Northeast Fisheries Science Center Reference Document 93-22

The Northeast Region Fisheries Data Needs Workshop

Gloucester, Mass.
March 31-April 1, 1993

T. P. Smith, editor

NOAA/National Marine Fisheries Service
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CREDITS AND ACKNOWLEDGEMENTS

Co-conveners of the Northeast Data Needs workshop were Terrence Smith, Northeast Fisheries Science Center, Woods Hole, and Patricia Kurkul, Northeast Regional Office, Gloucester. Dr. Smith was workshop moderator. Rapporteurs were Helen Mustafa, Kathi Rodrigues, and Jack Terrill. This report represents the joint efforts of the rapporteurs, the moderator, and Teri Frady, head of Information Services at the Northeast Fisheries Science Center.

We would like to thank all workshop participants for their uniformly excellent contributions. We especially acknowledge the Atlantic States Marine Fisheries Commission, and the states of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, Maryland and North Carolina for both providing representation and beginning a dialogue that should lead to better cooperation and coordination of state-federal fisheries data collection efforts.

To obtain additional copies of this report contact, Information Services Unit, Northeast Fisheries Science Center, Woods Hole, MA 02543 (508-548-5123, ext. 260). The correct citation for the document is: Smith, T.L., ed. 1993. Report of the Northeast Region Data Needs Workshop, March 31-April 1, Gloucester, Mass. NOAA/NMFS/NEFSC: Woods Hole, MA. *NEFSC* [Northeast Fisheries Science Center] *Ref. Doc.* 93-22.

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SUMMARY

A two-day workshop was held on March 31 and April 1, 1993 in Gloucester, Massachusetts, at the Northeast Regional Office of the National Marine Fisheries Service. The purpose of the workshop was to identify a set of data necessary to managing the offshore fisheries of the Northeast region.[1] Attendees represented, on the federal side: the Northeast Fisheries Science Center, Woods Hole; the Northeast Regional Office, Gloucester; the Southeast Fisheries Science Center, Miami, and the Office of Research and Environmental Information, Silver Spring, Maryland; and, from the point of view of the region's states, the Atlantic States Marine Fisheries Commission and the states of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, Maryland, and North Carolina. An agenda for the meeting is included as Appendix I and a list of attendees as Appendix II.

The Northeast Region of the National Marine Fisheries Service is attempting to enhance its data collection, archival, and analysis systems to support increasingly complex needs as fisheries management becomes more intensive and sophisticated. The Data Needs Workshop was organized to elicit from interested users a list of data items that would be necessary to manage the region's fisheries. For the purposes of the workshop, management was defined broadly to include biological, economic and socio-cultural assessment, law enforcement and compliance issues, habitat, environment and endangered species issues, fishery management plan development and compliance, and extra-regional data needs. The workshop constitutes Phase I of a three-phase approach to implementation of new data management systems relative to federal fishery management issues in the northeast. Phase II involves designing data collection systems which would gather the data identified in Phase I. Phase III is an implementation strategy for moving from the present systems to those identified in Phase II.

Since the workshop was devoted to identifying data needs from the perspective of the users of the data - the managers as broadly defined - we brought together managers and scientists from the regional fishery management councils, state fishery agencies, and the National Marine Fisheries Service. We also invited individuals with different disciplinary perspectives. As a result, the most important product of the workshop was a better understanding of fisheries data needs across user groups and across management jurisdictions. It is crucial that this dialogue continue so that state/federal data management systems can co-evolve and that all users of these data be involved in data system development.

In terms of consensus, there was general agreement that current data collection systems were inadequate in satisfying current needs. In particular, data is almost completely lacking in three areas identified as very important to fisheries management analysis: economics, socio-cultural considerations, and habitat and environmental concerns. There was also agreement that the workshop identified a fairly complete and comprehensive list of data needed in fisheries management but that significant obstacles remained with regard to prioritization of those items and implementation of new data collection systems.

The group felt that any data design effort must build in verification systems and validity checks, that some data items should be routinely reported, that other items should be periodically collected, and that additional data would be collected through special vehicles, such as surveys. There was recognition that the data needs discussed could be partitioned into fishery-dependent and fishery-independent data sets, with much of the discussion focused on fishery dependent data. The need for 100% coverage versus statistical sampling and the need for mandatory versus voluntary reporting were discussed but not resolved.

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[1] The term "fisheries" as used in this document and discussed in the workshop is defined to include not only commercial, recreational, and subsistence capture fisheries, but also other living marine resources and their habitat.

ORGANIZATION

This report is in three parts. In the introduction we present some background as well as the rationale for re-examining data needs relative to northeast fishery management. Part 2 is a summary of the first day of the workshop - a day devoted to presentations and discussions of data needs from the perspective of the various disciplines of data users. The concluding section summarizes the second day of the workshop in which the participants attempted to organize the data items elicited on day 1 into generic collection vehicles. The resulting collections of data items are included as tables summarizing this discussion.

INTRODUCTION

During recent planning and policy sessions, both fishermen and fisheries managers have suggested that they need additional and more detailed data describing fishing activity in the northeast region.[2] These data include those describing fishing performance (catch, landings, effort, vessel characteristics, and so on), and those related to the ecological, social, and economic systems which support those fisheries.

Currently, some of this information is collected when vessels land their catch. In the northeast region, this is called the "weigh-out interview" system; a sampling program designed to collect landings and effort data that is voluntary in some fisheries and mandatory in others. Other data are collected during the fishing trip by NMFS contracted employees (the "sea-sampling program") and other elements are collected on a nonroutine basis. Some information is not collected at all, for example, data useful for analyzing the economic and social impacts of changes in fisheries management.

Changes in the way we are currently managing several northeastern fisheries have led to a reexamination of data needs. First, the focus on regulatory requirements for analysis of fishery management plans (FMPs) developed by regional fishery management councils (Councils), as well as amendments to those FMPs, has sharpened. For any contemplated change in fisheries management, the Councils need to develop biological, economic, and social data for environmental impact statements (EIS) or environmental assessments (EAs), regulatory impact reviews (RIRs), Initial Regulatory Flexibility Act analysis (IRFA) as well as Section 7 Consultation/Endangered Species and Coastal Zone Management.

Second, recent or proposed changes in FMPs developed by the New England Fishery Management Council (NEFMC) and Mid-Atlantic Fishery Management Council (MAFMC) have tended to include management systems that have different and more stringent data requirements than previously was the case. For example, management by quota is now used in the summer flounder FMP and the shark FMP; measures to limit and control effort (days-at-sea) are included in Amendment 4 to the sea scallop FMP and under consideration in Amendment 5 to the northeast multispecies FMP; individual quota systems, which require timely and accurate catch monitoring, are in place in the surf clam and ocean quahog fisheries.

Third, to the extent that certain management systems, such as quota and effort controls, become more ubiquitous in the northeast, it is both logical and efficient to attempt to devise systems that will work across multiple fisheries. This not only simplifies fisheries management and data management systems, but is also absolutely essential to the understanding of and cooperation by fishermen who are affected by reporting requirements and the demands of data collection systems.

For these reasons, the NMFS Northeast Regional Office is considering replacing the current voluntary system by which commercial fishermen and dealers report activity with a mandatory reporting system that would document fishing and fishing commerce activity not only for research and policy development purposes, but also for effort allocation measures or enforcement of catch limits.

At the same time, NMFS has initiated strategic planning with a national scope for collecting fisheries statistics (FSSP 1992).[3] The strategic plan contemplates regional input and a three-stage process: assessing current data systems; determining data needs; and, moving from current systems to newly defined systems.

A STUDY IN THREE PHASES

The process in the northeast will be simi-

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[2] The Northeast Region as defined by the National Marine Fisheries Service includes the states from Maine to Virginia. For the purposes of this workshop, we also included the waters off North Carolina, since several of the federally managed fisheries in the northeastern U.S. extend into that state.

[3] Holliday, M.C. and P.J. Anninos. 1992, manuscript. Planning a fisheries statistics program for the National Marine Fisheries Service. See pages 13-15 for more complete discussion on the FSSP and its relationship to the NMFS national initiatives on computer hardware (IT95) and software (IDDP) systems for data management.

A Fisheries Data Collection System

- Phase I: Determining data needs

  This workshop

- Phase II: Designing a system

  Workshop
  Committee

- Phase III: Implementation

  Schedule and milestones
  Fiscal and personnel plans

Figure 1. Northeast fisheries data strategic plan.

lar. We suggest an exercise with three phases (Figure 1). Phase I would examine, in a somewhat idealized situation, the data necessary to management, where management is defined to include not only Council-driven processes but related scientific, and policy-relevant analysis. Phase I would identify data needs by canvassing users of the data. These include Councils, state management agencies, the Atlantic States Marine Fisheries Commission (ASMFC), biologists, economists, sociologists, and anthropologists doing scientific assessment of management systems, as well as personnel responsible for compliance and enforcement. A Northeast Fisheries Data Needs Workshop held in Gloucester, Mass. on March 31 and April 1, 1993 and this report resulting from that workshop, constitute Phase I.

In Phase II, a data collection system designed to efficiently collect the data identified in Phase I will be developed. Phase II could be implemented as a workshop and associated report or it could be handled by creation of a standing committee (or committees). It will be important in Phase II to identify data collection systems appropriate to identified needs independently of existing systems.

Phase III of the study will be concerned with devising a strategy for moving from current fisheries data collection systems to the system described in Phase II. Specific time lines will be necessary to make the transition practical; that is, cognizant of fiscal and personnel constraints.

PHASE I - THE WORKSHOP

The Northeast Fisheries Data Needs Workshop was intended to define the data needs of users of the data. These include fisheries scientists, managers, and enforcement officials who are actively involved in research; reporting and/or analysis; FMP development and evaluation; regulatory development and enforcement and who support fisheries and public policy activities related to the Magnuson Fishery Conservation and Management Act (MFCMA), regional fishery management councils, and the FMPs written and amended by those councils.

Participants addressed data needs with respect to effort and/or resource allocation measures that may be included in FMPs; reporting systems that require fishermen, buyers, and processors to report various descriptive data; and the scope of a comprehensive reporting system (and associated databases) that could be used to support FMP and management needs on a region-wide basis.

This workshop was not intended to resolve whether a mandatory system should replace the existing voluntary system, nor did it report on the various sources of the data, the priority of data needs, or how a mandatory system could be set up or enforced. While these are obviously related topics worthy of discussion, the report of this workshop is limited to describing data needs. The larger, more complex, question of "how" and "how soon" is dependent, in part, on the findings of this workshop, but is essentially the purpose of Phase II and III of the overall plan for re-design of fishery data collection systems.

To focus discussion, we considered data needs by scientific discipline or purpose. An organization based on the discipline of users is shown in Figure 2. We consider data needs

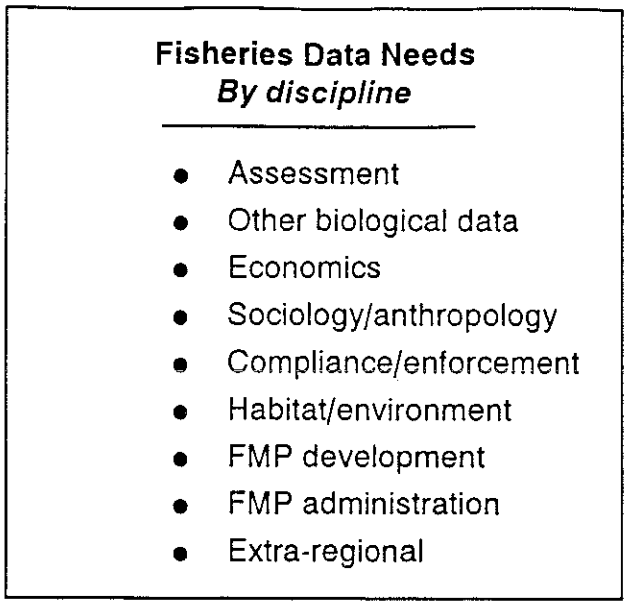

Figure 2. Northeast fisheries data needs.

relative to stock assessment; other biological data needs; economic and social assessment; habitat, environmental and protected species concerns; data which would allow an examination of compliance with a FMP or data collection requirements; data necessary for developing FMPs or analyzing the impacts of amending FMPs; data necessary for tracking performance of FMPs; and data necessary to users in other regions, or users with a national, rather than regional, perspective.

At the conclusion of this report we collect the identified data requirements into two tables: "trip information", and "periodic information." In general, however, the data items have the following dimensions:

Application: How will the information be used (*e.g.*, stock assessments, quota monitoring)

Frequency: How often should the information be collected (monthly, annually, daily)

Timeliness: How soon after the event is the information needed (For example, enforcement agents may require days-at-sea information almost immediately to enforce an effort allocation, while other individuals may be more interested in trends in effort over longer periods of time)

Coverage: Will all participants be required to provide the information or will the data be collected as a statistical sample (For example, if we need trip costs, do we need figures for each trip of every vessel, or for some percentage of trips for a few representative vessels?)

Source: From whom are these data collected

DISCUSSION

In overview, the discussion was broad-ranging, with debate focused on two general issues:

> How various attributes of data that are presently being collected could be improved for different users.
>
> Identifying data that are not presently collected, but which the workshop identified as necessary to support science and management efforts.

Attendees also discussed how the usefulness of the data would be affected both by collection through a mandatory system and through residence in the larger, still to be developed, inter-regional database. The limiting parameters are:

> The imminent use of mandatory reporting systems for effort monitoring in various FMPs, particularly the model established by Amendment 2 to the MAFMC Summer Flounder Plan and Amendment 5 to the NEFMC Multispecies Plan.

The NMFS-wide coastal reporting system and relational database under development by the NMFS Interregional Database Design Project (IDDP); an initiative to standardize database design and access across regions.

There were also several abiding concerns that surfaced in the discussion of nearly every data element (not in any priority order):

- The need for two "boiler plates":

  An addition to the MFCMA giving NMFS authority to collect information essential to the support of FMPs.

  A core mandatory reporting requirement for industry that is virtually the same in every FMP.

  Avoiding introduction of bias into existing databases if current collection methods are replaced with mandatory reporting, especially, but not exclusively, in fisheries we are trying to rebuild.

- Ways to transmit and verify or authenticate data required/received under mandatory or other collection systems, particularly those data that would be used in determining violations of a management measure.

- How re-allocation of scarce government resources to mandatory reporting might harm other data collection efforts identified as equally important.

- The lack of appropriate economic, habitat, and socio-cultural data to meet management, research, and analysis requirements; a perceived slant of all current data collection toward fisheries assessment and management needs at the expense of research and analysis.

- The need for improved communication between state and federal managers and scientists on changes in data parameters for example, changes in port agent sampling quotas, more consistent samples in terms of methods and frequency and on the currently available data.

- The range, flexibility, variability, and accessibility of the current data bank available on northeast living marine resources and habitat.

- Opportunities presented by the NMFS software (IDDP) and hardware (IT95) initiatives for making data standards and coding more consistent among users and for improving NMFS-wide computing power.

- The importance of factoring in recreational fishing activity in all areas.

- Historically, problems caused when management measures are put in place without the support of data or research staff and/or techniques.

- Support for port agents and sea samplers, not only as data gatherers, but as observers of fleet operations and as checks on self-reported data.

Summaries of discussion in each subject area are presented next. Since each speaker approached the topic differently, each section has a slightly different organization.

ASSESSMENT

Dr. Steven Murawski, NEFSC Chief of Population Dynamics, presented an overview of information needs for fishery assessments. He indicated that the current data collection and resulting database is sufficient for assessment purposes, although it could certainly be improved. However, for the purpose of supporting allocation decisions, current data collection systems are inadequate. Improvements necessary can generally be characterized as those improving precision and reducing bias in data. Until now, imprecise data has been accept-

able because it was consistent. Sea sampling, for example, has been used to increase precision of data. The concern with implementing any kind of mandatory data collection system is to insure that the reliability of the information does not decline as we attempt to account for all catch and effort.

Problems With Data

Catch Information

We need catch information on as fine a space and time scale as possible, that is, by market category/statistical area at the port level.

A major objective of biological catch sampling is to get unbiased size composition estimates. It is necessary to sample the market-culled size categories, since landings are generally reported in these groups. It doesn't matter if there's drift in the market categories over time because market categories are matched to landings in the same quarter. As long as the sample is keyed accurately to its time frame, we can factor out differences in the cull by port and over time.

Canvass of Landings

Some reporting is done just once at the end of the year, as for the majority of landings of near-shore species such as lobster. If the canvass is annual, there is a time lag in the reporting for some fisheries.

Discard and Bycatch

Sea sampling is the major source of this information. Recently, trips are less and less directed, tows are longer, catches are more mixed, so it's hard to identify a target species by plurality of catch. To an increasing extent, fishermen are fishing a biomass, not a species. Sampling at the tow level is difficult. For example, with a three hour tow it is straightforward to determine what was caught, but difficult to pinpoint catch location. It is important from an assessment standpoint to have a consistent sea sampling effort over time so as to evaluate interannual changes in discard patterns in relation to differences in year-class strength.

Recreational Catch and Effort

Catch and effort data from recreational fisheries should be included in a collection system. At this time, recreational catches are incorporated into the indices of relative abundance. Numbers are collected by telephone intercept (participation) and field interviews that include biological sampling (catch rates).

Biological Samples

A random sample of the size and age composition over time is needed.

Improvements Needed in Data and Data Collection

Communication

The states need to know about changes in biological sampling quotas for federal port agents, and they would like to have input. The NEFSC Stock Assessment Workshop (SAW) was discussed as a possible conduit for this kind of exchange.

Effort

The fleet should be described by individual vessel size, gear, time at sea, and fishing power. Near real-time data are necessary to monitor and estimate catch per unit effort in order to tune catch and effort estimates over time. Fishing power is also related to physical characteristics of the vessel such as length, beam, and gear configuration and size; this descriptive information is needed to calibrate CPUE. Updating of vessel characteristics should be timely and

old characteristics should also be retained by the system for the purposes of comparison.

Landings

Total landings on a fishery-wide basis are currently estimated rather well, however, the current sampling program does not estimate landing by small vessels in small ports with much precision.

Catch Sampling

To improve databases, more samples are needed. Mandatory access to fish landed would help. Sea sampling data is hard to match to port information, except for unclassified samples, because port samples are culled by market category whereas sea samples are not.

Spatial Resolution

There is usually no reason to report inaccurately, but precision is low because the unit areas are so large. Finer geographic resolution is needed. Currently NMFS uses 1/4° square areal grids, which is about 500 square miles in area; a lot of un-interviewed trips are to 1/2° scales. Finer spatial resolution of catch and effort may be required to support management measures such as time/area closures.

Sea Sampling

More days-at-sea spread over the fisheries conducted in the northeast are needed to reduce the bias contained in current information. This is the weakest part of the current collection system as far as assessment is concerned. Also, although sea samplers are trying to observe gear and monitor technology used on vessels to some extent (used in CPUE estimates), more of that kind of observation and reporting is necessary.

Bycatch Data

Bycatch (incidental catch) data on a tow-by-tow basis are needed. Currently, we get bycatch/discard information primarily through the sea sampling program.

Tagging

Tagging may be appropriate for some species to determine age and length distributions, however, except in large pelagics and anadramous stocks such as salmon and striped bass, tagging has not been used as an assessment technique. Tagging has produced more useful information at the state level.

Port Sampling

State representatives noted that port samples aren't consistent. All port agents interview, collect from dealers, and sample, but to varying degrees. Sampling schemes designed for the port agents haven't taken into account state requirements, as the federal service adjusts sample quotas to support management needs. One state representative described the situation in this way: "... when sampling efforts are going to be redirected or new things required, the states should know and should have some input on how it will affect us, and whether we can make the change. The 'trade-offs' in the NEFSC on sampling [priorities] are, to a lot of us, a mystery."

ECONOMICS

Data Requirements

Dr. Phil Logan, head of the Economics Investigation at the NEFSC, presented a 136-page document that fully examined and listed the data required for economic evaluation of renewable marine resources. The products of this research and analysis are derived

economic value from the resource in its current use, measurement of the flow of net benefits from the various uses and how the flows are generated, and improvement of the net benefits derived from the resource through conservation, preservation, and enhancement. Very little of this information is collected in a regular, appropriate way for use by economists.

For each business sector (harvesting, processing, wholesaling, and retail) economists need similar information on the market value of vessels and equipment, on the costs of doing business, detail on the firm's financial standing, and economic details of fleet-dependent industries. A plan amendment changes the behavior of fishermen. Economists are expected to understand how industry will react to a change as part of the economic evaluation of a FMP. As one participant put it, "In economics, you want to know about an individual firm and how it is tracking. In biology, it would be like following an individual fish. Biologists don't care about one fish, we want to know about the whole stock. But you can't generalize in economics. You have to truly add the individuals together."

Data Problems

All of what is needed is already required by the MFCMA, but the authority to collect it is not necessarily there. The Act contains impediments to collecting economic and proprietary information. This is recognized in some of the NMFS and Council requests for reauthorization of the MFCMA.

Improving Data Collection and Quality

Economists put the priority for data where the market failure is. In New England, that's harvesting, and to some extent, processing. A major improvement over currently available data would simply be to know precisely how many vessels are in a fishery, if they fish, when, or how much they fish, the skipper's name and basic vessel characteristics (assuming that port sampling, sea sampling and permit applications remain unchanged).

A mandatory industry reporting system could provide economists with certain core information, yet such a system would not address all needs. There has to be flexibility to collect additional necessary data. That flexibility involves other kinds of collection methods; for example, questionnaires, interviews, permit applications, industry advisory panels, surveys, and studies for specific information conducted for NMFS by academic and other researchers. Some of the most critical missing data are those derived from a firm's balance sheet, information currently considered proprietary.

Currently, benefit and cost estimates are made primarily using the weigh-out database, the sea sampling data, and the federal commercial fisheries loan program; none of which were designed to gather economics information.

The economics data needs document is thorough in its justification and explanation of each data element required and how it fits into current requirements for economic study and analysis in support of FMPs. The text describes the resulting product in this way:

> Five broad categories of use are identified: (1) seafood production, (2) recreation, (3) subsistence, (4) nonconsumptive use and preservation, and (5) aquaculture. An attempt has been made to identify as many data needs in each use as we consider reasonable and valuable. Although we have not let the cost of collecting these data constrain our choices, those identified are equivalent to what is regularly collected in agriculture.

SOCIO-CULTURAL

Introduction to a New Field of Inquiry

Dr. Patricia Clay, NEFSC anthropologist, presented a discussion of her 47-page sum-

mary of socio-cultural data needs. This is a new area of inquiry in this region, so the data needed is even less represented in the current collection systems than that for economic or habitat analyses. The presentation generated some lively interest in the applications of sociology and anthropology to fisheries management.

The MFCMA requires socio-economic assessment, but such requirements have not been formally imposed on the states. Since there is no regulatory requirement for data collection, consideration of social issues is currently involved in the decision process for the most part only through interpretation of the results of public hearings. Joint state or state-federal plans tend to move toward allocation issues that require assessment of social impacts.

Several state representatives said that they too were collecting more and more of this kind of information, but few had the staff expertise to analyze it. All agreed that inter-regional and inter-jurisdictional plans are becoming more common, as is using allocation schemes that require public hearing. Impacts on user groups are a priority to politicians. Said one attendee, "I see a forced marriage between mandatory socio-economic data and current voluntary contributions."

Economics and anthropology are combined in the fisheries management arena because, as one participant put it, "Economics tells you why fishermen are complaining. Anthropology tells you why they are at your meeting complaining." As Clay said, "Economists are looking at the 'firm.' My basic units are the 'household' and the 'culture group,' used to judge how fish management affects communities and vice-versa."

The bases for socio-economic inquiry at the Northeast Fisheries Science Center as described in Clay's document are:

> To help design FMPs that minimize cost and maximize compliance by identifying, among the alternatives which will satisfy stock rebuilding objectives, the option or options that will provide the least social and economic disruption and dislocation, and be the most palatable to the target population.
>
> To evaluate FMP decisions by identifying cases such as: sub-groups that will be exceptionally burdened by a measure; a specific behavior that is so important to a group that it is virtually impossible to change; false preconceptions among managers and/or the managed that need to be changed before a measure can be effective; existing local resource management patterns that can be exploited and/or augmented to meet a management goal without involving a new FMP.

A research program would begin with gathering baseline information on the demographic composition, social structure, world view, and local knowledge of resource users and managers. The collection methods would be quite varied, for example, ranging from the current port agent interviews and weigh-out data, to specialized interviews and surveys, extended periods (of weeks or months) of participant-observation aboard fishing vessels and with fishing families,and access to tax or insurance records. As Clay put it, "All the information indicated in my document won't be collected by a mandatory reporting system, and won't be collected soon. There's about a 20-year plan here."

The question was raised about whether any change in the *status quo* would be considered "bad" in a social impact analysis. Clay responded that the purpose of social impact analysis is not to prevent change, but rather to anticipate management-induced changes that are likely to be defined as bad by the fishermen, the processing industry, the public at large, or some other interested party. In some cases this examination may lead to alternate ways of accomplishing management goals. In other cases there may be no good alternatives to the suggested change, but managers may be able to mitigate the abruptness or severity of the change through other measures.

Data Problems

The most pressing need is for information on groups that have not been included in the current databases such as vessels under 5 gross registered tons; crew members on commercial vessels; recreational and subsistence users; household level information on the fishing industry's families and their employment; ethnic fleet specific and home port specific behavior; and employment patterns in the processing and marine support industries. To begin, a universal census is needed to develop a set of important cultural subgroups. Then researchers can move on to random sampling of those subgroups to answer particular questions, knowing that the responses will be representative of the fishery as a whole something we are currently unable to ascertain. A social impact statement for a FMP would require a baseline data set that could be stratified into subgroups whose responses to specific management variables can ascertained and perhaps predicted. Then for each management question, a short term study can be conducted, without the current need for extensive (and expensive) background research for every situation. As a current example, the Cooperative Marine Education Research program (CMER) at the University of Rhode Island may consider an anthropology project to develop a random sampling methodology to cover subgroups in a rapid assessment for a particular question.

Another important factor is that industry argues that it is "outside the process," that management is a club to which they do not belong. Managers need to know why industry feels that way, regardless of whether or not it's true, in order to develop better plans and to generate more consensus about complying with the management measures. To the extent that it is true, industry needs to be drawn more fully into the management process through application of recent advances in techniques of co-management. Hand-in-hand with this consensus is understanding how information is transferred in a community and how opinion is formed: who opinion leaders are, whether they represent big groups of stakeholders or a small interest group, where their information comes from and how it is passed around.

Participants agreed that the importance of this work relates to behavioral models: how fishermen will react to a management change. As one participant described it, "People who fish in Gloucester fished the northern edge of Georges Bank, and that's where they still are even though there are places that are more lucrative."

There was considerable dispute over the suggestion that managers and legislators should also be studied. Some participants saw no relation to fisheries management. Clay explained that this was not a direct impact on management, but part of a larger understanding of the process and how it works, why decisions are made, where the information on which decisions are based comes from, and how priorities change or differ with electoral or staff turnover.

COMPLIANCE/ENFORCEMENT

Gene Martin of the Northeast Region NOAA General Counsel's Office (NOAA GC) indicated that data needs from a compliance or enforcement perspective are generally those required to document violations and prosecute.

Data Collection

There needs to be enough data to document a violation. If the data are derived from a mandatory reporting system, there will have to be cross-checks. To prosecute, GC will need information to prove a violation, convict, and collect a fine. Under a mandatory reporting system, reporting requirements must be very clear: what data are to be reported, the time frame, who is the authority for reports, and the required paperwork to be submitted. The NMFS needs clear verification that required information has been sent and received, including information sent electronically.

Data Improvements

Vessel transponders might provide compliance information on area restrictions. Permit applications need to include more required information on the firm's organization, so GC can determine whom to prosecute and who pays. Certificates of incorporation, for example, identify vessel owners. Ninety-nine percent of federal cases are civil. If the violation is criminal, the U.S. attorney handles it. Rarely has NOAA been challenged after naming owners or shareholders. NOAA will also cite individuals, but rarely does the business have assets distinct from those of the partners.

Although not currently proposed, there has been discussion of skipper and crew member licenses as part of FMPs. The NOAA General Counsel and Enforcement offices need to review any such proposed licensing to assure that the requirements are enforceable and that violations can be prosecuted.

Discussion

There was discussion of the converging functions of port agents and enforcement agents. Consensus was that port agents shouldn't be used to enforce mandatory reporting and that port agents' data collection may suffer if industry becomes uncooperative because of a mandatory system. Mr. Martin was asked if the enforcement agents' daily logs might contain information useful for determining effectiveness of a FMP or for compliance monitoring. He replied that requiring access to an enforcement agent's diary would compromise his work. In the past, enforcement has provided statistical information, but requiring more specific reporting is going too far. Although the duties of port agents and special agents are quite distinct, more information could be shared between enforcement and port agents without compromising either function. As he put it, "It doesn't make any sense to have them not talk to each other at all."

It was mentioned that many people do comply. As far as public information goes, there should be a rounded picture, showing boardings versus violations, not just the violations. Martin indicated that no analysis has been done on that. Another comment was made that such information would also be helpful in determining if a plan is being complied with and how successfully.

HABITAT

Data Needs

Tom Bigford of the Northeast Region's Habitat and Protected Resources Division stated that the division's priorities were not so much for new and/or additional data, but for organization, standardization, and access to data that already exists. Habitat concerns are naturally part of this process. Getting habitat into the research and management process means we have to change the way we do business. As he put it: "The mind-set is more of a problem than the data set."

Habitat managers need data to support any recommendation they might be asked to make on any permit or plan. That information is both fishery-dependent and fishery-independent. Requests for data and recommendations are escalating and usually arrive with a very tight time frame for response. These requests often involve projects or proposals that will or may affect either protected species or habitat. The other major category of work involves catastrophic or chronic events such as oil spills or dredge spoil dumping. In this case, the requests for assistance or comments are broad-based.

It was suggested that the improvements needed in a habitat database included first, a basic inventory of the resources themselves and the available data, and second, more integrative studies.

Bigford agreed, noting that there was no process like the SAW to answer questions related to habitat, the environment or endangered species. The bias in habitat information is "off the chart because the information is all over the map," making it hard to answer even a basic question. For example,

there are eleven National Estuarine Programs (NEP) in this region, 12 if you count that of North Carolina. There are a lot of NEP products, but NMFS does not participate in planning, development, or implementation of any of these programs. The NMFS was told not to participate because it was not funded to do so under the Clean Water Act. Mark Holliday, of the Washington, D.C. NMFS Fisheries Statistics Division, mentioned the Interior Department's newly proposed integrated national biological survey. Steve Murawski noted the Gulf of Maine initiative that was generated by several different groups who wanted to combine and share data.

The environmental impact and habitat sections of the FMPs were discussed. Moderator Terry Smith asked how NMFS is equipped to do those sections. Mr. Bigford replied that Councils definitely want to include a habitat section, but those sections have no connection to the plan, to the process, or implementation. More recently there has been a concerted effort to produce a habitat section with recommendations for supplemental environmental impact statements (SEISs). It remains to be seen if the recommendations will be considered. Said Bigford, "We need to think beyond the MFCMA fisheries 'clique' to get what we need" to look at how habitat is affected by management schemes.

Moderator Smith asked if the FMP habitat section discusses how preferred alternatives affect the habitat. Bigford replied that it doesn't at this time. Much of what's available is site-specific and the effect on a larger area has to be extrapolated. Graphical information systems (GIS) technology might help in that regard. Having enough information to use such systems is coming, but it's not here yet.

Data Improvements

Site-specific information should be collected on when and where people are fishing. For habitat we need very specific information on fishing effort and location (tow-by-tow, haul by haul). Offshore dredging and dumping on the shelf is starting to hit industry in the pocketbooks and is on the Council agenda. Dredge materials and disposal are issues on both recreational and commercial fishing grounds. There was general consensus that once stock rebuilding is underway in the Northeast, habitat is the next big area of concern. As one member put it, "Once the 'greens' get done with fish stocks, the habitat is next. We should be developing the long-term database and techniques we'll need to address those issues."

State representatives concurred. The Massachusetts representative, Charlie Anderson, said, "Almost half of our response to your query about data needs mentioned habitat and ecological data, contaminant monitoring, bio-toxin monitoring, and a push behind GIS data. Using the capabilities of spatial modeling is definitely the way we are going. We have found that data layering in GIS modeling ends at the coast." Tom Hoops, a Massachusetts state researcher, described a recent project applying GIS technology to habitat questions. " We have sampled just one area around Waquoit and Buzzards Bay. There is a wealth of data, but they are for specific points, not consistent over the geographic area."

In order to map essential habitat, a long-discussed goal of fisheries managers, more marine site-specific data clearly has to be collected or gleaned from existing databases. Mr. Bigford remarked that the Northeast Region is doing a pilot project using GIS with river data and mapping it to see what the applications are.

It was noted that several basic research questions have to be answered on marine habitats. The monitoring required for a baseline database is large scale, but has to be thorough only for a few years.

FMP DEVELOPMENT

Chris Kellogg of the New England Fishery Management Council indicated that, in general, managers are using data to build an FMP and/or analyze changes in FMPs. For the purposes of preparing for this workshop,

Council staff concentrated on fishery-dependent data, therefore, data involving biological surveys, monitoring, or endangered species was excluded. Since the Councils' use of mandatory data is very applied and specific, Kellogg's table of data requirements was very specific. This table later was used as a template for the combined data needs list constructed by workshop attendees on the second day of the meeting.

Data Needs

FMP development needs were fully outlined in the table presented to the group. Comments on the table are summarized here.

Data Improvements

Coverage

Managers lose credibility with the fishing industry when they use estimates of fishing activity based on a sample. The Councils need real-time reporting in some cases and much more detail on individual activities.

Timeliness

Timeliness is not just a matter of how frequently you collect data, but when it is actually available for use. It's difficult to interpret which management measures will have a time framework and which won't. For example, to know what's happening with the 400 lb exclusion on scallop meats requires real-time data. The effect of the measure needs to be known after one year. We can't wait to detect a shift of effort. Fishing practices change very quickly, so timeliness is critical for management councils.

Data Quality

Council staff feels that quality will improve if coverage is more universal and monitoring happens more often. We need to take care of problems such as days-at-sea associated with the wrong vessel name. We need a way to verify and make corrections rapidly when an error occurs.

Economic and Social Impacts

At this point, scientists and managers make gross generalizations about these kind of impacts. Social impact information is now a part of the plan development guidelines. If it isn't provided, fishermen's groups ask for it. We also need better two-way information exchange. Improvements in this area may help us learn why plans are rejected by industry. Said Kellogg, "We recently presented a plan at public hearing in Maine and not one person there liked any part of it. Not one part." Managers would like an occasional survey which could acquire information of this sort.

Trip-Based Information

The kind of data needed but not currently collected include: information on pounds taken home for consumption by species, distance from shore, reason for ending trip (to evaluate the impact of regulation), crew size by trip, bottom types (for habitat), tag captures, discards (and bycatch for marine mammals and endangered species). Any effort data collected will certainly help habitat work.

Tom Hoff of the Mid-Atlantic Fishery Management Council also contributed to this presentation. He said that he concurred with most of Kellogg's remarks, and added a few more details:

Habitat

Improving data quality and information on habitat is a big part of the discussion on MFCMA reauthorization, but more authority from Congress is required to really do anything. That said, his priorities were for studies of how fishing gear affects habitat and marine populations in order to respond

to EIS concerns, and identifying significant habitats for each FMP species (in conjunction with states).

Landings and Value

More information is needed concerning fishery imports from Canada, specifically, and other countries, generally, for certain species. In order to evaluate plans, we have to interpret demand and purchasing patterns as well.

Other Data Needed

The MAFMC also needs fishery-independent NEFSC and state resource surveys, data used for tuning virtual population assessments (VPAs), young-of-the-year indices, and pelagic surveys, as well as additional information on squid and butterfish.

PLAN ADMINISTRATION AND MONITORING

Pat Kurkul of the Northeast Region's Fishery Management Operation Division, suggested that most of her section's needs had already been presented. A core group of data needs was emerging, and she said that there needs to be an expansion both in frequency and scope over what we are accustomed to. Items in addition to those already mentioned include data generated by tagging programs and ITQ program lease-sale price information to monitor effectiveness of ITQ allocations.

EXTRA-REGIONAL DATA NEEDS

NMFS Southeast Region, SEFSC, Miami

John Poffenberger from the SEFSC concurred with needs already suggested by other members, and added the following items.

Large Pelagics

In the southeast region, large pelagic survey and monitoring programs are a little different from those in the northeast, so there may be some additions or adjustments there. Also, there are regulations that require logbooks for large pelagics. The southeast region issues permits for dealers who purchase large pelagics. Agents collect data, however, the monitoring of compliance falls on the northeast region. There needs to be better exchange of information among regions on compliance.

Quota Monitoring

The southeast region is monitoring some quotas on the North Carolina/Virginia line. The northeast region should have data on the North Carolina fisheries for swordfish, shark, and mackerel.

NMFS Fisheries Statistics Division, NMFS Headquarters, Silver Spring, Maryland

Dr. Mark Holliday, Chief of NMFS Fisheries Statistics Division, focused on three current initiatives that provide new opportunities for NMFS in the areas of data collection and management.

The IT-95 is an agency-wide procurement of hardware, software, and telecommunication networks that provide the tools to link fisheries statistics (fisheries-dependent and fisheries independent) databases in fishery science centers, laboratories, and regional offices. For the first time in the agency's history, the NMFS computing facilities will operate from a common hardware and software platform linked by a wide area network (WAN) providing the technical capability for distributed data processing and relational data management. Dr. Holliday presented the analogy that IT-95 provides the link between "islands" of data within regions (*e.g.*,

Weigh-out, Marine Mammal Exemption Program, Enforcement Management Information System, Capital Construction Fund, *etc.*) and between regions.

In order to take advantage of the tools provided by IT-95 hardware, software, and WAN, the NMFS will expend considerable effort in designing or redesigning fishery-dependent databases. This second initiative, the Inter-regional Database Design Project (IDDP), has commenced and will primarily address database design issues as they relate to conversion of existing databases to the new computing environment. Fisheries statistics and data management representatives from each region and headquarters will be involved in five primary areas of work:

1. Production of a Data Resource Directory (data dictionary) at the data element level.
2. Development of data element and coding system standards and practices (*e.g.*, species codes, gear and effort codes, water body codes, state-county-port codes, *etc.*).
3. Creation of data models for data systems destined for redesign.
4. Production of a prototype database for distributed monthly landings data and a relational catch, effort and operating unit database.
5. Creation of an Agency-wide ORACLE database design "Help" system.

The third initiative is the NMFS Fisheries Statistics Strategic Plan (FSSP). In January, 1993, the NMFS Assistant Administrator and Board of Directors asked for the development of an Agency-wide plan that addresses data and information needs in the context of established NMFS goals and objectives articulated in the NMFS Strategic Plan. It is clear that the agency's information needs have changed and continue to evolve. *Ad hoc* data collection systems have proliferated over time; thus the intent is to establish a systematic and thorough evaluation of existing systems and determine if those systems meet current and projected information requirements. The FSSP will also provide the basic rationale for credible NMFS budget initiatives involving fisheries statistics.

The 18-month project has been commissioned by the Office of the Senior Scientist and will be managed by a project management team and steering committee consisting of field and headquarters staff. Although the design of the planning process is not yet complete, it is being developed with the intent of involving internal (NMFS, Councils) and external (Commissions, states, industry, *etc.*) clients/stakeholders.

Phil Logan suggested that a database designed initially so that people can look at stocks of fish would not reveal information on fishing strategies or vessels or effort. The issue is when, in the software procurement and design cycle, is there an opportunity to develop software needs? Those attendees who are members of the IDDP steering committee noted that they are aware of the great variety of data and data attributes in the systems they are trying to link. Because these individuals have been assisting people for whom the data is clearly not sufficient economists, sociologists, managers dealing with allocation schemes they are also very aware of current limitations. At this time, what they are looking for is a complete picture of data types required by users. Attributes required for each type of data by each user are not mutually exclusive and IDDP/IT95 is the opportunity for systematic improvement of long standing data and computing inadequacies, particularly the lack of relational database capabilities.

Dr. Holliday listed a number of things that his group felt were important parameters for the Workshop as it developed a list of data needs and attributes:

1. Remove preconceptions and concentrate instead on
   what needs to be improved and what the constraints are.

2. Data quality should be paramount. Concrete goals that can be quantified should be set so as to generate feedback on quality.

3. Communication is the fundamental underpinning. Management will be considerably improved if there are consistent data standards and coding systems, for example. We need to improve the flow of information.

4. Match fishery management techniques with data and expectation of success. Management measures have been used that relied on data and fishery management techniques not in place. At some point we should say, "Don't do it that way" until we can support it.

5. There should be no national-level data needs that can't be met by aggregating the regional data. Access to, communication about, and integration of data are our problems.

As in the field offices, the national office sees additional data collection requirements for enforcing and monitoring ITQs, not just collecting data, but for handling allocation of ITQs, including data on price, transfers, value, and so on. Also, trade data, both domestic and international, are becoming more important. The Departments of Customs and Census collect some of these data, but the items are not specific enough for our needs. Real time reporting on domestic prices and marketing trends is also required.

WHAT IS A MANDATORY REPORTING SYSTEM?

Before the group split up to generate a combined data needs list, Moderator Terry Smith posed the problem of defining "mandatory" reporting. Throughout the meeting there was use of mandatory to mean "required to complete various tasks," and of mandatory to mean "required reporting."

One attendee suggested simply "required submission of information," pointing out that the degree of coverage is where it is mostly reflected: "If you make a decision about how much, how often and how fast you need it, that may answer your question about whether it should be mandatory." This was discussed and eventually the group agreed that mandatory reporting meant "a uniform, required collection vehicle that obtains accurate information."

It was pointed out that compliance monitoring and allocation decisions are what will most likely require mandatory, universal reporting. Lively discussion ensued about the economies in time and effort to be made by universal requirement in FMPs of a core of trip-based data, and of socio-economic data on permit applications. There was consensus that more FMPs will require mandatory reporting in the future, and that adding species over time to a mandatory system is much more expensive and difficult than just making reporting universal from the beginning.

Experiences with mandatory reporting systems, such as PacFIN in the Northwest, used in Alaska's offshore fisheries, and in various states where mandatory reporting is in place were discussed. While the NPFMC and Alaska Department of Fish and Game do have mandatory reporting, it was insufficient to monitor rapidly-attained quotas. As a result, NMFS overlaid more timely collection over existing state and federal mandated reporting. As one member said, "It has not been data collection that's been a pain, it's the management measures themselves that generate controversy."

Massachusetts representatives discussed their mandatory reporting systems for striped bass and summer flounder fisheries, both of which implement an FMP specifying quotas divided by state. Massachusetts gets direct catch information from fishermen, simple log sheets are required from dealers, and at some point fishermen send in a landings report. They use touch-tone data entry and are fairly happy with the results. They advise keeping the logbook requirements as simple as possible and suggest requiring minimal data for quota management. In Massachusetts, data must be reported for the whole trip, whether in state waters or the EEZ.

The important point is that mandatory reporting is not a panacea, but rather the issue is what data are reported, when and by whom.

ADDITIONAL PLANNING

Suggestions for continuing the process beyond identifying data needs and toward development of data collection instruments and implementation plans, that is, Phase II and Phase III, as identified earlier were discussed.

With regard to Phase II (defining attributes, data for mandatory reporting, and collection vehicles) it was suggested that:

1. On all biological trip data we should get as much of what we need for mandatory reporting from the dealers.

2. Use sea sampling for the balance of the biological data.

3. As little data as possible should be obtained from mandatory logbooks unless it can be verified.

4. Managers should ask for as much of the socio-economic data as appropriate on the permit application and get the balance from personal interviews.

5. Port agents should be used not only to collect information, but also to train people to fill out the logbooks or use whatever mandatory reporting methods are put in place.

With regard to Phase III, it was suggested that part of describing mandatory reporting elements should be indicating the data needs the element might fill FMPs, food safety, assessment, and so forth.

RESULTS

The sets of tables in that follow represent a slightly edited and reorganized version of tables put together by several working groups in the evening of the first day of the workshop and discussed by the group on the second day. It is important to note that the items contained in these tables represent the group's consensus on the collective data needs of the northeast region (with regard to federal fishery management needs broadly defined).

In reviewing these tables several caveats are in order:

> Workshop participants developed the tables assuming that data currently obtained through port sampling, sea sampling, and NMFS biological surveys would continue at the present or, in a perfect world, greater effort levels.
>
> The tables do not represent a complete list of all data required for all attendees to conduct sound science and analysis within their respective disciplines, but the list does represent collective data needs with respect to fishery management.
>
> The tables do represent a set of data to be included in a system of reporting required from industry, although the data required would be a subset of the data in the table.
>
> The tables constitute a list of core data that, by a consensus of the scientists and managers present, are essential for development, administration, and analysis of FMPs.
>
> For the most part, the exercise tended to develop data needed from harvesters, thus, there may be additional data needed of processors or other marketing levels.

There are two parts of the overall data needs table. In part one, data elements that can be collected at the conclusion (or during a trip) are included. In part two, data items that would be collected on some other periodic basis are included. In the second set of tables, data are organized by intended application (trip-level reporting, biological and assessment data, economic analysis, and socio-cultural analysis).

Phase II of the northeast data redesign initiative will consider appropriate data collection vehicles for gathering these data such as trip reports, logbooks, dealer reports, periodic and special surveys, and contracted special research projects.

Table 1. Trip level data needs.

TRIP INFORMATION				
Attribute	F	T	C	S
IDENTIFIERS				
Vessel				
Name				
Coast Guard number				
Federal permit #				
Captain's state lisc. #				
Home port				
Principal use Commercial Charter Recreational Subsistence				
Trip				
Type Commercial Recreational Charter Subsistence Trip ID # Name of vessel operator Number of crew Departure date Port of departure Reason for ending trip Return date Port of landing				
Crew lay system				

TRIP INFORMATION				
Attribute	F	T	C	S
Gear (for all gear aboard or in water) Type Quantity Size Mesh size				
TOW-BY-TOW/SET-BY-SET INFORMATION				
Tow/set number				
Gear				
Beginning of tow/set Latitude and longitude (or Loran) Time Depth				
End of tow/set Latitude and longitude (or Loran) Time Depth				
Catch, retained Species Weight				
Bottom type				
Target species				
Bycatch Species Pounds				

TRIP INFORMATION				
Attribute	F	T	C	S
ADDITIONAL CATCH INFORMATION				
Discard Species Pounds Condition (dead,live,injured)				
Split trip indicator				
LANDINGS AND REVENUE INFORMATION				
Date landed				
Port landed				
Pounds landed Species Product form (whole, gutted, tails, etc.)				
Ex-vessel price Species Market category Dealer Dealer permit #				
Market price Wholesale ($/lb) Retail ($/lb)				
Fish transferred Species Product Ex-vessel or processed value				
Pounds taken for home use				

TRIP INFORMATION				
Attribute	F	T	C	S
VARIABLE COSTS				
Crew wages				
Captain's share				
Other wages				
Food				
Water				
Fuel				
Oil				
Ice				
Bait Type Amount Cost				
Other vessel supplies				
DATA FROM CHARTER, PARTY, AND RECREATIONAL TRIPS				
Number of customers				
Fee schedule				
Captain Name ID Experience				
Gear Rental Cost Revenue				
Consumer goods Cost Revenue				

TRIP INFORMATION				
Attribute	F	T	C	S
Sales by Captain Species Number Size Total weight Ex-vessel or wholesale value				
Sales by Mate Species Number Size Total weight Ex-vessel or wholesale value				
Other Revenue Tips Filleting				

Note: F - frequency; T - timeliness; C - coverage; S - source

Table 2. Other periodic data needs by discipline.

PERIODIC INFORMATION				
Attribute	F	T	C	S
BUSINESS CHARACTERISTICS				
OWNERSHIP				
Owner name				
Ownership type				
Number of vessels owned by firm Name Vessel ID				
FISHING POWER/VESSEL VALUE				
Construction year				
Year bought				
Fishing gear owned Type Cost				
Deck gear Type Cost				
Wheelhouse electronics Type Cost				
Gear-mounted electronics Type Cost				
Onboard processing equipment Type Cost				
Estimated vessel market value (fully equipped)				

PERIODIC INFORMATION				
Attribute	F	T	C	S
Other long-term loans Principal Interest				
Operating loans Principal Interest				
Other short-term loans Principal Interest				
Taxes				
Annual vessel depreciation				
Annual gear depreciation				
Annual equipment depreciation				
Other service charges Towing				
Capital Investments				
Gear purchases New Used				
Equipment purchases New Used				
Electronics purchases New Used				
Other upgrades				

PERIODIC INFORMATION				
Attribute	**F**	**T**	**C**	**S**
Other Firm/Business Operations Expenses				
Number of other employees (excludes vessel personnel, if captured in trip reports)				
Other employee wages/salaries (excludes vessel personnel, if captured in trip reports)				
All employee benefits (includes vessel personnel)				
All taxes				
Cold storage				
Company vehicles Loan payments R&M Depreciation Fuel costs				
Insurance (excludes vessel-related) Property Liability Mortgage on buildings Health				
Professional fees Legal Accounting				
Association fees				
Permit/license fees				
Onshore processing/holding costs				

PERIODIC INFORMATION				
Attribute	**F**	**T**	**C**	**S**
Office expenses Rent Utilities Supplies Furniture Cost Depreciation Equipment Cost Depreciation				
REVENUE				
Income from sales of Gear Equipment Vessel(s)				
Income from fishing In this region Outside this region				

PERIODIC INFORMATION				
Attribute	**F**	**T**	**C**	**S**
SOCIO-CULTURAL[4]				
Individuals				
Status Crew Captain Mate Owner Processor Family member Member of extended household				
Town of residence				
Kinship among crew, captain, and owner				
Kinship among captain, owner, processor				
Age				
Ethnicity				
Education				
Annual Employment Fishing Fishing-related Other				
Annual Income Fishing Fishing-related Other				

[4] This information also has to be linked to identifiers, depending on the project (relating worker characteristics to a vessel, firm, owner, community). For vessels or fishers not captured by the trip database, information would have to be gathered outside the reporting system, but the same formats could probably be used for harvesting and economic information.

PERIODIC INFORMATION				
Attribute	F	T	C	S
GRT Initial Current				
NRT Initial Current				
Horsepower Initial Current				
Length				
Hull construction				
Hold capacity				
Engine type Gasoline Diesel				
FIXED AND OTHER ANNUAL EXPENSES				
Vessel Operation				
Repairs and Maintenance Annual Haul-out Overhaul Unscheduled repairs Other routine vessel maintenance Other routine vessel repair				
Annual insurance cost Hull P&I Mortgage Other				
Mortgage payments Principal Interest				

PERIODIC INFORMATION				
Attribute	**F**	**T**	**C**	**S**
Involvement in trade associations				
Sources of fisheries management information				
Reason for involvement in fishing				
Decision-making strategies aboard ship				
Community or Social Group				
Existing local common and other property systems				
Percentage of population employed in fishing and fishing-related businesses				

PERIODIC INFORMATION				
Attribute	F	T	C	S
ASSESSMENT BIOLOGY/SURVEY				
Catch Age/size Length/weight				
Discard Age/size Length/weight Mortality				
Gear selectivity				
Bottom type				
Tag captures				
Mean weight				
CPUE				
Species/Stock Distribution Migration Maturity Food Habits Habitat				

APPENDIX I

NORTHEAST REGION FISHERIES DATA NEEDS WORKSHOP

National Marine Fisheries Service
Northeast Region
One Blackburn Drive
Gloucester Massachusetts

March 31 - April 1, 1993

Wednesday, March 31

10:00 Introduction

10:15 Agenda and Meeting Products

10:30 Discussion of Data Needs by Discipline

12:00 Lunch

1:00 Discussion (Continued)

5:00 Wrap-up of Day 1

Thursday, April 1

8:30 Translating Data Needs into Data Collection Instruments

12:00 Preparing a Workshop Report

12:30 Adjourn

APPENDIX II

NORTHEAST REGION
FISHERIES DATA NEEDS WORKSHOP
Gloucester, Massachusetts
March 31 - April 1, 1993

LIST OF PARTICIPANTS

National Marine Fisheries Service

Northeast Fisheries Science Center
Patricia Clay
Teri Frady
Phil Logan
Tom Morrissey
Steve Murawski
Robert Murchelano
Helen Mustafa
Joan Palmer
Greg Power
Terrence Smith

Northeast Regional Office
Tom Bigford
Pete Colosi
Pat Kurkul
Gene Martin
John McCarthy
Harold Mears
Jack Terrill
Robert Reidman
Jon Rittgers
Kathy Rodrigues
Dick Seamans

Southeast Fisheries Science Center
John Poffenberger

Office of Research and Environmental Information
Paul Anninos
Mark Holliday

New England Fishery Management Council
Lou Goodreau
Chris Kellogg
Douglas Marshall

Mid-Atlantic Fishery Management Council
Tom Hoff

Atlantic States Marine Fisheries Commission
John Dunnigan

Maine Department of Marine Resources
Richard Langton

New Hampshire Fish and Game
Ted Spurr

Massachusetts Department o fMarine Fisheries
Charles Anderson
Jim Fair
Tom Hoopes
David McCarron

Rhode Island Department of Fish and Wildlife
Dick Sisson

Connecticut Department of Environmental Protection
Eric Smith

New York Department of Environmental Conservation
John Mason

Maryland Department of Natural Resources
Bill Outten

North Carolina Department of Marine Fisheries
Dennis Spitsbergen