

NEW ZEALAND'S MARINE PEST IDENTIFICATION GUIDE



HOW YOU CAN HELP

Since 2005 we have found more than 266 marine pest species in New Zealand. This guide contains the top 11 marine pest species that we don't want in New Zealand. You can help us by reporting any suspect marine animal or plant.

If you come across a suspect marine animal or plant, or a mass death or illness event in marine life, report it as soon as possible to MPI by calling the Exotic Disease and Pest Hotline **0800 80 99 66**. It is free to call and open to calls 24/7.

Collect: In the short term, keep all samples of marine plant or animal life shaded, cool and wet by containing (in a plastic bag or other container) with a small amount of seawater.

Contact: MPI on 0800 80 99 66. When the investigator contacts you, you will be given further instructions about the specific handling and preservation required for any samples collected. The investigator will also arrange pre-paid packaging and give instructions on how and where to submit specimens for examination or identification.



MARINE PEST:

CLUBBED TUNICATE/LEATHERY SEA SQUIRT *STYELA CLAVA*

THE THREAT: Fast growing nuisance fouler of vessels, marine farms and fishing equipment. Competes with native species for food and space.



Styela (centre right) amongst other fouling species

Report if found outside the known locations

- Note exact location
- Take a photo or sample where possible
- Seal in a plastic bag with a small amount of seawater and chill or preserve in methylated spirits
- DO NOT FREEZE
- Phone MPI on 0800 80 99 66

C Woods, NIWA

Status in New Zealand: Established

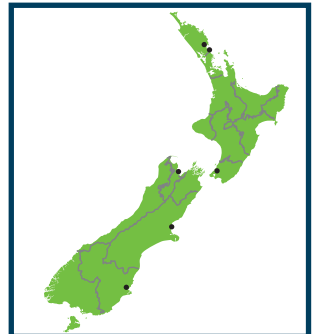
Key features

- Tubular, club-shaped body that tapers to a stalk
- Leathery, bumpy, often wrinkled outer skin
- Brown coloured
- Two short siphons or holes on end
- Up to 16 cm long
- Often thickly covered with other marine fouling growth
- Grows as single individuals

Habitat

- Attaches to hard surfaces in sheltered areas away from wave action
- Found on rocks, oyster and mussel shells and seaweed
- Commonly attaches to man-made structures such as boat hulls, wharves and mussel lines
- Low intertidal zone (area between high and low tides) to 25 m depth

Known locations



Native species which look similar

Pyura pachydermatina – or sea tulip

Key differentiating features:

- Could be confused with *Styela clava* as it has a stalk
- However, stalk is much longer making up $\frac{2}{3}$ to $\frac{3}{4}$ of its overall length
- The body can grow longer than 14 cm and the stalk may exceed one metre
- White/purple-red in colour



Impacts of *Styela clava*

- Fast growing and can form dense groups
- A filter feeder that can compete with native and aquaculture species for food (planktonic larvae) and space
- Nuisance fouler of vessels, aquaculture and fishing equipment and other artificial structures

How you can help

Avoid spreading marine pests by:

- Regularly cleaning your boat's hull – ideally keep fouling growth to no more than a light slime layer
- Applying good thorough coatings of antifouling paint and keeping it in good condition
- Ensuring your hull is clean and free of fouling before you travel to a new region
- Inspecting areas on your boat that retain water in case they're harbouring marine life
- Cleaning and drying any marine equipment (e.g. ropes, lines, pots) before using in a new location

Learn more

- Read all about best practice vessel cleaning at:
www.biosecurity.govt.nz/biosec/camp-acts/marine/cleaning

Information on marine pest species is at:

- www.biosecurity.govt.nz/pests/salt-freshwater/saltwater

MARINE PEST:

MEDITERRANEAN FANWORM

SABELLA SPALLANZANII



THE THREAT: Forms dense groups competing with native species for food and space.



C Woods, NIWA

Status in New Zealand:

Established

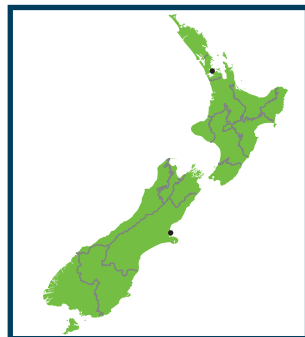
Key features

- Spiral fan of feeding tentacles on top of leathery tube
- Fan is white banded with pale fawn/orange or brown
- Tube is tough and flexible, dull grey brown coloured and up to 40 cm
- Tube is often muddy in appearance with other organisms growing on it
- Commonly forms clumps of several individuals, creating a canopy of feeding fans

Where are they found?

- Attaches to hard surfaces including rocks, concrete, and seabed organisms such as mussels and oysters
- Has been found on boat hulls and wharf and marina structures
- Sheltered temperate waters, up to 30 metres depth

Known locations



Report if found outside the known locations

- Note exact location
- Take a photo or sample where possible
- Seal in a plastic bag with a small amount of seawater
- Chill – DO NOT FREEZE
- Phone MPI on 0800 80 99 66

Native species which look similar

There are many native New Zealand fanworms that look similar. However, the Mediterranean fanworm is larger than all native fanworms, and has other distinctive features that distinguish it from natives underwater.

Hard Tubeworm *Protula bispiralis*

Key differentiating features

- Two fans whereas Mediterranean fanworm has only one



Department of Conservation

Impacts of Mediterranean fanworm

- Can form dense groups
- Competes with native species for food and space
- Can have negative impact on establishment of new generations of some species, and on nutrient flow
- Dense beds can foul fishing equipment or aquaculture structures

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MARINE PEST:

AQUARIUM CAULERPA

CAULERPA TAXIFOLIA



THE THREAT: Aggressive weed that can quickly spread and smother native species.



Report suspect sightings immediately

In an aquarium:

- Report location of aquarium to MPI on 0800 80 99 66
- If you must dispose of this weed, freeze any plants and attached material (eg rocks) for 24 hours. Then dispose in the household rubbish going to landfill
- Remaining tank water should go into the sewerage system through a toilet, and NOT into stormwater drains or waterways
- Aquariums that have contained the weed must be treated with a bleach solution and thoroughly air dried

In the wild:

- Note exact location
- Photograph if you can
- DO NOT attempt to pick or remove this weed – tiny fragments can re-grow into new plants
- Phone MPI on 0800 80 99 66

Status in New Zealand:

Not presently detected

Note: This species has been found and removed from marine aquariums in New Zealand, but has never been reported in the environment.

Key features

- Bright green seaweed
- Horizontal runners reach up to nine metres
- Runners give rise to many upright fronds
- Fronds are flattened with a smooth and distinct mid rib
- Fronds up to 1 cm wide and up to 15 cm long (up to 60 cm in deep water)
- Pinnules (or individual leaves) attach to mid-rib directly opposite one another

Where is it found?

- Up to 100 m depth, but usually between 3–35 m
- Rock, sand, mud and seagrass beds
- Exposed and sheltered estuaries, coastal lagoons and bays
- Tolerates a wide range of water temperatures
- A common aquarium weed overseas – infestations can occur in the wild where aquariums are emptied into the sea, drains or other waterways
- It is an offence to import, grow or spread this weed. The aquarium trade is still the most likely route of entry for Caulerpa into New Zealand

Native species which look similar

Caulerpa articulata



Learn more

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Impacts

- Aggressive weed that can quickly spread and smother other algae, seagrasses and invertebrate communities
- Out-competes native species for food or light and produces toxic compounds
- Vast beds can destroy native species diversity and fish habitat
- Tangles in nets and anchors
- If aquarium Caulerpa escaped into the marine environment there is a high risk of it establishing and severely damaging the marine environment

How you can help

Avoid spreading marine pests by:

- Regularly cleaning your boat's hull – ideally keep fouling growth to no more than a light slime layer
- Applying good thorough coatings of antifouling paint and keep it in good condition
- Ensuring your hull is clean and free of fouling before you go travel to a new region
- Cleaning and drying any marine equipment (e.g. ropes, lines, pots) before using in a new location
- Inspecting areas on your boat that retain water in case they're harbouring marine life
- Checking anchors, trailers and other equipment for tangled weed. *Caulerpa taxifolia* can live for two weeks out of water and reproduce from fragments as small as 2 mm

MARINE PEST:

ASIAN CLAM

POTAMOCORBULA AMURENSIS

THE THREAT: Forms huge populations, competing with native species for food.



Status in New Zealand:

Not detected

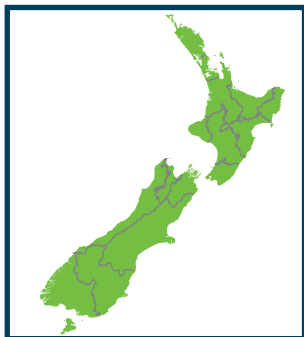
Key features

- Has a distinctive overbite – the two shells are uneven in size
- Shell dirty white, tan or yellow in colour – frequently with brown staining
- Thin and smooth shell (older shells may be wrinkled at edges)
- Generally 2–3 cm in length. But can be as small as 0.5 cm

Where are they found?

- Most often on mixed sand and mud substrates
- Clams are partially buried in soft material with ½ to of shell exposed above the surface
- Mostly subtidal, but also intertidal
- Can live in almost freshwater upper estuarine creek areas through to fully marine habitats
- Subtropical to cold temperate waters

Known locations



Report suspect sightings immediately

- Note exact location
- Take a photo or sample where possible
- Seal samples in a plastic bag with a small amount of seawater and chill, or preserve in methylated spirits
- DO NOT FREEZE
- Phone MPI on 0800 80 99 66

Native species which look similar

Basket shell – *Corbula zelandica*

Key differentiating features:

- Has overbite
- Found on sandy shores and harbours – NOT estuaries

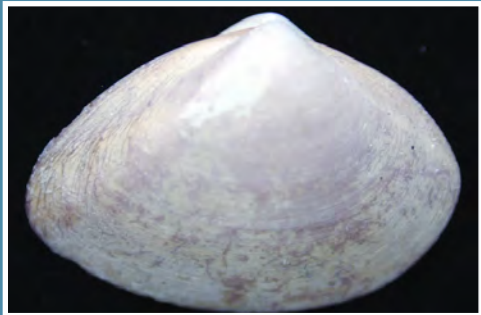


Kate Neill

Surf clam – *Maorimactra ordinaria*

Key differentiating features:

- No overbite.
- Found on open coasts – NOT estuaries



Kate Neill

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Impacts

- Reduces planktonic food sources, causing decline in abundance and diversity of native species, and decline or collapse of commercial fisheries and farmed shellfish
- Reaches extremely high population densities, altering the soft sediment community structure of an area by changing the sediment structure and reducing the space available for other species

How you can help

Avoid spreading marin

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MARINE PEST:

CHINESE MITTEN CRAB

ERIOCHEIR SINENSIS



THE THREAT: Burrowing weakens banks of estuaries, accelerating erosion. Can carry a liver fluke which can harm human health.



California Department of Fisheries and Game

Status in New Zealand:

Not detected

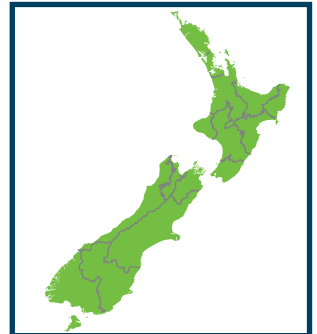
Key features

- Hairy “mittens” on front claws – unlike any New Zealand crab
- Mitten claws have white pincer tips
- Four spines or serrations on each side of the shell
- Distinct notch between eyes
- Light-brown to olive green shell – up to 10 cm across

Where are they found?

- Burrows into sand, mud or clay banks
- Adults inhabit the bottom and banks of freshwater rivers and tidal creeks, before migrating to brackish and saltwater to reproduce
- Larvae develop into juveniles in marine coastal areas then migrate up rivers and creeks
- Able to survive in highly polluted habitats

Known locations



Report suspect sightings immediately

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- Take a photo or sample where possible
- Seal in a plastic bag with a small amount of seawater and chill, or preserve in methylated spirits
- Phone MPI on 0800 80 99 66

Native species which look similar

Tunnelling mud crab

Helice crassa

Key differentiating features:

- Flat, spade-like nippers – NOT furry or white tipped
- Much smaller crab – shell width approx 4 cm
- No spines on front edge



C. Woods, NIWA

Hairy handed crab

Hemigrapsus crenulatus

Key differentiating features:

- Despite its name, claws are only slightly hairy and on the inner side only
- Smaller crab – shell width less than 4 cm
- No spines on front of shell



C. Woods, NIWA

Stalk-eyed mud crab

Macrothalmus hirtipes

Key differentiating features:

- Claws not hairy or white tipped
- Eyes on stalks
- No spines on front edge or shell
- Shell width less than 3 cm



C. Woods, NIWA

Impacts

- Burrowing weakens banks and causes accelerated erosion
- Damage to fishing nets and catch
- High densities can block water intakes in irrigation and water supply schemes
- Crab hosts liver fluke (*Paragonimus* sp.) that is harmful to human health
- Consumes both plants and animals

How you can help

Avoid spreading marine pests by:

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MARINE PEST:

EUROPEAN SHORE CRAB

CARINUS MAENAS



THE THREAT: Voracious predator – eats mussels, crabs, oysters, limpets, barnacles, and worms. Also juvenile crabs and shellfish, including scallops.



CSIRO

Status in New Zealand:

Not detected

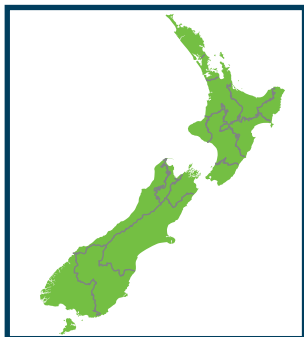
Key features

- Adult shell width up to 8 cm
- Five spines or spikes on each side of shell
- Adult colour varies from green top and yellowish underside, to red/orange mottled above and orange or partly red underneath
- Juveniles generally lighter in colour than adults
- Three rounded teeth or lobes between the eyes
- No swimming paddles on legs

Where are they found?

- All types of protected and semi-protected marine and estuarine habitats, including mud, sand, rocky substrates and seagrass beds
- From the intertidal to 60 m deep
Predominantly a shore to shallow water species

Known locations



Report suspect sightings immediately

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- Phone MPI on 0800 80 99 66

Native species which look similar

Swimming or paddle crab *Ovalipes catharus*

Key differentiating features:

- Larger – up to 15 cm across shell
- Pale pink/brown colour
- Has paddles on rear legs for swimming



R Naylor, NIWA

Common rock or shore crab – *Hemigrapsus sexdentatus*

Key differentiating features:

- Distinctive square carapace coloured purple and cream
- Two (not five) spikes on outer edges of shell
- No spines between eyes
- Smaller – shell width to approx 4 cm



C. Woods, NIWA

Purple rock crab *Leptograpsus variegates*

Key differentiating features:

- Shell variegated colours – green/brown/purple/cream
- Lines/stripes angled in from notched edges shell
- No spines between eyes



John Morton

Impacts

- Highly adaptable invasive species
- Voracious predator – eats mussels, crabs, oysters, limpets, barnacles, and worms. Also juvenile crabs and shellfish, including scallops
- Potential to significantly alter ecosystems causing mortality in native crab and shellfish populations
- Has been implicated in the decline of native shellfish populations overseas, some of commercial importance

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MARINE PEST:

JAPANESE KELP

UNDARIA PINNATIFIDA



THE THREAT: Rapidly forms dense stands that overgrow and exclude native seaweed species.



Juvenile *Undaria* plants

K Neill, NIWA
Northland Regional Council

Status in New Zealand:

Established

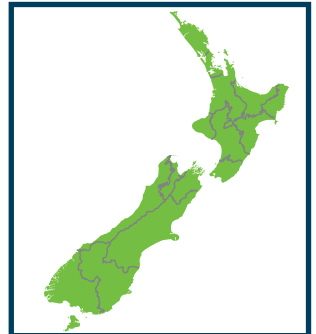
Key features

- Brown to yellow green coloured kelp, 1–3 m length
- Frilly sporophyll near base of mature plants
- Strap-like midrib in mature plants
- Smooth thin blades or leaves that stop well short of base

Where are they found?

- Grows best in cold temperate ocean waters
- Low intertidal to approximately 20 m depth
- Highest density occurs between 1 and 3 m depth
- Grows on any hard surface including rocky shores and reefs and artificial structures such as wharves, vessel hulls and aquaculture equipment
- Tolerates a wide range of wave exposures, from sheltered marinas to open coast

Known locations



Report if found outside the known locations

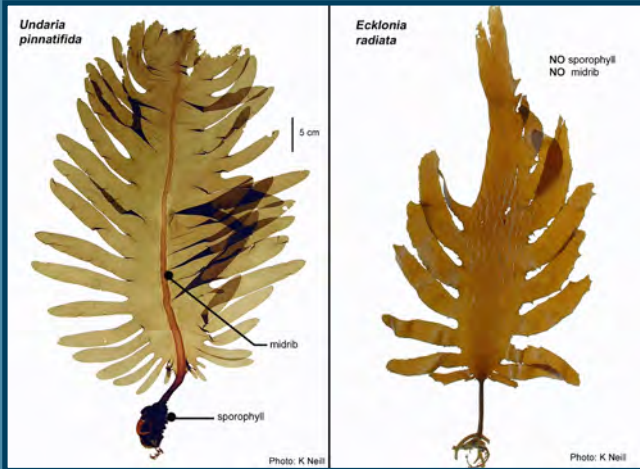
- Note exact location
- Take a photo or sample where possible
- Seal samples in a plastic bag with a small amount of seawater and chill, or
- Sprinkle with salt and keep moist and cool
- DO NOT FREEZE
- Phone MPI on 0800 80 99 66

Native species which look similar

Common kelp – *Ecklonia radiata*

Key differentiating features:

- No midrib or frilly sporophyll
- Blades/leaves are rough not smooth
- Young ecklonia is difficult to distinguish from juvenile undaria until the midrib becomes visible
- *Ecklonia radiata* blade is, however, more leathery



Kate Neill

Impacts

- Rapidly forms dense stands that overgrow and exclude native seaweed species
- Nuisance fouling can cause problems and increased costs for aquaculture

How you can help

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- Checking anchors, trailers and other equipment for tangled weed

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MARINE PEST:

NORTHERN PACIFIC SEASTAR

ASTERIAS AMURENSIS



THE THREAT: Voracious predator of native species and economically important farmed shellfish.



Status in New Zealand:
Not detected

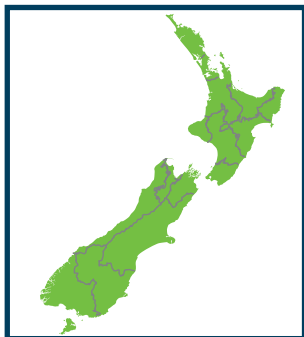
Key features

- Five arms with pointed, upturned tips
- Yellow/orange, often with purple markings on top – yellow underneath
- Arms covered with numerous unevenly-arranged small spines
- Generally 12 cm to 24 cm across, but can grow to 40–50 cm

Where are they found?

- Grows best in cold temperate.
- Down to 200 metres depth – usually shallower than 25 metres.
- Mud, sand or pebbles, or artificial structures including wharf piles and mussel lines
- Prefers sheltered waters – estuaries, bays, rock pools

Known locations



Report suspect sightings immediately

- Note exact location
- Take a photo or sample where possible
- Seal in a plastic bag with a small amount of seawater and chill, or preserve in methylated spirits
- Phone MPI on 0800 80 99 66

Native species which look similar

There are several five-armed starfish that may appear similar, but they are different colours and none have upturned tips on their arms.

Examples are:

Sclerasterias mollis



C Woods

Comb seastar – *Astropecten polyacanthus*



Mike Barker

Allostichaster insignis



Mike Barker

Impacts

- Voracious predator of native species and economically important farmed shellfish
- Potentially serious impacts on aquaculture, fisheries and wild shellfish populations

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MARINE PEST:

ASIAN PADDLE CRAB

CHARYBDIS JAPONICA

THE THREAT: Aggressive crab that can out-compete native crabs for space and food.



Webber

Report if found outside the known locations

- Note exact location
- Take a photo or sample where possible
- Seal in a plastic bag with a small amount of seawater and chill, or preserve in methylated spirits
- Phone MPI on 0800 80 99 66



Status in New Zealand:
Established

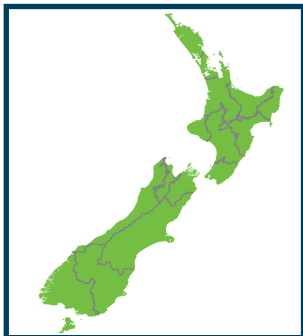
Key features

- Six spikes on each side of shell
- Five spines on upper surface of front claw
- Flattened swimming paddles on back legs
- Adult shell width up to 12 cm.
- Shell colour ranges from off-white and pale green, through olive green to a deep chestnut brown with purplish markings
- Aggressive behaviour when threatened

Where are they found?

- Firm sand or muddy fine sand bottoms
- Estuarine and marine areas
- 0 – 15 metres depth

Known locations



Native species which look similar

Swimming or paddle crab *Ovalipes catharus*

Key differentiating features:

- Five spines on shell at side of eyes (not six)
- Two distinct spots on shell
- Pale orange/pink colour speckled with dark red-brown spots



C. Woods, NIWA

Dwarf swimming crab *Liocarcinus corrugates*

Key differentiating features:

- Five spines on shell at side of eyes (not six)
- Fine corrugations (ridges) over most of the shell
- Smaller – adults only 2 –2.5 cm shell width



C. Woods, NIWA

Hairy red swimming crab *Nectocarcinus antarcticus*

Key differentiating features:

- Four spines on shell at each side of eyes (not six)



C. Woods, NIWA

Impacts of the Asian paddle crab

- Aggressive crab that can out-compete native crabs for space and food
- Threat to aquaculture as it preys on shellfish
- Can carry White Spot Syndrome virus which can infect native and farmed prawns, crabs and lobsters

How you can help

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MARINE PEST:

PYURA

PYURA PRAEPUTIALIS



THE THREAT: Forms dense populations or mats that could displace important native species including green shell mussels.



Bruce Hayward

Status in New Zealand: Established

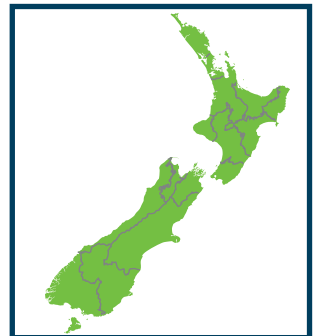
Key features

- Hard sack-like body with brown or reddish-brown leathery skin
- Sand and shell material or algae may be incorporated into outer skin
- Flat upper surface surrounded by a ridge, and two siphons close together that project slightly above the flat surface
- Adults 15 cm or more in height (max 30 cm) and approx 3–5 cm diameter
- Underwater, a distinctive “cross” may be visible in siphon openings

Where are they found?

- Rocky intertidal, or rocky surfaces in the shallows
- Forms a mat over rocks that is often clearly visible at low tide

Known locations



Report if found outside the known locations

- Note exact location
- Take a photo or sample where possible
- Seal in a plastic bag with a small amount of seawater and chill, or preserve in methylated spirits
- Phone MPI on 0800 80 99 66

Native species which look similar

There are no native species that look particularly similar to *Pyura stolonifera praeputialis*, however the native New Zealand sea tulip is a similarly stalked sea squirt.

Sea tulip – *Pyura pachydermatina*

Key differentiating features:

- Could be confused with *Pyura* as it has a stalk
- However, stalk is much longer making up $\frac{2}{3}$ to $\frac{3}{4}$ of its overall length.
- The body can grow longer than 14 cms and the stalk may exceed one metre
- White/purple-red in colour



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Impacts

- Forms dense populations or mats, and can survive in a wide geographical range
- Could displace important native New Zealand species, including green shell mussels

How you can help

Avoid spreading marine pests by:

- Regularly cleaning your boat's hull – ideally keep fouling growth to no more than a light slime layer
- Applying good thorough coatings of antifouling paint and keep it in good condition
- Ensuring your hull is clean and free of fouling before you go travel to a new region
- Inspecting areas on your boat that retain water in case they're harbouring marine life
- Cleaning and drying any marine equipment (e.g. ropes, lines, pots) before using in a new location
- Checking anchors, trailers and other equipment for tangled weed

MARINE PEST:

AUSTRALIAN DROPLET TUNICATE *EUDISTOMA ELONGATUM*



Status in New Zealand:

Established

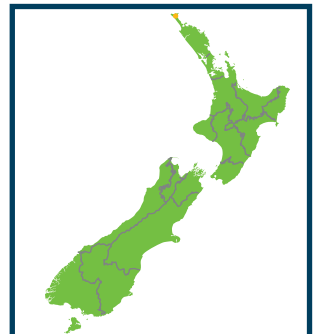
Key features

- White or cream coloured cylindrical tubes or “tunics”
- Generally 5–20 mm in diameter.
- Tubes generally 5–30 cm long – but can reach 1.5 metres
- The white tunics contain many small individual organisms and can sometimes appear orange-flecked due to the bright orange larvae within them

Where are they found?

- Sheltered bays and harbours
- Attached to any hard surfaces present, including rocky outcrops, cobbles, pebbles, shell pieces, and artificial structures e.g. wharf piles and oyster racks. Often found attached to pieces of shell and twigs buried just below the surface of the sediment. Also often found unattached lying in depressions in the sediment and amongst eelgrass beds
- Low intertidal to subtidal
- Generally submerged just below the waterline, but can often be seen at low tide

Known locations



Report if found outside the known locations

- Note exact location
- Take a photo or sample where possible
- Seal in a plastic bag with a small amount of seawater and chill, or preserve in methylated spirits
- DO NOT FREEZE
- Phone MPI on 0800 80 99 66

Native species which look similar

There are no native species in the intertidal zone that look like *Eudistoma elongatum*.



Impacts

- Unsightly fouling of coastal environments and coastal marine infrastructure
- Fouling nuisance for marine farming

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Learn more

- Read all about best practice vessel cleaning at:
- www.biosecurity.govt.nz/biosec/camp-acts/marine/cleaning

Information on marine pest species is at:

- www.biosecurity.govt.nz/pests/salt-freshwater/saltwater

SAMPLE COLLECTION – GENERAL INFORMATION

The following are general instructions for collecting marine algae and invertebrates (plants and animals).

Collect: In the short term, keep all samples of marine plant or animal life shaded, cool and wet by containing (in a plastic bag or other container) with a small amount of seawater.

Contact: MPI on **0800 80 99 66**. When the investigator contacts you, you will be given further instructions about the specific handling and preservation required for any samples collected. The investigator will also arrange pre-paid packaging and give instructions on how and where to submit specimens for examination or identification.



SAMPLE PRESERVATION

As a general rule, for short term storage – keep specimens moist/wet (but not submerged) by sealing with a small amount of seawater in a plastic bag (preferably ziplock) or a plastic jar. Refrigerate. This will keep most specimens stable for one or two days – long enough for transporting in packaging that will be supplied by MPI.

Avoid freezing soft-bodied invertebrates (i.e. worms, gelatinous organisms, ascidians/sea squirts) as it turns them mushy when defrosted.

If there are likely to be time delays and the sample will take longer than a day or two to reach the examination laboratory, preserve by sealing in a container submerged in ethanol or methylated spirits.

Packaging and sending: Samples are better if they arrive fresh, so sending them in a chilly bin with an ice pack is preferable. This will be supplied by MPI pre-paid and addressed.

As above, inside the chilly bin, specimens should be in tightly-sealed containers inside plastic bags (e.g. zip lock bags), and then in tougher plastic bags or containers to avoid breakage or leaks. Include a label or documentation showing the location of the find, date of sampling and your contact details in indelible pen or in pencil.

FISH KILL EVENTS

A “fish kill” is an event involving an unusual number of sick or dead wild or farmed fish, shellfish or crustaceans (e.g. crabs/crayfish).

General information on diseases in fish

Fish respond to diseases in a fairly consistent way. It is important to recognise the signs of infectious disease in fish. These are:

Visible externally:

- rash on the body;
- reddening at the base of the fins or in the eye;
- darkening of skin;
- lethargy;
- spots or lesions on body;
- gaping (mouth open).

Internal signs:

- blood spots on internal organs and/or muscle;
- extra fluid in body cavity (may be blood stained);
- dark/pale/blotchy liver.

Additional information

The following information is useful for the laboratory and investigators to put the fish kill into context, and should be noted where possible:

- Date and time of the event, and when samples were collected.
- Location of find, including approximate area the fish kill covered.
- Species if known and approximate number affected.
- Abnormal behaviour observed (if animals were alive when collected).
- Abnormal environment (e.g. flooded rivers, algal blooms, unusual temperature).
- How the samples were found (e.g. dead, near death).
- Noticeable lesions/marks on fish.



COMMON CAUSES OF FISH KILL

PHV – Pilchard herpes virus

Mortality events of pilchards (*Sardinops neopilchardus*) have occurred in New Zealand and Australia due to this virus in both 1995 and 1998. The virus affects the gill tissue resulting in suffocation. Pilchard herpes virus only affects pilchards.

Clinical signs of PHV:

- dark brown gills;
- rapid death of large numbers of fish. Dead fish will be found washed up on shores or floating;
- very sick fish may appear to be gasping.

AVG – Abalone viral ganglioneuritis

This disease affects the nervous system of abalone and has been reported from abalone in Australia and Taiwan, but not from paua in New Zealand. New Zealand paua are related to Australian abalone (same genus, *Haliotis*), and may also be susceptible to this disease.



Clinical signs of AVG:

- Edges of foot curling inwards, lack of adhesion to, or easily detached from substrate.
- Swelling and protrusion of the “mouth”.
- Excess mucus production.
- Large quantities of freshly dead shells appearing on the shore.

