Chatham Islands

Biosecurity: A Snapshot 2011 – 2017

chatham islands council

Environment Canterbury
Regional Council
Kaunihera Taiao ki Waitaha

Acknowledgements

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Finally, but foremost, Owen Pickles (CEO), Alfred Preece (Mayor) and the Chatham Islands Council for their unwavering support of our biosecurity activities, and for thinking outside the square, beyond what's required by legislation, for the good of the Chatham Islands.

Thank you all.

Steve Palmer

Biosecurity Advisor Special Projects
Environment Canterbury

Foreword

The Chatham Islands Council is a district council with most regional council functions. These include biosecurity and border control.

Environment Canterbury is engaged under contract to assist the Chatham Islands Council to meet its regional council obligations, with biosecurity being a significant part of this.

The Council is looking to control unwanted plants and animals found on the Chatham Islands and to prevent new ones establishing.

This publication explains how this is being achieved and how you can help.

The Chatham Islands have a unique biodiversity which the Council is serious about protecting.

I commend this publication to you and hope you can assist Steve, Kerri, Robin and the team with the work they do.

Owen Pickles

Chief Executive Officer
Chatham Islands Council

Photo: Ngaire Lawson

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Introduction

Environment Canterbury is contracted to the Chatham Islands Council to carry out a variety of services. This is a unique situation within New Zealand where a regional council is contracted to a district council.

One of the functions Environment Canterbury carries out on behalf of the Chatham Islands Council is biosecurity.

In very broad terms the biosecurity portfolio covers:

1. *Surveillance and control of plant and animal pests already on the Chatham Islands*

2. *Border control – preventing new pests from arriving on the Chatham Islands*

There are numerous subsections of both 1 and 2 which are detailed further within this document.

Our guiding document for everything we do is the Chatham Islands Pest Management Strategy 2008 – 2018, copies of which can be obtained from the Chatham Islands Council or the website.

Initially the Pest Management Strategy provided a good regulatory framework but over the years some sections have become redundant. As new pests have arrived the Council has adopted a number of initiatives which are unique and beneficial to Chatham Islanders.

In some cases, in consultation with the Council, we have stepped outside the original brief outlined in the Strategy document.

While Environment Canterbury does carry out other functions for the Chatham Islands Council, the purpose of this book is to give the reader a better appreciation of what the biosecurity team actually does on the Islands.

The current Strategy is up for review, so now is the optimum time to look at updating it to reflect our activities.

Staff

There are a multitude of people and organisations that support our biosecurity activities, both on and off the Islands.

The people most directly involved with Chatham Islands biosecurity are:

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Border Control

It goes without saying that keeping pests off the Chatham Islands is far more cost effective than trying to deal with them once they have become established.

We subcontract a portion of our border control work to SPS Biosecurity. Their primary role is to identify and minimise the risk pathways of pests transported to the Islands. Most of this work is carried out in New Zealand and focuses on freight handler training, transportation (sea/air/human), retail supplier pest awareness, port/supplier site checks, and diagnostic services.

Chatham Islands Border Quarantine and Biosecurity

Stopping new pests establishing on the Chathams thanks to SPS Biosecurity

The border biosecurity programme (No Pests Please) uses a risk-pathway approach to manage a wide range of pest and disease threats to the Chatham Islands.

The programme is science based and uses strategies aimed at achieving biosecurity outcomes outlined in the Chatham Islands Pest Management Strategy. These strategies cover pest risk to the environment and primary productive sectors.

The border programme strategies fall into three broad areas of work:

- Quarantine and risk site management
- Science and surveillance
- Training and increasing biosecurity awareness within key sectors and the general population

Quarantine and risk site management

Pest management programmes are maintained at key sites to reduce pest load and help prevent 'hitch hiker' pests travelling to the Chatham Islands and also from Chatham to Pitt Island. (A distinction is made between the New Zealand – Chatham Islands border and the Chatham – Pitt border).

Additional inspections and surveillance occurs at up to 150 sites of interest and includes:

- Key freight suppliers and cargo consolidation locations for the Chathams
- Targeted surveillance for known serious pests
- Specialised biosecurity treatments and inspections of up to five vessels in 2016 - 2017

'High risk' goods	*Pest or contamination of interest*
Timber and posts	*Weeds and weed seed*
Construction and farm materials	*Rodents and lizards*
Garden and landscaping products	*Ants and wasps*
Aggregate, soil and potting mix	*Soil*
Vehicles and machinery	*Animal diseases*
Vessels and marine equipment	*Marine fouling*

Special Programmes

Large events, major construction works or one-off shipments can present unique biosecurity risks. Inspection, cleaning and training occurs before any risk is transferred to the Chathams.

The Waitangi wharf construction has required the shipment of significant volumes of materials and equipment. A tailored biosecurity plan was developed with the construction company MPA to address marine and terrestrial pest risks associated with the project. MPA cover the cost of any additional treatments.

Vehicle and machinery cleaning and treatment

A pest risk analysis of vehicles and machinery imported by the general population found these items were often contaminated and efforts to get cleaning done by the importer sometimes failed due to purchasers using sites like TradeMe, and the 'last minute' nature of delivery to shipside.

Specific assessment, cleaning and treatment has been arranged with shipping companies to deal with contaminated vehicles and timber. Where possible, all cleaning costs are recovered for these activities.

Science and surveillance

Decisions about Chatham Islands biosecurity have a solid scientific foundation by using key science partners – Landcare Research, AgResearch, and Scion. Reports and recommendations from these organisations are developed into operational outputs and delivered by SPS Biosecurity Ltd. Risk site monitoring and surveillance activities used by SPS Biosecurity are based on the Ministry for Primary Industries 'best practice' and internationally recognised protocols.

A formal twice-yearly surveillance programme to update pest baseline information is undertaken at designated risk sites on the Chathams and a similar programme occurs at sites on the New Zealand mainland with frequency based on a risk site ranking.

Risk factors considered:

- Type and volume of freight sent and stored
- Commercial activity and visitor numbers (Chathams)
- Storage of imported goods (Chathams)
- Nature of special projects i.e. construction work (Chathams)
- Sentinel sites that have a good representation of flora and fauna

Training and awareness

A key approach of the programme has been to change public and commercial behaviours around biosecurity. Groups and individuals receive training on basic biosecurity and are encouraged to notify biosecurity staff of pest issues. Biosecurity guides, workbooks and other information material has been developed to support the training activities.

- Skill checks and awareness training for freight and shipping companies
- Pest management training for Chatham Islands biosecurity staff
- Biosecurity training for construction company staff
- Inspection and treatment training for freight company staff
- Chathams biosecurity treatment training for commercial pest control companies

Border Control – Chatham Islands

If, for some reason, 'dirty' freight slips through the New Zealand controls, our next back stop is to check as much freight as we can before it is dispersed after unloading on the Chathams.

This can be frustrating for people waiting to take possession of their goods and machinery. As you can imagine, pests come in many forms and even an untrained eye can spot a big one. At the other end of the scale we are dealing with seed, larvae, small insects and reptiles.

The following photo spread is a snapshot of some of the things that have slipped through the New Zealand controls and arrived on the Islands. Some have turned out to be non-invasive but you can see how easy it would be for a new pest to arrive if everyone isn't vigilant.

Border Control – People

Virtually every pest we have in New Zealand and the Chatham Islands arrived with the help of people (Canada geese would be the exception).

The Chatham Islands is regarded as a domestic port and therefore is not subject to customs or immigration checks before arrival. We endeavour to keep public awareness of biosecurity issues high through various media but sadly some people still aren't aware, or worse, don't care about protecting such a unique environment.

Border Control – Pitt Island

Of the 11 islands that make up the Chathams group, Pitt Island is the only other inhabited island aside from the main Chatham Island.

Where humans go, unwanted pests often follow. Pitt Island is no exception, although incidences of introduced pests are remarkably low.

Pitt Island is in a unique situation where we operate a biosecurity 'border within a border' as there are numerous pests that are present on the main Chatham Island but not present on Pitt Island.

The most notable of these are;

- Rats
- Possums
- Hedgehogs
- Feral goats

As well as all of the plants in the Chatham Islands Eradication Programme list (see p15).

Unfortunately, gorse has started to become established in and around Flower Pot Bay, and while total eradication is an optimistic aim, in the past we have carried out progressive control.

As long as constant pressure is maintained, it is possible the 'seed bank' will be reduced over time and we may be in a position to deem it an 'eradication pest' on Pitt Island in the future.

The results of the Pitt Island 'Gorse Free' initiative are depicted on the helicopter spraying map in the Chatham Islands Council/Environment Canterbury Initiatives section of this book.

Recent Incursions

There have been several new pest incursions to the Chatham Islands recently, which are described below.

German wasp *(Vespula germanica)*

German wasps are a nuisance to the general public, and of particular concern to those working in forestry or the tourism industries. They are unwelcome guests at summer picnics and barbeques. The venom from a wasp sting contains several toxins that can cause a hypersensitive or allergic reaction in some people.

Wasps also eat huge numbers of native insects and have even been seen killing newly hatched birds.

Black ants *(Lasius niger)*

Black ants are social insects that can be a considerable nuisance pest when they enter the home. They can also be a significant biodiversity pest when exotic species are introduced to vulnerable habitats.

Cockroaches

Cockroaches are a common household pest in New Zealand. While they are only a low-level health risk, cockroaches thrive in unhealthy environments and can transmit a number of diseases.

Tree lupin *(Lupinus arboreus)*

Tree lupin grows and matures quickly, producing many long-lived seeds. It is taller than competing coastal species and can quickly form a canopy, reducing light levels in open habitats and causing subsequent invasion by weedy shrubs and vines.

It is most likely to invade short tussockland, bare land, riverbeds, coastal areas, and sandy, well-drained areas.

(Photo courtesy of Weedbusters)

Pest Management Programmes

Each pest included in the Chatham Islands Pest Management Strategy is included in a management programme appropriate to infestation levels and based on achievable goals.

Eradication → Sustained Control → Progressive Containment → Site-led → Exclusion

Photo: Ngaire Lawson

Eradication Programme – Plants

The Eradication Programme refers to plants that are present in the Chatham Islands territory but are of low or limited distribution. The aim is to eradicate these pest plants from the Islands.

To be included in the Eradication Programme, eradication must be an achievable goal. New incursions are treated as eradication plants until it is determined that they don't meet the criteria.

Eradication Programme plants are:

- Banana passionfruit *(Passiflora tripartita and P.tarminiana)*
- Broom: common *(Cytisus scoparius)*, montpellier *(Genista monspessulana)* and white *(Cytisus multiflorus)*
- Chilean rhubarb *(Gunnera tinctoria)*
- Reed sweet-grass *(Glyceria maxima)*
- Old man's beard *(Clematis vitalba)*
- Ragwort *(Jacobaea vulgaris)*
- Tree lupin *(Lupinus arboreus)*

More information on each of these plant pests is included on the following pages.

Banana passionfruit

(Passiflora tripartita and P.tarminiana)

Description

Banana passionfruit is a tall climbing vine with large pink tubular flowers producing pale green oval fruit throughout the year which turn yellow to orange when ripe.

Habitat

Banana passionfruit can be found along forest and shrubland margins, on stream sides and coastal cliffs, on consolidated sand dunes, and in domestic gardens.

Impact

The layering vines of banana passionfruit dominate the canopy and smother desirable species.

Spread

Banana passionfruit is mainly spread by birds and people.

Banana passionfruit spread

Banana passionfruit
(Photo courtesy of Weedbusters)

Distribution - Chatham Island

PEST SPECIES:
Banana passionfruit

Common broom, montpellier broom and white broom

(Cytisus scoparius, Genista monspessulana, Cytisus multiflorus)

Description

Broom is a multi-branched perennial shrub up to 2.5 metres tall. Common and montpellier broom have bright yellow flowers while white broom is smaller and has white flowers with a red fleck.

Habitat

Broom can be found in developed pasture, river gravels, coastal dunes, tussock grasslands, road verges, and in domestic gardens.

Impact

Broom grows rapidly, establishing dense stands and shading out desirable species including pasture. Tolerant of dry conditions, broom is a prolific seed producer with seed remaining viable for many years.

Spread

Spread by stock, vehicles, machinery and water.

Young broom at Tioriori

Montpellier broom flowers

Distribution - Chatham Island

PEST SPECIES: Common broom, montpellier broom and white broom

0 3 6 12 18 Kilometres

N

Chilean rhubarb

(Gunnera tinctoria)

Description

Chilean rhubarb is a large clump-forming perennial herb with large leaves (up to 1m x 1m). Hairy on the underside and on the leaf veins, both leaves and stout stems are covered in rubbery red prickles. Tiny, densely packed green flowers are produced in summer on long erect conical spikes which can be up to a metre long. They develop into reddish oblong fruit, each containing a single oval orange seed.

Habitat

Chilean rhubarb prefers moist leached soils in high rainfall areas, in full sun or dappled shade. It inhabits forest and forest margins, wetlands and drains, unfertilised farmland, stream sides and bluffs, and coastal cliffs.

Impact

Chilean rhubarb can form dense stands shading out and suppressing native vegetation and altering the habitats of birds, insects, and lizards. It can block drains, streams, and access to natural and recreational areas. It also contributes to erosion on slip-prone banks.

Spread

Seeds are spread by birds, water, soil movement and by deliberate planting. Chilean rhubarb can also spread vegetatively by growth of rhizomes and regrowth of rhizome fragments.

Chilean rhubarb

The large leaves of a Chilean rhubarb plant (Photo courtesy of Weedbusters)

Distribution - Chatham Island

PEST SPECIES:
Chilean rhubarb

0 3 6 12 18 Kilometres

N

Reed sweet-grass

(Glyceria maxima)

Description

Reed sweet-grass is a bright green mat-forming, rhizomatous perennial aquatic grass up to 2 metres tall with shiny hairless leaves and rough leaf edges. It produces a multi-branched flowerhead with numerous spikelets containing many seeds.

Habitat

Reed sweet-grass inhabits wetlands, bogs, freshwater margins, lakes, streams, and open, frost-free areas.

Impact

Tolerant of damage and grazing, reed sweet-grass grows rapidly to maturity, forming dense mats on water and in damp areas replacing most other species. It degrades habitat for native flora and fauna and can cause silt accumulation and flooding.

Spread

Reed sweet-grass can be spread by water, machinery, livestock, or in soil or dumped vegetation. It can also be transported into new catchments in eel nets, or on boats and trailers.

Reed sweet-grass invading a water body at Nigel Ryan's

Reed sweet-grass in flower

Distribution - Chatham Island

PEST SPECIES:
Reed sweet-grass

0 3 6 12 18 Kilometres

N

Old man's beard

(Clematis vitalba)

Description

Old man's beard is a deciduous, climbing, layering vine. It has long woody stems with prominent ribs and pale bark which is easily rubbed off. Leaves are made up of five widely spaced leaflets that fall in autumn. Creamy white flowers are produced from December to May followed by grey, hairy seeds in dense fluffy clusters which persist over winter.

Habitat

Old man's beard can be found in disturbed and open forest and forest margins, shrublands, fernlands and tussock grassland, riverbeds, cliffs, on roadsides, vacant land, and in hedgerows.

Impact

Capable of smothering and killing all plants to the highest canopy, old man's beard prevents the establishment of desirable/native seedlings and moves readily over the canopy by layering. It is tolerant of shade, frost, wind, salt, and most soil types.

Spread

Seed is spread by water or wind, and both seed and stem fragments are spread in dumped vegetation.

Old man's beard in flower

Old man's beard

Distribution - Chatham Island

PEST SPECIES:
Old man's beard

0 3 6 12 18 Kilometres

N

Ragwort

(Jacobaea vulgaris)

Description

Ragwort is a biennial or perennial plant up to 1.5 metres tall, with slightly furry leaves and purplish rigid stems. Producing bright yellow daisy-like flowers from November to April, ragwort has an unpleasant smell when crushed.

Habitat

Ragwort can be found in disturbed forest, shrubland, short tussockland, fernland and herbfields. It will invade wetlands, inshore and offshore islands, river systems, bare land, and coastal areas.

Impact

Maturing quickly, ragwort produces massive numbers of viable, long-lived, widely dispersed seeds and will rapidly colonise bare spots, light gaps and margins in full or partial light. It is tolerant of very hot to very cold temperatures, very wet to moderately-dry conditions, most soil types, and a little shade. Ragwort forms dense stands in disturbed and grazed areas and can prevent the establishment of seedlings of native plant species.

Spread

The wind spreads ragwort seeds over great distances. They are also spread by water, soil movement, contaminated machinery, livestock, lime, clothing, and hay.

Ragwort in flower

Ragwort at the Wharekauri Mairangi boundary

Distribution - Chatham Island

PEST SPECIES:
Ragwort

Tree lupin

(Lupinus arboreus)

Description

Tree lupin is a short-lived, perennial shrub up to 2-3 metres tall with tough, branching stems which have silky hairs when young, and soft, woody hairs when mature. The grey-green leaves are hairless on top and silky underneath with 5-11 leaflets spreading like fingers from one point. Tree lupin produces pale yellow or white sweetly scented pea-like flowers from October to May, followed by stout, soft-haired seed pods that split explosively.

Habitat

Tree lupin can be found in short tussockland, on bare land, in riverbeds and in coastal, sandy, well drained areas.

Impact

Growing and maturing quickly, tree lupin produces long-lived seeds. It is taller than many coastal species so can form a canopy and is tolerant of wind, salt, hot and cold temperatures, damage and grazing (not readily eaten), drought, fire and low fertility (fixes nitrogen) and causes sand and gravel build up. Increased cover prevents some birds from nesting and increases predation by cats and mustelids of birds that do nest.

Spread

Seeds are spread by explosive pods, water, and soil movement.

Tree lupin at Vaughn Hills

An infestation of tree lupin

Distribution - Chatham Island

PEST SPECIES:
Tree lupin

0 3 6 12 18 Kilometres

N

Photo: Ngaire Lawson

Eradication Programme – Animals

The eradication programme refers to animals that are present in the Chatham Islands territory but are of low or limited distribution. The aim is to eradicate these pest animals from the Islands.

To be included in the eradication programme, eradication must be an achievable goal. New incursions are treated as eradication animals until it is determined that they don't meet the criteria.

Eradication programme animals are:

- Canada geese *(Branta canadensis)*
- Feral goats *(Capra aegagrus hircus)*

More information about each of these species is contained in the following pages.

Canada geese

(Branta canadensis)

Canada geese on the Chatham Islands were first reported to Environment Canterbury staff in 2013. The initial estimated population was only 29 birds. Since that time, biosecurity staff have culled 232 birds using helicopter shooting and ground sniping control. We now estimate there are approximately 40-50 birds remaining but we do stress this is an estimate. Total eradication is entirely achievable but these last few birds could prove relatively costly. The intent is to locate them during the 'molt' when they are more reluctant to fly and easier to control.

Description

Canada geese have brown and grey plumage, and a black head and neck with white patches on their faces which are sometimes referred to as chinstraps. Their body length ranges from 75 to 110cm, they have a wingspan of up to 185cm, and a mature male can weigh up to 6.5kg.
An average nest contains five eggs.

Habitat

Pastoral land adjacent to a lake or large pond provides preferred habitat, but geese may also be found in well-forested valleys and around alpine tarns. Communal molt gatherings are at secluded or very large lakes with grazing available at the immediate margins.

Impact

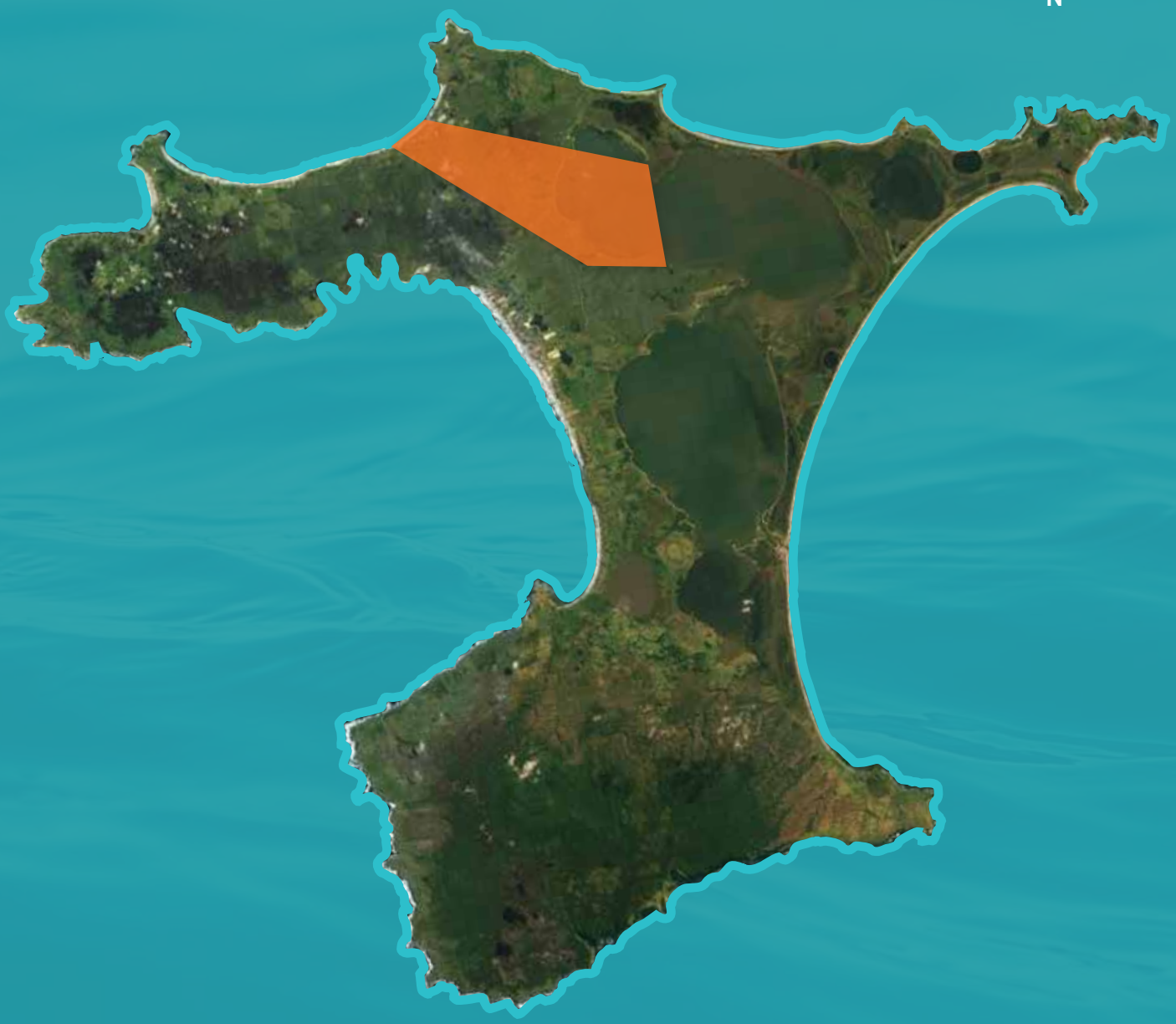
Canada geese are largely herbivores, eating a range of grasses and grains but also consume small fish and insects. Five geese can eat the same amount of grass as one sheep and they impact on farming by fouling paddocks. In the water, Canada geese feed from bottom sediments aquatic plants, but it is defecation from large numbers of birds that is the greatest threat to aquatic life. They introduce bacteria and nutrients into waterways and compete with other waterfowl for wetland resources.

Culled Canada geese

Canada geese

Distribution - Chatham Island

PEST SPECIES:
Canada geese



Feral goats

(Capra aegagrus hircus)

There are four known locations of the feral goats on Chatham Island. Extensive control by sniping and helicopter shooting commenced in 2013. We believe we have eradicated the goats from the largest of these areas (1156 shot) and are working with the landowners towards total control on the remaining three areas.

Description

Feral goats can be white, brown or black, or any combination of these colours, and both sexes have horns. All males and some females are bearded as adults.

Habitat

Ranging from sea level to the alpine zone, feral goats can be found in introduced and native grasslands, scrub and forest. They are agile and able to reach areas deer cannot reach and prefer sunny sides of slopes close to the shelter of forest or scrub.

Impact

Herding browsers such as goats cause two-fold damage by eating native plants and by trampling large areas of vegetation and compactable soils. They will eat the foliage of most trees and plants and quickly destroy all vegetation within their reach, eating seedlings, saplings, and litter fall, and will strip bark from trees. Loss of vegetation can also lead to increased erosion.

Goat control on the Chathams

Feral goat in steep country

Distribution - Chatham Island

PEST SPECIES:
Feral goats

0 3 6 12 18 Kilometres

N

Akeake tree

Sustained Control Plants

The Sustained Control programme aims to provide for ongoing control of the subject, or an organism being spread by the subject, to reduce its impacts on biodiversity values and spread to other properties on the Chatham Islands.

Sustained Control plants are:

- Gorse *(Ulex europaeus)*
- Variegated thistle *(Silybum marianum)*
- Californian thistle *(Cirsium arvense)*

More information about each of these species is contained in the following pages.

Gorse

(Ulex europaeus)

Description

Gorse is a sharp, spiny shrub up to 3-4 metres tall with woody, erect or spreading stems. Yellow pea-like flowers are produced from May to November and sometimes the plant may flower twice a year. Flowers are followed by hairy seedpods which turn black when mature and explode to release seeds.

Habitat

Gorse will establish in river systems, shrublands, along forest margins and coastlines, in tussockland, fernland, wetland, on consolidated sand dunes, on cliffs, in disturbed forest, on exotic plantations, poor pasture and on bare land.

Impact

Producing large numbers of long-lived seeds, gorse matures and grows rapidly. It is tolerant of both hot and cold temperatures, high to low rainfall, wind, salt, grazing and damage, and all soil types.

Spread

Explosion of seed pods spreads seed up to 5 metres from the parent plant. Seed is also spread by contaminated machinery, soil movement, animals, people, and in stock food.

Gorse visible from the air due to its distinctive yellow flowers

Sprayed gorse

Variegated thistle

(Silybum marianum)

Description

Variegated thistle can grow up to 2.5 metres tall and a metre or more wide. Leaves are very shiny and have a distinctive variegated appearance due to white veins and blotches. Large purple flowers grow on stout hollow stems. Each flower can produce up to 200 black to brown seeds.

Habitat

Variegated thistle tends to prefer coastal regions but it is frequently inland. It can be found on alluvial flats, stockyards, sheep camps, and other areas of high nitrogen soil levels. It may also invade pasture areas with summer drought and moist, mild winters.

Impact

Variegated thistle can form dense clumps, significantly reducing stock carrying capacity. It can kill the grass beneath and creates ideal cover for rabbits and hares.

Spread

Seeds are spread by stock, machinery, and birds.

Variegated thistle in flower

Variegated thistle leaves

Californian thistle

(Cirsium arvense)

Description

Californian thistle is a perennial thistle with underground creeping roots from which many shoots emerge. Purple to mauve clusters of flowers occur from December to February with the male and female flowers produced on separate plants. Patches of this thistle are often a single plant, the flowers arising from the same root.

Impact

Californian thistle reduces pasture availability. Sheep, and to a lesser extent cattle, avoid grazing infested areas in a paddock, reducing carrying capacity. It can also increase stock susceptibility to scabby mouth when abrasions from thistle spines create entry points for the disease.
Seed heads can contaminate wool.

Spread

Plants are spread by wind, stock and machinery, but also by underground creeping roots.

Californian thistle in flower
(Photo courtesy of AgResearch)

Californian thistle seed heads

Ponga frond

Site-led Programmes – Plants

The Site-led Programme aims to control a plant in a specified place to an extent that protects the natural values and character of that place.

Plants included in the Site-led Programmes for the Chatham Islands are:

- Buddleia *(Buddleja davidii)*
- Chilean flame creeper *(Tropaeolum speciosum)*
- *Chilean guava (Ugni molinae)*
- Cotoneaster *(Cotoneaster glaucophyllus and Cotoneaster franchetii)*
- Himalayan honeysuckle *(Leycesteria formosa)*
- Ice plant *(Carpobrotus edulis)*
- Kahili ginger *(Hedychium gardnerianum)* and yellow ginger *(Hedychium flavescens)*
- Montbretia *(Crocosmia x crocosmiiflora)*
- Tutsan *(Hypericum androsaemum)*
- Sycamore *(Acer pseudoplatanus)*
- *Wilding conifers*

More information about each of these species is contained in the following pages.

Buddleia

(Buddleja davidii)

Description

Buddleia is a deciduous, open, multi-stemmed shrub over 3 metres tall with willow shaped leaves and is white or grey and hairy on the underside. Buddleia produces distinctive, dense, cone-shaped clusters of fragrant purple or white flowers with orange insides from December to February.

Habitat

Buddleia can be found in riverbeds, along stream sides, in disturbed forest and shrubland margins, in short tussockland, on pumice, lava, and stony and bare ground.

Impact

Establishing and growing quickly, buddleia, forms self-replacing thickets. It is extremely versatile tolerating a wide range of soils (especially poor), hot to cold (likes frosts), wet to moderately dry conditions, deep shade or open areas, damage and wind. In riverbeds buddleia can alter water flow, causing silt build up and flooding.

Spread

Seeds are spread by wind and water, soil movement, and dumped vegetation.

Self-sown buddleia
(Photo courtesy of Weedbusters)

Buddleia flower spike
(Photo courtesy of Weedbusters)

Chilean flame creeper

(Tropaeolum speciosum)

Description

Chilean flame creeper is a climbing perennial vine which has slender stems and curling tendrils. Dull, soft green leaves with five leaflets and single tubular scarlet flowers (from November to April) are followed by a thin, fleshy deep-blue seed capsule made up of three round parts.

Habitat

Chilean flame creeper is likely to be found in disturbed forest and shrubland.

Impact

Climbing to the canopy, Chilean flame creeper alters light levels of bush areas and can prevent the establishment of native species. It is tolerant of warm to cold temperatures, salt, wind, many soils types, and damp to dry conditions.

Spread

Seeds are spread by birds.

Chilean flame creeper flower
(Photo courtesy of Weedbusters)

Climbing Chilean flame creeper
(Photo courtesy of Weedbusters)

Chilean guava

(Ugni molinae)

Description

Chilean guava is an aromatic, bushy perennial shrub, 1-2 metres tall. Shoots are often reddish when young, then deep brown later with shiny green leaves, ovate in shape with reddish margins. Small pale pink flowers hang singly or in small clusters from November to April. The round fruit can reach 14mm in diameter and become purplish red when ripe. The flesh is white and sweet.

Habitat

Chilean guava can be found in low shrub and fernlands on peaty soils on Chatham Island.

Impact

Chilean guava will out-compete low growing native species and establishes quickly. It produces many seeds in each fruit, suckers readily and re-sprouts after damage including fire. Tolerant of wet soils with high acidity, Chilean guava also tolerates cold temperatures and frosts.

Spread

Seeds are spread by birds.

Chilean guava infestation

Chilean guava leaves and berries (Photo by Sciadopitys)

Cotoneaster

(Cotoneaster glaucophyllus and Cotoneaster franchetii)

Description

Cotoneaster is a spreading evergreen tree or shrub, 2-5 metres tall with erect stems covered in downy hairs when young, but hairless and dark reddish-purple when mature and often covered in sooty mould. Clusters of white flowers appear from October to January and are followed by scarlet or orange berries from February to August.

Habitat

Cotoneaster can be found in most coastline habitats, inshore islands, dry forest and shrubland, forest margins, dry gullies, bluffs, rocky sites, slips, and riverbeds.

Impact

Overtopping and replacing native shrub species, cotoneaster will become the sole understorey shrub species and will completely prevent the establishment of other species except weedy vines. It is extremely tolerant of damp and drought conditions, hot and cold temperatures, salt, and a range of soil types.

Spread

Seeds are spread widely by birds.

Cotoneaster franchetti
(Photo courtesy of Weedbusters)

Cotoneaster glaucophyllus
(Photo courtesy of Weedbusters)

Himalayan honeysuckle

(Leycesteria formosa)

Description

Himalayan honeysuckle is a deciduous or semi-evergreen, many-stemmed perennial shrub up to 2+ metres tall. It has straight, green, hairless round stems that are hollow and green when young but become woody with age. Its leaves are heart shaped and its flowers white and funnel-shaped with delicate reddish-purple bracts. Flowers appear from December to May and are followed by juicy, dark brownish-purple berries.

Habitat

Himalayan honeysuckle can be found in wet forest, shrublands and margins, stream sides and damp gullies.

Impact

Colonising light wells, slips and other gaps, Himalayan honeysuckle quickly forms dense thickets replacing native species that are trying to establish. It is tolerant of moderate to deep shade, frost, damage, damp and most soils, but is not long-lived so is eventually succeeded by other species.

Spread

The few seeds produced are well dispersed by birds and water.

Monoculture of Himalayan honeysuckle

Himalayan honeysuckle flowers and fruit

Ice plant

(Carpobrotus edulis)

Description

Ice plant is a low growing, mat-forming perennial with fleshy, succulent, three-angled leaves. It has many-petalled yellow flowers that turn pinkish-orange with age, and fleshy fruit containing seed are produced all year round but are most common from October to February. Not to be confused with the native Chatham Island ice plant which is smaller, has flattened two-angled stems and produces pink flowers from November to January only.

Habitat

Ice plant can be found on coastal cliffs and sand dunes, and open, but frost free areas such as roadsides.

Impact

Spreading rapidly, ice plant forms impenetrable mats up to 50 metres in diameter and over 50cm deep on sand dunes and in open areas. Aggressively competing with native species and displacing other vegetation, it alters the structure of sand dunes by preventing sand movement and hindering the natural change in dune environments.

Spread

Spread by seed produced in abundance and stem fragments.

Ice plant (Carpobrotus edulis)
(Photo courtesy of Weedbusters)

Chatham Island ice plant (Disphyma papillatum)
(Photo courtesy of Phil Bendle)

Kahili ginger and yellow ginger

(Hedychium gardnerianum and Hedychium flavescens)

Description

Both kahili and yellow ginger are non-woody, ginger scented perennials up to 2+ metres tall. Leaves are shiny on both gingers but while the leaves on yellow ginger point upwards, on kahili they hang slightly. Yellow ginger produces cream flowers from May to June, but these do not bear fruit. Kahili ginger produces many fragrant, lemon-yellow flowers with red stamens from January to March which develop into fleshy orange fruits containing bright scarlet seeds.

Habitat

Both yellow and kahili ginger can be found in most habitats except dry rocky areas. Both are frost tender but will grow under the canopy in cool forests.

Impact

Long-lived and fast growing, both gingers form deep rhizome beds. They are extremely shade tolerant and tolerate most soil types, good or poor drainage, and are frost tolerant once established. Rhizomes sprout from any fragment and can survive immersion in the sea, crushing, and years away from soil. Nothing can grow up through the mats of tubers, and native species are soon out-competed.

Spread

Both yellow and kahili ginger spread outward slowly from clumps. New plants can establish from rhizome fragments in dumped vegetation and fill and by soil movement, flooding and contaminated machinery. Kahili ginger seeds are spread by birds and possibly possums.

Kahili ginger (Hedychium gardnerianum)
(Photo courtesy of Weedbusters)

Yellow ginger (Hedychium flavescens)
(Photo courtesy of Weedbusters)

Montbretia

(Crocosmia x crocosmiiflora)

Description

Montbretia is a clump-forming, rhizomatous evergreen or summergreen perennial. Its leaves are sword-shaped, all rising from the base with a conspicuous mid-vein. Flattened light brown corms with a fibrous cover form clusters at the stem base. Orange to crimson six-petalled flowers are produced from January to February followed by three-sided reddish-brown seed capsules.

Habitat

Montbretia can occupy most low-growing habitats, open shrubland, open or disturbed forest, stream sides, alluvial river systems, fernland, short tussock, and wetlands.

Impact

Monbretia competes with ground covers and small shrubs and inhibits the establishment of desirable species. It tolerates frost and heat, damage and grazing, damp, most soils, and moderate shade.

Spread

Although it produces few seeds, montbretia corms and rhizomes multiply rapidly. It also grows from fragments and is spread by water, soil movement, on machinery and vehicles, and in dumped vegetation.

Montbretia flowers
(Photo courtesy of Weedbusters)

Montbretia monoculture
(Photo courtesy of Weedbusters)

Tutsan

(Hypericum androsaemum)

Description

A small perennial, semi-evergreen shrub growing up to 1.5 metres tall, tutsan has reddish, semi-woody stems. Its fragrant leaves are ovalish in shape, have no stalk, are bluish underneath and usually turn red in autumn. Yellow, five-petalled flowers appear from November to February and are followed by round red berries that ripen to black and contain cylindrical or curved seeds.

Habitat

Tutsan is likely to be found in disturbed forest and shrubland, low-growing habitats, tussockland, bare land, and rocklands, usually in high rainfall areas.

Impact

An invader of regenerating sites, tutsan forms dense stands and prevents the establishment of desirable seedlings; it is usually succeeded by taller vegetation but is persistent in shorter habitats. It is tolerant of semi-shade, hot or cold temperatures, high to moderate rainfall, and damage.

Spread

Tutsan is spread by birds, possibly possums, soil, and water movement.

Tutsan flowers
(Photo courtesy of Weedbusters)

Tutsan berries
(Photo courtesy of Weedbusters)

Sycamore

(Acer pseudoplatanus)

Description

Sycamore is a deciduous tree with smooth grey bark and five-lobed leaves on reddish stems. Flowerheads are narrow drooping clusters of many dense green flowers followed by reddish winged, 'helicopter' seed capsules which contain two seeds.

Habitat

Sycamore is likely to be found in disturbed and intact forest and shrubland, short tussockland, fernland, river systems, and on bare land.

Impact

A long-lived tree, sycamore forms dense stands preventing establishment of desirable species. It produces many long-lived, well dispersed seeds that are shade tolerant. Sycamore tolerates warm to very cold temperatures, moist to dry conditions, most soils, wind, and salt.

Spread

Sycamore is mainly spread by wind but also water movement.

Young sycamore leaves

Sycamore seeds

Wilding conifers

Description

Wilding conifers are woody plants that produce cones. They include cedars, pines, firs, cypress, larches and spruces. Wilding conifer is a New Zealand term for introduced conifer that are self-sown and unwanted.

Habitat

Wilding conifer such as mugo and lodgepole can establish at altitude (above the treeline) in alpine areas, while others prefer open, low shrub and scrubland, tussock grassland and low intensity grazing environments. Douglas fir is shade tolerant and can be found in light wells within native forest, in open shrublands, and in regenerating native forest.

Impact

In NZ wilding conifers are spreading at a rate of 5% annually, infesting tens of thousands of hectares each year. They can cause loss of native ecosystems and species extinctions, impact iconic landscapes, reduce water yields, and increase fire risk.

Spread

When conifer cones mature on the tree, they open to release masses of wind-blown seeds. These seeds can travel kilometres downwind and need no special conditions to take root and grow.

The spread of wilding conifers over a 17 year period
(Photos courtesy of Marlborough District Council, Ministry for Primary Industries, and Department of Conservation)

Site-led Programmes – Animals

The Site-led Programme aims to control an animal in a specified place to an extent that protects the natural values and character of that place.

Animals included in the Site-led Programmes for the Chatham Islands may include:

- Emu
- Feral cattle and sheep
- Feral pigs
- Possums
- Black swans

More information about each of these species is contained in the following pages.

Emu

This is an unusual one in the Chatham Islands context. Environment Canterbury staff have assisted with some control of 'escapees' at the landowners' request. While emu are not deemed a pest, any introduced species running wild is undesirable on the Chathams.

Feral cattle and sheep

No formal control undertaken to date and it is highly unlikely we would do so, unless all concerned parties were in agreement i.e. the person who owns the land the animals are on, adjoining landowners if the animals 'belong' to them, and only if the Chatham Islands Council endorsed any control.

Feral pigs

Often the target of very passionate hunting groups and consequently can be quite contentious if formal control is carried out. Landowners usually carry out their own control when necessary such as lambing time.

It should be noted that OSPRI (formerly TB Free NZ) use pigs as the feral animal monitor species to determine if Bovine Tuberculosis is present in any feral population.

Possums

To date we have not carried out any possum control even though they are voracious eaters of native vegetation and prey on birds' eggs. In addition to this, they are also a primary vector if Bovine Tuberculosis becomes established in a feral population.

In the first instance, if Bovine Tuberculosis is found in domestic stock on the Chatham Islands it is highly likely that OSPRI will take the lead to determine the origin and pathways of the disease and implement the appropriate control measures.

There is ample evidence that if any possum population is not subject to sustained control it will increase by 30% every year. Unfortunately, hunters supplying the fur trade barely scratch the surface of any population over a wide area. For biodiversity reasons alone, we should keep possums at the top of any potential 'hit-list'.

Black swans

Environment Canterbury staff do carry out the odd cull and sponsor the annual 'egg hunt' in an effort to reduce some pasture fouling, water quality issues, and potential aircraft bird-strike.

With no natural predators on the Chatham Islands, the black swan population will continue to grow as long as there is a food source available. As with any excessively high animal population, ecological and environmental damage usually occurs well before any natural reduction starts.

Parea Tuku (Chatham Island pigeon)

Exclusion Programme

The Exclusion Programme aims to prevent a plant or animal species from becoming established in an area where it is not currently known to be.

Species included in the Exclusion Programme for the Chatham Islands are:

- Boneseed *(Chrysanthemoides monilifera subspecies monilifera)*
- Chilean needle grass *(Nassella neesiana)*
- Varroa *(Varroa destructor)*
- Velvetleaf *(Abutilon theophrasti)*

More information about each of these species is contained in the following pages.

Boneseed

(Chrysanthemoides monilifera subspecies monilifera)

Description

Boneseed is a semi-woody, many-branched shrub or small tree up to 2-3 metres with ribbed and woolly young stems that become smooth as they mature. It has smooth, leathery, bright green leaves (70 x 35mm) with irregularly toothed edges arranged alternately on the stems. Bright yellow daisy-like flowers (25-30mm diameter) are produced from September to February and are followed by hard oval green fruit (6-9mm) which ripen to black and each contain a hard seed.

Habitat

Boneseed grows on sand dunes, scrubland, coastal cliffs, offshore islands, and even rocky outcrops. It will tolerate most coastal soil types, salt, fire, wind, poor soils, and drought.

Impact

Boneseed quickly forms an incredibly dense cover that shades out everything else and can limit access to coastal areas. It rapidly replaces virtually all native species under two metres and prevents the establishment of native plant seedlings. Boneseed colonises disturbed sites faster than native species and creates heavy shade where high light levels should occur.

Spread

Seeds are spread by water, birds, and possums, as well as natural spread down cliffs below parent plants.

Boneseed infestation visible by its distinctive yellow flowers

Boneseed flowers

Chilean needle grass

(Nassella neesiana)

Description

Chilean needle grass (CNG) is an erect, tufted perennial tussock that can grow up to one metre when left ungrazed. It produces seeds from three points on the plant: the panicle seed, mid-stem seed at leaf joins, and at the base of the plant. CNG is easiest to identify when panicle seeds are present from November to January, and can be identified by their sharp feathery tip and a long twisted tail (awn).

Habitat

CNG is more likely to become established on properties where there is less competition from desirable pasture species such as dry, hard hill country, areas with light soil, heavily grazed pasture, and bare ground.

Impact

An infestation of CNG can reduce pasture and crop yields, reduce availability of stock feed (due to its unpalatability during seeding) and cause animal welfare issues when the sharp panicle seeds become embedded in the skin and eyes of stock animals. Lambs are particularly vulnerable to seeds penetrating their eyes causing blindness. A change in farming practice is often required as stock must be removed from infested areas from late October until March to avoid contact with seeds.

Spread

CNG seeds are heavy and will generally fall close to the parent plant, building up a large amount of seed around existing plants. The panicle seed is very sharp and attaches to anything that brushes past the plant, including stock, people, vehicles and machinery. Feeding out hay contaminated with CNG seeds can also spread the plant to new areas.

Seeding Chilean needle grass

Chilean needle grass panicle seed

Varroa

(Varroa destructor)

Description

Varroa is an external parasitic mite that attacks honey bees. The disease caused by varroa mites is called varroosis. The adult female is reddish-brown in colour, while the male is white. They are flat and button shaped, up to 1.8mm long and 2mm wide with eight legs.

Habitat

The varroa mite can only reproduce in a honey bee colony.

Impact

A significant mite infestation can lead to the death of a honey bee colony, usually in the late autumn through to early spring. The varroa mite is the parasite with the most pronounced economic impact on the beekeeping industry.

Spread

Mites reproduce on a ten day cycle. The female mite enters a honey bee brood cell and lays eggs on the larva. The young mites hatch in about the same time that a young bee develops and when the young bee emerges the varroa mites also leave and spread other bees and larvae.

A family of varroa mites found at the bottom of a honey bee brood cell

Varroa mite sucking on the blood of a bee

Velvetleaf

(Abutilon theophrasti)

Description

Velvetleaf is an annual broad-leafed plant that is a member of the mallow family. It has large, heart-shaped leaves which are velvet-soft, and can be clammy to the touch and smelly. Velvetleaf plants can grow 1-2.5 metres in height, although this may be less in cooler regions. Large buttery yellow flowers are present from spring to autumn and only open for a few hours. Seed capsules are large and distinctive, forming a cup-like ring of 13 woody and hairy segments, about 2.5cm across. Each segment releases 1-3 seeds through a slit on top of the capsule.

Habitat

In 2016 velvetleaf seed was accidentally imported with fodder beet seed and planted on over 600 properties throughout New Zealand. It is found mainly in cropland but could also establish on roadsides and in gardens.

Impact

Velveltleaf is one of the world's most invasive plant pests, damaging arable crops by competing with them for nutrients, space and water. Seeds can remain viable in the soil for up to 60 years. It is known to produce allelopathic chemicals that can inhibit water uptake and chlorophyll production in many crop plants.

Spread

Seeds can be spread by farm machinery (e.g. when harvesting grain), through livestock, and as a contaminant of grain or silage.

Velvetleaf seed pods
(Photo courtesy of Trevor James, AgResearch)

Velvetleaf in a fodder beet crop

Velvetleaf in a maize crop
(Photo courtesy of Trevor James, AgResearch)

Chatham Islands Council/ Environment Canterbury Initiatives

'Gorse Free' initiative

Gorse is the predominant (and most noticeable) plant pest on the Chatham Islands (main Chatham and Pitt Islands). In 2012, the Chatham Islands Council approved the expenditure of $150,000 towards aerial (helicopter) spraying of scattered gorse. Prior to this, the services of a helicopter were only used if, and when the helicopter company secured enough landowner paid work to warrant getting the machine to the Islands. The cost of just getting a helicopter to and from the Islands with relevant insurance is approximately $35,000. Consequently, the helicopter company needs to secure about $100,000 of paid work to make the trip viable.

In the years prior to 2012, the availability of this service was sporadic and the gorse spread quite happily in the intervening years. While the Chatham Islands Council is under no legal obligation to fund any gorse control, they took the initiative under the premise of 'where it is cost effective to do so, Council may undertake control'. This allowed the Council contractor (Environment Canterbury) to carry out this control on scattered infestations, aligned to the strategy of 'keeping the clear areas clear'. With the guaranteed Council funding, this secured the services of a helicopter to the Islands and the landowners have funded additional work each time the helicopter has been on the Islands.

Chatham Islanders have been very fortunate that $150,000 has been approved for this project annually since 2012. At present, it is funding that is applied for each year, so there is no guarantee that it will roll over indefinitely.

The project itself has evolved from just doing scattered plants at Environment Canterbury's discretion to trying to match landowner funded work on a dollar for dollar basis. Out of the $150,000, we do however set aside $30,000 to help keep the ground we have cleared maintained. Moving forward (and assuming ongoing funding is approved) the model of trying to match landowners' expenditure on helicopter spraying appears to be the best long term investment of funding i.e. when landowners contribute to the expense of control, they are more likely to maintain the area worked.

Note: There have been occasional enquiries from various helicopter companies and Environment Canterbury advertised a registration of interest in 2015. All enquiries and prices were considered but in the end, Mt Hutt Helicopters have been the sole provider of this service since the project began. It should be noted that in committing to the Chatham Islands work, Mt Hutt Helicopters can, and have been disadvantaged. The quickest they have ever completed our project is 16 days, and the longest seven weeks due to weather. An inactive machine on the Chatham Islands could be generating $10,000 plus per day in New Zealand.

The following maps illustrate each year's spraying completed by Mt Hutt Helicopters. This includes the Council and landowner funded work. Unfortunately, some of the 2012/13 year's GPS data was lost when the machine's GPS unit 'crashed' before it could be downloaded. A fairly impressive picture regardless!

Spraying of gorse by Mt Hutt Helicopters 2013 – 2016.

Chatham Island

Pitt Island

The 'Gorse Contestable' Fund

Helicopter spraying is an excellent tool to deal with isolated, inaccessible, or large infestations of gorse, but there are a lot of small to moderate infestations that are well within the scope of ground control by landowners. With this is mind, the Chatham Islands Council contractor (Environment Canterbury) proposed an annual $30,000 contestable fund that landowners could apply for, in the form of chemical to be supplied.

This fund has now been running since 2012 and is advertised in July/August of each year. Submissions are invited with all applications assessed by a panel of three Chatham Islanders. Once the assessments are done, the chemical is purchased and shipped to the Islands with dispersal to applicants occurring in September.

After a cautious start, we now receive between 30-40 applicants each year and demand exceeds the budget. When assessing the applications the panel place a lot of emphasis on the applicant's previous allotments and if the work was carried out. Other than the encouragement this fund offers to landowners to control their own gorse, the applicants reap the cost savings of us being able to bulk purchase chemical. Once again, the Chatham Islands Council is under no legal obligation to fund any chemical purchase for gorse control.

Cat de-sexing

Cats, both domestic and wild, can wreak havoc on indigenous fauna. A vet from New Zealand makes occasional visits to the Islands and carries out a cat de-sexing service.
The Chatham Islands Council recognises this is an opportunity to minimise a potential problem and consequently subsidise this service. Since 2012, the biosecurity budget has provided $1000 for each of the three times the vet has carried out this service.

Black swan reduction

With no natural predators, the black swan population is flourishing on the Chatham Islands. From a pest perspective, the fouling of pasture and water quality is of concern. When conditions permit, Environment Canterbury staff carry out occasional culls but for the past two years we have branched into the sponsorship of prizes for the 'most swan eggs collected' contest held in conjunction with the annual Chatham Islands pig hunt competition. Other than supplying the ingredients for numerous sponge cakes, this collection has resulted in over 2500 eggs not turning into swans. This sponsorship of prizes is a minimal cost compared to the gains.

Marine biosecurity

This is a relatively new and uncharted space for the biosecurity section. While we have our border controls checking for hitch hikers on the likes of second hand rope, floats, craypots and so on, we knew very little about the presence or absence of marine pests under the water around the Chatham Islands.

Following the identification of undaria in Port Hutt in 2011 and a subsequent de-limiting survey carried out by government appointed NIWA, no systematic underwater surveys have been carried out to determine the presence or absence of marine pests.

In 2014, Environment Canterbury asked the the Ministry for Primary Industries (MPI) if the Chatham Islands was on its radar to carry out any sort of marine pest surveys. The response was no, as the Chathams are not regarded as a first port of call to shipping, as are 11 New Zealand Ports. But they would be happy to investigate any report of invasive species found.

With this response from MPI, we investigated the viability and costs of engaging a suitably qualified New Zealand contractor such as NIWA or Cawthron to carry out surveys at our expense. It was immediately apparent that these costs were prohibitive. With the wealth of diving experience present on the Islands amongst commercial divers, the Chatham Islands Council saw the benefits of training its own team to the required Worksafe NZ Standard (ADAS part 1 restricted scientific diving to 30m) and equipping them.

The main benefits are;

- We have a highly qualified dive team that can carry out two annual dives at each of the four Chathams ports whenever conditions permit, at a fraction of the cost of bringing in contractors.
- This training provides additional employment opportunities for four Chatham Islands residents.
- Chatham Islands take real ownership of their own marine biosecurity.
- Even when not engaged in 'official' surveys, the knowledge they have gained means they act as another set of eyes underwater while commercial harvesting.
- This training has already transpired into carrying out a marine pest survey at Lyttelton Harbour on behalf of Environment Canterbury and MPI.

As a preamble to the diver training, we engaged NIWA to identify the ten most likely marine pests we should look for on the Chatham Islands. This list is attached in the appendix on p74.

Note: At the time of this book going to print, the Environment Canterbury biosecurity team and divers have just addressed a fairly major potential marine pest incursion on the Chathams. One tug and two barges associated with the MPA wharf project were found to have one (or more) of the following:

- *Undaria pinnatifida*
- *Sabella spallanzanii (Mediterranean fanworm)*
- *Styela clava (Clubbed tunicate)*
- *Didemnum vexillum*
- *Oysters/mussels (that are currently being tested for the Bonamia disease)*

A full report will be presented to the Chatham Islands Council by late November 2017.

The dive team is staffed as follows:

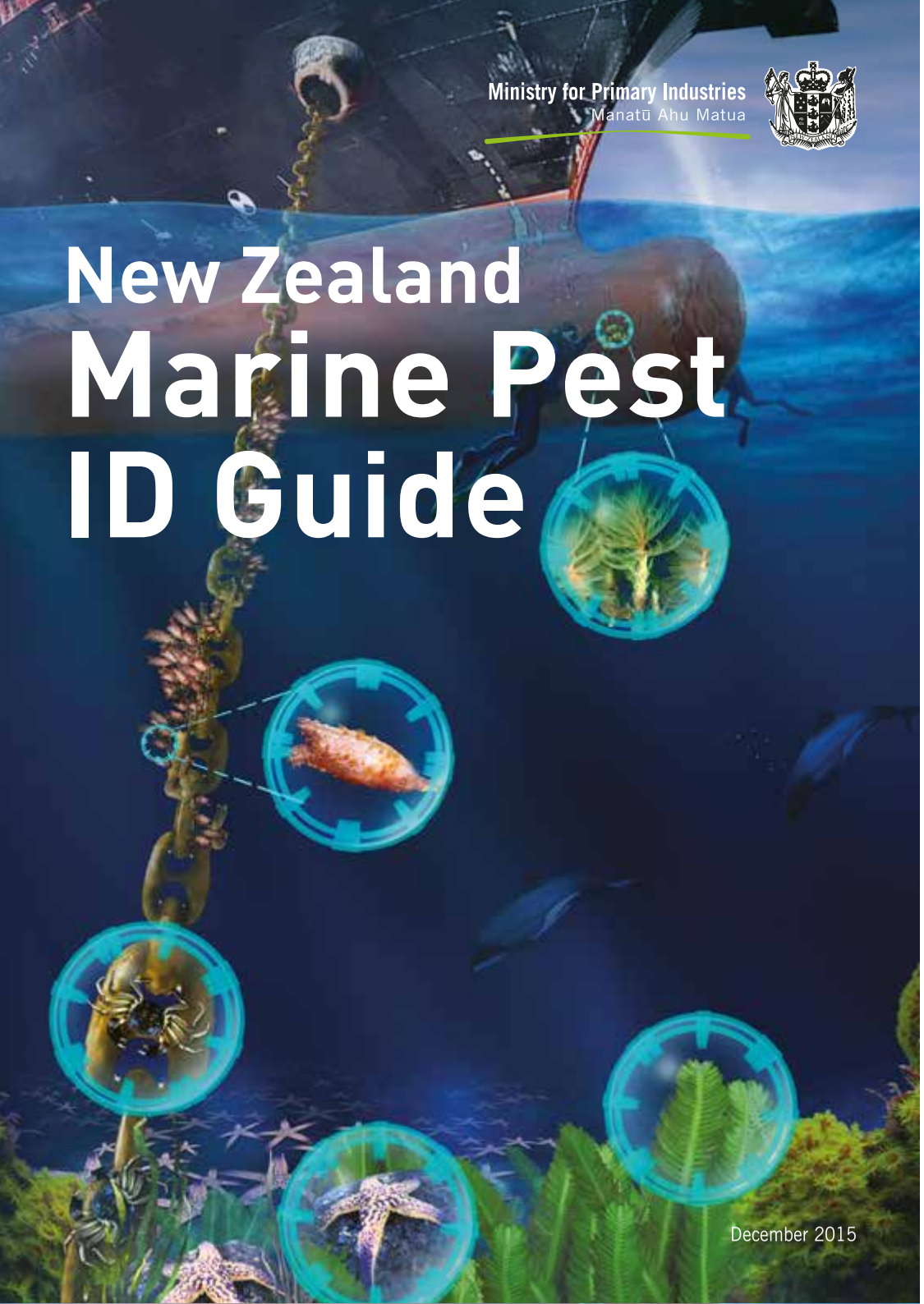
- *Steve Palmer (Environment Canterbury, Christchurch)*
- *Robin Seymour (Environment Canterbury, Chatham Islands)*
- *Nick Cameron (Commercial Diver/Contractor, Chatham Islands)*
- *Justin Johansen (Commercial Diver/Contractor, Chatham Islands)*
- *Chase Lanauze (Commercial Diver/Contractor, Chatham Islands)*

The marine dive squad, from left to right: Robin Seymour, Nick Cameron, Chase Lanauze, and Justin Johansen

August 2017 dive sites searching for undaria and other marine pests

Extent of undaria spread at Port Hutt August 2017

Chatham Island



Ministry for Primary Industries
Manatū Ahu Matua

New Zealand Marine Pest ID Guide

December 2015

CONTENTS

To report suspected marine pests or diseases call
0800 80 99 66

INTRODUCTION

This guide describes some of the marine pest species that have recently arrived in New Zealand, as well as some of the worst global marine pests that MPI is trying to keep out. The guide also includes information on how to recognise common diseases of fish and shellfish.

Since 2005 we have found more than 330 introduced (non-native) species, of which about half now have an established population or populations in New Zealand. These can have negative impacts on our fisheries, the environment, the aquaculture industry and be a considerable nuisance to a wide range of recreational or customary users and marine industries. Introduced species can also bring various new diseases and parasites.

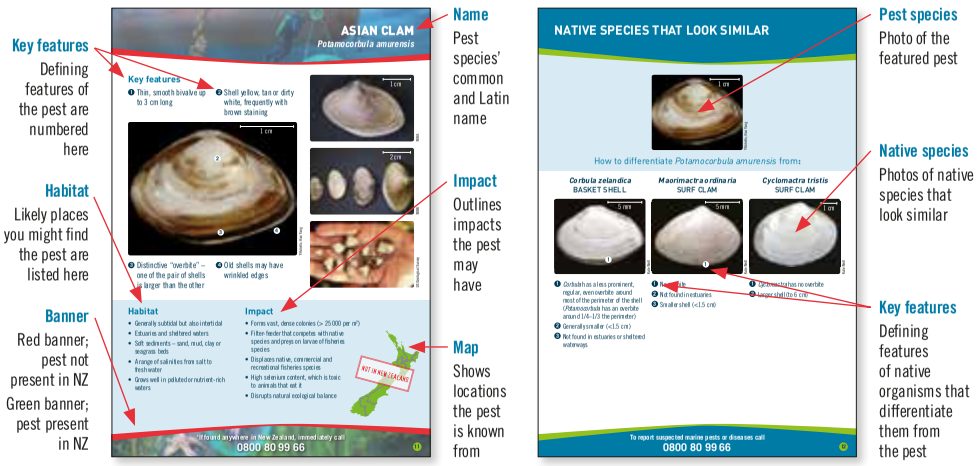
How to use this guide

Each page of this guide has information on the main marine pests of concern and is ordered alphabetically by taxonomic group. Pages with species that are established in some parts of New Zealand are green. Pages with species that have caused problems overseas and which we are actively trying to keep out are red.

Note: Distribution as depicted in the maps is accurate as of the time of printing and should be used as a guide only. If you want more information on the updated distribution of these species visit the marine biosecurity porthole, www.marinebiosecurity.org.nz.

For each species, key features and the habitat where it is likely to be found are outlined and some of its impacts are described. Native species that look similar are shown, with key distinguishing features labelled to assist with field identification.

Diseases in fish and shellfish are just as important as pests, but are harder to detect and diagnose, so information on diseases in fish and fish kills can be found in the first section of this guide.



INTRODUCTION

How you can help: be our underwater eyes

If you see anything out of the ordinary including unusual marine plants and animals, or unusual numbers of dead fish or aquatic life, call 0800 80 99 66.

If you come across a suspect non-native marine plant or animal outside of its known range (as shown on the maps in this guide), or a large number of dead or diseased fish or shellfish:

1. **Take a photo**
2. **Collect a sample**
3. **Record location and landmarks**
4. **Call 0800 80 99 66 to report find**

Remember, don't spread or introduce marine pests or diseases:

- Check and clean any equipment (e.g. pots, nets, fishing or diving gear) before moving to a new location, to ensure it is clean and free of marine life. Use fresh water and detergent or soak in a 2% bleach solution for 30 minutes, or use a specific biological treatment product. Alternatively, dry your equipment then leave it for >48 hours before using it in a different area.
- Inspect and clean your boat's hull, niche areas and other places that retain water before moving to a new location. This includes anchor wells, livebait wells, bilges, ballast tanks, etc. Remove and treat any marine life contained within these areas and dispose of any marine fouling to an appropriate rubbish bin ashore.
- Seafood waste and offal and bait from non-local sources can be vectors for transferring pests and diseases, so dispose of them thoughtfully. A land-based rubbish bin is best.
- Regularly apply antifouling paint to your moored vessel's hull.
- Use this guide to make yourself aware of pests that are likely to occur in your area, and ensure you don't spread these further.
- If disposing of aquarium plants, animals or other materials, treat them as a biosecurity risk. Dispose of them to a landfill or (if your sewerage goes to a treatment plant) you can flush them down the toilet.

DISEASES OF FISH AND SHELLFISH

Impact

Diseases can cause fish and shellfish stock collapses, which in turn can affect the natural balance of an ecosystem. Fish stock collapses can have severe effects on commercial, cultural and recreational fisheries and diseases may also be of concern to human health.

Mass-mortality events

Mass-mortality events involve the death of an unusually large number of organisms. A mass mortality is usually unexpected and there may be a number of species involved (including but not limited to fish, invertebrates and marine plants, including farmed or wild species or both). A mass mortality of commercially and/or recreationally valuable species is often known as a "fish kill", and it is this type of event that is of particular concern. If you see a fish kill, please call 0800 80 99 66 as soon as possible.

The following information is useful when investigating a fish kill and should be recorded whenever possible:

- Date and time of the event
- When animals were collected
- Location and size of the fish kill
- Species and number of individuals affected (photos are often useful)
- Abnormal behaviour of animals
- Abnormal environmental conditions (e.g. river flooded, algal bloom present, unusually high temperature)
- Condition of the animals when found (e.g. near death, dead, decomposing)
- Any lesions or other marks on animals

DISEASES OF FISH

Key diagnostic features

A fish kill may be obvious: a large number of a single species of fish dead or dying, over a wide area. Fish respond to diseases in a fairly consistent way. The signs of disease may be subtle, but more obvious indications of disease may be behavioural or external.

External signs:

- Obvious lesions on the fish (ulcers, loss of fins, strange lumps or growths, red streaks or spots)
- Reddening at the base of the fins or in the eyes
- Bulging eyes
- Gills swollen or covered in mucus
- Fish fat or bloated
- Rash on the body

Behavioural signs:

- Fish displaying abnormal swimming behaviour (lethargy, swimming in circles)
- Gasping for air, especially near surface (open mouth)
- Quick spinning movements and/or scratching or rubbing against objects

Some examples of diseased fish

Chris Speirs

A snapper with dermal/subdermal haemorrhaging on the ventral side, in this case attributable to a septicaemia caused by *Vibrio* bacteria

Cara Brosnahan

A wild-caught rainbow trout with unusual skin discolouration as may be observed in a diseased fish

DISEASES OF SHELLFISH

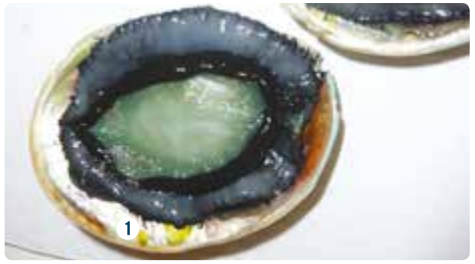
Key diagnostic features

A mass mortality may be obvious: a large number of a single species of recently dead shellfish washed up on the beach, or recently dead or dying over a wide area in the water. Except in cases of mass mortality, signs of disease are usually more subtle.

Signs a shellfish is sick:

1. Shellfish such as paua may be retracting away from the shell with the edges of the mantle curling away
2. There may be visible pustules, lesions or hard nodules present
3. Shellfish may look watery or in poor condition
4. Shellfish such as paua may not be able to stay attached to the substrate
5. Shellfish such as paua may not be able to right themselves when turned upside down
6. Bivalves may be gaping or slow to react when touched
7. Bivalves may not be able to stay shut
8. Excess mucus production may be evident

Some examples of diseased shellfish



Paua retracting its mantle away from its shell.

Anjali Pande, MPI

Watery, sick-looking oyster.

Shucked paua with nodules associated with *Perkinsus*.

Anjali Pande, MPI

Watery, sick-looking scallops infected with several pathogenic species of bacteria.

Collecting samples for investigation

Call MPI on 0800 80 99 66 – they will advise on whether samples are required, how to pack them and where to send them. Otherwise, as a general rule:

- Collect 5–10 whole animals that are moribund (dying but not dead) or freshly dead
- Chill them on ice or in a refrigerator (but do not freeze)
- Talk to MPI about how to package and send the animals to the lab

Information to collect

- Date and time of the observation, and when fish/shellfish were collected
- Location and approximate size of area affected
- Species and number of individuals affected (a photo is often useful)
- Whether fish/shellfish were dead or moribund when collected (or both)
- Any abnormal environmental conditions (e.g. river flooded, algal bloom present, unusually high temperature)

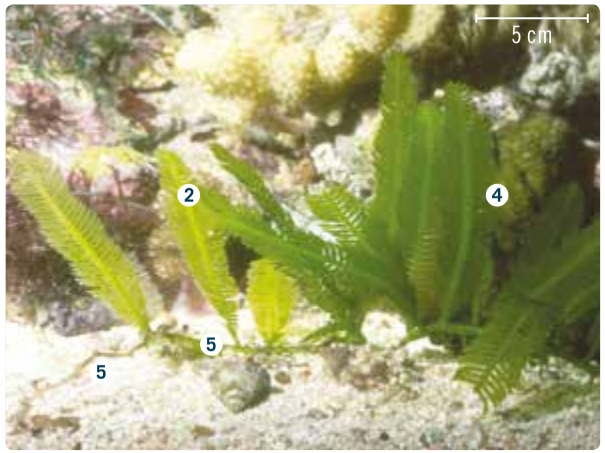
If you suspect you have seen signs of disease in captive or wild fish or shellfish call MPI immediately on 0800 80 99 66.

AQUARIUM CAULERPA

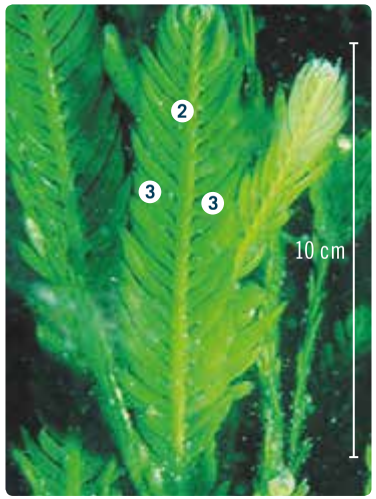
Caulerpa taxifolia

Key features

1. Bright green
2. Fronds have a smooth midrib
3. Paired branchlets, all flattened in the same plane



Bob Fenner



Australian Institute of Marine Science


Government of South Australia, Biosecurity SA

4. Fronds up to 15 cm (tropical form) or 40+ cm (Mediterranean form) in length
5. Long horizontal runners (stolons) with many upright, flattened fronds

Habitat

- Marine aquaria

If *Caulerpa* was to be released into the environment, then it would be found in:

- Sand, mud, rock or seagrass beds
- Estuaries, harbours and coasts
- Sheltered to semi-exposed environments
- Low tide to 100 m depth

Impact

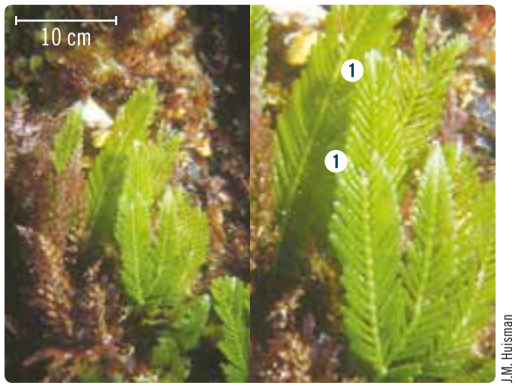
- Forms vast, dense beds
- Smothers and displaces native and fisheries species
- Fast-growing
- Disrupts natural ecological balance
- Accumulates toxins

NATIVE SPECIES THAT LOOK SIMILAR

Bob Fenner

How to differentiate *Caulerpa taxifolia* from:

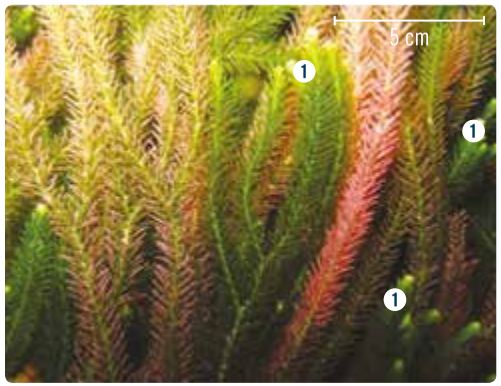
Caulerpa articulata



J.M. Huisman

1. *C. articulata* has cylindrical, turgid, bead-like vesicles that are not flattened like *C. taxifolia*
2. *C. articulata* is found in the North Island and offshore islands, and the northern South Island

Caulerpa brownii SEA RIMU



Richard Kinsey

1. *C. brownii* has distinctively three-dimensional shaggy fronds; they are not flattened in cross-section
2. *C. brownii* is found in the southern North Island, South Island and offshore islands

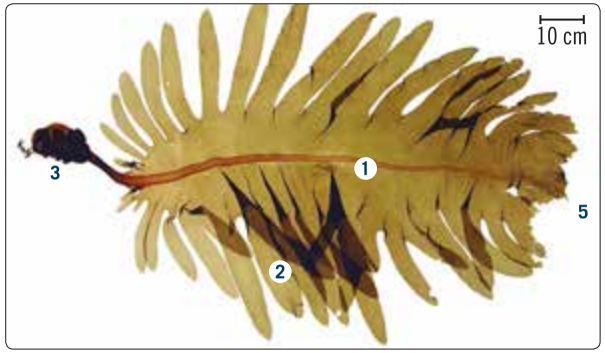
Additional information: the most likely way of *Caulerpa taxifolia* arriving in New Zealand is through importation with other aquarium species. Aquarium caulerpa is an unwanted organism, so if you suspect you've seen it in aquaria, or anywhere, please call **0800 80 99 66** immediately.

WAKAME/UNDARIA

Undaria pinnatifida

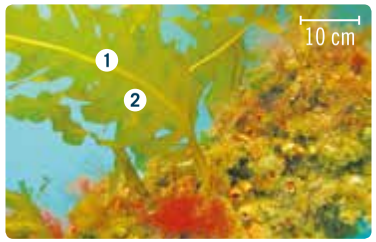
Key features

1. Strap-like midrib in plants larger than 10 cm
2. Smooth, thin, laminar blade, with side lobes, that starts just above the holdfast, or above the frilly reproductive tissue in mature plants



Kate Neill

3. Base of mature plant is frilly (reproductive tissue), with a root-like holdfast
4. Adult plants brown to yellowish, up to 3 m tall
5. Tops of mature plants are often eroded



Kath Blakemore


Lesley Patston

Serena Wilkens

Habitat

- Intertidal to 40 m depth
- Wharves, pontoons and buoys
- Rocky coasts and reefs
- Boat hulls
- Sheltered to exposed environments
- Grows well in polluted or nutrient-enriched waters

Impact

- Very fast growing and can form dense colonies displacing native and fisheries species
- Fouls boats, aquaculture installations and other marine structures

Report if found outside known locations

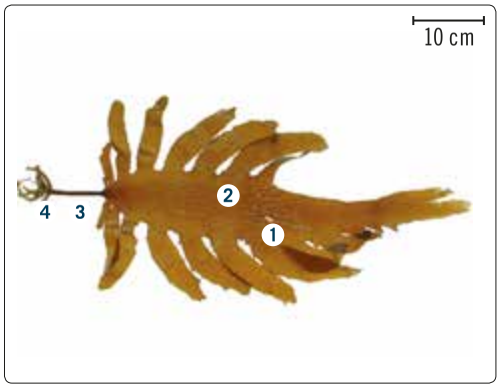
0800 80 99 66

NATIVE SPECIES THAT LOOK SIMILAR

Kate Neill

How to differentiate *Undaria pinnatifida* from:

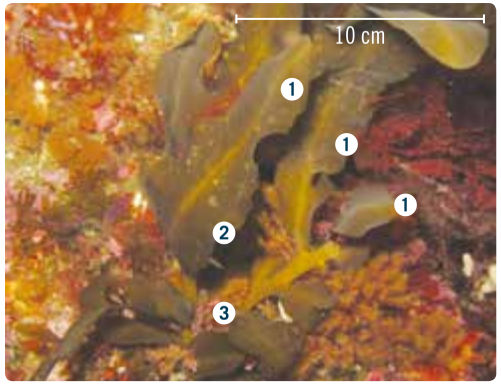
Ecklonia radiata
ECKLONIA



Kate Neill

1. *Ecklonia* has rough, leathery blade, often with many small, raised bumps; *Undaria* has smooth, thin and fragile blades
2. *Ecklonia* has no midrib (Note: plants are difficult to differentiate before this character develops in *Undaria* at about 10 cm length)
3. *Ecklonia* has a cylindrical trunk-like stipe. *Undaria* has a flattened, strap-like stipe
4. *Ecklonia* has no frilly reproductive tissue at base

Carpophyllum flexuosum



Richard Kinsey

1. *Carpophyllum* has multiple ribbed leaves; *Undaria* has only a single midrib and blade
2. *Carpophyllum* has stiff, tough, leathery leaves
3. *Carpophyllum* has no frilly base

To report suspected marine pests or diseases call

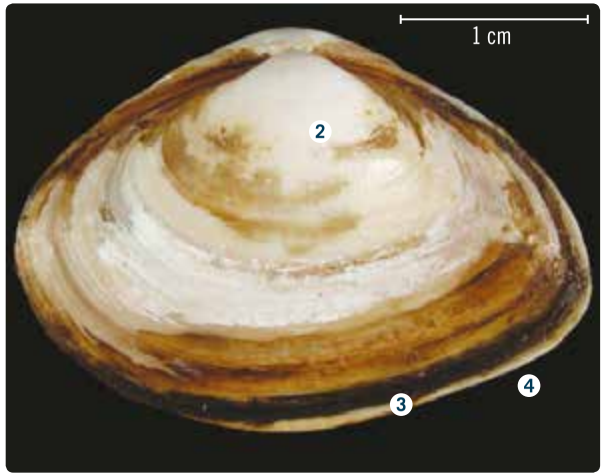
0800 80 99 66

ASIAN CLAM
Potamocorbula amurensis

Key features

❶ Thin, smooth bivalve up to 3 cm long

❷ Shell yellow, tan or dirty white, frequently with brown staining



YHshells; Hao Yang

❸ Distinctive "overbite" – one of the pair of shells is larger than the other

❹ Old shells may have wrinkled edges

NIWA

NIWA


US Geological Survey

Habitat

- Generally subtidal but also intertidal
- Estuaries and sheltered waters
- Soft sediments – sand, mud, clay or seagrass beds
- A range of salinities from salt to fresh water
- Grows well in polluted or nutrient-rich waters

Impact

- Forms vast, dense colonies (> 25 000 per m^2)
- Filter-feeder that competes with native species and preys on larvae of fisheries species
- Displaces native, commercial and recreational fisheries species
- High selenium content, which is toxic to animals that eat it
- Disrupts natural ecological balance

'If found anywhere in New Zealand, immediately call
0800 80 99 66

NATIVE SPECIES THAT LOOK SIMILAR

YHshells; Hao Yang

How to differentiate *Potamocorbula amurensis* from:

Corbula zelandica BASKET SHELL

Kate Neill

❶ *Corbula* has a less prominent, regular, even overbite around most of the perimeter of the shell (*Potamocorbula* has an overbite around 1/4–1/3 the perimeter)

❷ Generally smaller (<1.5 cm)

❸ Not found in estuaries or sheltered waterways

Mactra (Maorimactra) ordinaria SURF CLAM

Kate Neill

❶ No overbite

❷ Not found in estuaries

❸ Smaller shell (<1.5 cm)

Cyclomactra tristis SURF CLAM

Kate Neill

❶ *Cyclomactra* has no overbite

❷ Larger shell (to 6 cm)

To report suspected marine pests or diseases call
0800 80 99 66

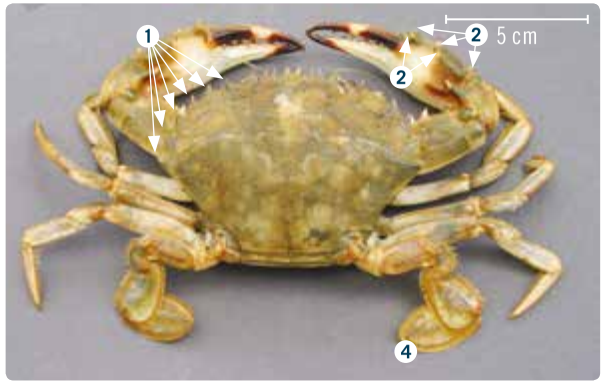
ASIAN PADDLE CRAB

Charybdis japonica

Key features

❶ Six prominent spines on each side of the carapace

❷ Five prominent spines on upper surface of each claw



Colin McLay

❸ Carapace up to 12 cm wide

❹ Flattened swimming paddles on back legs

Serena Wilkens

❺ Colour ranges from off-white and pale green, through olive-green to a deep chestnut brown with purplish markings

Serena Wilkens

Habitat

- Low tide to 15 m depth
- Sand and mud
- Estuaries, harbours and and most coastal habitats

Impact

- Highly detrimental to shellfish aquaculture
- Aggressive predator
- Displaces native and fisheries species
- Can carry diseases that affect crab, lobster, shrimp and prawn fisheries

Report if found outside known locations

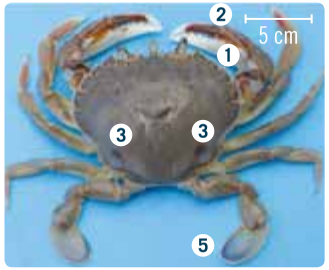
0800 80 99 66

NATIVE SPECIES THAT LOOK SIMILAR

Colin McLay

How to differentiate *Charybdis japonica* from:

Ovalipes catharus SWIMMING/PADDLE CRAB



Colin McLay

❶ *Ovalipes* has five flattened spines on each side along the front and extending around the sides (not six pointed spines along the front as in *C. japonica)*

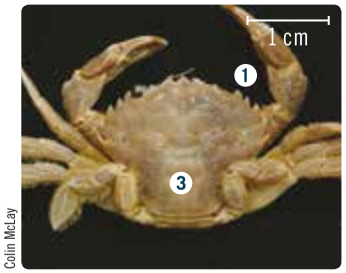
❷ One prominent spine on the claw

❸ Two distinct reddish "spots" on the carapace

❹ Pale sandy-grey with orange-red highlights

❺ Swimming paddles often with purplish tint

Liocarcinus corrugatus DWARF SWIMMING CRAB



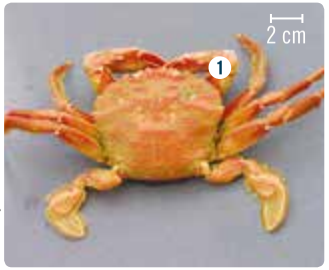
Colin McLay

❶ *Liocarcinus* has five spines on each side (not six)

❷ Much smaller – maximum 2.5 cm wide

❸ Fine corrugations over most of the shell

Nectocarcinus antarcticus HAIRY RED SWIMMING CRAB



Colin McLay

❶ *Nectocarcinus* has four spines on each side (not six)

❷ Red to pinkish-red colouration

To report suspected marine pests or diseases call

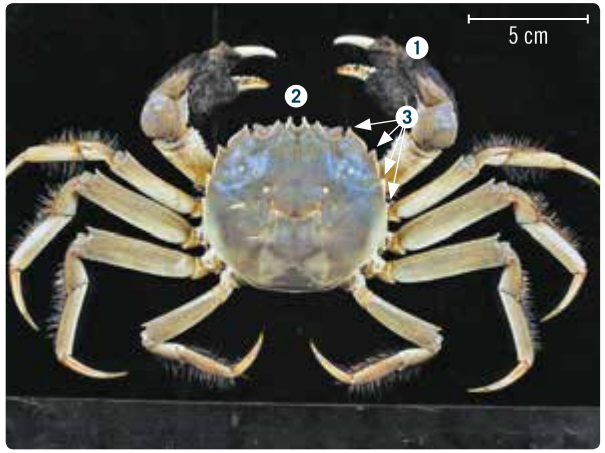
0800 80 99 66

CHINESE MITTEN CRAB

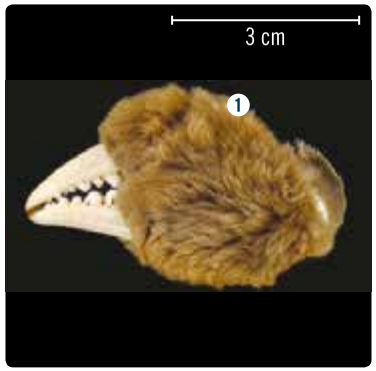
Eriocheir sinensis

Key features

1. Hairy "mittens" with white tips on front claws
2. Distinctive notches between the eyes
3. Four spines on each side of the carapace



University of Valencia



Phil Crabb, Natural History Museum

Central Fisheries Board, Ireland

4. Carapace 0.5-10 cm wide but generally >3 cm
5. Light brown to olive-green carapace

Habitat

- Above high tide to subtidal
- Burrows in sand, mud, silt or clay
- Freshwater, brackish, estuarine and marine waters
- Prefers polluted or nutrient-enriched waters

Impact

- Can form dense colonies
- Disrupts natural ecological balance
- Accumulates toxins
- Aggressive, highly effective predator
- Displaces native and fisheries species
- Damages fishing nets and catches
- Burrowing weakens and collapses river/estuary banks
- Can carry a liver fluke that harms humans

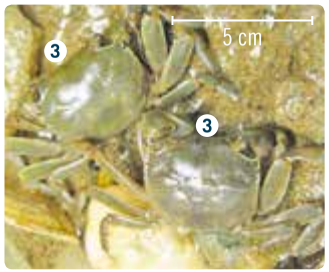
'If found anywhere in New Zealand, immediately call
0800 80 99 66

NATIVE SPECIES THAT LOOK SIMILAR

University of Valencia

How to differentiate *Eriocheir sinensis* from:

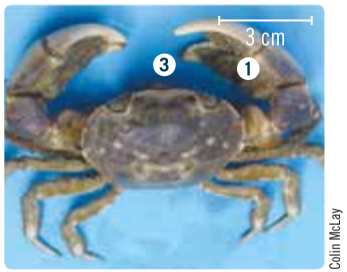
Austrohelice crassa TUNNELLING MUD CRAB



Chris Woods

1. *A. crassa* has large, rounded claws – not furry or white-tipped
2. *A. crassa* is much smaller – carapace width 4 cm max and distinctly oblong/square-shaped
3. *A. crassa* has no spines on the front edge of the carapace

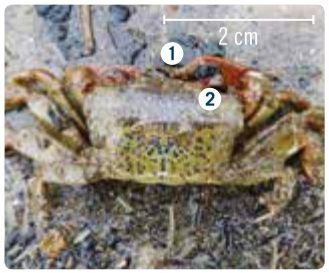
Hemigrapsus crenulatus HAIRY-HANDED CRAB



Colin McLay

1. *H. crenulatus* claws are only slightly hairy and the hairs are on the inner side only
2. *H. crenulatus* is a much smaller crab – carapace width less than 4 cm
3. *H. crenulatus* has no spines on the front edge of the carapace

Hemiplax hirtipes STALK-EYED MUD CRAB



Serena Wilkens

Chris Woods

1. *Hemiplax* claws are small, fringed with hairs and with long slender fingers
2. *Hemiplax* has eyes on long stalks
3. *Hemiplax* is a much smaller crab – carapace width less than 3 cm

To report suspected marine pests or diseases call
0800 80 99 66

EUROPEAN SHORE CRAB

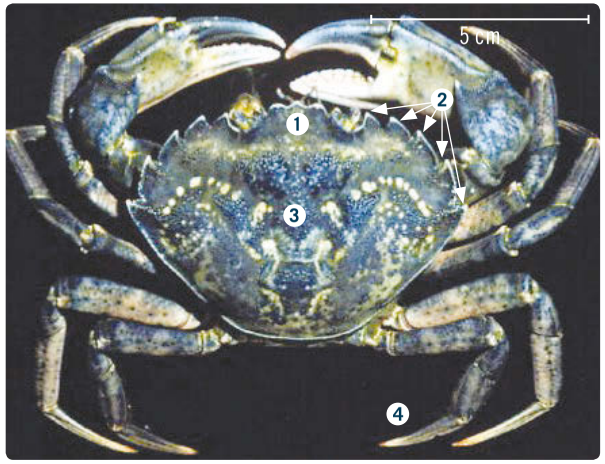
Carcinus maenas

Key features

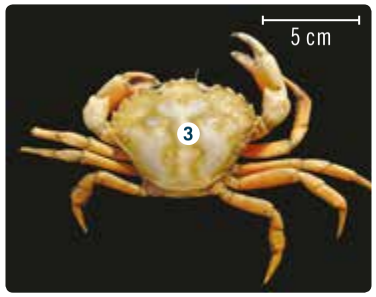
❶ Three rounded "teeth" or lobes between the eyes

❷ Five spines on each side

❸ Adult up to 8 cm wide



Michael Marmach

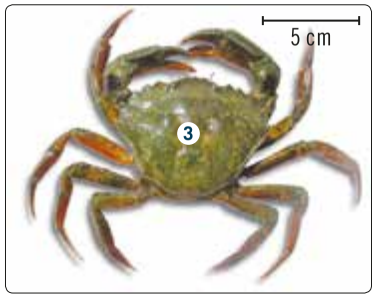


Hans Hillewaert

❹ No swimming paddles on legs

❺ Juveniles generally lighter in colour than adults

❼ Adult colour varies from green on top and yellowish underneath, to mottled red and orange above and orange or partly red underneath



A.M. Arias

Habitat

- Intertidal to 60 m depth
- Sand, mud, rock or seagrass beds
- Estuaries, harbours and coasts
- Generally nocturnal

Impact

- Can form dense colonies (up to 200 per m^2)
- Aggressive and highly effective predator
- Displaces native and fisheries species
- Highly detrimental to shellfish aquaculture
- Can collapse wild-harvest shellfisheries
- Facilitates other pest invasions

'If found anywhere in New Zealand, immediately call

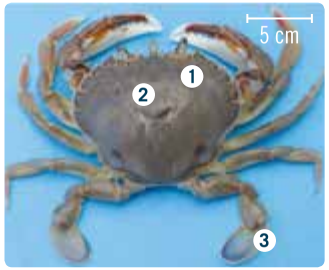
0800 80 99 66

NATIVE SPECIES THAT LOOK SIMILAR

Michael Marmach

How to differentiate *Carcinus maenas* from:

Ovalipes catharus SWIMMING/PADDLE CRAB



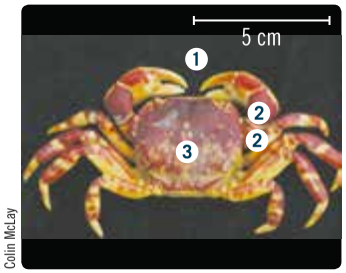
Colin McLay

❶ *O. catharus* is larger – carapace width up to 15 cm, compared to 8 cm in *Carcinus*

❷ *O. catharus* is sandy grey in colour with orange-red highlights

❸ *O. catharus* has paddles on rear legs for swimming

Hemigrapsus sexdentatus COMMON ROCK/ SHORE CRAB



Colin McLay

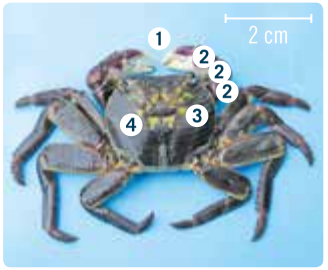
❶ *H. sexdentatus* has no spines/lobes between the eyes

❷ *H. sexdentatus* has two (not five) spines on outer edges of carapace

❸ *H. sexdentatus* has a distinctive square purple-and-cream carapace

❹ *H. sexdentatus* is smaller – maximum width about 4 cm

Leptograpsus variegatus PURPLE ROCK CRAB



Colin McLay

❶ *L. variegatus* has no spines/lobes between the eyes

❷ *L. variegatus* has three spines on each side of the carapace behind the eyes

❸ *L. variegatus* has grooves on the surface of the carapace

❹ The carapace is variegated with many colours including green, brown, purple and cream

❺ *L. variegatus* has a carapace less than 7.5 cm wide

To report suspected marine pests or diseases call

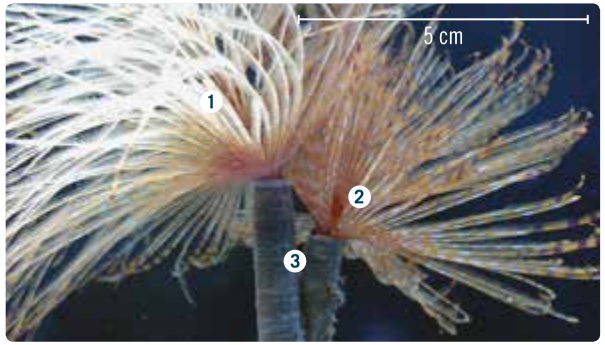
0800 80 99 66

MEDITERRANEAN FANWORM

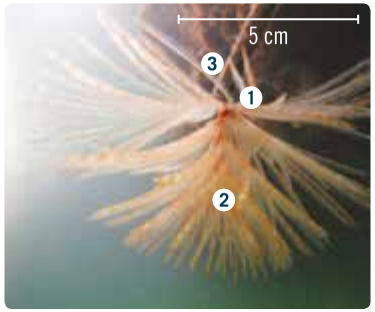
Sabella spallanzanii

Key features

1. Single spiral crown of elongated filaments projects from tube
2. Spiral appears yellow-orange, made of bands of white, yellow and brown

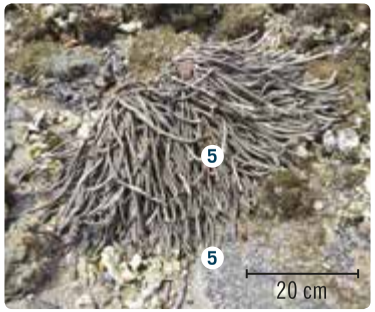


Geoff Read



Serena Wilkens

6. Can form dense clumps of many individuals, creating a large area of feeding fans



Richard Taylor

3. Tube is brown to grey, finely banded, muddy-looking, made of a leathery, flexible material; normally 10–50 cm but rarely up to 1 m long
4. Bristle lobes on body segments with bristles set in a spiral pattern (evident when worm removed from tube)
5. Tubes may be evident at low tide

Habitat

- Low tide to 30 m depth
- Sheltered harbours to semi-exposed rocky coasts and reefs
- Wharves, pontoons and aquaculture structures
- Boat hulls
- Attaches to hard surfaces in soft sediments
- Prefers polluted/nutrient-enriched waters

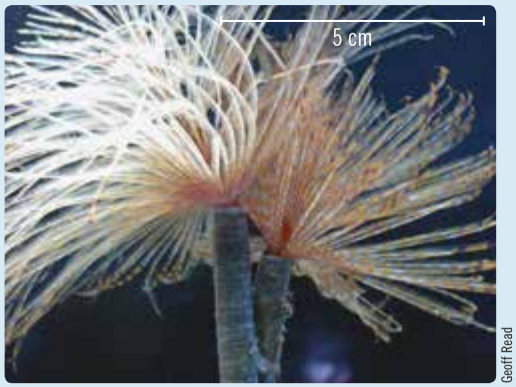
Impact

- Can form dense colonies (1000 individuals per m^2)
- Displaces native and fisheries species
- Highly effective filter-feeder
- Preys on larvae of fisheries species
- Disrupts natural ecological balance
- Fouls boats, aquaculture installations and other marine structures

Report if found outside known locations

0800 80 99 66

NATIVE SPECIES THAT LOOK SIMILAR



Geoff Read

How to differentiate *Sabella spallanzanii* from:

Native sabellid and serpulid tubeworms

Department of Conservation

Kein Grange

1. No native sabellids have a banded yellow-orange crown like *Sabella spallanzanii*
2. Native sabellids have a non-elongate, more flower-like, denser crown, not usually spiralled; and none of them have spiralled body bristles
3. All native sabellid fanworms are smaller, with tubes rarely longer than 20 cm
4. All serpulid fanworms have a hard whitish calcareous tube that is attached to the substrate along much or all of its length; *Sabella* has a flexible tube and is only attached at one end

To report suspected marine pests or diseases call

0800 80 99 66

NORTHERN PACIFIC SEASTAR

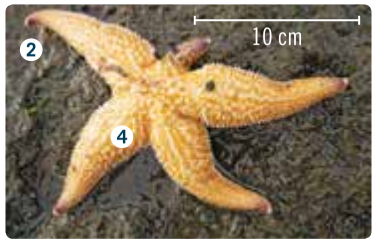
Asterias amurensis

Key features

1. Five arms
2. Pointed, often upturned tips
3. Yellow to orange, often with purple markings on top; yellow underneath

Serena Wilkens

4. Arms covered with numerous small, irregularly-arranged chisel-like spines
5. Usually up to 24 cm across, but can reach 50 cm
6. Reaches high densities



Serena Wilkens

Creative commons Flikr – Sasportato

CSIRO

Habitat

- Low intertidal to 25 m, occasionally to 200 m
- Rocky reef, mud, sand or pebbles
- Wharves, pontoons and buoys
- Aquaculture structures
- Estuaries, harbours and coasts
- Sheltered to semi-exposed environments

Impact

- Fast-growing
- Forms vast, dense colonies
- Displaces native and fisheries species
- Voracious predator
- Highly detrimental to shellfish aquaculture and wild-harvest shellfisheries

'If found anywhere in New Zealand, immediately call

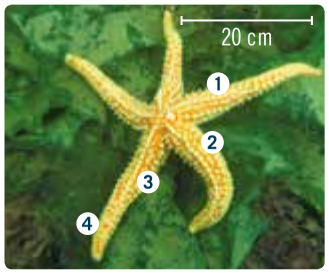
0800 80 99 66

NATIVE SPECIES THAT LOOK SIMILAR

Serena Wilkens

How to differentiate *Asterias amurensis* from:

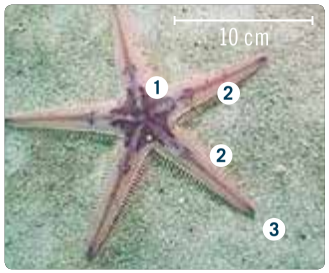
Sclerasterias mollis APRICOT SEASTAR/ CROSS FISH



Chris Woods

1. Well-defined rows of spines extending down the arms
2. Pale red to orange, with yellow bands and cream spines
3. Thin arms
4. Generally does not have prominently upturned armtips unless it's moving along the substrate

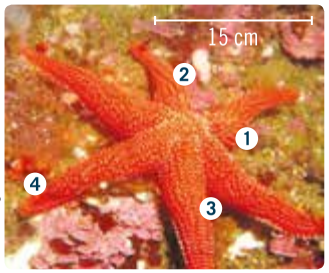
Astropecten polyacanthus COMB SEASTAR



seafriends.org.nz

1. *A. polyacanthus* is generally brownish red to fawn with a darker centre
2. Has a row of spines extending laterally around the edges of the arms
3. *A. polyacanthus* does not generally have prominently upturned armtips unless it's moving along the substrate

Allostichaster insignis THREE-AND-THREE SEASTAR



Paddy Ryan

1. *A. insignis* is orange, red or purple
2. *A. insignis* usually has six arms (occasionally five); *Asterias* always has five arms
3. *A. insignis* has groups of ~3 spines in rows extending down the arms, which *Asterias* lacks
4. *A. insignis* does not generally have prominently upturned armtips unless it's moving along the substrate
5. Smaller body (< 35 cm across)

To report suspected marine pests or diseases call

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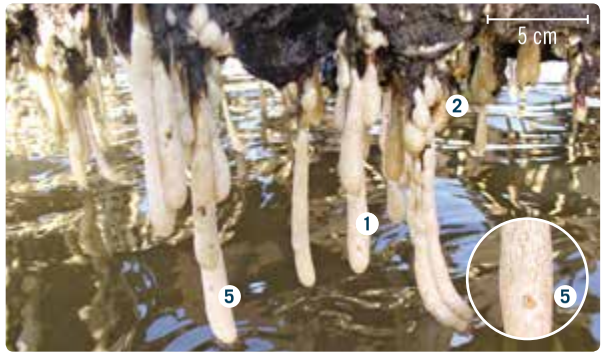
AUSTRALIAN DROPLET TUNICATE

Eudistoma elongatum

Key features

1. White or cream-coloured cylindrical tubes (tunics)
2. Sometimes with short, wartlike processes at the base



Sean Handley

Northland RC


Sean Handley

H Blomfield

3. Generally 5–20 mm in diameter
4. Tunic generally 5–30 cm long but can reach 1.5 m
5. Tunic contains many small individual organisms and can sometimes appear orange-flecked owing to the presence of bright orange larvae

Habitat

- Intertidal to subtidal
- Sand, mud, rock or seagrass beds
- Aquaculture structures
- Wharves, pontoons and buoys
- Estuaries, harbours and coasts
- Sheltered/semi-sheltered environments

Impact

- Can form dense colonies
- Displaces native and fisheries species
- Smothers beaches, rocks, tidepools
- Fouls boats, aquaculture installations and other marine structures

Report if found outside known locations

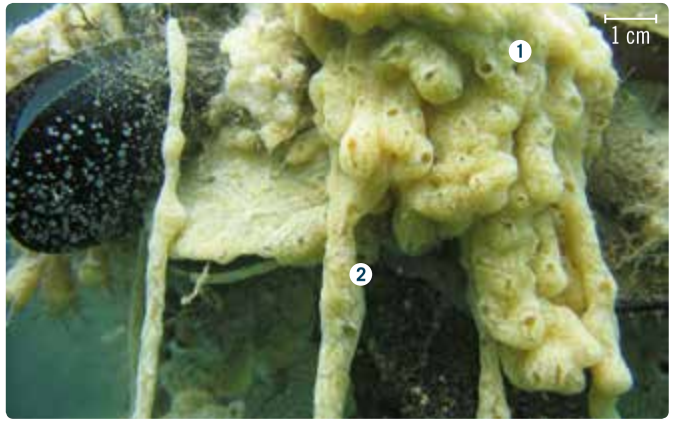
0800 80 99 66

NATIVE SPECIES THAT LOOK SIMILAR

Sean Handley

How to differentiate *Eudistoma elongatum* from:

***Didemnum* spp.**
COLONIAL SEA SQUIRT



Paul Barter, Cawthron Institute

1. *Didemnum* forms mats with messy interconnected drooping entwined tendrils, whereas *Eudistoma* consists of discrete circular tubes
2. A fine network of regular canals is visible on the surface of *Didemnum* but not on *Eudistoma*, where the pores are more irregularly distributed and lack visible canals
3. *Eudistoma* is firm and gelatinous to the touch; *Didemnum* less so and is also easily torn

To report suspected marine pests or diseases call

0800 80 99 66

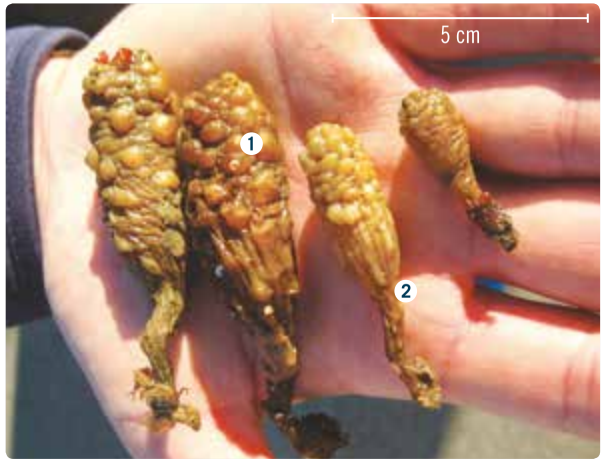
CLUBBED TUNICATE/LEATHERY SEA SQUIRT

Styela clava

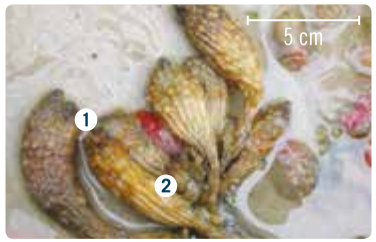
Key features

❶ Brown with lumpy, leathery skin

❷ Woody stalk, generally longer than the body, with longitudinal folds



Jeannine Fischer



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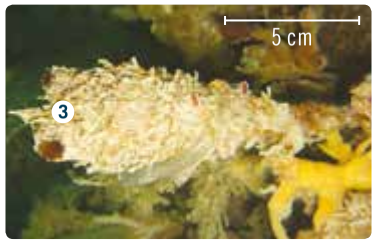
Northland RC



Chris Woods

❸ Two closely spaced siphons at the top of the body, usually surrounded by warty projections

Habitat

- Low intertidal to 25 m depth
- Rocky coast and reef
- Boat hulls
- Wharves, pontoons and aquaculture structures
- Grows on other organisms

Impact

- Can form dense colonies excluding other organisms
- Highly effective filter-feeder
- Preys on larvae of commercially important fisheries species
- Displaces native and fisheries species
- Fouls boats, aquaculture installations and other marine structures

Report if found outside known locations

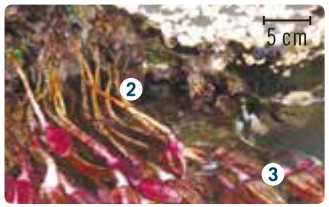
0800 80 99 66

NATIVE SPECIES THAT LOOK SIMILAR

Jeannine Fischer

How to differentiate *Styela clava* from:

Pyura pachydermatina SEA TULIP



John Barkla

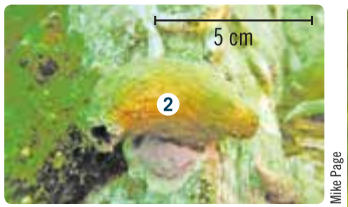
Chris Woods

❶ *Styela* is light or dark brown; *Pyura* is white to purplish-red

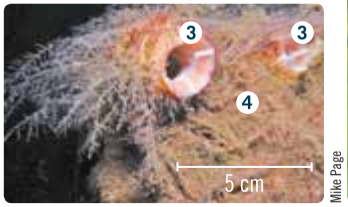
❷ *Pyura* has a much longer stalk – up to three-quarters of its overall length – and can grow to over half a metre long; *Styela* only reaches 16cm

❸ *Pyura* has a bulbous body with ridges along its length; *Styela's* body lacks ridges along its length

Cnemidocarpa bicornuta and *C. nisiotis*



Mike Page



Mike Page

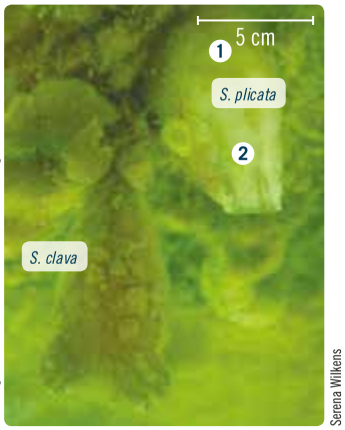
❶ Neither *Cnemidocarpa* species has a stalk

❷ *C. biornuta* has a wide saddle between the siphons, whereas *Styela's* siphons are close together

❸ *C. nisiotis* has siphons at opposite ends of the body. The body is flattened against the substrate, not stalked

❹ The body of *C. nisiotis* can be obscured by heavy fouling, whereas *Styela* is always prominent

Styela plicata



Serena Wilkens

❶ *S. plicata* has no stalk

❷ Generally has a smooth, white to cream-coloured body and is not usually fouled with other species such as hydroids and bryozoans

To report suspected marine pests or diseases call

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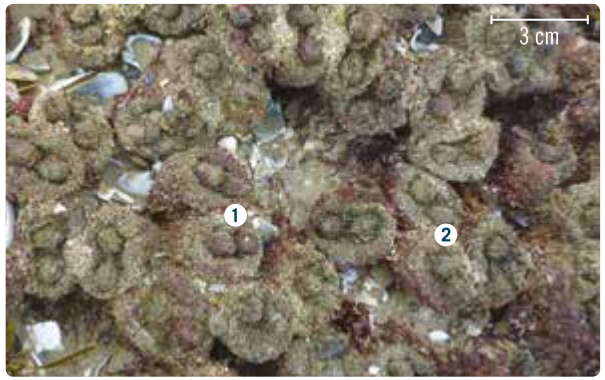
PYURA

Pyura doppelgangera

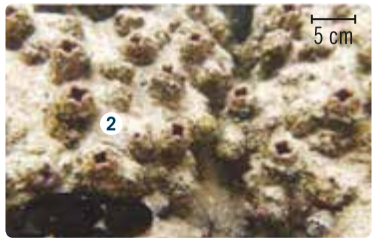
Key features

❶ Flattened upper surface surrounded by a ridge with two siphons projecting slightly from the centre

❷ Hard, sac-like body with brown or reddish-brown leathery skin, often incorporating sand and shell fragments



Roger Grace



NRC

Serena Wilkens

Bruce Hayward

❸ Adults 1.5–6 cm high and 3–5 cm in diameter, squat and globular in shape

❹ Colonies may form a dense mat, which may be visible at low tide

Habitat

- Rocky intertidal and shallow subtidal
- Grows on hard surfaces in soft sediments

Native species that look similar:

- No native species look similar to pyura

Impact

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

Report if found outside known locations

0800 80 99 66

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