MARLBOROUGH
DISTRICT COUNCIL

YOUR WETLAND

A GUIDE TO WETLAND RESTORATION

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Your Wetland.

A GUIDE TO WETLAND RESTORATION




What is a wetland?

The term wetland covers habitats where the land is covered in, or wetted by, water for most (but not necessarily all) of the time. Wetlands occur in areas where surface water collects or where groundwater seeps through to the surface. They include swamps, bogs, estuaries, coastal wetlands, lakes and some river edges.

Why are wetlands important?

Wetlands were once considered useless wastelands and often used as waste disposal sites or seen as 'potential pasture'. Today however, we recognize that they are important and hugely diverse ecosystems – and that conserving and restoring them benefits not only wetland species, but also many other aspects of our environment and way of life.

A giant 'sponge'

Wetlands act as a giant sponge, helping to control water flow and water quality. Their plants slow the flow of water off from the land when it rains. In summer, stored water is slowly released from wetlands, maintaining water flow.

Cleansing the system

Bacteria in wetlands' damp soil contribute to cleaner water by absorbing and breaking down about 90% of the nitrogen contained in farm run-off (such as fertilizers, chemicals and animal wastes). This cleaner water prevents nuisance algal blooms and is better for stock. Plants also trap waterborne sediment, preventing silt entering streams and harbours.

A food source

Wetlands are the most productive places on Earth, providing an enormous food source for fish, birds and other animals. They absorb large amounts of water and nutrients from outside sources, and their micro-organisms (fungi and bacteria) efficiently decompose and recycle nutrients.

A cultural treasure

Wetlands are also important to Maori, featuring in the history and culture of our local iwi. Wetland plants, including, Harakeke (flax) and Raupo, are traditionally used for clothing, mats, medicine and dyes. Tuna (eels) and other wetland animals are a valuable source of food.

Rarangi Beach ridge wetland

A refuge for wildlife

Wetlands now cover less than 2% of New Zealand's land area, but are home to 22% of our native land bird species. Wetlands support an immense variety of animals, some of which are very rare. Most of New Zealand's wetland animals are not found anywhere else in the world. They include fernbirds, scaup, paradise shelducks, and giant kokopu.

Unique plant communities

Many of our wetland plant species are also not found anywhere else in the world. If wetlands are drained, and these unique plant communities are lost, they will be gone forever.

Para wetland

Wetlands in Marlborough

The Marlborough of today is more renowned for its dry hills than its wetlands. Hot dry summers and parched landscapes come to mind when most people think of Marlborough. However, if we could turn back the clock and go back to the 1840's things would be different. Very large areas of wetlands were once found in the lowlands of Marlborough, particularly around the Blenheim area. In those days Blenheim was known as Beavertown, and travel across the Wairau Plain was an arduous journey during the winter.

The wetlands have now been almost eliminated with approximately 1 % of the original freshwater wetland area remaining on the Wairau Plain. This means that each and every one of our remaining wetlands is worthy of protection and restoration.

The Marlborough Region has 5 main types of remaining wetlands.

- Swamps
- Fens
- Lakes, Tarns and Ponds
- Coastal/Estuarine wetlands
- Faultline associated wetlands

Swamps

Swamps are wetlands that have water flowing through them and have water levels that fluctuate seasonally. The water flowing through them brings silt and organic matter into the swamp making them fertile areas.

Typical swamp plants include Harakeke (flax), Raupo and Purei (carex). The organic matter

these plants produce encourages large populations of aquatic invertebrates including insects, water-snails, crustaceans and worms and vertebrates such as birds and fish.

Fens

Fens are wetlands that predominately receive inputs of water and nutrients from groundwater. Water levels are relatively constant with slow to moderate flow. Fen vegetation is often composed of sedges, tussock grasses and scrub.

Lakes, Tarns and Ponds

Lakes, tarns and ponds are permanent areas of open freshwater. Open water areas with shallow margins surrounded by swamp vegetation provide ideal habitat for waterfowl. Lakes are natural areas of open water. Tarns are small areas lakes occupying glacially formed depressions. Ponds are man made wetlands, with the majority of the area in open water.

Coastal/Estuarine wetlands

Estuaries and coastal wetlands are the most productive of all wetlands, and are especially rich in animal life. Many coastal fish, such as flounder, depend on estuaries as fish spawning grounds.

Faultline associated wetlands

Marlborough is notable for the earthquake faultlines that run through it, in particular the Wairau (Alpine), Awatere and Clarence Faults. Associated with these faults are a series of wetlands. The movement along these faultlines turns rock into clay. Water moving slowly through the soil cannot get past the clay and is forced to the surface where it forms a wetland upstream of the faultline.

Other wetlands types in Marlborough

Beach ridge wetlands around Rarangi are a rare feature found in Marlborough. These beach ridge wetlands are unique within Marlborough and a rare landform in New Zealand, and are not common on a global scale.

Bogs are wetlands that are only fed by rainfall and are therefore low in fertility and are acidic. Bogs are relatively rare in Marlborough. Marine formed wetlands found in the Marlborough Sounds are also a rare wetland type.

Why should I restore/create a wetland?

Wetland wildlife

Animals that can only live in wetlands face an uncertain future through loss of habitat. Many, like the bittern and giant kokopu, are now endangered. Conservation and restoration programmes provide the habitat these creatures need to ensure our wildlife survives into the future.

Bird	Habitat requirements
Spotless crake, marsh crake and bittern	These secretive birds feed in permanently shallow water under cover of dense raupo or flax. They build nests under sheltering sedges among stands of manuka.
Pied stilt	Pied stilts feed on worms and insects in temporary winter pools in paddocks, and nest in scattered clumps of rushes.
Scaup	Scaup prefer deep, open and clear water.
Mallard, grey duck, shoveler and grey teal	These birds prefer shallow water around the edges of a pond or lake. They need open water to moult in safety, away from predators.
Tui, bellbirds, and kereru	These birds visit wetlands at certain times to feed. Tui and bellbird feed on harakeke (flax). Kereru (wood pigeons) visit wetlands to feed on kahikatea fruit.

Wetland birds

The bigger and more diverse your wetland and those in your area, the more diverse the birdlife will be. The table below shows the kinds of habitat wetland birds need.

Fish

Many of New Zealand's native freshwater fish live in wetlands for some or all of their lives – such as short and long-finned eels, inanga, giant kokopu and banded kokopu. These fish also journey to and from the sea using a corridor of rivers, streams and drains. This watery pathway must be kept intact if they are to complete their life cycles successfully.

Whitebait

The juveniles of five of our native fish – banded, giant and short-jawed kokopu, inanga and koaro – are collectively known as 'whitebait'. Their eggs hatch in autumn and the larvae are washed out to sea. Six months later they make the hazardous return journey as juveniles.

Coastal wetlands within the tidal influence are important breeding sites for inanga. Most of the whitebait fishery catch in Marlborough is inanga.

Juvenile kokopu and koaro may migrate over 100 kilometres upstream, even climbing damp rocks beside steep waterfalls, until they reach sheltered streams and wetland habitats.

Insects and other creatures

Although birds are the most visible component of wetlands, other animals like invertebrates (such as insects), amphibians and reptiles (lizards, etc) also live there. Typical wetlands can have hundreds of normally unseen insect species.

Landscape

The landscape of Marlborough was once dominated by lowland wetlands. Creating a wetland can help to restore some of the natural character of the Marlborough landscape.

Plants

A number of wetland plants are now threatened. Species such as swamp nettle (Urtica linearifolia) and matt leaved mazus (Mazus novaezealandiae) would once have been widespread but are now limited in their distribution. There are currently less than 10 mature kahikatea remaining on the Wairau Plain ,where they once would have been very common.

Raupo wetland margin

How do I restore a wetland?

Keep all wetland restoration work as simple as possible. Your goal is a wetland that takes care of itself with little effort from you.

The follow steps are a general guide for wetland restoration, focusing on swamps (estuaries and peat bogs will have different management needs). Each wetland is unique, so some steps may not be necessary in your situation. We recommend you seek professional help for detailed information and advice. There is a list of contacts available at the back of this guide.

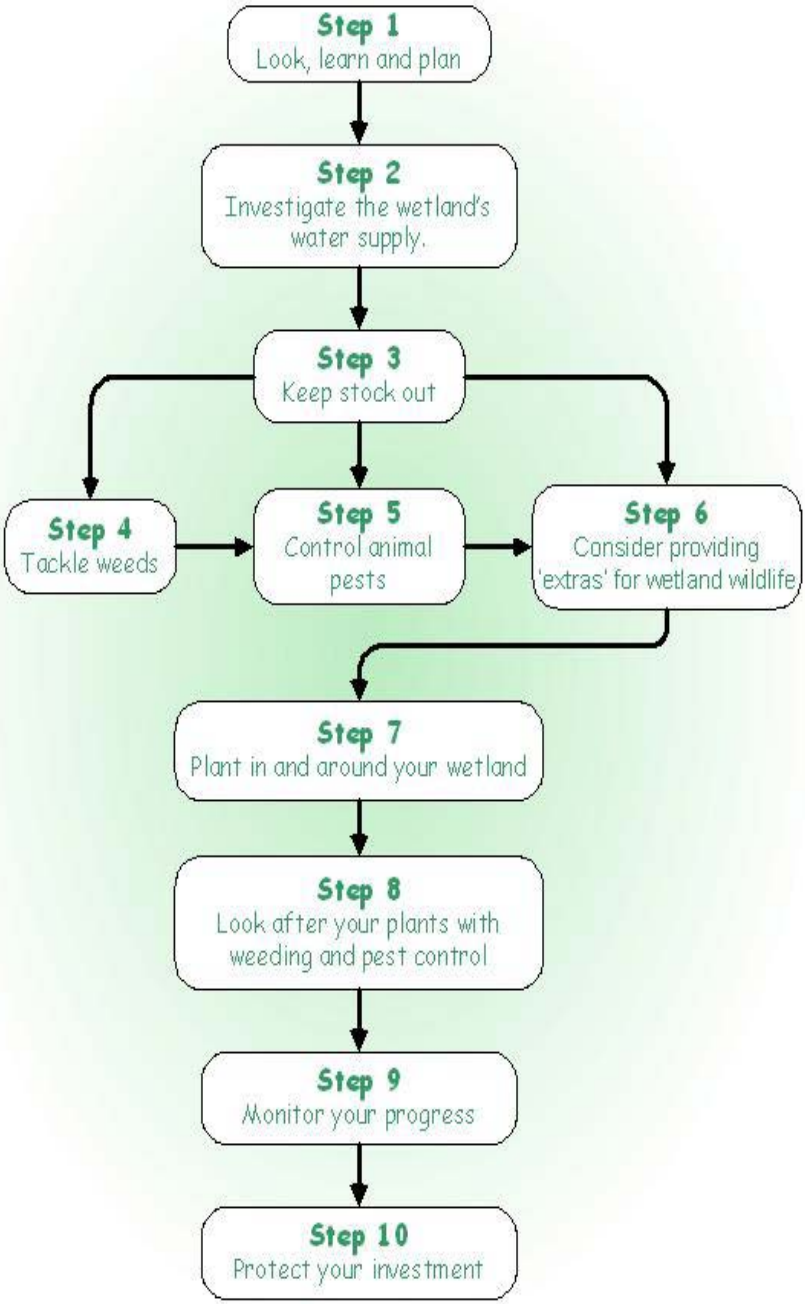
Look, learn and plan

Consider the wetland type, what you want to achieve and what suits your situation. Seek advice and take your time.

No two wetlands are alike – how they look, and the plants and animals they contain, will vary with local conditions (e.g. soils, climate and water flow). Larger wetlands may contain several different types of plant and animal communities, and all wetlands change with time.

Before you start restoring your wetland, develop a site plan and ask yourself:

- What effect will your activities have on neighbouring properties, both upstream and downstream?
- What was there originally?
- What's there now? Plan to protect and encourage any desirable plants first.


Step 1
Look, learn and plan
Step 2
Investigate the wetland's water supply.
Step 3
Keep stock out
Step 4
Tackle weeds
Step 5
Control animal pests
Step 6
Consider providing 'extras' for wetland wildlife
Step 7
Plant in and around your wetland
Step 8
Look after your plants with weeding and pest control
Step 9
Monitor your progress
Step 10
Protect your investment

What would you like to see in the future?

What are your aims? Erosion control? Wildlife? A water source?

How much time and what resources do you have?

Is a resource consent required?

Could you work with neighbours?

Seek advice and help

Talk to the Marlborough District Council and the groups listed at the back of this guide about your goals. They can advise you on what to plant and options for assisting with funding for restoration work.

Understand the water supply

Your wetland and its water

Wetlands are covered or soaked for at least part, and often all, of the year. They depend on a natural supply of water – from tidal flows, streams, flooding rivers, connections with groundwater, rainfall or a combination of these.

Bankhouse wetland

The water level in your wetland, and how much it fluctuates, will determine the plants and animals it can support. Before you even lift a spade, think about the source and amount of water, especially over the seasons. Use a 'depth marker' (such as a wooden post) to mark water levels at different times of the year, and use stakes to mark the edges of the winter water levels and summer water levels. This will help you decide if the water levels need to be managed, and what to plant and where.

A number of things can damage a wetland's natural cycle of flooding and drying. They happen at two key places:

At the 'wetland' level the water cycle can be affected by drainage (including the construction of drainage ditches) and filling and levelling low-lying areas.

At the 'catchment' level (i.e. the source of the wetland's water) the water cycle can be affected by fewer floods than normal, overusing water in streams and groundwater, and the drainage of nearby wetlands.

If your wetland has been partially drained, you'll probably need to increase its water levels by filling in or blocking ditches or drains. If there have been changes within the catchment you may need to increase water levels by building a low bund, weir or dam, or other earthworks. Before you make any changes to water levels or undertake any earthworks, contact the Marlborough District Council for information about resource consents, drainage management and fish passage requirements.

Should I create areas of open water

Creating ponds or areas of open water in an otherwise pondless wetland is commonly done with the intent of improving or "enhancing" wetlands. Ponds are typically created for aesthetic reasons – often to attract waterfowl. Although a shallow pond is a type of wetland, it does not follow that all wetlands should have ponds, or that a pond is always an enhancement.

In creating a pond in an existing pondless wetland you may lose other functions. Wetlands are formed through natural processes. Therefore, leaving your wetland pondless attains the greatest environmental benefit.

It's generally not a good idea to create areas of open water by excavating material out of existing wetlands or creating dams. Areas of open water can be difficult to keep free of nuisance weed and algae in summer, and dams can block fish access – and most native birds prefer swampy rushes and flax rather than deep, open water.

Avoid damming or excavating wetlands that have not been previously disturbed and that support native plants and animals. If you want to create open water make sure you create gently sloping, irregular shorelines. This allows birds, particularly waders,

chicks and ducklings, easy access to and from the water, and will extend the belt of reeds and rushes growing around the edge.

Note: You may require a resource consent for this work, so check with the Marlborough District Council first.

Keep stock out

Stock that venture into wetland areas are likely to increase the soil's nutrient levels, pug (compact) the soil, cause erosion, disturb the wildlife, and eat and trample wetland plants. Cattle in particular tend to gather near water and wade into it.

Fencing stock out will encourage plants to regenerate from natural seed sources and will prevent stock getting stuck. If you can, aim to exclude not just the wetland itself, but a buffer strip around it.

Keeping stock out of your wetlands doesn't necessarily mean that you need a full seven-wire fence around your wetland. A single wire electric fence may be suitable to prevent stock entering the wetland.

If you don't wish to keep stock out for the whole year – for example, if you want to keep surrounding plants cropped short for feeding waterfowl and pied stilt – it's better to graze a small number of sheep as they are less likely to enter water, pug soil, or ring-bark trees. The best time for light grazing is midsummer to mid-autumn, as your wetland will be drier and most bird breeding will be over.

Control the weeds

Weeds are one of the greatest threats to wetlands. In many cases, weed control will be the most important thing you can do to restore your wetland. If you're planning any planting, you must control weed species in and around the area first – and continue weed control once your planting is complete.

The first step is a weed audit, in which you use a map of the wetland to locate and identify weed infestations. The next step is to gather information on how to control the weed species. You can then decide where to start the weed control, and when – and remember, it may take several seasons to control a serious weed infestation.
You may find you need help from a specialist qualified to use herbicides in wetlands. Contact the Marlborough District Council's biosecurity officers for information on how to control wetland weeds.

Glyceria maxima is a serious wetland weed

Wandering willows

Willows were introduced to New Zealand for bank stability, shelterbelts and fodder. However, their dense growth can block stream flow and shade out native species. Crack willow and grey willow are particularly invasive – broken crack willow branches take root easily in muddy soils, and grey willows have tiny, windblown seeds. It is therefore recommended that willows be removed from wetlands.

Willows can be controlled in a number of ways – it is recommend that willow control be carried out by poisoning prior to any form of removal. This prevents any regrowth of branches etc that fall into the wetland. Contact the Marlborough District Council for more information on willow control through poisioning.

Helpful hints on weed control

When working with spades and machinery in weedy areas, wash them down before using them elsewhere to prevent weed spread.

Fence out stock to reduce the spread of weeds.

Barley straw reputedly inhibits algal growth and boosts aquatic insect life in slow-moving water. Two bales should keep around half a hectare of shallow, open water free of algae for six months. Either spread it out or anchor it in one position – eventually it will sink and decompose.

Control animal pests

A number of animals pose significant risks to wetland bird and plant life, for example: Possums, hedgehogs, stoats, weasels, ferrets, cats and rats all take birds eggs, and most will also eat chicks and adult birds.

Magpies are territorial and aggressive to native birds. Rabbits, hares and possums eat wetland plants.

Dogs may harass wetland birds (note: high-tensile net fencing will discourage dogs from entering the wetland and provide more incentive for birds to nest).

Pukeko can also pose a problem. Although a native to New Zealand and a natural part of a wetland ecosystem, they can nibble on and uproot newly planted seedlings. To deter them, use large and heavy potted plants. Alternatively, try placing a hedge of short sticks around the plants, or use plant protectors.

Animal pest control will enhance bird life in your wetland and protect young plants. Contact the Biosecurity Section of Marlborough District Council for practical information on the best animal pest control methods for your situation.

Provide 'extras' for wildlife

Extras for birds

As well as providing the basics for birds (water and shelter), you can provide a number of 'extras' that will make your wetland a highly desirable home:

Provide logs and trees in the water as well as on the banks for perching sites and shelter.
During the breeding season (September to December for most species), either stop, or significantly reduce, grazing and other activities – birds are particularly sensitive to disturbance at this time. If your wetland is near a block of native bush or another wetland, consider linking them with a 'green corridor' of native plants.

Extras for fish

If your wetland is connected to a stream (or streams) at least 10 centimetres deep – it should be accessible to most native freshwater fish. Long stretches of fast-flowing or polluted water and overhanging culverts can act as impassable barriers and stop fish getting to your wetland. Logs and branches in the water also provide places for native fish to hide.

Native fish also need streams with fairly clear water, shading and cover. Muddy water limits their vision and reduces their food supply of aquatic insects.

Goldfish and other introduced species should not be placed in wetlands as they compete with other species and can become a pest.

Help fish find your wetland using the tips below:

Plant overhanging species like flax and carex for shelter and to keep the water cool.

When clearing drains, leave one side or parts of it untouched, until plants have grown back.

If putting culverts in streams, set them below the current streambed level to allow rocks and gravel to accumulate in the bottom of the culvert. The roughened bottom slows the water flow, providing habitat and ensuring fish passage is maintained.

Note: You may require a resource consent for this work, so check with the Marlborough District Council first.

Carex secta

Start planting

Prepare a planting plan

When you're ready to plant your wetland, divide it into three plant zones:

Moist soils that flood infrequently.

Wet soils, with temporary flooding.

Standing water/water margin.

Identify any desirable plants you already have in each zone, and list the plants you can use in each, taking into account wind and drainage.

The following table includes a small sample of potential species. Not all will be suitable for your area or situation – coastal and upland areas, in particular, have their own species associations.

Note: A more comprehensive list of suitable species for planting in wetlands is available from the Department of Conservation or the Marlborough District Council.

Zone 1: Moist soils. Flood infrequently	Zone 2: Wet soils. Temporary flooding.	Zone 3:Water margin. Standing water
Manuka: Fast-growing, hardy pioneer, useful as a nurse crop. Good erosion control, can grow on a wide range of soils. Grow from seed. Makomako (wineberry): Fast growing cover plant. Slightly frost tender and favoured by possums. Grow from cuttings or seeds. Kowhai: Fast growing semi-deciduous. Possum hardy. Grown from seed or cuttings	Toetoe (not to be confused with pampas): Suitable for damp and dry soils - can grow on poor soils. Rats and stoats can inhabit dense stands. Harakeke (flax): Fast-growing, hardy plant. Withstands five centimetres of water, flooding and dry soils. Unpalatable to possums. Easily split into small fans or grown from seed. Attracts tui and bellbird. Ti kouka (cabbage tree): Tolerates wet and dry soils. Rabbits eat young plants. Can be grown from seed. Hardy. Good erosion control.	Kapungawha (Lake Clubrush): Grows in fertile water up to 0.8 metres deep, tolerates salt water. Wildlife shelter. Best grown from division although will also grow from seed. Purei (Carex secta): Grows in shallow water, boggy margins and dry soil. Shelter and nesting for ground birds. Can be split or grown from seed. Manihi (Potamogeton cheesemanii): Grows in water up to 4m deep. Bottom rooted with floating leaves. Wildlife values.

It's a good idea to buy your plants from nurseries that source plants from your district. This will ensure they're suited to your climate and soils.

You may also be able to grow some of the plants you need from seeds or cuttings taken from neighbouring wetlands. Make sure you get your neighbours' permission first. Keep use of cuttings to a minimum and take them from a large number of parent plants, to ensure a good genetic mix and that you have male and female plants.

Timing

In wet areas, around the water's edge and in shallow water, plant in summer when water levels are low and the water is warm. Otherwise, plant hardy, frost-tolerant species in autumn and frost-sensitive species in spring. Plants that need shelter or shade can be planted one to two years later, once cover has developed.

Site preparation

Clear a one-metre circle around each planting spot with a spade or a herbicide to prevent competition from grass and weeds. This will make sure your plants get enough light and nutrients.

Planting

Remember, native plants don't tolerate grazing by stock – protect your investment by keeping stock out.

When planting:

Choose sites suitable to each plant's growing requirements, leaving space for them to grow. Ferns, rushes and small sedges can be planted three per square metre. Larger plants need more room. Remember that native plants prefer to be planted in close groups rather than out on their own.

Dig a hole twice the size of the plant container, leaving some soft soil at the bottom. Set the plant in the hole, gradually fill in the soil, compacting it to remove air gaps.

If you're planting on dry sites around the edge of your wetland, form a hollow around the plant's base to trap rainfall.

Give the plants and surrounding soil a good watering. Water young plants over dry spells. In very wet soil, plant nursery grown plants on a small (e.g. 30 cm high) mound to give their roots time to

Cabbage tree

Staking the plants at this stage will make them easier to find later. Tall, thin bamboo stakes highlighted with spray paint are ideal.

Looking after your plants

Weeds can overwhelm your plants in the first one to three years, and smothering by tall grass is the most common cause of planting failure.

It's important to maintain your plants during this time by clearing the weeds around them. You can weed by hand, or with a grubber or herbicide – and save further weeding by mulching or using mats (eg. non-rubberised carpet underlay) that eventually decompose. Pests such as rabbits and possums should also be controlled, particularly during the plants' seedling stage.

Once the plants have grown tall enough, they will begin to shade out grasses and aquatic weeds and will no longer need weed control. After three years your plantings should take care of themselves. Overhanging trees and plants will provide shade and trap any run-off from the surrounding catchment.

Herbicides

You can greatly reduce the need for manual weeding if you use glyphosate herbicide (we don't recommend long-lasting residual herbicides, as they remain toxic to plants three to four months after application). Remember that chemicals are transported rapidly through water, making wetlands more sensitive to pollution and herbicides. Care needs to be taken when spraying as plants such as kowhai can be very sensitive to sprays.

If you have to use spray the best time is late summer when water levels are low and most nesting and flowering have taken place.

Note: If you want to apply herbicide to aquatic weeds or over water, you will need to get consent from the Marlborough District Council.

More planting tips

The best time to plant in Zones 2 and 3 is summer when the water levels are at their lowest.

To ensure your plants have a good chance of survival, use larger potted plants. When planting the dry edges of wetlands, use a mulch at least 10 centimetres deep. This can be untreated wood chips, compost, cardboard, or rotted hay. It will help to conserve water from evaporation, keep weeds down and add nutrients. Alternatively, leave a low grass cover around the plants for the first summer (until March) to help conserve water.

Use fast-growing species such as manuka as nurse plants to provide shade for seedlings underneath.

Monitor your progress

Make sure you maintain an ongoing programme of weed and pest control, and keep a photographic record and a diary of progress. This will help you learn what works and what doesn't and make changes as necessary. It will also be a record to show you how much you have achieved. Meet with other people who are restoring wetlands and share information and lessons learnt.

Protect your investment

You can protect your investment of time and energy by placing a covenant on the site. This means you or subsequent owners retain ownership and control, but the wetland is protected forever.

Grovetown Lagoon

Contacts for more information

Marlborough District Council

Resource Consents.

You may need a resource consent for your wetland restoration activities. To check, phone 03 520 7400 or call into the councils main administration building in Seymour Street, and ask to speak to the duty planner.

Plant and Animal Pest Control.

For information on plant and animal pest control, phone
03 520 7400 or call into the councils main administration building in Seymour Street, and ask to speak to a biosecurity officer.

Plants species and planting guides.

For information on plant species and to obtain planting or landscape guidelines, phone 03 520 7400 or call into the councils main administration building in Seymour Street, and ask to speak to a reserves officer.

Wetland Wildlife.

For information on plant species and to obtain planting or landscape guidelines, phone 03 520 7400 or call into the councils main administration building in Seymour Street, and ask to speak to an Environmental Scientist.

QEII National Trust

The QEII National Trust helps private landowners protect areas of bush and wetland on their property by using covenants. For more information, visit www.nationaltrust.org.nz or phone 0508 732 878.

Fish and Game New Zealand, Nelson/Marlborough Region

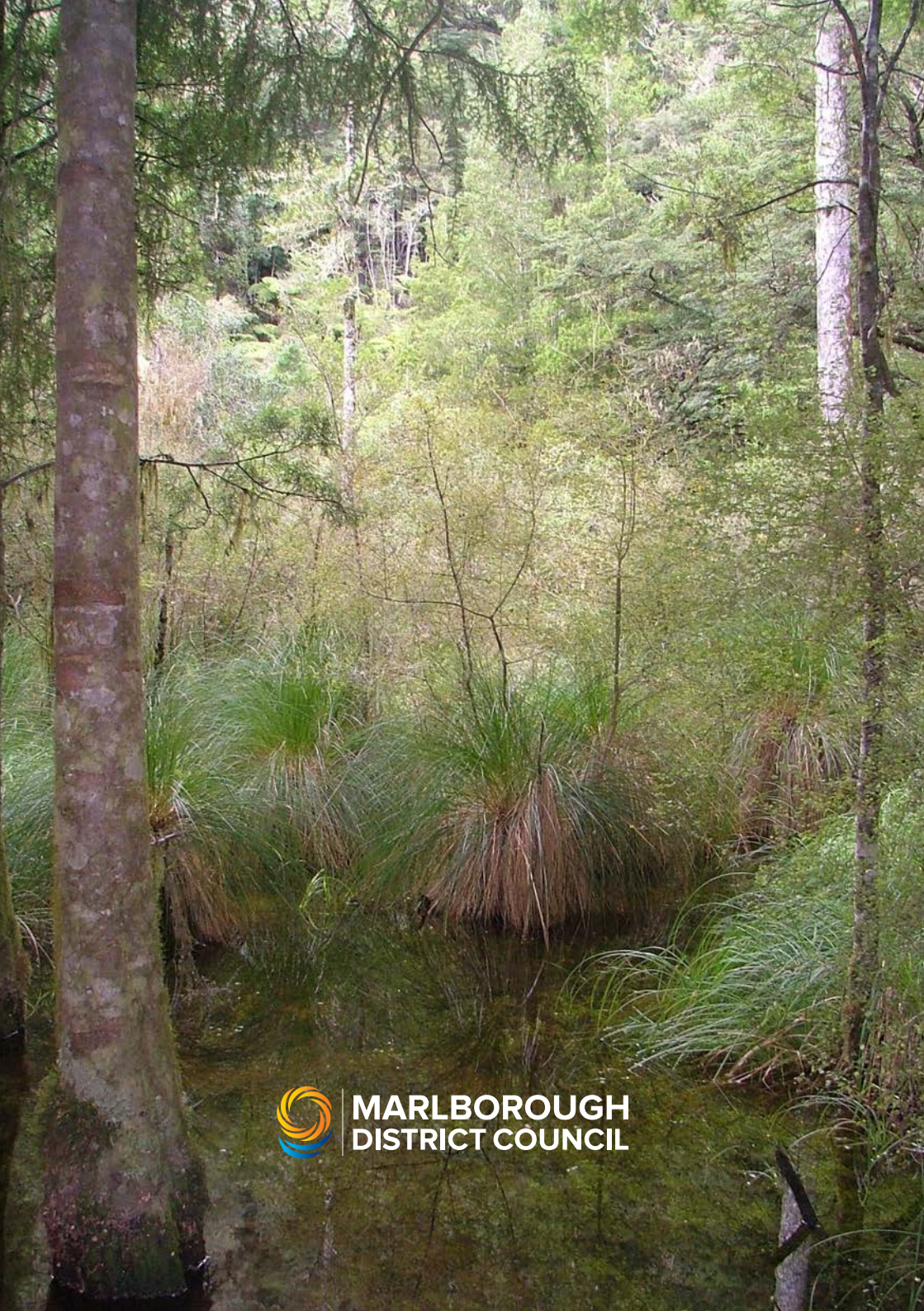
Fish and Game New Zealand provides specialist advice and support for landowners seeking to enhance wetlands or develop farm ponds for game bird habitat. Funding may be available and approved projects can receive up to 50% financial support. For more information, visit www.fishandgame.org.nz or phone 03 544 6382.

Department of Conservation

Department of Conservation (DoC) staff can provide advice on how to identify, maintain, protect, and where necessary, enhance conservation values. Contact your local area office. South Marlborough (03) 572 9100, Sounds (03) 520 3002 or Check out DoC's website www.doc.govt.nz.

New Zealand Landcare Trust

The New Zealand Landcare Trust helps with community group projects and may be able to provide funding. For more information, visit www.landcare.org.nz or phone 0508 526 322.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