Species growing immersed in 1 m of standing water for extended periods		
Species	F	S
Schoenoplectus validus (tabernaemontani)	x	x
Bolboschoenus lacustris	x	x
Typha orientalis (raupo)	x	

Species growing immersed in 2 m of standing water for extended periods		
Species	F	S
Eleocharis sphacelata (bamboo spike-sedge)	x	
Myriophyllum propinquum	x	
Myriophyllum triphyllum	x	
Potamogeton cheesemanii (manihi)	x	

Native Fish

Where outfalls or swales connect wetlands with receiving waters they should be designed to permit native freshwater fish passage, so fish can utilize the created habitat.

References and further reading

(1) Delaware Department of Natural Resources and Environmental Control and Environmental Management Center of the Brandywine Conservancy: Conservation Design for Stormwater Management 1997

(2) Peter Johnson, Pat Brooke: Wetland Plants in New Zealand, Wellington: DSIR Publishing 1989

(3) Brian Parkinson, Geoffrey Cox: New Zealand Lakes and Rivers, Random Century, 1990

(4) 'Plants of New Zealand's Wetlands' pamphlet by Oratia Native Plant Nursery upon which this pamphlet is based.

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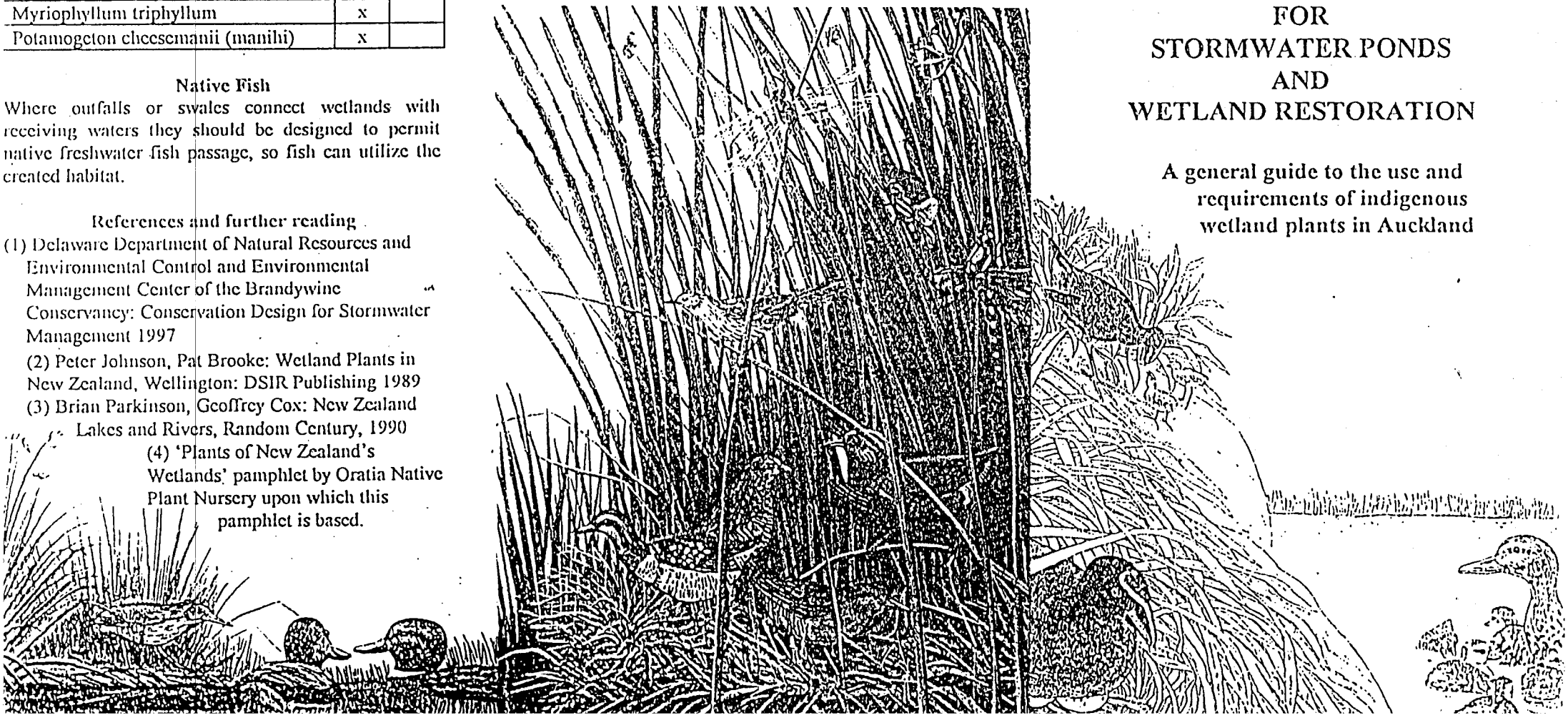
FOREST & BIRD

NATIVE PLANTS FOR STORMWATER PONDS AND WETLAND RESTORATION

A general guide to the use and requirements of indigenous wetland plants in Auckland



Stormwater

Stormwater is a major pollutant of waterways in Auckland. It carries oils, silt, rubbish, and other contaminants from the streets into rivers and streams. The effects of stormwater are apparent in a stream if 15% of the watershed area is sealed by impervious cover. In streams receiving stormwater above this threshold level macroinvertebrate populations change permanently to pollutant tolerant species (1).

Natural Wetlands

Holding the stormwater back in ponds that are designed as natural wetlands reduces the flood risk and the contaminant load. Cleansing occurs through processes such as settling of contaminants, incorporation into plants, adsorption, decomposition, filtration and volatilization (1). At the same time a natural wetland is a valuable habitat for native birds and plants. As only 10 % of New Zealand's natural wetland areas remain it is important to maintain and create these habitats for many endangered species. To achieve this the planting or encouragement of native, locally suitable wetland plants is essential.

Where stormwater ponds or wetlands are created close to existing wetland areas it is preferable to allow for natural regeneration of the habitat, in conjunction with weed control. However, where there are no adjacent seed sources the following list of appropriate native wetland plants for the Auckland region can be used. Eco-sourcing is the best approach, where seeds are collected in the local area then seedlings are grown and planted out. If this is not possible some specialist nurseries in the Auckland area supply native wetland plants.

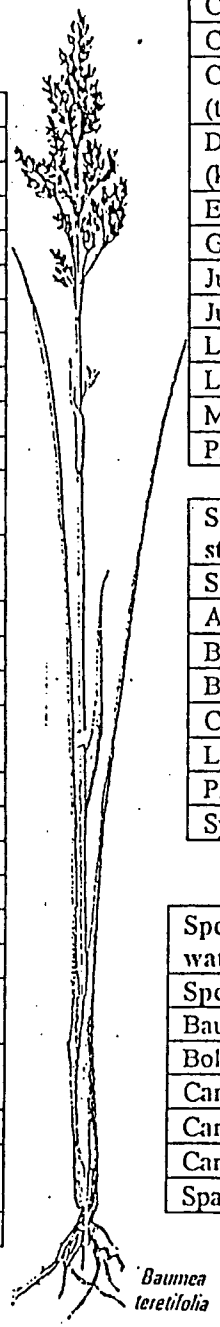
Native Plant Associations of Auckland's Wetlands

The following list illustrates the basic habitat requirements of many of the more important species in Auckland. Species are grouped according to their ability to grow in varying water levels.

F = Freshwater, S = Saline

Species growing under periodic immersion

Species	F	S
Baumea juncea	x	x
Baumea tenax	x	
Baumea teretifolia (pakihi rush)	x	
Carex flagellifera	x	
Carex lessoniana	x	
Carex litorosa	x	x
Coprosma propinqua (mingimingi)	x	x
Coprosma rigida	x	
Cortaderia fulvida (toetoe)	x	
Cotula coronopifolia (bachelor's button)	x	x
Eleocharis gracilis (slender spike-sedge)	x	
Isachne globosa (swamp millet)	x	
Juncus caespiticius	x	x
Juncus gregiflorus	x	
Juncus maritimus var. australiensis (sea rush)	x	x
Juncus pallidus	x	x
Juncus planifolius	x	
Juncus sarophorus	x	
Lepidosperma laterale	x	x
Leptocarpus similis (oioi)	x	x
Leptospermum scoparium (manuka)	x	x
Phormium cookianum (wharariki, mountain flax)	x	x
Plagianthus divaricatus (saltmarsh ribbonwood)		x
Rhopalostylis sapida (nikau)	x	
Bolboschoenus lacustris (kapungawha, lake clubrush)	x	x
Selliera radicans (remuremu)	x	x



Baumea teretifolia

Species growing immersed in 10 cm of standing water for extended periods

Species	F	S
Carex subdola	x	
Coprosma tenuicaulis (hukihuki)	x	
Cyperus ustulatus. (toetoe upoko-tangata)	x	x
Dacrycarpus dacrydioides (kahikatea)	x	
Eleocharis acuta (sharp spike sedge)	x	x
Gunnera strigosa	x	
Juncus holoschoenus	x	
Juncus prismatocarpus	x	
Laurelia novae-zelandiae (pukatea)	x	
Leptospermum scoparium (manuka)	x	x
Machaerina sinclarii (tuhara)	x	
Pratia angulata (panakenake)	x	

Species growing immersed in 20 cm of standing water for extended periods

Species	F	S
Astelia grandis	x	
Baumea huttonii	x	
Baumea rubiginosa	x	
Cordyline australis (cabbage tree)	x	
Leptocarpus similis (oioi)	x	x
Phormium tenax (harakeke, flax)	x	x
Syzygium maire (maire tawake)	x	

Species growing immersed in 50 cm of standing water for extended periods

Species	F	S
Baumea articulata (jointed twig rush)	x	
Bolboschoenus fluviatilis (kukuraho)	x	x
Carex maorica	x	
Carex secta var. secta (purei,makura)	x	
Carex virgata	x	
Sparganium subglobosum (maru)	x	