



Manaaki Whenua
Landcare Research

Field guide to wetland types

**Guidance for regional councils to meet mapping
requirements under the NPS-FM 2020**

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1 Introduction

Regional councils are required by the National Policy Statement for Freshwater Management 2020 (NPS-FM) to map wetlands, and assign them a wetland type. While a comprehensive book on wetland types in the New Zealand context is available (Johnson and Gerbeaux 2004), regional council staff have expressed a desire for a shorter document that can be printed on waterproof paper for use in the field. This document is designed to meet that need and act as an aid for individuals in the field seeking to assign wetland type. This document is designed to be used as a complement to Johnson and Gerbeaux (2004) and cross references it for more detail, where appropriate. Regional councils specifically requested more examples of wetlands dominated by exotic species, and these are included in Appendix 1. We considered including diagrams of likely landscape positions of different wetlands, but the topographic changes that happen to differentiate wetlands occur at such small scales, we decided against this. The best 'clue' will be inference as to water flow within the landscape, and this can change at small and large scales.

This document assumes that the wetland extent has already been delimited. There are tools to delimit wetland extent both via desktop methods (Bartlam and Burge 2024) and in the field (Clarkson 2014; Fraser et al. 2018; MfE 2021, 2022a). In reality, we expect that wetland type may be classified at the same time as field verification of wetland extent. However different methods apply to each task, and wetland extent delineation will occur first.

This document is designed to be referred to before a field trip, but we suggest it may be useful to only print the 'During the field trip' section (with any appendices as desired) as an in-field companion.

2 Field guide

2.1 Before the field trip

- 1 Refer to Appendices B and C for skills and preparation required. Links to useful information are provided in Appendix D.
- 2 Assess wetland extent – how large is the wetland? Is it likely there will be multiple wetland types within the mapped wetland extent? The potential number of wetland types will influence how long might be required in the wetland.
- 3 Gather available aerial imagery – assess the vegetation communities (as in the pasture methodology protocol: MfE (2022b)). Assess each major vegetation community and its most likely wetland type as in Johnson and Gerbeaux (2004). Examples of exotic-dominated wetlands are provided in Appendix 1.
- 4 Gather other relevant topographic information, such as topographic maps or digital elevation models. Consider what kinds of wetland types might be present based on this information.

- 5 Gather other relevant information, such as soil nutrient data or previous vegetation plot data. A list of useful links is provided in Appendix D.
- 6 Familiarise yourself with the Lucid key (Burge, 2024 which draws on Johnson and Gerbeaux (2004), the classification scheme in Johnson and Gerbeaux (2004), and this guide).
- 7 Identify the key indicators that are missing information or are uncertain – these will be the in-field priority.
- 8 Decide whether you will be using the Lucid key in-field (for which an electronic device is needed), or using the points below to take notes (pencil and waterproof paper recommended), or some combination of the two.
- 9 Ensure you are field-ready – refer to Appendix B (Skills required) and Appendix C (Pre-trip planning). If you are going on a multi-day trip, we suggest bringing along a copy of Johnson and Gerbeaux (2004) to refer to after leaving the wetland.

2.2 During the field trip

We have separated fieldwork into a temporal sequence of tables (approaching, edge, and within the wetland; Tables 1–3, respectively). However, *all* the information will be required to be integrated to infer wetland type. Before the field trip, missing information will have been identified that will be a priority to collect in order to identify wetland type – pay attention to the best times to gather this information. For example, the water table may be observed on the approach to the wetland if a good viewpoint exists (identify areas of inundation), or the depth to water table may be best measured directly in the wetland, particularly where little visible inundation exists, or viewpoints are lacking.

Table 1. Approaching the wetland

Indicator	Process represented	Key Johnson and Gerbeaux 2004 reference
Geomorphology of surrounding landscape	Water origin, water flow, drainage	Table 2
Topography of wetland	Water flow, drainage	Table 2
Surface water presence	Water table position cf. ground	Table 2

Table 2. Edge of the wetland

Indicator	Process represented	Key Johnson and Gerbeaux 2004 reference
Vegetation	Vegetation integrates multiple processes (e.g. nutrients, hydrology), but note that edge vegetation may differ from the interior (e.g. bog ringed by fen)	Table 3
Slope & topography	Water flow and drainage. Change of slope near a wetland may indicate a marsh downslope of a seep.	Table 2
Drains	Substrate – drains that are cut into soil will allow an examination of the peat/mineral substrate	Table 2

2.2.1 Within the wetland

Confirm your broad map (from aerial imagery) of the vegetation communities within the wetland. This may involve describing the vegetation associations as you move around the wetland (e.g. *Phormium tenax*, *Leptospermum scoparium* over *Empodisma minus*, *Salix cinerea* over *Carex secta*). Vegetation plots may also be useful to assess composition quantitatively. Soil and water samples will be useful in addressing elements of Table 2 from Johnson and Gerbeaux 2004. Assess the relative distribution of wetland types. It may be useful to refine the vegetation communities that have been mapped from aerial imagery, and then assign each community to a wetland type, particularly in larger wetlands.

Table 3. Within the wetland

Feature or indicator	Process or measure represented	Key Johnson and Gerbeaux 2004 reference
Vegetation	Vegetation integrates multiple processes (nutrients, pH, hydrology) Different vegetation communities may indicate a shift in wetland type	Table 3
Water table	Water flow, water table, and drainage	Table 2
Substrate	Peat or mineral? In agricultural settings, peat may be degraded due to drainage	Table 2
Soil nutrients	Nutrient cycling	Table 2
Water chemistry (pH, conductivity, salinity)	Hydrology and nutrient cycling	Table 2
Von Post peat decomposition index value	Peat decomposition – bogs will typically have a lower von Post value than other wetland types, except where anthropogenic drainage has led to decomposition	Not classified

2.3 After the trip

Review the information you have collected against the Lucid key and Johnson and Gerbeaux 2004. If you are assigning wetland type spatially, revise the map of types within the wetland. Otherwise, finalise estimates of relative proportions of wetland type for the wetland and record these in the appropriate database. Assign certainty to your wetland type classification following the guidance in Bartlam and Burge (2024).

3 Acknowledgements

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4 References

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Appendix A – Examples of exotic-dominated wetlands, by type

Regional council feedback on Johnson and Gerbeaux (2004) noted the lack of examples of wetland types for where wetlands are not pristine. This appendix (Figures 1–22) provides examples of different wetland types with varying degrees of anthropogenic impact/exotic species invasion.

Examples of swamps



Figure 1. Swamp dominated by willow with standing water apparent. Bay of Plenty region.



Figure 2. Swamp with a margin of *Salix spp.*, and high standing water with mats of floating *Isolepis prolifera*. Bay of Plenty region.



Figure 3. Swamp with invading *Salix spp.* (background) and surrounded by exotic *Pinus spp.*. *Azolla spp.* and *Carex spp.* occur within the inundated areas of the swamp. Bay of Plenty region.



Figure 4. Swamp (blue line) dominated by *Typha orientalis* in a pastoral setting. Note: some seep wetlands (yellow line) are visible in the background (greener patches following lower contour sloping ground). Waikato region.



Figure 5. Swamp dominated by *Carex secta* within a pastoral setting, and fringed by willow. Key swamp characteristics in this case was common standing water and obligate wetland *Carex* species. Ben Omar swamp, Otematata area, Otago region.

Examples of marshes and seeps

We note that seeps are referred to as a subtype of marsh in Johnson and Gerbeaux 2004, and therefore include them with these examples (as Figures 6–11).



Figure 6. Marsh with exotic grass species, *Cyperus ustulatus*, and *Carex virgata*. Bay of Plenty region.

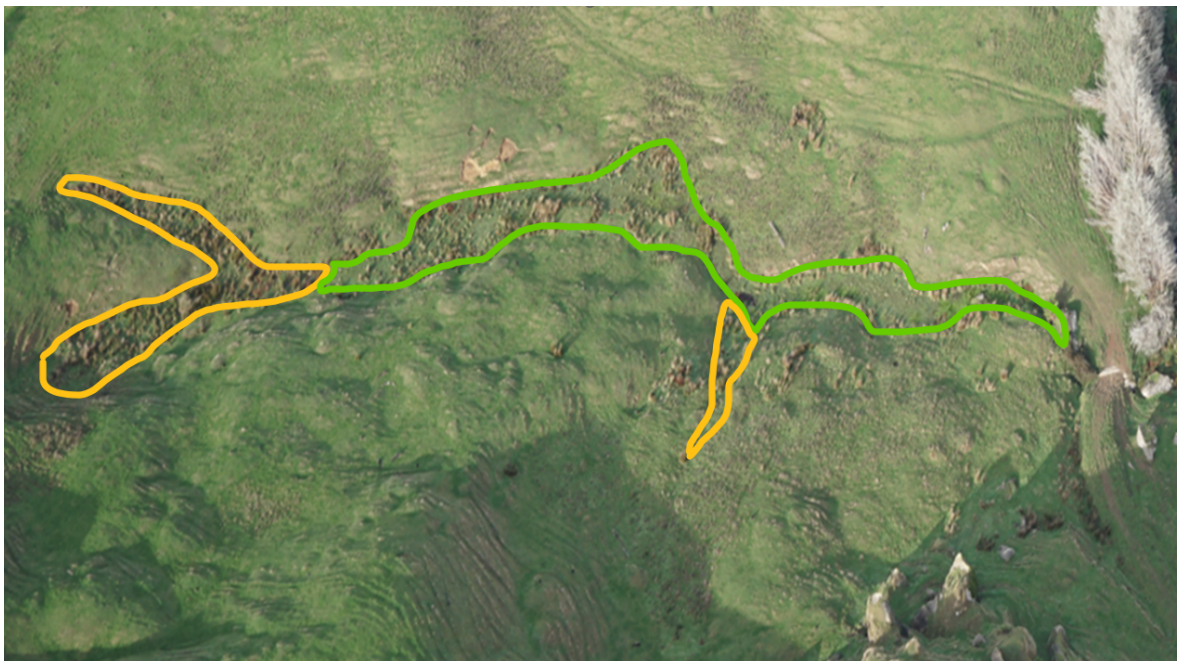


Figure 7. Aerial image of marsh (green line). Rushes, exotic grasses, and herbaceous species appear to be present. Seeps (yellow line) appear on the sloping ground to the upper left of the image. Waikato region.



Figure 8. Marsh (green line) dominated by exotic pasture grasses, in a depressional setting. Waikato region.



Figure 9. Marsh with rush species around the exterior, in a farming landscape. Taranaki region.



Figure 10. Marsh (green line) with 'feeder' seeps (yellow line) on the slope above, within a pastoral landscape. Both marsh and seeps are fringed by rush species. Waikato region.



Figure 11. Saline-influenced marsh dominated by *Apodasmia similis* and *Phormium tenax*. Otago region.

Examples of ephemeral wetlands



Figure 12. Ephemeral wetland in a depressional setting. Otago region.



Figure 13. Ephemeral wetland as pictured from within the wetland. Otago region.

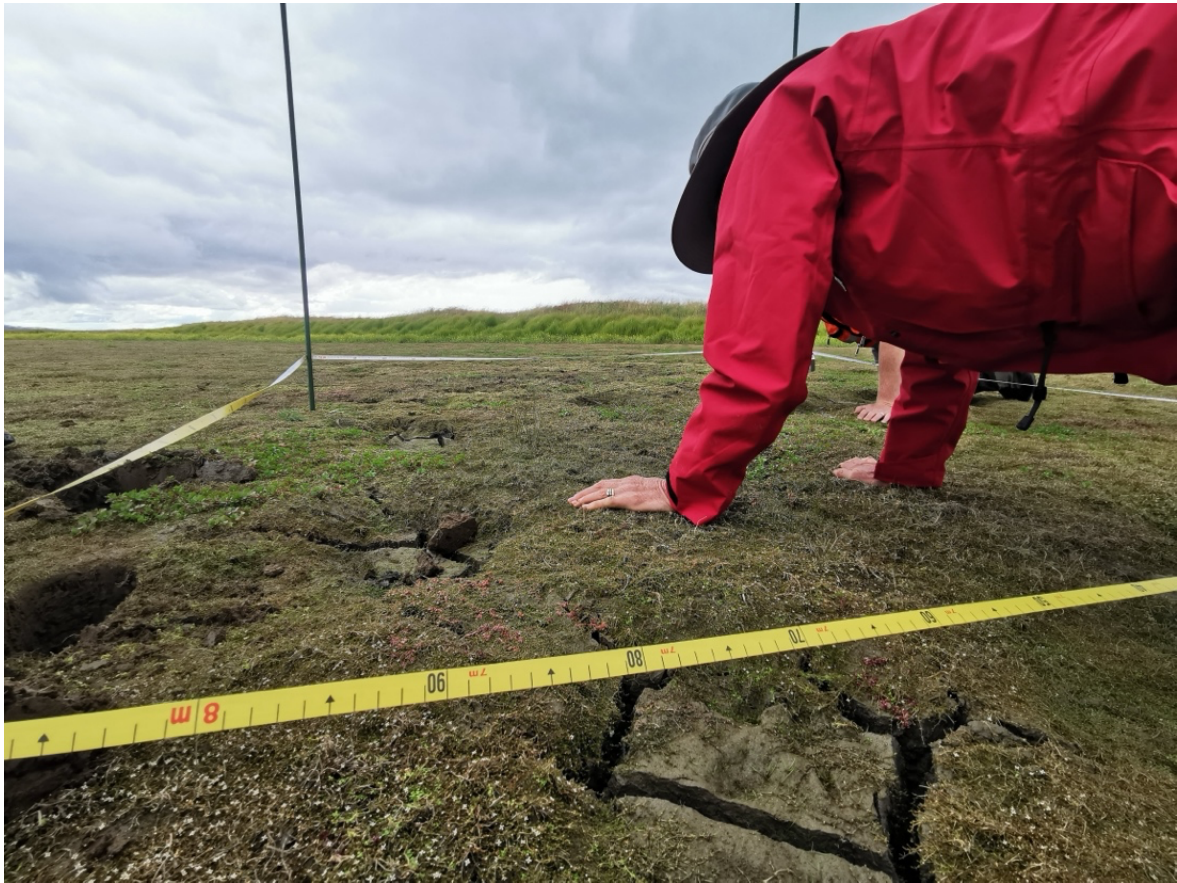


Figure 14. Ephemeral wetland with turf vegetation, within a pastoral setting. Taieri River area, Otago region.

Examples of bogs



Figure 15. 'Classic' pristine restiad bog with *Sporadanthus ferrugineus* and *Empodisma robustum* (both peat-formers). Note: *Sporadanthus ferrugineus* is range restricted to the North Island. Waikato region.



Figure 16. Restiad bog in Southland. Vegetation is *Empodisma minus* being invaded by *Pinus contorta*. Southland region.



Figure 17. The same restiad bog as in Figure 16, with a more extensive perspective. Southland region.



Figure 18. Aerial view of a peat bog within a pastoral landscape. Waikato region.



Figure 19. Constructed wetland (swamp) surrounded by regenerating peat bog. *Gleichenia* spp., *Leptospermum scoparium* in foreground. Ex-farmland. Southland region.

Examples of fens



Figure 20. Classic 'pristine' fen with *Machaerina* spp., *Gleichenia dicarpa*, and *Leptospermum scoparium*. *Empodisma robustum* is just starting to establish in this fen (darker olive green patches amongst the *G. dicarpa*). Duck Creek wetland, Waikato region.



Figure 21. Fen with *Salix cinerea* and *Leptospermum scoparium* at the margins, as seen from aerial imagery. Waikato region.



Figure 22. Fen (background); willow-invaded, with substantial swamp areas (co-author pictured in the swamp). This image represents a mix of wetland types. Bay of Plenty region.

Appendix B – Skills required

Wetland type classification requires many of the same skills as those required to delineate wetland extent (Ministry for the Environment, 2024). In this guide, we focus on field skills as these are most relevant to in-field classification of wetland type.

Ability to carry out fieldwork safely and effectively

- Experience in field health and safety judgements.
- Experience in team management (where appropriate).
- Competent communicator with landowners.
- High level of fitness.
- Excellent navigational skills.
- Experience or training in working in wet environments.

Specialist skills relevant to wetland type

- Familiarity with New Zealand wetland types, the ecological processes by which they are classified, and an ability to assess how these processes may present in the field.
- Geomorphological knowledge and observational skills, in order to determine water flow in the landscape (relevant to water sources for wetlands, a key determining characteristic).
- Botanical skills in order to identify key species that indicate different wetland types (see Johnson and Gerbeaux (2004) and the Lucid key (Burge, 2024) for indicator species).

Appendix C – Pre-trip planning

Regional councils and other institutions will have their own protocols for field preparation, and inductions for fieldwork. Some good practice minima are shown in the bullets below (and can be used as a checklist).

- Identify the wetland of interest.
- Gather information (see 'Before the field trip' in main text).
- Contact owners, land managers, and other interested parties, as appropriate, to seek permission to enter the land.
- Ensure date and time of field trip will be appropriate to the likely species (e.g. herbaceous species are easiest to identify while reproductive organs are present), and that 'normal circumstances' are present. Normal circumstances are critical for wetland extent delineation, but also important for classifying wetland type. For example, if a large pulse of sediment has been deposited due to an unusual flood, shorter vegetation types may be unidentifiable, leading to uncertainty as to wetland type.
- Complete health and safety planning and hazard identification. Purchase any required personal protective equipment.
- Discuss expected fieldwork conditions with all parties before entering a site as part of a health and safety briefing.
- Check all field gear – this includes ensuring sufficient recording implements, that any GPS points are successfully loaded on a device, and that all field meters are working and – if required – calibrated.

Appendix D – Links to relevant information

Table 4. Sources of relevant information, sorted by whether the tool is primarily designed for desktop or in-field use, and whether the tool has information relating specifically to wetland extent, or classifying wetland type.

	Desktop	Field
Wetland extent	Wetland delineation using desktop methods: a guide	Wetland delineation protocols Ministry for the Environment A vegetation tool for wetland delineation in New Zealand (landcareresearch.co.nz) Pasture-exclusion-assessment-methodology.pdf (environment.govt.nz) Hydric soils – field identification guide (landcareresearch.co.nz) Wetland delineation-hydrology-tool-final.pdf (environment.govt.nz)
Wetland type	Johnson P and Gerbeaux P. 2004. Wetland types of New Zealand . Wetland delineation¹ using desktop methods: a guide https://datastore.landcareresearch.co.nz/dataset/wetland-mapping-resources	This guide. Lucid key to wetland types of New Zealand

¹ Note although the report is entitled 'Wetland delineation', there is a section specifically on assigning wetland type using desktop methods.