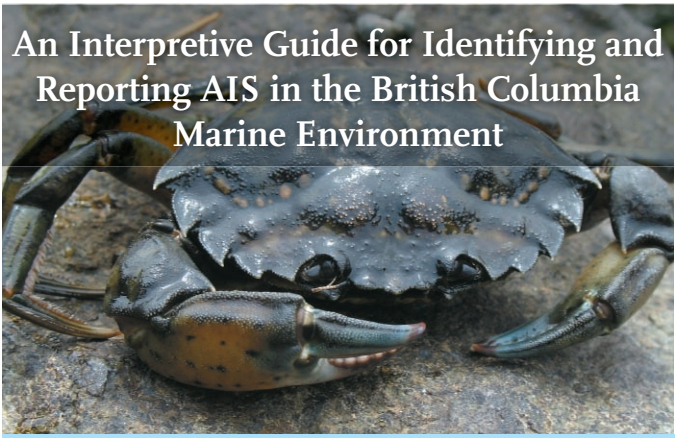
Aquatic Invasive Species (AIS) Guide

An Interpretive Guide for Identifying and Reporting AIS in the British Columbia Marine Environment



For more information see

www.bcsga.ca/AIS

Produced in partnership by:

Environment Canada Environnement Canada

BC Shellfish Growers Association

Aquatic Invasive Species (AIS) Background

The presence of AIS is one of the most pervasive and potentially irreversible impacts on marine ecosystems. The World Conservation Union (IUCN) rates AIS as one of four greatest threats to the world's oceans, along with land-based pollution, over-exploitation of resources, and destruction of habitat. AIS in BC's marine environment, such as invasive tunicates, or the European green crab may pose significant ecological and economic risks to the shellfish farming industry and other marine stakeholders. On Canada's East coast, invasive tunicates have resulted in significant grow-out, harvesting and processing challenges for the mussel farming industry.

Therefore, this interpretive brochure was produced as a pro-active measure, to help marine stakeholders identify AIS so that further colonization and spread may be controlled. The species highlighted in this brochure are considered invasive and should not be confused with the various native tunicates and crab species.

Why look for tunicates?

Tunicates are known as fouling organisms. This means they grow on hard substrates such as rock, boulders, and gravel as well as artificial substrates such as boat hulls, docks, and aquaculture gear. Tunicates also can outcompete and suffocate filter feeding bivalves such as mussels and oysters.

What is a tunicate?

A tunicate is a filter feeding invertebrate. Tunicates draw water in through an incurrent siphon, filter food from the water passing through their pharynx, and expel the filtered water and waste products out an excurrent siphon.

Tunicates can be solitary (Figure 1) or colonial (Figure 2) where there are multiple smaller versions, called zooids, embedded within a common tunic. Colonial tunicates can regrow from small fragments of the colony.

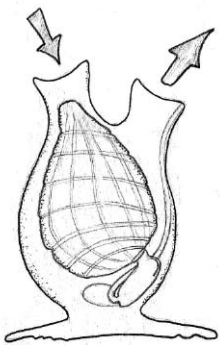
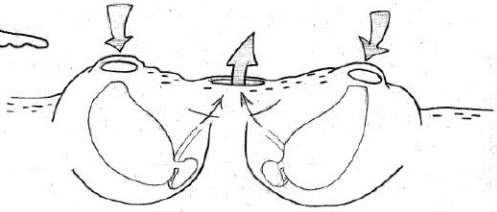


Figure 1: Solitary Tunicate

Figure 2: Colonial Tunicate



Styela clava - Clubbed tunicate

Distinguishing Features

- Solitary 'club-shaped' tunicate
- Tunic (outer skin) is tough, brown, bumpy, and wrinkly
- Attached to substrate by a stalk (about 1/3 of the total length)
- Two short siphons, closely spaced, with alternate red and tan bands
- Often overgrown by other fouling organisms

Origin: **Northwest Pacific Ocean (predominantly Japan and Korea)**

Habitat and Growth: *Styela clava* is a lower intertidal to subtidal tunicate that is found growing in protected environments, predominantly on artificial structures like pilings, aquaculture gear, floats, etc. *Styela clava* can withstand a wide range of temperatures and salinities, and therefore may be found in estuarine environments.

Reproduction: *Styela clava* is a broadcast spawner, releasing eggs and sperm that can stay in the water column for 1-3 days during spring and summer.

Can be confused with:

- *Styela montereyensis*, which is longer (up to 30 cm) and more slender. The tunic also has lines and furrows along the entire length. *Styela montereyensis* has closely spaced siphons, these have no banding and one is siphon curved.
- *Styela gibsii*, which is shorter (often not over 4cm) and stalkless.

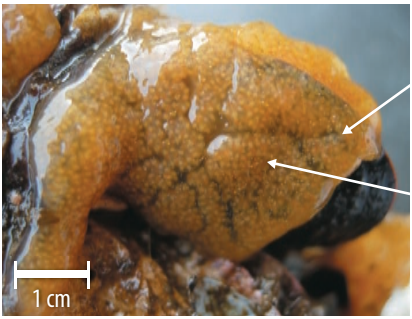
Management:
To remove solitary tunicates from culture gear:
Cut or pull tunicate off by the stalk. Throw in a bucket for disposal on land (at a landfill).

Styela clava - Clubbed tunicate

Didemnum species

Distinguishing Features:

- Colonial tunicate
- Colour ranges from tan to orange
- Dark lines may run between groupings of zooids
- Large colonies form long slender lobes
- May have a 'spotted' appearance due to calcareous spicules embedded in the tunic
- To distinguish from local sponges, check for a gelatinous texture (as opposed to soft and spongy texture)



Origin: **(likely) Japan**

Habitat and Growth: *Didemnum* sp. is a subtidal tunicate that will grow on any hard substrate ranging from docks, to the shells of bivalves, to gravel seabeds. Mature colonies can form large lobes when growing from a suspended structure, or form large 'blanket' sheets when growing along the seafloor. On the east coast of North America, at Georges Bank, scientists have measured over 259 square kilometres of seafloor blanketed by *Didemnum* sp.

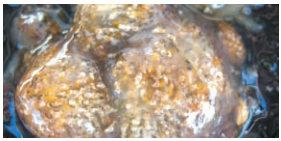
Reproduction: The colony can regrow and reproduce from fragments. Larvae only remain in the water column for minutes to hours before settling on a hard substrate to grow into juvenile tunicate colonies.

Can be confused with:

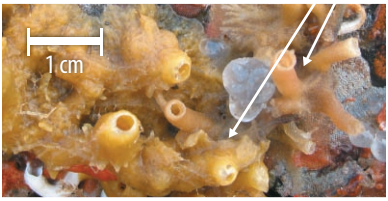
- Most sponges - *Didemnum* sp. has a gelatinous texture as opposed to a soft and spongy texture.
- Native tunicate *Cystodytes lobatus* which also has calcareous spicules. *Cystodytes lobatus* is purple coloured and is thick and lobed.

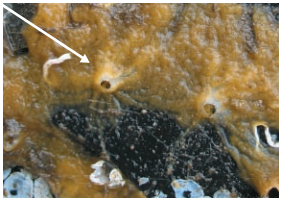
Management: Remove colonial tunicates manually and place in garbage receptacle or let dry out of the water. If you must pressure wash colonial tunicates off equipment, only do so on land (not on the farm) and make sure the outflow does not go into the sea, as these colonies can re-grow from small fragments. Completely dry culture gear before placing it back in the water or moving it between sites.

Native tunicate
Cystodytes lobatus



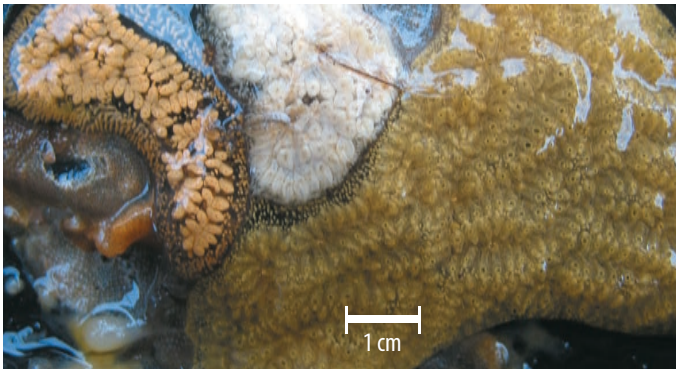
Sponges

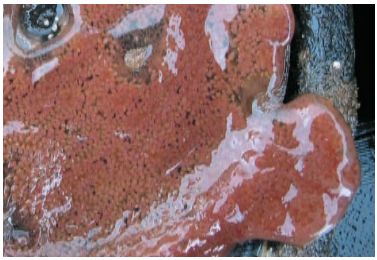


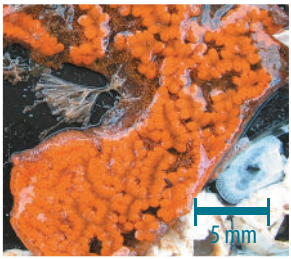


Didemnum species

Botrylloides violaceus - Violet Tunicate

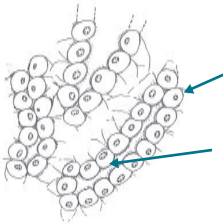


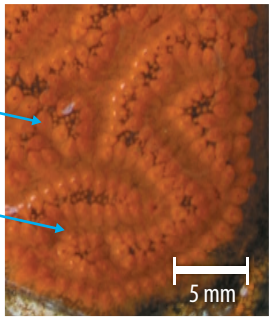




Distinguishing Features:

- Colonial tunicate
- Colony usually one solid colour (purple, pink, yellow, orange, or white)
- Zooids upright (vertical to substrate)
- Usually organized into systems of elongated rows





Origin: **Japan**

Habitat and Growth: *Botrylloides violaceus* is a shallow subtidal (<50m) tunicate found mainly in protected areas growing on both natural and artificial hard surfaces. This tunicate is known to withstand polluted habitats.

Reproduction: The colony can regrow and reproduce from fragments. Larvae remain in the water column for less than a day before settling on a hard substrate to grow into juvenile tunicate colonies.

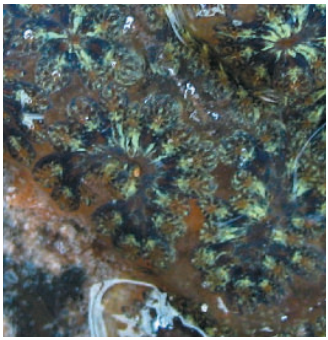
Can be confused with:

- Most sponges - Tunicates have a gelatinous texture as opposed to a soft and spongy texture.
- *Botryllus schlosseri* - Unlike the violet tunicate, these colonies are two-toned with zooids arranged in star patterns (see next page).

Management: Remove colonial tunicates manually and place in garbage receptacle or let dry out of the water. If you must pressure wash colonial tunicates off equipment, only do so on land (not on the farm) and make sure the outflow does not go into the sea, as these colonies can re-grow from small fragments. Completely dry culture gear before placing it back in the water or moving it between sites.

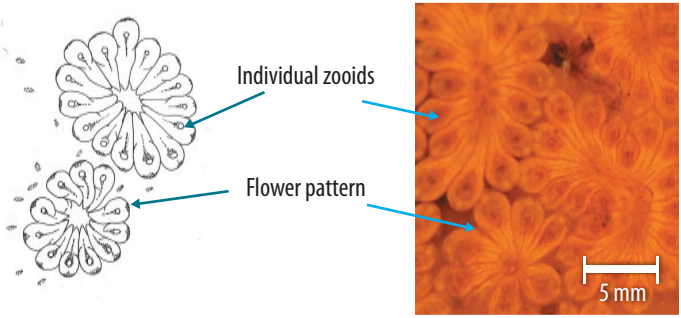
Botrylloides violaceus - Violet Tunicate

Botryllus schlosseri - Golden star tunicate

Distinguishing Features:

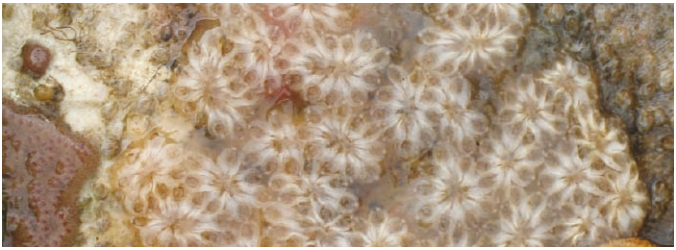
- Colonial tunicate
- Colony usually two-toned (predominant colour black, brown, orange, or green)
- Organized into star or flower shaped patterns
- Zooids are recumbent (horizontal to substrate) with the pointy-end of zooid directed inward towards the centre of the cluster



Origin: **Mediterranean**

Habitat and Growth: *Botryllus schlosseri* is a subtidal (up to 200m) tunicate found mainly in protected areas growing on both natural and artificial hard surfaces. This tunicate species can withstand estuarine habitats with low salinities (18 ppt or less).

Reproduction: The colony can regrow and reproduce from fragments. Larvae remain in the water column for less than 36 hrs before settling on a hard substrate to grow into juvenile tunicate colonies.

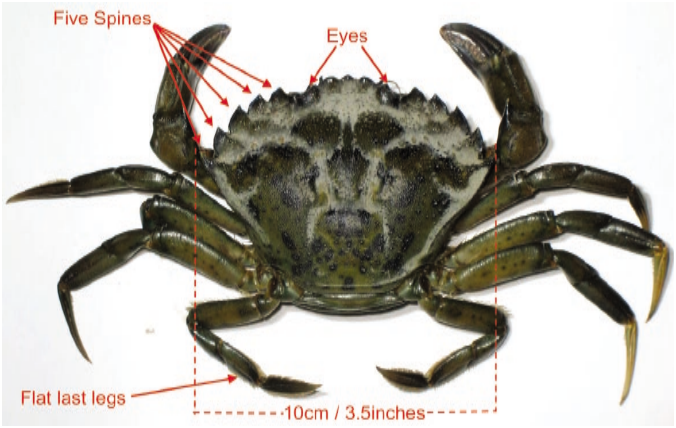


Can be confused with:

- Most sponges - Tunicates have a gelatinous texture as opposed to a soft and spongy texture.
- *Botrylloides violaceus* - unlike the Golden star stunicate, these colonies are mainly one color with zooids in elongated rows (previous sheet).

Management: Remove colonial tunicates manually and place in garbage receptacle or let dry out of the water. If you must pressure wash colonial tunicates off equipment, only do so on land (not on the farm) and make sure the outflow does not go into the sea, as these colonies can re-grow from small fragments. Completely dry culture gear before placing it back in the water or moving it between sites.

Carcinus maenas - European green crab



Distinguishing Features:

- Colour of carapace (top shell) is usually mottled, green with yellowish spotting
- Shell up to 10 cm (3.5 inches) wide
- Five distinct spines between the widest part of the shell and the eyes on each side

- Three rounded lobes between the eyes
- Little to no hair on the carapace (shell) and claws, and only very little along the edge of the walking legs
- Both claws are the same size
- Last pair of legs somewhat flattened

Biology:

European green crab compete with native crab species and are a major predator on clams, mussels, juvenile fishes, and other species in the natural environment and in aquaculture settings.

Management:

Report European green crab sightings to the contact phone or email on the back page of this brochure. West coast harvesters should take special care to thoroughly examine and rinse harvested shellfish prior to leaving the harvest area.

There is the potential for people to misidentify green crabs with the Helmet crab *(Telmessus cheiragonus)* or the Kelp crab *(Pugettia producta)*, but neither of these species is commercially important at this time.

Species that can be confused with the European green crab:

Helmet crab
(Telmessus cheiragonus)

- Six unequal, jagged spines (teeth) on each side of the carapace (shell)
- The shell between the eyes protrudes past the eyes
- The shell and legs are covered with stiff bristly hair
- Body is yellowish green with darkened claw tips

Dungeness crab
(Cancer magister)

- Oval carapace (shell) with 10 spines (teeth) on each side
- Five small, unequal teeth between the eyes
- Light-coloured leg tips
- Adult Dungeness crabs grow up to 23cm (9 inches)

Red rock crab
(Cancer productus)

- Ten teeth on each side of the shell
- Area between the eyes protrudes beyond them
- Claws are dark at the tips
- Reddish color

Northern kelp crab
(Pugettia producta)

- Green, reddish, or brown in color
- Two teeth on each side of the carapace
- Elongated body with a very pointed front
- Long, pointy, and spider like legs
- Up to 9cm (3.5 inches) across

Graceful crab
(Cancer gracilis)

- Brown to purple in colour
- Nine spines (teeth) on each side of carapace
- All legs are very pointed and without hairs
- Up to 12cm (5 inches) across

How to report an invasive species:

- Compare its appearance with the descriptions in this booklet to make sure it is an invasive species; for additional identification information see also **www.bcsga.ca/AIS**
- If you can, try and take a picture of the organism
- Record the date and location where you saw it
- Record in what environment you found it, for example on an oyster cage, on the beach, on a rope, on a rock
- If available, record the GPS coordinates of the location where you found the organism
- Email your report with the pictures to

AISPACIFIC@pac.dfo-mpo.gc.ca
or call **1-888-356-7525**

Help and prevent the spread of invasive species:

- Whereas green crab larvae can drift for large distances, tunicate larvae can only spread very short distances. Through controlling human movements we can make a real difference in tunicate spread
- Maintain a clean boat hull to make sure no tunicates are hitching a ride
- A good way to kill tunicates is to leave them out of the water for a day or two
- If you clean / pressure wash tunicates from boats or gear, make sure the water will not flow in the sea as colonial tunicates can re-grow from tiny fragments
- Minimize movement of aquaculture stock and equipment between sites

BC Shellfish Growers Association (BCSGA) thanks:

Photos & Text: Anna Epelbaum, Heidi Gartner, Graham Gillespie, Lucie Hannah and Matthias Herborg

Hand drawings: Anna Epelbaum

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Production Partners:

Environment Canada Environnement Canada

BC Shellfish Growers Association