

## CONSISTENT WETLAND MAPPING

Prepared by the Regional Biomanagers Group for the BCG

Championed by Rob Smith, Tasman District Council

15 June 2018

1. This brief note is to outline the existing and accepted standard method for wetland extent mapping. For completeness sake the identification of wetlands has not really been the problem in getting wetlands protected. For the majority of ecologists what is a wetland has not been in question, however wetland boundaries may be less clear. Earlier definitions used international methods or relied on the ecologist's knowledge of typical wetland plant species. Latterly the wetland type and extent was based on the New Zealand Wetland Classification System, which was comprehensively developed in the Johnson and Gerbeaux publication '*Wetland Types in New Zealand*'. This work mostly focused on hydro system types and associated species assemblages rather than how to define the marginal boundary.
2. Wetland boundaries were normally determined from existing wetland maps captured via the Protected Natural Areas Programme or Significant Natural Area mapping processes, were contained within the Land Cover Database layers or mapped from aerial photography by Council staff or contractors based on distinct vegetation boundaries. The need to more accurately define a boundary has arisen due to a softness of the regulatory framework, or possibly more accurately, the effective manoeuvring by those wishing to push-back on the extent of wetland coverage. The need to manage and protect the entire wetland is the pressing issue in ensuring adequate protection. Many existing and 'known' wetlands were, and some still are, being eroded by margin activities (drainage, stock damage, over sowing, spraying, urban sprawl, developments...).
3. From the days of the early national schemes to measure and record wetlands (e.g. Department of Conservation WERI database) ecologists have been able to identify wetland type and general extent. With the rise of the likes of the NZ Landcare Trust, National Wetland Trust, biodiversity enhancement groups and a general awakening of the public to the role and function (and hopefully the beauty) of wetlands there is now a wider cadre of ecologists involved in wetland identification, delineation and calls for protection. The contest now is focused on extent and significance. As the value of the 'dry' ground surrounding the wetland increases the need to define the extent increases.
4. To avoid contest and increase objectivity two tools have been provided for New Zealand wetlands that greatly assist this process. These have been adapted from tools developed by the US Army Corps of Engineers. The first is based on vegetation '*A vegetation tool for wetland delineation in New*

*Zealand* and is the primary tool that should be used in any assessment of extent. This uses wetland indicator status ratings (e.g. obligate, facultative) for both native and exotic species found in New Zealand wetlands to define where the vegetation indicates the change from predominately wet to predominately dry and is based on a plot or transect surveys. This tool was initiated via a contract to Manaaki Whenua Landcare Research from Meridian Energy to provide the first step in developing a wetland delineation system to help define wetlands on the ground. Their aim was to provide a vegetation-based tool to assist councils, wetland landowners, managers and other stakeholders in identifying and delineating wetland areas. The tool has standardised procedures and recording formats, so there is confidence that once an ecologist is field competent, by following the protocol their work will be consistent across the country. This tool was supported in its development through commercial contracts, MBIE funding and via support from the Department of Conservation, NIWA and Regional Councils/Unitary Authorities.

5. This information is robust and has been tested in the court so has a level of rigour that supersedes earlier work. While not all Councils are using every aspect of the tool the majority are using components and that uptake is increasing as the level of rigor needed to ensure adequate information, that is beyond contest, is achieved. Given that not all Councils are directly using the whole Tool, it is safe to say that no Council is working inconsistently with the Tool's procedures.
6. Based on vegetation alone there is sometimes dissent between parties as to the definitive dryland margin especially where the vegetation pattern is not intact or dominated by facultative species (common in both 'dry' and wetlands), e.g. manuka. Therefore a second tool has now been adapted by Landcare Research staff from the US Corps of Engineers, '*Hydric soils - field identification guide*' (in draft). This, in most situations, allows the margin to be established even when the vegetation has been altered by disturbance like fire, over sowing, mowing, stock damage, spray or draining. The two tools used together along with the topographical and historical nature of the location provide solid footing for extent characterisation. The development of this second tool was supported by in kind support in the regions and via the use of both Envirolink Medium Advice Grants and via an Envirolink Tools bid. There was universal support by the Biomanagers Group to see this tool made available to support the vegetation tool that is already in use.
7. These tools are used to delineate wetlands, irrespective of ecological and other values. They include boggy patches on farmland dominated by exotic rushes, grasses and herbs. The significance and relevance filter needs to be applied separately (Councils are not in the habit of calling badly managed pasture a wetland). At present the standardisation of methods to define significance are still being firmed up. While the measures are generally accepted there is a lack of historical extent knowledge for many wetlands. This was being addressed in the Waters of National Importance project

(WONI) led by DOC but has now fallen back to the Regional/Unitary authorities to determine. While historic extent is important, it is likely that most existing wetlands will be classed as significant given the loss nationally of many of the wetland types.

8. Lastly, for a small number of significant wetlands, especially in ephemeral situations (e.g., gumlands, pakihi, marshes) there is a third tool in the US kit relating to hydrology. There is likely to be a call for further work to 'localise' this tool also so it can be applied in tandem with the vegetation and soil tools where results are inconclusive or misleading.

### **What's the skinny on the Tools actual use?**

9. The Councils use of the Tool is actually still a little variable as shown in the attached table at the end of the document. This reflects the relatively recent adoption and given that essentially, with experience, ecologists are usually delineating the majority of wetlands very quickly based on visual clues such as changes in topography and dominance of common wetland plants, e.g., raupo, rushes, sedges. This is essentially applying the Dominance Test from the tool (using the tool in a cut down manner). Most are easily finding the edge of a wetland where the dominant vegetation changes from wetland plants to being dominated by dryland terrestrial plants. Initially many will apply the protocols, and when they have a good understanding of their region, they can do this without formal plots, but resort to using the tool in more tricky situations. The added value of the full tool is in dispute resolution, either in the field with landowners, or in court cases/hearings. In contentious cases the data on the plot sheets can be interpreted by other experienced delineators (without a field visit) as to whether it was sampled/interpreted correctly, and if the result is valid (or not). So the standardisation throughout NZ is important and is occurring, much like the present Council initiated process for standardising dairy farm inspections to ensure consistency (e.g. Tasman and Marlborough have done inter region comparisons and have been audited by LCR for an added level of rigour). This should save costly legal and consultancy fees for all parties by providing a standard national approach for hearings, court cases, and plans, and speeding up resource consent processes.
10. So yes the tool is being used and the use is increasing.

### **How does it compare to the proposed Auckland example?**

11. Anything is better than nothing and deriving a standard for wetland identification and delineation is seen as useful. Note that there are varying levels of accuracy required for identifying the location and limits of wetlands. Depending on the land use implications of the decisions of delineation decisions, then the certainty/objectivity required varies. For example when plan rules allow subdivision based on the presence or area (m<sup>2</sup>) of wetlands

present, then the need for accuracy is high. Where the presence/boundary is being used to guide fencing location or when working with a proactive landowner, then a certain amount of pragmatism and lower degree of accuracy may be acceptable.

12. At the collective council level we have accepted that an experienced staff member or external expert is required to accurately identify wetlands 'where necessary' (bearing the above point re accuracy and consequences of identification and delineation in mind). While it is acknowledged that there are financial implications of expert derived assessments, this cost is not considered out of scale with the financial implications of such assessments (a horses for courses approach applies). This assessment could well form part of the standard ecological assessment required under a planning processes and would therefore not be a significant addition to costs.
13. The example Auckland tool given is a one size fits all and does not assess or guide a significance assessment. A significance assessment (in the Auckland context) is driven by 'significance factors' and the ecosystem classification referenced in Auckland Unitary Plan (AUP) (using the national Singers and Rogers ecosystem classification, which has been articulated in an Auckland specific ecosystem guide: <http://knowledgeauckland.org.nz/assets/publications/Indigenous-terrestrial-and-wetland-ecosystems-of-Auckland-2017.pdf> ).
14. The current approach appears to be most useful for a 'greenfields' development situation in Auckland. However, there is some concern that despite this aim, it would be picked up and used beyond those areas.
15. The important point is that the approach taken in determining whether an area is wetland based on the presence of a species commonly found in rural Auckland is too simplistic - it implies that the presence of a single obligate species makes the area a wetland, without considering abundance, which the delineation tool measures when delineating a wetland (dominance test and prevalence). In practice any staff or ecologist undertaking an assessment needs to be using and aware of the species covered in the 'wetland indicator status ratings' work and not be restricted to a limited subset of those plants, or there is a chance that due to modification the site may be mis-identified as not being a wetland.

**Do we have methods to allow, in terms of practicality and cost effectiveness, a wetland tool for scheduling wetlands in our Plans?**

16. Yes, we can use the existing fit for purpose ways of identifying the bulk of sites based on topography, history and effectively the dominance test (based on training and experience) and then use the vegetation tool on the sites where there's conjecture about the existence of a wetland, e.g. where a landowner is disagreeing with the initial assessment, or where council officers

aren't sure about the site (the less obvious ones). In more marginal situations the 'soils' tool will offer additional corroborating information.

17. In order to create a schedule of wetlands in a Council Plan there is no need to expect the tools to be used on every site, it will only be needed on those where there's doubt about what's present on site or where there is debate about its extent.

18. The area where there is still some lingering debate is in assigning significance. The standard approach is to use a standard set of measures but work to agree nationally for wetlands is yet to occur, but is well advanced, e.g. the Auckland reference above or the reworked terrestrial version from Tasman. In determining a schedule of wetlands for a Plan the significance assessment is not a priority due to one of the primary drivers of significance being the 'remaining extent'. So mapping and capturing wetlands of all forms is the primary need. The existing vegetation tool for wetland delineation and the in-development hydric soils tool are more than adequate for this purpose. The limiting factor is time, resources and demand to get the surveys completed.

<b>Council</b>	<b>Is your Council active in wetland survey work? (extent or significance)</b>	<b>Is your council using the LCR wetland vegetation tool to define wetland extent?</b>	<b>If not what tool are you using</b>	<b>Is your Council planning to pick up and use the LCR soils tools?</b>
NRC	Yes	Yes		Yes
AC	Yes	No	Expert ecologist	Yes
WRC	Yes	No	LCDB & FENZ	Maybe
EBOP	Yes	Yes**		Yes
GDC	Yes	No	Staff assessment	Maybe
HBRC	Yes	No	Staff assessment	Yes
TRC	Yes	Yes*	Staff assessment	Yes
M-WRC	Yes	No	Staff assessment	Maybe
GWRC	Yes	Yes		Yes
MDC	Yes	No	Staff assessment	In contestable circumstances
NCC	Yes	Yes	Na	Maybe
TDC	Yes	Yes	Na	Yes
WCRC				
ECan	Yes	Yes	Na	Maybe
ORC	Yes	Yes		Maybe
ES	Yes	Yes		Maybe

\*TRC using the tool for SEM only at this stage; \*\*limited use

**The Routine Method for wetland delineation using the vegetation tool is as follows:**

1. Determine project area
2. Decide whether 'normal' circumstances are present. The Routine Method should not be applied for atypical situations, e.g. abnormal environmental conditions (drought, flood) or recent disturbances (landslides), or wetlands that have been filled, drained or cleared
3. Identify and map the major vegetation types in the project area.
4. For areas  $\leq 2$  ha, establish a representative plot in each major vegetation type (Fig. 2 of Clarkson 2014).
5. For areas  $> 2$  ha, establish representative plots along transects running perpendicular to the suspected wetland boundary (Fig. 3). At least one plot for each vegetation type should be sampled and therefore located on at least one transect. The suggested minimum number of transects ranges from 3 for wetlands up to 1.5 km in length, to 8+ in wetlands longer than 6.5 km long.
6. Sample the plot using the Dominance Test and Prevalence Index.
7. Refine the wetland boundary on the ground, by using visual clues such as changes in topography (e.g. flat – hillslope interface), vegetation or soils, and/or establish paired sample plots (wetland/upland) located close enough to either side of the wetland boundary to substantiate boundary location.

**Key relevant wetland references for wetland extent and type mapping. The three in bold are the primary reference tools.**

Atkinson, I.A.E.; Derivation of vegetation mapping units for an ecological survey of Tongariro National Park North Island, New Zealand. 1985. New Zealand Journal of Botany. Vol 23: 361-378:

**Clarkson, B.R. 2014; A vegetation tool for wetland delineation in New Zealand. Lincoln, New Zealand, Manaaki Whenua Press.**

**[https://www.landcareresearch.co.nz/data/assets/pdf\\_file/0003/71949/vegetation\\_tool\\_wetland\\_delineation.pdf](https://www.landcareresearch.co.nz/data/assets/pdf_file/0003/71949/vegetation_tool_wetland_delineation.pdf)**

**Clarkson, B.R., Champion, P.D., Johnson, P.N., Bodmin K.A., Forester I., Gerbeaux P. and Reeves P.N.; 2013. Wetland indicator status ratings for New Zealand species. Landcare Research, Hamilton.**

Clarkson, B.R., Fraser, S.N.; (draft). Hydric soils –field identification guide Envirolink Advice Grant: 1732-GSDC137

Clarkson, B.R., Sorrell, B.K., Reeves, P.N., Champion, P.D., Partridge, T.R., and Clarkson, B.D. 2003 (rev. 2004) Handbook for Monitoring Wetland Condition. [www.landcareresearch.co.nz/publications/researchpubs/handbook\\_wetland\\_condition.pdf](http://www.landcareresearch.co.nz/publications/researchpubs/handbook_wetland_condition.pdf)

Cromarty, P. and Scott, D.A. (Eds). 1995. A Directory of Wetlands in New Zealand. Department of Conservation, Wellington, New Zealand.  
[www.doc.govt.nz/upload/documents/science-and-technical/nzwetlands00.pdf](http://www.doc.govt.nz/upload/documents/science-and-technical/nzwetlands00.pdf)

Johnson, P. and Brooke P.A.; 1998. Wetland plants in New Zealand. Lincoln, New Zealand, Manaaki Whenua Press. 319 p.

**Johnson, P. and Gerbeaux, P. 2004. Wetland Types in New Zealand. Department of Conservation, Wellington, New Zealand.**  
[www.doc.govt.nz/upload/documents/science-and-technical/WetlandsBW.pdf](http://www.doc.govt.nz/upload/documents/science-and-technical/WetlandsBW.pdf)

Peters, M. and Clarkson, B.R.; 2010. Wetland Restoration, A handbook for New Zealand Freshwater Systems. Lincoln, New Zealand, Manaaki Whenua Press.

Ward, J.C. and Lambie, J.S.; 1998; Coordinated monitoring of New Zealand wetlands. A Ministry for the Environment SMF funded project. Classification of wetlands. Report from Workshop One. UNEP / GRID, Christchurch. 85 p.