

A WETLAND HABITAT ASSESSMENT SCHEME

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INTRODUCTION

The work of Goodrick (1970) documented the loss of wetlands along the New South Wales coast and highlighted the need for conservation and protective management of remaining valuable wetlands. Throughout the 1970s, growing community awareness of the values of wetlands was increasingly reflected in the gazettal of a number of wetland Nature Reserves and more balanced consideration of development applications potentially affecting wetlands. The 1979 Environmental Planning and Assessment Act provided the legislative basis for environment protection in New South Wales with planning guidelines for control at local, regional and state levels.

To support the effective implementation of the Act in rural areas, the Department of Environment and Planning published the Rural Land Evaluation Manual (Woodward and Neilson, 1981) which included rudimentary guidelines for the identification of valuable wetlands and urged the compilation of an inventory of wetlands in each local government area. However, the manual stopped short of giving detailed procedures for comparative assessment of specific wetlands.

Very little work had been done in Australia on the assessment of conservation value of wetlands, but in 1981, R.L. Pressey prepared a 'Survey of the Wetlands of the Lower Hunter Floodplain, N.S.W.' for the New South Wales National Parks and Wildlife Service.

Pressey's survey procedure has since been modified slightly and used for similar surveys of floodplain wetlands for the Clarence and Macleay Rivers on the north coast of New South Wales. The procedure used in the Hunter involved a comprehensive survey of wetland sites based on examination of fourteen attributes:

1. Size
2. Habitat types
3. Representation of habitat types
4. Habitat diversity
5. Interspersion of habitat
6. Cover type
7. Surrounding habitat
8. Condition of margins
9. Water supply
 - a) Ratio of catchment area to swamp area
 - b) Actual catchment size
10. Alteration
11. Special faunal values
12. Degree of threat
13. Land use in catchment
14. Land tenure and easements

However, not all attributes were scored for use in a quantitative assessment of conservation value because some attributes such as size were considered inappropriate for wetland habitat evaluation. Others, such as alteration were excluded "because of the difficulty in defining the severity of the change" (Pressey, 1981), and because degradation through alteration was considered to be covered under other attributes.

The use of the Pressey procedures requires the involvement of one or more investigators very familiar with wetland plants over an extended period of time, sufficient for thorough investigation of the water supply of each wetland and the total area of each habitat type in the study area (region or sub-region).

Still lacking, and much needed, is a rudimentary procedure for the overall assessment of habitat or conservation value of any particular wetland. Such a procedure needs to be straightforward enough to be used by planners or local government environmental officers as a guide to the treatment of the wetland in question. The aim of the assessment should be to place the wetland under scrutiny into one or other of three categories:

- i) highly valuable in its present condition, warranting reservation and management to protect habitat values;
- ii) moderately valuable, perhaps worthy of further investigation and/or sympathetic management to enhance habitat values;
- iii) of little conservation value in its present condition, would require major rehabilitation and costly management to provide habitat of value.

WETLAND HABITAT ASSESSMENT

Table 1 summarises an assessment procedure devised to provide a basis for the preliminary evaluation of conservation value of individual wetlands. The evaluation scheme is based on a simplified and compressed Pressey procedure. Eight (8) attributes are scored on a five point scale, attributes 1-5 provide an Inherent Value Score and attributes 6, 7 and 8 give an indication of viability or potential for protective management.

1. Size

Because of the widely acknowledged values of both large and small wetlands, Pressey (1981) was unwilling to ascribe a rating score based on size and simply noted the wetland area so that proportions and rareness of habitat types could be calculated. However, Woodward and Neilson (1981) attribute significance to size *per se*. Whilst I acknowledge the often disproportionate value of small wetlands, I believe that if all other habitat attribute values are equal, the larger wetland must be accorded greater ecological significance by virtue of its greater carrying capacity and internal buffering which translates into greater potential for protective management.

The rating scale proposed is:

- 5 <50 hectares
- 4 21-50 hectares
- 3 11-20 hectares
- 2 6-10 hectares
- 1 0-5 hectares

2. Habitat diversity

A 'habitat' has been taken to mean a structurally distinct vegetation zone or exposed substrate or open water. This is a simplification of Pressey's "habitat types", avoiding the separation of structurally similar vegetation types. For example, an area of mixed *Phragmites* and *Typha* might be treated as a single habitat zone. Similarly another structurally distinct zone might contain a mixture of *Juncus* and *Scirpus* species.

A crude diversity component can be included by taking account of the relative proportions of the different habitat types. In this way, a wetland with four habitat types taking up say 80%, 10%, 5% and 5% of the area respectively would be given a lower habitat diversity score than a wetland with four habitat types more evenly represented, say, 35%, 25%, 20% and 20% respectively.

The scoring scale proposed is:

- 5 Five or more structurally distinct vegetation zones evenly proportioned.
- 4 Intermediate between 5 and 3 either in number of zones or proportions.
- 3 At least 3 structurally distinct vegetation zones, moderately well proportioned.
- 2 Intermediate between 3 and 1 either in number of zones or proportions.
- 1 Only one or two structurally distinct vegetation zones dominating the wetland.

Also, if a wetland is dominated by open water rather than a single emergent vegetation type, it should be

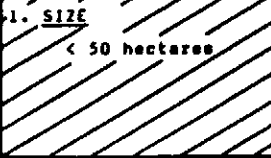






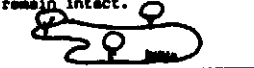

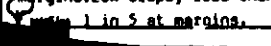

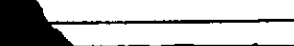




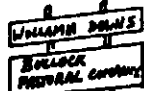
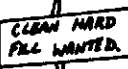


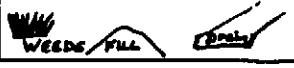
SCORE 5 HIGH	4	3 MODERATE	2	1 LOW
1. SIZE  < 50 hectares	21-30 ha.	11-20 hectares 	6-10 ha.	0-5 hectares 
2. HABITAT DIVERSITY Five or more structurally distinct vegetation zones well proportioned. 		At least 3 structurally distinct vegetation zones, moderately well proportioned. 		Only one or two structurally distinct vegetation zones dominating the wetland. 
3. INTERSPERSION Habitat types in segments of variable size and shape with many types of edge. 		Some irregularity in distribution of habitat types but most remain intact. 		Length and types of edge are at a minimum. 
4. MARGINS & COVER At least 55% vegetation cover. Plentiful roosting trees. Varied substrate at margins. Low slope, less than 1 in 5 at margins. 		Some cover. Some trees. Some variation in substrate at margins. Moderate slope at margins. 		Little cover. Few, if any trees. No variations in substrate at margins. Steeply sloping margins. 
5. SPECIAL FEATURES <ul style="list-style-type: none"> a) Large numbers of birds or other fauna. b) Signs of heavy usage by fauna (eg. droppings, footprints, feathers etc.) or breeding. c) Rareness - only site exhibiting particular plant association or other feature. <ul style="list-style-type: none"> - usage by rare or endangered species (eg. Freckled duck) d) Existence of islands, vegetation rafts or secure low level roosts. e) linked to other wetlands or habitat areas. f) Unusual geomorphology. 				
6. ADJACENT LAND USE. Low impact, natural vegetation cover or low intensity grazing. 		Moderate impact, grazing or low density "urban" settlement. 		High impact, intensive cultivation, urban, commercial or industrial land use. 
7. TENURE Nature Reserve, National Park or otherwise safeguarded public land in a single unit. 		Privately owned rural land in one or few separate units. 		Privately owned land in numerous separate units. 
8. ALTERATION Pristine or almost completely in its natural state in terms of vegetation cover, water regime etc. 		Some weed infestation and/or drainage and/or filling and/or evidence of high fire frequency. 		Heavily weed infested and/or substantially drained and/or filled and/or severely "cover burnt". 

Table 1 Wetland habitat assessment.

scored higher for diversity, because there is more inherent habitat variety in varying depths of open water than in a massive stand of emergent vegetation.

3. Interspersion

A widely accepted rule of thumb is that the habitat value of a wetland is greater if habitat zones or types are well mixed with a maximum length and variety of edge or 'ecotone' (Larson, 1973, 1976).

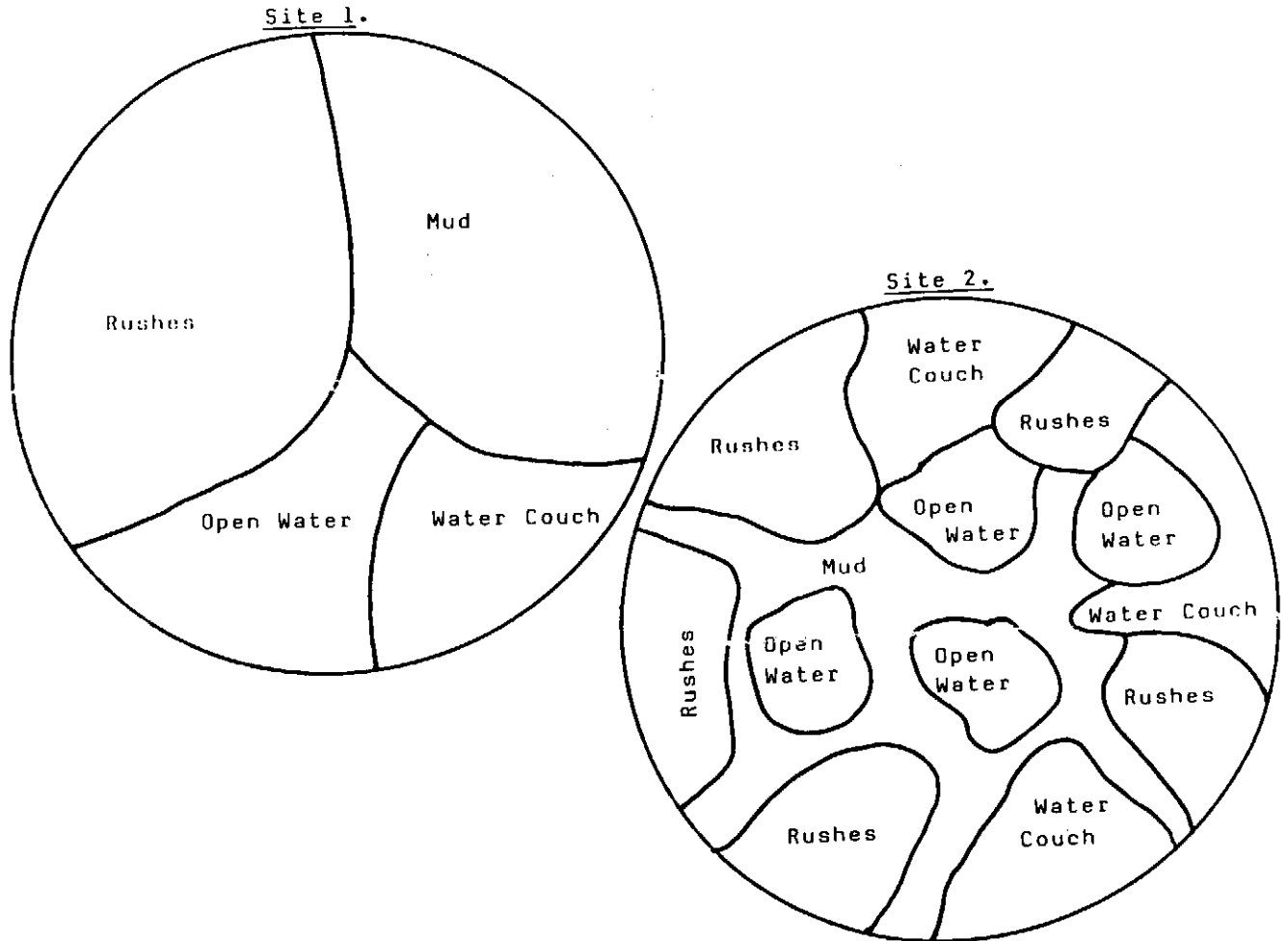


Figure 1 Site 2 represents generally more valuable habitat than Site 1

The scoring system proposed for Interspersion is the same as that followed by Pressey (1981) which was taken from Larson (1976):

- 5 High: habitat types in segments of variable size and shape with many types of edge (Figure 1).
- 4 Intermediate between 5 and 3.
- 3 Moderate: some irregularity in distribution of habitat types but most remain intact.
- 2 Intermediate between 3 and 1.
- 1 Low: length and types of edge are at a minimum.

4. Margins and Cover

Pressey's (1981) attributes, "Cover type", "Surrounding habitat" and "Conditions of margins" have been combined into a single attribute for more meaningful overall assessment. In scoring this attribute, consideration should be given to the percentage of the perimeter surrounded by trees, the percentage surrounded by rushes and other emergents and the average density of marginal rushes and emergents. However, I disagree with the implication in Pressey's system that more and denser vegetation is always better. The optimum margin particularly for a small wetland will be more varied than to simply have greater than 90% tree cover, and greater than 90% of the perimeter surrounded by a broad band of very dense rushes or other emergents.

The slope and composition of the substrate at the margins is also considered to be significant. Gentle sloping margins are preferable to steep, sharp changes, some exposed mud interspersed with low vegetation provides feeding habitat for numerous wading birds, gravel banks are used for roosting and nesting by others.

The security of the margins from introduced predators and disturbance by human activities is particularly important at some sites.

The scoring system proposed for Margins and Cover is as follows:

- 5 At least 55% vegetation cover. Plentiful roosting trees. Varied substrate at margins. Low slope, less than 1 in 5 at margins.
- 4 Intermediate between 5 and 3.
- 3 Some cover. Some trees. Some variation in substrate at margins. Moderate slope at margins.
- 2 Intermediate between 3 and 1.
- 1 Little cover. Few, if any, trees. No variations in substrate at margins. Steeply sloping margins.

5. Special Features

This attribute has been included to cover any one or more of the miscellany of habitat values and intangibles which contribute to the uniqueness of a site. A wetland will score highly in this regard if it is the only site or one of a short list of sites which contains a particular habitat type, particularly large numbers or rare species of waterbirds or breeding colonies.

Among the observations which might lead to high scores are:

- a) Large numbers of birds or other fauna.
- b) Signs of heavy usage by fauna (e.g. droppings, footprints, feathers etc.) or breeding activity.
- c) Rareness – only site exhibiting particular plant association or other features.
- d) Existence of islands, vegetation rafts or secure low level roosts.
- e) Linked to other wetlands or habitat areas.
- f) Unusual geomorphology.

Pressey (1981, 1984 pers. comm.) considers the attribute of "Rareness" or "Representation of habitats" to be of such significance to warrant not only treatment as a separate attribute, but probably one that should be given double weighting.

Representation of habitats is much complicated by alteration to water regimes and other human modifications. For example, Pressey (1981) includes Mosman Swamp on the Williams River floodplain on his list of 25 outstanding wetlands, (given highest priority for conservation on the lower Hunter floodplain), because it contains the largest sample of *Juncus* habitat in the study area. No allowance is made for the fact that the area of Mosman Swamp, occupied by *Juncus* has been dramatically increased by flood mitigation works which have reduced the area occupied by other habitat types.

Furthermore, the mobility and ready dispersion of most aquatic plants (Jacobs, 1983) needs to be taken into account. *Philydrum lanuginosum* for example, is a very opportunistic species which quickly colonises farm dams and other wet areas. Its presence covering a large area is questionable justification for inclusion of Wetland 124 on Pressey's "top 25" list (Pressey, 1981).

This is not to say that rareness or representation of habitats is not significant, particularly when tree species with a long lifespan are involved, but we are dealing with systems that have much greater regenerative capacity in the short term than rainforests or some other communities. Because of this and the dynamic nature of most wetlands, I believe rareness and representation of habitats can be adequately rated under the 'special features' attribute with the proviso that evidence of rare or endangered plants or habitat types should lead to a further, more detailed study of the site.

Scores for Attributes 1 to 5 inclusive can be totalled to give an Inherent Value Score for a particular wetland. If a wetland scores more than 20 points in such an assessment it has considerable conservation value and deserves to be reserved and managed to protect that value. A score between 15 and 20 suggests that the wetland is quite valuable and, if possible, a more thorough investigation is called for to document the inherent value of the site with view to providing the basis for a decision on possible reservation and/or protective zoning.

A score of 10 to 15 indicates a moderately valuable wetland. Total reservation is probably not warranted

but action should be taken to protect or enhance the particular values of all or part of the site.

Scores below 10 suggest that the wetlands in question are substantially degraded and require major rehabilitation and active management work to restore their conservation value. The location and specific characteristics of each site will determine whether or not such work can be justified for any particular wetland.

Attributes 6, 7 and 8 relate to the viability of the wetland in question and its potential for management.

6. Adjacent land use

'Adjacent land' is taken to mean the immediate environs, usually a distance of several hundred metres from the wetland margins. Ideally, the total catchment should be considered but this has not been attempted as part of a preliminary assessment. Urban and/or industrial activities will generally produce scores equating with low ecological value with respect to this attribute. Agricultural land uses generally are given moderate scores (grazing higher than cultivation), whilst sites where the adjacent land has natural vegetation cover will register high scores.

This can be summarised as follows:

- 5 Low impact, natural vegetation cover or low intensity grazing.
- 4 Intermediate between 5 and 3.
- 3 Moderate impact, grazing or low density 'urban' settlement.
- 2 Intermediate between 3 and 1.
- 1 High impact, intensive cultivation, urban, commercial or industrial land use.

7. Tenure

This attribute involves a subjective judgement that some tenure can be regarded as more likely to protect or enhance the habitat value of the site than other title.

The following scoring system is proposed:

- 5 Nature Reserve, National Park or otherwise safeguarded public land in a single unit.
- 4 Intermediate between 5 and 3.
- 3 Privately owned rural land in one or few separate units.
- 2 Intermediate between 3 and 1.
- 1 Privately owned land in numerous separate units.

8. Alteration

Drainage, filling, weed infestation, increased fire frequency, grazing and clearing are the major alterations to wetlands. There are difficulties in assessing the severity of change in the habitat value of the wetland but the attribute is an important one for meaningful assessment of the viability of any wetland.

Reference has already been made to the *Juncus* stands which dominate Mosman Swamp. Pressey (1981) makes reference to grazing, drainage and mowing under a heading of alteration for this site (Wetland No. 93) but because his assessment procedure does not score alteration the presence of the large areas of *Juncus* is hailed as an outstanding feature rather than a shortcoming due to the alteration of the site. Following the same logic, the presence of some water hyacinth (*Eichhornia crassipes*) in a wetland could be treated as simply another habitat type, a plus for the evaluation, rather than the major threat to the viability of the wetland, which it really represents.

The following scoring system is proposed for general assessment:

- 5 Pristine or almost completely in its natural state in terms of vegetation cover, water regime etc.
- 4 Intermediate between 5 and 3.
- 3 Some weed infestation and/or drainage and/or filling and/or evidence of high fire frequency.
- 2 Intermediate between 3 and 1.
- 1 Heavily weed infested and/or substantially drained and/or filled and/or severely 'over-burnt'.

INTERPRETATION OF RESULTS

The total score for any wetland should give a general indication of the value of the site and its potential for management as well as a crude basis for comparison with other wetlands. Ideally, comparisons should only be made with other systems of similar geomorphology and/or water chemistry.

It is important to acknowledge that wetlands are highly changeable ecosystems and the score is only useful as an indication of the value of the wetland at the time of the assessment. Furthermore, individual plant and animal species have their own specific habitat requirements which are often mutually exclusive of one another. However, the attributes used in the foregoing assessment procedure provide the basis of a broad evaluation of the overall habitat value for a balanced community composed of a wide range of species.

SUMMATION

Increasingly our society seems willing to acknowledge wetland values and take account of them in planning studies and the consideration of development applications.

Whilst there is no substitute for a thorough long-running investigation of a wetland, if we are to facilitate effective protection and management of wetlands we must provide local government planners and consent authorities with simplified assessment procedures for use as a first step in taking account of wetland values and devising strategies for their protection and management.

The attributes used in such preliminary assessments and the scoring systems applied will have short-comings but provided conclusions drawn are in keeping with the generalised nature of the evaluation, such a procedure can serve to facilitate more appropriate consideration of wetland values, particularly at local government level and in situations where time and/or funds are not available for a thorough study of the site in the short term.

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