BIVALVE MOLLUSC CARE

SOP# - MOLL1

PURPOSE: To describe methods of care of bivalve molluscs.

POLICY: To provide optimum care for all animals.

RESPONSIBILITY: Collector and user of the animals. If these are not the same person, the user takes over responsibility of the animals as soon as the animals have arrived on station.

PROCEDURE:

There are a number of bivalve species commonly found around BMSC.

Species:

English Name	Scientific Name
Swimming scallop	*Chlamys hastata*
Heart cockle	*Clinocardium nuttallii*
Giant Pacific oyster	*Crassostrea gigas*
Nesting clam	*Hiatella arctica*
Rock scallop	*Hinnites giganteus* (aka *Crassadoma giganteum*)
Pointed macoma	*Macoma inquinata*
Bent nose macoma	*Macoma nasuta*
California mussel	*Mytilus californianus*
Bay mussel	*Mytilus trossulus*
Jingle shell	*Pododesmus macrochisma*
Littleneck clam	*Protothaca staminea*
Manilla clam	*Venerupis philippinarum*
Butter clam	*Saxidomus giganteus*
Horse clam	*Tresus capax*
Softshell clam	*Mya arenaria*
Varnish clam	*Nuttallia obscurata*

Identification

Species	Description
Chlamys hastata	▪ Shell is ~ 6cm high. ▪ Ribs radiate across the shell and are roughened by small, arched spines.

	▪ Shell margins are also rough. ▪ Lies with its right valve against the substrate. ▪ Green eyes are iridescent and almost luminous around the edge of the mantle on both valves. ▪ Left valve often colonized by sponges that form a thick coating.
Clinocardium nuttallii	▪ Found in fine, muddy sand and in beds of eelgrass on mud. ▪ Shell reaches a length of ~10cm. ▪ Valves are vaguely triangular with rounded corners. ▪ ~ 35 strong ribs radiate from the umbo (the protruberance of the valve that rises above the line of articulation). ▪ Young specimens are colored a warm brown with some mottling ▪ Older specimens usually a monotonous darker brown.
Crassostrea gigas	▪ Large specimens can exceed 25cm in length. ▪ Left valve much deeper than the nearly flat right valve, and is partly or almost completely cemented into the substrate. ▪ Tends to settle on species of its own kind creating a pile of oysters. ▪ Shells are often grotesquely twisted and deformed; no two specimens are alike.
Hiatella arctica	▪ Siphon tips crimson in color. ▪ Shell length reaches ~ 3cm.
Hinnites giganteus	▪ Found firmly attached to rocks by the right valve of its heavy shell. ▪ Left valve generally somewhat irregular and may be grotesquely misshapen. ▪ Coarsely ribbed and ribs have small spines on them. ▪ Both valves are white internally with a large blotch of rich purple close to the hinge. ▪ Outside of the free valve is brownish in colour, but may become colonized by sponges, giving it varying colours. ▪ Shell also often eaten away by the boring sponge, giving it a honeycomb look. ▪ Diameter of large specimens can exceed 15cm.
Macoma inquinata	▪ About the same size and appearance as *M. nasuta* (see below), but its valves are not bent and the shell is slightly more inflated. ▪ Siphons are barely yellowish.

Macoma nasuta	▪ Maximum length of about 5cm. ▪ Valves bent sharply to the right near the posterior end. ▪ Generally lies ~10 to 15cm below the surface of muddy sand, with its left valve down. ▪ Siphons are orange. ▪ Periostracum (shell exterior) is a dirty brown but the rest of the valves are white.
Mytilus californianus	▪ Found in areas of rough wave action. ▪ Can reach 20cm in length but usually are ~15cm long. ▪ Tightly attached to rock by the byssus; these mussels tend to aggregate in large numbers. ▪ Typically have several strong ribs. ▪ Usually associated with the goose barnacle. ▪ Older specimens tend to be brownish in colour.
Mytilus trossulus	▪ Reaches a length of 7cm. ▪ These mussels don't get as large as *M. californianus*. ▪ Older specimens tend to be black and dark blue in colour.
Pododesmus cepio	▪ Tightly attached to the substrate by a byssus that emerges through a hole in one of the valves. ▪ Valves are nearly circular, sometimes ~10cm in diameter. ▪ Valves are unequal in size, the one attached to the substrate being smaller. ▪ Flat shells will deform to follow the contour of the substrate, bending to 90 degrees if necessary. ▪ Flesh is bright orange.
Protothaca staminea	▪ Found in protected habitats where substrate is gravel mixed with sand or mud. ▪ Shell reaches a length of ~6cm. ▪ Valves are sculptured with both radiating and concentric ridges. ▪ Valves are sculptured like a file just inside the ventral margins. ▪ Younger specimens may have brown markings on white shell. ▪ Older ones uniformly pale brown and may have a pinkish tone. ▪ Siphons fused together and extremely short.
Venerupis philippinarum	▪ Up to 7.5cm in diameter. ▪ Shells more elongate than littleneck clam.

Saxidomus giganteus	▪ Thick shelled, ~10cm or longer. ▪ Basically whitish, though it may have blackish discolorations due to iron sulfide. ▪ Surface of valves marked by raised concentric growth lines and grooves. ▪ Hinge is very thick. ▪ May be buried up to 30cm deep, but is often found close to the surface.
Tresus capax	▪ The largest bivalve found in the area - valves can attain a length of 20cm. ▪ These clams may be buried up to 50cm depth; usually less than 30cm below the surface. ▪ Periostracum (shell exterior) is a dull brown color; rest of the shell is chalky white unless blackened by sulfides. ▪ Tip of the siphon covered by two small, leathery plates. ▪ Almost always has soft-bodied crabs in its mantle cavity.
Mya arenaria	▪ Up to 17 cm in diameter. ▪ Chondrophore (a spoon-shaped structure) is the obvious protrusion at the hinge of the clam.
Nuttailia obscurata	▪ Has a solid purple tinge with a brown periostracum and a flat shell.

Refer to Eugene N. Kozloff's book, "Seashore Life of the Northern Pacific Coast" and Gotshall's "Guide to Marine Invertebrates: Alaska to Baja California" for in depth descriptions of individual specimens.

Sites

Intertidal and subtidal sites are found on the shores of:

- The Deer Group Islands
- Dixon I.
- English Bay (Scott's Bay)
- Off the Blowhole
- Along Grappler Inlet
- At the Harbor mouth across from Aguilar Pt.

Species	Location
Clinocardium nuttattii, Macoma inquinata, Macoma nasuta, Protothaca staminea, Venerupis philippinarum, Saxidomus giganteus, Tresus capax, Mya arenaria, and Nuttallia obscurata	▪ Found in mud and/or sand, shell intertidal areas
Mytilus californianus and Mytilus trossulus	▪ Commonly found on rocky intertidal sites ▪ *M. trossulus* can be found on protected or exposed rocky sites ▪ *M.* ***californianus*** generally found on exposed or semi-exposed sites.

	▪ Both attatched to substrate by byssal threads.
Chlamys hastate and Hinnites giganteus	▪ Collected subtidally from rocky substrates by scuba diving or dredging
Pododesmus cepio	▪ Collected by collecting the rock it is attached to by diving or dredging. ▪ Occasionally found very low in the intertidal.
Crassostrea gigas	▪ Found on shell or pebble beaches intertidally

Collection Methods

Species	Method of Collection
Clinocardium nuttattii, Macoma inquinata, Macoma nasuta, Protothaca staminea, Venerupis philippinarum, Saxidomus giganteus, Tresus capax, Mya arenaria, **and** ***Nuttallia obscurata***	Must be dug out of the substrate using shovels
Mytilus californianus, Mytilus trossulus and Chlamys hastata	Can by pulled off rocks by hand or use scissors/knife to cut the byssal threads attaching it to the rock.
Crassostrea gigas, Hinnites giganteus, Pododesmus cepio	Must be collected with the rock that they are attached to.

Holding
- All bivalves should be held in continually flowing seawater.
- Lids are unnecessary.

Feeding
- Almost all bivalves are filter feeders, actively processing water for microscopic food.

Note: Bivalves need supplemental feedings of plankton if held for periods longer than 3 weeks as the amount of plankton in the seawater system is not adequate to sustain them for long periods.

Tank Cleaning
Frequency: Once a week.

Procedure:
1. Bivalves should be removed from the tank and placed into a holding bucket.
2. The tanks should be drained and the sides and bottom should be scrubbed and rinsed with warm freshwater.
3. The tanks should then be rinsed with cold seawater and allowed to refill, and the bivalves replaced.

Animal Return
Return animals to the site of their collection.

DAILY ACTIVITIES

1. Ensure water is flowing into the tank at a reasonable rate.
2. Ensure the standpipe is in place and not blocked.
3. Check for and remove and dead animals.
4. Check for and remove any uneaten prey organisms.
5. Check for and remove and foreign organisms.

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