

PACIFIC BILLFISHES AND THE ASSESSMENT PROCESS

Robert A. Skillman

The National Coalition for Marine Conservation asked me to review the status of Pacific billfish resources, keeping in mind the three purposes of the symposium. These are: 1) examine research, data and institutional needs for conservation; 2) help policy-makers and non-governmental interests to foster broader international cooperation in stewardship; and 3) serve as a catalyst for improving international cooperation to conserve the stocks. To accomplish this, I will briefly describe the status of members of the istiophorid family: Indo-Pacific blue marlin, black marlin, striped marlin, and sailfish-shortbill spearfish; and the swordfish. I will also remark on how these assessments are generally conducted. Problems with the usual approach will be discussed, and this will lead to a discussion of alternate ways of conducting such work.

Status of the Stocks

Most billfish are taken incidentally during fishing operations targeting tuna, and those of us in the field are aware that more emphasis is placed on assessing tuna stocks than billfish stocks. Nonetheless, it came as a surprise that a search of a commercial electronic database found only one reference for billfish stock assessment in the Pacific and that was a summary of a paper that I knew existed. Compared to the Atlantic, there is a paucity of assessments of Pacific billfishes; to my knowledge there are only four published papers and one in press (Table 1). A conclusion to be drawn from these assessments is that none of the Pacific stocks of billfishes show significant signs of stress; in other words, they seem healthy. It should be noted, however, that all the papers except the one in press are 10 or more years old. The assessments cited in Table 1 all struggled with data quality problems and how to evaluate the trends in the catch and effort data. Half the assessments were done by visual inspection of data trends and half by quantitative modeling. While all but one of the assessments concluded that the species stock was healthy, there is considerable uncertainty in all of the assessments.

For blue marlin, I fit a generalized (equilibrium) production model (Pella and

Tomlinson 1969) to catch and effort data (with a simulated effect of changes to deep longline gear) and presented a chart showing considerable lack of fit. I also noted that the catches in the last years of the data series were among the lowest recorded and fell in the descending limb of the production curve (Skillman 1989). In contrast, Suzuki (1989) examined the same data extended a few years, incorporated actual measures of the effect of changing to deep longline gear, and concluded that the recent data showed no trend even with increasing fishing effort.

For black marlin, neither Skillman (1989) nor Suzuki (1989) was able to assess the stock using a production model. The latter concluded the stock was healthy based on trends in the data. For striped marlin, Suzuki (1989) fitted a production model to the catch and effort data from the south Pacific and concluded the stock was healthy. He could not fit a model to data from the north Pacific, but concluded the stock was healthy based on trends in the data. Skillman (1989) noted that the data for the Pacific overall were linear and that it was not possible to assess with a production model.

For sailfish/shortbill spearfish, pooling of these species in the published statistics makes it impossible to assess the status of the stocks separately. Skillman (1989) indicated that the increasing trend in catches suggested a healthy state. For swordfish, Sakagawa and Bell (1980) and Skillman (1989) fitted a generalized production model to swordfish fishery data while Bartoo and Coan (1989) concluded that the data were too variable and could not be modeled using a production curve. All three assessments concluded that the resource was healthy. Hinton and Deriso (In press) have conducted the most sophisticated analysis to date, using a Deriso-Schnute delay difference (non-equilibrium) model, but only for the eastern tropical Pacific. They also have concluded that that portion of the stock is healthy.

Study Implementation: The Way It's Been

Of the five papers cited, one is a rapporteur's report of a symposium held in Honolulu in 1977 (Sakagawa and Bell 1980), and three were

prepared for the Second International Billfish Symposium held in Honolulu in 1988. So, it seems that most of the assessments were conducted because someone decided to have a symposium. In these cases, the reasons were to examine the stocks of several billfishes and to update our knowledge of billfish biology.

Similarly, the persons preparing these assessments are from only a few agencies and localities. Three papers were prepared by staff from the National Marine Fisheries Service Southwest Fisheries Science Center in Honolulu and La Jolla, one from the Inter-American Tropical Tuna Commission in La Jolla (indeed in the same building), and one from the National Research Institute for Far Seas Fisheries in Shimizu, Japan.

I suspect that most of these assessments were conducted as follows. Having been invited to attend a symposium, a researcher began by assembling information on the fishery, material on the biology of the species, and available fishery data. The latter involved checking the agency's electronic database and attempting to update it with more recent data that were either published or available from other agencies or organizations.

National confidentiality regulations and other data sharing practices often foiled this attempt. The researcher then selected the assessment tool to be used, based possibly on some combination of the data available and experience with given assessment tools. The analysis was then conducted, the results gotten and the paper written. After the symposium, the researcher was off on another project, probably involving tuna.

What Is Wrong With This Approach?

This approach has several problems involving the appropriateness of the assessments, their timeliness, participation by different interests, data problems, and biological-centric thinking.

Not problem-oriented or-priority directed. Since management needs have not been examined comprehensively, there is essentially no guidance about how to conduct the assessment. There is no consensus regarding resource (fish) and fishery (people, communities, businesses) problems, nor about the relative importance of these different

Table 1. Status of billfishes in the Pacific Ocean. ETP stands for eastern tropical Pacific, mt for metric tons, MSY for maximum sustainable yield, North for North Pacific, and South for South Pacific. Sailfish-spearfish indicates that the assessment was for both species combined.

Species	Condition	MSY	Source
Blue marlin	Overharvested	20,000 mt	Skillman (1989)
Blue marlin	Healthy	--	Suzuki (1989)
Black marlin	--	--	Skillman (1989)
Black marlin	Healthy	--	Suzuki (1989)
Striped marlin	--	--	Skillman (1989)
South	Healthy	6-9,000 mt	Suzuki (1989)
North	Healthy	--	Suzuki (1989)
Sailfish-Spearfish	Healthy	--	Skillman (1989)
Swordfish	Healthy	20,000 mt	Sakagawa & Bell (1980)
Swordfish	Healthy	--	Bartoo & Coan (1989)
Swordfish	Healthy	20,000 mt	Skillman (1989)
ETP	Healthy	8,000 mt	Hinton & Deriso (in press)

issues. Thus, it is not clear what parameters need to be estimated, e.g., those of more purely biological interests or those having more direct management utility. Nor is it clear whether effects, say of some proposed or enacted management intervention, need to be evaluated. Without these guidelines, choice of assessment tools is pretty much arbitrary.

Undertaken sporadically. Another consequence of conducting assessments in the above manner is that they will not be kept current. Also, they may not be available for the species or fisheries where there is a real management interest.

Conducted in isolation. This approach does not encourage collaboration, whether among resource users (commercial, recreational, subsistence), nations fishing the resources, management institutions, or agencies. The ability to conduct assessments is generally limited to those with access to data from large, widespread fisheries (lots of data that are more likely to encompass the stock boundaries of these highly migratory species). Thus, commercial fisheries are emphasized, while recreational and subsistence fisheries, which are often localized and poorly monitored, are not.

Data gaps and unresolved inconsistencies. With no recognized long-term goals and a plan to sequentially improve stock assessments, there is little incentive to fill data gaps and resolve data

inconsistencies. Without such goals-directed thinking, there is little basis for changing or augmenting national data collection procedures. Establishment of an "official" database for widespread use should result in more consistency in the assessments by different workers.

Emphasis on biological status. Nothing is *per se* wrong with assessing the biological status of the resources, but economic, social and cultural aspects of fishery management are commonly ignored under the present scheme of doing things. Resolving non-biological problems is often more difficult than dealing with biological factors. Consequently, there is great uncertainty in the results, they may have little relevancy to the important management issues, and making them more current may essentially amount to starting all over.

Doing It Differently

There are two common ways of conducting business that have led to improved stock assessment and fishery management. In addition, a transitional arrangement between these will be discussed.

Formal management organizations. Organizations such as the International Commission for the Conservation of Atlantic Tuna (ICCAT) and the Inter-American Tropical Tuna Commission (IATTC) are familiar examples for highly migratory species. These organizations emphasize the assessment of the resources and promulgating appropriate management action to conserve the managed resources. The Forum Fisheries Agency, in contrast, was formed purely to manage the fisheries harvesting the highly migratory resources in the waters of its south Pacific member nations, leaving resource considerations largely to other bodies. These formal bodies take a long time to form and involve considerable political action at the international level. They generally were formed to address problems with high-valued commercial species, only taking up lesser species, such as billfish, later.

Informal working groups. Where the formation of regional management organizations is lacking, the establishment of informal working groups has contributed to systematically addressing assessment issues. Examples of such groups are the Western Pacific Yellowfin Tuna Research Group, the South Pacific Albacore Research Group (SPARE), and the North Pacific Albacore Workshop. Meetings of these groups generally

follow a workshop format with selected members, and members are not official representatives of any government or organization. Data are commonly brought to the sessions, often combined into some agreed upon single data set, used in analyses, and then taken home by the providers. One problem with such informal groups is that the agencies of the members often do not allocate as much of their time and resources as they might for membership in formal organizations. Consequently, work often does not proceed as rapidly or systematically as it might.

Something between these arrangements. Concern for the status of the albacore resource in the north Pacific, interest in albacore management, and the success of the North Pacific Albacore Workshop working group, led the US State Department to explore a regional management organization with other states. This resulted in a bilateral agreement between the US and Japan to establish a scientific working body with multinational membership as a first step toward the development of a regional management organization. The Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean has established working groups for swordfish, bigeye tuna, bluefin tuna and fishery data. As an example of the political sensitivities involved, an albacore working group has not yet been formed because of problems associated with the existing membership of the North Pacific Albacore Workshop (US, Japan, Canada, Taiwan).

Working group advantages. I think the working group arrangement, including the formal groups being developed in the Interim Scientific Committee, offers the best hope for furthering the conservation of billfishes in the Pacific at this time. Some advantages of this approach are as follows: *Focusing* of activities through goal and priority setting will result only after an analysis of problems and arriving at a consensus. Of course, the latter will not be easy with multiple interests involved. Inclusive membership or participation, for example large and small fishing nations and diverse interests within the US, will help broaden the perspective of conservation issues considered. *Collaboration* among scientists in solving stock assessment and data problems should lead to synergism and be more productive than individual efforts. *Sustained* effort should result from working on long-term goals and priorities set for solving data deficiencies and resource and fishery problems.

Working group challenges. Working groups, especially on the international stage, are of course not without their problems and limitations. The following may be some of the potential problems from the US perspective: *Billfishes*, with the possible exception of swordfish, are still likely to receive less attention because of the commercial importance of tunas on the world market. Note that the Interim Scientific Committee has not formed a marlin working group. *Optimum yield* has not been a common concept on the international scene, although recent United Nations proclamations (FAO Code of Conduct for Responsible Fishing and, to a lesser extent, the United Nations Fish Stocks Agreement) address this issue. *Protected species* are included in the language of the FAO Code of Conduct, but the mechanism for including them in deliberations on fishery management in the international arena will undoubtedly be a challenge. *Data*, the possession of, is generally a requirement for participating in the assessment of the status of stocks and drafting proposed management schemes. This *de facto* game plan has relevancy to small-scale fisheries in general and recreational fisheries in particular because data are often not collected for these fisheries in any systematic manner. *Diverse U.S. interests*, or namely how to involve interests ranging from recreational to commercial fisheries as well as protected species and fishery habitat management interests in the process of identifying resource conservation and fishery management needs will be a challenge.

Summary

The status of swordfish and other billfishes in the Pacific has not received as much attention compared to other highly migratory pelagic species, and there is considerable uncertainty in the estimates. Nonetheless, no species is believed to show serious signs of stress due to fishing. Stock assessment studies for these species are conducted irregularly by various national agencies and regional organizations without significant collaboration. As a consequence, assessments are often out of date and do not match management needs. Data needed to conduct such studies are incomplete and not readily available. The working group approach to stock assessment, for example within the Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean, is suggested as the best means of addressing billfish conservation needs.

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Bob Skillman has worked for the Honolulu Laboratory, Southwest Fisheries Science Center, National Marine Fisheries Service since 1969 as a fishery biologist. He has conducted research on the population biology and dynamics of highly migratory pelagic species. He participated in the "second international billfish symposium" sponsored by the National Coalition for Marine Conservation in 1988. Currently he is involved with estimating bycatch of marine turtles and seabirds in the Hawaii-based pelagic longline fishery and database development work for pelagics. He serves on the Scientific and Statistical Committee of the Western Pacific Council and a team monitoring the fishery management plan for highly migratory species.