

## Wetlands

### What is a wetland?

A wetland is a collective term for permanently or frequently wet land, shallow water and land-water margins. It is characterised by a natural ecosystem of plants and animals that are adapted to wet conditions. Wetlands can be found in many different places: estuaries, lake edges, farm depressions, river and stream banks, drains, and around geothermal surface features.

Damp lands without wetland plants, like temporary ponds, low-lying land with patches of rushes, or temporary watercourses, are not wetlands. They may however be good places to restore or convert into a wetland.

Wetland areas are useful in helping restore the Rotorua Lakes. This is because they

can filter nutrients like nitrogen and phosphorus from water before the water enters our lakes and streams. These nutrients feed algal growth, which degrades water quality.

Nitrogen and phosphorus enter waterways through groundwater, surface runoff, effluent and by direct application. Research shows that wetlands remove up to 90% of nitrate from the water by denitrification. Denitrification is where anaerobic bacteria convert the nitrogen in the water to nitrogen gas, which is then released into the atmosphere.

By reducing the amount of nitrogen going into the degraded lakes, algae levels and the risk of algal blooms are also lowered.

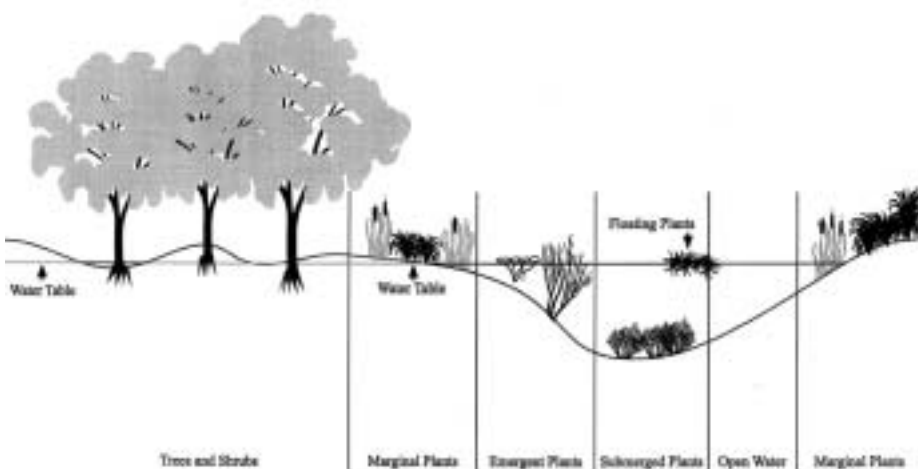
Wetlands maintain themselves, and are good for the environment generally. A large wetland is



A wetland in Lake Rotoma

### The Rotorua Lakes Problem

- Many of Rotorua's lakes have too many nutrients, caused by activities such as farming and residential settlement.
- These nutrients (nitrogen and phosphorus) feed algal growth, which degrades water quality.
- The Rotorua Lakes Protection and Restoration Action Programme is initially tackling water quality problems in five lakes in the Rotorua district
- Some long-term solutions focus on land management and include new wetlands, restricting nutrients "outflows" from properties, and changes in land use.
- More urgent solutions include sewerage reticulation, structures to divert flows, and the use of mineral products to lock up nutrients.



A wetland may have any one, or a combination, of these areas

being built at Lake Okaro and others are being considered for other lakes under the Rotorua Lakes Protection and Restoration Programme.

### Benefits from wetlands

#### Water absorption during wet periods

Wetlands soak up water like a sponge, lowering peak flows during a flood and reducing downstream erosion.

#### Water release during dry periods

Wetlands provide a more continuous water source, recharging streams and groundwater.

#### Stable banks

Stream edge wetland plants bind the soil under them, reducing bank erosion.

#### Sediment collection

Wetlands settle out sediment in surface flows from eroded patches, construction sites, tilled areas, farmland, and other land.

#### Water filter

Wetlands are a buffer between land uses and water bodies like lakes, rivers and streams. They are the “kidneys” of the landscape:

- They remove partly-combusted fuels (poly-aromatic hydrocarbons) in road runoff.
- They uptake and neutralise many toxins, heavy metals, pesticides and faecal microbes.



*Blackberry and willow infested wetland*

- They absorb dissolved nutrients and trap particulate nutrients e.g. phosphorus
- They oxygenate the water (healthier for instream fish and invertebrates).
- Bacteria around wetland plant roots convert up to 98% of nitrogen in the water into harmless nitrogen gas released to the atmosphere. This reduces algal blooms in waterways and keeps water healthy for stock to drink.

#### Aesthetically pleasing feature

Wetlands can enhance natural character and views. If a wetland is functioning well it can add market value to a property.

#### Home for rare and threatened native birds and plants, and a variety of insects

Wetlands are 2% of New Zealand’s land area but are home to 22% of native land bird species and 30% of native freshwater fish.

There are 47 separate species of rush and 72 species of native sedge. Many are threatened or endangered.

#### Cultural values

Many Maori value wetlands for traditional flax harvesting and fishing. Wetlands can also contribute to the character and heritage of an area.

#### Recreational and educational values

Wetlands can be used for fishing, shooting, bird watching, board walking, research, education and water sports.

#### Wildlife corridors

Wetlands are node points for travelling native species, like tui and giant kokopu. Wetlands are essential breeding and feeding grounds for many bird and fish species.

#### Loafing area

Many wild fowl prefer to congregate in wetlands which prevents fouling of reserves and grassed areas.

### What wetlands do not do

High nitrogen removal rates occur when water moves slowly and evenly through the wetland. Large water flows and channelised flows through the wetland do not provide the contact with organic rich soil and bacteria that help with nitrogen removal.

Because wetlands trap sediments, they will gradually “dry out” as mud flats and new soil is created. This is a natural process, but the higher the sediment load in water entering the wetland, the faster the wetland will fill up with



sediment. Therefore wetlands should not be used as a sediment trap, or to treat water flows with high sediment loads.

Dissolved phosphorus in water flows is not affected by wetlands, excluding a small amount absorbed by wetland plants. Constructed wetlands are used mainly as nitrogen-removal systems, and not for phosphorus removal.

### Threats to wetlands and their wildlife

- Plant and animal pest infestations like willows, blackberry, rats, cats and possums.
- Lowering or raising of the water table by building drains or stopbanks.
- Vegetation clearance by heavy machinery or herbicide sprays.
- Changing water volumes, speed, sources, timing,

or direction through the wetland.

- Too much sediment, nutrients or toxic substances entering the wetland. There is a limit to how much pollution a wetland can remove.
- Heavy stock that graze and trample wetland plants, compact and erode soil, increase nutrient levels, and promote the spread of weeds by opening up areas and carrying seeds in their hooves, coat or dung.

If you are unsure how an activity may damage a wetland, contact Environment Bay of Plenty for assistance.

### Creating and enhancing wetlands

Only three per cent of the original wetlands in the Bay of Plenty remain. As they are so rare yet so important for the environment, regional rules restrict any

activities that will harm or destroy a wetland.

Construction, maintenance or enhancement of a wetland is promoted.

Many enhancement works can be done as of right, but some may need a wetland management agreement or consent from Environment Bay of Plenty.

If you are intending to do some works that will affect a wetland, contact an environmental planner at Environment Bay of Plenty who will guide you through the relevant rules and processes.

### Constructed wetlands

New wetland areas can be created for a number of reasons: waterfowl habitat, nutrient stripping, landscape enhancement and/or a more constant water supply. Some wetlands are created to remove nitrogen from farm runoff, streams, sediment and plant material.

### Features that make a constructed wetland an effective nutrient removal system

- The water speed through the wetland is slow and spreads throughout the whole wetland area. Sediment settles out, and the water has time for proper treatment.
- Close contact between water, soil, plants, and microbial biofilms. The bacteria transform ammonia and nitrate (different forms of nitrogen) into nitrogen gas that is released to the atmosphere (denitrification).



Wetland at Lake Okareka

Having oxygen-rich and oxygen-poor micro-environments close to each other that promote nitrogen transformation.

- High plant productivity. The dense wetland plants take up nutrients and when dead, they provide organic matter to fuel the bacteria that transform nitrogen into nitrogen gas.
- Wetland plants have internal ventilation systems – “snorkels” – their stems transport oxygen down into the root zone and vent respiratory gases.

### Assistance to establish or restore wetland areas

Environment Bay of Plenty land management staff provide a free advisory service for landowners who want to construct or restore wetlands. Many private wetlands are managed through the Environmental Programme property plan approach – a partnership between Environment Bay of Plenty and each individual landowner to promote sustainable farm management and reduced nutrient inputs to waterways.

Grants are available to cover some or all of the costs of wetland construction, fencing, pest removal and related works.

Design advice is also available on how to best construct the wetland for its intended purpose. Wetlands can be registered and covenanted under the Queen Elizabeth II National Trust or

Nga Whenua Rahui to protect them in perpetuity.

For information contact the Department of Conservation or visit [www.nationaltrust.org.nz](http://www.nationaltrust.org.nz).

### Sources of further information

Wetlands can be constructed around water bodies like streams and ponds, in low-lying damp areas to intercept farm runoff, or a large flat area to treat a stream flow. If you are interested in establishing a constructed wetland on your property, contact an Environment Bay of Plenty land management officer on freephone 0800 ENV BOP (0800 368 267). You can also visit our website: [www.envbop.govt.nz](http://www.envbop.govt.nz)

For further reading, try Environment Waikato’s Wetland fact sheets:

- Wetland fact sheet #1: Wetland Restoration
- Wetland fact sheet #2: Wetland Wildlife
- Wetland fact sheet #3: Wetland Planting Guide
- Wetland fact sheet #4: Wetland Restoration – Information and Contacts
- Wetland fact sheet #5: Wetland Restoration – Case Studies

These fact sheets are free on request from Environment Waikato. Their website also contains useful information: [www.ew.govt.nz](http://www.ew.govt.nz).

Be aware that some of the content may not be applicable to the Bay of Plenty region. Fish & Game (Eastern Region) Council

can offer information on how to design wetlands for fishing and game bird hunting opportunities. The Department of Conservation (Bay of Plenty Conservancy) can help with information on appropriate native species for a wetland site. Other local conservation groups may also give some ideas.

### More technical research

Tanner, Chris; Kloosterman, Vivian. (1997) *Guidelines for Constructed Wetland Treatment of Farm Dairy Wastewaters in New Zealand*. NIWA Science and Technology Series No. 48, June 1997.

Gibbs, M.M.; Lusby, F.E. (1996). *Lake Edge Wetlands: Their environmental significance to the Rotorua lakes*. NIWA Consultancy report BPR005/2, June 1996. Available from Environment Bay of Plenty.

Tanner, Chris. (2003) *Constructed wetland treatment of streams flowing into Lakes Rotoehu and Okaro – Preliminary assessment*. NIWA Project BOP03210, April 2003. Available from Environment Bay of Plenty.

For further information and advice, contact your local soil conservator at Environment Bay of Plenty:

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