

FISHERIES RESEARCH AND DEVELOPMENT CORPORATION

FINAL REPORT

PROJECT NUMBER: 91/95

PROJECT TITLE: National Fisheries Technical Workshop Series

SUBTITLES: "Larval Biology" workshop (1 day).
"Recruitment Processes" workshop (2 days).

PROJECT OBJECTIVES:

- (i) To promote the opportunity during the Australian Society for Fish Biology annual conference for the national fisheries research expertise to focus on a technical area or subject of current or perceived national or regional fisheries significance. Such area or subject to be identified by the membership of the Society or by the Corporation as appropriate.
- (ii) To support where appropriate visiting fisheries scientists of acknowledged expertise in the workshop subject area to offer a national or international perspective.
- (iii) To assist in the publication of workshop proceedings as a benchmark document of current knowledge in the workshop subject area.
- (iv) As a result, to identify and define research questions of national fisheries significance.

THE EXTENT TO WHICH THEY WERE ACHIEVED:

The two workshops were hosted by CSIRO Division of Fisheries and enjoyed the professional backup of its excellent Hobart facilities. The workshop on "Larval Biology" which was held on August 20, 1991 was aimed at resolving concerns that fisheries scientists working on the same commercial species in different laboratories were having difficulty in agreeing on adequately staging and identifying larvae. This had implications from temperate to tropical regions and marine to freshwater habitats. It included groups as diverse as penaeid prawns, scallops, demersal finfish such as gemfish or orange roughy and pelagic finfish such as tunas.

Funding for the workshop and administrative resources was provided by the then Fishing Industry Research and Development Council, the workshop coordinated by Dr Don Hancock (formerly Research Director with W.A. Fisheries) and publication of the Proceedings provided by the Bureau of Rural Resources.

The topic was both timely and of national significance to Australian fisheries since considerable industry and research funding is currently directed toward early life history stages of commercial species. Such research has immediate and basic significance in the management of our commercial fisheries in terms of the stock assessment process and since results can focus the most basic management responses to biological cues.

Dr Iain Suthers of the University of New South Wales, a noted larval fish scientist, convened the meeting and was also a principal organiser. Following the successful Australian and New Zealand Conference on Southern Trawl Fisheries in Melbourne in May 1990, many similarities in trans Tasman fisheries and management philosophies were identified and workshop organisers felt that a keynote speaker able to highlight developments in New Zealand would be of benefit to Australian scientists. We were fortunate that Dr Rob Murdoch of the New Zealand Oceanographic Institute agreed to present the keynote address on larval work in New Zealand. We were also fortunate that Dr Don Robertson of the Ministry of Agriculture and Fisheries, New Zealand presented a talk by colleague Dr John Zeldis on the role of larval fish studies for fisheries research.

The programme was designed around several themes each chaired by a scientist with particular expertise. Thus Drs Greg Jenkins (Feeding Ecology and Condition of Larvae), Steven Battaglene (Extensive Larval Rearing), Iain Suthers (Biological Effects of Oceanographic Processes) and John Gunn (General Discussion and Summing Up) ensured the workshop was a success and that the major topics of concern were discussed. The basic structure included panel sessions which highlighted major points followed by more general discussion by workshop participants. Dr Jeff Leis provided an excellent summary of the workshop. The workshop was followed by an evening session for larval fish taxonomists. The aim of this session was to generate a preliminary guide to the families of temperate larvae, a list of names of relevant Australian researchers and to promote the compilation of an Atlas of larval drawings of commercially important species.

The workshop on "Recruitment Processes" which was held on August 21-22, 1991, considered both the general question of variability in recruitment as well as more specific questions as to recruitment in commercially significant species ranging from prawns to demersal fishes to tuna. Recruitment has significance in the management of commercially important species since it is a central issue as to the magnitude of available stock and, recruitment stability, variability or long-term change are key determinants in determining "optimum" management strategies.

This workshop was convened by Dr Ron Thresher of CSIRO Fisheries, Tasmania, a noted fisheries scientist researching larval fishes. The Society was fortunate that Dr Michael Sinclair, Director of the Bedford Institute of Oceanography, Nova Scotia agreed to present the keynote address. Dr Sinclair is a world-renowned scientist who has published widely on recruitment. He has developed a theory in which events in the early life-history stages of fish can assist in the retention of eggs and larvae (recruitment success) in relation to particular physical oceanographic features.

As with the preceding workshop on Larval Biology, the programme was organised around several key themes with panels of experienced scientists examining each area, followed by a general discussion by all participants. Themes included "Problems in Measuring Recruitment Variability" (coordinated by Warwick Nash and chaired by Richard

McLoughlin), "Space and Time Scales of Recruitment Variability and Determinants of Variability" (coordinated by Peter Doherty and chaired by Peter Rothlisberg and Dave Pollard), "Case Studies of Stock and Recruitment Relationships" (coordinated and chaired by David Smith), "Stock/Recruitment Models and Management Implications of Models and Recruitment Variability" (coordinated by Tony Koslow and Tony Smith and chaired by Tony Smith), "Recruitment Enhancement: How and Is It Worth the Effort?" (coordinated and chaired by Johan Bell) and "General Discussion and Summing Up" (chaired by Mike Sinclair).

The outcomes of the workshops are in the process of publication and will be available before the end of this year. These documents outline the "State of the Art" of our knowledge and will be significant references for Australian fisheries scientists. They further define research questions of national fisheries management significance.

RESEARCH RESULTS AND BENEFITS:

The Larval Biology workshop was an outstanding success. For the first time Australian researchers working on larval fish and especially those of commercial significance, were able to meet and discuss common problems. More significantly for Australian fisheries science, this interaction has continued since the workshop with meetings between scientists from different institutions. Thus this workshop has acted as a catalyst for interaction with these scientists.

In addition to the publication of the Proceedings of the Larval Biology workshop, all the larval fish scientists present have since cooperated on an ABRS project to produce an atlas of fish larvae which will be a landmark publication and add significantly to our knowledge of larval fishes.

One of the most significant outcomes was the realisation of the advances in this most significant area that have been made by our New Zealand colleagues. An example are the advances they have made in their understanding of larval ecology of the Hoki and the role of physics. Such oceanographic processes could also be most significant in the

dynamics of our own species - gemfish for example. All in all there was widespread agreement that this workshop was very successful.

The Recruitment Processes workshop was particularly relevant to Australian fisheries management since many panellists reported research on commercial species or sought to draw management implications. For example the extent of the studies helped to define the scale of management and the critical issue of recruitment overfishing, studies on pre-recruitment indices are directly applicable to the abundance estimation for exploited species and the lack of age structured data was particularly apparent, estimation of total allowable catch (or effort) targets are similarly dependant.

In addition evidence was presented that recruitment overfishing has probably occurred for Bass Strait Scallops, Western Australian Tiger prawns and east coast Gemfish. Dr Sinclair also compared the high productivity of eastern Canadian waters with the comparatively poor waters of eastern Australia, generally attributed to low nutrient levels. Sinclair suggested that our narrow shelf which is devoid of significant topographical features may explain the lack of fish production in Australian waters. The question is whether it is caused by food limitation or spatial constraints to egg and larval retention.

A number of fisheries scientists discussed various stock-recruitment models and their interpretation. An important consideration identified was that the interpretation of the biological information underpinning these models is as important as the model. For example the number of self-sustaining populations in a management unit can radically change interpretation of stock-recruitment data.

Australia has several well developed recruitment data bases (prawns in the NPF, W.A., S.A., lobsters in W.A., various coral reef fish studies in Qld), but there is a lack of comparable physical oceanography data. An understanding of recruitment dynamics of major commercial species will be enhanced with the coupling of these data sets.

DIFFICULTIES ENCOUNTERED:

In order to organise such workshops, considerable time must be devoted by participating scientists - time which is subtracted from their normal research or management functions. This is a considerable cost to the home institutions, but must be weighed against the benefits of holding such meetings. A key component of the success of the workshop series however, has been the organisation and dedication of Dr Don Hancock, the coordinator. Without his involvement, the programme preparation and follow-up, the smooth running of the workshop and the professional publication of proceedings would not be possible.

The publication of proceedings has had a number of problems. The Bureau of Rural Resources had agreed to undertake publication through their information series. Unfortunately, the workshop proceedings were not afforded a high priority in the publication sequence and delay through other Bureau publication jobs assuming higher priority caused the Proceedings to be superseded in priority. This situation was resolved recently and outstanding Proceedings published. Discussions between the Society and the Bureau have ensured the backlog is cleared and future publication assured. The very professional publications that have resulted have to some extent compensated for the delay. Future publication will not face this problem.

RECOMMENDATIONS FOR FUTURE RESEARCH:

There were a number of suggestions for future workshops and high on the list were (1) fish habitat and its role in the sustainability of fisheries and (2) developments in fish population dynamics research. The latter has been identified for the 1993 workshop in Western Australia whilst the former is the topic for this year's workshop in South Australia.

The Society would like to reiterate its view that workshop topics reflect members' views of areas or subjects of current or perceived national fisheries significance. However, we would be pleased to also hear the Corporation's views on possible topics that they

consider to warrant attention. The Society recognises the Corporation's charter to promote research activities that will benefit the fishing industry and consequently has endeavoured to identify topics that are both applied and of direct significance to research and management of Australia's fisheries. However should the Board identify a subject area or topic to be of particular strategic importance, the Society would be pleased to develop a proposal for the Board's further consideration.

APPLICATION OF RESULTS TO INDUSTRY:

The Australian fishing industry will benefit from the review of these research topics by researchers becoming more focussed in the two related subject areas. Of immediate benefit are the improved access to larval fish taxonomy data through the development of the atlas - a direct outcome of the workshop - and the improved interactions between researchers at the different institutions. The exposure of our leading fisheries scientists to Dr Sinclair's ideas on recruitment processes and our New Zealand colleagues' advances in larval ecology cannot but enhance our own research efforts in our fisheries. Australian fisheries science is currently facing enormous challenges in providing advice to fishery managers in some of our most important fisheries. Recruitment and larval biology are critical components of any stock assessment and particularly if scientists are faced with recommending Total Allowable Catches to managers.

Summaries of each of the workshops will be circulated via "Australian Fisheries" and other industry media.

LIST OF SCIENTIFIC PAPERS OR PUBLICATIONS RESULTING FROM PROJECT:

Proceedings of workshops are enclosed and others will be forwarded to the Board of the Corporation as soon as they are published. Summaries are to be published in "Australian Fisheries." Copies will be available to industry representatives on request.