Ministry for the Environment
Manatū Mō Te Taiao

# Wetland delineation protocols

New Zealand Government

**Acknowledgements**

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# Contents

# Introduction

A robust national method for delineating wetlands is required for the implementation of policy regarding wetlands under the National Policy Statement for Freshwater Management 2020 (https://www.mfe.govt.nz/publications/fresh-water/national-policy-statement-freshwater-management-2020). The following protocols have been developed to allow for both off-site wetland identification by experienced wetland ecologists in cases that are clearly wetlands, and on-site delineation of areas that are less clear-cut.

# Background

The approach is based on the US wetland delineation system for regulatory purposes (Environmental Laboratory 1987, and US Army Corps of Engineers updates). This uses three criteria: vegetation, soils, and hydrology. The vegetation and soils criteria have been adapted for New Zealand conditions and are available as the Vegetation Tool (Clarkson 2014) and the Hydric Soil Tool (Fraser et al. 2018). The Hydrology Tool is currently under development, but many of the main hydrology indicators of the US system (eg, observation of surface or ground water) are directly applicable.

The Vegetation Tool applies the Dominance Test and the Prevalence Index to a plant community to determine whether the vegetation is hydrophytic (wetland). When the Vegetation Tool is used on its own, both the Dominance Test and the Prevalence Index are required to be satisfied for the site to be categorised as a wetland. In the absence of wetland soil and hydrology tools, these two plant-based tests applied in tandem are considered to provide the on-site quantitative data necessary for delineating wetlands and their boundaries. A third vegetation procedure, the US Rapid Test (Environmental Laboratory 1987), which requires less quantitative data and less effort, was not used in the 2014 New Zealand Vegetation Tool.

With the subsequent development of the Hydric Soil Tool (Fraser et al. 2018) and the imminent development of the Hydrology Tool (the US system could be applied in the interim), the full set of wetland delineation criteria will be available. We here incorporate the Rapid Test for vegetation as a simple first step for assessing obviously-wetland vegetation (eg, raupō reedland) that can be conducted offsite. The full step-by-step procedure encompasses hydrophytic vegetation, hydric soil, and wetland hydrological characteristics.

# Wetland Delineation Procedure

1. Determine the project area (the putative wetland).
2. Decide if ‘normal circumstances’ are present, ie, typical climatic/hydrologic conditions, and no recent disturbances or modifications to the project area. If yes, proceed to step 3. If no, proceed to step 7.
3. Identify and map the major vegetation types using aerial photographs, maps, contours, inventory reports, other data, and, if necessary, on-site field verification.
4. ***Off-site methods*** to identify wetland presence and sketch approximate boundaries. Wetlands may be confirmed without an on-site inspection depending on:
    i the amount and quality of data (vegetation, soils, hydrology, topography)
    ii wetland ecological expertise to interpret the data.

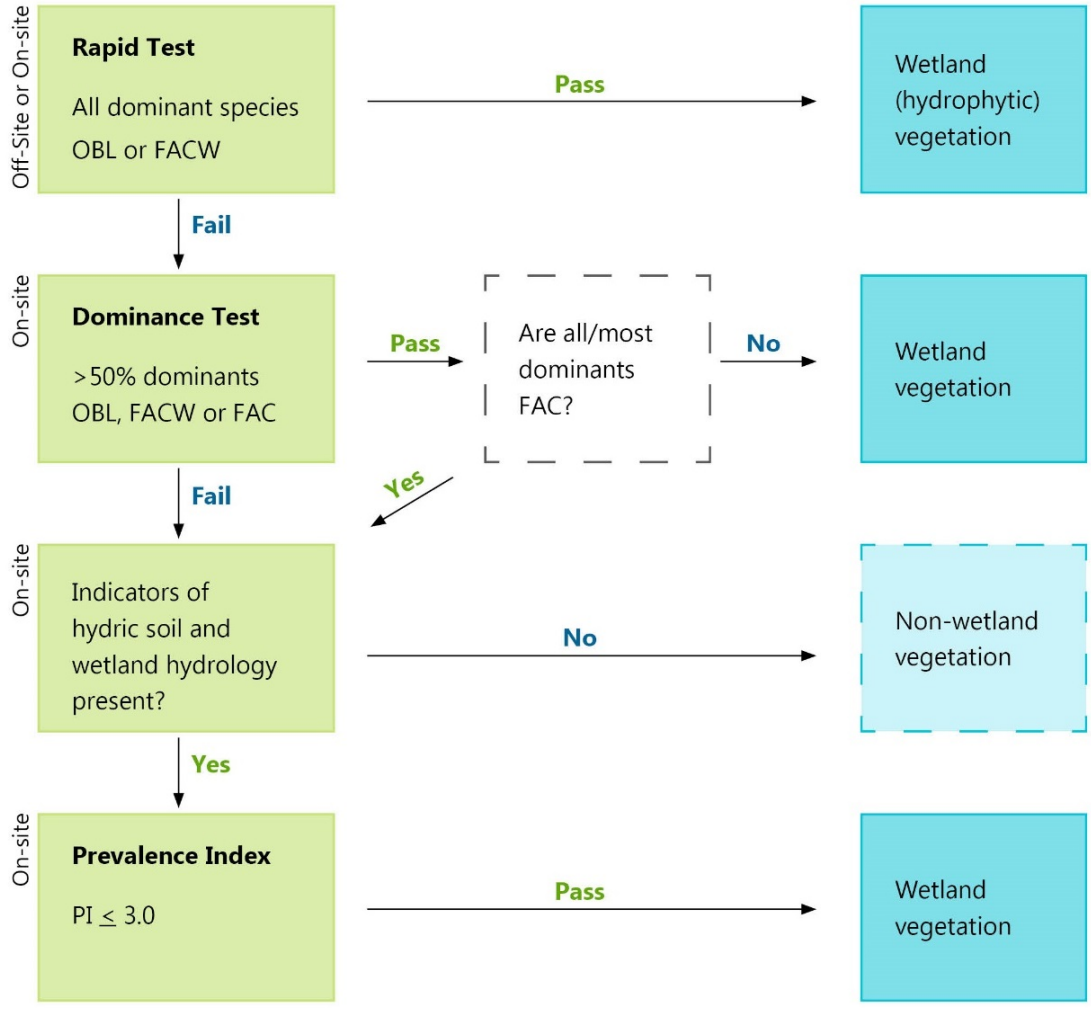
5. ***On-site methods*** to delineate wetland presence and accurate boundaries:

   i for small areas (≤2 ha), establish a representative plot in each major vegetation type and record the plot vegetation in three strata: tree, sapling/shrub, herb

   ii for larger areas, establish representative plots along transects (as per Clarkson 2014) and sample the vegetation in three strata: tree, sapling/shrub, herb.

6. ***Hydrophytic vegetation determination.*** Based on the data you have gathered, conduct a hydrophytic vegetation determination using the following flow chart (figure 1). Wetland indicator status ratings for species are in Clarkson et al. 2013 and subsequent updates.

**Figure 1:** **Flow chart of steps for hydrophytic (wetland) vegetation determination. Wetland indicator status abbreviations: FAC= facultative; FACW = facultative wetland; OBL = obligate wetland.**




7. The above procedure will be used in the vast majority of wetland delineations. However, recent disturbance or abnormal environmental conditions may result in atypical or problematic wetland situations in which one or more of the three criteria (vegetation, hydrology, soils) is/are absent. In these cases, more information and quantitative data will be required and the US procedures for these situations are recommended (sections E–G in Environment Laboratory 1987, and subsequent updates).

# Glossary

***Dominance Test**:* more than 50% of dominant species across all strata are rated OBL, FACW, or FAC using the 50/20 rule.

***Dominant species**:* the most abundant plant species (when ranked in descending order of abundance, e.g. in a plot, and cumulatively totalled) that immediately exceed 50% of the total cover for the stratum, plus any additional species comprising 20% or more of the total cover for the stratum. This is known as the 50/20 rule, and is calculated for each stratum (tree, sapling/shrub, and herb).

***Growing season**:* this needs to be developed and defined in the Hydrology Tool.

***Hydric soils**:* soils that have formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic (low oxygen) conditions in at least the upper 30 cm of the soil.

***Hydrophytes (hydrophytic vegetation)**:* plant species capable of growing in soils that are often or constantly saturated with water during the growing season. The hydrophyte categories (wetland indicator status ratings: Clarkson et al. 2013 and subsequent updates) are:

> ***Obligate (OBL)**:* occurs almost always in wetlands (estimated probability >99% in wetlands)
>
> ***Facultative Wetland (FACW)**:* occurs usually in wetlands (67–99%)
>
> ***Facultative (FAC)**:* equally likely to occur in wetlands or non-wetlands (34–66%)
>
> ***Facultative Upland (FACU)**:* occurs occasionally in wetlands (1–33%)
>
> ***Upland (UPL)**:* rarely occurs in wetlands (<1%), almost always in 'uplands' (non-wetlands).

***Normal circumstances**:* the long-term or stable condition of a site including any legal alterations, such as highways, dams, and other relatively permanent development. The concept also includes the soil and hydrologic conditions that are normally present, in cases where the vegetation has been altered or removed.

***Off-site wetland delineation**:* assessment is made as a desk-top exercise using pre-existing information (ie, does not require a field inspection).

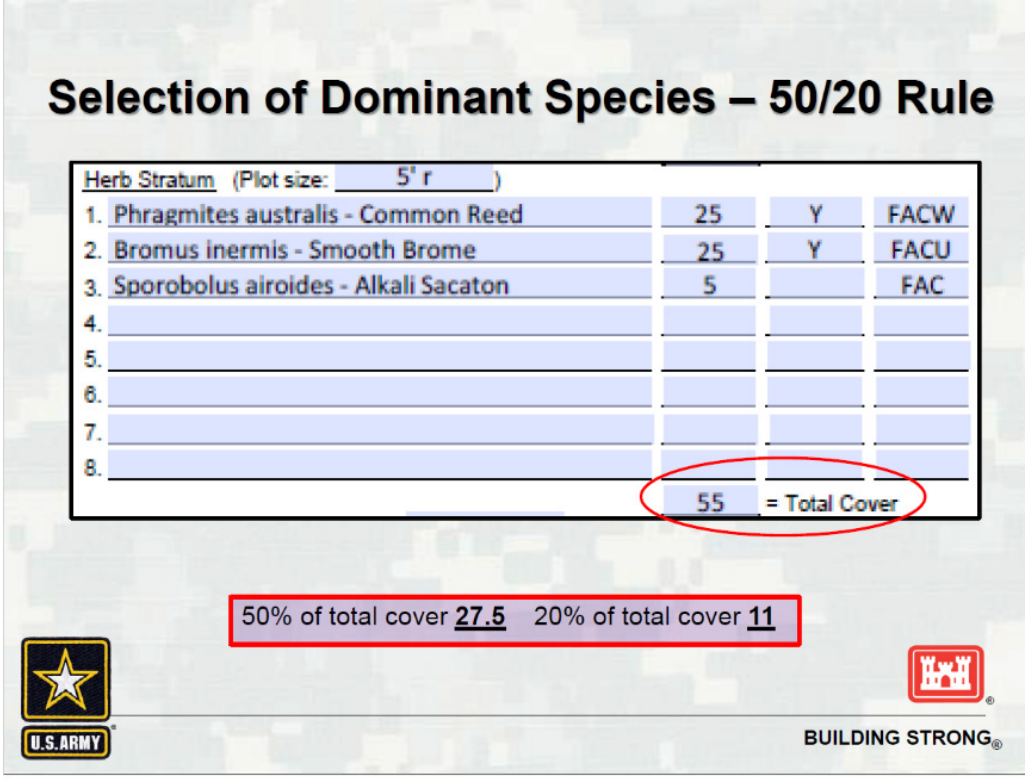
***On-site wetland delineation**:* assessment is made based on information gathered from a field visit to inspect the area under investigation.

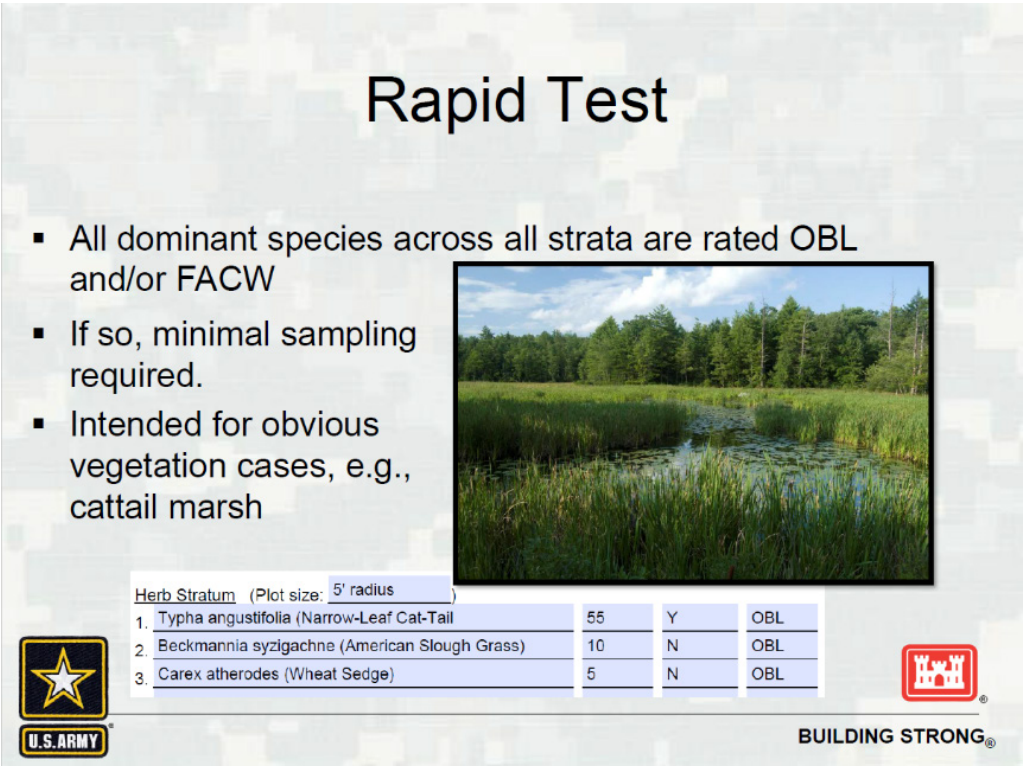
***Prevalence Index (PI)**:* a plot-based algorithm derived from the unique combination of OBL–UPL plants and their cover. The vegetation is considered to be hydrophytic (wetland) if PI ≤ 3.0, but values around 3.0 should be used alongside other wetland indicators.

***Rapid Test**:* all dominant species across all strata are rated OBL and/or FACW.

# Appendix 1 – Illustrated examples of wetland delineation protocols

The following examples illustrating some of the protocols are from Morse (2016). These are from US wetlands, but they could easily be adapted for New Zealand examples.



# Dominance Test

- More than 50 percent of dominant plant species across all strata are rated OBL, FACW, or FAC
- 50/20 Rule

**Dominance Test worksheet:**

| | | |
|---|---|---|
| Number of Dominant Species That Are OBL, FACW, or FAC: | 3 | (A) |
| Total Number of Dominant Species Across All Strata: | 4 | (B) |
| Percent of Dominant Species That Are OBL, FACW, or FAC: | 75 | (A/B) |

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## Determining Dominance: Ties in Percent Cover

Herb Stratum (Plot size: 5' r )

| | | | | |
|---|---|---|---|---|
| 1. | Luzula parviflora (small-flower wood-rush) | 10 | Y | FAC |
| 2. | Oxypolis fendleri (Fendler's cowbane) | 8 | Y | FACW |
| 3. | Juncus dudleyi (Dudley's rush) | 8 | Y | FAC |
| 4. | Saxifraga chrysantha (golden saxigrage) | 8 | Y | FACU |
| 5. | Senecio triangularis (arrow-leaf ragwort) | 5 | N | FACW |
| 6. | Carex aquatilis (leafy tussock sedge) | 1 | N | OBL |
| | | 40 | = Total Cover | |

50% of total cover **20** 20% of total cover **8**

**If two or more species are equal in coverage (i.e., they are tied in rank), they should all be selected.** The selected plant species are all considered to be dominants.

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# Prevalence Index

**Prevalence Index worksheet:**

| | Total % Cover of: | | Multiply by: | |
|---|---|---|---|---|
| OBL species | | x 1 = | | |
| FACW species | 50 | x 2 = | 100 | |
| FAC species | 5 | x 3 = | 15 | |
| FACU species | 35 | x 4 = | 140 | |
| UPL species | 6 | x 5 = | 30 | |
| Column Totals: | 96 | (A) | 285 | (B) |

Prevalence Index = B/A = 2.97


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