

Wetland delineation protocols

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Introduction

A robust national method for delineating wetlands is required for development of policy regarding wetlands under the proposed NPS-Indigenous Biodiversity. The following protocols have been developed to allow for both off-site wetland identification by experienced wetland ecologists in cases which are clearly wetlands, and on-site delineation of areas that are less clear-cut.

Background

The approach is based on the USA wetland delineation system for regulatory purposes (Environmental Laboratory 1987 and U.S. Army Corps of Engineers updates), which comprises 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 yet to be developed, however, many of the main hydrology indicators of the USA system, e.g., observation of surface or ground water, are directly applicable.

Vegetation Tool

The Vegetation Tool applies the Dominance Test and the Prevalence Index to a plant community to test whether the vegetation is hydrophytic (wetland). When the Vegetation Tool is used on its own, both tests (Dominance Test, Prevalence Index) are required to be satisfied for the site to be categorised as a wetland. With the development of the Hydric Soil Tool (Fraser et al. 2018), and the imminent development of the Hydrology Tool (although the USA system could be applied in the interim), the full set of wetland delineation criteria will be available. As a result of having additional indicators, we now incorporate the Rapid Test for vegetation (Environmental laboratory 1987) as a simple first-step for assessing obviously-wetland vegetation, e.g., raupo reedland, that may be conducted offsite.

Procedure:

- 1 Determine project area i.e., the putative wetland
- 2 Decide if 'normal' circumstances are present i.e., typical climatic/hydrologic conditions, no recent disturbances or modifications to project area. If yes, use Routine Method and proceed to 3. If no, use the Comprehensive Method, which uses detailed quantitative information (Section E in Environmental Laboratory 1987)
- 3 Identify and map the major vegetation types using aerial photographs, maps, reports, other data, and on-site field verification.
4. **Off-site methods** for wetland determination. Wetlands may be confirmed off-site depending on:
 - i) Amount and quality of data (vegetation, soils, hydrology, topography)
 - ii) Wetland ecological expertise to interpret data

5 **On-site methods** for wetland delineation. For small areas (≤ 2 ha), establish a representative plot in each major vegetation type. Record plot vegetation in 3 strata: Tree, Sapling/Shrub, Herb

6 For larger areas, establish representative plots along transects as per Clarkson 2014. Sample vegetation in 3 strata as above.

7 Hydrophytic vegetation determination:

Rapid Test (all dominants OBL or FACW) → pass → wetland vegetation

↓fail

Dominance Test (>50% dominants OBL, FACW, FAC) → pass → wetland vegetation. NB if all/most dominants are FAC, e.g., pakihī, gumland, Hydric Soil and Hydrology assessments are required

↓fail

Indicators of Hydric Soil and Wetland Hydrology present? → no → non-wetland vegetation

↓yes

Prevalence Index ($PI \leq 3.0$) → pass → wetland vegetation

↓fail ($PI > 3.0$)

Problematic wetland situation, e.g., recent disturbance, vegetation sparse or absent, lacking one of the three criteria, Prevalence Index close to 3.0. Use Comprehensive Method (Environmental Laboratory 1987).

Glossary:

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. Known as the 50/20 rule. Calculated for each stratum (Tree, Sapling/Shrub, and Herb).

Growing season: Needs to be developed and defined in the Hydrology Tool

Hydrophytes: 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) 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)

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

Dominance Test: More than 50% of Dominant Species across all strata are rated OBL, FACW, or FAC using the 50/20 rule.

Prevalence Index: 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 $PI \leq 3.0$, however values around 3.0 should be used alongside other wetland indicators.

References

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Environmental Laboratory 1987. Corps of Engineers Wetlands Delineation Manual Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, Mississippi. 100 pp. plus appendices.

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Fraser S, Singleton P, Clarkson B 2018. Hydric soils – field identification guide. Envirolink Tools Contract C09X1702. Landcare Research Contract Report LC3233 for Tasman District Council.

https://www.landcareresearch.co.nz/_data/assets/pdf_file/0007/170935/hydric-soils-fieldguide.pdf

Appendix 1: Illustrated examples of wetland delineation protocols from Morse (2016)

The following illustrations are from Morse T (2016) Wetland delineation and Technical Criteria. US Army Corps of Engineers, Colorado Regulatory Branch, Colorado to illustrate some of the protocols. http://www.spk.usace.army.mil/Portals/12/documents/regulatory/Reg_workshop/2016-10-12-GJ/4-RegulatoryWorkshopPresentation.pdf?ver=2016-10-17-133020-190

NB: No permission has been sought to use these. If they are considered useful, we will develop some NZ examples.

Selection of Dominant Species – 50/20 Rule

Herb Stratum (Plot size: 5' r)			
1.	Phragmites australis - Common Reed	25	Y FACW
2.	Bromus inermis - Smooth Brome	25	Y FACU
3.	Sporobolus airoides - Alkali Sacaton	5	FAC
4.			
5.			
6.			
7.			
8.			
		55	= Total Cover

50% of total cover 27.5 20% of total cover 11




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Rapid Test

- All dominant species across all strata are rated OBL and/or FACW
- If so, minimal sampling required.
- Intended for obvious vegetation cases, e.g., cattail marsh



Herb Stratum (Plot size: 5' radius)			
1.	Typha angustifolia (Narrow-Leaf Cat-Tail)	55	Y OBL
2.	Beckmannia syzigachne (American Slough Grass)	10	N OBL
3.	Carex atherodes (Wheat Sedge)	5	N OBL




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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 saxifrage)	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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