

Session I Group Discussion

Question 1. Groups 1, 4 and 9

Does the definition of a stock (as outlined in the Bureau of Resource Sciences Status Report 1995)¹ meet current management needs?

- The term “stock” means different things to different people. There is therefore a need to identify, and importantly document, the requirement for such a definition, whether that be for management, research and political use.
- Therefore, while BRS stock definition was considered adequate for general purposes, it would need to be redefined to meet the specific goals and constraints of each management problem, and be flexible enough to reflect improvements in knowledge and changes in priorities.
- Group 9’s view was that, within the Australian context, while stock definition is important as a common basis for discussion by stakeholders, the stock concept may be irrelevant, to a greater or lesser extent, for day-to-day decisions on fisheries which are managed on the basis of gear types or spatial distribution.
- It is conceivable that a variety of definitions could be derived for a stock. A higher priority was placed on determining and documenting the most appropriate stock description for specific issues and situations, than seeking resolution on a definition that is acceptable to all.
- The communication of the outcomes and the translation of research information into management needs is a matter of priority for all stakeholder groups.
- Biologists are attempting to identify stocks and may, in some instances, attempt to assess on a stock-by-stock basis, but it may be some time before they reach this level of sophistication.
- Definition of a stock often relates to biological interactions. However, management seeks to address the socio-political considerations of often competing and conflicting stakeholders seeking to maximize their individual allocation of available catch. It may therefore be appropriate for managers to define a stock composed of “units” which take into account geographical location, stakeholder access and entitlements, species composition, etc. and incorporating a habitat component into the definition.
- Stock definition for legislative purposes is important, particularly for Native Title considerations.
- The trigger to more meaningful assessment and management will be the

¹ McLoughlin, K., B. Wallner and D. Staples (Eds) (1995). Fisheries Status Reports 1994 — Resource Assessments of Australian Commonwealth Fisheries. Bureau of Resource Sciences: Canberra.

development of precautionary management plans against a sequential fish down or stock collapse, or *ad hoc* reactions to real stock collapses.

Question 2. Groups 5 and 12

Can the BRS definition of a stock be supported technically and scientifically and what level of certainty is required for technical and scientific acceptance?

- The reasons for defining stocks are principally to identify management units which allow maximum yield(s) from harvesting while maintaining the biodiversity of the exploited fish resources and the ecosystem of which they are part.
- The BRS definition of stock was not considered to be sufficiently precise to be always supportable technically and scientifically — this will depend on whether the stock is defined from a scientific viewpoint or from a practical management perspective, and on the species involved.
- It was generally agreed that historically the term “stock” in fisheries management and science has often been poorly defined, and has been used for a range of intended meanings, from a group of fish occupying a physical region, to one with distinct genetic integrity. The BRS definition was therefore considered to be reasonable provided management units can be defined at different levels, depending on the context and the practical components of the fishery in question.
- It was considered that the BRS definition does not allow for uncertainty, such as that which can come from misinterpretation of biological data, for example on genetics. However, decisions will still have to be made, notwithstanding not having an acceptable/supportable definition of a stock. Scientists work on a 95% level of confidence, but from then on it will be dependent on trade-offs between the risk to the resource and to industry.
- As many tools as possible should be used to test stock structure hypotheses — the more tools providing supporting evidence, the more acceptable the hypotheses. What analyses have been done? — are the results believable? Fisheries must always be managed on the basis of the best scientific knowledge of stock structure available.
- In determining the level of technical and scientific certainty needed to define fish stocks, the following factors must also be considered:
 - biology and behaviour of the exploited species;
 - geographical coverage of the fishery in question;
 - impact of alternative stock structure scenarios on socio-economic characteristics of the fishery; and
 - impact of alternative stock structure scenarios on fishing fleet dynamics.
- Research is required on methods for assessing the risks of making management decisions in the absence of knowledge of the stock structure. The costs to management, industry and resource sustainability of making such decisions,

on the basis of incorrect stock structure information, could be significant.

- It is acknowledged that events in management/politics may emerge to alter the whole management regime of a fishery. However, there must be underlying acceptance of the “stock structure” in the fishery, regardless of new management regimes.

Question 3. Groups 6 and 10

What are the advantages, disadvantages, strengths and weaknesses of the BRS definition of a stock? Can the strengths and weaknesses be addressed technically?

- Defining a stock for management and assessment purposes has several advantages:—

- it promotes a common understanding of management boundaries between stakeholders;
- it provides a functional management unit to facilitate better management practices; and
- it encourages scientific rigour of assessment and reduces errors resulting from applying single-stock assumptions to multi-stock species.

- The BRS definition of a stock as “a group of individuals of a species which can be regarded as an entity for management or assessment purposes”, while general in nature, was considered to have some practical advantages for legal purposes and inter-jurisdictional

arrangements. It is broad and flexible and able to be refined to suit particular situations.

- However, the definition is too broad and has insufficient detail, and there is a need for more precise definitions tailored to suit each species being managed. While there may be important socio-economic reasons for management units such as traditional fishing areas, biological characters such as the life history and distribution of each stock need to be the basis for defining management units. Consultation with stakeholders may result in further subdivisions to address social considerations.

- The definition therefore can be used to provide a general concept of stock, with additional refinements on a case-by-case basis.

- Improved stock definitions can be achieved with modern technology such as tagging, mitochondrial DNA and otolith microchemistry, preferably by applying several of these tools simultaneously. Protocols are needed to determine the level of genetic divergence which is significant for fishery management purposes, because genetic technology is now able to distinguish differences between individual fish. The preservation of genetic diversity, an important corollary of genetic stock identification, greatly increases the complexity of fishery management, but needs to be addressed in aquaculture (barramundi, silver perch), freshwater fisheries management and for rare and endangered species.

Question 4. Groups 3 and 11

What processes and projects are underway to address any weakness of the definition? If none, what processes should be undertaken to address such weaknesses?

- The groups were not aware of any processes or projects to address weaknesses in the definition of stock.
- There is a need to better define a stock to give a direction for research and to co-ordinate the roles of management and science in establishing and using information on stock structure.
- A stock can have distinct genetics, biological and ecological characteristics, which should be recognized in any management regime applying to that stock.
- Often stocks are defined as convenient management units rather than as biological units. The current definition gives no indication of how a stock should be defined or for what purpose. This may necessarily be different for different species and/or management situations.
- The definition of a stock needs to be strongly focussed towards utility for management purposes; be easily understood; address changes in productivity; be flexible; and be appropriate to the aims of the fishery.
- To provide a better definition of a stock a protocol should be developed to help determine in each case what type of stock unit is required. For example, is there a need for a broad generic definition or a specific or localized definition? Is there a need for a genetic/biological

definition? Referral back to the protocol would reduce confusion and assist progress.

Question 5. Groups 2, 7 and 8

With the increasing emphasis on management of fisheries as mixed fisheries or as components of large ecosystems, is the issue of stock resolution important? Explain your position(s).

- All three groups considered the issues of stock resolution to be important for the following reasons:—
 - identification of stock structure (or species structure) of mixed resource fisheries is important because many assessment approaches/models attempt to elucidate the relationship between fishing pressure and the status of biologically meaningful components of harvested resources, e.g. discrete breeding populations;
 - it is necessary in order to identify and avoid overexploitation of the most vulnerable component(s) of a mixed species resource, and to determine whether localized exploitation is taking place;
 - the greater the pressure on fishery resources, the greater the need to understand their stock structure and other biological/ecological characteristics in order to properly assess the impacts of fishing and other activities;
 - stock resolution helps us to understand the relationship between adjacent fisheries — in particular, whether they are fishing the same or different stocks;

- it helps to determine which other user groups may need to be consulted in developing management plans, and the impacts one user group may have on the availability of fish resources to other competing user/interest groups; and
 - stock resolution is vital to any attempt to manage fisheries within an ecosystem context.
- Future stock definition needs to be based on biological criteria rather than management and enforcement needs.
 - There is a need for more work on defining the extent of stocks being fished in Australia. Examples of Australian fisheries where a knowledge of stock structure has made a significant contribution to management regimes include barramundi, orange roughy, pilchards, southern bluefin tuna and gemfish.
- Genetic studies using the latest techniques are seen as the most practicable system for establishing stock identity, preferably complemented by non-genetic methods. However large-scale genetic resolution is likely to be expensive, and such expenditure may need to be diverted towards fisheries which are either the most valuable or the most vulnerable. Moreover the example of Australian bass, which showed very little genetic variation despite their obvious geographical separation, suggests that genetic analysis is not a stock discrimination panacea.
 - The economic and social implications of fishery management under alternative stock structure scenarios will need to be considered as well as stock conservation.