Session 5. Summary

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In the first paper in this session on stock assessment, Wetherall evaluated the condition of the pelagic armorhead stock using a nonlinear autoregressive model of the stock dynamics. Application of the model was hampered by unavailability of crucial statistics on the catches by Soviet trawlers, statistical difficulties in parameter estimation, and likely model misspecification.

Based only on Japanese catch and effort statistics, Wetherall's preliminary analysis suggested that high variability in recruitment was the chief cause of fluctuations in fishing success. The collapse of the fishery in 1978 could not easily be ascribed to excessive trawling effort. Behavior of the fishery in its early years suggested that stock independent recruitment is the norm for pelagic armorhead except at very low stock levels. Because the spawning stock is now severely depressed, a sharp reduction in fishing mortality is worth considering as a way to accelerate the stock's recovery.

In the second paper, Yamamoto presented an assessment of the stock of alfonsin in the vicinity of the Izu Islands. He noted a drastic change in fishing methods in 1978, from the "drifting barrel operation" to the more efficient "vertical bottom longline" type of fishing. His analysis revealed that the alfonsin stocks inhabiting grounds around Aoga Shima and Tori Shima have declined in recent years, possibly as a result of expansion of fishing.

In the ensuing general discussion, Wetherall pointed out that for the central North Pacific seamount fishery, the decline in catch per unit effort (CPUE) for pelagic armorhead may give an exaggerated picture of the actual armorhead stock decline, if there has been a change in trawling strategy to target alfonsin. The importance of documenting the history of trawling practices and possible changes in fishing strategy and tactics was emphasized.

To a question on the level of the spawning stock of pelagic armorhead, Wetherall replied that the stock is very much depressed, probably by at least an order of magnitude below its condition before the collapse. In related discussions, he added that he has not specifically studied any density-dependent responses of pelagic armorhead, but noted that the average size of armorhead in the catch increased when CPUE dropped drastically, suggesting the possibility of density-dependent growth in the prerecruit stages.

It was suggested during the discussion that the preexploitation stock of pelagic armorhead was probably small because the seamounts provided only limited habitat.

To a question on whether the pelagic armorhead stock assessment model is completely dependent on catch data, Wetherall replied that the model is based on the type of data now available, but is sufficiently flexible to allow modification as more information is acquired. Wetherall pointed out that the model explicitly considered only the adult stage of the pelagic armorhead and does not yet use input on the early life history phases. Conceptually, to model the prerecruit phases information on oceanographic processes and early life conditions might be incorporated, but such elaborations of the armorhead stock model would require very costly and sophisticated research and may never be feasible.

In discussions of the potential of tagging pelagic armorhead for population studies, scientists from the Honolulu Laboratory reported on their experiences in this area and indicated that such tagging is not practical. Armorhead caught on handlines are in poor condition when brought aboard, and when held in baitwells on the research vessel, or tagged and held for observation, they soon die.

It was suggested that future armorhead studies should be directed toward a critical examination of productivity over the seamounts and a study of factors affecting the distribution, development and survival of eggs, larvae, and other early life stages. Additionally, studies should focus on age composition of the seamount armorhead population. It was pointed out that through age determination it would be possible to critically examine aspects of the life history presented in an earlier session. Age and growth studies at the Honolulu Laboratory have just begun, but if the results of preliminary work are validated, life history models of pelagic armorhead could change significantly from those now described in the literature. For example, it may be found that the "fat" pelagic stage of armorhead is indeed recruited to the seamount population at an age of 2 years, as the stock model tentatively assumes. It may also be found that there is a narrow range of ages in the spawning stock, and few older individuals. If so, one might speculate that death soon after spawning is highly probable, if not certain.

In the general discussion regarding alfonsin, it was remarked that the percentage of alfonsin in the ichthyofauna is relatively large in the Emperor Seamount area compared to its representation elsewhere in its range. It was also noted that the catch of alfonsin from the Emperor Seamounts in recent years has been larger than that made in Japanese coastal waters. The relationship between alfonsin stocks in the two areas is unknown. In particular, it is not known to what degree alfonsin yields on the seamounts might be affected by fishing effort and biological production elsewhere.