

CHAPTER 4

# SITE INTERPRETATION 1

MARC SCHALLENBERG AND ROB CADMUS

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Pukatea capsules with seeds.  
Drawing: Monica Peters

The study of informed human perspectives on the present state and recent changes in wetlands is useful for setting restoration goals. For example, a review of historical records before the restoration of the Waipori/Waihola Lake-Wetland Complex, Otago, provided information on historical human modifications to the catchment and historical changes in sea level, hydrology and sedimentation. Collectively, this information gave an excellent account of disturbance events and changes to the ecosystem, providing information on opportunities and constraints to restoration. This research is summarised and presented as a case study.

There are several commonly used approaches for reconstructing the environmental histories of wetlands – all are an important part of developing a Wetland Restoration Plan with associated goals and objectives (See Chapter 2 – Restoration planning and Chapter 6 – Goals & objectives). Included in this chapter are: reviewing historical and scientific records, understanding site ecology, and finding appropriate reference wetlands to compare with the wetland being restored. The relative advantages and disadvantages of each approach are also summarised, along with the resources and type/level of expertise required. In-depth studies for reconstructing the environmental histories of both the human and pre-human eras are the subject of Chapter 6 – Site interpretation 2.

**Previous page: Maori Lakes, Ashburton Basin.**

Photo: Hugh Robertson. Crown Copyright, Department of Conservation

**Opposite page: A transect running from the margin to the centre of Kopuatai peat dome (Waikato) reveals a sequence of vegetation types.**

Photo: Monica Peters, NZ Landcare Trust



**Chris Bell and Andrew Blayney (both TNHS workers) using sound recordings to determine whether bitterns are present in the South Taupo wetlands, December 2008.**

Photo: Tongariro Natural History Society (TNHS)

# 1 Reconstructing the past to restore for the future

## 1.1 Reviewing available information

Historical information can come from a wide variety of sources and exists in an equally wide variety of forms. While some historical scientific information may be available in the form of journal articles and published or unpublished reports, non-scientific information can also be very useful. For example, old maps, aerial photographs and survey records can illustrate historical changes to a wetland and its catchment. Collecting oral histories from local elders, visiting museums, reading local histories, and interpreting Maori place names can help develop a timeline of relevant historical conditions and significant changes and events.

### 1.1.1 Strengths and weaknesses

- ✓ Uses existing information to identify issues and areas of concern, and to develop an environmental history relevant to the wetland and its catchment.
- ✗ Sources of information can be numerous and varied and relevant information may not be in an easily accessible form.

### 1.1.2 Resources and expertise

**RESOURCES:** Libraries (e.g., local and national public libraries, museum libraries, private collections, Regional and District Council, university and wananga libraries), herbaria (often associated with museums, universities and Crown Research institutes), scientific journals, botanical society newsletters, ornithological society bird lists, local records (e.g., historical societies, local historians, iwi authorities). Note that many resources such as journals and reports are online. Sound recording equipment is useful for collecting oral histories.

**EXPERTISE:** General interpretation skills and understanding are required.



This Waikato map dates from 1935 and clearly shows that the region's lakes were once much larger than they are today. Photo: Waipa District Council



A current map of the same area reveals that drainage has removed an entire lake as well as shrinking others. Photo: Terralink International LTD and Environment Waikato

## 1.2 Understanding site ecology

Interpretative visits by experienced ecologists can be useful to assess the historical development, current ecological state, and restoration potential of the wetland. Visits may include vegetation and/or wildlife surveys, assessments of existing hydrology, and analysis of any wetland remnants.

### 1.2.1 Strengths and weaknesses

- ✓ Can give an understanding of the current ecological functioning and condition of a restoration site and of key species present or absent.
- ✗ Thoroughness and usefulness can vary and will depend on the expertise available and the restoration goals identified.
- ✗ Can be time-consuming and may require visits at different times of the year to determine water levels, wildlife numbers, etc.

### 1.2.2 Resources and expertise

**RESOURCES:** Costs vary depending on the intensity of the examination required and whether the expert requires full cost recovery. However, experts working in universities or government laboratories may be able to carry out the work at minimal expense as a voluntary community service. Botanical societies and ornithological groups may also be able to assist.

**EXPERTISE:** Access to an expert with substantial experience and broad expertise in wetland ecology and hydrology is required. Local knowledge would also be an asset.

Local botanical societies may be able to assist with bringing together plant species lists. Waikato Botanical Society Kawhia field trip, 2006.

Photo: Liz Overdyck, Waikato University



# CASE STUDY

## WAIPORI/WAIHOLA & WAITUNA WETLANDS: DIGGING INTO THE PAST

### THE WAIPORI/WAIHOLA LAKE-WETLAND COMPLEX

The 2000 ha complex 30 km southwest of Dunedin includes several ponds and waterways. Both lakes Waipori (1.05 m deep) and Waihola (2.20 m deep) are tidally influenced. A group of local landowners, stakeholders and regional authorities have expressed interest in restoring the system.

#### Issues

Upstream flow management by a hydro-electric dam, drainage of farmland, water abstraction for irrigation, and climate all regulate the balance of freshwater and saltwater in the system. Future changes in sea level and possibly climate, could exacerbate saline intrusions. Water quality has declined through land development and agriculture.



Despite being one of the largest remaining wetlands in New Zealand, 150 years ago the Waipori/Waihola Lake-Wetland Complex was seven times larger. Photo: Gretchen Robertson, NZ Landcare Trust

### THE WAITUNA LAGOON-WETLAND COMPLEX

The 3556 ha complex lies east of Bluff and is a modified, shallow coastal lagoon with surrounding coastal wetlands. The lagoon is separated from the sea by a gravel bar that is often opened to allow discharge of freshwater and influx of saltwater. A group of local landowners, stakeholders and regional authorities have recently begun exploring possibilities for restoring the system to a more natural state.

#### Issues

A century of native vegetation clearance in the catchment, wetland drainage, increased nutrient inputs into the lagoon, artificial opening of the gravel bar barrier to the sea, agricultural development, and surrounding land use.



The secretive but inquisitive fernbird prefers swamps, pakahi, rush and tussock covered saltmarsh with low vegetation and emergent shrubs. Photo: R Sutton

## Researching the past using common approaches

Fortunately, some relatively good records of historical information exist for both complexes, including maps, paintings, photographs, and historical texts. Recent scientific surveys cover geological, botanical, and limnological aspects of the systems. Local oral histories can also be very informative; however, as the accuracy of the information can be difficult to verify such evidence was not included in this study.

Appropriate reference wetlands were not able to be identified because of the relative size and complexity of both wetland complexes. Virtually

all land and wetlands on the east coast of the South Island have been heavily modified. Although a much smaller remnant wetland in the lower Taieri Estuary still supported native vegetation, this site was not used as a reference wetland due to other numerous differences between it and the Waipori/Waihola Lake-Wetland Complex. Native bush is no longer found in the Waituna Wetlands. However, some relatively undisturbed wetland areas persist, providing useful information on appropriate plants and animals, which could be fostered by restoration efforts.

– *Marc Schallenberg*



**The Waituna Lagoon-Wetland Complex is a DOC administered Ramsar site, highly valued for its ecological values and for hunting and fishing.**

Photo: Janet Gregory, NZ Landcare Trust



### 1.3 Using reference wetlands

The examination of appropriate reference sites can be a means to determining the types and degrees of environmental changes that have occurred. As such, reference sites may also be useful for assessing progress towards restoration. The use of reference sites involves the comparison of the ecosystem structure (e.g., hydrology, communities, habitats, etc.) and function (e.g., productivity, biodiversity, nutrient processing, etc.) of a restoration site to one or more similar, existing unmodified or less modified sites. Reference sites with undisturbed (or minimally disturbed) hydrology, vegetation, biomass, biodiversity, etc., can be used to identify important environmental conditions and ecological characteristics to inform restoration goals.

#### 1.3.1 Strengths and weaknesses

- ✓ Can be used to monitor the progress of restoration, by identifying a set of ecosystem functions, activities, or processes such as hydrology, plant community maintenance, biogeochemistry, that define an ecosystem.
- ✗ None available if all similar potential reference wetlands (i.e. matched in climate, hydrology, altitude, wetland type, etc.) in a region have been modified.
- ✗ High ecological variability within and among wetlands can make finding appropriate reference wetlands difficult.

#### 1.3.2 Resources and expertise

**RESOURCES:** Cost and time depend on the availability of suitable reference wetlands and restoration goals. For example, reference wetlands can be used simply to help establish a list of appropriate species to be planted at a restoration site. On the other hand, where reference wetlands are used to guide the restoration of specific plants and/or hydrological regimes, the study of both restoration and reference wetlands should be conducted throughout the year to capture seasonal variation in plant communities and hydrology.

**EXPERTISE:** Seek expert advice, as an understanding of ecological principles is needed both to identify and use appropriate reference wetlands



Te Hapua, Wellington. Finding appropriate reference sites can be challenging in regions where the landscape has been substantially modified. Photo: Mari Housiaux

## 2 References and further reading

Brinson M. M. and Rheinhardt, R. 1996. *The role of reference wetlands in functional assessment and mitigation*. Ecological Applications 6: 69–76.

Schallenberg M., Harper M., and Goff J.R. *Records of a mid-Holocene sea level highstand and European impact from the Taieri Basin, Otago, New Zealand*. Submitted to Journal of Paleolimnology.

Vivian-Smith, D. 2001. Creating a proper restoration framework. In: Zedler, J. B. (Editor), *Handbook for Restoring Tidal Wetlands*, pp. 39–88. CRC Press, Boca Raton, Florida, USA.

### 2.1 Useful websites

#### Agencies and Crown Research Institutes (science providers)

Regional and District Councils  
[www.localcouncils.govt.nz/lgip.nsf](http://www.localcouncils.govt.nz/lgip.nsf)

Department of Conservation  
[www.doc.govt.nz](http://www.doc.govt.nz)

Crown Research Institutes  
[www.morst.govt.nz/rst-links/crown-research-institutes/](http://www.morst.govt.nz/rst-links/crown-research-institutes/)

#### Scientific journals

NZ Journal of Botany  
[www.royalsociety.org.nz/Site/publish/Journals/nzjb/default.aspx](http://www.royalsociety.org.nz/Site/publish/Journals/nzjb/default.aspx)

NZ Journal of Zoology  
[www.royalsociety.org.nz/Site/publish/Journals/nzjz/default.aspx](http://www.royalsociety.org.nz/Site/publish/Journals/nzjz/default.aspx)

NZ Journal of Ecology  
[www.nzes.org.nz/nzje/](http://www.nzes.org.nz/nzje/)

Notornis  
[www.notornis.org.nz/](http://www.notornis.org.nz/)

#### Herbaria in New Zealand

[www.nzherbaria.org.nz/herbaria.asp](http://www.nzherbaria.org.nz/herbaria.asp)

#### Societies

Botanical Societies  
[www.nzbotanicalsociety.org.nz/pages/links.html](http://www.nzbotanicalsociety.org.nz/pages/links.html)

Ornithological Society of NZ  
[www.osnz.org.nz/](http://www.osnz.org.nz/)

Historical societies  
[www.nzhistoricalsocieties.org.nz/](http://www.nzhistoricalsocieties.org.nz/)

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.