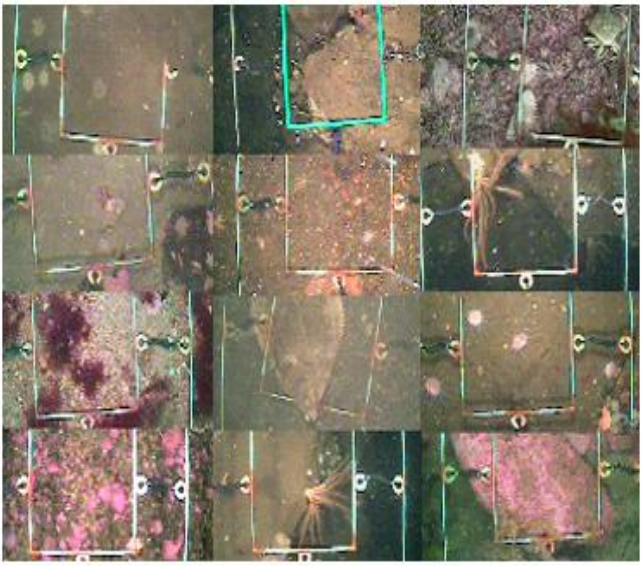
A Photographic Guide to Benthic Species of Hard Bottom Communities in Southwest Newfoundland



Fisheries and Oceans Canada

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This guide is designed as a reference to assist in the, identification of benthic organisms observed during underwater surveys of aquaculture sites located in hard bottom areas along the south coast of Newfoundland, Canada. The species listed in this guide were not collected and may not represent actual species described, as some species are similar to other taxa.

This document has been produced by the Aquaculture, Animal Health, and Biotechnology Section, Science Branch of Fisheries and Oceans Canada (DFO), Newfoundland.

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Legend used in classification:

Phylum [P]

Class [C]

Subclass [C]

Order [O]

Family [F]

Species-like [*L*]

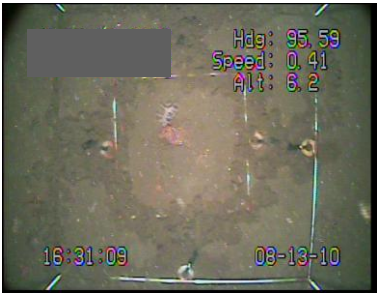
Genus species [*L*]

This classification guide is designed to assist in recording substrate type, species presence, and abundance (species diversity) on predominantly hard bottom aquaculture and reference sites, for the purpose of assessing potential impacts of aquaculture activities on fish and fish habitat. Descriptions provided were derived from reference material (Fisheries and Oceans contract # F6090-100021) and modified to list only those features visible in underwater video. Few of these benthic organisms can be reliably identified to genus or species based on video alone, and samples are needed for species confirmation. However, video does allow the observer to discriminate among most macroorganisms, usually to a sufficiently refined taxonomic level (e.g. Family) for use in studies of macro-diversity. The science of taxonomy is constantly being refined as new methods for classification become available (e.g. DNA sequencing). With this uncertainty in mind, Species ID is provided to the lowest possible taxonomic level, coded in *Blue*.

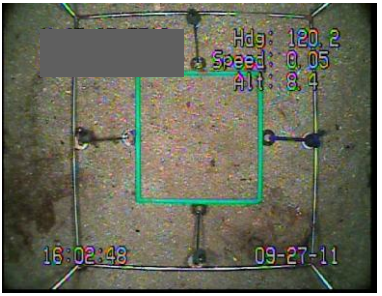
Typical substrate types

Based on modified Wentworth scale

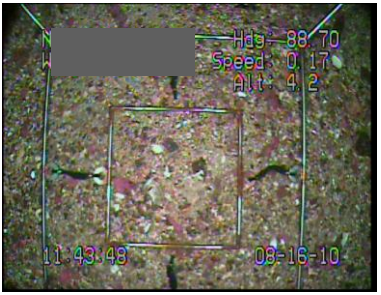
Mud/silt
Grains not detected by eye



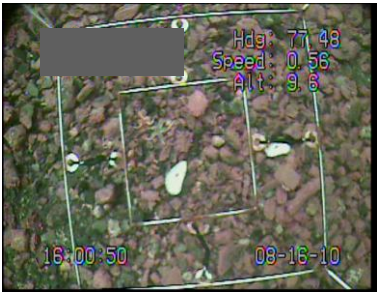
Sand



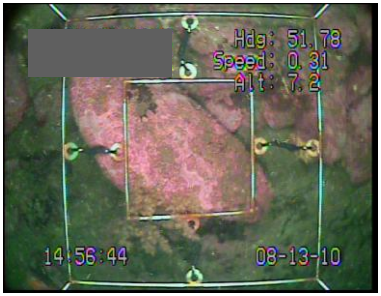
Gravel/Pebble
Grains can be seen (<6cm)



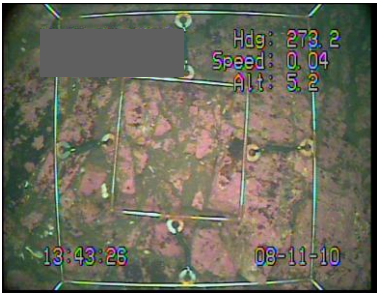
Cobble
(6-13cm)



Rubble/Boulder
(13-25cm) (>25cm)



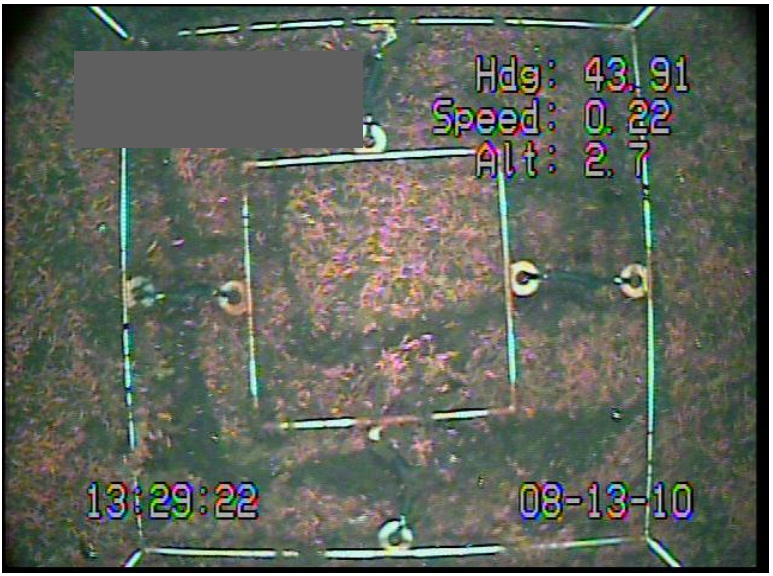
Bedrock
Continuous rock



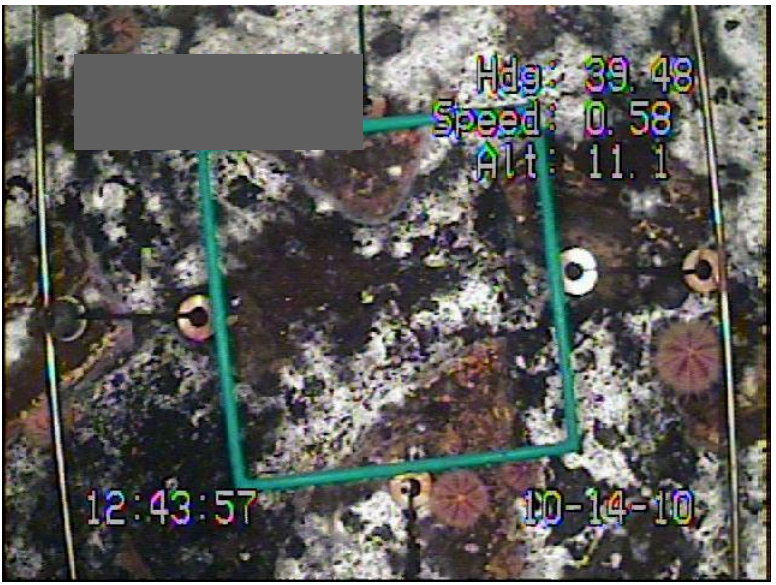
Rock Wall
Vertical rock surface

Rock Wall
Vertical rock surface

Opportunistic Polychaete Complex (OPC)

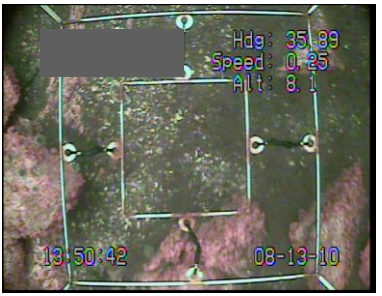


Beggiatoa

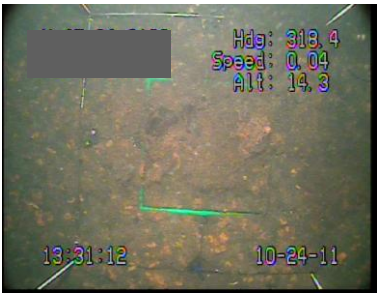


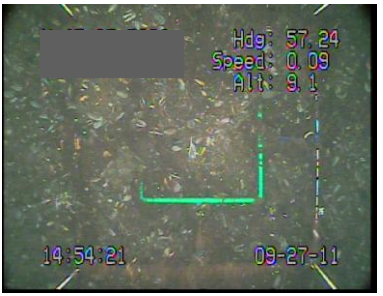
Potential indicators of highly impacted substrates

Black Sediment



Flocculant





Annelida

Annelida [P] - Segmented worms, includes terrestrial earthworms, marine bristle worms, and leeches

Polychaeta[C] - Marine bristle worms

- May be burrowers, roaming, tube-forming, or pelagic.
- Accurate classification based on microscopic features including bristles.
- In video-based surveys, the material of the tube (e.g. mud, calcareous) and its shape (e.g. cone), can be useful in identification.

Annelida [P] **Polychaeta** [C] **Serpulidae** [F]

Serpula [L]

- Calcareous tube-dwelling worm, attached to rocks.

Serpula [L]


Hdg: 21.86
Speed: 0.31
Alt: 1.7
14:07:52
09-26-11


Hdg: 319.9
Speed: 0.20
Alt: 5.5
13:23:10
08-12-10

Arthropoda

Arthropoda [P] - Jointed appendages, exoskeleton

Crustacea [C] **Decapoda** [O] - Crabs, shrimp, lobster

- Five pairs of walking legs.
- In video-based surveys, identification uses shell morphology, shell notches and markings, and shape and size of claw.

Arthropoda [P] **Crustacea** [C] **Decapoda** [O] **Xanyhidae** [F]

Cancer spp. [L] *(C. irroratus* [L] or *C. productus* [L]*)*

- By maturity, carapace can grow to 13 cm across, with two sharp edges at the widest points.
- Fan-shaped body which narrows posteriorly – resembles “skull with eyes”.
- Can be red, purple, or brown.
- Often found among seaweeds or on horizontal surfaces.

Cancer spp. [L]

Chaetognatha

Arrow worms

Chaetognatha [P] Sagittoidea [C] Aphragmophora [O] Sagittidae [F]

Sagittidae [F]

- Distinct body shape – pencil-like, straight when resting.
- Body is blue and transparent.
- Hard to distinguish in pictures due to transparent body form. Identifiable based on S-shaped swimming pattern in video, can be observed darting and folding through water.
- Pelagic, feeds on copepods.
- Associated with discrete temperature and salinity gradients, considered to be a good water quality indicator.

Sagittidae [F]

Cnidaria

Cnidaria [P] - Anemones, hydroids, jellyfish, corals

- Radial symmetry with central cavity.
- Mouth surrounded by tentacles.
- Tentacles with stinging cells.

Anthozoa [C] - Anemones, soft corals

- For identification of anemones in video-based surveys, use size, color (not reliable), shape of stalk and pedal disc, shape and number of tentacles, and habitat type.

Staurozoa [C] - Jellyfish, most likely:

- *Aurelia aurita* - moon jelly
- *Lucernaria quadricornis* - stalked jelly

Cnidaria [P] **Anthozoa** [C] **Nephtheidae** [F] - Soft corals

Gersemia spp. [L] (*G. antartica* [L] or *G. drifa* [L])

- Can be 12 cm wide or larger.
- Profusely branched and rounded.
- Can vary in color: red, brown, white, pink (ranges with light availability).

Gersemia spp. [L]

Cnidaria [P] **Anthozoa** [C] **Actinostolidae** [F] - Anemones

Stomphia [L]

- Oral disc is approximately 5 cm wide, concave, with a bare center and pink protruding mouth. They have 30-50 long slender tentacles, mostly along the edge.
- Column is approximately 4 cm long and totally smooth. The pedal disc is wide and obvious, and can be dislodged if disturbed (in some cases, medusoid forms are free-swimming).
- Individuals are abundant in videos, appearing white or pink depending on light.
- Mostly seen attached to rock, often with column hidden in soft sediment.
- Another identification possibility would be *Hormathia* [L], also with wide pedal disc, but with raised bumps along the column. May be confused with *Cerianthus* [L] (stalked jellyfish) if stalk hidden by sediment.

Stomphia ^{L}


Hdg: 211.8
Speed: 0.58
Alt: 7.3
12:14:17
08-12-10


Hdg: 230.3
Speed: 0.40
Alt: 7.6
12:14:38
08-12-10

Cnidaria [P] **Anthozoa** [C] **Boloceridae**[F] - Anemones

Urticina [L]

- Larger than *Stomphia* – can be 7 cm wide.
- Color varies, usually white, pink or red.
- Has relatively thick, blunt tentacles and a wide column.

Urticina [L]

Cnidaria [P] **Anthozoa** [C] **Sagartiadae** [F] – Anemones

Metridium senile [L]

- Column is 5 cm high when open, disc is 2 cm wide.
- Olive green column (may appear brownish in video).
- Tentacles are white (paler than column), slender and numerous. This gives individuals a frilled appearance when open or a white center when retracted.

Metridium senile [L]

Cnidaria [P] **Anthozoa** [C] **Cerianthidae** [F] - Anemones

Cerianthus borealis [L]

- Small specimens are 4 cm wide, larger specimens can be up to 10 cm in width.
- Two whorls of thin, maroon-colored tentacles are visible at substrate level, can withdraw leaving a visible hole. The rest of the individual is embedded in the sediment and lacks a pedal disc.
- Hole in substrate is hazy due to tentacles, and edges appear red/brown due to color of tentacles.
- For larger specimens, column may be visible protruding from the sediment.
- Identification difficult from photo, video needed to observe anemone retract.

Cerianthus borealis [L]

Cnidaria [P] **Medusozoa s** [P] **Staurozoa** [C] **Stauromedusae** [O] **Lucernariidae**[F] – Stalked jellyfish

Lucernaria quadricornis [L]

- Looks soft and frilly. Each individual has four long arms. Each arm has two bundles of short knobby tentacles.
- Body colours are light to dark brown.
- Attached to rocks or seaweed by a long stalk.
- Rarely seen above sediment.

Lucernaria quadricornis [L]

Ctenophora

Ctenophora[P] **–** Comb jellyfish

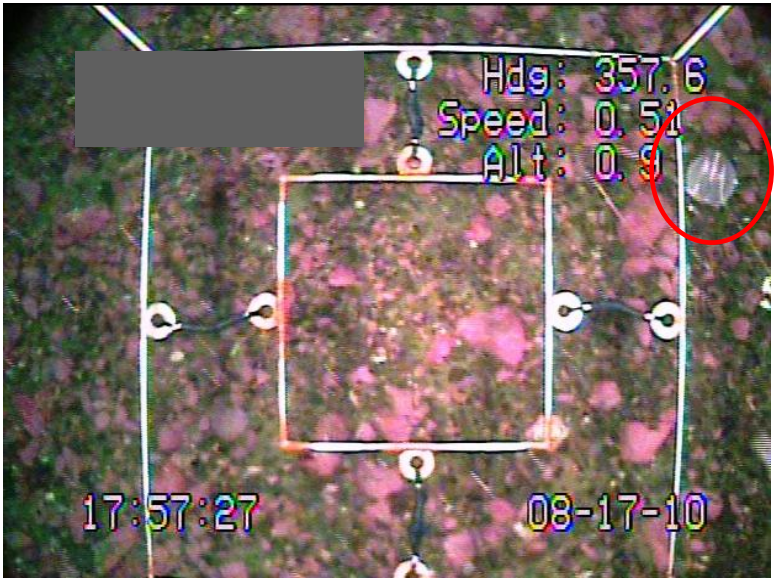
- Radial symmetry with central cavity
- Gelatinous body similar to *Cnidaria*, but distinguished by rows of cilia running from the oral surface to opposite pole, used for swimming.

Tentaculata [C] **Cydippida** [O] **Pleurobranchiidae** [F]

Pleurobrachia pileus [L]

- Round, transparent/blue-tinted body, with two long trailing tentacles.
- Rows of cilia appear bright, often with visible flashes of colour.
- Pelagic in coastal waters.

Pleurobrachia pileus [L]



Echinodermata

Echinodermata [P] - Sea stars, brittle stars, basket stars, sea cucumbers, urchins, sand dollars, feather stars (crinoids).

- Radially symmetrical but commonly symmetrical along 5 planes.
- Locomotion by tube feet.
- For identification in video-based surveys, use overall shape and color, morphology and number of arms, habitat type.

Echinodermata [P] Asteroidea [C] Asteriidae [F]

Asterias rubens [L] (formerly *A. vulgaris* [L])

Common seastar/starfish

- Typically grow up to 20 cm in diameter.
- Colour varies, usually pale variations of orange, red, or purple.
- Tend to live in shallow rocky areas.
- Typically has 5 arms, may be less due to body damage.

-

Asterias rubens [L]

Echinodermata [P] **Asteroidea** [C] **Asteriidae** [F]

Leptasterias polaris [L]

Polar star or six-arm sunstar

- Resembles common seastar but has six arms.
- Grows to 20 cm in diameter.
- Colour is mottled pink/purple and white.
- Can live in deeper, colder water than *A. rubens*, but typically seen in the same habitats.

Leptasterias polaris [L]

Echinodermata [P] **Asteroidea** [C] **Echinasteridae** [F]

Henricia sanguinolenta [L]

Blood star

- Generally smaller than *Asterias* and *Leptasterias*, up to 10 cm in diameter.
- Colour tends to be bright red, purple or orange, but will appear dull in low light.
- Typically has 5 arms, may be less due to body damage.
- May be seen feeding on sponges or ascidians (sea squirts).

Henricia sanguinolenta [L]

Echinodermata [P] **Asteroidea** [C] **Solasteriidae** [F]

Crossaster papposus [L]

Spiny sunstar

- Grows up to 30 cm in diameter, with 8-14 arms.
- Colour is typically pink/purple, and concentric bands of alternating colour (typically white) may be visible on underside.
- Typically found in rocky or gravelly areas, and will feed on a wide variety of benthic invertebrates.

Crossaster papposus [L]

Echinodermata [P] Crinoidea [C] Comasteridae [F]

Heliometra glacialis [L]

Crinoid or feather star

- Ten feathery arms up to 20 cm in length.
- No stalk, attaches to substrate using short filamentous tentacles that are barely visible when detached.

Heliometra glacialis[L]

Echinodermata [P] **Echinoidea** [C]
Strongylocentrotidae [F]

Strongylocentrotus droebachiensis [L]

Green sea urchin

- Adults reach a test (shell) diameter of approximately 8 cm.
- Live individuals are covered in long spines – tests without spines indicate dead individuals.
- They will live in most habitats, at a wide range of depths; however, they feed heavily on *Laminaria* and are often found around kelp.

Strongylocentrotus droebachiensis[L]

Echinodermata [P] **Holothuroidea** [C]
Cucumariidae [F]

Cucumaria frondosa [L]

Orange-footed sea cucumber

- Typically 20 cm long at maturity.
- Cylindrical black (occasionally white) body. Oral end has ten bushy tentacles used for filter feeding, which will retract upon contact.
- Live in a wide range of habitats and depths, typically in rocky or gravelly areas.

Cucumaria frondosa^{L}

Echinodermata [P] **Asteroidea** [C] **Ophiolepidae** [F]

Ophiura sarsi [L]

Serpent star or brittle star

- Central disc approximately 2-2.5 cm wide at maturity.
- Aboral surface is orange or light brown.
- Preyed upon by many species, and tend to be cryptic when possible (live in crevices and under rocks, with their arms raised to capture food).
- Forage on benthos in muddy or sandy areas.

Ophiura sarsi [L]

Mollusca

Mollusca [P] – Mussels, clams, scallops, whelks, periwinkles

- Soft-bodied animals that typically secrete a calcareous shell.
- Identification of bivalves and gastropods focuses on shell structure and size.
- In gastropods, for identification use the type and number of shell whorls and whether a species is left or right-sided (direction of whorl).

Mollusca [P] **Bivalvia** [C] **Mytilidae** [F]

Mytilus edulis [L] (or *M. trossulus* [L])

Blue mussel

- Grows to approximately 8 cm in length.
- Most often found at shallow depths (intertidal and shallow subtidal areas).
- Shells are often seen as biogenous material on the benthos, as *M. edulis* is prey for many species.
- Can occur naturally at a site, or as a result of aquaculture activities in the area.

Mytilus spp. [L]

Mollusca [P] **Bivalvia** [C] **Pectinidae** [F]

Placopecten magellanicus [L]

Giant sea scallop

- One of two prominent species of scallops that may be seen – the other is the Iceland scallop (*Chlamys islandica*).
- Generally distinguished by size: Sea scallops can grow up to 21 cm shell height, while Iceland scallops typically grow as large as 10 cm.

Placopecten magellanicus[L]

Mollusca [P] **Gastropoda** [C] **Epitoniidae** [F]

Epitonium groenlandicum [L]

Greenland wentletrap

- Shell is 5 cm long, elongated, and tapers to a smooth point.
- Shell opens to the right, with deep whorls/spiral detail.
- Lives in soft sediment and preys on anemones.

Epitonium groenlandicum [L]

Porifera

Porifera [P] **Demospongiae** [C] - Sponges

Demospongiae [C] - Includes most of the common sponges found in North America.

- Loose structure of cells and support tructures (used for accurate classification with sample).
- Predominantly complex in structure (high degree of folding, irregular pores and larger holes for water circulation).
- Shape can be: upright branching, fan, vase, cushion, encrusting, or not-visible due to boring.
- Visible features in video-based surveys used for ID are: shape, size, color, and location.
- Mostly marine, sessile and attached to hard substrates.

Porifera [P] **Demospongiae** [C] **Myxillidae** [F] - Sponges

Melonanchora [L]

Warty sponge

- Upright, irregular mass.
- Wart-like with visible oscula (holes).
- White, beige, or pale yellow in colour.

Melonanchora [L]

Porifera [P] **Demospongiae** [C] **Halichondriidae** [F]

Halichondria [L]

Breadcrumb sponge

- Encrusting; can range from thin layer to warty layer.
- Typically pale to deep yellow in colour; varies with artificial light and does not define species.

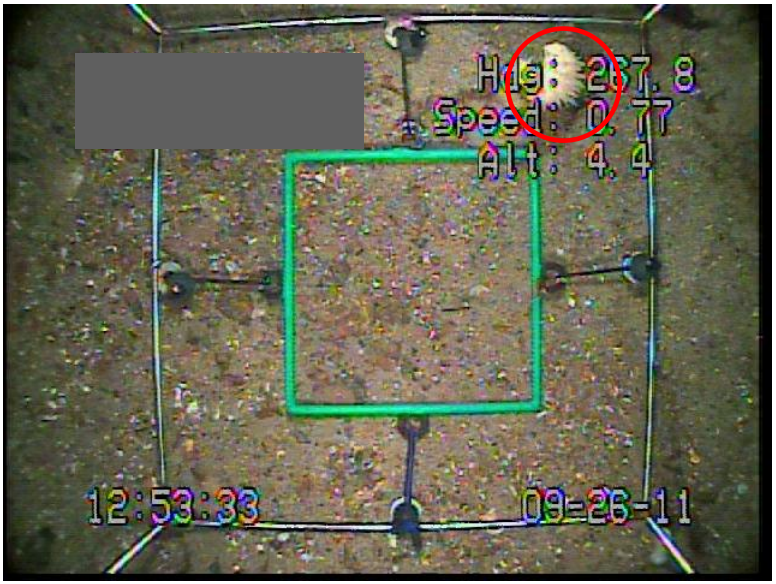
Halichondria [L]

Porifera [P] **Demospongiae** [C] **Polymastiidae** [F]

Polymastia [L]

- Round with numerous finger-like protrusions.

Polymastia [L]



Chordata

Perciformes [O] Labridae [F]

Tautogolabrus adspersus [L]

Cunner

- Body is elongate, with a thick peduncle, rounded caudal fin, and a single long dorsal fin.
- Eye is moderate, and mouth is small, terminal, and fleshy.
- Color depends on background, can be reddish, greenish, or brownish, often mottled or with bars.
- Young cunners (< 10 cm) have distinctive black spot in front of soft dorsal fin.
- Adults can grow op to 30 cm.

Tautogolabrus adspersus [L]

Perciformes [O] Scorpaenidae [F]

Sebastes spp.[L] (*S. fasciatus*[L] or *S. mentella*[L])

Redfish

- Because their red colour may appear similar to that of cunners, these may be misidentified when viewed from above.
- Redfish have a deeper body, larger head with spines, and a small peduncle. The caudal fin is slightly forked, and the dorsal fin is long (spiny), ending with a higher lobed section. Eyes are large; the mouth is terminal and bony.
- Color is red/pale pink, with some brown along back, irregular blotches and crossbars of darker scarlet.
- The adjacent image is still under discussion, identified as *Sebastes* for now.

Sebastes spp. [L]

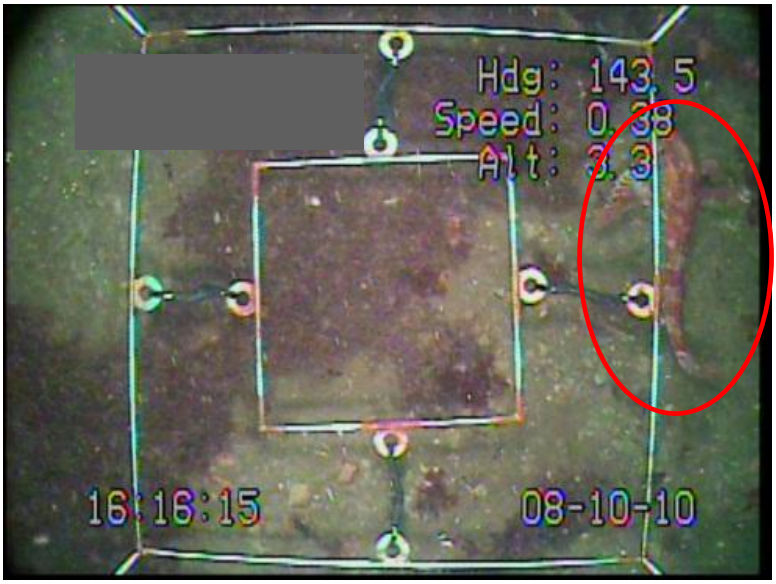
Perciformes [O] Cottidae [F]

Myoxocephalus octodecemspinosus [L] (most likely, or *M. scorpius* [L])

Sculpin

- Body is elongate, slender, and tapering to a slender peduncle. Head is blunt and wide. Pectorals are large, rounded and often flared open.
- Color varies; dark olive to grey above with strong crossbars, and light below.
- Swims by undulating along the bottom.

Myoxocephalus spp. [L]



Gadiformes [O] Gadidae [F]

Gadus morhua [L]

Atlantic cod

- Body is large and elongate, with a blunt snout, distinct large barbel, stout peduncle, three dorsal fins, flared pectorals, and a rounded/square caudal fin.
- Color is grey or brown, mottled, with white belly and pale lateral line.

Gadus morhua [L]

Pleuronectiformes [O] Pleuronectidae [F]

Pseudopleuronectes americanus [L]

Right-eyed winter flounder

- Body is oblong, with a thick peduncle, rounded caudal fin, and long dorsal fin. Eyes are moderate, and the mouth is small.
- Color is brown to black, spotted or mottled, and changes with background. Blind side is white.

Pseudopleuronectes americanus [L]

Rhodophyta

Rhodophyta [P] - Red algae

Lithothamnium spp. [L]

- Calcareous (hard) and rock-like.
- Usually light pink in colour.
- Can grow in individual branching, baseball-sized chunks (called ‘rhodoliths’) or flat and encrusted on rocks and shells.

Lithothamnium spp. [L]

Rhodophyta [P] **-** Red algae

Hildenbrandia rubra [L]

- Encrusting on rocks.
- Smooth, no raised bumps.
- Burgundy/dark red/purple in colour (much darker than *Lithothamnium*).

Hildenbrandia rubra [L]

Rhodophyta [P] - Red algae

Palmaria palmata [L]

Dulse (common name)

- Has flat, branched, dark red thalli (blades) that can grow from 3-8 cm wide.
- Holdfast attaches to rocks or kelp.
- Lives in shallow water, from low intertidal zone to approximately 20 m depth.

Palmaria palmata [L]

Rhodophyta [P] - Red algae

Chondrus crispus [L]

Irish moss

- Dark red, but may appear purple or brown.
- Small, rarely grows larger than 20 cm long.
- Extensively branched, many small, thin thalli (2-15 mm wide).
- Dense thalli give it a bushy appearance.
- Lives in shallow water, from shallow subtidal zone to approximately 20 m depth.

Chondrus crispus [L]

Phaeophyta

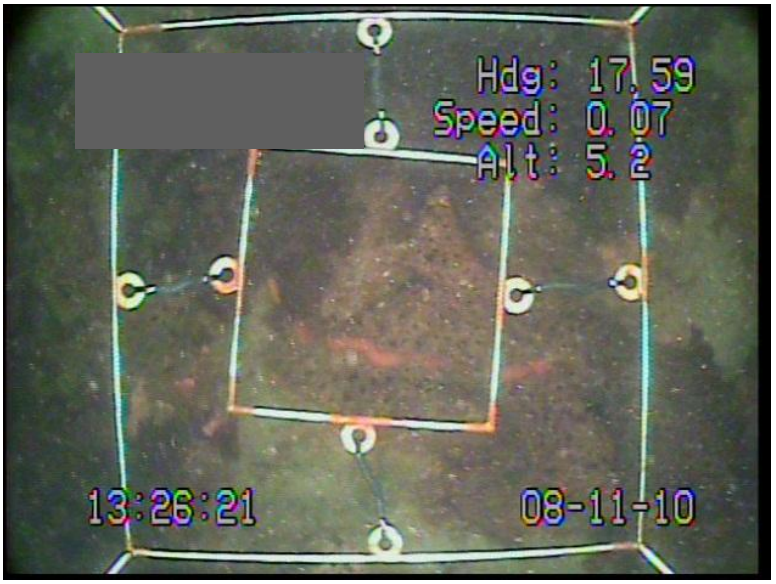
Phaeophyta [P] - Brown algae

Agarum cribosum [L]

Sea colander (common name)

- Stipe grows up to 30 cm long, while blade can grow to 90 cm long and 50 cm wide.
- Stipe and blade are brown.
- Many small holes throughout flat blade.
- Lives in shallow water, from shallow subtidal zone to approximately 20 m depth.

Agarum cribosum [L]



Phaeophyta [P] - Brown algae

Fucus spp.[L]

- Has branched thalli with multiple vesicles (floats).
- Stipes and thalli are brown.
- Found in intertidal zone and shallow subtidal areas.

Fucus spp. [L]

Phaeophyta [P] - Brown algae

Laminaria and *Saccharina* spp.[L]

Kelp

- Brown algae characterized by large holdfasts, long stipes and large blades.
- Size varies between species, but blades can grow 2-3 m long.
- Holdfasts typically have extensive branching, used for attaching to substrate.
- Blades may have rippled appearance and extensive communities of epiphytes or parasites.
- Lives in shallow water, from shallow subtidal to approximately 20 m depth.

Laminaria and *Saccharina* spp. [L]

Phaeophyta [P] - Brown algae

Laminaria and *Saccharina* spp.[L]

- Holdfast and stipe of kelps may be seen without the blade

Laminaria and *Saccharina spp.* [L]

NOTES

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