

CHAIRPERSON'S INTRODUCTION

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Good morning and welcome to Session 5 on Day 2 of this workshop. During yesterday afternoon's sessions we had extensive discussions on the relationship between aquatic organisms and their habitats, and on the possible impacts of various types of human activities on these relationships. This morning I hope to further develop the theme of the workshop by broadening the discussion to consider linkages not only between various human activities and habitat alteration, but also between such habitat alterations and fluctuations in the abundance or availability of economically important species.

The main objectives of the discussion will be:

- to identify major categories of human-induced impact on aquatic habitats;
- to assess, for each of these major categories, the quantity and quality of scientific evidence for linkages between human activities, habitat alterations and fluctuations in fishery resources; and
- to identify (if possible) strategies for demonstrating these linkages in order to convince governments and the general public of the importance of protecting and maintaining aquatic habitats.

I will begin by presenting a list of human-induced impacts on aquatic habitats which are considered to be of some significance in the Australian context (Table 1). This list can be added to or modified during the course of the discussion.

Before introducing the panellists for this session, I would like to share with you a brief impression of the impact of human activities on coastal marine and estuarine habitats and fisheries in the USA as a prelude to discussion of the Australian situation. This impression is based on information collected over more than 20 years by the US National Marine Fisheries Service (NMFS) as part of its National Habitat Conservation Program. I was fortunate enough to attend an international coastal management symposium (Coastal Zone '89) in the US at which this information was presented, and I subsequently obtained a transcript of the presentation and permission to cite the information, courtesy of the Office of Protected Resources and Habitat Programs, NMFS, Washington D.C.

The overwhelming impression from the NMFS presentation was that as population growth - and therefore increased urban, industrial and agricultural activities - has occurred along the US coastline over the last 100 years or more, so have there been increased problems in maintaining the health and productivity of in-shore and coastal aquatic habitats and living resources. Over 110 million acres, or more than 50%, of *total* US wetland habitats had been lost up to the mid-1970's. The total loss of *coastal* wetlands is not as severe (about 20% up to the mid-1970s), but the rate of loss has accelerated to more than 100,000 acres per year in recent years. This is of particular concern when about 70% of all US commercial fishery resources are estuarine-dependant, and estuarine-dependant

species support commercial and recreational fisheries each estimated to generate economic benefits of several billion dollars per year.

The NMFS presentation identifies physical habitat modification, contaminant loading, excessive nutrient loading, water diversions/obstructions, waste disposal, pathogen introductions, chemical loading, marine debris, dredging and spoil disposal, hydropower and forestry and mining as the most important sources of impact on US coastal and inshore marine habitats. Specific evidence of the impact of human activities on aquatic habitats and/or fish populations included:

- decline of Columbia River Basin salmon and steelhead trout catches to 16-25% of historic levels following a loss of access by wild fish to 33% of historic headwater spawning areas due to hydropower dams;
- 60-80% decline in striped bass populations in San Francisco Bay following increasing diversion of freshwater inflows and loss of up to 80% of Bay wetlands;
- 80% or more decline of commercial catches of striped bass, river herring and American shad in Chesapeake Bay during 1960-1983. This coincides with substantial seagrass loss associated with excessive nutrient loading, and with other human-induced habitat modifications in brackish water nursery areas;
- a substantial proportion of US coastal waters under shellfish aquaculture in the early 1960s have since been closed - mainly because of contamination from human sewage effluent. Many of these closed areas have high levels of human sewage tracers in the sediments; and
- US coastal areas with the highest human population densities are also the areas where the highest levels of contaminants (eg. DDT, PCBs, PAHs) are being found in fish and sediments. These are also the areas where fish have the highest incidence of cancerous growths and other serious diseases.

The NMFS presentation concludes by stressing that while fish populations can recover from overfishing, the pollution and/or loss of fish habitats results in long-term and generally irreversible population losses.

This sobering impression of the situation in the USA may not be immediately relevant to us because of Australia's much smaller population and economy. However, Australia's population continues to grow and, like the USA, we have an affluent life style and a strong coastal orientation. The US trends outlined above can therefore be viewed as an indicator of what is in store for Australian aquatic habitats and living resources if the population and economic trends of recent decades continue.

So what do we know of the links between human activities, changes in aquatic habitats and production of fishery resources in Australia? My experience in drawing together panellists for this session suggests that our 'knowledge' in this area consists of a great deal of hypothesis, some circumstantial evidence, and only a small amount of rigorous quantitative assessment of such links. Perhaps some of you in this workshop might have a different perception, in which case we would like to hear it.

We will now prime this discussion session by hearing three Australian case studies of habitat change and fluctuations in fishery resources. Martin Mallen-Cooper will talk about habitat changes and fluctuations in the distribution and abundance of freshwater fish, mainly in eastern Australian drainages. Greg Jenkins will then discuss the relationship between seagrass loss and declines in commercial scalefish catches in Westernport Bay, Victoria. Robert Campbell will then conclude by describing the effects of trawling on marine benthic habitats and fish communities on the North West Shelf of Australia. It is hoped that these presentations will stimulate general discussion on the relationship between human activities, habitat changes and fisheries production, which will in turn lead to the formulation of findings and/or conclusions regarding the discussion objectives listed above.

Table 1. Major categories of human impact on Australian aquatic habitats

Freshwater:

Physical habitat loss (flow regulation, development, channelisation etc.)

Excess nutrients/eutrophication

Erosion/sediment deposition

Salinisation (land use practices)

Contaminants (organic and inorganic)

Species introductions/translocations

Marine:

Physical impact of fishing methods

Hydrocarbons (oil)

Waste dumping/debris

Sewage/industrial effluent disposal

Estuaries/Bays:

Physical habitat loss (shoreline dredging and spoil disposal, etc.)

Excess nutrients/eutrophication

Catchment erosion/sediment deposition

Species introductions/translocations

Physical impact of fishing methods

Contaminants (including heavy metals and hydrocarbons)

Global:

Greenhouse effect/ climate change

Ozone depletion/UV damage