APRIL 2004

Fensham wetland monitoring guidelines

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Fensham wetland monitoring guidelines

The Fensham Group
Melanie Dixon, Greater Wellington Regional Council

The Fensham Group receives support and assistance from Greater Wellington under the 'Take Care – Environmental Programme' to restore Fensham Wetland, west of Carterton.

These guidelines were prepared by the Fensham Group and Melanie Dixon (Greater Wellington)

Contents

1. Introduction

1.1 Purpose of the monitoring guidelines

These guidelines provide the framework for all monitoring at Fensham Wetland.

The guidelines will be updated as more is learned about wetland monitoring techniques and what works best at Fensham Wetland.

1.2 Aim of the monitoring programme

The vision the Group have for Fensham Wetland is to:

Restore the wetland to a sustainable natural state. (Fensham Wetland Restoration Plan, 2001).

The aim of the monitoring programme is to help the group meet achieve this vision. Wetlands are complex systems to restore - monitoring provides vital feedback on what's and what isn't.

Monitoring allows us to spot mistakes and learn from them.

1.3 An annual written monitoring report and monitoring meeting

Once a year all the monitoring information should be compiled into one report, with all of the raw data in appendices. This is scheduled for the **2nd Tuesday in March.** Changes can be made to the next season's work plan if necessary.

Note: The monitoring report needs a concise one page summary for circulation amongst the group.

1.4 What skills are needed?

All data can be presented in hand-written reports with diagrams on graph paper. However it would be quicker and easier to use computer programmes such as Word and Excel to draw up graphs and write up results.

The skills needed are:

- basic data analysis;
- data management (making sure information is recorded and data not lost);
- specialist plant identification skills

In the future the group may wish to gain the following additional skills:

- bird ID skills;
- invertebrate ID skills

2. What to monitor

2.1 Fauna monitoring

2.1.1 Mudfish population

Why monitor? The presence of brown mudfish (*Neochana apoda*), a nationally threatened species, is part of what makes Fensham Wetland so important. The restoration of the wetland must encourage this population to thrive. Monitoring will show long term trends in population numbers.

How to monitor: There are six sites where unbaited traps are set overnight and the number of fish in the traps counted and measured the next morning. The sites are marked by posts.

How often? Traps are to be checked monthly from July to December.

What to do with the data?

Present data in Annual Report in February.

Forward data to DoC Wairarapa Office, for their information.

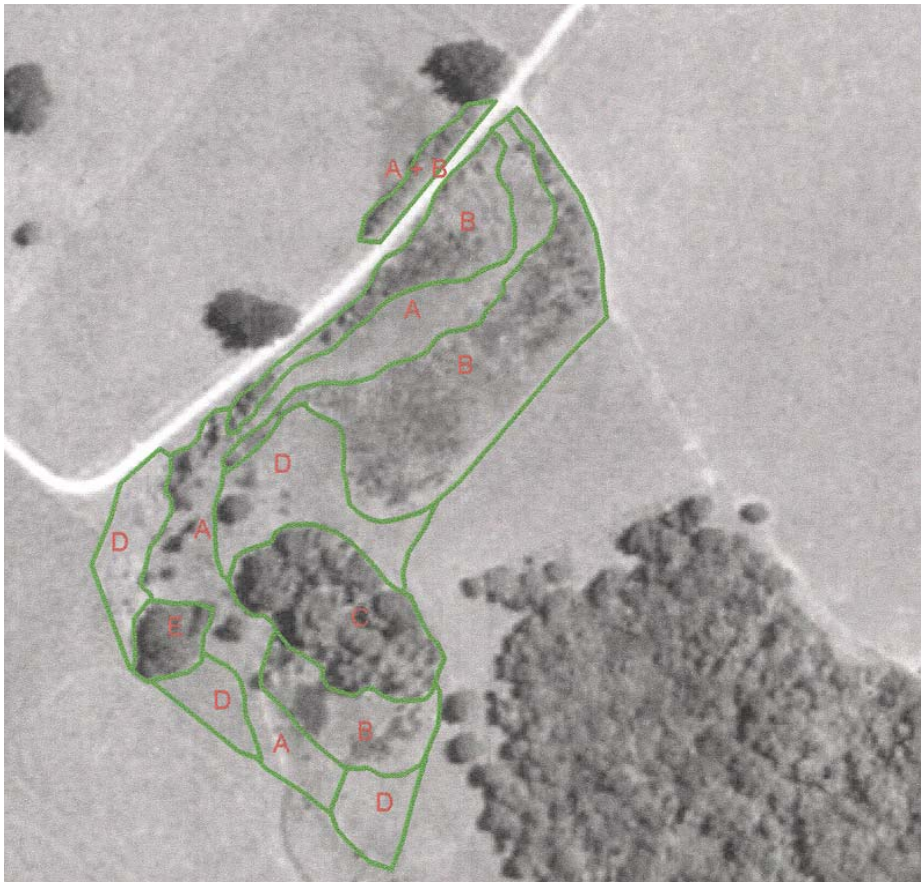
Check for trends in mudfish population. Get in contact with mudfish experts through the Department of Conservation if there is a decline in mudfish numbers.

2.2 Flora monitoring

2.2.1 Natural regeneration

Why Monitor? The approach taken in the Management Guidelines is to encourage native regeneration and only re-vegetate areas where there is no possible hope that the native vegetation will regenerate naturally. We need to monitor natural regeneration to know if and when to intervene and plant areas.

Background



The wetland has been divided into 4 main vegetation communities.

Zone A	blue sweetgrass-yorkshire fog grassland
Zone B	manuka/rush-sedge shrubland
Zone C	kahikatea-totara/*Carex* forest
Zone D	browntop-*Juncus* grassland

11 permanent vegetation-monitoring plots (quadrants) were set up in areas A-C in a baseline survey in February 2001. These were re-monitored February 2003.

How to monitor: Re-assess these quadrants by recording the species present and percentage cover using the Braun-Blanquet cover scale (see Appendix 3) Model field sheets for each area are attached in Appendix 4.

How often? The vegetation monitoring sites should be monitored biannually. Next planned monitoring is February 05.

What to do with the data? *Fensham Wetland Vegetation Monitoring (2003)* should be used as a guide as to how to present and analyse the data. Any new species found should be added to the species list.

2.2.2 Plant survival

Why monitor? As part of restoring Fensham Wetland, hundreds of plants are being planted. Zone A (that is, the area dominated by sweet grass) is a difficult area to get plants established. Monitoring how many plants survive in this area means we can work out what species work best and where, and in the long run save on planting effort and numbers of plants used.

How to monitor: Each time a plant is planted record the following:

- how many plants were planted;
- what species;
- what size (e.g. PB2)
- where;
- general comments (e.g. the health of the plants when planted, environmental conditions when planted (ie. water depth etc, who planted them).
- weed control (method and frequency).

Each January these plants should be checked to see how many have survived. The group may also need to detail plant maintenance if this differs between plantings. A plant survival monitoring form is attached in Appendix Five.

How often? All plantings should be monitored:

- when they are put in the ground; &
- In January

for at least 3 years.

What to do with the data? Summarise numbers of plants, where planted, how many survived annually. Make revised recommendations on species to use etc. for next years planting programme if necessary.

2.2.3 Updating the Plant Species list and surveillance for pest species

Why Monitor: Maintaining an up-to-date record of species known to occur in the wetland adds to the broader knowledge of the site. Keeping an eye out for new species is also a good way to spot new weed infestations before they establish. The current species list is attached in Appendix 2.

How to monitor: Ad Hoc. Note new species when observed. Send samples to Greater Wellington if they cannot be ID'd.

What to do with the data: Update species list once per year. Get advice from Greater Wellington on the known 'weediness' of any new exotic plant found to decide whether to eradicate or monitor.

2.3 Water monitoring

2.3.1 Hydrological monitoring

Why monitor? Healthy, functioning wetlands dry out sometimes. Flood and drought are a normal and necessary part of the cycle of life in wetlands. In fact, the wetland's water regime is normally the primary influence on what vegetation communities a wetland will support. The main reason for monitoring wetland hydrology is to gain information about the water regime of the wetland. This information forms an important baseline for determining possible adverse effects resulting from human activity in and around the wetland, and provides a foundation for wetland management or restoration planning.

Background: You will need to record the water level in the wetland over a period of time in order to understand the pattern of the water regime. This includes measuring water depth above and below ground. Peizometers are used to measure water levels below ground, and staff gauges (installed in the deepest part of the wetland) are used to measure surface water levels.

How to monitor:

Groundwater: To measure the depth of water, use a weighted tape measure and lower it into the peizometer until it touches the water surface (you may need a torch to do this). Alternatively you can use a dipstick.

Measure and record the distance between the top of the pipe and the water surface. To calculate the depth of the water table below ground level, subtract the amount the pipe protrudes above ground level from this measurement. Record both measurements in the monitoring journal.

Surface water: Simply take a reading from the gauge plate.

Put all in this information in a monitoring journal and include comments about extreme weather events etc.

How often? Take measurements at least monthly (preferably fortnightly and more often extreme weather events).

What to do with the data?

The data should be plotted on a graph (with the date on the X axis and water levels on the Y). Note: You will need at least one year of data is needed before any real conclusions can be drawn. Answer questions such as:

- Does the maximum depth vary?
- How much does the water levels vary from year to year?
- Does this relate to change in species present?

2.3.2 Water quality monitoring

Fertility (that is, the availability of nutrients to plants for growth and reproduction) has a major influence on wetland plant communities. Wetlands are places where nutrients tend to accumulate. The consequence of nutrients accumulating in wetlands (a process known as eutrophication) is an increase in biomass (that is, the total amount of plant material) and a decrease in species richness. That is because high nutrient conditions favour highly competitive, fast growing, wetland plants. These plants are often (but not always) exotic.

The process of denitrification (bacteria breaking down nutrients) is working effectively in this wetland (see Warr, 2001). This means there is a nutrient gradient throughout the wetland.

Why Monitor? Nutrients come into the wetland from the surrounding catchment, generally from 'non-point sources' (that is, runoff from surrounding farm land). Monitoring will pick up any changes to management of the catchment that leads to a change in water levels.

What to monitor: Nitrate nitrogen and Dissolved Reactive Phosphorus are two good indicators of overall nutrient levels.

How to Monitor: There are two water quality monitoring points (see attached map). Either arrange with the water quality scientist based in Greater Wellington's Masterton Office to process the samples or contact a commercial laboratory. This will cost about $40 per site.

How often? Take samples twice per year. Once in the first week of December, and once in the last week of June.

What to do with the data? Compare water quality data with previous years, and between monitoring points.

2.4 Photographic monitoring

Photomonitoring (as opposed to random picture taking) is the photographing of a site from precise documented locations at specific times of the year.

Why Monitor? Photomonitoring will visually record the changes in the wetland over a period of time. By photographing at the same time of year, seasonal changes are eliminated from the documentation. A photographic record will also demonstrate how much has been achieved.

What to monitor: Photopoints are specific sites within the wetland where photographs are taken. Four photopoints have been identified (at the marker posts for A1, A3, and A3, and on the 'bridge')

How to Monitor: At each photopoint take 4 photographs, facing North, East, South , and West (take a compass, don't guess). Photographs need to be taken at the same time of year to allow realistic comparison. For this reason it's important to record details of the date and time photographs were taken. Repeat photographs should be taken at a similar time of day and under similar light conditions to minimise variation.

How often? Take photographs in February..

What to do with the data? Include photographs in the annual monitoring report.

3. Things to consider monitoring in the future

The following elements may be included in the monitoring programme in the future.

3.1 Invertebrate monitoring

The diversity and number of invertebrates is a good indicator of the progress of restoration projects. James Lambie (Greater Wellington, Wairarapa Office) is working on an invertebrate monitoring programme.

3.2 Bird counts

A baseline study would be needed first before birds could be added to the monitoring programme.

3.3 Pest monitoring

Monitoring pests as part of a pest control programme may be added to the monitoring programme in the future.

4. Monitoring and work calendar

Month	Task
January	**1. Record plant survival** 2. Record water levels: Watch for Zone A drying in preparation for planting when water levels drop. 3. Release plants and 'tidy' reserve.
February	**1. Meet second Tuesday to discuss preparation of monitoring report** **2. Prepare Annual Monitoring Report** **3. Vegetation monitoring (Biannual, next due 2005)** **4. Photomonitoring** 5. Record water levels
March	**1. Complete Annual Monitoring Report** 2. **Meet to discuss Annual Monitoring Report and any suggested changes to management** 3. Record water levels 4. Inspect Plantings 5. Undertake weed control (OMB, wandering willie, blackberry) 6. Collect *Carex* seed.
April	1. Working bees as required and notified 2. Record water levels 3. Plan for 'People's planting day' in August. 4. Collect seeds and seedlings
May	1. Working bees as required and notified 2. Record water levels 3. Plan for 'People's planting day' in August. 4. Collect seeds and seedlings
June	1. Working bees as required and notified 2. Record water levels 3. Plan for 'People's planting day' in August. 4. Collect seeds and seedlings
July	1. Monitor mudfish population 2. Record water levels
August	1. **People planting day 2nd Saturday**. Prepare for visitor planting followed by a day or two to finish. Seedlings may still be collected. 2. Monitor mudfish population 3. Record water levels

September	1. **Formal meeting 2nd Tuesday** to plan for next twelve months 2. Inspection tour 3. Monitor mudfish population 4. Record water levels
October	1. Working bees notified as required. 2. Monitor mudfish population 3. Record water levels 4. General maintenance: • release spray for plants • 'repel' rabbits • spray entrance drive • cut grass and treat broom
November	1. Monitor mudfish population 2. Record water levels 3. Working bees notified as required. 4. Record water levels 5. General maintenance (complete maintenance started last month)
December	**1. End of year meeting. 2nd Tuesday** **2. Water Quality** 3. Monitor mudfish population 4. Record water levels 5. Watch for ZoneA drying 6. General pre-Christmas tidy.

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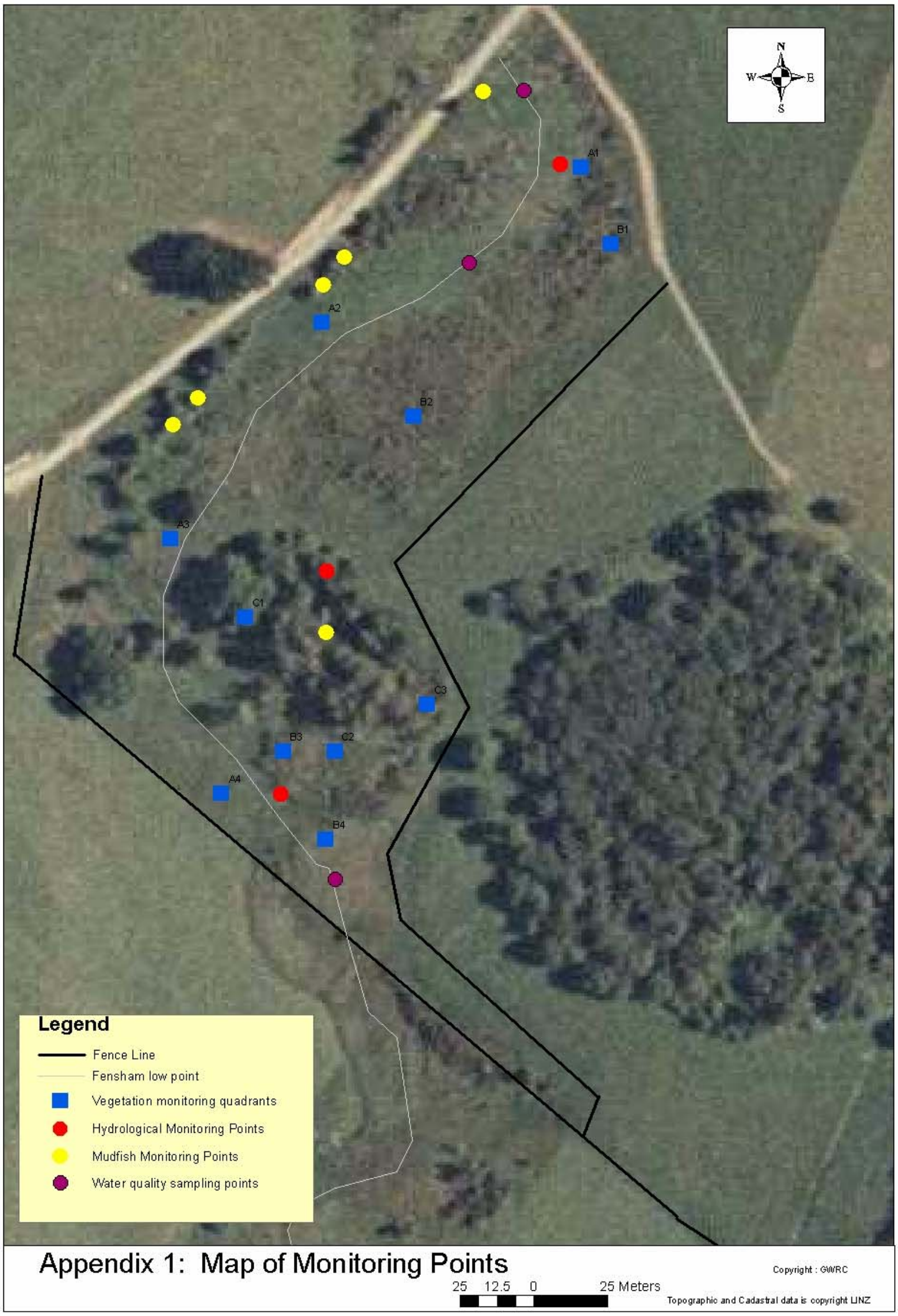
Warr, S (2001) **Water Quality of Fensham Reserve Wetland Tributary** Unpublished report. Greater Wellington.



Appendix 1: Map of Monitoring Points

25 12.5 0 25 Meters

Appendix 2: Plant species list: Fensham Wetland (last updated February 03)

Scientific name	Common name	Old name
Trees		
Alectryon excelsis var. *excelsis*	titoki	
Beilschmiedia tawa	tawa	
Cordyline australis	cabbage tree	
Dacrycarpus dacrydiodes	kahikatea	
Elaeocarpus hookerianus	pokaka	
Hedycarya arborea	pigeonwood	
Myrsine salicina	toro	
Nestegis lanceolata	white maire	
Nothofagus fusca	red beech	
Podocarpus totora	totora	
Pseudopanax crassifolius	lancewood	
Syzgium maire	swamp maire	
Shrubs		
Coprosma grandifolia	kanono	
Coprosma robusta	karamu	
Coprosma propinqua	mingimingi	
Coprosma tenuicaulis	swamp coprosma	
Leptospermum scoparium	manuka	
Melicytus ramiflorus	mahoe	
Sambucus nigra	elder	
Sophora microphylla	kowhai	
Dicot Lianes		
Muehlenbeckia australis	pohuehue	
Passiflora tetrandra	kohia / NZ passionfruit	
Rubus australis	swamp lawyer	
Ferns		
Blechnum novae-zealandiae	swamp kiokio	
Histiopteris incisa	water fern	
Phymatosaurus diversifolius	Hound's tongue fern	
Pteridium esculentum	bracken	
Orchids		
Microtis unifolia		
Pterostylis alobula	greenhood orchid	
Grasses		
*Agrostis capillaris**	browntop	
Cortaderia fulvida	toetoe	
Cortaderia toetoe	toetoe	
*Dactylis glomerata**	cocksfoot	

*Festuca arundinacea**	tall fescue
*Glyceria declinata**	blue sweetgrass
*Holcus lanatus**	Yorkshire fog
*Alopecurus geniculatus**	marsh foxtail
Sedges	
Baumea tenax	
Baumea rubiginosa	
Carex dissita	
Carex lessioniana	
Carex maorica	
Carex secta	
Carex virgata	
*Cyperus eragrostis**	umbrella sedge
Eleocharis acuta	sharp spike sedge
Eleocharis gracilis	slender spike sedge
Isolepis distigmatosa	
Isolepis inundata	
Isolepis prolifer	
Isolepis reticularis	
Schoenus apogon	
Schoenus maschalinus	
Uncinia unciniata	hook sedge
Rushes	
*Juncus articulatus**	
*Juncus bufonius**	
*Juncus effusus**	soft rush
Juncus gregiflorus	
Juncus pallidus	
Juncus planifolius	
Juncus sarophorus	
Luzula picta	wood rush
Herbs	
*Achillea millefolium**	yarrow
*Bidens frondosa**	beggars tick
Callitriche muelleri	native starwort
Cardamine debilis	bittercress
Centella uniflora	centella
Cichorium intybus	Chicory
*Cirsium palustre**	marsh thistle
Cotula coronopifolia	bachelor’s button
*Crepis capillaris**	hawksbeard
*Digitalis purpurea**	foxglove
*Elodea canadensis**	oxygen weed

Epilobium insulare	willow herb	
Epilobium pallidiflorum	willow herb	
Euchiton limosus	creeping cudweed	
*Galium aparine**	cleavers	
Gonocarpus micranthus		
Hydrocotyle heteromeria	pennywort	
Hydrocotyle pterocarpa	pennywort	
Hypericum japonicum	swamp hypericum	
*Hypocheris radicata**	catsear	
Lemna minor	duckweed	
*Lotus pedunculatus**	lotus	
*Ludwigia palustris**	water purslane	
*Mimulus guttatus**	monkey musk	
*Mimulus moschatus**	musk	
Myriophyllum propinquum	water milfoil	
*Myosotis laxa subsp. caespitosa**	water forget-me-not	
*Nasturtium microphyllum**	watercress	*Rorippa microphylla*
Persicaria decepiens	water pepper	*Polygonum salicifolium*
*Persicaria hydropiper**	swamp willow weed	*Polygonum hydropiper*
*Persicaria persicaria**	willow weed	*Polygonum persicaria*
Phormium tenax	flax	
*Plantago lanceolata**	plantain	
Potomogeton suboblongus	mud pondweed	
*Prunella vulgaris**	selfheal	
Ranunculus amphitrichus	waoriki	
*Ranunculus repens**	creeping buttercup	
*Rubus fruticosus**	blackberry	
*Rumex conglomeratus**	clustered dock	
Rumex obtusifolius	broad-leaved dock	
*Sonchus oleraceus**	sow thistile	
*Stellaria alsine**	bog stitchwort	
*Trifolium pratense**	red clover	
*Veronica anagallis-aquatica**	water speedwell	

Appendix 3: 'Cheat Sheet' for calculating Braun-Blanquet classess

For calculating area of % cover classes for different quadrant sizes.

Braun-Blanquet cover scale: Cover Classes:

1= <1% **2**= 1-5% **3**=6-25 **4**=25-50% **5**=50-75% **6**= 75-100%

Cover class	% cover	2m x 2m	3m x 3m	4m x 4m
1	<1%	20 x 20cm	30 x 30cm	40 x 40cm
2	1-5%	20 x 20cm to 45 x 45cm	30 x 30cm to 67 x 67cm	40 x 40cm to 89 x 89cm
3	6-25%	45 x 45cm to 1 x 1m	67 x 67cm to 1.5 x 1.5m	89 x 89 cm to 2 x 2m
4	26-50%	1m x 1m to 1.4 x 1.4m	1.5m x 1.5 to 2.12 x 2.12 m	2m x 2m to 2.83 x 2.83m
5	51-75%	1.4m x 1.4m to 1.73 x 1.73m	2.12 m x 2.12m to 2.6 x 2.6m	2.83 x 2.83m to 3.46 x 3.46m
6	76-100%	1.73 x 1.73m to 2 x 2m	2.6 x 2.6 to 3 x 3m	3.46 x 3.46m to 4 x 4m

Appendix 4: Model vegetation monitoring forms

Zone A	PLOT	
Date:		
Recorders:		

1= <1%	2= 1-5%	3=6-25	4=25-50%	5=50-75%	6= 75-100%

		A1	A2	A3	A4
Dicot Lianes					
Muehlenbeckia australis	pohuehue				
Grasses					
*Agrostis capillaris**	browntop				
*Dactylis glomerata**	cocksfoot				
*Festuca arundinacea**	tall fescue				
*Glyceria declinata**	blue sweetgrass				
*Holcus lanatus**	Yorkshire fog				
Herbs					
Epilobium pallidiflorum	willow herb				
*Lotus pedunculatus**	lotus				
Persicaria decipiens	swamp willow weed				
*Ranunculus repens**	creeping buttercup				
*Rorippa microphylla**	watercress				
Rumex conglomeratus	clustered dock				
		A1	A2	A3	A4
*Trifolium pratense**	red clover				
Veronica anagalis-aquatica	water speedwell				
Other species					

Zone B	PLOT	
Date:		
Recorders:		

1= <1%	2= 1-5%	3=6-25	4=25-50%	5=50-75%	6= 75-100%

		B1	B2	B3	B4
Trees					
Dacrycarpus dacrydiodes	kahikatea				
Podocarpus totara	totara				
Shrubs					
Coprosma robusta	karamu				
Coprosma propinqua	mingimingi				
Coprosma tenuicaulis	swamp coprosma				
Leptospermum scoparium	manuka				
Dicot Lianes					
Muehlenbeckia australis	pohuehue				
Ferns					
Blechnum novae-zealandiae					
Grasses					
*Agrostis capillaris**	browntop				
*Dactylis glomerata**	cocksfoot				
*Festuca arundinacea**	tall fescue				
*Glyceria declinata**	blue sweetgrass				
*Holcus lanatus**	Yorkshire fog				
*Alopercurus geniculatus**	marsh foxtail				
Sedges					
Baumea tenax					
Baumea rubiginosa					
		B1	B2	B3	B4
Carex dissita					
Carex lessioniana					
Eleocharis acuta					
Eleocharis gracilis					
Rushes					
*Juncus articulatus**					
*Juncus bufonius**					
*Juncus effusus**					
Juncus gregiflorus					
Juncus pallidus					

Herbs					
*Achillea millefolium**	yarrow				
Centella uniflora					
Cirisium palustre	marsh thistle				
*Hypocheris radicata**	catsear				
*Lotus pedunculatus**	lotus				
*Mimulus moschatus**	monkey musk				
*Plantago lanceolata**	plantain				
*Prunella vulgaris**	selfheal				
*Ranunculus repens**	creeping buttercup				
*Rubus fruticosus**	blackberry				
*Trifolium pratense**	red clover				
Mosses					
Sphagnum sp.	sphagnum moss				
Other species					

Zone C	PLOT	
Date:		
Recorders:		

1= <1%	2= 1-5%	3=6-25	4=25-50%	5=50-75%	6= 75-100%

		C1	C2	C3	C4
Trees					
Alectryon excelsis var. excelsis	titoki				
Beilschmiedia tawa	tawa				
Dacrycarpus dacrydiodes	kahikatea				
Elaeocarpus dentatus	hinau				
Elaeocarpus hookerianus	pokaka				
Hedycarya arborea	pigeonwood				
Syzgium maire	swamp maire				
Shrubs					
Coprosma propinqua	mingimingi				
Coprosma tenuicaulis	swamp coprosma				
Leptospermum scoparium	manuka				
Melicytus ramiflorus	mahoe				
Myrsine australis	mapou				
Dicot Lianes					
Muehlenbeckia australis	pohuehue				
Rubus australis	swamp lawyer				
Ferns					
Histiopteris incisa	water fern				
Hypolepis ambigua					
Phymataosaurus diversifolius					

		C1	C2	C3	C4
Grasses					
*Agrostis capillaris**	browntop				
*Alopercurus geniculatus**	marsh foxtail				
*Dactylis glomerata**	cocksfoot				
*Holcus lanatus**	Yorkshire fog				
Sedges					
Carex dissita					
Carex lessioniana					
Carex maorica					
Carex virgata					
Herbs					
*Bidens frondosa**	beggars tick				
Epilobium pallidiflorum	willow herb				
Hydrocotyle pterocarpa	pennywort				
*Lotus pedunculatus**	lotus				
*Mimulus moschatus**	monkey musk				
*Myosotis laxa subsp. caespitosa**	water forget-me-not				
Persicaria decipiens	swamp willow weed				
Ranunculus amphriticus	waoriki				
*Plantago lanceolata**	plantain				
*Prunella vulgaris**	selfheal				
*Ranunculus repens**	creeping buttercup				
*Rubus fruticosus**	blackberry				
*Trifolium pratense**	red clover				
Mosses					
Sphagnum sp.	sphagnum moss				
Other species					

Appendix 5: Model plant survival monitoring forms

Planting details

Plot preparation details:

Date of Planting: Planted by:

Soil conditions:

Source of plants: Size(s):

Plant spacing:

Mulching: Staking:

Plant species and nos																				
Plot	Manuka				Kahikatea				C.tenuicaulis				C. propinqua							
	Pl	Yr 1	Yr 2	Yr 3	Pl	Yr 1	Yr 2	Yr 3	Pl	Yr 1	Yr 2	Yr 3	Pl	Yr 1	Yr 2	yr3	Pl	Yr 1	Yr 2	Yr 3
1																				
2																				
3																				
4																				
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18																				
19																				
20																				
21																				
22																				
23																				
24																				
Total																				
Survival %																				

Pl = Planted
Yr 1= 12 months after planting
Yr 2= 24 months after planting
Yr 3= 36 months after planting

Post planting treatment

Date	Operation	Comments

Comment on extreme weather conditions, possible causes of plant deaths, growth rates, etc.

Water, air, earth and energy: elements in Greater Wellington's logo combine to create and sustain life. Greater Wellington promotes **Quality for Life** by ensuring our environment is protected while meeting the economic, cultural and social needs of the community.

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Fensham Group member,
Geoff Doring, standing in
sweetgrass (Glyceria declinata).

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