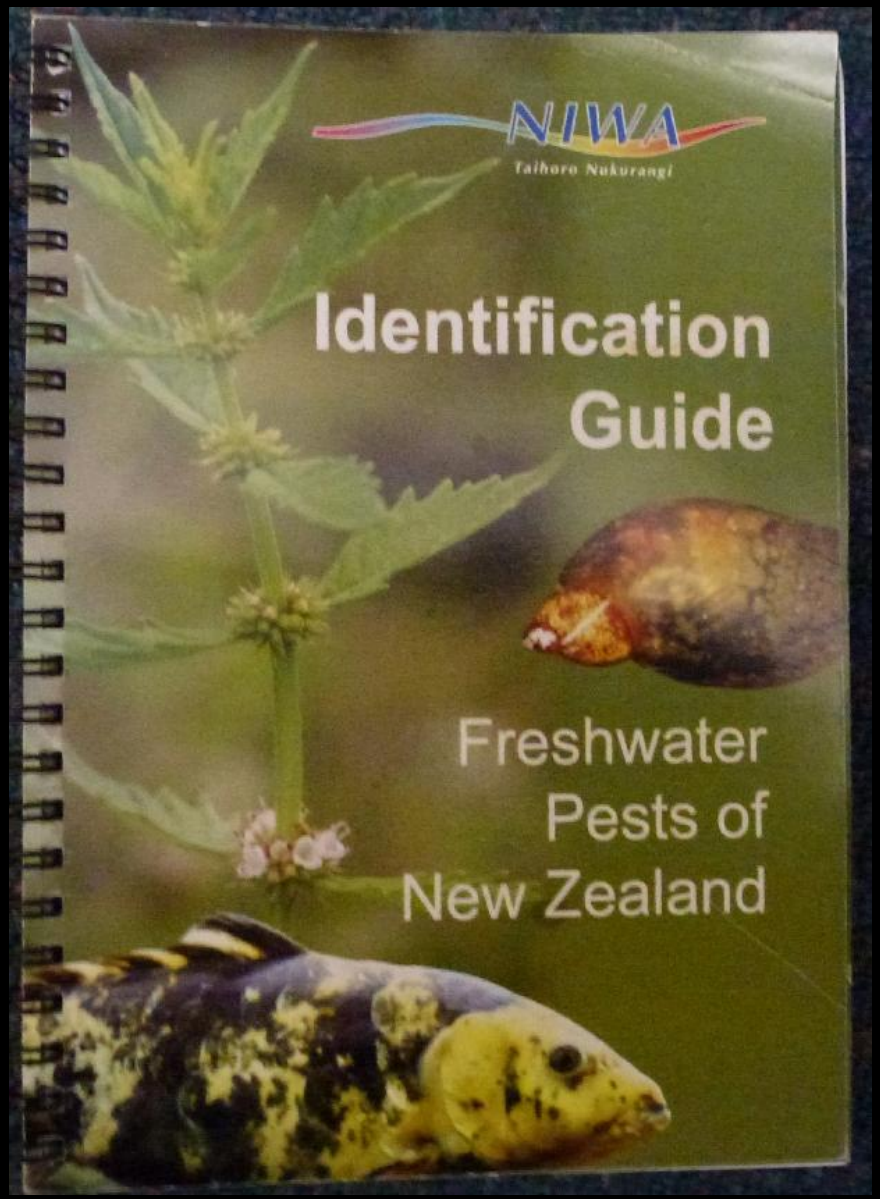
NIWA
Taihoro Nukurangi

FRESHWATER PESTS
of New Zealand

Paul Champion

NIWA's Web-based information

- Freshwater Pests of New Zealand booklet
- What has happened to FBIS?
- Searches with FBIS
- Other NIWA tools available on-line
  - LakeSPI
  - Aquatic Plants site
  - Identification keys



Champion et al. 2004

NIWA
Taihoro Nukurangi

Staff Login | Media Centre | Careers with NIWA

Science | Services | News & Publications | Education & Training | Events | About

Home » Science » Freshwater and Estuaries » Management Tools » Identification guides and fact sheets » Freshwater Pest Species

Freshwater and Estuaries

- Programme Overview
- Research Projects
- Our Services
- **Management Tools**
  - Restoration tools
  - Sediment Tools
  - Water Quality tools
  - Ecological monitoring
  - **Identification guides and fact sheets**
    - Fish ID guides
    - Algae ID guides
    - Macrophyte (plant) ID guides
    - Invertebrate ID guides
    - **Freshwater Pest Species**
  - Biosecurity Tools
  - Publications for Water Managers
- Freshwater and Estuaries Update
- News

Freshwater Pest Species

Science Centres: Freshwater and Estuaries

This is a series of fact sheets on alien fish, invertebrate, algal and weed species that are recorded in New Zealand freshwaters.

The fact sheets outline species distributions in New Zealand, preferred habitat, dispersal mechanisms, identification features, similar species and how to distinguish these, current biosecurity status and biosecurity risks.

The establishment of alien pest species in New Zealand's freshwater systems continues to threaten the values and utility of our natural resources. Early identification of new pest incursions and appropriate action can help prevent further spread or mitigate their impacts. Water body managers and agency field staff also require resources on pests to aid in inventory, surveillance and monitoring.

These fact sheets provide an updated resource to replace the 2004 booklet *Identification Guide: Freshwater Pests of New Zealand*. They address nine fish species, eleven invertebrate species, two algal species and thirty-nine weed species.

A Publishing and Reporting System enables on-going content management for the provision of up-to-date information. Funding was provided by the Terrestrial and Freshwater Biodiversity Information System (TFBIS) Programme, administered by the Department of Conservation.

Images

Website: http://www.niwa.co.nz/freshwater-and-estuaries/management-tools/identification-guides-and-fact-sheets/freshwater-pest-species

Attachment	Size
Freshwater Pests of New Zealand 2013 - landscape format	6.51 MB
Freshwater Pests of New Zealand 2013 - portrait format	6.25 MB

FRESHWATER PESTS
of New Zealand

• Paul Champion • Dave Rowe • Brian Smith • Rohan Wells • Cathy Kilroy • Mary de Winton •

Introduction

Invasion of our freshwaters by alien species is a major issue for resource and natural heritage managers. Today, few if any New Zealand water bodies support a biota that is wholly native. Over 200 freshwater plant and animal species have been introduced to New Zealand, many of which have naturalised and become pests, or have the potential to become pests. Impacts from these species are significant, including reduction in indigenous biodiversity, destabilisation of aquatic habitats, implications for human health, economic losses through lost power generation, impeded drainage or irrigation, and reduced opportunity for recreational activities like boating and fishing.

The intention of this resource is to introduce users to freshwater pests of greatest concern, provide a description of key features to identify these pests, and background information on their known distribution and biosecurity status, so that significant new records can be discerned and reported. Note that the pests in this series have already been found in New Zealand. If incursions of new-to-New Zealand organisms are suspected, then the Ministry for Primary Industries (MPI) should be contacted.

The freshwater pests considered here can be divided into three sections, with fact sheets provided on:

1. Fish (9 species).
2. Invertebrates (11 species).
3. Plants: algae (2 species) and aquatic weeds (39 species).

Included is information on presence and distribution in NZ, habitats, dispersal mechanisms, identification features, reference photographs, similar species and how to distinguish these, biosecurity status and biosecurity risks.

Species distribution maps are drawn from number and location of records available from source data up until the last date of major revision for the species fact sheets. Historic records are represented, but note that eradicated sites are not distinguished. If these distributions differ from your knowledge of records for species then please seek to submit a record to the source databases. Source data for fish are drawn from the Freshwater Fish Database (www.niwa.co.nz/our-services/online.../freshwater-fish-database), whilst plant and invertebrate data are sourced from the Freshwater Biodata Information System (https://fbis.niwa.co.nz/). Didymo records are from the Didymo Samples Database (https://www.didymosamplesdb.org.nz/).

NIWA
Taihoro Nukurangi

FISH

dave.rowe@niwa.co.nz

NIWA
Taihoro Nukurangi

INVERTEBRATES

brian.smith@niwa.co.nz

NIWA
Taihoro Nukurangi

PLANTS

paul.champion@niwa.co.nz

Perca fluviatilis Linnaeus, 1758, Perch, redfin perch

Perch (S.C. Moore)

ID features

A deep-bodied fish with two dorsal fins, six or more dark, vertical stripes along the side of the body and orange-edged fins; sharp spines on the first dorsal ray and lower posterior edges of the operculum (gill cover).

Similar species

Rudd (*Scardinius erythrophthalmus*), goldfish (*Carassius auratus*), orfe (*Leuciscus idus*).

Biosecurity Status

Regional Pest Management Strategy: NTL, AUK, WKO, BOP, NSN, MBH. A sports fish requiring a licence from Fish & Game Councils to catch them.

Biosecurity Risk

Reduces the abundance of common bullies and small planktivorous fish (i.e., smelt and galaxiids) in lakes. Reduces crayfish and is also assocated with the development of cyanobacterial blooms in lakes.

Preferred/known habitats

Lakes, reservoirs, ponds and wetlands. Also occurs in rivers where water is slow-moving.

Presence in New Zealand

First populations were established in New Zealand between 1868 and 1877 in Canterbury, the West Coast, Wellington, Wanganui and Taranaki. They were subsequently spread to other parts of the country and are now present in lakes, ponds and reservoirs throughout most of the west coast of the North Island and the east coast of the South Island.

Dispersal Mechanisms

Stocking was carried out in the 1980s and early 1900s by early settlers to create sports fisheries. Since the 1970s, new populations have been established illegally in many lakes and ponds to create coarse fishing opportunities.

New Zealand distribution

Cherax tenuimanus Smith 1912, Marron, Margaret River marron, hairy marron

Lateral view with insert of ventral view (G.Barnes)

Biosecurity Status

Notifiable organism.

Biosecurity Risk

Marron are large and omnivorous and could threaten native crayfish species by outbreeding them. Like most crayfish, marron can carry two species of tiny parasites attached to their shell and gills, a ciliate protozoan *Epistylis* and a small flatworm *Temnocephala*; although so far absent from Australia and New Zealand, the diseases microsporidiosis and *Thelohania* have been reported in marron; marron are also very susceptible to the crayfish plaque *Aphanomyces astaci*.

ID features

One of the largest freshwater crayfish in the world; can grow up to 380 mm (total length) and weigh over 2 kg; marron have jet-black pinchers and a paler olive-green to brown or cobalt-blue body.

Similar species

Small specimens may initially be confused with native crayfish but can be distinguished by their overall larger size and colouration; marron may have areas of red (underside) and splashes of purple.

Preferred/known habitats

Lakes, ponds, streams, rivers and impoundments; marron prefer good water quality and a diversity of habitat structure such as woody debris.

Presence in New Zealand

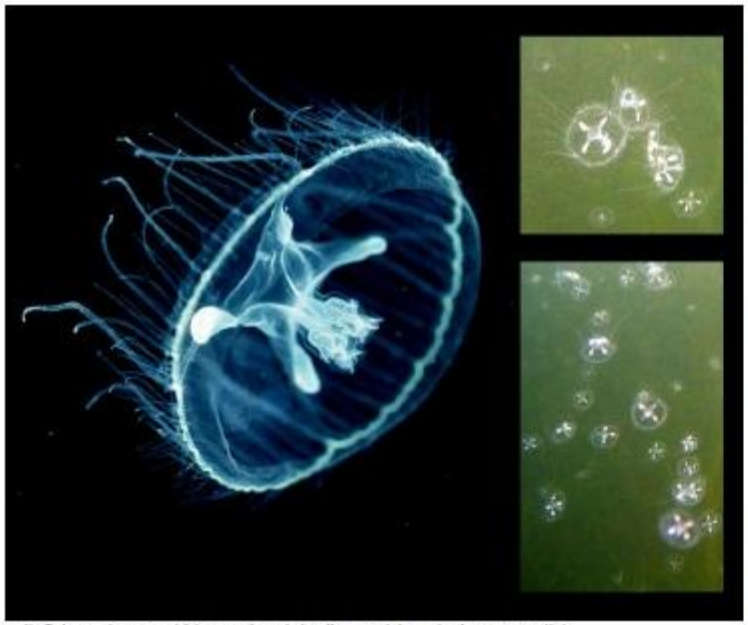
All known populations eradicated, introduced in 1986.

Dispersal Mechanisms

Introduced from Australia for aquaculture; marron are able to survive for long periods out of water, and consequently able to cross land in search of water bodies; dispersal potential enhanced by illegal translocation and breeding.

New Zealand distribution

Craspedacusta sowerbyi (Lankester, 1880), Freshwater jellyfish



Jellyfish medusa and blooms in a lake (inserts) (B. O'Brien, R. Wells)

Biosecurity Status

No status.

Biosecurity Risk

Unlikely to affect zooplankton populations, but potential to compete with native zooplankton feeders such as pelagic fish is unknown.

ID features

There are two distinct life-history stages with the medusa forming the mobile, classic jellyfish shape (20 – 25 mm diameter) with around 400 tentacles around the circumference; the non-swimming stage or polyps can be very small and often overlooked.

Similar species

None.

Preferred/known habitats

Lakes and hydroelectric impoundments; distributon of *Craspedacusta* maybe underestimated due polyps being less obvious than medusa.

Presence in New Zealand

First recorded fromLake Taupo in 1956, and now widely naturalised in both North and South Islands;

Dispersal Mechanisms

Can reproduce only by 'budding' when water temperatures reach 25°C; juveniles (polyps) may attach to stones, aquatic weed or boats.

New Zealand distribution

Didymosphenia geminata (Lyngbye) M.Schmidt 1899, Didymo





Rock snot growths on river rocks and a microscopic view of cells (J. Clayton, C. Kilroy)

Biosecurity Status

Unwanted organism.

Biosecurity Risk

Ability to form large blooms in low-nutrient waters that would not normally support high algal biomass. Anecdotal evidence suggests that didymo impacts upon environmental (water quality – ecosystem health, biodiversity; indigenous biodiversity – biodiversity/extant), economic (industry – maintenance and nuisance), and social (recreational – swimming; aesthetics - potential) values.

Algae

ID features

A diatom (alga characterised by silica cell walls). Visible colonies are brown to slightly pinkish-brown at the surface, with a cream or white interior. Range from round "pimples" a few mm in diameter to continuous mats up to 50 mm thick. Mats have a tough, woolly feel rather than the slimy texture of most algae. Individual cells bottle-shaped (wedge-shaped in side view) and up to 140 mm long. Cells exude polysaccharide stalks which attach to stable substrates (usually rocks) in flowing water.

Similar species

Native alga *Gomphoneis minuta* var. *cassieae*, another stalk-forming diatom, can form thick mats that resemble didymo. However, *Gomphoneis* mats are more slimy and fragile than those of didymo.

Preferred/known habitats

Mostly in flowing, nutrient-poor waters; tolerates a wide range of water velocities.

Presence in New Zealand

Widely naturalised in South Island but still apparently absent from the North Island. First recorded in Waiau River, Southland in 2004.

Dispersal Mechanisms

Downstream through transport of individual cells. Inter-catchment spread in the South Island probably via recreational equipment such as angling gear, felt-soled waders, kayaks and 4WD vehicles. In cool, wet conditions, cells can remain viable for weeks.

New Zealand distribution

Ceratophyllum demersum L., Hornwort, coontail

A weed bed seen from the surface (top) and underwater (bottom left), with a close-up the plant, forked leaves and minute flower (R. Wells)

Submerged

ID features

Leaves are whorled and 10-40mm long. The leaves fork once or more into linear segments which are toothed (the teeth look like tiny horns – hence the name hornwort, wort being old English for plant). Flowers are minute and located at the base of the leaves. Hornwort has no roots, instead its lower leaves anchor it to sediment. It can survive as a free floating mat absorbing all the nutrients it needs from the surrounding water.

Similar species

Fanwort (*Cabomba caroliniana*), *Myriophyllum* spp. All have finely divided submersed leaves. However, fanwort has leaves arranged in pairs, not whorls and *Myriophyllum* spp. have pinnate (feather-like) arrangement of leaflets, not forked.

Biosecurity Status

Unwanted Organism, National Interest Pest Response (South Island only), National Pest Plant Accord, Regional Pest Management Strategy: BOP*, NSN/TAS, STL, MWT, WGN, AUK, HKB (* management within defined areas of region).

Biosecurity Risk

Currently New Zealand's worst submerged weed, affecting indigenous plant biodiversity, hydro-generation, irrigation, flood protection and recreation.

Preferred/known habitats

Moderate flowing to still water bodies, growing to >15 m deep in some clear water lakes

Presence in New Zealand

Widely naturalised in North Island, all South Island sites have been targeted for eradication with no plants seen since 2008, first record from Napier 1961.

Dispersal Mechanisms

Propagation by fragmentation of its brittle stems. Flowers occur on this species, but there is no evidence of seed production in New Zealand.

New Zealand distribution

Timaru Herald
Thursday, May 16, 2013
Page : 3
Section :
Edition :
Region : New Zealand Regional

Page
Circulation :
Area Of Clip : 244.7
Clip ID : 7

LOCAL / NATIONAL

Officials declare end of weed in south

A Timaru lake has been cleared of hornwort, officially leading to the eradication of the invasive weed in the South Island, after first appearing in 2006.

Hornwort was cleared from Timaru's Centennial Park Lake using aquatic herbicide endothall in 2008.

The lake has been monitored since and has now been officially declared free of the pest.

Ministry for Primary Industries (MPI) senior adviser Dr Liz Clayton said hornwort was a significant threat to the ecology of freshwater ecosystems and could affect the functioning of hydro power generators and irrigation and drainage systems, with major economic consequences.

The ministry had made it a priority to contain hornwort and clear it from the South Island, she said.

National Institute of Water and Atmospheric Research (Niwa) carried out the operation in Timaru after success at sites near Motueka.

Niwa aquatic ecologist Rohan Wells said his team had monitored Centennial Park lake since 2008. There had been no re-appearance of hornwort in that time and the ministry was now able to declare the pest eradicated from the South Island.

"It was a difficult site and conventional methods of weed removal were not successful," Dr Wells said.

"We then tried the new herbicide endothall and only one treatment was needed to successfully eradicate it."

Hornwort can grow to 10 metres and is well established in the North Island, which poses a risk of re-introduction to the South Island.

"For this reason, MPI is seeking pre-approval from South Island regional authorities to use endothall against hornwort, should it be found in their area in future," Dr Clayton said.

Endothall is understood to be a safe aquatic herbicide, which is broken down naturally. Recent studies have shown it is safe to swim and eat fish where the water has been treated.

All gone: The invasive weed hornwort has been eradicated from the South Island after it was announced yesterday that it had been cleared from Timaru's Centennial Park lake.

Designated biosecurity status (Legal and management designation)

Biosecurity Status	Definition/legislation	Agency	Web-page
Notifiable Organism	Requires immediate notification under Section 44 of the Biosecurity Act 1993	Ministry for Primary Industries	http://www.mpi.govt.nz/
Unwanted Organism*	Restricted sale, distribution and propagation defined in the Biosecurity Act 1993	Ministry for Primary Industries	http://www.mpi.govt.nz/
National Interest Pest Response (NIPR)	Aims to eradicate 11 selected established pests from New Zealand	Ministry for Primary Industries	http://www.mpi.govt.nz/
National Pest Plant Accord (NPPA)	Cooperative agreement between the Nursery and Garden Industry Association, Regional Councils and MPI to prevent sale, propagation or distribution of nominated plants	Ministry for Primary Industries	http://www.mpi.govt.nz/
Regional Pest Management Plan	A strategic and statutory framework for efficient and effective management of pest plants and animals in regions	Unitary Authorities and Regional Councils	See below
Noxious fish*	Illegal to have under control, or rear, raise, hatch or consign under the Fisheries Regulations 1983, but note rescinded for some species in 1986	Ministry for Primary Industries	http://www.mpi.govt.nz/

*Management responsibilities for freshwater fish designated as Unwanted Organisms or as Noxious fish lie with Department of Conservation or Regional Councils.

Central Government, Unitary authorities, Regional Councils, and research agencies

Abbreviation*	Agency	Web-page
MPI	Ministry for Primary Industries	http://www.mpi.govt.nz/
DOC	Department of Conservation	http://www.doc.govt.nz/
NTL	Northland Regional Council	http://www.nrc.govt.nz/
AUK	Auckland Council	http://www.arc.govt.nz/
WKO	Waikato Regional Council	http://www.waikatoregion.govt.nz/
BOP	Plenty Bay of Plenty Regional Council	http://www.boprc.govt.nz/
GIS	Gisborne District Council	http://www.gdc.govt.nz/

Glossary

Acute:	sharply pointed.
Adipose fin:	a small fleshy lobe with no spines or rays on the back of fish between the dorsal fin and caudal fin.
Alternate:	arranged singly along the stem (opposite of opposite).
Anal fin:	the unpaired or single fin on the ventral (underside) of a fish just behind its vent; the base of the anal fin is where it joins the body.
Anal gill:	the respiratory structure positioned at posterior of invertebrate.
Annual:	plant living only one year or season.
Axil:	upper angle between dissimilar parts such as leaf and stem.
Barbel:	soft, whisker-like appendage protruding from around the mouth of fish.
Basal:	attached near the base, as with leaves on a stem.
Bladder:	swollen body with hair triggers (carnivorous plants).
Budding:	offspring grows out of the body of the parent.
Bract:	a modified, usually much reduced, leaf (scale-like).
Caudal fin:	tail fin of fish.
Cleft:	deep incision.
Comb scales:	small comb-like scales present on lateral margins of last abdominal segment of a mosquito larva.
Cross-veins:	veins that run perpendicular to the leaf across longitudinal veins.
Dorsal fin:	an unpaired fin on the back of fish; there may be up to 3 dorsal fins and some may be joined.
Echinostomes:	intestinal flukes (flatworms) of the family echinostomatidae which consists of many species. They occur in humans and other vertebrates. The intermediate hosts are frequently snails.
Elliptical:	rounded at both ends, widest in the middle.
Entire:	not toothed or lobed, smooth.
Filiform:	thread-like.
Filament:	stalk of a stamen.
Fin rays:	soft rods that give support to fins. Rays are usually branched into two halves (side by side), are often segmented, and are usually flexible.
Fin spine:	a stiff, bony rod supporting a fin. Some spines are sharp. Not divided in half.
Forked:	refers to the posterior margin of the caudal fin: a forked fin is deeply indented.
Gill opening:	the exterior opening of the gills – located just behind the head. Gill openings may be covered by a bony plate (the operculum) or soft flaps of skin.
Globose:	nearly spherical.
Gonopodium:	a specialised part of the anal fin in male gambusia and other poeciliids (live bearing fish) that is used to transfer sperm to female fish.
Inflorescence:	collection of flowers and their supporting branchlets which arise from a common point.
Lamina:	an expanded flattened portion of an organ (usually the blade of a leaf).
Lanceolate:	lance-shaped.
Lateral:	from the side, or extending horizontally from the main axis.
Ligule:	outgrowth at the inner junction of the leaf sheath and blade.
Linear:	narrow with parallel margins (see diagram).
Liver fluke:	flatworm parasitic in liver and bile ducts of domestic animals and humans.
Lobed:	divided into (usually rounded) segments.
Node:	the region of a stem from which one or more leaves or branches arise.
Oblique:	having a slanting direction.
Oblong:	with parallel sides and rounded ends.
Obovate:	egg-shaped, attached at the narrow end.
Obtuse:	blunt.
Operculum:	a hardened plate used to seal a snail shell.
Opposite:	arranged in pairs along the stem (opposite of alternative).
Ovate:	egg-shaped, attached at the broad end.

http://ei.niwa.co.nz/search

niwa.co.nz | Explore Atlas | LakeSPI Lake... | New Tab | niwa.co.nz

NIWA Taihoro Nukurangi

Environmental Information Browser

Sign in

Home About

This portal is the beginning of a simple interface to discover NIWA's data holdings, view its metadata and learn how to access it. All the underlying services are published as standard OGC (Open Geospatial Consortium) web services and can be connected to by compatible tools. At present it has access to NIWA's metadata catalogue (our database of what databases we have), the Freshwater Biodiversity Information System (data and metadata gathered from New Zealand's freshwater streams, rivers and lakes) and our national network of climate and hydrological stations. Over time we will be publishing more and more of NIWA's data sources using this technology.

Dr Jochen Schmidt, Chief Scientist - Environmental Information

How to search?

Users can search by keywords, spatial domain and time period (What, Where, When).

- Keywords entered in the 'What' field enables full text search in the underlying datasets.
- The spatial domain is defined by zooming on the map until the desired area is displayed, or search a location using the 'Where' field.
- The time period of interest can be defined using the 'When' slider.
- The search returns the number of matching records in each data source, clicking on that number allows discovering detailed information.

EI Browser is built on a software platform made up of open source components including PostGIS, GeoServer, Geonetwork. Visit the OS Geospatial Foundation for more information about open-source geospatial software. Data is accessed and served using OGC standard protocols, including CSW, WMS, WFS and SOS.

Close ☐ Do not show it again

What

Where

Search

1900-01-01 2013-06-15

When

Limit to date range ☐

Terms of Use

These Terms of Use govern the use of any data, information and other intellectual property you obtain from NIWA (the "Data"), whether directly or indirectly from these pages or associated database(s). Ensure you read these terms carefully, as by downloading, using, or making or using any copy of the Data, you agree, and are deemed, to be bound by those terms.

Searched Services

NIWA Metadata Catalogue

The service provides publicly available information about environmental datasets and services registered in the NIWA metadata catalogue. The service contains for each catalogue record ISO compliant metadata. The service is provided as an OGC compliant Catalogue Service for the Web (CSW)

More information

NIWA Station Catalogue

The service provides publicly available information about environmental monitoring stations registered in the NIWA Station Information Management System (SIMS). The service contains a limited set of station metadata, including station type, contact organisation, and time period of operation. The service is provided as an OGC compliant Web Feature Service (WFS). For more information see: http://sims-wfs.niwa.co.nz

More information

FBIS Freshwater Biodiversity

The Freshwater Biodata Information System (FBIS) contains fish, algae, aquatic plant and invertebrate data and metadata gathered from New Zealand's freshwater streams, rivers and lakes.

More information

Website: http://ei.niwa.co.nz/

NIWA Taihoro Nukurangi

Freshwater Biodiversity

This portal is the beginning of a simple interface to discover NIWA's data holdings, view its metadata and learn how to access it. All the underlying services are published as standard OGC (Open Geospatial Consortium) web services and can be connected to by compatible tools. At present it has access to NIWA's metadata catalogue (our database of what databases we have), the Freshwater Biodiversity Information System (data and metadata gathered from New Zealand's freshwater streams, rivers and lakes) and our national network of climate and hydrological stations. Over time we will be publishing more and more of NIWA's data sources using this technology.

Dr Jochen Schmidt, Chief Scientist - Environmental Information

How to search?

Users can search by keywords, spatial domain and time period (What, Where, When).

- Keywords entered in the 'What' field enables full text search in the underlying datasets.
- The spatial domain is defined by zooming on the map until the desired area is displayed, or search a location using the 'Where' field.
- The time period of interest can be defined using the 'When' slider.
- The search returns the number of matching records in each data source, clicking on that number allows discovering detailed information.

EI Browser is built on a software platform made up of open source components including PostGIS, GeoServer, Geonetwork. Visit the OS Geospatial Foundation for more information about open-source geospatial software. Data is accessed and served using OGC standard protocols, including CSW, WMS, WFS and SOS.

Close ☐ Do not show it again

What

Where

Search

1900-01-01 2013-05-15

When

Limit to date range ☐

What: Egeria densa

Where: Canterbury

Search

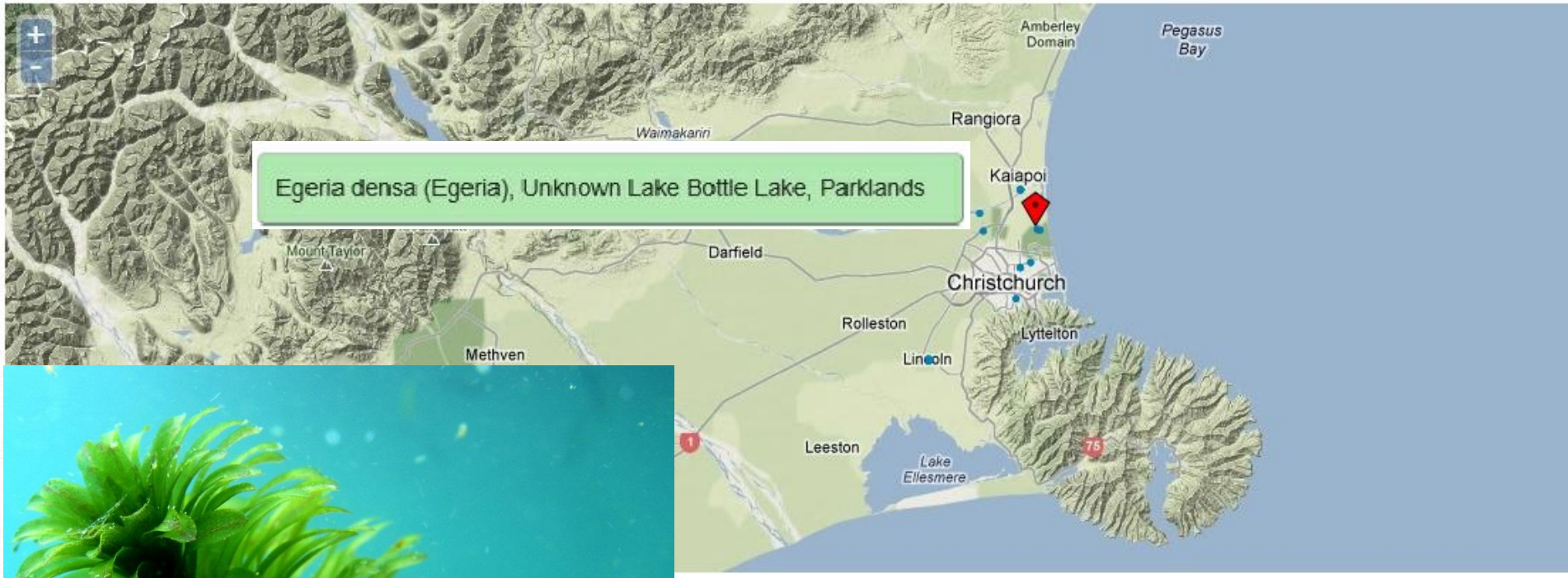
When: 1900-01-01 — 2013-05-15

Limit to date range

We found 15 search results for Freshwater Biodiversity

As a signed in and subscribed user to FBIS you can download reports (CSV). Register here or sign in.

Dismiss



What

Where chatham island

When

Search

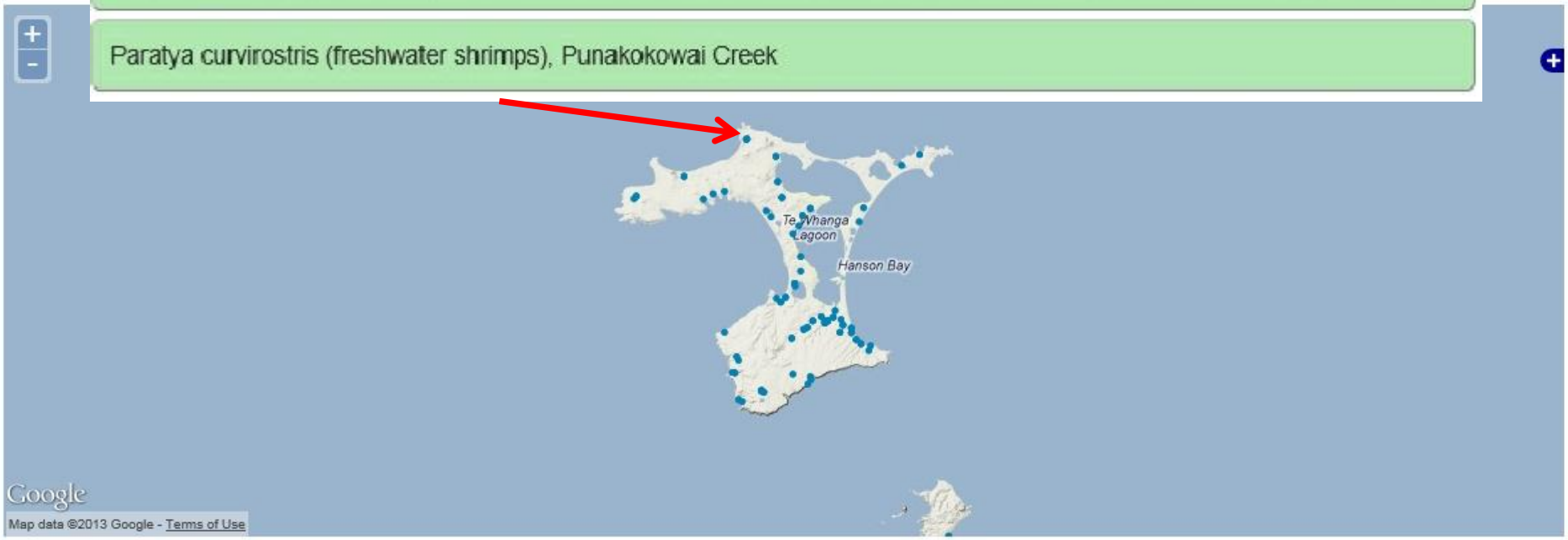
We found 99 search results for Freshwater Biodiversity

As a signed in and subscribed user to FBIS you can download reports (CSV). Register here or sign in.

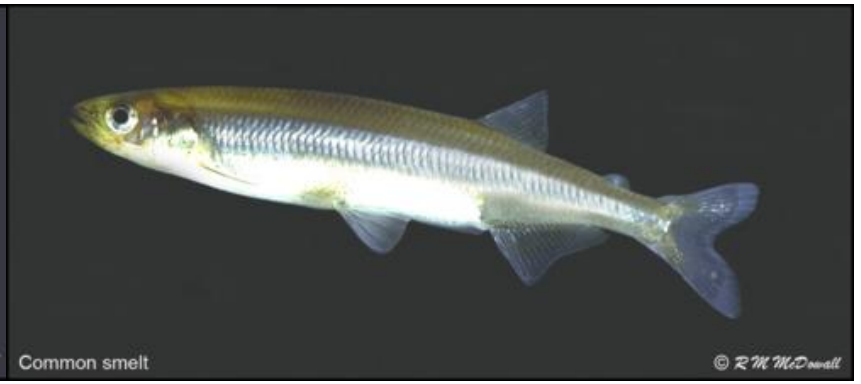
Retropinna retropinna (common smelt), Aldrichetta forsteri (yelloweye mullet), Galaxias maculatus (inanga), Lake Waikauia

Anguilla australis (shortfin eel), Anguilla dieffenbachii (longfin eel), Gobiomorphus huttoni (redfin bully), Punakokowai Creek

Paratya curvirostris (freshwater shrimps), Punakokowai Creek



Map extent defines spatial search area.



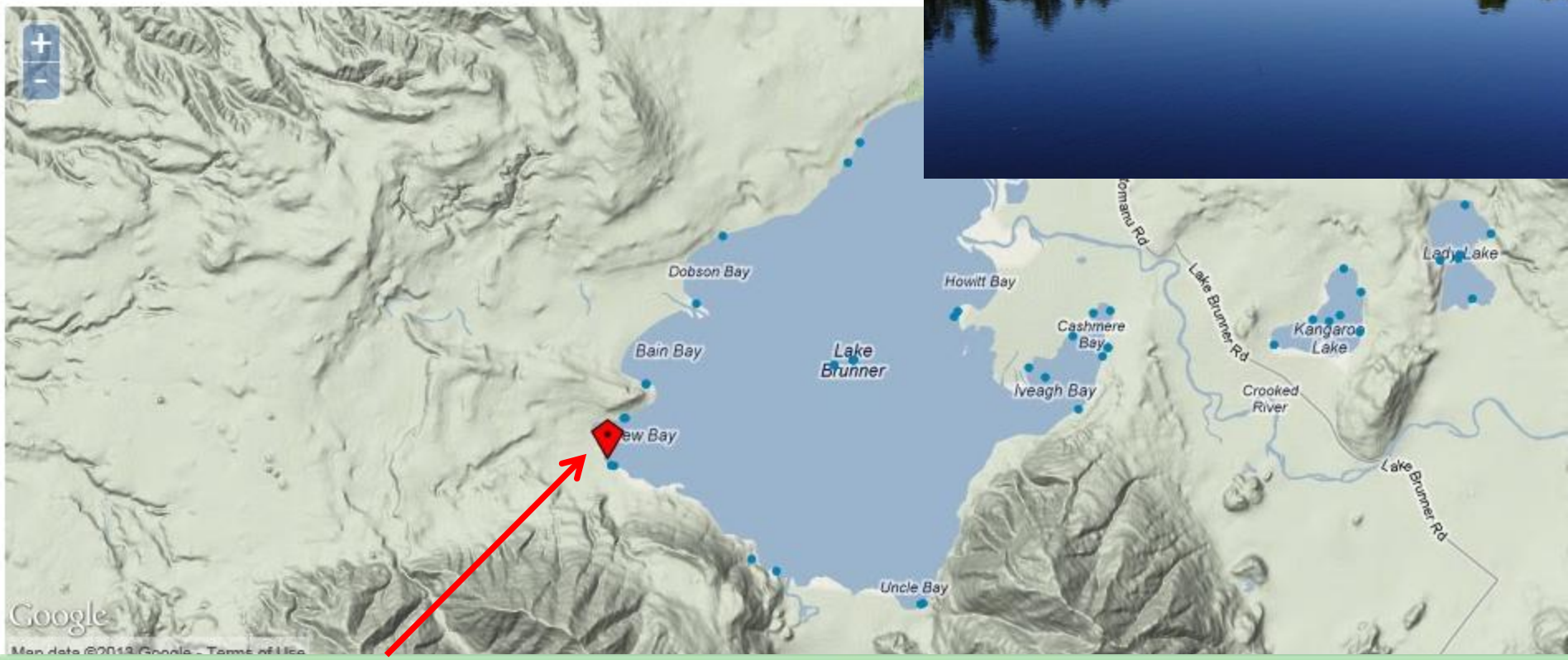
What: macrophyte

Where: Lake Brunner

Search

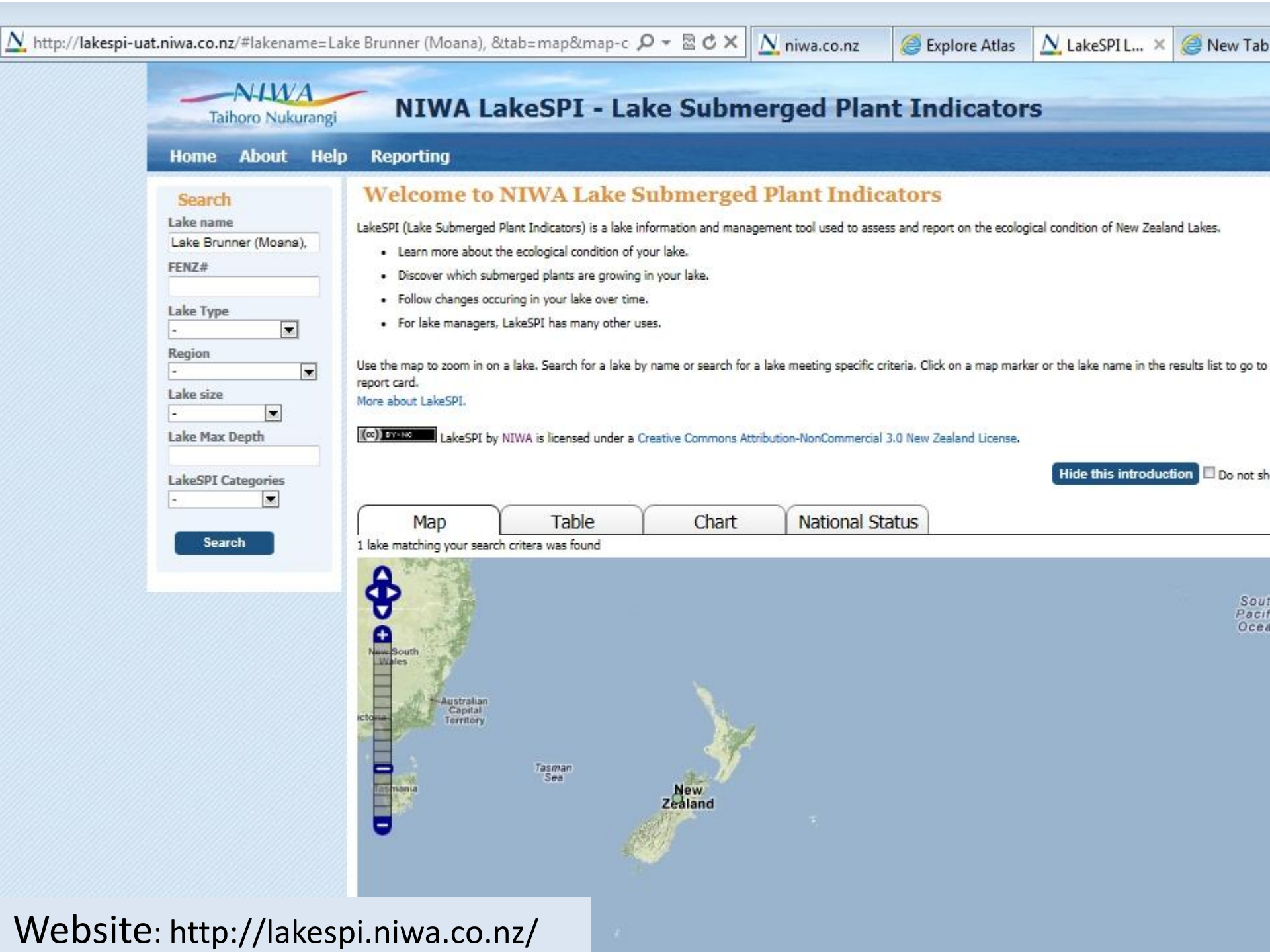
When: 1900-01-01 — 2013-05-15

Limit to date range



Nitella pseudoflabellata, Isoetes alpina, Juncus bulbosus, Lobelia perpusilla, Chara australis, Nitella sp. aff. cristata, Elodea canadensis (Canadian pondweed), Potamogeton ochreatus, Brunner Site 10 for Visit 4 using Site Co-ordinates

Ranunculus limosella, Lilaeopsis ruthiana, Isoetes alpina, Elatine gratioloides, Eleocharis pusilla, Ranunculus amphitrichus, Callitriche petriei sub sp. petriei, Nitella leonhardii, Myriophyllum propinquum, Ludwigia palustris, Nitella sp. aff. cristata, Elodea canadensis (Canadian pondweed), Chara fibrosa, Chara australis, Nitella pseudoflabellata, Lobelia perpusilla, Pilularia novae-hollandiae, Isolepis fluitans var. fluitans, Gratiola sexdentata, Brunner Carew Bay, 30 M West Of Boat Ramp



Website: http://lakespi.niwa.co.nz/

Taihoro Nukurangi

NIWA LakeSPI - Lake Submerged Plant Indicators

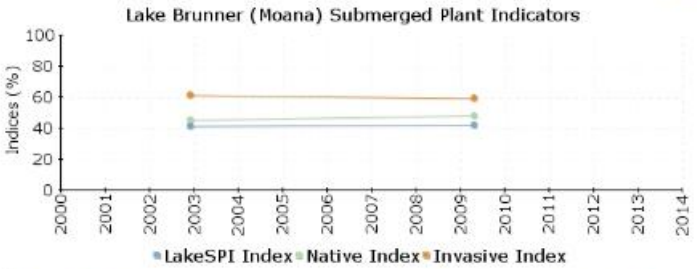
Lake Brunner (Moana)

LakeSPI Report Card - April 2009

Current Lake SPI Condition	Moderate
Maximum Depth	109.0m
Size	40.61km²
Lake Type	Glacial
FENZ#	38974

Tannin stained water. Sawdust common below a thin silt layer in areas where forest milling once occurred

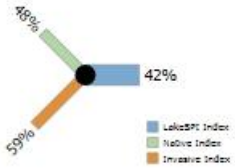
Show all indices



Survey Date	Status	LakeSPI %	Native Condition %	Invasive Impact %
April 2009	Moderate	42%	48%	59%
November 2002	Moderate	41%	45%	61%

April 2009

Moderate



Native Submerged Plants Present

- Turf community
- Isoetes
- Native Pondweeds
- Native Milfoils
- Charophyte species
- Charophyte meadow

Invasive Submerged Plants Present

- Elodea
- Potamogeton crispus

Submerged Plant Depths

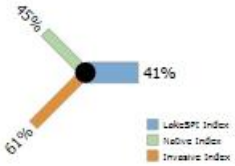
Maximum Depth (m) Submerged Aquatic Plants

Native	Invasive
7.2	5.7

Survey Notes

November 2002

Moderate



Native Submerged Plants Present

Invasive Submerged Plants Present

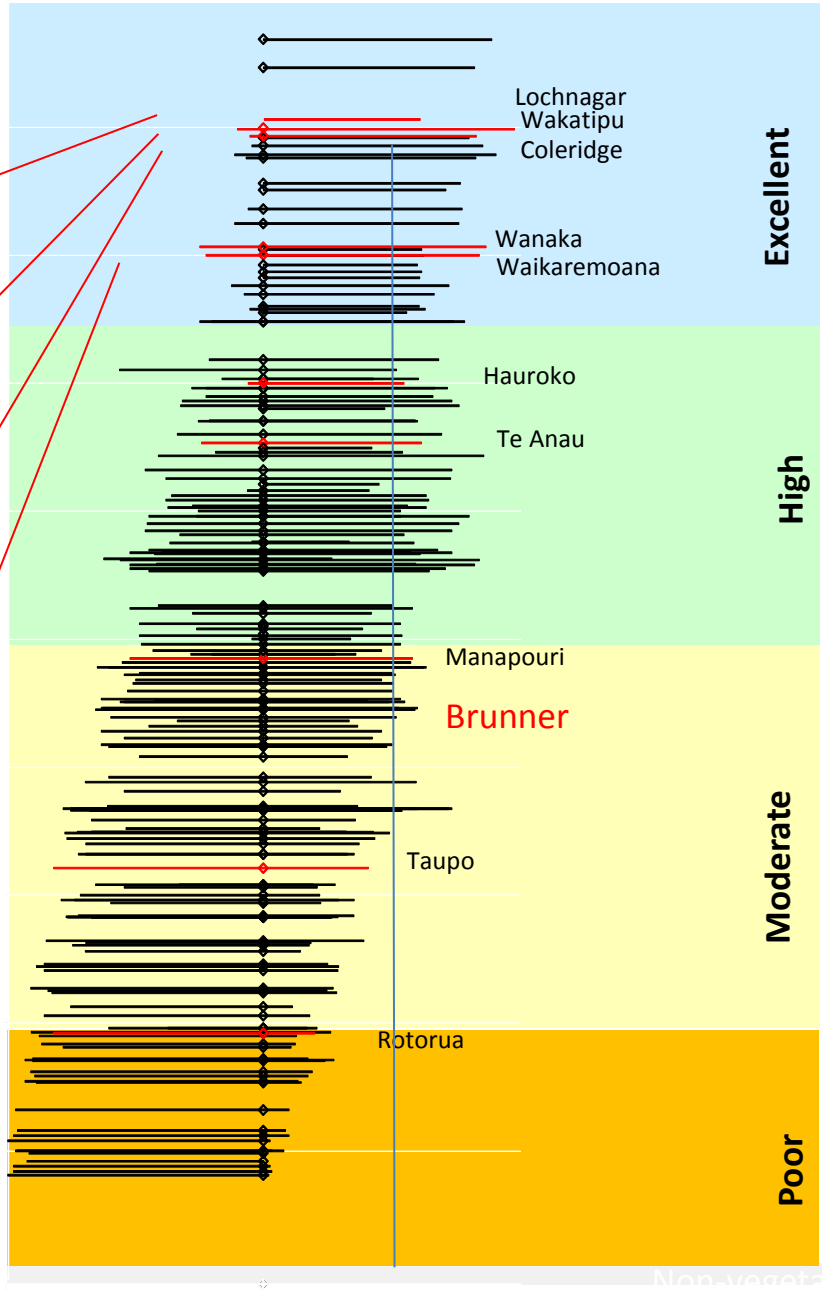
- Juncus bulbosus
- Elodea

Submerged Plant Depths

Maximum Depth (m) Submerged Aquatic Plants

Native	Invasive
7.5	5.9

Survey Notes



National status

http://www.niwa.co.nz/our-science/freshwater

niwa.co.nz | Explore Atlas | LakeSPI Lake Sub... | Freshwater an...

NIWA Taihoro Nukurangi

Staff Login | Media Centre | Careers with NIWA

Science | Services | News & Publications | Education & Training | Events | About

Home » Science » Freshwater and Estuaries

Freshwater and Estuaries

- Programme Overview
- Research Projects
- Our Services
- Management Tools
- Freshwater and Estuaries Update
- News
- Key Contacts

Freshwater and Estuaries

Robust science is critical in the sustainable management of our precious freshwater resources and estuarine environments.

The National Centre for Freshwater and Estuaries provides public information on river, lake, and groundwater conditions across New Zealand including water quantity and quality. It also acts as a distribution point for new technology and management tools for water -related issues.

Research Programmes

NIWA's Freshwater and Estuaries Centre organises its work around six research programmes. See the following pages to find out more about our research.

Publications for Water Managers

A set of references and links useful for Water Managers.

Waiology

Waiology is NIWA's freshwater science blog, covering hydrology, ecology, geomorphology and associated fields.

Featured Research Projects

Restoration of Aquatic Ecosystems
Freshwater monitoring and reporting
Mapping our freshwater biodiversity
Small waves in estuaries
Tidal creeks – connections between freshwater and saltwater
Sediments and mangroves
Staying ahead of water weed invasions
Fish Risk Assessment

Freshwater and Estuaries Update

A regular newsletter that includes a seasonal review and outlook for New Zealand's water resources, and an update on some of NIWA's freshwater and estuaries research .

You can subscribe here.

- Freshwater Update 57, April 2013
- Freshwater Update 56, January 2013
- Freshwater Update 55, October 2012
- Freshwater Update 54, July 2012
- Freshwater Update 53, May 2012

Are antifouling paints harming our sealife?

NIWA has recently completed a national project for modelling the leaching of copper from antifouling paints on vessels' hulls.

Read more

Latest News

Are antifouling paints harming our sealife?
Summer Series 4: Life in the (ex) stream - exploring New Zealand's fabulous freshwater fauna
New Study Measures Snowmelt into South Island Rivers
Recent studies reveal significant warming of the world's lakes
Project Matauranga

Free phone within New Zealand
0800 RING NIWA
0800 746 464

National Science Centres
Aquaculture
Coasts and Oceans
Fisheries
Atmosphere
Energy Solutions
Freshwater and
Climate
Environmental Information
Natural Hazards

Useful Links
Careers with NIWA
Media Centre
Site Map
Accessibility

Back to top
PRINT THIS PAGE

Website: http://www.niwa.co.nz/our science/freshwater/

How you got here

Click to see full navigation path to this section

Freshwater aquatic plants

- Resource Survey & Information
- Biodiversity services
- Biosecurity services
- Outreach
- News
- Team

Freshwater aquatic plants

Science Centres: Freshwater and Estuaries

The centre provides research, services and solutions spanning the spectrum of freshwater plant problems within New Zealand.

Resource survey & information systems

How aquatic plants are surveyed & what they can tell us, with database links.

Biodiversity services

Understanding biodiversity & ways to protect native flora.

Biosecurity services

Strengthening the lines of defence against weed invasions; from border, to battles for control.

Outreach

Aquatic plant overview, weed management options & freshwater plant ID guides.

News

The latest advances, collaborative initiatives & planned activities.

Team

Staff contact details & areas of interest.

Images

Freshwater and Estuaries

- Programme Overview
- Research Projects
- Our Services
- Management Tools
  - Restoration tools
  - Sediment Tools
  - Water Quality tools
  - Ecological monitoring
  - Identification guides and fact sheets
  - Biosecurity Tools
  - Publications for Water Managers
- Freshwater and Estuaries Update
- News
- Key Contacts

Freshwater and Estuaries - Management Tools

Science Centres: Freshwater and Estuaries

Some of the useful methods, guidelines and modelling tools we've developed to assist with management of freshwaters.

Restoration Tools

- Guide to restoring freshwater native fish in streams
- Answers to frequently asked questions on riparian management
- Riparian Management Classification
- Shallow Lakes Restoration Workshop
- more...

Sediment Tools

- Models to help manage erosion
- Setting turbidity levels for riverine fish
- Quorer for estimating deposited fine sediment
- more...

Water Quality Tools

- Analysis of water quality trends
- Water quality modelling
- New Zealand Guidelines for Constructed Wetland Treatment of Tile Drainage
- more...

Ecological Monitoring

- LakeSPI for monitoring lake health
- Stream Health Monitoring and Assessment Kit (SHMAK)
- Stream Periphyton Monitoring Manual

Freshwater ID guides

These guides are designed for rapid identification of freshwater flora and fauna for use in biomonitoring.

Biosecurity Tools

- Fish Risk Assessment Model
- Weed Risk Assesment

Publications for Water Managers

A set of references and links useful for Water Managers.

Freshwater and Estuaries

- Programme Overview
- Research Projects
- Our Services
- **Management Tools**
  - Restoration tools
  - Sediment Tools
  - Water Quality tools
  - Ecological monitoring
  - Identification guides and fact sheets
  - **Biosecurity Tools**
    - Fish Risk Assessment Model
    - **Weed risk assessment**
  - Publications for Water Managers
- Freshwater and Estuaries Update
- News
- Key Contacts

Weed risk assessment

Science Centres: Freshwater and Estuaries

NIWA has developed a model to assess the potential weed risk of aquatic plants. The key variables evaluated in the model are

- invasiveness (the ability to establish and displace other plants),
- potential geographic distribution, and;
- extent of potential impacts.

Invasive attributes include habitat versatility (sensitivity to temperature, salinity, substrate, flow and water depth), competitive ability compared with other species, and effective dispersal measured as a combination of reproductive output and mechanisms of spread. Potential distribution depends on availability of suitable habitat. Impacts include damage to natural ecosystems, changes to biodiversity, obstruction of water uses, and resistance to management activities.

Reports and papers

- Weed risk model
- Weed risk assessment
- Weed risk management
- Champion, P.D.; Hofstra, D.E.; Clayton, J.S. (2010). Nipping aquatic plant invasions in the bud – weed risk assessment and the trade. Hydrobiologia 656: 167-172.

Applying the Model

The Aquatic Weed Risk Assessment Model (AWRAM) provides a robust and scientifically defensible decision support tool for managers. The Ministry for Primary Industries (formerly MAF) have used the results obtained for various weedy aquatic plants using AWRAM in their process to decide which species are managed under the Biosecurity Act. These include:

- Determining species prohibited entry into New Zealand, with eleven species not known to be present in New Zealand classified as Notifiable Organisms http://www.biosecurity.govt.nz/pests/registers/no
- Determining species that are managed nationally in eradication programmes under the National Interest Pest Response (NIPR) programme, with six aquatic species managed in this way http://www.biosecurity.govt.nz/pests/surv-mgmt/mgmt/prog/nipr
- Banning the propagation, sale and distribution of ornamental pond and aquarium plants under the National Pest Plant Accord (NPPA) with 30 aquatic plants currently managed http://www.biosecurity.govt.nz/nppa

These management actions assist New Zealand's biosecurity system by keeping risks offshore, prevents future impacts of high risk species and reduces the volume of plant propagules being spread around New Zealand.

Quick Guide to Free Floating Macrophytes

By Paul Champion and Paula Reeves

Key
Rare native plant
Native plant
Non-Invasive exotic plant
Invasive exotic plant

Plant a simple plate or thallus

Thallus furrowed longitudinally

→ *Ricciocarpus natans*

Thallus not furrowed longitudinally

Plant lacking roots → *Wolffia australiana*

Plant possessing roots

More than one root per plate

→ *Spirodela punctata*

One root per plate

→ *Lemna minor*

Plant with composite leaves or scales

Continued on page 2

NIWA's Web-based information key web addresses

http://www.niwa.co.nz/freshwater-and-estuaries/management-tools/identification-guides-and-fact-sheets/freshwater-pest-species

http://ei.niwa.co.nz/

http://lakespi.niwa.co.nz/

http://www.niwa.co.nz/our science/freshwater/

http://www.niwa.co.nz/freshwater-and-estuaries/programme-overview/freshwater-biosecurity

http://www.niwa.co.nz/our-science/aquatic-biodiversity-and-biosecurity/our-services/aquaticplants

Acknowledgements

- Thanks to all the freshwater biosecurity group at NIWA

- Funding received from DOC TFBIS

NIWA
Taihoro Nukurangi