



## TEACHING RESOURCE

# THREATS TO SEAFOOD PRODUCTION: BIOSECURITY AND ILLEGAL HARVESTING

### RATIONALE

This resource aims to help students and teachers in secondary schools investigate and understand more about the economic and environmental impacts associated with two threats to the Tasmanian seafood industry; biosecurity and illegal fishing. It will look at how the seafood industry monitors current and emerging threats, and how industry works with the scientific community, recreational fishers and the general public to manage these threats.

### LEARNING OUTCOMES

- Identify various invasive marine pests in Tasmania, and how they threaten marine biodiversity.
  - Understand why and how Tasmania's seafood industry monitors current and emerging biosecurity threats.
  - Understand your general biosecurity duty, and how to follow best biosecurity practices at home.
  - Understand the different types of illegal harvesting in Tasmania.
  - Understand the social, environmental and economic impacts of illegal harvesting.
  - Problem solve and suggest solutions to introduced marine pest species and illegal harvesting of seafood in Tasmania.
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## PART 1: BIOSECURITY

### Outline: Biosecurity in Tasmania

Tasmania's marine environment is unique and home to endemic species such as the Weedy sea dragon, Red velvet fish and Handfish. There are also many invasive marine pests that pose direct and indirect threats to endemic species, as well as to Tasmania's tourism and seafood industries.

The anthropogenic movement of water, such as boat ballast water, or on fishing or sporting/leisure equipment such as wetsuits, kayaks and dinghies can introduce biological threats to new areas.

The movement of infected plants or animals, which may be hidden in ballast water, on wetsuits, or through ship biofouling, for example, is the most significant factor in the spread of aquatic disease and pests.

All Tasmanians have a statutory duty of care to properly manage biosecurity risks under the *Biosecurity Act 2019*, referred to as a General Biosecurity Duty (GBD) <https://dpiwwe.tas.gov.au/biosecurity-tasmania/about-biosecurity-tasmania/biosecurity-act-2019/>

The seafood industry constantly monitors fish stocks as well as for biological threats to support the health of the environment it fishes and farms.

Examples of biological threats to Tasmania's environment and seafood industry are on the next page, although there are many more.

The General Biosecurity Duty (GBD) creates an obligation on all Tasmanians and businesses to use reasonable standards of care when dealing with any biological material that may pose a biosecurity risk.

Under the GBD, any person dealing with plants or animals (or their derived products) who knows, or ought reasonably to know, that a biosecurity risk is posed or is likely to be posed has a legal duty to ensure that, so far as is reasonably practicable, the risk is prevented, eliminated or minimised. So the GBD means that we all have a role to play to manage biosecurity risks – either through the work that we do or during our recreational activity time [www.dpiwwe.tas.gov.au/GBD](http://www.dpiwwe.tas.gov.au/GBD).

## Viruses

Thousands of marine virus strains can survive for periods without a host, with the duration depending on the virus, environmental factors, and more. The following are examples of key seafood industry species and their respective viral pathogen.

**ABALONE:** Abalone Viral Ganglioneuritis (AVG) affects the nervous system of abalone and results in curling of the foot, swelling of the mouth, weakness and death. It can be transferred between abalone via water and infected abalone, including abalone mucus.

The virus has been shown to occur naturally in wild abalone populations in Tasmania. However, the disease only tends to emerge when abalone from separate populations (thus with separate strains) are mixed together on farms or in holding tanks. The major control for this disease is by holding regional abalone populations in separate tanks and treating water from holding facilities before it is discharged back into the natural marine environment.

Commercial abalone divers also constantly monitor the health of wild stocks, and practice preventative measures including washing boat and diving gear between locations.

**ATLANTIC SALMON:** Pilchard Orthomyxovirus (POMV) was first detected in Tasmania in 1999, and first detected in Atlantic salmon in Tasmania in 2006. Pilchards (a native fish species) are vectors of this virus, although there is no evidence of it causing mortality in wild populations. Pilchards are small enough to swim through salmon farm nets, where POMV can be passed to and between salmon (this has not been demonstrated but is the current accepted theory). It can be fatal to salmon but is not dangerous to humans. To avoid serious outbreaks and minimise potential spread, salmon farms keep younger and older fish in separate pens to avoid disease transfer from old to young salmon. Farms also ensure that equipment is clean and disinfected.

**PACIFIC OYSTER:** Pacific Oyster Mortality Syndrome (POMS) virus weakens and kills Pacific oysters. The disease also causes the adductor muscle, which is used to close their shell, to fail and expose the dead or dying oyster to scavenging and predation. POMS is spread by water movement, biofouling, and the transport of infected oysters to areas with healthy oysters. Once established, there is currently no known way to eliminate it as wild oyster populations, which cannot easily be eliminated, can reinfect farmed stock each year.

Oyster farms closely monitor water quality and report to Biosecurity Tasmania and the Chief Veterinary Officer to identify POMS and Harmful Algal Blooms (HABs) which contain Paralytic Shellfish Toxins (PSTs). They also work with ShellMAP to manage sampling and testing and secure market access, and with scientists to breed pacific oysters that are more resistant to POMS.

<https://dpipwe.tas.gov.au/biosecurity-tasmania/product-integrity/food-safety/seafood/shellfish-quality>



Greenlip abalone with AVG  
Image credit: Victorian Dept. of Primary Industries



Image credit: Wikimedia



Image credit: Ian Duthie/Oysters Tasmania



## Invasive species

### WHITE COLONIAL SEA SQUIRT

(*Didemnum* spp.)

The major species of concern in Tasmania is *D. vexillum*. These grow over and smother commercial marine animals such as mussels and oysters. They travel between locations as larvae and broken fragments. There are some similar looking native species but none that are likely to hang from artificial structures in such densities. The *D. vexillum* colonial sea squirts have not been observed in Tasmania yet and would be catastrophic for native habitats and the oyster and mussel farms. [All commercial vessels entering Australia must complete pre-arrival reporting via the Maritime Arrivals Reporting System \(MARS\)](#). Biosecurity Tasmania officers routinely audit ballast water management records to ensure that appropriate treatment has been undertaken prior to discharge.



Image credit: Wikimedia

### NORTHERN PACIFIC SEA STAR

(*Asterias amurensis*)

Indiscriminate, aggressive predators which consume anything organic, primarily molluscs and invertebrates. They are reported to displace many other species and in some regions have become the predominate benthic predator. A single female sea star can carry up to 20 million eggs which spread as eggs or larvae in water for 120 days.

They are a marine farm pest as the larvae can settle and grow on farming equipment and prevent adequate water flow and add additional weight to floating farming equipment. Although seastars can be present in biofouling and may settle in oyster baskets as larvae, they primarily are a benthic species and do not contribute to net farm biofouling or prevent water flow. Frequent cleaning of farming equipment helps to prevent this species establishing.



The Northern Pacific sea star (left), and the New Zealand cushion star (right) are both introduced species present in Tasmania.

### LONG SPINED SEA URCHIN

(*Centrostephanus rodgersii*)

These non-specific feasters consume organic material (seaweeds and animals). They create underwater barrens where nothing else can survive and spread to new areas in their larval form. The only known natural predators are large southern rock lobsters. The abalone and southern rock lobster sectors of Tasmania's wild catch fisheries are working in conjunction with scientists to control this pest species, including reporting sightings and harvesting the urchin for commercial trade. [More information can be found here.](#)



An animated story about Long-spined sea urchins and the barrens they've created since they were first found in Tasmanian waters in the 1970s. [Click here to watch video.](#)

## LEARNING ACTIVITIES

1. Select a marine pest species to research. Describe its biology and why it is or could be a pest species in Tasmania. How did it or could it arrive here and what is currently being done to control it?

2. Students read the biosecurity scenarios and design a way to solve the problem presented.

### Scenarios

#### 1) WETSUITS AND BEACH GEAR

Jemma and her two brothers love to snorkel at the beach in front of their house. They have lived there for over ten years and have discovered secret spots with lots of seaweeds and creatures. The beach gets a lot busier in summer when families from the city come to visit for a beach escape. Jemma has heard about the negative impact Northern Pacific sea stars have on marine ecosystems, and fears that someone may unknowingly carry its eggs or larvae to their beach on their wetsuits and leisure equipment (such as boogie boards, kayaks or absorbent beach balls).

**Can you design a way to educate beach visitors of the impact of this marine pest, and teach them how to prevent introducing it to new areas?**

#### 2) FISHING EQUIPMENT

Rick and his mother are from a small seaside town. They go fishing together at least three times a week and have done so for a very long time. To avoid interacting with other fishers, they decide to travel to a new fishing spot about 40 minutes south of their usual spot. They don't know about marine pests or that they could be carrying larvae, spores or eggs of pest species on their fishing equipment.

**Your challenge is to design a way to teach Rick and his mum about marine pests and the way you can prevent introducing them to new areas.**

#### 3) KAYAK

Max is two weeks away from a kayaking trip with his ocean-adventure club. There are 20 other people going, ranging between 12 and 17 years old. The camping equipment and kayaks were last used on a trip in waters close to an oyster farm that was suffering from Pacific Oyster Mortality Syndrome (POMS). Max is worried that the gear has not been cleaned properly after their last use and would like to teach the other club members and leaders about how important this is. Max has decided to design a sticker, like a car bumper sticker, that can be placed on kayaks and boats to remind people to wash down their equipment.

**Your challenge is to design an eye-catching sticker that will remind people of the need to wash down their beach equipment and boats to avoid spreading marine pests.**

#### 4) DIRTY BOAT

Wendy works as a marine engineer at the local shipyard. Boat hulls begin to foul with marine organisms after several months of being submerged. After 1 -2 years, all sorts of life such as mussels, sponges, slimes, seaweeds and even crabs begin to live on the hull. Boat owners must put their boats on 'the slip' (lifting them out of the water with a large sling) and clean them.

Wendy has seen boats from all over the state arrive to the shipyard to clean and repair their hulls. She is concerned that boat owners may unknowingly be introducing pests to new areas as they travel with extremely fouled hulls. Wendy would like to put systems in place for owners of marinas and shipyards to make sure contaminated biofouling is disposed of correctly when cleaning boats.

**Your challenge is to produce a document with a list of ways people can avoid contaminated biofouling (marine organisms stuck to the bottom of boats) being washed into the water when boats are cleaned and repaired.**

#### 5) SPECIES RELOCATION

Julia is extremely excited to show the rest of the family the fantastic creatures she found whilst visiting the east coast. To ensure they didn't miss out, she has collected a handful of them in a large container filled with seawater (to keep them alive) and seaweeds that she also picked up from the same spot. She has various crabs, shellfish, and even a small sea star from a rock pool and is planning to release them at their local beach once her family has seen them.

**Can you think of any biosecurity issues that Julia has overlooked? Your challenge is to design a way to communicate and teach people like Julia why they should not relocate organisms and seawater.**



## PART 2: ILLEGAL HARVESTING

### Outline

Illegal harvesting can deplete fish stocks, damage fish ecosystems and damage the livelihood of lawful fishers. It is also very difficult to account for marine resource managers to make decisions for lawful fishers when they cannot account for illegally harvested stock. There are many different forms of illegal seafood harvesting in Tasmania and governing them can be difficult due to need to monitor a vast area – police cannot be constantly watching all fishing efforts. Community plays a key role in reporting, which contributes to accounting for illegal harvesting in stock management.

### Types of illegal harvesting

- **Fishing in no-catch zones** (i.e. marine reserves and restricted harvest areas). Fishing in no-catch zones is prohibited unless otherwise specified. They are intended to provide sanctuary for all marine life.
- **Catching fish when season is closed.** Seasonal closures can be introduced during spawning times to protect breeding stock or to limit the catch for a fishery. Closures may also be in place for public health reasons (such as biotoxins).
- **Collecting threatened or protected species.** The population of threatened and protected species is usually under threat from habitat loss or historic overfishing. Tasmanian Aboriginal People may harvest limpets and elephant snails when engaged in cultural activities.
- **Keeping undersized fish.** Size limits exist for most fishable species to help maintain a healthy fish stock. It is important that a large enough proportion of a population reaches sexual maturity for succession.
- **Exceeding bag, boat and possession limits.** Limits are in place to help maintain a healthy fish stock. The Institute for Marine and Antarctic Studies prepares fishery assessments based on catch data from the previous year. These assessments inform the State Government who set quota.
- **Harvesting without a license.** Some fisheries have limited licences available to ensure the sector is sustainable.
- **Using prohibited fishing equipment** (e.g. explosives, driftnet or spearfishing). The use of various forms of fishing equipment are prohibited in Tasmania. Some reasons for prohibition include animal ethics, negative impacts of non-target species and by-catch.
- **Exceeding the length of time for active pots/nets.** This is otherwise known as soak time and it differs between gear type. Soak times are implemented to minimise by-catch and other negative impact on non-target species.
- **Harvesting native seaweeds from their substrate.** People may collect up to 100 kg of wrack – seaweed that washes ashore – per year. To protect marine ecosystems, it is illegal to harvest native seaweed from its substrate in Tasmania.



Image credit: Fisheries Tasmania



## Tasmanian species commonly targeted

- **Abalone:** Greenlip and Blacklip – harvested without a licence, undersized, and exceeding bag limits.
- **Southern Rock Lobster:** Harvested without a licence, undersized, and exceeding bag limits.
- **Scallops:** Exceeding bag limits and out of season.
- **Scalefish:** Stripy trumpeter, Banded morwong – out of season and undersized.
- **Native Seaweeds:** Harvested from substrate.
- **Plants and animals along shorelines:** Exceeding bag limits and collecting threatened or protected species.



An example of legal seaweed harvesting. Many individuals collect seaweed from beaches to eat or use in the garden as a fertiliser.  
Image credit: Milkwood Permaculture.

## Reporting

- Squads associated with the Tasmania Police Marine and Rescue Division are responsible for most monitoring efforts.
- Difficult due to vast area – authorities cannot be everywhere at once.
- Community can support reduction in illegal harvesting through education and advocacy (hospitality, tourism, public areas), and by reporting illegal fishing to Fishwatch (with as much information as safely possible).



## LEARNING ACTIVITIES

1. Students choose one area of illegal fishing to investigate and research:

- The implications this has on the marine environment.
- The current legalities; ways it's communicated to the public; and who monitors and governs this?

2. Students read the five scenarios below and determine whether this is accidental, ignorance, or blatant defiance. Design a way to educate and inform the general public on the problems of illegal harvesting.

### Scenarios

#### 1) HARVESTING FROM THE FORESHORE

You notice a white minibus pulled over in a carpark by the foreshore. People often stop here for a scenic lookout, however this time a large group of people disembark a minibus, each person holding a bucket. You then see them disperse along the coastline collecting handfuls of molluscs, crabs, and seaweeds. They return to the minibus and you can see that they have many buckets full of shellfish and have taken native seaweed directly off the rocks. A few weeks later, you notice the same thing happen! Your friends say that they have also seen this in other areas.

**Your challenge is to decide whether this form of illegal harvesting is accidental, ignorance, or blatant defiance, and to design a way to combat it.**

#### 2) COLLECTING FOR A FISH TANK AT HOME

The local beach is a well-known spot to see Weedy seadragons. There is a carpark at the far end of the beach, and a few small cafes along the esplanade. Emma walks her dog along the esplanade every afternoon. Last Friday, she noticed someone hopping out of the water carrying a bucket. It caught her attention as it was a crisp winter day, and it would have been freezing in the water. As she walked past and exchanged pleasantries, the person showed her what was in their bucket. It was a Weedy seadragon, and they said that is was for their home aquarium. Horrified, Emma's voice froze. Eventually she was polite, excused herself and headed home.

**Your challenge is to decide whether the person that Emma bumped in to was illegally harvesting accidentally, ignorantly, or blatantly defying the law, and to design a way to combat it.**

#### 3) UNDERSIZED ABALONE

Pete is walking along the waterfront in front of his house when he bumps into two young people heading in the opposite direction to him. They are wearing wetsuits and carrying snorkelling gear and a white plastic bag. He asks how their swim was, and they say, 'refreshing'. He then asks if they got anything, and they reply, 'some abalone'. They seem to be in a hurry and not wanting to chat, so he leaves the conversation there. He thinks that they may have collected undersized abalone, as he knows the area well and has never seen a sized abalone here.

**Your challenge is to decide whether the people that Pete bumped in to were illegally harvesting accidentally, ignorantly, or blatantly defying the law, and to design a way to combat it.**

#### 4) EXPIRED LICENCE

Laura and her family head to their shack on the coast every Christmas. Last Christmas they she went snorkelling for abalone with her older brother and before they left, they had to jump online to purchase a Recreational Abalone Fishing Licence. This year they take their boat to a small reef further up the coast and decide to have a snorkel. They see plenty of abalone of good size and decide to grab a few. They harvest 2 abalone sized each (one each for them and one each for their mum and dad), but as they head back to the boat ramp they see a local Fishcare group talking to people about responsible fishing, and Laura and her brother realise they have not renewed their fishing licences for this year.

**Your challenge is to decide whether Laura and her brother illegally harvested accidentally, ignorantly, or blatantly defying the law, and to design a way to combat it.**

#### 5) SELLING TO A LOCAL RESTAURANT

Joe has loved fishing his entire life. He is friends with the owner of a local restaurant who has been looking to source local seafood for their menu. Joe does not have his commercial fishing licence, but decides to sell his catch to the restaurant, after all, they are friends.

**Your challenge is to identify whether Joanna and her friend are breaking the law. If so, decide whether Joanna and her friend have done this accidentally, ignorantly, or blatantly defying the law, and design a way to combat it.**





## RESOURCES AND FURTHER READING

### BIOSECURITY

1. <https://www.youtube.com/watch?v=YUkcwCmhqfI> (Oysters in Hot Water - IMAS video about POMS)
2. <https://dpirwe.tas.gov.au/biosecurity-tasmania/aquatic-pests-and-diseases/aquatic-biosecurity-threats>
3. <https://www.imas.utas.edu.au/research/fisheries-and-aquaculture/fisheries/Long-spined-sea-urchin-Centrostephanus-Rodgersii>
4. <https://dpirwe.tas.gov.au/biosecurity-tasmania/product-integrity/food-safety/seafood/shellfish-quality>
5. <https://dpirwe.tas.gov.au/biosecurity-tasmania/aquatic-pests-and-diseases/protecting-against-aquatic-threats>
6. <https://dpirwe.tas.gov.au/biosecurity-tasmania/about-biosecurity-tasmania/biosecurity-act-2019>
7. <https://www.marinepests.gov.au/what-we-do/publications/marine-pest-plan>
8. <https://nimpis.marinepests.gov.au/>

### ILLEGAL HARVESTING

1. <https://dpirwe.tas.gov.au/sea-fishing-aquaculture/recreational-fishing/recreational-fishing-seasons>
2. <https://dpirwe.tas.gov.au/sea-fishing-aquaculture/recreational-fishing/other-fisheries/protected-species>
3. <https://dpirwe.tas.gov.au/Documents/SeaFishingGuide2020-21FULL.pdf>