

MANAGEMENT OF THE ESTUARINE HABITAT

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Estuarine habitats have suffered major disruptions this century, and habitats such as seagrass beds, mangroves and saltmarshes are all continuing to suffer from the cumulative impact of small encroachments—the tyranny of small decisions.

Issues and problems

The importance of estuaries

Estuaries are ecologically significant areas that provide a variety of habitats for aquatic plants and animals. Their importance to fisheries and thus the need for their protection, has only really been realised in the past few decades (e.g. Pollard 1976). These habitats play a major role by providing nursery areas for juvenile fish as well as shelter, food and breeding areas for many adult fish.

Estuaries are areas of considerable significance to both commercial and recreational fisheries. It has recently been estimated that 64% (by value) of the 1987/90 catch of commercially marketed species in New South Wales are dependent on estuaries during all or part of their life cycles. This equates to a value of \$77 million (C. Copeland and D. Pollard, pers. comm).

Estuarine habitats

Estuarine fish habitats can be roughly differentiated by vegetation type, sediment type and depth. They include seagrasses, rocky reefs,

mangroves, unconsolidated sediments of sand or mud, and saltmarshes. Of these habitat types, the most threatened are probably seagrasses, mangroves and saltmarshes.

Seagrasses in particular have suffered serious declines. Of the major estuaries in NSW which have been intensively studied, many have lost as much as two thirds of their seagrass beds over the last thirty or forty years. For example, in the Clarence River in NSW there were 356 ha of seagrasses in 1942 and only 158 ha in 1981 - a 56% decrease (Shepherd *et al.* 1989). More recent research has shown that by 1990 there had been an 80% decrease on the 1942 figure. Over 90% of the wetlands of the Hunter, Clarence and Macleay River floodplains have been affected by drainage and flood mitigation schemes.

Activities liable to affect estuarine habitats

There are a number of human activities that have the potential to severely impact on estuarine habitats (Pollard *et al.* 1991). The key ones in NSW are:

- infilling, dredging and extractive operations;
- diffuse and point source pollution;
- waterfront developments, such as canal estates;
- marinas and other recreational facilities, such as jetties;

- road and bridge construction; and
- structural flood mitigation works.

Management problems

Conservation, amelioration and enhancement of these important fish habitats are honourable ambitions but there are many hurdles to overcome before these can be achieved:

- a) There is either a lack of adequate legislative protection for fisheries habitats, or legislation may rest with an inappropriate agency where this provision is not a high priority. For example, there is no direct legislative protection for seagrasses in NSW.

Neither is there legislation which requires compensation/mitigation for habitat destruction. Instead, there is a reliance on time-consuming negotiations throughout planning processes; e.g. during the public exhibition and determination phase of developments requiring environmental impact statements.

- b) The final decisions with regard to the destruction or protection of important fish habitats often rest with other agencies (e.g. construction authorities such as the Department of Public Works) or with different levels of government (such as local councils). Often the government agencies with the largest budgets are in the strongest positions of control and influence.
- c) There is a critical lack of good information bases, particularly on mapping of habitats, habitat utilisation, necessary buffer zones, etc. Estuarine inventories are perhaps the most valuable management tools, but these are few and far between and are seldom upgraded. There is also a critical lack of restoration techniques.
- d) There is great difficulty in managing cumulative impacts resulting from the "tyranny of small decisions". It is very difficult to

argue the case for the retention of *one* mangrove or a small patch of seagrass that may be lost as the result of a development. As a result, over time large areas of important habitat are gradually being eaten away.

- e) There is a lack of economic and cost/benefit studies. These can rely on commercial fish catch data but this is usually only an annual estimate. This then ignores the fact that fisheries are renewable resources if managed properly, and therefore have potentially an infinite value to the community. The values of other functions such as stabilisation and filtering are often ignored and not costed out.
- f) In mitigation projects there are seldom any acceptable measures of success, e.g. "x% of biodiversity returned after y years". Often there are no baselines to determine appropriate performance indicators and it is often necessary to rely on the results of only very brief surveys carried out in relation to environmental impact assessment.

Management solutions

Today as managers of estuarine fish habitats, we are faced with the fact that we may be lacking necessary background information, legislation, decision-making ability and resources. What we *do* have, however, is the vision and the ideas for habitat conservation, amelioration and enhancement.

Every opportunity must be taken to participate actively in the processes, whether it be attending interdepartmental or catchment management committees, preparing submissions in response to environmental impact statements and other planning instruments, presenting evidence for Commissions of Inquiry, or merely undertaking day-to-day negotiations with other agencies.

There are three current case studies in NSW estuaries which, to varying degrees, all involve

concepts of habitat conservation, amelioration and enhancement. These may help to highlight some of the problems and complexities inherent in proactive habitat management.

Case Study 1—Ballina Mangrove Compensation Project

Development: Bridge and access road through mangroves.

Impact: Loss of 8 ha of mangroves.

Management Action: Development approved by local council on the condition that an equivalent area of mangroves be created.

Problems: No available area was available and there were no available techniques or baselines.

Solution: Removal of fill from previously reclaimed industrial land, with various treatments being used to determine best method for future projects, including:

- transplanted trees (1-3m).
- transplanted seedlings (20-50cm).
- planted seeds.
- natural recruitment.

Results: Planted seeds were found to be the best technique, and the resulting mangroves are now growing successfully on the reclaimed areas. A large and diverse fish population has also returned to the area.

Case Study 2—Kooragang Island Wetland Restoration/Compensation Project

Development: Historical reclamation of islands in the Hunter River for industrial land. Wetland areas were also drained for grazing.

Impact: More than 600 ha of mangroves and saltmarsh has been reclaimed or degraded. Tidal creeks have been blocked by poor culvert design.

Management Action: NSW Fisheries approached key players with the concept of repairing past damage and creating new habitats. A jointly-funded feasibility report was prepared.

Problems: Community/landowner acceptance. Cost effectiveness of earthworks. Continued access for utilities.

Solution: The feasibility report recommended opening and deepening of tidal creeks to allow tidal inundation and use of experimental plots to determine the best way of restoring/creating fish habitats.

Results: Unknown at this time.

Case Study 3—Construction of Third Airport Runway in Botany Bay

Development: The third airport runway which will encroach into Botany Bay.

Impact: Large scale dredging (15 million cubic metres) and reclamation. Loss of 30 ha seagrass, 4 km of sandy beaches, destruction of fishing grounds.

Management Action: Plan of Management requiring monitoring and compensatory mechanisms.

Problems: Lack of appropriate compensatory mechanisms, especially for large-scale dredging. Little available room to manoeuvre. Lack of performance/success indicators.

Solution: Equivalent seagrass replacement and possible rocky reef creation. Potential for restoring with fish.

Results: Unknown at this time.

Shepherd, S.A., A.J. McComb, D.A. Bulthuis, V. Neverauskas, D.A. Steffensen and R West (1989). Chapter 12 Decline of Seagrasses. In: *Biology of Seagrasses* Ed A.W.D. Larkum, AJ McComb, and S.A. Shepherd. Elsevier, Amsterdam.

Conclusions

The challenge is not merely to conserve what is left of our important estuarine fish habitats but, whenever and wherever possible, to repair past damage done and compensate for unavoidable destruction. The opportunities exist now, and fisheries habitat managers need to be entrepreneurial in their approach and to broaden their traditional horizons and skills.

These estuarine habitats are the source of tangible benefits to the public. They, together with the fisheries they sustain, are a renewable resource of potentially infinite value to the community. They are a common property resource and the whole community must share the responsibility for conserving them.

References

- Pollard, D.A. (1976). Estuaries must be protected. *Australian Fisheries* 35(6), 1-5.
- Pollard, D.A., M.J. Middleton and R.J. Williams (1991). *Estuarine Habitat Management Guidelines*. NSW Agriculture and Fisheries, Sydney.