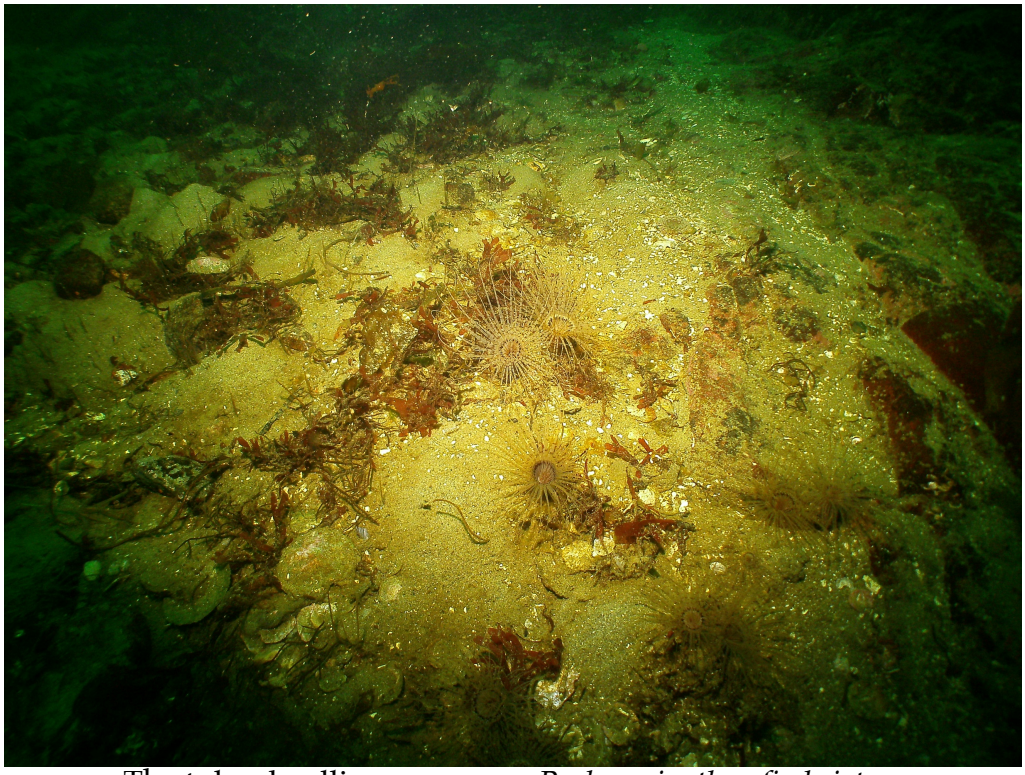
Sandshell is the most common soft sediment present at our subtidal study sites, overlying a rocky slope or horizontal ledge where it is often overlain by cobble!

We consistently observed the black-eyed goby *Rhinogobiops nicholsii* in the sandshell habitat where they excavate sheltering burrows. Two species of large dendronotid nudibranchs were consistently observed, the red dendronotid *Dendronotus rufus* and the giant nudibranch *Dendronotus iris. D. iris* feeds on the tube-dwelling anemone *Pachycerianthus fimbriatus* that often forms large fields on level sandshell surfaces.

Over mud and heavy organic silts, the gray brittle star *Ophiura luetkenii* was often observed occurring as a "network" with arms linked tip to tip over large areas.

The slime-tube feather duster worm *Myxicola infundibulum* was consistently seen buried in sandshell as was *Spiochaetopterus costarum* the jointed three-section tubeworm.

The lined chiton, *Tonicella lineata* grazing cobble fields of the red encrusting algae, *Hildenbrandia* spp.



The tube-dwelling anemone, *Pachycerianthus fimbriatus*, forming a large field on a level sandshell soft sediment surface.

IV. Biological Diversity

Strong biological diversity across phyla was observed at several of our subtidal study sites, which merit further inventory research.

Marine species observed were identified to genus and species where possible. Keeping apace of the ever-changing taxonomy represents a challenging …work in progress! Taxonomic expertise will be required for some taxa, notably the poriferans and microscopic support will aid in species identification of other taxa.

The subtidal species observed are contributing to FOCI's collation of a master inventory of marine species on/around Cortes Island. Following our 2019/2020 dive set, FOCI director Gerri Davis completed the data entry and as of this reporting, the tally has passed the 500 species mark and will increase with every dive! The marine inventory is attached to this report as Appendix 2.

The heart crab, *Phyllolithodes papillosus,* hunkered down between the giant acorn barnacle, *Balanus nubilus*; what incredible camouflage!

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