DISCUSSION OF SESSION 7

Recorded by D.A. Pollard

Fisheries Research Institute
PO Box 21
Cronulla NSW 2230

Questions were first addressed to individual panellists, and then followed by more general discussion.

Following *Bob O'Boyle's* panel presentation, Chairperson Barbara Richardson asked for the discussion to consider pollution property rights, and what impacts these may have on policies and management options for fish habitats.

Murray MacDonald opened the discussion by commenting that the legislation referred to by Bob O'Boyle, and on which it was presumed that all these strategies for management were based, was in fact Fisheries legislation and that the definition of habitat used was based on the value of that habitat to fisheries production. He asked whether there is any other legislation in Canada which defines the value of habitat and the management of habitat in terms other than fisheries, and how it interacts with the Fisheries legislation.

Bob O'Boyle felt that he was not close enough to the issue to make an authoritative comment. He knew that the Department of Environment had a lot of air pollution control regulations, but did not know whether all habitat legislation was specifically under the Fisheries Act.

Peter Young asked where industries and other stakeholders would get involved in the process of decision making.

Bob O'Boyle replied that the proponent comes with a package which includes his proposal, and what he feels he has to do under the legislation. It comes to the notice of Fisheries, and basically within the first step the Government examines it, and if it appears that there will be a major impact, then it is opened to a public hearing process. In short, only the proponent and Government are involved until a decision is made as to whether there will be a major or a minor impact. Clearly, with 2000 proposals coming in a year, that could mean a lot of public hearings. So, what are really being concentrated on are the major impacts, and if the Minister for Fisheries says it is a major impact, he establishes a three to five or seven, member panel. Generally it is at that level that you find a good cross section of the people that would be involved in the issue.

Barbara Richardson, in inviting some questions on *Jenny Burchmore's* panel presentation, believed that the speaker had demonstrated very well the position Fisheries Habitat Managers are put in quite frequently in terms of serious decision making and negotiating.

The sorts of information they may have are often insufficient, but nevertheless we've got to move forward; we have to take opportunities that come up and learn from them so that we progressively develop and improve policies for protecting and managing our habitats.

Julian Pepperell told Jenny Burchmore that he was surprised with the lack of legislation to protect seagrasses and mangroves. This is all the more amazing considering that NSW Fisheries can gazette overnight other restrictive regulations on the catching of fish, like bag limits, closed seasons and so on.

Jenny Burchmore responded that there were other agencies which did not believe that regulation to protect vegetated habitats was a Fisheries role. NSW Fisheries is now getting new legislation and hopefully this will provide proper protection for some of these areas. The really difficult thing in getting new legislation designed to protect fish habitat is defining what it is you want to protect, what constitutes critical habitat, and so on.

Peter Gehrke referred to Jenny Burchmore's mention of the lack of guidelines for the creation of compensatory wetlands in Australia. The US Army Corps of Engineers has guidelines to compensate for habitat damage; for example, when extracting soil from one site for major construction projects elsewhere. A comparison of fish nurseries found that habitats created according to Army specifications consistently provided good recruitment to local fisheries. Despite having limitations in Australia, the same guidelines could be used to develop our own requirements for compensatory wetlands.

Barbara Richardson agreed that this was the sort of approach needed now. We have to go out and do *something* based on our present knowledge. We may make mistakes along the way, but if we can build a reasonable experimental design, it will give us directions for the future, or information on how to do it better in the future.

John Koehn commented on *Wayne Fulton's* presentation that the outline presented for Tasmania was basically how things operate as far as priorities go in Victoria as well. You end up following up projects or files or whatever comes up. How do we get around that, given the lack of resources, and try to set our own agendas to get some of the priority things done? He was sure we know the key factors in freshwaters, anyway, and we know the key threats. You can go down the list—1, 2, 3, 4; dams, riparian vegetation, catchments, toxic impacts, whatever they are. How do we break this cycle every time they build a new dam? Maybe next time in Victoria, which may be 20 years away, we might get them to put in a fish ladder and a multi-level offtake; but in the meantime there are 20 dams out there that are still causing havoc. How do we actually break that cycle?

Wayne Fulton believed that public awareness can be a great tool in the longer term as with litter campaigns, which are a simple means of educating people not prepared to let something happen.

The way we've probably got to go with this is to motivate organisations, whether they be angling groups or conservation groups, to push things in the right direction, i.e. to demand that these processes take place and that there be some coordination for them as well, which is something very much lacking. As Bob O'Boyle said, we should take the lead. There are at least 10 organisations with management responsibilities for fresh water in Tasmania, and no one is prepared to take the lead in many cases. Someone does have to take the lead, to say this is how we do need to go, and to develop some sort of strategy. We are short of time and short of resources, but we can get some of the public to demand of the Ministers that something be done, and get someone to coordinate these issues—that is one way we can move forward.

Barbara Richardson suggested that one of the very important matters Wayne Fulton had raised was about dealing with government agencies and shifting their attitude. What we should be aiming at is to make them think differently. External pressure in the community can be harnessed to help change attitudes, and strategic planning processes in Fisheries agencies can also reflect the importance of this component in fisheries management.

Peter Jackson again emphasised the importance of data. In Queensland, where Water Resources is listening to Fisheries, they will build fishways. In fact there is legislation to force people to build fishways; but there is not yet a complete data set to build proper fishways, and this can lead to enormous problems. At the moment a million dollars is being spent on two fishways, and as Martin Mallen-Cooper will tell, it is not certain whether one of those fishways will work or not. So we have the goodwill there, we've got the cooperation, and we have *some* data, but if we do the wrong thing we can set everything back twenty years. We need to have the data as well as knowing what the threats are.

Wayne Fulton agreed with Peter Jackson. In Tasmania there is no legislation for fishways, or even the right to talk about water allocations. There is no legislation to cover that at the moment. So they have just had to muscle their way in to be able to debate water allocations with some of those other groups without any legislative backing at all.

Mick Olsen wanted to know whether the emphasis in Tasmania is now on the native fish rather than trout.

Wayne Fulton pointed out that this is not the case. There has been a lot of work done in recent years on the native fish, but there are still very strong recreational fisheries based on the salmonids, and a need to balance those interests. Certain elements of the public, if they had their way, would go even more towards the salmonid side. However, it is the view of the Inland Fisheries Commission that we need the balance without that being necessarily the view of the wider public.

Chairperson Barbara Richardson suggested that, as this was the last session before the General Discussion, the focus should now be on what information managers needed in order to manage and make decisions to improve Fish Habitat Management.

Rob Lewis was interested in Bob O'Boyle's reference to transferable pollution property rights. When transferring rights, does that take into account the different or similar capacities of different water masses, or can they just be transferred across just any water masses; or do you approach it on the irrigated watershed management strategy?

Bob O'Boyle replied that he had added that as a thought for discussion, but in fact they were not using those rights now at all. He knew that it had been used in other fields, certainly in air pollution, and maybe it is something that could be considered.

Barbara Richardson commented to Rob Lewis that NSW is having to face that now, because the NSW EPA has new legislation which provides for pollution rights; and the Fisheries agency has to develop a response to that as managers. But it is one of those issues on which there isn't much information at all. However, some information is being collected on some of the problems with bioaccumulative materials that have been licensed for discharge and give cause for concern. Other components, such as nutrients, are seen as potentially suitable for management by property rights at this point in time. Priority is not being directed towards those problem chemicals that are persistent at this stage.

Karen Edyvane responded to Barbara Richardson's plea for tools of management by refocussing the debate on to ecological modelling, which, in common with Bob O'Boyle, is assuming priority in her thinking. That is, that when you are looking for tools of management, particularly at a regional level in an ecosystem, it is of the utmost importance to model ecosystem responses. Australia certainly has a number of initiatives underway at the moment, and she invited Norm Hall to comment on some of the initiatives in ecosystem modelling and the role it can play, not only as a management tool but also in directing research through concentrating on processes.

Norm Hall responded first of all with some background.

The problem of effluent disposal for the northern Perth metropolitan region is growing. We have an increasing population. Current disposal techniques involve secondary treatment, followed by piping the waste water into Marmion lagoon, a fairly narrow coastal lagoon bounded by an offshore reef, where the average depth of water is about 10 metres. While it is considered that the flushing time of the lagoon is of the order of about 1 to 2 days in the region of interest, there is concern that the nutrients released into the lagoon from the outfall may simply slosh up and down along the coast, rather than exchanging and mixing with oceanic water from outside the bounding reef.

Some years ago, the Western Australian Water Authority constructed the first outfall within the Marmion lagoon. Subsequently, a marine park was established within the same region. The Environmental Protection Authority, EPA, approved the initial outfall, and agreed to a subsequent increase in the volume of waste water to be discharged, conditional on the Water Authority establishing that the impact of the increased nutrient load would be acceptable. Of concern are not only health, and aesthetic qualities, but also the potential changes that might occur within the plant and animal communities.

The EPA required the Water Authority to assess the assimilative capacity of the northern metropolitan waters. The Water Authority faced the need to replicate the pipeline into the lagoon (or the northern suburbs would be awash with sewage), and to increase the flow of effluent. The EPA had constrained the total amount of nutrients that might be released, and projected increases in effluent from the region suggested that by 1995 the nutrient load would reach the EPA specified upper limit. It was therefore urgent that a study be undertaken to assess the assimilative capacity of the lagoon, in order to determine whether further increases in the nutrient load might be permitted, or whether alternative disposal methods might need to be considered.

Nutrients flowing into Cockburn Sound, south of Perth, had resulted in the excessive growth of epiphytes on seagrass leaves, causing the death of the seagrass through the effects of shading. A similar impact had been seen at Princess Royal Harbour near Albany in the south-west of the State. In both cases seagrasses had been lost. The EPA's principal concern for the Marmion lagoon was that the enhanced levels of nutrients might result in the loss of seagrass, with an associated impact on the fish communities of the area. Further outfalls are also planned to cater for the growth of the city. The cumulative impact of the nutrient added to coastal waters by these additional planned outfalls must also be assessed.

Initial proposals to study the physical, chemical, and biological processes operating within the Marmion lagoon, in the vicinity of the Beenyup outfall, lacked integration and appeared excessively expensive. The Water Authority decided that the first thing to do was to bring in a modelling team, and to run a workshop in order to determine the features and processes that required study. It was hoped that this would result in a more cost-effective study.

Professor Carl Walters, from the University of British Columbia, was invited to run such a workshop. This was held at Perth in December 1991. During the workshop, a barotropic model was set up to describe the physical and chemical aspects of the system. Previous studies had suggested that water movement within the system was wind driven. Baroclinic, or temperature and density related, effects were considered of lesser importance. Following on from the workshop, John Hunter, from CSIRO at Hobart, has extended and improved the model of the physical process.

After calculating the movement of water within the system, the chemical processes were calculated. Then, with an understanding of the concentration of chemicals throughout the system, the processes of primary production were examined. Finally, components were added to the model to describe some aspects of secondary

production, by including filter feeders, detritivores, and grazers. Little information was directly available for many of the parameters required within the model for the seagrasses, macro algae, and epiphytes within the Marmion lagoon, so values were selected from the literature. A detailed understanding of the processes of growth and mortality of the grazers, filter feeders, and detritivores was completely lacking, and subjective estimates were supplied for the parameters required to describe these processes.

The workshop was successful in bringing together available data, and producing discussion and interaction between the various groups involved in the study. While each group is still in competition for the available funds, there is now considerable interaction between the various studies that are proceeding. The original model is being modified and extended, but provides a framework and basis for all the separate studies. It focuses the work being undertaken, and forces the integration and critical assessment of the information collected. The resulting model is intended to be general in nature, with the facility for it to be applied to other coastal areas by changing the description of bathymetry, outfalls, and habitat.

When the original study began, it was thought that little information was available. In fact, when the modelling process began, and data from earlier studies were collected, a considerable volume of information surfaced. These data are now being brought together within a Geographical Information System.

In summary, the approach has been effective in bringing available information together, in a form readily accessible to managers and scientists. A modelling framework was used to integrate the available data, and assisted in the identification of areas where inadequate knowledge existed. Predictions from the model are being made and tested against observations from the real system. The process of modelling has resulted in the interaction of the researchers involved and the establishment of a common goal, and appears to be working well in both focussing the researchers' minds on the impact of nutrient enrichment within Marmion lagoon and in using their understanding to predict the possible changes that might occur. It should be regarded, however, as only the first step in an ongoing research effort to understand the processes operating within this system. The system is now the subject of a very intensive study which is expected to terminate in 1995.

There is also a very successful plan in place for control of oil spills along the W.A. coast. By identifying the resources at risk, and with a broad understanding of the physical oceanography and the biological systems concerned, a plan to handle oil spills at various locations was formulated. The plan has been tested on several occasions and appears to work well, although its effectiveness in protecting the environment has yet to be tested by a major oil spill.

Barbara Richardson then displayed (on overhead) the following suggested list entitled "Data Needs".

- Habitat information base—what's there and what's happening to it?
- Data on habitat utilisation:
  - critical habitats a priority
  - juxtaposition of habitats and interaction
  - critical links between habitats
  - species interaction and by-catch effects
- How do we 'value' habitats?
- Impacts of harvesting activities:
  - species catch data to include environmental data
  - data on impacts of gear type and operation on habitats
- Effectiveness of protected areas
- Collaborative research—multi-disciplinary/ strategic vs tactical
- Monitoring design and data source

- Assessment of other human activities
- Long-term data sets

In the discussion which followed, Jenny Burchmore stressed the importance of habitat mapping and inventory to management, and the need for it to be repeated and continued.

Sandy Morrison further underlined the importance of monitoring the effects of anything which is done e.g. fish ladder construction. Such feedback is a vital part of the learning experience from case studies.

Jenny Burchmore agreed, but with the reservation that monitoring is not enough. In the event that an undesirable impact is revealed by monitoring, the required management strategies need to be developed.

George Paras wanted to place more emphasis on amelioration. Alternative strategies of demand management are needed e.g. for reducing water use. We should be looking towards the long term and applying what is already known about impacts, rather than accepting the *status quo* as being good enough.

Hugh Cross urged the need for more of a vision, through which to target the decision makers, and encapsulated the three major obstructions demonstrated from Jenny Burchmore's case examples as legislation, final decision makers and the lack of information. Barbara Richardson challenged the group on how to set that vision.

Murray MacDonald believed that the vision would be set by strategic planning and informed community debate - a strategic system framework, involving the assessment of impacts of all other types of human activity.

In closing the session, Barbara Richardson urged participants to consider the issues of management through amelioration, enhancement and conservation and have their thoughts ready for the final discussion.