MANAGEMENT OF THE TOWRA POINT AQUATIC RESERVE BY NSW FISHERIES

A.K. Smith & D.A. Pollard
Conservation Management Branch, NSW Fisheries
Locked Bag 9, Pyrmont NSW, 2009

ABSTRACT

In many parts of Australia, aquatic environments are being slowly degraded. The conservation and management of all fish and fish habitats in NSW state waters is the responsibility of NSW Fisheries. Aquatic reserves represent one mechanism of fisheries management. There is a well developed management, research, compliance and advisory structure to support the eight existing aquatic reserves in NSW. The 333 hectare Towra Point Aquatic Reserve was declared as a multiple use reserve in 1987 and its zonation was modified in 1992. The reserve allows some fishing activities and protects fish habitats. In recent years the reserve has been placed under considerable threat because of direct and indirect developments such as the proposed creation of artificial bird habitat at Spit Island, erosion from dredging in Botany Bay, and pollution from the Georges River. The future integrity of the reserve is very important for both the preservation of its biodiversity and for the ecological sustainability of fisheries in the surrounding waters. In particular, the large stands of vulnerable *Posidonia* seagrass and mangroves are vital as nursery habitats for a large variety of juvenile fish and invertebrates.

INTRODUCTION

The aquatic environment may be conserved by a variety of methods, including closed areas, closed seasons, protected species, habitat protection and mitigation of the effects of human activities (Table 1). Closed areas or Marine and Estuarine Protected Areas (MEPAs) are the most widely known and popular aquatic conservation measures in inshore waters.

A MEPA is an area which has been reserved to protect all or part of the aquatic environment and its flora and fauna (Hamer *et al.* 1989, Brunckhorst 1994, Pollard 1995). MEPAs are an important tool for marine conservation, particularly for protecting biodiversity. Over 5 % (or 460,000 km^2) of Australia's marine environment is currently protected by MEPAs. A large proportion of this area is in a single large MEPA- the Great Barrier Reef Marine Park. In NSW less than 1% of the aquatic environment is protected as MEPAs. There have to date been considerable resources devoted to protection of marine areas, but estuarine (and freshwater) protected areas are currently under-represented in NSW waters.

INPUT CONTROLS	OUTPUT CONTROLS	OTHERS
gear restrictions	total allowable catches	protected species
area closures	bag limits	noxious species
seasonal closures	size limits	habitat protection
		pollution mitigation

Table 1: Examples of some fisheries management tools

MEPAs are created for a variety of different purposes and may have different zoning classifications. A major aim is to protect fish habitat in order to promote fish production, protect aquatic biodiversity and allow for the recovery of degraded fish stocks and their habitats. Large MEPAs may have multiple use zonings, such as general use, refuge and sanctuary zones. Sanctuary zones totally exclude exploitative activities, and the other two zonings are less restrictive, forming nested buffers around them.

Positive effects which could result from the declaration of protected areas, depending on their design, include:

1. *Biological* - conservation of biodiversity

and increased size of some species (particularly exploited species), and increased abundance of some species (particularly large carnivores). There may be advantages for fisheries because such reserves can facilitate increased harvests in adjacent areas, and also provide refuges for the preservation of breeding populations of some species. They may also facilitate the protection or recovery of significant aquatic habitats (reefs, seagrasses, mangroves, etc).

2. *Social* - increased value of the area to non-consumptive users such as conservationists and SCUBA divers, etc.

Negative effects might include restriction of the area available for extractive users such as fishers, which may place higher pressures on adjacent areas. The negative consequences may be economic (decline in catches and/or number of fishers), recreational (decline in area available for recreational fishing) or resource based (diverting fishing effort to other species).There has also been some criticism of the lack of firm scientific evidence supporting the selection of the sizes/numbers and or location of some of the protected zones.

NSW Fisheries is responsible for declaring and administering MEPAs as Aquatic Reserves. There are currently eight Aquatic Reserves in NSW waters, ranging in size from about 2 to 100 000 hectares. These Aquatic Reserves were created for a variety of different purposes and some of them have different zoning classifications. The National Parks and Wildlife Service (NPWS) also administers some aquatic extensions to some of its terrestrial National Parks and Nature Reserves e.g. Bouddi National Park Marine Extension is jointly administered by NPWS and NSW Fisheries.

TOWRA POINT AQUATIC RESERVE

NSW Fisheries legislation

Towra Point Aquatic Reserve was declared under the Fisheries and Oyster Farms Act 1935 (1979 Amendments) and the Fisheries and Oyster Farms (Towra Point Aquatic Reserve) Regulation 1987 (repealed), in 1992. It is now managed under the Fisheries Management Act 1994 and Fisheries Management (Aquatic Reserves) Regulations 1995, which simplify and strengthen the previous Aquatic Reserve regulations The new Act also provides greater protection for mangroves and seagrasses statewide, including in Aquatic Reserves.

History and goals of the Towra Point Aquatic Reserve

Towra Point Aquatic Reserve is located along the southern shores of Botany Bay (Figure 1). This area supports the most extensive area of estuarine wetlands in the Sydney region, and a diversity of terrestrial and aquatic fauna and flora, including saltmarsh, mangrove, seagrass and algal communities. The area contains over 230 species of fish and invertebrates (Parker 1991) and has been described as the productive heart of the Botany Bay catchment, with an estimated annual primary productivity for seagrasses of 10 tonnes $ha^{-1}yr^{-1}$and mangroves of 15 tonnes $ha^{-1}yr^{-1}$ (Morrisey 1995). Towra Point Aquatic Reserve is also much more than a regional resource, because Botany Bay wetlands are an important nursery, feeding and resting area for fauna (particularly fish and birds) that migrate intra and interstate and/or overseas.

The Towra Point Aquatic Reserve was gazetted in 1987 and its zonation modified in 1992. The major goals of the Towra Point Aquatic Reserve are (Leadbitter and Pollard 1986a, b, c):

1. The conservation of the flora and fauna within the Aquatic Reserve boundaries.

2. The maintenance of the viability of fish habitats, and particularly fish and invertebrate nursery grounds.

3. To provide a scientific reference, research and educational estuarine area in the Sydney region.

4. To co-operate with the NPWS in managing aquatic and terrestrial ecosystems as a single, inter-related unit.

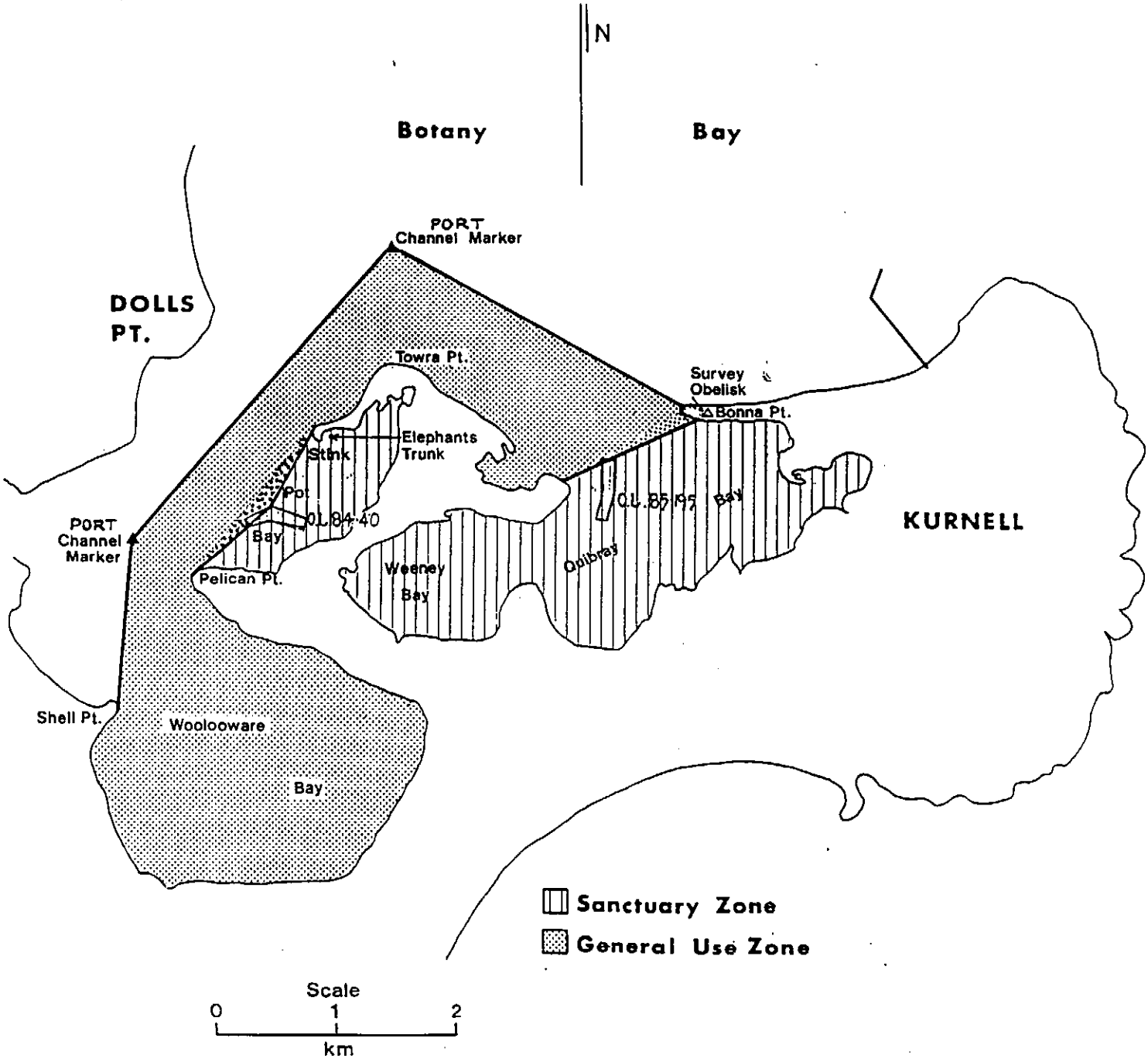

Figure 1: Towra Point Aquatic Reserve

The first three of these goals have been and are being achieved. The fourth goal has not been achieved to a satisfactory degree (Robinson, Leadbitter and Pollard 1988). This has probably been because of the different levels of expertise in relation to the management of terrestrial and aquatic fauna and flora, and different interdepartmental priorites and resulting conflicts between these two agencies.

Towra Point Aquatic Reserve was NSW Fisheries' first multiple use Aquatic Reserves and at the time the State's largest Aquatic Reserve. There were three zones in 1987, which were reviewed in 1992, to create the existing two zones of the current reserve. The sanctuary zone includes Stinkpot Bay, Weeney Bay and Quibray Bay (Figure 1). The refuge zone includes parts of Botany Bay and Woolooware Bay. Table 2 lists the permitted and/or prohibited activities in the two zones. On the spot fines of up to $500 and penalties of up to $100 000 may apply, and forfeiture of fishing gear may be required, if these regulations are breached.

Activities	Refuge	Sanctuary
Damage or destroy marine flora	no	no
Disturb, injure or interfere with fish	no	n
Exemptions		
Angling (hook and line)	yes	no
Recreational netting (eg for crabs)	yes	no
Invertebrate collection	no	no
Commercial haul netting	yes	no
Commercial mesh netting	yes	no
Commercail fish trapping	yes	no
Other collecting activities	by permit	by permit

Table 2: Permitted/restricted activities in the Towra Point Aquatic Reserve

There is a long history of detailed regional planning, such as the Kurnell Regional Environmental Plan (Department of Planning 1989) for parts of the Botany Bay region. Other planning documents that have implications for the Towra Point Aquatic Reserve are listed in Table 3 and include SEPP 39 and the Environmental Management Plan (EMP) for Botany Bay. This EMP was produced following commitments of State and Federal Governments, and the community expectation was that it would help protect and improve the environmental quality of Botany Bay. Its stated aim was: "To protect, restore and enhance the environmental qualities of Botany Bay (especially the water quality and the aquatic and terrestrial habitats for flora and fauna in and around the Bay) in relation to the adverse impacts of the third Airport runway".

1975	282 ha of land acquired by Commonwealth to satisfy JAMBA agreement
1980	Interim Development Order No.33- Sutherland Shire Council
1982	Draft Sydney REP (Botany Bay)
1982	Towra Point Nature Reserve declared
1987	Towra Point Aquatic Reserve declared (333ha)
1989	Sydney REP No. 17- Kurnell Peninsula
1990	Towra Point Aquatic Reserve modified
1994	SEPP 39- Little tern protection
1994	Fisheries Management Act 1994
1994	Environmental Management Plan FAC

Table 3: History of planning and legislation affecting the conservation of Towra Point

Current management issues

Marine and estuarine systems are "open systems" and hence susceptible to impacts from activities outside their boundaries. Terrestrial reserves have similar problems, but usually to a lesser extent. The Towra Point Aquatic Reserve is subject to natural and man-made influences. The man-made influences can be obvious or subtle, be on both large and small scales, and may have both direct and indirect impacts. A major danger is that subtidal habitats can be destroyed without much visible evidence. For example, directly damaging influences in the Towra Point Aquatic Reserve would include reclamation, dredging, vegetation clearance, pollution, introduced species, fishing (legal and illegal) and aquaculture.

Indirect influences would include pollution, dredging, stormwater input and sedimentation.

Generally, NSW Fisheries is not so concerned about natural changes to aquatic systems, but sometimes it is not clear in a particular situation whether observed changes are natural or man-made. For example, declines of seagrasses, particularly of the strapweed *Posidonia*, have been a long-term management concern and are due to both natural causes (sea urchin plagues) and the direct and indirect impacts of human activities and particularly altered wave regimes due to dredging.

Mitigation of human activities is important because these are liable to cause the destruction or alteration of fish habitats and communities and hence reduce the sustainability of fisheries (NSW Fisheries 1993a,b; Saenger 1995).

A management issue that is difficult to resolve, because of private land ownership in this area, is that of provision of adequate buffer zones between urban and industrial developments and the Aquatic Reserve. For example, in some areas of Woolooware Bay urban developments are located adjacent to the reserve, and a recommended buffer zone of 50 metres has not been implemented around marine vegetation such as mangroves. Most other buffer zones around the Aquatic Reserve are reasonably effective because of the adjacent terrestrial Nature Reserve controlled by NPWS.

From a compliance and education perspective, the local Fisheries Office at Sans Souci reports that there are no major problems at the Towra Point Aquatic Reserve because public access is largely restricted due to its distance from major roads. Boats can access more readily but are limited in some areas by shallow water. The multiple use zones of the reserve are well marked with signs and line-of-sight boundaries (which are preferable to depth or distance boundaries). However, there are some problems with the harvesting of invertebrates, and particularly cockles, (*Anadara trapezia*) in the Aquatic Reserve.

There are many current and future threats to the status of the Aquatic Reserve. These include:

1. The proposed creation of additional bird habitat at Spit Island.
2. The loss of aquatic habitat (particularly seagrass and mangrove) due to direct and indirect manmade changes - industrial, port and residential.
3. Introduced species, e.g. toxic dinoflagellates.
4. Pollution from sewage, urban runoff from the Georges River and oil spills
5. Mismanaged oyster leases.

Some further discussion on one of these issues, the proposed creation of the Spit Island bird habitat, is warranted because this is an immediate and potentially large scale impact. The basis of this proposal is to provide environmental compensation for the loss of bird (particularly little tern) habitat following the construction of the Third Sydney Airport Runway by the Federal Airports Corporation. The proposal is to create an island as a bird habitat, but unfortunately this will require the construction of groynes, dredging, and reclamation, and will result in the destruction of vulnerable *Posidonia* seagrass and a general degradation of the values of the Towra Point Aquatic Reserve. This is a very sensitive issue but NSW Fisheries will be attempting to mitigate any effects of the proposal on aquatic fauna and flora, and may insist on permits, comprehensive monitoring and environmental compensation if the proposal proceeds.

Future management of Aquatic Reserves?

NSW Fisheries believes that the positive aspects of creating Aquatic Reserves far outweigh the negative aspects, although it is recognised that, historically, there may have been some *ad hoc* or opportunistic creation of such reserves. NSW Fisheries now recognises that the selection and management of Aquatic Reserves can be improved, and is presently conducting a study to help facilitate the selection of a biogeographically representative system of MEPAs along the coastline of NSW.

How much of the sea should be reserved in MEPAs? As a general rule they should be sufficiently large to maintain ecosystem structure and function and prevent overexploitation. The Brundtland Report (World Commission on the Environment and Development 1987) recommended that 8% of the World's oceans should be set aside in protected areas.

The management plans for all existing Aquatic Reserves are generally reviewed every five years in the light of new resource and usage information.

Future Adaptive Management

The success of conservation practices and the control of the impacts of activities that are permitted and/or excluded from reserves (such as recreational fishing, commercial fishing) or specific fishing methods (such as beach seining, trawling, oyster farming, SCUBA diving, collecting of invertebrates or spearfishing) needs to be assessed in some definable way. For example, the sizes and location of zones and permitted methods of fishing could be manipulated, and assessment could be by monitoring studies of human activities and aquatic fauna and flora.

In conclusion, aquatic conservation and fisheries management should aim to achieve optimal and ecologically sustainable utilisation of the State's living aquatic resources. This involves making the best possible use of the aquatic environment, considering all of its values and the uses to which it can be put, from fishing of all kinds (commercial, recreational and traditional) to non-capture uses such as those of conservation, tourism and foreshore development (Saenger 1995). The Towra Point Aquatic Reserve is a very valuable component of NSW Fisheries' conservation program because it is the largest estuarine Aquatic Reserve in NSW. However, because the reserve is surrounded by industry and a large urban population is it constantly threatened and is being slowly degraded by direct and indirect pressures.

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