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## I. INTRODUCTION

### A. Objectives

The Fisheries Conservation and Management Act (FCMA) of 1976 is potentially the most significant institutional change in the history of U.S. fisheries management.<sup>1/</sup> Under the provisions of the FCMA, Regional Fishery Management Councils are created with broad authority to recommend fisheries management plans to the Secretary of Commerce.<sup>2/</sup>

The FCMA specifies broad national standards and purposes, including fisheries development and management for "optimum yield," which are to be pursued. To identify the needs for fishery management data an intra-departmental committee on fisheries management data was formed (See Appendix D). The objectives of the report derive from the need for an adequate data base.<sup>3/</sup> Specifically, the objectives of this report are:

- 1) to specify data needed for fisheries management
- 2) to assess the extent to which needed data are being collected
- 3) to identify factors which affect data availability, quality and usage
- 4) to recommend ways and means for alleviating problems identified in 2) and 3)

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<sup>1/</sup>94th Congress, H.R. 200, Public Law 94-265, April 13, 1976. This Act is hereafter referred to as "the FCMA" or simply "the Act."

<sup>2/</sup>In the interest of brevity, the Regional Fishery Management Councils are hereafter referred to as the Councils or the Regional Councils.

<sup>3/</sup>For reasons stated below, the discussion is largely, although not exclusively, focused on economic data.

B. Justification

The Fisheries Conservation and Management Act established a new mode of operation for NMFS<sup>1/</sup>. It is now a quasi-regulatory body which, with the eight Regional Councils, must undertake cooperative management of all fisheries resources covered by the Act. Though conservation of these resources remains a major consideration, emphasis must also be placed upon their rational use and upon the benefits and costs thereby incurred. Conservation and optimum yield are now the two major policy objectives of U.S. fisheries management. To achieve these objectives NMFS, the councils and NMFS will develop management plans which affect the economic status and efficiency of the commercial fishing industry, the satisfaction of consumers, and of recreational fishermen.<sup>2/</sup>

The FCMA provides for national review by the Secretary of Commerce of management plans prepared by Regional Councils, as well as issuance of regulations by the Secretary of Commerce. Information at the regional level is therefore also needed at the national level, either the same information or information developed from the same basic data.

Besides being needed for the FCMA, the information needs discussed are also required for economic impact analyses which are required for all Federal governmental proposals with major impact on government, business or consumers. Similar assess-

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<sup>1/</sup>For a list of agency acronyms used in this report, see Appendix E.

<sup>2/</sup>The States are represented on the councils via statutory memberships and the appointment procedures for Council membership under the FCMA.

ments were required in the past under an anti-inflation program, and it is expected that the requirements for such assessments will become more rigorous and thorough. Most or all management plans will be covered, individually or collectively.

Clearly, if sound management plans meeting these requirements are to be created, they must be based on analyses and data that are accurate and timely. The data required for these analyses include cost and revenue, consumer and recreational benefits as well as such biological data as catch and effort. If such data are not available on a consistent and regular basis, the effectiveness of management plans may be jeopardized and the plans may not achieve the desired benefits to commercial fishermen and processors, recreational fishermen and consumers.

#### C. Scope and Method

This report outlines certain data needs under the FCMA. The report is not a detailed plan of action, but rather, a guideline for the development of such plans in the future. It does not include budget projections and should not be viewed as an endorsement of specific financial or other resource commitments in the area of data acquisition and management. An assessment of resource requirements is best reserved to a detailed planning process. Such a process can be initiated subsequent to policy

decisions to pursue some or all of the conclusions and recommendations of this report. The report includes an assessment of the extent to which data needs are now being met. It judges the importance of data deficiencies in several areas and suggests general priorities for planning future data collection activities.

Although some discussion of fishing effort and catch statistics is included in the report, it was assumed that biological and ecological data needs will be projected primarily by the Fisheries Centers of NMFS. The discussion of economic data under the rubric "labor force characteristics", does overlap with social dimensions of fisheries management. However, no pretense is made that the social data needs have been adequately addressed. In addition, there are significant needs for timely data on enforcement and administrative requirements that arise out of the new NMFS role. In view of these restrictions in scope and coverage, the report should be regarded as primarily addressing economic data needs.

The scope of the report is restricted to the FCMA for several reasons. While there is other legislation to which NMFS must be responsive, it is anticipated that much of the data needed under the FCMA will serve multiple purposes. In many issues not strictly covered by the FCMA (for example, joint management of tuna and porpoise stocks), it requires

little imagination to extend concepts and data needs to include such issues. Therefore, while the FCMA is the focus of the report, a wider applicability is anticipated.

While the report is intended primarily for guidance to DOC agencies, it may also be of value to the Regional Councils in their planning activities. Council participation in the planning process is vital, particularly in areas where data must be tailored to the unique requirements of specific fisheries or locations. However, since it almost always makes sense to have an integrated, coordinated approach to developing and operating a data system, coordination of national and regional needs is desirable.

Certain kinds of regional data may not need national integration, but even here the decision should be made in the context of national and regional needs; thus the determination of priorities and other aspects of data planning must be a cooperative effort involving NMFS, the Regional Councils and other users of this data. This is particularly true for the commercial and recreational harvesting sectors of the industry because it is in these sectors that regional variations are most pronounced and interregional linkages are weakest.

Two parallel methods were followed in developing this report. The first is derived from a conceptual model of the fisheries system extending from the consumer back to the

resource and to U.S. imports from foreign sources (Appendix B). The second method was to list perceived legal requirements of the FCMA (Appendix C). These two methods have complemented each other by providing a cross check on consistency and completeness. In some areas, the discussion extends to data needed to evaluate the FCMA itself. In discussing foreign fee structures for example, the discussion extends to the data needed to set fees on a rational basis rather than arbitrary cost allocations.

#### D. Procedures

A committee was formed by the Director of NMFS and the Assistant Secretary for Administration, DOC to review data needs. The composition of this committee is indicated in Appendix D. This committee held several meetings during January-April 1977. Following these meetings, this report was drafted and circulated for review and comment within the Department of Commerce. Following the Departmental review, the current draft is being circulated elsewhere in the Federal Government and among such outside organizations as the Regional Councils and the Sea Grant institutions. It is anticipated that comments received will lead to improved statements of data needs and availability. A final report will be issued with more definitive judgements of priorities and specific

recommendations. If accepted, it will constitute a general plan to guide the future definition of detailed data needs and the development of more specific plans to meet those needs.

The FCMA either directly or by implication sets forth data requirements. These in large measure overlap the data suggested by the model in Appendix B. However, to ensure inclusion of legal requirements, a summary was developed (Appendix C). This Appendix provided a cross check on the data needs identified and reference to this Appendix is made repeatedly in the text of the report.

The model in Appendix B recognizes the three commercial sectors of the domestic industry (Consumption, Processing and Marketing, and Production), a combined "sector" representing catches and fish markets in foreign countries, and a special sector for recreational fishing. Chapter II contains a brief discussion of the major data areas involved, a note on present availability and suggestions for supplying the missing data. The availability of material is, of course, based on assessments at the Department of Commerce and may not fully reflect the situation elsewhere. Reviewers are invited to remedy any defects in this area.

The draft also includes a chapter on suggested approaches to certain aspects of data management (Chapter III) and a summary chapter (Chapter IV) containing conclusions and recommendations.



## II. SECTORAL ANALYSES

A. Consumption Sector

Fish consumption can be divided into industrial utilization or nonfood consumption and food fish consumption. Industrial use of fish is an important component of the fisheries system.<sup>1/</sup> However, the nature of consumption is such that the appropriate data needs are covered in the discussion of the processing and marketing sector.<sup>2/</sup> Food fish consumption can be subdivided into consumption from commercially caught sources and consumption from the recreational harvest. Thus, recreational and commercial uses of the resource are interrelated, not only via fishing mortality and population dynamics, but also through demands for food fish and recreational user-days. The recreational sector receives special attention in Section C of this Chapter while Section A concentrates on food fish consumption, regardless of source. The possible linkages between food fish demand and recreational participation have been recognized but little is known. (Rothschild, et al, 1977) The benefits of fisheries management will be incident on various groups including consumers. A standard method for measuring benefits to consumers is based on the associated demand curve or function which relates quantity demanded by consumers to

1/ The 1975 domestic harvest of fish for industrial use was about 50% by weight and 7.3% by value, of total domestic harvest.

2/ For a review of existing data on menhaden, which is the major component of industrial use, see Kolhonen (1976).

market price. Given the definition of optimum yield in the FCMA, it is necessary to consider benefits (see items 1, 4, 5(a), 5(b) in Appendix C).

Consumer price and consumption data are desirable to estimate the demand for fish products and to permit projections of economic impact on consumers under alternative management plans and policies. Consumption data are also needed for assessing micro-constituents (e.g. mercury) in fish products and consumer safety. This data need arises from FDA requirements. For this purpose, mean consumption per capita or per household has been deemed insufficient. Frequency distributions for per capita consumption are required.<sup>1/</sup>

Three kinds of consumer demand data are identifiable.

These are:

- 1) Home Consumption
- 2) Restaurant Consumption
- 3) Institutional Consumption

Each of these demands is discussed seriatim followed by a discussion of availability. Consumption may be from commercial or recreational catches and these two sources can be isolated in collecting data. In some collection methods (see subsequent discussion) currently in use, this will be done and may provide a cross check on recreational catch statistics.

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<sup>1/</sup> Personal conversation, Mrs. Betty Hackley, micro-constituents Program Coordinator, Environmental Assessment Division, (F53), NMFS, Washington, D. C.

Home Consumption

Data on fish purchases for home consumption should be collected by area, major species, product type (fresh, canned etc.) and appropriate size, quality and preparation classifications.<sup>1</sup>

It is desirable, at least initially, to collect these data for major regions of the country, through random samples stratified geographically, by major species, product types and preparation classifications.

Restaurant Consumption

The most dynamic component of the food industry over the past two decades has been the restaurant trade; especially the growth of the fast food chains. This is true with fish products also. The estimate of informed NMFS personnel is that the restaurant component accounts for at least 50 percent of the total market. Consequently, demand analyses which do not include this component would probably yield biased estimates of price and income elasticities.

Collection of these data should be via samples; stratified by region, major species, product type, and appropriate size, quality and preparation classifications. It may be necessary to collect by type of outlet if consumer demand varies markedly by this classification.

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<sup>1</sup>/Species breakdown permits use of data for micro-constituent and consumer safety assessments which, as noted earlier, are required by FDA.

There are substantial index number problems in restaurant demand since a consumer is comparing alternative meals and the cost of any single input may have little bearing on his decision to buy a meal containing fish versus substitutes, such as meals containing beef or chicken. The prices of representative packages would then be the relevant data series to collect.

In the restaurant market, it is important to identify substitution effects associated with changes in relative prices (i.e. the price of meals with fish relative to the price of meals without fish) and also to identify effects associated with changes in disposable income. A recession or even reduced economic growth rates may cause drastic reductions in total consumer expenditures in restaurants. The resultant reduction in fish consumption has nothing to do with relative prices of fish packages and very substantial reductions in ex-vessel prices could result from economic recession.

These problems within the restaurant component are shared by other food commodities as well as by fish. It is reasonable to hypothesize that part of the difficulties experienced in analyses of demand for food may stem from a failure to disaggregate markets; that is to account for restaurant and institutional consumption in sufficient detail.

Institutional Consumption

Institutions such as schools, hospitals, homes for the aged, the military etc., constitute a significant market for fish products.

Data problems and needs are basically the same for institutions as for restaurants except that consumer choice may be greatly reduced. Even when there is limited choice at a given meal, the selection may involve no price differential or no changes in price differentials. Hence, a consumer demand function cannot be estimated. Fortunately, however, it is not necessary to collect data on prices charged in such institutions. The relevant demand is that by the institution itself. This demand can be estimated from data on quantities of meat, fish and poultry purchased by such institutions and the corresponding wholesale prices of these food commodities.

Consumer Expenditure Surveys

A basic problem in estimating consumer demand, via statistical analyses, is lack of detail on food spending habits, particularly by type of consumer and in the context of total food and other expenditures. The latter is particularly important and can be used to get at the crucial problem of substitution. Retail, restaurant and institutional data will give the price and quantity information necessary to establish demand, but not to predict with confidence changes in demand;

especially these due to cross price effects and long-term consumer responses to price changes. A useful method in this context is the individual or household expenditure survey.

In expenditure surveys, data are collected by type of consumer, as identified by income level, family size and other socio-economic characteristics. It can also be collected by meaningful species aggregations and product classifications for both fish and competing products, as well as by geographic area. The intent is to establish a representative cross-section of the food consuming public, the behavior of which can be compared against pertinent price fluctuations for competing food products.

It should be noted that expenditure surveys, by contrast with the components of total consumer demand discussed earlier, are a method for collecting data. As such, they provide a mechanism for simultaneous collection of at home and away from home consumption data. Consumer expenditure surveys can also distinguish between consumption from commercial and recreational catches; a distinction alluded to at the beginning of the Chapter. This feature of expenditure surveys will be noted later in discussing data availability for the consumption sector. Institutional consumption is probably best handled by other means because the decision agents are not individual consumers but purchasing agents of the respective institutions.

An NMFS program entitled "Operation Fish Watch" was initiated in 1973 to monitor and record retail fish prices in food stores in selected cities. This is an excellent beginning but the program deserves more formal support and should be coordinated (or combined) with the BLS consumer price index surveys and the new consumer expenditure program. The importance of such coordination lies in the fact that substitution effects between fish, meat and poultry products cannot be estimated from a series containing only fish prices.

The major deficiencies with the Fish Watch series are twofold. The first is that corresponding quantity data are not collected. That is, data on prices facing consumers are observed and recorded but the responses of consumers to these prices (i.e. their fish purchases) are unknown. The second deficiency is the absence of analogous price data for meat and poultry.

Data for restaurants and institutions, other than the price index data discussed later are not available. In some fisheries this implies that for a substantial portion of market demand, virtually nothing is known except to those in the fish marketing business. Unfortunately, good market intelligence is beyond the resources of small firms so that the absence of public market intelligence may tend to discourage competition in the marketing of fish products.

The BLS collects some data on fish prices. The objective of this data collection is the construction of price indices at the consumer and wholesale levels.

The consumer price indices (CPI) prepared by the BLS include an index of fish prices in food stores. This index reflects prices paid by consumer for certain specific product forms of shrimp, ocean perch, haddock, flounder, cod, ocean catfish, Chinook (king) salmon, halibut, sole, mahi-mahi, tuna and sardines.

The choice of products and weights in the current index is based on a consumer expenditure survey conducted circa 1961. This survey has been updated and the new CPI indices will be published later this year. Since these data cover home consumption, a second series is collected to cover meals away from home; i.e. consumption in restaurants. This restaurant and snack index includes fillets or steaks (any species, breaded or unbreaded), whole fish (any species), fish and shellfish cakes, shellfish (shrimp, prawns, scallops, oysters) and sea food platters (3 or more kinds of fish). In both the home consumption and restaurant price indices, quantity data are not collected and weights are updated only infrequently. As noted above, the current CPI weights reflect consumer expenditures circa 1961 and are being revised.

A problem with the data, for analytic purposes, is the lack of corresponding data on quantities consumed (per capita per year). Thus, while the price data or indices can



be used as deflators to obtain relative prices for demand analyses, information is needed on quantities purchased at the indicated prices.

The BLS also constructs a wholesale price index (WPI) which includes a fish component. With three exceptions, the data on which the WPI for fish are based are obtained from NMFS. The three exceptions are: (1) frozen fish sticks, (2) frozen fish portions and (3) frozen, raw, peeled and deveined shrimp.

A survey of household expenditures on fish products was supported by NMFS circa 1970. The NMFS survey has not been repeated and was restricted in coverage to meals at home. Hence, consideration of restaurant-institutional demand issues was precluded by the survey design. Aside from this limitation, the advantage of this type of data is that it yields a wealth of cross-sectional information about demand. Based on the NMFS survey it appears that there are very significant differences in fish consumption patterns that relate to income, occupation, religion, family size, region, etc. If, for example, one wished to compare per capita fish consumption in New England and the Mid-West, the NMFS is the only publicly available basis for such a comparison. These data have, as best as can be ascertained, received little analysis. This reflects another problem, viz. the lack of a significant

capability for economic analysis. Problems of data quality and quantity and of analytic capacity are, of course, inter-related phenomena. While surveys analogous to the above survey have been financed by private industry, they are normally proprietary and would typically be available for public use only on a limited or partial basis. However, they could be an important source of ideas for improving future surveys.

A consumer panel study covering the period September 1973 - August 1974, was financed by the Tuna Research Foundation. This survey covered 137 species; 47 in detail. It also included consumption away from home. The data on quantities consumed have been made available to NMFS for the purpose of estimating intake of microconstituents.<sup>1/</sup> Unfortunately, the source of the data is proprietary and data on regional consumption patterns, prices, etc., are not available. As indicated above, an analysis of these consumption data could prove a fruitful source of hypotheses and lead to better design features for future surveys.

In addition, the microconstituents program has supported the inclusion of fish consumption data in the USDA 1977-1978 Nationwide Food Consumption Study. The cost of inclusion

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<sup>1/</sup>Personal conversation, Mrs. Betty Hackley, Microconstituent Program Coordinator, Environmental Assessment Division, F53, National Marine Fisheries Service, Washington, D.C.

was \$75,000 and, fortunately, the Agricultural Research Service appended appropriate questions about prices in the questionnaire.

The USDA Nationwide Food Consumption Survey is the most detailed, comprehensive survey available for food consumption. Participating agencies include the Economic Research Service, the Food and Nutrition Service (both within USDA), the Social Security Administration, Food and Drug Administration, Administration on Aging, Community Development Agency, and Aid to Dependent Children (all in HEW), Bureau of the Census (DOC), and BLS. The 1977-78 Survey will include NMFS as a participating agency and coverage will include a wide range of fish commodities. Consumption at home, in restaurants, and in institutions will be identified. Consumption also covers self supplied commodities including recreational catch of fish, which suggests that a linkage with recreational fisheries data needs might be desirable. The survey is stratified geographically (nine regions), temporally (by quarter etc.), and by degree of urbanization.

This survey includes consumption away from home and is precisely the type of consumer expenditure survey suggested earlier. If future repeats of this survey (repeated every ten years) include fish, a substantial improvement will have been made in this area. To ensure inclusion, a program

commitment must be made by NMFS. For the other consumption data needs discussed, serious consideration should be given to cooperative efforts with USDA and/or BLS in the interest of lower cost and more timely and widely useful data series. If the USDA Nationwide Food Consumption Survey were conducted more frequently, the estimates of consumer expenditures in the BEA quinquennial benchmark and annual input-output tables would be improved. Input-output tables show how the various industries of the Nation interact to produce the gross national product. In some cases, integration with the surveys conducted by these organizations would be a cost-effective way to obtain data. It would be relatively easy, for example, to have BLS add pertinent questions to the next (1978) consumer spending survey. This would have the advantage, over the USDA survey, of higher frequency. Analyses of the USDA data should address the question of a streamlined annual survey for inclusion in the BLS surveys.

B. International Trade Sector

Neither the U.S. fishing industry nor the U.S. market functions in isolation. Each is part of a world structure whose operation is affected by what goes on in other countries, particularly Japan, Canada, Mexico and the Scandinavian countries. No picture of U.S. markets can be complete without data on products exchanged with the U.S.<sup>1/</sup>

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<sup>1/</sup> In some markets, e.g., ground fish, U.S. imports run as high as 80 percent of consumption. See items 1, 4, 5, 9 and 18, Appendix C for pertinent sections of the FCMA.

U.S. import and export data are generally needed in terms of price, value, and quantity and should be classified by species, importing or exporting country and product condition and quality. Because of the considerable use of imported fish by American processors, particular attention should be paid to classification by condition. Changes in product mix within an aggregated category or in quality can cause dramatic changes in the unit values. Failure to recognize aggregation and quality problems can lead to excessive forecast errors and spurious statistical results from demand and supply analyses. (See subsequent discussion of BLS international price program).

It is possible that U.S. fishermen will "export" directly to foreign processing ships anchored off our shores. This possibility may have to be dealt with through special arrangements in the collection of otherwise domestic landings and exvessel prices.

Except for this special case, needed U.S. import and export data are either now available or can be made available by the Customs Bureau.<sup>1/</sup> The export and import data for fish and other commodities are tabulated monthly by the Bureau of The Census. The data for exports are based on information on the DOC "shippers' Export Declaration" form, which is filed by the exporter with the Bureau of Customs. The data for imports are based on information on the Bureau of Customs

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<sup>1/</sup> Schedule B (exports) and TSUSA (import) series, Bureau of Customs.

"Import Entry" form, which is filed by the importer. Some changes in these data may be desirable but identification of these changes should flow from analyses of the existing data. A reviewer commented, for example, that it is impossible to obtain export data for a particular species. No documentation was supplied of attempts to obtain such data and it is difficult to generalize on the validity of this comment without further investigation. The primary deficiency in this area, in addition to price data deficiencies discussed below, appears to be inadequate staffing and ADP resources to assemble the data, organize it in meaningful ways and make it available on request to users such as the regional councils, NMFS personnel, etc.

A completely different situation exists with respect to the origins of trade flows and the potential effects of changes in world fishing and markets on U.S. imports and exports. Development of a feasible way to provide such data is essential and constitutes the principal data needed in the international trade sector. The statistics currently compiled by foreign nations themselves could be obtained and made available at rather modest cost. Unfortunately, the FAO yearbooks are delayed by the latest reporting nation and do not include prices within exporting nations.

The Division of International Prices, BLS has begun to compile data on the prices of food imports, including fish. Their interest in these data arises from their program to

develop import and export price indices for major categories of foreign trade. In this program, the Bureau of Customs data are used as a sampling universe for surveys and data on prices for certain specific commodities are collected directly, following sampling procedures, from importing establishments. The procedure used by BLS is distinct from the use of values and quantities taken from Customs consumption documents for calculation of unit values. The BLS procedure, by concentrating on actual prices, avoids the biases that arise in unit values because of changes in product mix, terms of transaction, quality changes, etc.

The BLS also has numerous foreign statistical publications, including some on fish, which could be useful data sources. A review of these is suggested to determine their utility.

Foreign catches and market prices are important determinants of the export supply situation of countries that export to the U.S., and hence the competition the U.S. industry must face. That portion of foreign catches which is harvested from waters under U.S. jurisdiction is also needed to advise the regional councils of foreign fishing activities as required by Section 302f-5 of the Act and to project the effect of alternative fee schedules on foreign demand for access to fish stocks within U.S. jurisdiction (see Section E, this chapter).

Foreign catches and market price data should be collected for countries that:

(1) export appreciable quantities of fish to the U.S. or are likely to export such quantities in the near future, and

(2) are likely to constitute markets for U.S. exports. Catch and wholesale prices, and the cost of transportation to markets are the most obvious data elements needed.

The effects on international trade of foreign export subsidies, U.S. and other tariffs, and other nonmarket factors have received little analysis. The major fish exporting nations like the U.S. have mixed economies, and their fishing industries are in varying degrees insulated from market forces. One study has indicated that U.S. domestic policies affecting costs of major inputs such as vessel hulls and gear have placed domestic fishermen at a competitive disadvantage by raising the costs of inputs purchased by Gulf of Maine purse seiners above those paid in world markets (Maine Commercial Fisherman, 1976). Also, it cannot be presumed that U.S. exporters face open markets abroad and this can be particularly important in determining "optimum yield." There are fisheries in which prices that would be received by potential U.S. exporters are artificially low; that is, lower than they would be in the absence of foreign tariffs. Examples of trade barriers include Spanish import tariffs on squid, Japanese import quotas on herring,



and European tariffs on shrimp.

A recent study of effective protection for processed agricultural commodities indicates the relevance of international trade data and analysis (Yeats, 1976). This study estimated an effective rate of protection on preserved sea foods in the European Economic Community (EEC) of about 53% versus about 16% in the U.S. A simulation of the effect of removing EEC trade restraints indicated a 21% increase in EEC imports of sea foods.

Given such situations, one can visualize cases in which foreign allocations of underutilized stocks are artificially high. The question in such cases is whether optimum yield, and hence foreign allocations, should reflect the status quo or a more rational regime of international trade. These types of situations must be identified as they arise and associated special purpose data needs specified and collected. Again, this is primarily a task of problem identification rather than specifying, a priori, a set of data to be collected. Most of the indicated international data are already compiled abroad and could be obtained at modest cost. This might best be done from a central facility dealing directly with major trading countries and by relying on data supplied by U.S. attaches. Reliance on the attaches is not strictly necessary, but may in the long run, be advantageous. Since they are an important source of informed opinion on future market developments.

### C. Recreational Fishing Sector

Data on recreational fishing are needed to evaluate recreational benefits under various levels of optimum yield, as required by Section 301a-1 of the Act. Such data will also serve biological purposes and assist in determining overall consumer demand for fish. The recreational catch is about a third of the commercial catch and represents a major source of edible fish. Descriptive material on "recreational interests" must be included in proposed management plans.<sup>1/</sup>

There are major conceptual problems which cast doubt on the significance and utility of current recreational data (Rothschild, et al. 1977). The problem primarily involves the demand for recreation and hence recreational benefit measurement. There are several relevant factors, including leisure time, income levels, access, cultural considerations, economic impacts and density of fish. The latter, of course, is the most important factor that can reasonably be influenced by management plans and is therefore a major policy variable for multiple use management of fisheries.

It is not clear how these considerations will be translated into data needs, because there are, as yet, no generally accepted indicators of benefit. Suggestions have been made for number of fishermen, time spent or number of outings, number or weight of fish caught, catch per unit of time, and expenditures on fishing equipment, fuel, vessels and other inputs.

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<sup>1/</sup> See items 4, 5(a), 5(b), 12, and 13 in Appendix C.

Data on some of these measures were collected under NMFS's Salt Water Angling Survey program, which is being redesigned to improve measurement techniques and reliability. No new measures, however, are being added at this time. This program consisted of a series of concentrated regional surveys on a repetitive basis. Major changes in this program seem inappropriate until a better consensus is reached among researchers on the way in which such measures would be used to establish and analyze demand. In the interim, support should be given to attempts to measure recreational benefits and to integrate them in fisheries management. This necessarily involves integration of concepts from population dynamics and economics. The Salt Water Angling Program should be continued since it provides some measure of intensity of use and indicates the recreation induced pressure on the resource. This is important for biological purposes. It is also essential to the calculation of optimum yield and determination of foreign allocations. (Note: Comments and views are solicited in this areas.)

D. Processing and Marketing Sector

The processing and marketing sector covers all operations from point of landing to consumer purchase. It includes fish buyers, processors, wholesalers, transportation enterprises and retailers, as well as fish importers. Most of

these enterprises, of course, also deal with food products other than fish and are already covered by existing data series. It is not proposed to duplicate these series, but rather to focus on those data which are unique to the fishing industry.<sup>1/</sup> Most of the discussion is therefore focused on the processing part of this sector.

The major areas identified within this sector are: production and price, plant capacity, production cost analysis, and labor force characteristics. Each is discussed below. Among the marketing strategies that may be pursued by firms is the importation of fish products from foreign nations. In many cases the products imported require substantial processing prior to resale. In other cases, for example, imported green headless shrimp processed in foreign countries, the imported products may require little or no additional processing. In either case, the requisite data can be collected either under this sector or the international sector just discussed. An advantage of the sectoral framework is that it suggests most of the cross linkages which must be made in design of data collection programs and in analytic models which use such data.

#### Production and Price

Processing production and prices are needed for price analyses and assessment or monitoring of the economic

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<sup>1/</sup> See items 1, 2, 13 and 18 of Appendix C.

effects of fishery management plans. Shipment and price data should be collected by major species, product type and form (canned, frozen, size, etc.). In addition, end-of-period freezer holdings or inventories are necessary to derive production flows from shipment data. These data should be collected on a quarterly or monthly basis. Benchmark survey results could be updated via a stratified sample. A statistical sampling strategy would probably suffice and be most cost effective.

#### Plant Capacity

Section 303(a)(4) of the act requires an assessment of harvest sector capacity in determining the portion of optimum yield which will not be harvested by the domestic fleet and can be made available for foreign fishing. However, the portion which will be harvested by the domestic fleet may be constrained in the short run by processing as much as by harvesting capacity. Hence, it is desirable to have estimates of processing capacity.

Some plant production data are collected by NMFS and the potential of using this data base for capacity estimates should be explored. While there are more general surveys of industrial capacity utilization, these are too aggregated to be useful for fisheries. Special surveys covering fish plants could be added to existing surveys.

Capacity estimates should distinguish between major capacity components such as plant production rate capacity, freezer and cold storage capacities. Quarterly holdings by major product category should also be available to permit estimation of capacity utilization. Cold storage data are collected, and are considered by those responsible, to be valid indicators of frozen product inventories. The data are based on a survey of holdings in public and private warehouses.

Production data, and some price data, are available by plant, but freezer capacity estimates are not. Two decades ago, much of the freezing was connected with public warehouses. The situation has changed dramatically in the past decade because some of the larger modern plants are equipped with substantial freezer capacity. Consequently, monthly freezings may be an inaccurate series. The annual data on freezings are considered accurate.

#### Production Cost Analyses

Studies of costs and margins in the processing and marketing sector are almost nonexistent and the few that do exist are not analytical. Studies are needed which characterize the sector in considerable detail.<sup>1/</sup> Detail on the materials consumed for processing industries should be specified. Some detailed data are collected in the census of manufactures, but they are generally broader than 4-digit SIC codes. More

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<sup>1/</sup> A linear programming formulation of processing, for example. If major inputs are known in physical terms e.g., labor and energy inputs, then it is possible to estimate the economic effects of changes in the prices of these inputs.

detailed data would strengthen the industry estimates in BEA input-output tables, and this would aid analyses of the economic impact of the processing sector on other industries. Updating would then be possible via the development of a data series on major input costs. These would include fish purchases, labor, transportation, energy, etc. These major inputs should, where appropriate, be expressed in physical units, as well as dollars, to facilitate updating. Thus, the need for production cost data should be linked with the continuing need for analytic studies which use the data for policy issues. For example, if the implications of negotiated changes in foreign tariffs (See Section B, this Chapter) can be analyzed for the processing sector can be analyzed, this may lead to revised calculations of optimum yield and foreign allocations.

Studies in this area should go beyond just processing, so that intermediate margins within the sector can be established. Aside from processing, most of the data necessary for this purpose can be estimated and integrated.

The Bureau of Census collects cost data on establishments classified by SIC codes. The cost detail includes total wages and salaries of production and nonproduction workers, employees, fuel and power, materials consumed and value added (includes depreciation, return to capital and wages and salaries). These are available at the four digit SIC code level. The closest code for fisheries is SIC code 2092 entitled fresh or frozen packaged fish. This code includes establishments

involved in the preparation of fresh, raw, cooked, frozen packaged fish or other seafoods including soups, shucking and packaging of oysters. This category is to aggregated to be useful for fisheries.

#### Labor Force Characteristics

Data on processor labor force characteristics are needed for the same purpose as those on fisherman labor force characteristics (Section E of this Chapter), viz. to establish employee earnings and to help determine local dependence on fishing.

This is a broad category which needs further specification but it would provide a data base from which to assess factors such as regional unemployment rates, job mobility, opportunity cost of labor.<sup>1/</sup>

#### E. Production or Harvesting Sector

Production requires extraction of the resource and its transport shoreside or to some other place of sale.<sup>2/</sup> Production is where the product chain starts and the only point of the industry where economic operations will be directly controlled by management plans. The importance of sound, reliable data for evaluation of these operations cannot be overemphasized.

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<sup>1/</sup> See analogous data area within the production sector for further discussion.

<sup>2/</sup> In some fisheries, aquaculture is an important feature of the fishery and production begins prior to extraction. This distinction prompted use of the term production to embrace, where applicable, all phases of production; from hatcheries to landings. It is possible that aquaculture, public and private, will play an increasingly important role in at least some fisheries



The production sector has three basic areas, each with its own unique set of data requirements. First, clearly, is catch, with its effect on the resource and the closely allied items of landings and ex-vessel price. Second is harvest capacity, which necessarily involves the number and characteristics of available fishing vessels. Third is the matter of costs of fishing effort, together with the benefits realized from these activities. The requisite data include cost and earnings data, fishing effort, vessel construction costs and labor force characteristics.

There is also a special data area that originates with the issue of appropriate fees to charge foreign fleets. It is difficult to evaluate this issue without knowledge of vessel cost structures of applicant nations and fees charged by other nations with foreign allocations.

#### Catch and Ex-vessel Price

Catch (production) and ex-vessel price data are needed to assess population dynamics and supply and demand relationships.

The catch data will serve other purposes and are necessary to satisfy Section 303(a)(5) of the Act. Together with cost and earnings data it will help address the efficiency requirement of Section 301(2)(5).

The reader should be aware that "catch" and "landings" are not necessarily synonymous, since a vessel may discard a portion of its catch for various reasons. For example, the existence of

an incidental catch quota for a species may force a skipper to discard a portion of his catch. A more common reason would be limited hold capacity and unfavorable prices such that the value of discards is less than value of catch which displaces it. A special or limiting case of this is landed value less than the costs of handling and disposal on shore. For economic purposes, landings are usually the relevant measure, whereas for biological purposes, catch is the relevant measure. However, for simplicity, the term catch is used throughout this paper.

Catch should generally be collected in terms of weight, but in fisheries with limitations imposed under Section 303(b)(3)--or in fisheries where such limitations are believed imminent--other variables may be prescribed. These may involve number of fish, size, sex and so forth.

Catch and price data should generally be collected by area fished, fishery, major species, and port of landing.

The stratification by area may present special problems since at least four areas are needed: (1) outside the 200-mile limit, (2) inside the limit but beyond 3 miles, (3) inside 3 miles, and (4) in waters where jurisdiction is disputed. Other areas may also have to be established, particularly if limited fishing zones are established under Section 303(b)(2).

Generally the data on catch and exvessel price are quite good, but there may be an accessibility-timeliness problem related to the structure of NMFS and State-Federal data exchange. There are, also, legal obstacles, under various

federal confidentiality statutes, to access and exchange of data. Foreign data on catch within U.S. jurisdiction will be reported, but not by port of landing, and value of catches in port of landing will not be reported (See also, Section B, this Chapter). Foreign catches should be reported frequently and by area to facilitate analyses as well as enforcement of regulations.

Another issue, related to catch, is the measurement of capacity utilization, actual catch as a portion of the fleet's total capacity to take the resource. This issue, however, presents conceptual problems and in any case cannot be analyzed without more information on the fleet itself.

#### Vessel Inventory

Fishing vessels, domestic and foreign, are a fundamental component of the system, the basic production unit, and in many cases the basic economic unit (firm). The size and composition of the fleet are basic to determination of fishing effort and projections of fishing mortality. As the basic economic unit, vessels usually provide a logical sampling unit for monitoring economic performance, net income and financial status of fishermen. In addition, projection of capacity (see item 13, Appendix C) presumes an accurate inventory of vessels and their characteristics.

Data on vessel characteristics are needed to project long-term changes in each fishery's capital costs, and hence shifts in the supply situation for that fishery. Such data will help analyze alternative fishing uses of vessels which

affect supply, both for the fishery in question and for related fisheries. In some fisheries such characteristics help identify a short-term capacity limit beyond which supply price elasticity diminishes rapidly. Some elasticity is inevitable through changes in fishing strategy and/or adaptation of vessels and/or gear.

Data on vessel characteristics will help meet the duplication requirement in Section 301(a)(7) of the Act and provide some of the descriptive information called for by Sections 303(a)(2) and 303(a)(5). In the event of limited access, these data are basic to an assessment of multi-fishery capabilities as required by Section 303(b)(6).

Vessel characteristics data may also be useful in the event that a fishery, or portion thereof, is limited to certain vessels and/or gear, as provided by Section 303(b)(2).

Sample design for collecting data by vessel type presupposes a current inventory of vessels from which strata can be designed and samples drawn. It is imperative that such an inventory be compiled and maintained in a current and accurate status. To achieve this, vessels in offshore fisheries should be identified by a number which stays with the vessel even if name or ownership changes. While the Coast Guard vessel documentation number is a logical choice for vessel identification for the offshore fleet, certain inshore fisheries are characterized by small vessels almost exclusively.

While a current inventory is feasible and imperative for the offshore fisheries, an inventory for the inshore fisheries presents more difficulties. The large number of vessels and small size of many individual operations would make this part of the inventory an expensive proposition.

Perhaps survey samples can be drawn from state or federal lists of license holders instead of a comprehensive vessel inventory. The U.S. Coast Guard (USCG) conducts sample surveys every three or four years, but these surveys primarily involve pleasure craft. The USCG also obtains registration statistics from many states. (Note: Suggestions in this area are solicited by the committee.)

The inshore-offshore dichotomy is potentially misleading. For example, some "offshore" vessels also fish inshore at least part of the year. Because of the imprecision of the inshore-offshore categories, a classification scheme based on vessel size, such as length or tonnage, may be more appropriate.

For foreign fleets, an inventory is essential for monitoring and enforcement purposes. Knowledge of the age, condition and construction cost factors are useful for planning purposes in projecting future foreign demand for U.S. fish resources. With respect to foreign fleets, the permit system provides the desired inventory but is incomplete with respect to several data elements.

The vessel inventory should include such basics as tonnage, hull construction, age, condition, construction cost and hold capacity. These data would be used to classify at least the larger vessels by type, which classification would then form the sampling frame for cost and earnings and fishing effort data. Such a procedure would help produce more representative data in these areas and permit more efficient sample designs.

The basis for the domestic component of the inventory already exists in the Coast Guard registration system. It is questionable, however, whether the raw data from this system can be used directly. The USCG registers virtually all larger vessels but may miss a substantial number in the twenty to thirty foot class since it is sometimes difficult to tell, without a formal inspection, whether such vessels are above or below the tonnage maximum at which registration is required. However, even for registered vessels the USCG registry is only a starting point for an inventory of fishing vessels. There is an annual re-registration requirement but the fine for noncompliance is as low as ten dollars and, as a practical matter, unenforceable. Some ports purge the registry of vessels with expired registrations; most do not.

There are also legal requirements which, under certain circumstances, prevent the USCG from removing out of service vessels from their records. Adjustments to the

U.S.C.G. registry are needed, if an accurate fishing vessel inventory is to be produced. Since the U.S.C.G. list is concerned with documentation rather than current use, a specific effort is necessary to create an inventory. While the NMFS currently compiles adjusted lists, there is some field experience indicating that additional adjustment may be needed. A follow-up is necessary to maintain a list according to current use and to purge vessels that sink or are scrapped, etc. An accurate domestic inventory is so fundamental that the whole question requires examination.

The details of the vessel inventory (and of other series in the harvesting sector) should be developed on a regional basis but with some guiding principles to facilitate coordination, standardization of methods, procedures and results. Coordination and standardization are desirable to reduce costs and to avoid the animosities that arise when the same individual is surveyed more than once.

#### Cost and Earnings

Cost and earnings data are needed to analyze economic status and performance and supply response relationships, as well as to meet the efficiency and revenue requirements of Section 301(a)(5) and 303(a)(2) of the Act. It will also help with the assessment of minimum cost required by Section 303(a)(4A). Estimates of the cost structure of fishery

activities in input-output tables of the BEA could also be improved by such data. The improved data would also permit separation of fisheries from their current inclusion in a more aggregate category of forestry and fishery products in the input-output tables.

Interest charges constitute an important cost and should be included in the domestic portion of this data, but/<sup>more</sup>needs to be known in this area. Commercial fishing is a specialized, high-risk business with peculiar financing problems. Many banks, for example, will not make loans to commercial fishermen, or will make them only under highly restrictive circumstances. Supporting research into credit availability and terms is also needed.

A special problem arises in analyzing cost data for multi-fishery vessels; namely how to allocate the costs of multi-fishery vessels. This could be facilitated by having the vessel captain keep a log book; a record of fishing times, locations, depth and gear during the fishing season.<sup>1/</sup> Again, a statistical sample might be designed for this purpose. The mechanics of any log book system should be examined carefully, particularly with respect to methods for motivating high quality reporting. In this connection, pecuniary incentives may be more productive than universal mandatory reporting requirements.

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<sup>1/</sup> Allocations of joint costs are, of course, not unique and can be misleading. Allocation of variable operating costs is intimately related to the definition and measurement of fishing inputs and fishing strategy in a multiple species fishery.



For larger, less numerous vessels, the inventory described earlier would provide the universe to be sampled. For smaller, more numerous vessels, the task of maintaining an accurate inventory may be too large to justify. An alternative strategy for small vessels would be to design a sample from state registrations for such vessels. This would be a particularly appropriate strategy for fisheries in which numerous, small vessels account for a substantial portion of the catch.

The current cost and earnings data are extremely erratic and ususally out of date. It is unfortunate, to say the least, that research reports can honestly cite ten-year-old material as "the most recent available."

Some cost data for domestic vessels are acquired in connection with an NMFS vessel construction assistance and subsidy program. They are not representative, and there are a priori grounds for expecting bias in such cost components as fuel consumption, labor costs (via crew size) and capital costs. With respect to costs of foreign fleets, while NMFS has no program for obtaining such data, it is not at all obvious that it need be an expensive undertaking. Some of the best examples of vessel cost studies are those by the Canadian Fisheries Service for Canadian vessels. There may, however, be problems of interpretation where accounting systems differ and cost allocation problems arise.

Foreign cost and earnings data could be provided in part via the foreign permit system, provided a credible program of verification exists.

Fishing Effort

Data on fishing effort are necessary to estimate stock adjustment relationships. They are also needed to estimate domestic capacity and the surplus stocks available for foreign allocations, per Sections 303(a)(4) through 303(b)(6) of the Act.

Fishing effort data should be collected by fishery and class of vessel and in terms of time spent fishing and number of hauls, two elements prescribed by the Act for all fisheries. Other measures of effort may also be necessary, but their development presents major conceptual problems. In general, the definition and measurement of fishing effort is a very complex issue and the most appropriate data elements vary between fisheries. Fishing effort has economic as well as biological dimensions but any attempt to assess the deficiencies of existing fishing effort data should be done in the context of fisheries and fleets and is beyond the immediate scope of this committee effort. Effort by foreign vessels should probably be reported by month, geographic area and target specie.

Considerable effort data exist. There are also considerable gaps which need to be filled. The data which do exist are

scattered through the Fisheries Centers of NMFS and in State agencies and need to be reviewed before a definitive assessment of need can be developed.

#### Vessel Construction Costs

The primary reason for this series is that cost data reflect historical construction costs or book value. With many vessels of pre-World War II vintage, book value and original cost are rather meaningless today. For private investment and some fisheries management decisions it is necessary to adjust cost data to reflect current construction or replacement costs. Data from the NMFS vessel construction assistance program could be used as a sample but, as noted earlier, there would be questions of bias to be evaluated before use of such data should be considered.

#### Labor Force Characteristics

Data on domestic labor force characteristics are needed for each fishery to compare employee benefits under different production alternatives. Data on labor force characteristics will help determine dependence on fishing, a determination required by Section 303(b)(6) of the Act where limited entry is contemplated. This will be particularly the case in areas where fishing employment is a substantial portion of total employment.

Labor force characteristics data constitute a broad area which needs further evaluation and specification, but

which could provide a base from which to assess factors such as regional unemployment rates, job mobility, opportunity cost of fishing. While there is a substantial labor force data base i existing census series, etc., an evaluation of these data is needed to determine their adequacy for use in fishery management plans (Kavalunas, 1976).<sup>1/</sup>

A survey of the fishing labor force will be conducted by NMFS at the request of the USDL. The stimulus for the request is a review of exemptions (of which fisheries is one) from the Fair Labor Standards Act of 1938.<sup>2/</sup> An NMFS commitment to an analogous resurvey five years hence is desirable as part of a long range plan. Under the present circumstances, which include rather limited NMFS expertise in this area of economic analysis, it does not appear appropriate to expand NMFS data collection in this area pending an analysis of data obtained from the current labor force survey. Such an analysis should identify (1) the extent to which the fisheries labor force is sufficiently unique to require special surveys (as distinct from existing regional economic data series compiled by Census, BLS, etc.) and (2) the extent to which such labor force data are needed in fisheries management plans.

#### Foreign Fees

It cannot be presumed that the U.S. can set fees for foreign vessels so as to recover management costs allocated to

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<sup>1/</sup> The process by which management is implemented in a fishery includes preparation of fishery management plans. See items 1 and 18 in Appendix C.

<sup>2/</sup> Section 13.(a)(5) and Section 4.(d)(2).

foreign fishing and simultaneously encourage full utilization. This presumption could be valid but it is difficult to judge its validity without data on costs of foreign fleets. At the same time any substantial difference between fees to foreign and domestic harvest vessels is an open invitation to joint ventures involving foreign investment in U.S. registered capture vessels and foreign built and manned offshore factory vessels. If an expanded domestic fleet is desired irrespective of ownership, the critical levels of foreign fees could be estimated from cost data. Under alternative objectives, the same data could be used to estimate upper bounds on fees that would ensure full utilization and/or domestic ownership of U.S. vessels. It is recognized, of course, that the willingness of foreign nations to subsidize their distant water fleets is also germane to the question. The indicated cost data is at least the starting point of an informed analysis.

Data on fees that other countries charge foreign fishermen are needed to help assess U.S. foreign fees and to provide information to U.S. fishermen who wish to fish abroad. These data should cover the amount of the fee, eligibility and any special conditions these applicants must meet either prior to receiving permission to fish or while actually fishing.

No serious problems are foreseen in collecting data on foreign fees since some are already available in NMFS and the State Department. However, collection needs to be conducted in a more systematized, institutionalized manner.

## III. DATA POLICY AND ANALYSIS

The discussions developed in Chapter II of this report show that under the FCMA much more data, especially of an economic nature, will be needed and suggest the need for a long range plan for meeting data needs under the FCMA. While NMFS can initiate most or all of the actions required to obtain this data, action programs must be timely and appropriate to the urgency of the problem. It is also important that NMFS receive NOAA and DOC support for these programs.

It will, however, take some years to implement programs to the point where all the needed data are available. In the meantime, management plans will have to be developed and approved. These plans will require data, and some interim arrangements must be made to assure that the best available data are used. This is not only required under Section 301(a)2 of the Act but is necessary to give the plans the fullest credibility possible.

It is appropriate, therefore, that there be developed a national data locator; a central inventory of all pertinent fisheries data currently available. Such a locator would contain descriptions of each data series, including coverage, frequency, parent organization and program. These descriptions should be retrievable by subject matter, geographical area and other appropriate classifications. NMFS, Census, state fisheries organizations and other data collection agencies would provide the input. Such a system (ENDEX) currently exists for biological

data but economic and social data for fisheries management are not included.

This locator should be developed quickly, in the next six to nine months and should be computerized. Most of the design work and the development of necessary software could be done by contract.

Besides providing data for fishery management plans, the locator will have other uses. It will help sharpen the identification of data deficiencies and make available data more readily accessible and useful. It will also assist the research community, as well as State and local conservation and recreation planning agencies.

The discussions in Chapter II also suggest that NMFS should improve headquarters organizational arrangements for determining data needs. This is no criticism of the way in which NMFS develops specific data requirements or carries out its collection activities, matters which are in any case outside of the Committee's scope. Who is to collect the needed data is also outside the committee's scope. NMFS, Census, BLS and other should all be involved.

However, a lack of data policy, long-range plans and research in this area is evident. The very existence of this committee underscores these deficiencies. The key questions of what data should be collected, by whom, and how often will not vanish.

NMFS needs a permanent mechanism for identifying existing as well as new and changing needs and for developing well-thought-out, comprehensive and practical ways of meeting these needs. This function has been better performed for biological data than for economic and social data.

The policy-planning function would best be performed as part of a comprehensive information system, one which takes into account all NMFS data needs and which addresses such operational matters as coverage, frequency, sampling procedures and the efficiency of alternative hardware - software systems.

This system should be able to present data to management and NMFS users in meaningful form. This means that it must have substantial interpretive and analytical capability, specifically, an increased capability for quantitative economic analysis. NMFS currently has very little capability in the area. Until recently a total of sixteen NMFS personnel nationwide were classified as economists and this number has not changed much. In percentage terms, about 1.5% of the full time staff of NMFS are classified as economists. These economists are diffused throughout the NMFS system. Nowhere in the system is there a corps of sufficient size and quality, together with support personnel to meet FCMA and other needs. The information system should, however, be management and user oriented rather than discipline-oriented. This orientation would maximize usefulness to fishermen, biologists, economists, planners and executives who are involved in various stages in the development of management plans. Responsibility for development and operation of such a system should be at the assistant director level or its equivalent.



## IV. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

A. Summary and Conclusions

The committee has been impressed by the breadth and depth of data deficiencies, especially in the area of economic and social data, and by the shortage, in this area, of analytical staff. While in large part associated with the quantum leap in NMFS responsibilities associated with the FCMA, these deficiencies constitute a major problem which should receive attention at highest possible levels in NMFS, as well as at appropriate NOAA and DOC levels.

NMFS has the responsibility for making sure that the data necessary for management decisions are available. This responsibility stems not only from specific mandated provisions of the FCMA and from implicit requirements of the plan development process, but also from a basic responsibility to provide sound management-oriented data and analyses which reflect relevant ecological, social and economic factors. Some of the data are regional in character, some are national and some are both. The regional connection appears strongest for data relating directly to the resource. Data for the production sector, such as cost and earnings data, tend to be region-specific, although some standardization is desirable to improve comparability. As one moves further away from the resource and closer to consumption, it becomes increasingly difficult and less meaningful to characterize data as "regional."

NMFS headquarters must have a capability not only to develop national data but also to transmit it to the regions. Conversely, the regions must be able to transmit much of their own data to headquarters, and these data must, in many cases, be capable of being aggregated on a multi-regional or national basis. It is therefore concluded that there must be a compatibility among the various data bases if the decision-making process envisaged by the FCMA is to work in a timely and effective manner. In the consumption sector, a need was identified for additional quantity and price data associated with (1) household consumption, (2) restaurant consumption, and (3) institutional consumption. Household expenditure surveys were discussed briefly as a method for obtaining data for (1) and (2). A series on prices in retail establishments was initiated by NMFS in 1973 which only partially satisfies the home consumption need and the principal deficiencies of this series were noted. Only price index data exist for restaurants or institutions. Public data on household expenditures is limited to a unique, narrowly focused NMFS survey in 1970. This situation will improve since fish products will be included in the 1977-78 Nationwide Food Consumption Study of the USDA.

The data needs identified for the international trade sector were (1) U.S. imports, (2) U.S. exports, and (3) general intelligence on foreign production and markets.

Data in the first two categories are adequate with the exception of price data. In the third area, some data exist but not much. One of the problems here is that it is not practical to maintain more than the series of major importance; there are too many nations and fisheries to attempt comprehensive coverage. However, for major nations and for such groupings as groundfish or shrimp it would be possible to maintain at least foreign catches and prices. The task of assessing the adequacy of current data in this area would be greatly facilitated by the creation of an adequate economic research capability.

Within the processing and marketing sector, the data categories identified were (1) production and price, (2) plant capacity, (3) production costs and (4) labor force characteristics. Some data exist for the first category. No data exist for the second or third. For the last category, a review of existing series in other Government agencies would be appropriate.

Data collection for the processing and marketing sector could well be coordinated with survey work of a more general nature elsewhere within the Department of Commerce. For example, the plant capacity series could be linked with the general industry capacity series already collected. For labor force characteristics the direction of coordination is ambivalent.

At the present time the USDL has asked NMFS to execute a special purpose study of the harvest labor force; again because of characteristic peculiar to fisheries. In the processing sector it may be the case that the comparative advantages of NMFS and BLS are reversed.

Within the production sector, eight categories were identified: (1) catch and price, (2) vessel inventories and characteristics (3) costs and earnings, (4) fishing effort, (5) vessel construction costs, (6) domestic labor force characteristics, and (7) foreign fee data. In most of these categories the current availability of data was judged to be very low. The only category where availability was judged adequate was the catch and price category. In the fishing effort category, considerable data are available, but much remains to be done if the key question of capacity is to be answered. For the other six categories the data base characterizations range from fragmentary and out-of-date to nonexistent.

In general, data needed for the production sector are peculiar to fisheries and not easily derived from the general purpose business data collected by the Census Bureau and other organizations. There are no existing data sources which could be modified to provide any significant portion of the missing data in this area.

In the area of data management and analysis, an immediate but continuing need for a national fisheries data locator system and a long-term need for improvements in the data policy and planning function were identified. The latter would involve organizational and/or functional changes at NMFS headquarters. A critical deficiency was also identified in the area of economic analysis. NMFS has no significant analytical capability in economics. Such a capability is necessary for preparation or evaluation of plans as well as numerous central office functions which emanate from the plans and from other NMFS responsibilities not directly related to the FCMA.

Each of the needs identified is necessary for fisheries management to fulfill the letter and spirit of the FCMA. It would be difficult, however, to initiate action to meet all of these needs immediately. Therefore, actions must be phased in an orderly developmental process. With this in mind, four priorities to guide the phase-in period are suggested below.

The first, or top priority, was assigned those areas which are necessary to identify basic supply-demand factors for fishing, and are indispensable if management plans are to reflect economic considerations. With two exceptions these areas were primarily in the production or harvesting sector. One exception was with price and consumer expenditure data

since these are essential to project economic impacts on consumers. Another exception was foreign market intelligence. In some major fisheries markets (e.g., groundfish and shrimp), imports are so important and influenced by international markets that forecasts of domestic prices are impossible without such intelligence. Conversely, it was suggested that optimum yield and foreign allocations should, in some cases, reflect improvements in access to foreign markets rather than the status quo. Another top priority area was recreational fisheries where further development of measurement concepts is needed to evaluate recreational benefits as required by the FCMA. Catch data in this area are also inadequate.

The second priority was assigned to selected items in the production and processing sectors. Items assigned this priority were those judged very important but not essential to the basic supply-demand situation; also, in many cases no clear statutory requirement was found. The third priority was assigned the residual items. In a few areas, e.g., catch (excluding recreational catch) and exvessel price, it was felt that existing data series are of sufficiently high quality to warrant a special priority (priority "zero") indicating that existing programs are adequate although not necessarily perfect. These areas are (1) imports (2) exports (3) industrial consumption (4) catch and (5) exvessel price. These "zero" priority items are not shown in Table 4.1 which summarizes the other priorities. At the risk of stating the obvious, priority zero does not imply that an area is unimportant.

It is suggested that the recommended data series not be confined to those fisheries for which management plans will be developed under the FCMA. To the extent practicable, these series should cover all fisheries within 200 miles whether under federal or state law, and also U. S. participation in tuna fisheries under international law and in certain foreign fisheries such as the shrimp fishery of Mexico.

To some degree, such coverage will have to be maintained anyway, and it is most sensible, for example, to collect consumption data on a comprehensive basis. Even in the commercial production and recreation sectors, collection should extend to all fisheries since the industry is too interconnected for any other approach. Developments in fisheries not covered by the Act will inevitably affect demand and supply in fisheries that are covered. Even though such fisheries may not be within their jurisdiction, the councils and NMFS still need to know what is happening in these fisheries, especially since NMFS has responsibilities besides those explicit in the FCMA.

B. Recommendations

Recommendations of specific ways to alleviate the problems discussed above are being developed and will be included in the final study report. These recommendations will involve pertinent NMFS policy and operations.