

## Appendix WTL1: Wetland assessment methodology

This procedure was developed by Environment Canterbury with assistance from outside experts. As at 4 February 2004 it had been trialled on a limited number of sites and generally found to be satisfactory. Other trials were to continue in conjunction with a working party convened by Environment Canterbury to advise on any need for the procedure to be amended.

### Introduction

Wetland surveys carried out in accordance with this plan, and any resulting schedule of moderate or higher significance wetlands, will focus on:

- (a) palustrine ecosystems (dominated by shallow or sub-surface fresh water with attached root vegetation, and including wetlands in the margins of rivers and lakes); and
- (b) estuarine ecosystems (coastal wetlands semi-enclosed by land and dominated by effects of saline water).

These surveys have two purposes, to document the nature and extent of wetlands in the region and provide a basic assessment of their ecological and hydrological significance. Practical limitations mean that no more than a rapid assessment of any one site, focused largely on vegetation and the generalised hydrology, is possible. The information compiled in this way will be sufficient to define the significance thresholds relied on by provisions in the plan, and to facilitate ongoing trend monitoring. However, depending on the circumstances, applicants for resource consent for activities affecting wetlands may need to furnish information beyond the scope of this type of survey (see *Chapter 7.8 Information to be provided with resource consent applications*).

The Ministry for the Environment (MfE) has developed a national standard process for the classification and assessment of estuarine and palustrine wetlands (Clarkson *et al* 2002). In classifying wetlands, and assessing their condition and pressure indicators, ecological field surveys of wetlands carried out for the purpose of this plan will follow the MfE methodology.

Mapping wetland extent during field surveys will provide for baseline monitoring of this indicator, necessary for wetlands inventory at both the regional and national level. Monitoring wetland extent at a regional level can be used to test the effectiveness of policies aimed at reducing wetland loss, achieving no net loss, or increasing the area and number of wetlands (Ward and Lambie 1999).

Generally, the presence of certain indicator plant species provides the most practical method for delineating the edge of a wetland (Anderson 2001). Indicator species will vary depending on locality (i.e., coastal, lowland, high country). The dryland-wetland edge will typically be defined where one or more of these wetland indicator species are spaced less than four times their ungrazed height apart. Alternatively, analysis of soils can be used to help determine wetland-dryland boundaries.

Following field survey of a wetland site, an assessment will be made of its significance from both a hydrological and ecological viewpoint. The ecological assessment process will interpret the site information collected on wetland type and condition in the light of the following criteria: representativeness, rarity/distinctiveness, ecological context and viability (Norton and Roper-Lindsay 1999). Each wetland will be assessed as having low, moderate or high ecological significance using these criteria.

Each wetland will also be assessed as having high, moderate or low significance in relation to its hydrology. The aspects to be considered in making hydrological assessments are listed in Part D of this appendix.

The overall significance of any wetland is the higher of its ecological or hydrological significance.

It is important to realise that wetlands assessed as having low hydrological and/or ecological significance may still have considerable restoration potential. Any such restoration is, however, entirely voluntary.

## **Part A: The MfE method for wetland classification and recording condition and pressure indicators**

The *Handbook for Monitoring Wetland Condition* (Clarkson *et al* 2002) provides a framework for classification of wetlands (Figure WTL4) and a standardised wetland field record sheet (Figure WTL5). (Those not familiar with this handbook should refer to it before embarking on a wetland survey.) The information on the field record sheet, together with a map showing wetland extent and main vegetation types, will help inform subsequent assessment of the wetland's ecological significance. The scores of the various state- and pressure-indicators can also form a baseline for subsequent monitoring of the general condition of a wetland site.

### **A.1.1 Wetland classification**

The first box on the wetland field record sheet deals with wetland classification. Each surveyed wetland is classified based, in descending order, on:

- (a) The wetland system (i.e., estuarine or palustrine);
- (b) Wetland subsystem, based on water flow regime (e.g., intertidal, non-tidal, permanent, ephemeral);
- (c) Wetland class, based on substrate and site chemistry (e.g., saltmarsh, mudflat, swamp, bog, flush);
- (d) Wetland form, based on landform (e.g., estuary, lagoon, shore, slope, channel, basin).

The main vegetation types (indicated on an accompanying map) would also be recorded on the field sheet, together with notes on native fauna and other general comments.

### **A.1.2 Recording wetland condition**

In the second box on the field record sheet, wetland condition at the time of survey is assessed and scored on the basis of five state indicators and six pressure indicators. The state indicators are:

- (a) Change in hydrology.
- (b) Change in physico-chemical parameters (e.g., fire damage, sedimentation, erosion, nutrient enrichment).
- (c) Change in ecosystem intactness (i.e., loss in area of original wetland, fragmentation).
- (d) Change in browsing, predation and harvesting regimes (i.e., effects of introduced herbivores, predators and humans).
- (e) Change in dominance of native plants (i.e., proportion of introduced species in canopy and understorey).

Each state indicator is scored on a 0-5 scale where a low score indicates a high degree of modification, giving a total wetland condition index / 25. The higher the score, the better the wetland condition.

Hydrology is probably the single most important determinant of the establishment and maintenance of wetlands and wetland processes. In the absence of existing monitoring or historical information on hydrological regime, the presence of man-made structures (e.g., drains, stopbanks) that influence hydrology can be used as simple indicators of modification.

Sedimentation, nutrient enrichment and fire are the physiochemical parameters most commonly affecting wetlands. Runoff of suspended sediment into wetlands can smother vegetation and reduce light penetration into standing water. Sediment input is often associated with nutrient enrichment, but wetland nutrient enrichment may also result from groundwater loading and surface run-off. Sedimentation and nutrient enrichment lead to changes in the vegetation (often with increases in exotic plant species) and cause the habitat to become more anaerobic, with negative effects on invertebrate, fish and bird populations. Fires may occur naturally, but most often are of human origin. Fires disrupt wetland nutrient cycles, destroy wildlife habitat, and provide opportunities for weed invasion.

A large, intact wetland ecosystem is better able to maintain its viability and resist human effects. Wetlands that have been reduced in extent or fragmented are more vulnerable to disturbance, and can no longer offer habitat for species with low dispersal capability. The original extent of wetlands can be estimated using historical information and soil maps.

Domestic stock can cause severe damage to soil and plants from trampling and browsing; the extent of which is usually obvious. Feral animals also damage wetland flora and fauna, but are less visible than domestic stock and are much harder to control.

The change in abundance of native plants indicator is assessed by determining the extent to which native plants have been displaced by introduced plants, as introduced plants are one of the major threats to wetland condition.

### **A.1.3 Recording wetland pressure indicators**

Pressure indicators, also scored on a 0-5 scale, with 0 being no pressure and 5 very high pressure, are:

- (a) Modifications to catchment hydrology
- (b) Catchment water quality
- (c) Animal access (livestock or other introduced mammals)
- (d) Key undesirable species (weeds or pests)
- (e) Proportion of the catchment in introduced vegetation
- (f) Other pressures (as specified).

The total wetland pressure index will thus be scored out of 30, with a high score indicating a greater degree of pressure on the site.

In the state (or condition) indicators, the section on change in hydrological integrity focused on modifications within wetlands. In addition, an important risk to wetlands is from changes in the catchment hydrology that can lead to lowered regional groundwater tables or reduced surface water inputs. Features affecting this score include drains and other structures that divert water from or into the catchment, clearance of vegetation within the catchment, and extraction of groundwater from shallow bores.

Deteriorating upstream water quality is an indication of future deterioration in wetland condition. Surface water and groundwater quality data from upstream of the wetland can be used, as well as other indices such as the stream health monitoring assessment kit.

Assessing the animal access indicator can be based on direct observations during the site visit or can be deduced from the nature of the catchment and the size of the wetland itself. Some background knowledge of factors such as predator control operations in the vicinity may be required to score this feature accurately.

Once key undesirable species have invaded and become established in wetlands, control and eradication can be difficult and expensive. As most undesirable species that enter wetlands usually do so only after being present in the catchment for some time, identification of these species before invasion is an important pressure indicator. The relevant species are those plants and animals that are known to be damaging to wetlands—the most common examples are willows which are able to survive and out-compete native species in most wetland habitats.

For the proportion of the catchment in introduced vegetation feature, the score is based on quantification from 0 = 0% to 5 = 100%. The reason for its inclusion is that the risk of new weed arrivals is much greater if the catchment has introduced vegetation, and that predominantly introduced catchments are less likely to allow migration of desirable animal species. For restored and created wetlands, a predominantly native catchment provides a greater likelihood of desirable plant and animal species re-introducing themselves.

Other pressures that might be scored in the final category of the pressure indicator box are residential development, mining, dairy conversions, deer conversions, off-road vehicle use,

logging activity and other land-use change. Surrounding gardens may also be an important threat, as many wetland weeds are garden escapes.