1982

Finfisheries Problems and Approaches

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REPORT OF

WORKSHOP ON CHESAPEAKE BAY FISHERIES STATISTICS

Fredericksburg, Virginia

July 12-13, 1982

Chesapeake Biological Laboratory
Center for Environmental and Estuarine Studies
University of Maryland

Chesapeake Research Consortium

Tidal Fisheries Division
Tidewater Administration
Maryland Department of Natural Resources

Virginia Institute of Marine Science
The College of William and Mary

Virginia Marine Resources Commission

L. Eugene Cronin, Editor

October 1982

CBC PUBLICATION NO. 107

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FINFISHERIES
PROBLEMS AND APPROACHES

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The fisheries data of principal concern at this conference are those which provide an accurate description of the harvest from the resource. Most often, one thinks of the "standard" reference fishery data from commercial fish landings: pounds by species, dockside dollar value, location of the catch, gear used, and number of fishermen. These data have been widely used by biologists and managers to evaluate the status of particular stocks and trends in the fishery. An example of a recent evaluation for Chesapeake Bay fisheries is Rothschild et al. (1981).

Several underlying truths must be borne in mind when discussing territorial seas fisheries management and the statistical database: a) We seek to manage the finfisheries which are primarily conducted upon species which migrate fairly widely; b) The resources managed do not have the right to vote thus the managers must adopt an altruist's view (people vote, but fish do not); c) Watermen of both commercial and recreational inclination engage in that activity because it allows a great degree of independence. Some fair number view the collection of statistics and licensing as an infringement upon their freedom. Suffice it so say that there is a reluctance among fisherman to furnish voluntary information to the government; d) Finfish resources are common property resources which are shared by multiple harvesters and no one group of users has a greater right to the resources; e) The water body which supports the biological resources is subject to multiple uses such as waste disposal, merchant shipping, pleasure boating, cooling water, drinking water, etc. Fishery managers must be aware of and factor in the effects of other uses upon the biota and the carrying capacity of the system; and f) Effective management entails the ability to detect changes in the resource(s) under management

so that the public will know if action is needed and what response the resource has made to the prior management action(s). Fisheries statistics are to provide the resource measures of pulse and response to treatment.

We assume that the objective of the statistical collection program for Chesapeake Bay is to provide a comprehensive documentation of finfish harvest by commercial and recreational fisheries and that these estimates would have a definable confidence limit. Coupling the harvest information with other resource data allows the manager to present a balanced recommendation in support of a management action. Effective management recommendations most often are developed through examination of several information types. The types of information and levels of resource assessment available to the manager are many (Table 1). Information presently available for most finfish resources allows stock assessment at the relative abundance trend level. Managers, legislatures, and scientists will strive for the best suite of data obtainable within the constraints of fiscal resources. Today's trend of budget austerity demands that we take a close look at the kinds of information being collected and the methodology employed to assure that the essential core data base is maintained and available to the managers in a timely and cost efficient manner.

There are several problems with the current landings data and statistical collection systems for Chesapeake Bay finfishes.

1. Data are expensive to collect.
2. Records are physically and administratively bulky.
3. Accuracy of reported data is suspect.
4. Selected elements which could give a more complete picture of landings are missing.
5. Reporting, processing, and application to management of data are not timely.

Cost of data collection is dependent on the method of collection, the completeness of census and the efficiency with which the data moves through the system to summary output. Collection systems for Maryland and Virginia landings are fundamentally different. The relative merits of each method could be debated but the crux of the matter is that the percent accuracy and comparability of total landings derived from each system are unknown. Actual catches and reported catches may differ by factors of 3 to 7 X (Maryland Waterman's Association 1978). Several commercial fishermen have commented that they under-report in good years but they

will report their catch accurately in bad years (also discussed in Kohlenstein 1980). In years of high resource abundance fishermen do not want the catch figures to reflect intense fishing pressure and in years of low abundance they don't want a drop in catch to suggest that restrictions are needed because of reduced stocks.

Landings data alone are not intended to provide quick answers to short term problems. However, they are often the first point of reference for questions to resource managers. Declines in reported catch may reflect a true decline in the fish population or simply a decline in the amount of fishing effort. The amount of effort expended in a fishery is therefore as critical a piece of information as the total landings. In both states the ability to derive reliable and comparable unit of effort data is limited (Rothschild et al., 1981). Catch of a given species by multiple gear types further compounds the problem and complicates the interpretation of trends. Questions of seasonal activity, by area, by species are often answered by reference to the last year for which data entry, summaries and reports are completed. The number of delinquent reports and the speed at which the data compilation takes place will determine how soon the data are in a useable form. Seasonal behavior of fish is too variable to use the landing data system for reliable assessment of all current short term questions.

There are several important factors to be borne in mind relative to Chesapeake Bay finfisheries when interpreting data on catch, effort, relative abundance, etc. (1) The fishes available to Chesapeake Bay fishermen may be only a part of the unit population (i.e., striped bass, menhaden, weakfish). (2) Multiple gear fisheries exert different fishing pressures upon selected sizes of fish or by areas (recreational vs. commercial, gill net vs. pound net, river vs. open bay). (3) Climatic and environmental factors may have an overriding influence upon recruitment (striped bass spawning success, or larval recruitment from offshore spawning areas as for menhaden, spot and croaker). (4) Fishery managers and their scientific advisors strive to insure the presence of an adequate resource base to support and foster the commercial and recreational fisheries within the context of multiple use of the Chesapeake Bay. (5) Cost-benefit analyses of major engineering or development projects may jeapordize the future of the fisheries under management. The fisheries are renewable resources but the relative importance of habitat types and characteristics to production of fishery resources are poorly understood. When faced with the trade-off, a few fish versus millions in income and tax bases, the biotic resource does not pull equivalent political weight.

As we pursue new approaches to a landings data system or more sophisticated stock assessment program, it should be kept in mind that if the key statistic, total landings, is altered to the degree that it is no longer comparable to the historical data we may weaken a powerful piece of management information. Landings have been demonstrated to be reliable as an indicator of stock size in striped bass (Van Winkle et al., 1979, Kohlenstein 1980, Rothschild et al., 1981) croaker and weakfish (Joseph 1972), American shad and river herrings (Rothschild et al., 1981), yellow perch (Muncy 1962) and spot (Pacheco 1962). In addition to landings, information on age, size and sex of the catch and the catch per unit of effort must be collected. Collection of these data may be accomplished more reliably and quickly through efforts which are separate from the landings collection system.

In Maryland, only gizzard shad, menhaden, eels, and possibly carp are free from commercial and recreational competition for the stocks. In 1979, eight of the ten most frequently caught sport fish (except toadfish) were among the top 10 commercial species by pounds (Williams et al., 1982). Excluding menhaden, the estimated poundage of the 10 most frequently caught sport fish was over 3 times the corresponding commercial catch.

The point of this analysis is to reinforce the conclusion of Richkus et al., (1980): "The absence of what may be significant amounts of landings (sport take) from the catch records can obviously introduce inaccuracies into analyses performed on these records."

Where do we go from here or what can we do to improve the fishery information systems for management of Chesapeake Bay finfishes? We recommend:

1. Develop landings data for the full harvest, sport and commercial.
2. Compare the methodologies of MD and VA for adequacy of reports, accuracy of information and economy of information.
3. Evaluate alternative methods for census of harvesters and define confidence limits upon the estimates of catch. Evaluate the use of the random stratified sampling technique for license holders to compile more reliable and accurate daily catch and effort data. This would include licensing of marine recreational fishermen to establish the user population for sampling.
4. Design comparable state programs for biological stock assessment and forecasts of abundance. Monitoring programs would provide the vital statistics on target resources and should be scaled in frequency to the generation time of the species and age at recruitment, i.e.

short vs. long lived resources would be assessed at different intervals.

5. Streamline data reporting and processing to provide more timely summary statistics to managers, scientists, and general public. A great disparity exists among MD-DNR, VMRC, and PRFC present capabilities. An overnight equivalancy is not anticipated but a plan and phased approach to improve the capabilities (hardware and software) in the latter groups is needed. Evolution of mini-computers has been rapid and management agencies must modernize their facilities to include present day state of the art hardware with user friendly terminals and software.
6. Encourage sea grant, 88-309, 89-304, and other program support for biological research on critical data types which are applicable in assessment of fishery resources and development of management recommendations.
7. Develop bistate working groups for target resources to implement coordinated research and stock assessment. The existing institutional framework within ASMFC should be adequate to tie together Chesapeake Bay research and management agencies. Use the ISFMP, NE Cooperative Statistics working group, and Advisory Committee as core elements.

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CODE KEY -

Essential ●

Desirable ○

INFORMATION NEED	ASSESSMENT TYPE						
	None	Catch trend	Relative abundance trend	Equilbrium yield	Annual yield forecast	Multispecies total biomass yield	Ecosystem Yield
Species description	○	●	●	●	●	●	●
Species distribution		○	○	●	●	●	●
Stock identification		○	○	○	○	●	●
Catch (Sport and Commercial)		●	●	●	●	●	●
Discard		○	○	○	○	●	●
Effort			○	●	●	●	●
Length composition			○	○	●	●	●
Age composition				○	●	●	●
Growth rates/length-weight			○	●	●	●	●
Relative abundance			●	●	●	●	●
Mortality rate				●	●	●	●
Exploitation rate				○	●	●	●
Reproductive rate				○	●	●	●
Behavior				○	○	○	●
Catchability				○	○	○	●
Absolute population size				○	●	●	●
Annual recruitment				○	●	●	●
Environmental indices					○	○	●
Causal environmental mechanisms					○	○	●
Species interactions					○	●	●
Multiple factors						○	●
Multispecies models						○	●

Source: NOAA-TM-NMFS-SWFC-12, p.A 29