

CHAPTER 3

# WETLAND TYPES

BEVERLEY CLARKSON AND MONICA PETERS

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WETLAND TYPES



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Understanding which type of wetland you have is integral to the restoration process and will help define appropriate goals for your project. Wetland types are defined by their water regime, nutrient levels, pH, and substrate. These factors produce the characteristic flora and fauna communities associated with each wetland type.

In many cases, determining the wetland type will be relatively easy, e.g., a willow-dominated wetland with *Carex* spp. (sedges) throughout the understorey was, and still is, a swamp. In other cases, where the site has been more modified, the wetland type may not be so obvious, or in larger systems, e.g., the 10,000 ha Kopuatai peat

dome, several different wetland types may be represented. Wetlands such as Kopuatai are important – the site retains part of a sequence from freshwater swamp forest through fen to restiad raised bog associated with increasing peat depths. Such sequences are now a rarity. Today, only remnants are left of the larger and complex wetland systems that once covered significant tracts of the New Zealand landscape.

The wetland types described over the next pages are based on Johnson and Gerbeaux (2004), though in keeping with the freshwater focus of this Handbook, saline wetlands have not been included.



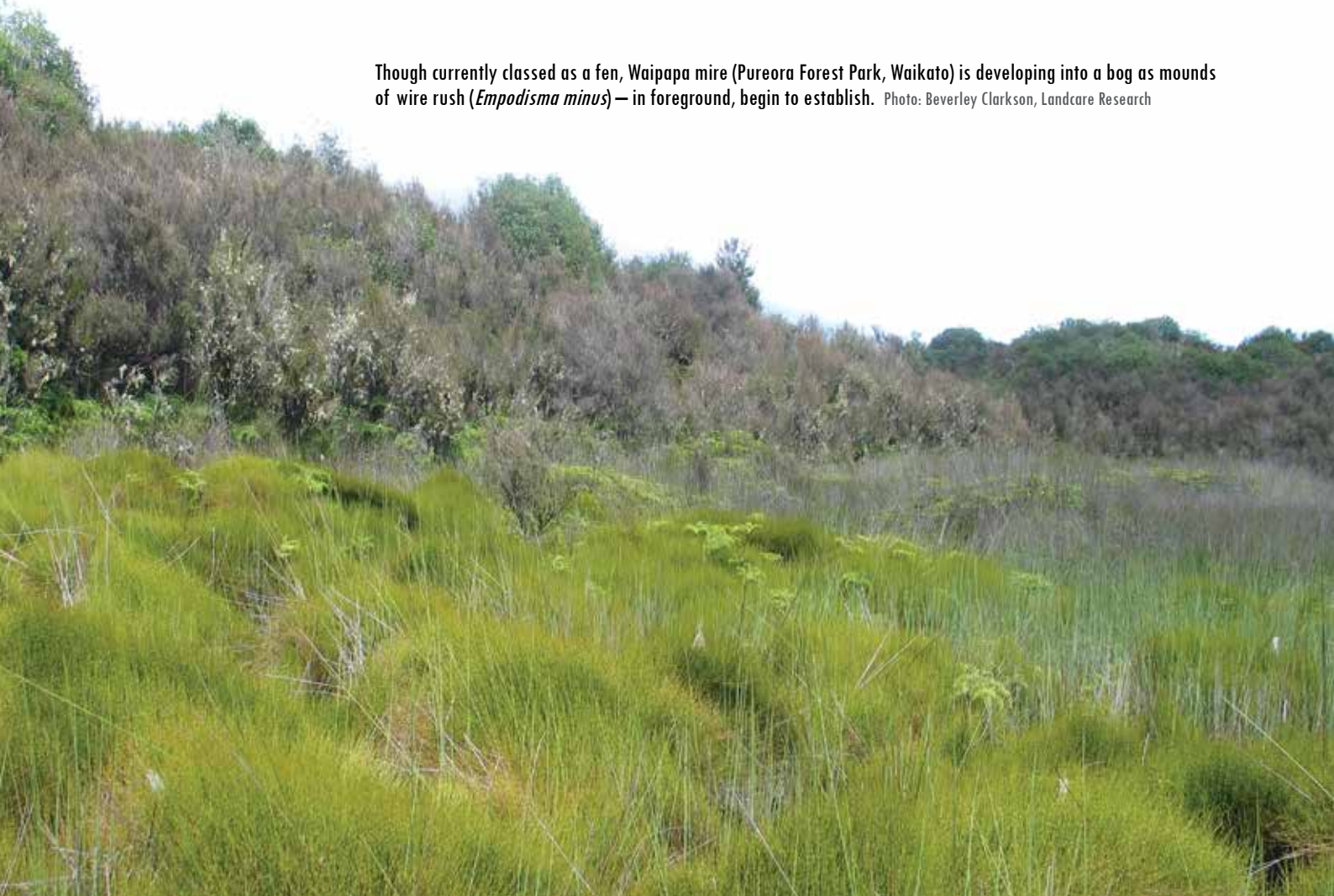
Kopuatai is home to one of only three remaining naturally occurring populations of the restiad, giant cane rush (*Sporadanthus ferrugineus*). The dome is recognised for its international significance under the Ramsar agreement on account of its size, intactness and representativeness. Photo: Monica Peters, NZ Landcare Trust



Situated on a flood plain, the Upper Taieri Scroll Plain (Otago) comprises a meandering river that changes its course during flooding. This system includes a range of wetland types, namely marsh, fen and swamp.

Photo: Gretchen Robertson, NZ Landcare Trust

Though currently classed as a fen, Waipapa mire (Pureora Forest Park, Waikato) is developing into a bog as mounds of wire rush (*Empodisma minus*) — in foreground, begin to establish. Photo: Beverley Clarkson, Landcare Research





# 1 Freshwater wetland types in New Zealand

The main functional wetland types in New Zealand are bog, fen, swamp, marsh, and shallow water. A simple way of distinguishing between types is based on the gumboot test. Short gumboots or ‘Red-bands’ are usually adequate for keeping feet dry in bogs because the vegetation and peat will support your

weight. Taller gumboots will be needed for fens, and thigh waders are recommended for swamps, which have large areas of open water. Waist waders may be required for marshes when water levels are high, and a drysuit or wetsuit will be useful for traversing shallow water.

Wetland Type	BOG	FEN	SWAMP	MARSH
	SHALLOW WATER*			
Water Source	Rainfall	→	Groundwater	→ Surface water
Water flow & fluctuation	Low	→	Medium	→ High
Nutrient availability	Low	→	Medium	→ High
pH	Low/acidic	→	Medium	→ High/neutral
Peat Content	High	→	Medium	→ Low/none

Figure 1. Key environment characteristics of wetland type. Beverley Clarkson, Landcare Research.

\* Shallow water wetlands may form part of bog, fen, swamp and marsh systems. Whangamarino, Waikato. Photo: Aleki Taumoepeau, NIWA





## 1.1 Bogs

Bogs are peat-accumulating systems fed only by rainwater and thus have very low nutrient levels. They are usually strongly acid, and water flow is restricted. The water table is either at or just below the surface and remains relatively constant.

### LOCATION

Level or gently sloping ground, e.g., hill crests, basins, terraces as well as within other wetland types. Mainly found in Southland, Westland, Waikato and Chatham Is.

### VEGETATION

Highly varied, e.g., tree, shrub, liverwort, fern, cushion plant, moss, restiad and sedge types.

Awarua Bog, a Ramsar listed site administered by the Department of Conservation, hosts a range of plants more commonly associated with alpine regions. Southland. Photo: Beverley Clarkson, Landcare Research



Tangle fern (*Gleichenia dicarpa*) and manuka on the shores of Lake Maratoto, one of more than 30 peat lakes in the Waikato region. Photo: Abby Davidson, NZ Landcare Trust



*Donatia novae-zelandiae* is one of the distinctive cushion forming plants found in the Awarua bog, Southland.

Photo: Janet Gregory, NZ Landcare Trust



## 1.2 Fens

Fens have a predominantly peat substrate, although the peat is shallower and more decomposed than in bogs. They are fed by both rain and groundwater, resulting in low to moderate nutrient and acidity levels. The water table is typically just below the peat surface with small but noticeable fluctuations.

### LOCATION

Slight slopes, e.g., fans and toes of hillsides (where they may merge with swamps), and in relatively shallow peat, e.g., on the edge of raised bogs.

### VEGETATION

Scrub, tall herb, tussock grass, fern, restiad and sedge types.



Though called a “swamp”, Kaitoke on Great Barrier Is. is, strictly speaking, a fen. Photo: Beverley Clarkson, Landcare Research



Waiapa mire (Pureora Forest Park, Waikato) is showing signs of recovery from browsing as deer populations decrease through ongoing control. Photo: Beverley Clarkson, Landcare Research



*Carex secta* and red tussock swamp/fen upstream of Lake Clearwater (Canterbury), part of the Department of Conservation Arawai Kakariki wetland restoration programme.

Photo: Hugh Robertson. Crown Copyright, Department of Conservation

### 1.3 Swamps

Swamps are relatively high in nutrients, supplied by nutrients and often sediment via surface runoff and groundwater from surrounding land. Substrates are typically a combination of mineral soils and well decomposed peat. The water table is usually above some of the ground surface, though due to large, seasonal fluctuations can periodically be much higher or lower.

#### LOCATION

Basins, valley floors, deltas and plains.

#### VEGETATION

Tree, scrub, tall herb, flax, reed, rush and sedge types. Often heavily invaded by willow.



**Raupo in winter dieback colonising the swampy margins of a dune lake. Whatipu, Auckland.** Photo: Monica Peters, NZ Landcare Trust



**An ecologically important remnant of kahikatea swamp forest (*Dacrycarpus dacrydioides*) forest in the southwest corner of the Kōpuatai peat dome, Waikato.** Photo: Monica Peters, NZ Landcare Trust



**Bands of willow colonising former shorelines are clearly visible at the Waimarino wetland, Lake Taupo.**

Photo: Tongariro Natural History Society



## 1.4 Marshes

Marshes are characterised by large periodic fluctuations of water table or water level. They can experience water-level drawdowns that result in portions drying out and exposing the mineral substrate but the soil usually remains moist. They have a lower overall water table than swamps, higher nutrient levels and a higher pH. Ephemeral wetlands are a subset of the marsh type in which ponding and drying out occur on a seasonal basis. In more extreme cases, the vegetation alternates between aquatic and terrestrial.

**LOCATION:** Valley margins, valley floors, alongside rivers and lakes

**VEGETATION:** Rush, grass, sedge and herb types. Often infested with pasture weeds and grasses.

**Marsh area on the margins of the Ramsar listed Whangamarino wetland, Waikato.** Photo: Kerry Bodmin, NIWA



**Iveagh Bay, Buller District. Marsh at high water level.**

Photo: Brian Sorrell, NIWA



**The upper Rangataiki catchment (Taupo), is an ephemeral wetland depression still partly ponded in summer.** Photo: Peter Johnson





## 1.5 Shallow water

Shallow water wetlands are characterised by the presence of open standing water, generally less than a few metres deep. This includes intermediate-size water bodies not large enough to be considered lakes or lake-like, though more significant than just smaller water bodies and leads (channels of open water). Also included are the margins of lakes, rivers, and estuary waters. Nutrient levels and water chemistry are basically those of the water as opposed to the substrate.

**LOCATION:** Shallow, open water at lake, estuary and river margins, including gently flowing river channels.

**VEGETATION:** Submerged, floating or emergent aquatic plants.

The original vegetation in the shallow water zones of Lake Taharoa have been degraded by stock, though stands of raupo in less accessible areas remain intact, Waikato.

Photo: Monica Peters, NZ Landcare Trust



Shallow water area within the extensive Norske Skog wetland restoration site, Bay of Plenty. Photo: Wildland Consultants Ltd.



Parrot's feather infests this area of shallow water at Te Henga wetland on the west coast of Auckland. Photo: Kerry Bodmin, NIWA





### 1.5.1 Other wetland types

Both pakihi and gumland are local terms for wetland types that are often fire induced. The unifying characters are very low fertility and low pH soils, mainly mineral substrate, and sometimes with peat. Soils are old, extremely leached and poorly drained, frequently saturated but seasonally dry. As such, pakihi and gumland may also fit into bog, fen or swamp categories.

Other wetland types include seepages and geothermal. Seepages occur on slopes with an active steady flow of groundwater and sometimes surface water. They are typically small, localised wetlands that feed, drain or occur within other wetland types. Geothermal wetlands are influenced by heated geothermal water or chemistry derived from current or former geothermal activity. They are concentrated in the volcanically active area in the central North Island.



Seepage colonised by pasture grasses. Battle Hill Farm Park, Wellington. Photo: Monica Peters, NZ Landcare Trust



One of the many geothermal wetlands situated in urban Rotorua, Bay of Plenty. Photo: Monica Peters, NZ Landcare Trust



## 2 References and further reading

Cromarty, P. and Scott, D.A. (Eds). 1995. *A Directory of Wetlands in New Zealand*. Department of Conservation, Wellington, New Zealand.

[www.doc.govt.nz/upload/documents/science-and-technical/nzwetlands00.pdf](http://www.doc.govt.nz/upload/documents/science-and-technical/nzwetlands00.pdf)

Johnson, P. and Gerbeaux, P. 2004. *Wetland Types in New Zealand*. Department of Conservation, Wellington, New Zealand. [www.doc.govt.nz/upload/documents/science-and-technical/WetlandsBW.pdf](http://www.doc.govt.nz/upload/documents/science-and-technical/WetlandsBW.pdf)

Zoltai, S.C. and Vitt, D.H. 1995. *Canadian wetlands: environmental gradients and classification*. *Vegetatio* 118: 131–137.

Note that many of the resources above are available as hard copy from the respective organisations. There is also a CD containing all above hyperlinks at the back of this Handbook. If you are using the online version of the Handbook and having problems with the hyperlinks above, try copying and pasting the web address into your browser search bar.

**Gumland at Lake Ohia, Northland showing the exposed soil pan.**

Photo: Beverly Clarkson, Landcare Research

