NMFS OBSERVER PROGRAMS

Minutes and Recommendations from a Workshop held in Galveston, Texas November 10-11, 1993

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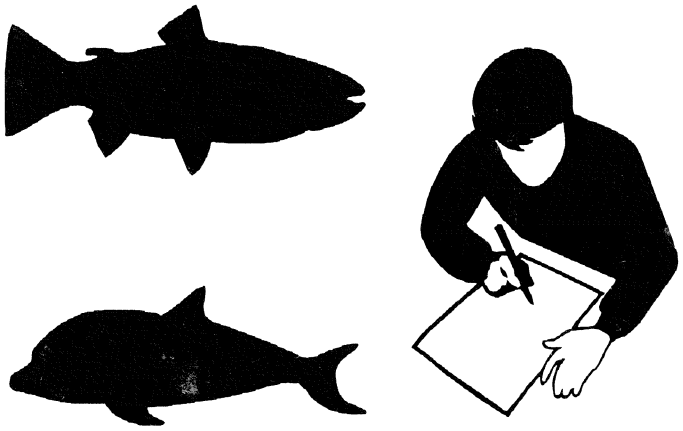
M. Bradley Hanson, William A. Karp, and Shannon M. Fitzgerald,
in collaboration with the Workshop Participants



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NMFS OBSERVER PROGRAMS: MINUTES AND RECOMMENDATIONS FROM A WORKSHOP HELD IN GALVESTON, TEXAS November 10-11, 1993

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EXECUTIVE SUMMARY

A workshop to discuss challenges currently facing observer programs of the National Marine Fisheries Service (NMFS) was held on 10-11 November, 1993, in Galveston, Texas. The workshop also addressed critical factors that should be considered when initiating new observer programs.

Considerable resources have been devoted to the establishment and operation of observer programs. Yet program managers operate in different regions, with little opportunity to compare notes and exchange ideas. This workshop brought together representatives from all of the many diverse observer programs that exist within NMFS, as well as other Federal/State agencies and international observer programs. Participants included managers of programs whose main objective is the collection of fishery data (landings of target species), as well as managers that operate programs to collect data on catch levels of non-target species (e.g., finfish, shellfish, invertebrates, marine turtles, and marine mammals).

The participants addressed many aspects of observer programs, including:

- the mandates and authorities observer programs operate under
- the calculation of fishery effort and observer coverage
- the design of statistically reliable sampling schemes· observer safety and training
- optimal placement of observers
- how data are used by resource managers
- insurance and liability issues
- the use of contracted observers vs. in-house observer programs

A number of conclusions and recommendations were made regarding ways to increase the efficiency of observer programs while ensuring that data collected by observers are of consistently high quality and statistically reliable, and that programs remain operationally flexible and responsive to the needs of resource managers. As a result of this workshop, the participants resolved that a national network be formed to facilitate communication between programs and with other agencies. This "observer network" would also provide a point of contact to assist in the development of NMFS policies to ensure that observer programs meet the growing demands for more information about the commercial yield and biological impacts of U.S. fisheries.

This report is organized into three main parts. The first part is a listing of the major recommendations made by workshop participants, the second part is the workshop proceedings, and the third part contains program summaries of recent and current observer programs operating within the National Marine Fisheries Service and elsewhere. Within the proceedings, recommendations made by the participants are noted in bold text.

It is hoped that the points raised during this workshop will provide the impetus for policy makers at all levels to make well-informed decisions about the future of observer programs. Program managers and others will continue to meet in order to find solutions to questions we could not answer during the workshop, to develop national guidelines for the consistent administration of regional programs, and to exchange ideas and information regarding the most effective methods of establishing and maintaining programs to meet the demand for more information about the impact of fishing on our Nation's living marine resources.

PART 1. WORKSHOP RECOMMENDATIONS

The following recommendations were generated by workshop participants during the workshop and at its conclusion.

Coordinating Legislative Support for Observer Programs. Federal and State agencies responsible for managing marine resources and the Congress should work together to ensure that the Acts and policies put in place to manage fisheries and protect marine species cooperatively support and authorize, rather than hinder, the collection of data by observer programs.

Standards and Guidelines. Federal policy and legislation regarding observer programs is often times inconsistent and ambiguous. Certain basic standards should be required of all observer programs, regardless of whether the work is contracted out or done by Federal or State personnel. NMFS should take a leadership role in developing consistent legislative mandates and minimal standards for observer programs.

Mission Statement. The principle missions of observer programs may need to be adjusted in response to changes in the fishing industry and the needs of fishery managers. Following the reauthorization of the Marine Mammal Protection Act (MMPA), the Magnuson Fisheries Conservation and Management Act (MFCMA), and the Endangered Species Act (ESA), each of the NMFS observer programs should re-evaluate their mission statements and revise them as necessary.

Observer Data Collection Priorities. Requiring observers to address compliance concerns may compromise their ability to collect data used for management and assessment and may influence the way an observer is treated on board a vessel. Agencies and fishery management councils often place additional data collection responsibilities on observers without taking into account limitations in existing workloads or levels of funding. It was recommended that NMFS review this problem and that policy be developed for clarifying the primary responsibilities of observers for each program.

Compliance Monitoring and Enforcement Activities. Participants recognized that the demands of fishery management require that observers monitor for compliance to fishery regulations. Participants recommended, however, that enforcement duties be left to those with appropriate experience and training, not to observers, in order to avoid potential harassment situations. Further, NMFS should develop a no-tolerance policy with regards to harassment of observers in any situation and provide guidance to enforcement and General Counsel regarding these concerns.

Data for Enforcement. The NMFS should develop policy regarding the use of observer data for enforcement purposes and compliance monitoring, in voluntary and mandatory observer coverage programs, and this policy should be applied in a consistent manner in all regions.

Observer Coverage Rates. Observer coverage rates should be tailored to achieve a desired level of precision in calculating total catch and estimating incidental mortality due to commercial fishing operations.

Calculating Fishing Effort. Program managers should be given the authority, ability, and resources to calculate fleet fishing effort and participation in a given fishery.

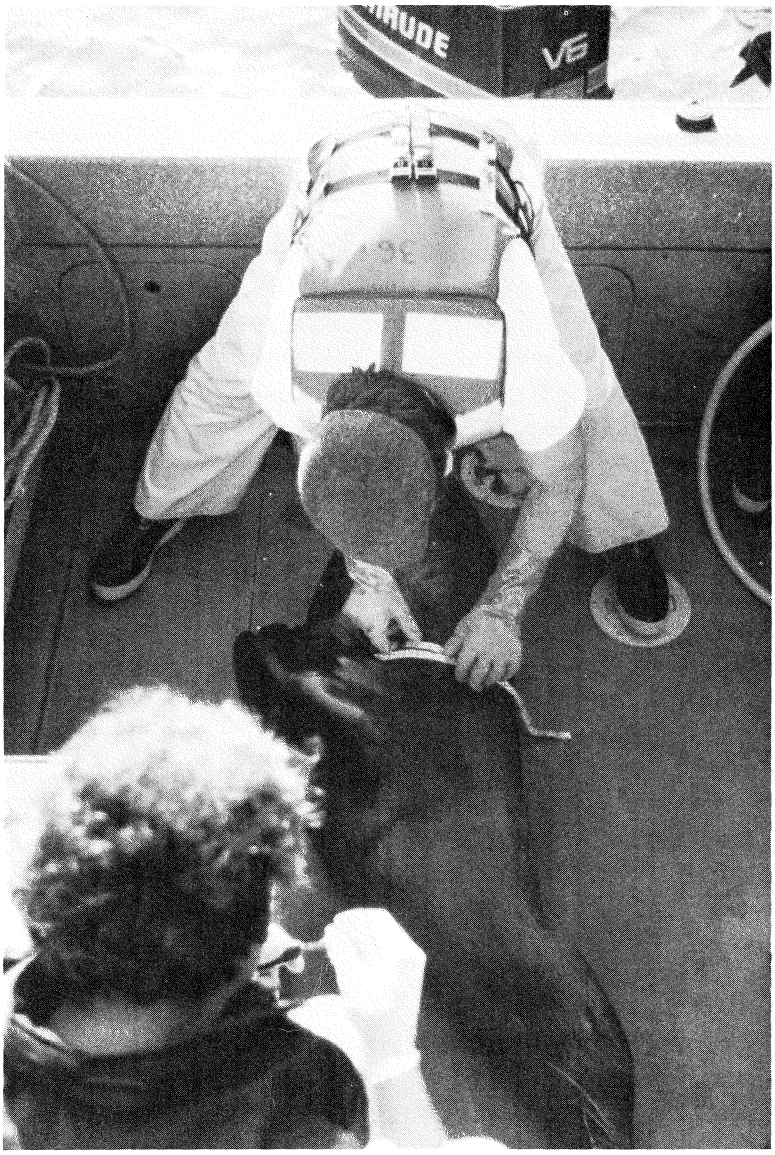
Further, due to the difficulty in reaching fishers, the burden to report fishing effort should lie with them and not the agency.

Definitions of Fishing Effort. Where possible, several different definitions of effort should be evaluated in each fishery, and take-rates should be presented based on as many different units of effort as appropriate. Further, all of the assumptions necessary to apply a particular definition of unit-fishing effort should be stated explicitly when estimating total mortality.

Selectively Placing Observers. In fisheries required to carry observers, it should be clearly mandated, by statute, that program managers have the authority and ability to selectively place observers as necessary to allow for the collection of unbiased and accurate data.

Documenting Refusals. To address the potential of biasing data collection in programs with less than 100% coverage, NMFS should establish guidelines that require observer programs monitoring fisheries with voluntary or mandatory observer coverage to report reasons given by vessel captains for refusing to carry an observer on a particular trip. In fisheries where observer coverage is mandatory, refusals should be documented in a manner which provides enforcement agencies the ability to take legal action against such vessels if deemed necessary.

Observer Coverage and "Unsafe Vessels". The NOAA General Counsel should develop a legal position regarding the placement of observers in fisheries where observer coverage is mandatory, yet where



Observers gather data from an incidentally caught sea lion. ***(Joni Packard, NMFS)***

certain vessels may be portrayed or deemed unsafe to carry an observer by vessel operators and/or program managers. General Counsel should summarize the options available to restrict the operations of such vessels pending placement of observers. Further, fishery managers should evaluate the extent to which observer coverage may be limited in fisheries where some or all vessels are considered to be "unsafe".

Observer Safety. The NMFS should establish guidelines that would ensure that observers: (1) be informed that they will be supported by their employers following a decision not to board a vessel that they have determined to be unsafe, (2) be trained in recognizing and documenting unsafe vessels and situations, (3) be equipped with and trained in the use of safety equipment (e.g., exposure suits, locator beacons, communication equipment), (4) be trained in basic seamanship and instructed in how to work safely on a commercial fishing vessel, and (5) where possible, communicate directly with experienced observers or program managers pending a final decision to board a vessel in inclement weather.

Vessel Liability. Participants recommended that NMFS establish guidelines with advise from NOAA General Counsel that address the fishing industry's liability concerns and the provision of liability insurance to protect vessels operators and owners when taking observers.

Adequate Observer Insurance. The NMFS should establish guidelines that ensure that observers be provided adequate insurance. The NOAA General Counsel should clarify what constitutes adequate insurance.

Assisting in Fishing Operations. The NMFS should request clarification from NOAA General Counsel related to the legality and insurability of observers assisting in fishing operations.

Harassment. The NOAA General Counsel should develop guidelines for observers that identify particular situations and behaviors that could be considered harassment or interference and steps an observer should take if in a harassment situation. Further, General Counsel should summarize the legal ramifications of such actions by a vessel captain or his/her crew towards an observer.

Discrimination. Discrimination based on gender, age, national origin, religion, or ethnic race should not be tolerated in either the hiring or the placement of observers collecting data for program agencies. However, all observers must be thoroughly competent, in optimal health, and physically fit to carry out their duties in a safe and satisfactory manner.

Contracting Observer Services. It was not possible to generalize the conditions under which observer services should be contracted. This remains an issue that must be tailored to a specific fishery in a particular region. However, all contracting services supplied to the agency should be made directly with the program agency and not through contracts with the observed fishing industry.

Fair Labor Standards Act. The NOAA General Counsel should prepare guidelines for NMFS observer programs regarding how to interpret the Fair Labor Standards Act relative to the payment of observers on trips aboard commercial fishing vessels that last more than one day.

Standards for Training and Debriefing. Agency guidelines and standards should be developed for these aspects of observer programs. Observer program training should include certain basic components; observers should receive adequate and consistent training regarding fishing regulations and authorities for deploying observers, all training programs must address safety and use of survival equipment, provide detailed guidance on safe working practices and basic seamanship appropriate to the fishery, and provide detailed guidance on acceptable sampling procedures and the collection of accurate data.

Tieing Observer Training and Debriefing. Observer training and debriefing should be conducted by the same agency, and be carried out by staff with current experience as observers in the fishery.

Retaining Experienced Observers. Observer programs operate more effectively, and consistently collect better data if the program is able to retain experienced, high caliber observers. Further, the process of training new observers is time-consuming, costly, and may affect the quality of data collected as the observer goes through the necessary "learning curve". Therefore, NMFS should establish guidelines that encourage and support the maintenance of experienced staff and observers.

Future Coordination and Communication. Workshop participants agreed that a national network should be established within the observer program community. This network could: (1) provide access to expertise, (2) develop publications, bibliographies, reference materials, manuals, and safety and training materials, (3) hold meetings and workshops to facilitate the transfer of information among programs, and (4) establish subcommittees to address issues and challenges facing observer programs.

PART 2: WORKSHOP PROCEEDINGS

INTRODUCTION

A workshop to discuss the challenges currently facing the observer programs of the National Marine Fisheries Service (NMFS) was held on November 10-11, 1993 in Galveston, Texas. The workshop also addressed critical factors that should be considered when initiating new observer programs. The workshop was hosted by the NMFS Office of Protected Resources (OPR), and was chaired by Vicki Credle, OPR, and Brad Hanson, NMFS National Marine Mammal Laboratory (NMML). Doug DeMaster, NMML, was the rapporteur. The agenda for the workshop is provided in Appendix 1.

Considerable resources have been devoted to the establishment and operation of NMFS observer programs. Observer programs have been developed independently at the Regional or Science Center levels in order to accomplish mandated, but often differing, objectives. These programs oriented either toward marine mammal-fishery interactions or protected resources (e.g., marine turtles or non-target fish) or to management of target stocks. Programs were structured to balance these objectives with the exigencies particular to monitoring each widely differing fleet, such as those operating in inland, near-shore, or high seas waters; those composed of small open craft, large motherships/processors, or vessels of intermediate size; and those deploying a wide variety of gear types (e.g., set or drift gillnet, longlines, purse seines, shrimp trawl, stern trawl).

Despite differing objectives and monitoring programs, many shared elements exist. However, it had become apparent to NMFS field personnel that elements common among programs were not treated consistently or in the most efficient manner. When problems in existing programs arose or new programs were begun, problem resolution or program development was difficult because no standards were in place, there was no easy way for programs to coordinate, and the data obtained from programs were often not comparable. Consequently, a real need existed to develop a forum for observer program experts to discuss a broad range of concerns.

Many of the observer programs initiated in the last five years were prompted by, and funded as a result of, the 1988 amendments to the Marine Mammal Protection Act (MMPA). The OPR, because of its national administrative responsibilities under the MMPA, became the focal point for creating such a forum. In organizing this workshop, OPR actively sought to include representatives from all of the many diverse observer programs that exist within NMFS, as well as other Federal/State agencies and international observer programs. To that end, participants included managers of programs whose main objective is the collection of fishery data (landings of target species), as well as managers that operate programs to collect data on catch levels of non-target species (such as finfish, shellfish, invertebrates, marine turtles, and marine mammals). Participants also included representatives from NOAA General Counsel (which advises NMFS on fisheries and observer program issues), the Marine Mammal Commission, and the U.S. House of Representatives. A complete list of participants is provided in Appendix 2.

Managers from each regional observer program were asked to provide a summary of the programs they operate before arriving

at the workshop, in order to give all participants background information on the many diverse programs that exist. These summaries are presented in Part II, along with points of contact for each regional observer program.

During the workshop discussions, it became obvious that despite our different program objectives and structures, there were indeed many commonalities between the programs that could be addressed more effectively as a group. Decisions are currently being made by persons within and outside of NMFS that could affect the quality of the data collected by observers, the ability of program managers to place observers where they are most needed, and the ability to ensure that observers operate in safe working environments.

This document is a summary of our discussions and an effort to identify the challenges that currently face observer programs. Recommendations from the group and areas identified for further discussion are listed in Section IV. As a result of this workshop, the participants resolved that a national network be formed to facilitate communication between programs and with other agencies. This "observer network" would also provide a point of contact to assist in the development of NMFS policies to ensure that observer programs meet the growing demands for more information about the commercial yield and biological impacts of U.S. fisheries. We hope that the points raised during this workshop will be the impetus for policy makers at all levels to make well-informed decisions regarding the future of the observer programs used to assess, monitor, and manage our nation's living marine resources.

Overview of Observer Programs

Credle led a discussion on the history of observer programs and current mandates which authorize observer programs. Credle noted that observers were first used by NMFS to determine catch levels and to monitor compliance with fishing regulations on foreign vessels operating in the U.S. Exclusive Economic Zone (EEZ), and to investigate the extent of marine mammal interactions in the Eastern Tropical Pacific tuna purse seine fishery. Today, NMFS observer programs provide a valuable mechanism for collecting data on all aspects of U.S. commercial fishery operations. Besides collecting data on catch levels, observers record information on the fishing vessel, area of fishing and exact location of catch, type of gear and bait used, fishing techniques, and safety methods employed. In addition, oceanographic data are collected where possible, such as wind speed, wave height, and water temperature. Most of the data collected are confidential in nature, and are released to the public only in aggregate form in order to protect "trade secrets" of individual fishers.

From a biological standpoint, fishing vessels provide excellent opportunities for sampling natural resource parameters of marine ecosystems. One important parameter is the composition of the catch (i.e., the species and quantity of both target and non-target animals taken in each fishing trip). The catch is weighed and/or counted, measurements are taken, and biological specimens are collected. Because the information collected often goes beyond that specifically mandated by the program, the technicians aboard these vessels are often referred to as natural resource observers, rather than fishery observers. The job of an observer is demanding, and requires a solid background in biology,

stamina to withstand long hours and harsh conditions at sea, and the personal integrity to maintain objectivity knowing (as does the captain and crew) that the data he/she collects may ultimately be used to impose restrictions on a fishery or otherwise limit fishing activity.

Authority of Observer Programs under Existing Legislative Mandates

Marine Mammal Protection Act (MMPA). Data on marine mammal mortality incidental to commercial fisheries are collected under the authority of the Marine Mammal Protection Act (Section 114), as amended in 1988. As mandated by Section 114, the Interim Exemption for Commercial Fisheries, participantss in Category I fisheries (fisheries that have frequent interactions with marine mammals) are required to carry an observer, if requested by NMFS. Participants in other fisheries may be asked to carry an observer on a voluntary basis, if resources permit.

More than a dozen different fisheries have had observer programs between 1990 and 1993 to collect data on marine mammal fishery interactions (not including the Eastern Tropical Pacific tuna purse seine fishery). The majority of these were Category I fisheries. Funding for these programs has come from direct appropriations by Congress.

The observer data, as well as information from vessel owners' logbooks and Federal and State landing receipts, have provided estimates of marine mammal take rates and allowed for estimates of total takes in each observed fishery. In addition, observer data have been used to identify problem areas ("hot spots"), problem seasons, or fishing methods which may be useful in mitigating impacts on marine mammals due to fishing. These data are evaluated periodically, and have been used to make scientifically-based recommendations to the Congress concerning various legislative regimes proposed to govern marine mammal-fishery interactions.

The Interim Exemption program was set to expire in October, 1993, but was extended by Congress until April 1, 1994. The House Committee on Merchant Marine and Fisheries introduced a bill, H.R. 2760, on July 27, 1993 to replace the Interim Exemption. The Senate Committee on Commerce, Science and Transportation marked up a complementary bill (S. 1636) on November 9, 1993. (The House bill and a draft version of the Senate bill were distributed to participants of the workshop). Under both bills, observer programs would continue to be used as a tool for monitoring take levels of marine mammals in certain fisheries. The intention of Congress to encourage the NMFS to contract for the services of observers rather than to use government employees as observers was expressed in the House bill. This generated much discussion by the participants, and a summary of the discussions is presented in the following sections of this report. It is hoped that recommendations and comments generated by this workshop may be useful in implementing observer programs authorized by amendments to the MMPA.

Magnuson Fisheries Conservation and Management Act (MFCMA). Authority for fishery observer programs may be provided for under the discretionary provisions of a Fishery Management Plan (FMP), developed in accordance with Section 303(b) of the MFCMA. Observer programs may be designed either to monitor the catch of the target species, or of specific bycatch species, although observers generally collect data on the entire catch.

More than a dozen fisheries had observer programs in operation in 1992 that were mandated under regional FMPs. Funding for these programs is provided, for the most part, by NMFS base funding. Data collected by observers are used to make management decisions on the timing of seasonal openers, the length of the fishing season, areas authorized for fishing, and allowable catch of both target and non-target species.

The MFCMA is currently up for reauthorization and although numerous hearings have been held on the subject, a bill has yet to be introduced by either the House or the Senate. Based on the hearings held by the House Subcommittee on Fisheries Management, it is expected that Congress will place an increased emphasis on better data collection methods and the importance of a habitat approach to managing commercial fisheries. One option being sought by NMFS during the reauthorization, which is supported by components of both the fishing industry and the environmental community, is the possible implementation of "user fees". User fees could be used to cover the cost of expanded observer coverage in certain fisheries, in accordance with FMPs. User fees could also be used to implement special management measures adopted in FMPs (including individual harvest share programs), to expand the collection of landings data, to investigate impacts of bycatch and develop gear to reduce bycatch, to increase enforcement efforts, and to expand resource surveys and apply alternative resource survey methods.

Endangered Species Act (ESA). There is currently no direct authority for fishery observer programs under the ESA. However, there are regulations in place which provide NMFS with the authority to place observers in certain fisheries that interact with endangered and threatened marine turtles. Under these regulations, fishers take observers on a voluntary basis. (Discussions on the biases associated with voluntary programs are presented in subsequent sections.) Regulations are being considered by NMFS which would make it mandatory to carry an observer, if so requested by NMFS, in any fishery which is suspected of having interactions with sea turtles.

Observers have been placed in one fishery specifically to gather information on the take of marine turtles (the Atlantic summer flounder fishery). In addition, an observer sampling program has been developed for the Hawaii longline fishery and should be implemented in the near future. Funding for these programs is provided, for the most part, by NMFS base funding. As a result, sampling effort is sporadic and of a low level. Regulations under consideration would expand the observer program to include fisheries such as the Atlantic, Gulf of Mexico and Caribbean longline fishery, Atlantic bottom trawl fisheries, various State and Federal gillnet fisheries, the Northeast lobster pot fishery, and other smaller pound net and crab fisheries operating in State waters.

The ESA is due for reauthorization in 1994. There have not been any amendments proposed that would affect the authority to place observers or to provide supplemental or routine funding of observer programs.

Atlantic Tunas Convention Act (ATCA). The placement of observers may be authorized under ATCA if the Secretary of Commerce (NMFS) promulgates the appropriate regulations to carry out recommendations of ICCAT, the International Convention for the Conservation of Atlantic Tunas. Current regulations provide for the placement of observers aboard vessels that have a di-

An observer inspects a catch of prohibited species aboard a large factory trawler. ***(NMFS)***

rected catch or bycatch of swordfish. Funding for this program is provided by NMFS base funding and, in fisheries that have a bycatch of marine mammals, by MMPA observer program funds.

Migratory Bird Treaty Act (MBTA). The MBTA was enacted in 1918 to restrict trade in migratory birds, and, as such, has no specific authority for the placement of observers aboard fishing vessels. However, the lack of authority to allow for incidental take of marine birds, which are protected under the MBTA, makes it extremely difficult for observers to collect information on marine bird and fishery interactions. This situation has generated a reluctance on the part of commercial fishers in the Pacific Northwest to carry observers. Some are wary that data regarding marine birds incidentally taken during fishing operations and collected by observers may be used in enforcement cases against them. Other participants noted similar problems having to do with marine birds and turtles. After some discussion, the group concurred that the ability of observers to perform their duties while on commercial fishing vessels was severely compromised by the specter of whether an individual fisher was potentially in violation of Federal or State laws, while fishing legally.

Conflicting Legislative Mandates and Authorities

Participants noted frustation with overlapping, and sometimes inconsistent, legislation regarding the authority under which observer programs operate. Several examples were discussed where observers

were placed on fishing vessels to collect information on a particular interaction, yet had no clear authority to collect information on other species-specific interactions. **Workshop participants recommended that the Federal and State agencies responsible for managing marine resources and the Congress work together to ensure that the Acts and policies put in place to manage fisheries and protect marine resources cooperatively support and authorize, rather than hinder, the collection of data by observer programs.**

KEY ISSUES OF OBSERVER PROGRAMS

Before the workshop began, observer program representatives were asked to submit information sheets that summarized recent, current, and pending observer programs. The program summaries were made available to workshop participants before their arrival in Galveston so that they could familiarize themselves with the various observer programs operating within NMFS and elsewhere. During the first morning of the workshop, some of the main issues involved with operating observer programs were presented by program managers in the context of their experience with their own observer program. (For more information on individual programs, see Part II). Following is a discussion, by general topic, of the key issues raised by each presenter.

Observer Coverage of Fishing Operations

The amount of fishing effort which is monitored and the degree of control over observer placement varies considerably between programs. In a few programs, 100 percent observer coverage is mandated. This requires a vessel to carry an observer the entire time it is fishing. In some fisheries, all fishing operations and all catches can be, and are required to be, monitored. In other fisheries, however, gear may be set or hauled back continuously. In these fisheries it would require at least two observers to monitor 100 percent of the fishing effort, and 100 percent coverage represents an observer on board, but not necessarily monitoring all fishing effort.

Most of the fisheries mandated to carry observers do not require 100 percent coverage. In these observer programs, agencies may not be able to place an observer at their discretion on a certain vessel or at a certain time. During her presentation, Pat Gerrior, NMFS Northeast Fisheries Science Center (NEFSC), coined such programs "voluntary/mandatory" observer programs. In voluntary/mandatory programs, observer placement tends to be opportunistic. Although it may be mandated that fishers are required to take an observer, program managers have been faced with serious obstacles in trying to selectively place observers in order to obtain data in a manner that is reliable and reasonably precise. The consent of a fisher is usually sought before a decision is made to place an observer. Refusals to carry an observer may or may not be documented, and not all of the vessels in an observed fishery may carry an observer during a given season.

Opportunistic placement is not necessarily due to fishers openly refusing or subtly avoiding to take an observer. An agency's inability to place an observer on a specific vessel may be due to a number of reasons: the vessel may be too small or dangerous to carry an observer; bad weather may impede placement; it may be virtually impossible to reach and locate a specific vessel before the opening of a fishery (henceforth referred to as an "opener") or the selected vessel may suffer equipment breakdown or simply choose not to fish. During his presentation, Joe Scordino, NMFS Northwest Region (NWR), described the difficulty of trying to randomly place observers in a fishery that is characterized by unpredictable and spontaneous fishing effort. In the Columbia River salmon gillnet fishery, observer coordinators often had less than one day's notification of upcoming fishing openers, making it difficult to locate and arrange observer placement with particular vessels. Scordino noted that trying to place observers on randomly pre-

selected vessels would (1) often be unsuccessful, (2) take considerable time and effort, and (3) seriously reduce observer coverage of the fishery.

In fisheries where observer placement is particularly problematic (i.e., where vessels are deemed too small or unsafe to carry observers), alternate observation platforms are sometimes used. Fishers, program coordinators, and observers may differ in their judgment on what constitutes a vessels that is "too small" or "unsafe". Fishing vessels that fall into the "too small" category are primarily found in gillnet fleets in which some vessels may be 20 feet (6 meters) or less in length. These vessels may have no bunk, no head (toilet), and occasionally no enclosed cabin space. Placing an observer on such a vessel for any length of time could fairly be described as constituting an "undue burden" to the operator and the observer. Defining what constitutes an unsafe vessel is more difficult. This topic generated much discussion and is taken up in Section III of this report.

Several of the presenters noted that they had used alternate platforms as part of their monitoring program. These platforms are usually charter vessels or research vessels from which observers can view fishing operations remotely without having to board the observed vessel. Charter or research vessels can also be used to place observers on selected fishing vessels for short periods of time.

Kate Wynne, University of Alaska Sea Grant Program, described the use of such platforms in the Prince William Sound observer program to monitor gillnet fishing vessels that were considered too small or dangerous to carry observers. Although observations may be compromised by monitoring a net retrieval from a distant platform, the alternate platforms provided an independent means of observing fishing vessels. Alternate platforms increased observer coverage levels, made placements safer, decreased the burden of carrying observers to small gillnet vessels, and improved cooperation with the fishing fleet. Wynne noted that attempts to use other forms of alternate observation platforms, such as fishing tenders and shore-based monitoring, were unsuccessful due to a lack of observer mobility, making it impossible to follow and monitor fishing vessels. Distances between the observer and the fishing vessel are too great for the observers to observe substantial portions of a set or a net retrieval. Other viewing platforms, such as aircraft overflights, did not allow for catch monitoring but did assist in determining effort and fleet distribution.

During the fishing season, Wynne currently conducts aerial beach surveys for marine mammal carcasses and documents the number of marine mammal deaths that may be fishery related. Not only do these surveys provide an indication of the frequency of marine mammal and fishery interactions, they are also a deterrent to intentional takes. Many presenters noted that when it is not possible to operate an observer program in a fishery, even a small monitoring presence can encourage fishers to voluntarily lower take rates of marine mammals.

The degree to which a program is considered voluntary or mandatory can be affected by a number of issues: the mandate the program operates under, the authorities of the agencies involved, the mission(s) of the observer program, the funding source and amount available, the staff constraints of the program, the status of the species involved and political sensitivity of the fishery/bycatch issue, and the characteristics of the fishery (i.e., number of participants and average trip length). Several

entirely voluntary programs exist. Such programs may be funded by the fishing industry, NMFS, other State or Federal agencies, or through cooperative agreements. In some observer programs, such as the Gulf of Mexico shrimp trawl fishery described by Liz Scott, NMFS Southeast Fisheries Science Center (SEFSC), fishers are financially compensated for carrying observers and the program is voluntary in nature. Although cooperation between the observer program staff and the fishing industry is valuable to all observer programs, it is essential in voluntary programs in order to obtain representative sampling effort.

Cooperation with the Fishing Industry

Programs employ a variety of approaches to foster positive relations between the agency and the fishing industry. Many of the observer programs encourage cooperation by holding open meetings with the fishing industry and providing them with information and summarized data as feedback. Two major concerns often voiced by fishers are their desire for data confidentiality and a need for liability insurance to cover observers placed on their vessels.

In most programs, access to data is limited in order to maintain the confidentiality of individual vessels, particularly data concerning catch rates and fishing locations. Many program managers have found that

Researchers conducting a beach cast survey . ***(Mandy Merklein)***

providing individual fishers with copies of the observer data collected aboard their vessels and providing the fleet with final reports that summarize the findings of the observer programs fosters cooperation and defuses potential misunderstandings and suspicion.

Although some programs provide or cover the cost of liability insurance, liability concerns continue to be a major obstacle faced by many programs. This is particularly true of small fishing vessels operating under dangerous conditions, as some of these vessels may carry no liability insurance. Requiring the purchase of liability insurance for one observer trip can be difficult and costly. Scott noted that in the Gulf of Mexico shrimp trawl observer program, an industry-based organization working in cooperation within SEFSC provides the necessary liability coverage.

Calculating and Defining Fishing Effort

Identifying all of the potential fishers in a particular fishery was regarded as a common problem faced by programs that operated with less than 100 percent observer coverage. Vessel registration requirements under the MMPA and MFCMA vary among fisheries and available lists of commercial vessels or fishers are, in some cases, unreliable. Further, not all fishers comply with registration requirements. This increases the difficulty in randomly selecting vessels that are actively participating in a fishery, notifying them to take an observer, and estimating the total amount of fishing effort for a particular fishery.

The definition of fishing effort and the methods used to calculate fleet effort vary among programs. Fishing effort is generally defined as the amount of time in which fishing gear is deployed from a particular fishing vessel. Fishing effort is specific to the type and amount of gear being deployed. For example, two gillnet fishers may fish the same number of hours yet use different size nets, resulting in two different measures of effort. Data managers need to be able to recognize and account for these differences in effort. In observer programs with less than 100 percent observer coverage, data managers use the known fishing effort recorded by observers and the program's best estimates of total unobserved fishing effort to calculate, through extrapolation, the estimated total catch and bycatch for a fishery.

In some programs, fishing effort is defined in terms of standard units such as day, hour, set or haul, or fishing trip. In other programs, catch landings are used to describe effort. Some programs require vessel operators to send in weekly catch reports that provide effort information. Other programs rely on fish tickets or logbooks. In a few programs, vessel participation is estimated via aerial surveys. The accuracy and timeliness of these systems varied considerably. Marilyn Beeson, California Department of Fish and Game (CDF&G), explained that fishing effort for the California drift and set gillnet fisheries is calculated using fishery logbooks and the approximately 145,000 landing receipts CDF&G receives annually. Although the information generated provides an indication of historic fleet participation and distribution, Beeson mentioned several problems in using landing receipts: they are often inaccurate, they take a long time to reach her office, and are difficult to verify. Several participants noted that their inability to accurately estimate fishing effort seriously hampers their ability to accurately extrapolate observer data and estimate total catch and bycatch rates for their fisheries.

Data Collection and Observer Training

Norm Mendes, NMFS Southwest Region (SWR), discussed the importance of training and maintaining high caliber observers. He noted that observers often work unsupervised, for extended periods of time, often in hostile environments, and that proper training is critical to the quality and accuracy of the data. Mendes identified common elements of observer programs that are applied to a variety of observer programs managed by SWR. These include careful observer selection, rigorous training programs that include safety instruction, insuring observer competence through testing, and conducting detailed data reviews and debriefings after observers complete their trips. Rick Lindsay, Inter-American Tropical Tuna Commission (IATTC), spoke about the value of having field offices where observers can be carefully debriefed, data corrections can be made, and observers can receive further training and guidance to improve their work. Many of the presenters commented that their observer programs operated with similar field office support.

Lindsay and Mendes both spoke to the value of maintaining a core of experienced, highly motivated observers. Observer training classes are both time-consuming and costly, and are only the first step in developing a good observer. It may take several trips on a fishing vessel before the data collected by a new observer is as consistently reliable as that of an experienced observer. Experienced observers become "savvy" to the ways of life at sea and over time present less of a safety risk and burden to the fishery. Incentives to retain observers include bonuses for good performance, pay increases that acknowledge the importance of experience, opportunities for advancement, involving observers in program development, and offering them a sense of understanding, pride, and respect for their role in providing data for the proper management of a fishery.

Maintaining consistency in observer training and data collection was a challenge faced by the North Pacific large-scale pelagic driftnet observer program, which operated as a cooperative effort involving five different nations. Shannon Fitzgerald, NMFS Alaska Fisheries Science Center (AFSC), briefly described the program's development and noted the importance of bringing together all involved parties before, during, and after data collection and analysis to cooperate and exchange information. Fitzgerald and other presenters noted that standardized training and data collection are critical for programs in which these duties are shared with other nations, agencies or contracted services.

Private Contractors and Observer Programs

Many observer programs are run successfully with the help of private contractors. Donna Grant, Archipelago Marine Research Ltd., Vancouver, B.C., explained that her company was the sole contractor for the Canadian west coast observer program. The contractor and government jointly share administrative and training responsibilities. The contractor conducts all data collection, observer debriefing, and data management.

The extent of contractor involvement in observer programs varies considerably among regions and observed fisheries. In some observer programs, the contractor may handle virtually all aspects of the program, including the design of the monitoring program, the hiring and training of observers, and, finally, the analysis of the data and the production of reports. In other

programs, responsibilities may be shared with the managing agency. For example, Gerrior stated that in the NEFSC, NMFS conducts training and certifies observers but debriefing is conducted by an observer contractor. In the North Pacific Groundfish Observer Program, NMFS conducts observer training and debriefing; contractors hire observers and handle logistics.

The management of an observer program becomes more complex when the fishing industry plays a part in directing the program. Peter Cassells, Australian Fisheries Management Authority, described how the observer program in Australia had moved from being a purely government run program to one that was directed by a board made up of fishing industry, scientific, and government representatives. Cassells felt that the inclusion of contractors and industry in the program contributes valuable insight.

Not all workshop participants were enthusiastic about the way their programs incorporated contracted services. Some participants felt that when training and debriefing responsibilities are separated and one or both are contracted, it is difficult to recognize and address data collection problems in a timely and coordinated manner, especially as the relationship among the contractor, the observers, and the agency they collect data for becomes more distant and complicated. This is particularly apparent in programs where NMFS has acted as a third party in an arrangement where independent observer contractors competitively contracted directly with fishers for observer placement.

Bill Karp, AFSC, discussed some of the difficulties that have arisen out of a third party contracting arrangement in his description of the North Pacific Groundfish Observer Program (NPGOP). The program has evolved from the Foreign Fishery Observer Program implemented under the MFCMA to a program which now supports the fully domestic groundfish fisheries in the U.S. EEZ in waters of the North Pacific. The program is managed under Federal regulations developed by the Alaska Regional Office and AFSC in association with the North Pacific Fishery Management Council (NPFMC). The current regulation regarding observer programs, termed the North Pacific Fisheries Observer Plan, identifies levels of mandatory coverage and government and contractor responsibilities. The NMFS is responsible for managing the program, training and certifying observers, debriefing observers when they return from a trip, and data management and manipulation. Agency funds are provided to support these functions. The NMFS also certifies contractors who contract directly with fishing vessel and plant owners to provide observer coverage. The contractors hire certified observers and are paid directly by the vessel and plant owners; NMFS has no responsibility in these contractual relationships. Consequently, salaries, benefits, and other terms of employment vary among contractors.

The North Pacific Fisheries Observer Plan (NPFOP) was developed as an interim mechanism for managing the program while a procedure for collecting user fees and providing observer coverage through NMFS-managed contracts was developed. A new regulation, termed the North Pacific Groundfish Research Plan (NPGRP) is currently being developed; by January 1996, this new plan is scheduled to be in place and will provide a mechanism for dealing with problems associated with "third-party" contracting.

Meanwhile, a serious problem has occurred with the existing third-party contracting arrangement of the NPFOP. The problem

stems from the difficult financial circumstances of many of the vessel owners and the inability of NMFS to intervene in the contractual relationships between the contractors and vessel owners and between the contractors and the observers they hire. Earlier this year (1993), one of the contractors ceased operations, leaving 20-25 observers unpaid for work already completed. It is estimated that the total amount owed to these individuals is $150,000. The contractor claims that they ceased operations because they were not being paid by vessel owners for observer coverage. The NMFS has been unable to assist the unpaid observers because the agency has no legal liability. The agency is currently reviewing various options for reducing the possibility of further crises of this type, but it is generally agreed that the only satisfactory solution will be implementation of NPGRP, under which NMFS will establish and monitor contracts and will have recourse if contractors do not perform or processors do not pay user fees.

Karp also described the frustrations of program staff as they deal with unpaid observers and the repercussions of this problem on morale. He stressed that contractual arrangements of this type are not appropriate mechanisms for implementing observer programs and urged participants to avoid third-party contracts wherever possible.

Another problem that can occur as a result of contractual services is a loss of control of the data that observers collect. It is this loss of control that worries and frustrates many program managers. Although sharing program responsibility with private contractors may prove economically beneficial to an observer program, the nature of the agreement is critical to a fully successful relationship. The degree to which the government agency and contractor should share responsibility and control of the program, the structure under which the agreement operates, and the challenges that often result from this relationship generated extensive discussion among workshop participants. Many program representatives mentioned that when observer management was shared between private contractors and a government agency, observers and fishers are confused in their understanding of who the observer works for and who they should turn to for support. It was noted that observer loyalty to the program and its mission is influenced by these relationships.

Another concern raised during this discussion was the potential difference in the legal authority of contracted (or subcontracted) observers and employees of the Federal or State government to collect data for management and enforcement purposes.

Program Funding and Cost

The issue of program cost arose during the discussion of contracted services. Workshop participants discussed whether program costs could be cut by handling program tasks in-house or through a contractor. Some workshop participants felt that this was a difficult and complicated question to evaluate. It was agreed that regardless of whether the services were contracted out or conducted in-house, the cost of running an observer program varies tremendously between the types of fisheries that are being monitored. Factors that contribute to higher observer program costs include: monitoring fisheries with large numbers of fishing vessels; dispersed and erratic fishing effort; challenging and expensive logistical operations; operating from distant and expensive ports; the use of alternate platforms (chartered or research

vessels); and the requirement of high levels of observer coverage. It is important that those who are responsible for mandating programs recognize the magnitude of these costs and the considerable variation among fisheries. Some workshop participants noted that in a depressed fishery with a large number of participating vessels, erratic and dispersed effort, and meager catch rates, it may be less costly to compensate the fishers for not fishing than to implement observer coverage levels that would provide statistically reliable data. It was generally noted that budget constraints seriously affect the ability of managers to obtain the data required to meet the goals of their observer program, and that the sources of funding could affect the nature of these goals and the overall mission of the program.

Common Design Elements and Sources of Bias of Observer Programs

A challenge common to all fisheries managers is the estimation of total catch and bycatch in commercial fisheries operating at less than 100 percent observer coverage. There was general agreement that estimates of catch and bycatch may be seriously biased, and steps to address this problem should be taken. Several types of bias were identified during the discussion, and are included here:

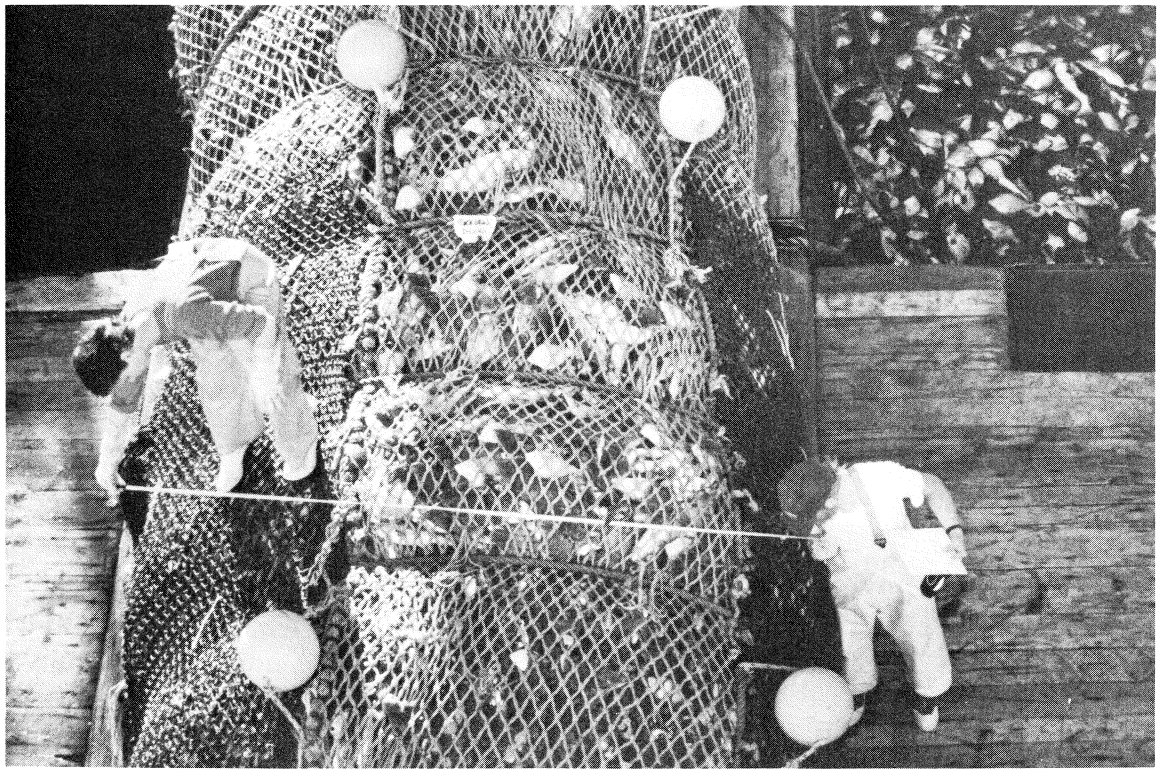
1. In general, total marine mammal bycatch is estimated as the product of a ratio-estimator (e.g., take per unit effort) and an estimate of total fishing effort. Ratio-estimators are known to be positively biased (i.e., bycatch is overestimated) when observer coverage rates are less than 10 percent. Because NMFS' ability to place observers on commercial fishing vessels is constrained by funding and other obstacles, rates of observer coverage in many of the observed fisheries have been less than 10 percent between 1990 and 1993.

2. If the operations of fishers are altered because of the presence of an observer, estimates of total mortality could be significantly biased. In the vernacular of the tuna-porpoise fishery, this has been referred to as the "observer effect", which may be a problem in any fishery where observer coverage is less than 100 percent. A similar situation was described in the Gulf of Maine sink gillnet fishery, where a mandatory observer placement program has become operationally voluntary.

3. If the vessels in a particular fleet of commercial fishing vessels are too small to safely carry an observer, alternate observer programs must be developed. Typically, these programs involve observing commercial fishing vessels from charter vessels. If the range of environmental conditions or locations under which the commercial vessels and the charter vessels can operate safely differ, and if the rate of bycatch varies by environmental condition or location, then the estimate of bycatch in these fisheries may be biased.

4. Estimates of bycatch may be biased whenever observer placement is non-random. Ideally, observers are placed randomly on a commercial vessel relative to the initiation of each fishing "trip". However, in practice, observer placement has often been opportunistic or systematic (i.e., every second, third, or fourth trip to get respective coverage rates of 50 percent, 33 percent, and 25 percent).

5. Observers on commercial fishing vessels are extremely vulnerable to harassment and intimidation when takes of unauthorized species are observed. Harass-



Observers estimate the total weight of a haul by taking volumetric measurements of the cod end of the trawl net. ***(Mandy Merklein)***

ment and intimidation may affect the objectivity of observers, thereby resulting in an underestimation of bycatch.

6. Estimates of bycatch could be biased if rates of observer coverage vary throughout the fishing season, especially if the rate of bycatch per unit of fishing effort varies throughout the fishing season.

7. Estimates of bycatch could be biased if rates of observer coverage are not constant by vessel type or area, unless the mortality estimate is properly stratified. For example, in the Alaskan groundfish trawl fishery, vessels larger than 125 feet carry observers 100 percent of the time, while vessels between 60 feet and 125 feet carry observers only 30 percent of the time.

CONSIDERATIONS FOR NEW OBSERVER PROGRAMS

A primary focus of the observer workshop was to identify areas of commonality that could be referred to when observer programs are set up for the first time. To that end, there were lengthy discussions of what components were essential for a successful program.

Contracted versus Federal or State Programs and Observers

Observer program managers have had to accomplish their missions, as directed by legislative mandates or agency regulations, within the frameworks and infrastructure of their regions or locales. The operation of observer programs includes efforts in: (1) staffing (program staff and observers), (2) observer training and debriefing, (3) deployment logistics, (4) data editing, quality assurance, and distribution, (5) data analysis and reporting, and (6) overall program management. Nearly all of the services related to these can be accomplished either "in-house" (by a federal or State agency) or through contracting.

As might be expected, a broad spectrum of observer program organizational categories have been developed as managers strive to achieve the best approach to solving specific management needs. The major organizational categories within this spectrum are:

1. Federal- or State-operated in-house programs. All tasks are completed by staff of the responsible agency.

2. "Blend" programs. Federal or State agency managers have oversight responsibilities, managerial control, and operate some portion of observer related duties through program staff. Some, but not all, of the program-related services are contracted through agency contracting procedures.

3. Total contract programs. An agency manager provides oversight responsibilities and runs the program through agency contracting procedures. The contractor completes all tasks and services and provides edited data to the agency.

4. Third-party programs. The agency has little or no oversight responsibilities and observers are placed on vessels to collect data through direct vessel-to-independent firm contracts.

Martin Loefflad, NMFS Alaska Region (AKR), found that his discussion on "contractors versus in-house observers" was a topic of great interest to workshop participants because a wide variety of experience with all the possible organizational categories was represented. Discussions focused on identifying the primary issues that managers need to be concerned with to successfully start and operate an observer program and to determine which of these issues are best suited to either an agency or contract service approach. The issues identified included:

Program Management
- start-up time for new programs
- administrative costs
- flexibility in administrative procedures
- efficiency with regards to competition
- insurance coverage
- potential in-season failure of private contractor

Staffing
- ability to determine the nature of the workforce
- efficiency in hiring staff

- quality of field-staff personnel
- program staff and observer rate of attrition
- flexibility of personnel assignments
- 24-hour and seasonal response capability
- ability to use existing infrastructure

Fleet
- observer placement
- percent coverage

Data
- work schedules and potential for observer fatigue
- quality assurance
- confidentiality
- compliance monitoring
- observer effect

Observer
- observer loyalty to government mission
- potential for observer harassment
- fishermen's perception of an observer's status
- observer legal status relative to agency enforcement mission

Agency
- maintaining agency expertise
- incorporating new ideas and approaches
- program continuity over time and among fisheries
- program self-perpetuation
- authorities and mandates

The goal of the discussion was to use the attendant expertise to identify which approach (contracted-service or agency in-house) best accomplished a given task. This proved untenable, for whenever a participant noted an advantage or disadvantage using a specific approach, one or more exceptions were noted. The exercise was valuable, however, as it illustrated the many different constraints under which different managers operate. These differed not only among, but also within regions. Start-up time, available personnel, existing agency infrastructure and support, existing contracts, availability of viable contractors, and finances were all constraints which affected the decision as to which approach was most appropriate. Each existing program has been developed under, and in response to, a particular suite of constraints.

Given these constraints it was difficult to strictly characterize a task or service as best accomplished under either the agency or contract-services approach. Attempts to delineate *a priori* how a program should be operated reduces the "tools" or options available to an agency manager responsible for ensuring that a responsive, efficient, effective program is constructed. **There was consensus that it was not possible to generalize the optimal degree to which observer-services should be contracted. This remains an issue that must be tailored to a specific fishery in a particular region.** It was generally agreed that the personnel assigned to the task, whether in-house or directly contracted to an agency, will likely play a more critical role to the success than the approach that is chosen.

One approach that is not recommended when we refer to contracted services is the third party contract system, in which a fishing vessel negotiates directly with a private contractor for the placement of observers. It was agreed that the severe problems noted earlier associated with this type of approach make it inappropriate for future observer programs. Thus, references to contracting in this discussion refer to a direct contract with the agency.

Some general concepts were identified. It was agreed that agency contracted services are useful, particularly for limited-duration

enforcement issues. Services can also be effectively contracted in long-term programs with firms directly contracted to the agency. In either case, the contract must be written in such a manner as to provide the agency with sufficient control and oversight of the contractor's performance. Care should be taken to write a good statement of work and work specification, and the agency's technical representative for the contract should understand observer programs and related operational problems. When the total contract-services option is chosen, as may be appropriate, government managers need to be aware of the greater potential for problems arising because of their lack of familiarity with the day to day operation of the fisheries and observer program.

The degree to which agency contracted arrangements can be effectively used is in part dependent upon the nature of the data being collected. Most participants thought that the more contentious the data being collected, the closer the relationship between observer and parent program must be to insure loyalty to program objectives and to insure proper data collection and agency support when contention arises. This situation also raised the legal issue of potential differences in the authority of observers to collect data for management and enforcement purposes depending on whether they were employees of the Federal or State governments or employees (or subcontractors) of a contractor. Tyson Vogeler, University of Alaska Sea Grant, noted that for the Alaska commercial crab fisheries observer program, which used contracted observers to collect compliance/enforcement information, regulations were instituted stipulating that observers were, for the purpose of data collection, representatives of the Alaska Department of Fish and Game.

Workshop participants recommended that certain basic standards, documentation, and continuity should be required of all observer programs regardless of whether the work is contracted or done by Federal or State personnel. Further, there was general agreement that the training and debriefing elements of an observer program be closely tied together, (i.e., they should be conducted by the same agency).

Observer Training and Performance

Mendes led a discussion on the necessary components of observer training and performance that should be considered when developing a new observer program or evaluating the effectiveness of an existing program.

Knowing Observer Authorities and Mandates. Workshop participants agreed that a difficult aspect of training observers is explaining the overlapping, and sometimes inconsistent, legislation that monitoring programs operate under. **Workshop participants recommended that observers be trained regarding specific legislation under which the observer program operates. However, in no situation should it be the observer's responsibility to interpret that legislation to the owner or operator of a fishing vessel.**

Along the same lines, many observers are asked to interpret current fisheries regulations. Some participants suggested that observers have with them at sea a copy of the current regulations concerning the fishery being observed, which could be provided to the vessel captain if requested.

The data generated by observer programs is recognized as an invaluable fishery management tool. Researchers and fishery managers are increasingly turning to ob-

server programs to provide them with all types of data, from tissue samples to water temperatures. Credle questioned panelists as to whether the current practice to train observers as "natural resource observers" would cause observers to become overburdened with data collection. Workshop participants concurred that it is critical in developing an observer program to develop a protocol for prioritizing data collection. Observers could then be instructed to collect data in a systematic manner. Workshop participants agreed that "observer overload" was a serious problem in some programs and was best addressed during the observer training period.

Hanson noted that the scientific community and fishery management agencies need to be informed that collection of additional data elements by observers may compromise the collection of the highest priority data elements, as identified by program mandates. Observers are often responsible for collecting fishery data and compliance information. Establishing clear priorities for data collection is particularly critical when observer duties are expanded to include the collection of compliance monitoring data. Requiring observers to address compliance concerns may compromise their ability to collect data used for management and assessment and may influence the way an observer is treated on board a vessel. Agencies and fishery management councils often place additional data collection responsibilities on observers without taking into account limitations in existing workloads or levels of funding. **It was recommended that NMFS review this problem and that policy be developed for clarifying the primary responsibilities of observers in each program.**

Mendes added that it was also necessary to limit the collection of data by observers to previously agreed-to data sets. That is, observers should not be allowed to collect "personal" data unless it does not interfere with the observer's ability to fulfill the standard data collection requirements.

Recruitment and Hiring. Mandy Merklein, contracted Observer Program Specialist, summarized the basic requirements for hiring effective observers. She noted that in addition to a college degree in biology (or equivalent natural resource experience), it is critical for observers to have a self-reliant personality and highly developed socialization skills. Merklein commented that biologists with experience in the Peace Corps generally made excellent observers. Others noted that colleges with marine science programs often were good sources of recruits. Mendes added that in the tuna-porpoise program, potential observers are screened for compatibility, medical fitness, conduct, and ethical standards. It was noted that all of the programs had established standards for recruitment and hiring, but that these standards may not be consistent among programs. **Workshop participants felt that discrimination based on gender, age, national origin, religion, or ethnic race should not be tolerated in either the hiring or the placement of observers collecting data for program agencies. However, all observers must be thoroughly competent, in optimal health, and physically fit to carry out their duties in a safe and satisfactory manner.**

Expectations of Observers and Performance Assessment. Workshop participants were unanimous in agreement that given the broad and often complex tasks an observer was asked to perform and their lack of supervision while at sea, it is critical to provide observers with a clear understanding of what is required of them in the perfor-

mance of their duties. Several of the programs used tests during the training period to evaluate and certify observers. Most of the programs had established criteria for assessing the quality of data collected by observers. Participants agreed that the first post-trip debriefing of an observer is the best opportunity for evaluating the effectiveness of the observer training process and expanding on the initial training process through feedback to the observer on their performance.

Participants commented on the considerable variation among programs in methods used to assess the performance of observers. Some program managers recommended the use of performance plans, as are commonly used to evaluate performance in the Federal workforce. Performance plans may include references to the number of samples collected, the number of errors made in data entry, the quality of the reports, etc.

It was recognized that experienced observers could provide valuable input during the training of new observers. Several approaches for utilizing experienced observers in the training of new observers were discussed and included at-sea training, dockside tours of vessels, use of training videos, and the use of experienced observers as trainers and debriefers.

Several workshop participants commented that maintaining a core group of high caliber, experienced observers is invaluable to a program. Experienced observers can identify problems developing in the field and provide feedback and potential solutions to program managers before such problems escalate. Participants noted that it is critical to have experienced observers as part of the observer program staff and to keep this experience current as fishing methods change and observer sampling methods often need to be adjusted. Experience in the field is essential in providing the expertise necessary to judge whether an observer's workload is reasonable, if their performance standards are realistic, and to help resolve sampling problems an observer may encounter. Management staff may lose credibility and the respect of the observers if they direct observers to collect unreasonable amounts of data in an impractical or dangerous manner.

Workshop participants agreed that observer programs operate more effectively, and consistently collect better data if the program is able to retain experienced, high caliber observers. Further, the process of training new observers is time-consuming, costly, and may affect the quality of data collected as the observer goes through the necessary "learning curve." Therefore, NMFS should establish guidelines that encourage and support the maintenance of experienced staff and observers.

Observers as Crew. There are major differences among programs in the degree to which observers are encouraged or permitted to assist the crew in fishing operations. In some programs, observers are expected to help with crew duties; in others, observers are prohibited from assisting fishers. The practicality of living at sea on a fishing boat, especially a small one, may require that observers occasionally "lend a hand." The types of duties an observer takes on and the amount of time this will require of them will vary among fisheries and the types of vessels they are placed on. Concerns of the group were that allowing observers to assist the crew could compromise the observer's data collection abilities, that there was a potential for conflict of interest for the observer if they pursued a full-time crew position, and that assisting the crew could complicate liability issues.

Workshop participants recommended that NMFS should request clarification from NOAA General Counsel related to the legality and insurability of observers assisting in fishing operations.

Standards of Conduct. The participants felt that observers should be made aware that they are in a position of public trust. Their standards of conduct will be evaluated by constituents relative to perceived, as well as real, conflicts of interest. For example, it would be inappropriate for an observer employed by a Federal observer program and on leave with out pay status to work for the owner of a fishing vessel in the observed fishery. Several program managers reported on specific elements in their training programs that advise observers on how to deal with conflict resolution and ethics. Mendes referred to this training as teaching observers how to maintain "professional distance". Merklein noted that conflict of interest problems can be more complex when observers live in the same ports they are deployed from.

Concerning mandatory drug testing, prior to or following observer hiring, participants noted that Federal programs do not currently require drug testing, whereas some of the contractors do. No consensus was reached as to whether mandatory drug testing of observers was necessary or appropriate.

Safety. Safety was considered to be one of the most important elements in observer training (safety is also considered as a separate issue later in this section). Commercial fishing is one of the most dangerous occupations in the country and being an observer on a commercial fishing vessel is an equally dangerous occupation. Training in the proper use of safety equipment is considered essential, as is the issuance of appropriate gear to observers prior to departure on commercial vessels. Although a critical part of safety training lies in preparing observers for emergencies at sea, perhaps even more important is the ability of an observer to use good judgement when working around fishing operations. Injury risks can be substantially lowered by good seamanship training. However, actual experience at sea will better cultivate good safety practices and lower the risks of injury and death. Unfortunately, there was not sufficient time to fully discuss the issue of observer safety at the workshop. **Therefore, workshop participants recommended that a subcommittee be established to prepare a list of recommended safety equipment for observers, a summary of safety topics that programs should address in preparing observers, and document the safety training methods used in the various U.S. and foreign observer programs.**

Program managers noted that observers had the option to refuse to board a fishing vessel if they considered the vessel unsafe. However, in some programs, such a decision could cost an observer his/her job. There was considerable discussion among workshop participants on developing standards for determining what constitutes a safe vessel.

Harassment. Harassment and assault of observers is one of the most important, yet difficult, issues observer program managers must face. Observer harassment and assault are particularly sensitive issues to discuss. The discussion of these types of concerns necessarily portrays some fishers in a poor light and may negatively heighten an observer's fears of being subjected to harassment or assault. Even though harassment may occur rarely or infrequently, it must be dealt with in a proactive and consistent manner.

Characterizing harassment or assault is difficult. The intensity of an incident may range from just a step beyond mild kidding around, through threats and verbal abuse, to actual physical and sexual abuse. Crewmen or vessel officers that joke with an observer may escalate their behavior into harassment long before the observer realizes that this has happened. Conversely, there are some easily recognizable harassment situations--verbal threats, obstructing sampling duties, discarding or damaging equipment, and destroying data. These are serious, yet by no means the worst to which observers have been subjected; outright physical and sexual abuse cases have been prosecuted. Statistics compiled by the National Victim Center for incidents among the general population indicate that 84% of all assault cases go unreported. Of the 16% that are reported, 12% are reported within the first 24 hours after the assault. This demonstrates that reporting rates fall drastically after the first 24 hours. Considering that many programs deploy observers for days, weeks, or months between port calls, prior training, emergency contacts, and an excellent support network are imperative.

Programs will need to tailor training, preparedness, support, and post-occurrence counseling to their particular situation. A fishery that deploys observers primarily for short day trips poses entirely different problems and challenges than one deploying observers for long trips at sea. Observer programs in each NMFS region need to interact with enforcement agents and General Counsel to determine how best to prevent these incidents from occurring and how to support the prosecution of these incidents when they occur. Successfully prosecuted harassment and assault cases, with appropriate penalties meted out, may act as a deterrent, especially if a company's resources (vessel time, personnel time, and money) are tied up during prosecution.

Fishery managers must realize that requiring compliance monitoring or enforcement duties of observers increases the potential for harassment or assault. Participants recognized that in many situations the realities of fisheries management require that data be used for compliance monitoring. If these duties must be asked of biologists, training and support must receive careful attention. Requiring observers to carry out enforcement activities is not appropriate because observers are not trained to perform this function. Unlike true enforcement officers, observers would not leave the vessel immediately after an enforcement action and would not be provided with backup. Because they would remain on board, the potential for interference and harassment would be great. **Participants recommended that enforcement duties be left to those with appropriate experience and training, not to observers, in order to avoid potential harassment situations. Further, NMFS should develop a no-tolerance policy with regards to harassment of observers in any situation and provide guidance to enforcement and NOAA General Counsel regarding these concerns.**

Harassment or assault of observers, even if it occurs rarely, is a critical issue, and will be covered in detail in a document to be produced later by a special subcommittee. In addition to the above, some general guidelines dealing with potential harassment or assault should be considered:

1. Observer training should include problem recognition, preparedness, and development of documentation.

2. Programs should provide support to observers while at sea in an effort to make them feel less isolated. Daily or weekly radio contact, including some type of safety/emergency code, should be considered.

3. Programs must provide a sense of security and a knowledge that support will materialize should a situation develop. This knowledge may often be all an observer needs to provide them with the self-confidence to deal with and diffuse many situations.

4. Program personnel should be trained in first-response actions, especially for the most critical cases such as abuse. An observer program staff member may be the first trustful contact after an incident, even if that incident occurred weeks ago.

5. Programs must recognize that dealing with harassment, especially sexual harassment, and cases of physical and sexual abuse, requires the expertise of a highly trained individual. Programs need to make contacts with available agency and community programs that deal specifically with these issues and have the expertise on staff. These should also include specialized programs developed to examine victims for injury and evidence, while addressing their emotional needs. Without this type of preparedness, an observer may well be "victimized" a second time by an inadequate response system.

It was recommended that NOAA General Counsel develop guidelines for observers that identify particular situations and behaviors that could be considered harassment or interference and steps an observer should take if in a harassment situation. Further, General Counsel should summarize the legal ramifications of such actions by a vessel captain or his/her crew towards an observer.

Observer Incentives. Because of time constraints, this topic was only briefly discussed. Many workshop participants commented on the importance of retaining experienced observers and offering incentives to maintain high morale. Incentives to observers included attractive wages, bonuses for good performance, pay increases that acknowledge experience, health insurance and other benefits, opportunities for advancement, and the involvement of observers in program development. Participants generally agreed that incentives for career advancement or salary increases be standardized between programs. When observes are hired by a private contractor, the overseeing agency should ensure that observers are provided comparable wages and incentives so that the program maintains a pool of high caliber, experienced observers.

In general, observers are not asked to record daily work schedules, but rather are paid for a standard day's work. A standard day's work is based on experience with the fishery. The nature of an observer's position often requires overtime. It was noted that the Fair Labor Standards Act only applies to certain job categories, but in some instances, an employer is required to pay overtime without the option of non-salaried compensation. **Workshop participants recommended that the General Counsel prepare a statement for Federal government observer programs regarding how to interpret the Fair Labor Standards Act relative to the placement of observers on commercial fishing vessels.**

Insurance and Liability

Insurance concerns include coverage for observers on chartered vessels while being ferried to fishing vessels and coverage for observers while they are on commercial vessels. There is language in the MMPA, but not in the MFCMA, that limits the liability of a commercial fishing vessel owner or operator relative to claims made by observers, except in cases of willful misconduct by the vessel owner. However, this language has never been tested in court. Several program managers commented that fishers have expressed their concern about carrying observers, given the uncertainty regarding insurance claims and the cost of insuring observers. In several instances, fishers have refused to carry observers because of concerns over issues related to insurability. Some fishers carry no insurance; this is particularly true for many small, family operated vessels whose owners see no need for liability insurance. In general, the uncertainty regarding this issue leads to reduced cooperation between vessel captains and observers, makes observer placement difficult, and thereby increases the potential for bias in the data. **Participants recommended that NMFS establish guidelines with advice from NOAA General Counsel that address the fishing industry's liability concerns and the provision of liability insurance to protect vessels operators and owners when taking observers.**

Although participants agreed that all observers should be adequately insured whether they work for a government agency or private contractor, considerable variation exists among programs in how such insurance is provided. Providing adequate observer insurance could be a complex problem due to the peculiarities of maritime law and the nature of an observer's work. Merklein noted that in many programs, no clear guidelines exist for what constitutes "adequate" insurance, and not all programs that use contracted observers evaluate whether observers are covered by adequate insurance. **Participants recommended that a national policy be established that ensures that observers be provided adequate insurance, based on recommendations from NOAA General Counsel as to what constitutes adequate insurance and who shall provide such insurance.**

Placing Observers On-Board Alternate Platforms

Karp led the discussions concerning alternate platforms. Many different types of alternate platforms have been used in different programs: (1) vessels to ferry observers to board commercial fishing vessels just prior to gear retrieval, (2) vessels as a platform from which observers can observe gear retrievals, (3) shore-based platforms to observe gear retrievals, (4) airplanes to observe gear retrievals, (5) maine mammal stranding programs to provide minimum estimates of marine mammal-fishery interactions, (6) chartered fishing vessels from which gear can be deployed and observed (often referred to as "experimental or research" fishing), and (7) video or still photography on commercial fishing vessels to document gear retrieval. As noted previously, several of these platforms offer advantages over direct deployment of observers on fishing vessels, particularly with respect to observer safety and allocation of sampling effort. However, the cost of alternate platforms can be prohibitive. Some participants were concerned that some chartered vessels are small craft, which might increase observer safety concerns. Participants noted that chartered vessel

operators must have knowledge of local conditions in order to operate small vessels safely.

Several participants noted the use of "remote photography" being used in several Japanese fisheries. Cameras may offer significant advantages for monitoring bycatch where retention is not possible. Participants agreed this is an important area for research and development.

Notifying Fishers of Pending Observer Requirements

Each program manager was asked to summarize the methods used to notify commercial fishers of observer requirements. The number of notification methods was almost as large as the number of fisheries, however, a few general principles were identified. Typically, notification involves written correspondence via certified mail, notices in the commercial fishing industry journals and newsletters, announcements at local meetings and council meetings, and telephone surveys. In most cases, it is the responsibility of the vessel captain to be familiar with observer requirements. Merklein commented that fishers generally respond better to a two-step notification process, where individuals are first informed of observer requirements at some type of public meeting and subsequently informed via written notification. Scordino noted that observer notices may be sent out with the fishing permit. Martin Hall, IATTC, added that fishers want to be treated equally. The IATTC achieves this by arranging observer placement schedules at annual meetings where fishers participate in a lottery system for observer placement. Several programs hold introductory meetings with the local fishers in their port of operation. It was noted that these first meetings could often be quite contentious as fishers vented their frustration at having to take observers on their vessels. However, holding local meetings often leads to valuable fleet cooperation and insight that might not otherwise occur.

Operators in two mandatory east coast fisheries receive written annual notification of the observer requirement. They must provide 5-day advance notification for each trip and NMFS either waives the regulation in writing or provides an observer. Regulations require the operators of foreign-owned vessels to give the agency a 5-day advance notification of planned fishing operations. The vessels operators are notified of arrangements to carry an observer at that time. Because program managers are familiar with the fishing schedules of the vessels in these fleets, observer placement can typically be done in less than 48 hours.

Identifying all of the potential fishers in a particular fishery was regarded as a common problem among managers. Lists of participating fishers are generally developed from multiple sources, which include names and addresses from Federal and State licensing programs, exemption program registration databases, dockside interviews, interviews with fish processors and buyers, and requests for information from fishers. This process is even more complicated when they participate in multiple fisheries. Several participants commented that it is important to obtain addresses that represent a fisher's residence during the actual fishing season. Because many live on their boat, these addresses are sometimes available from the local harbor master.

Workshop participants agreed that the problem of developing a list of the "universe" of all fishers in a particular fishery is closely related to the problem of how to

randomly place observers on commercial vessels. A list of permitted fishers must be stratified by those that have permits and are active, and those that have permits but operationally contribute little to total fleet fishing effort on an annual basis. Finally, there was agreement that response to notifications for observer coverage was much more variable in fisheries where carrying an observer was voluntary than in fisheries where observer coverage is mandatory. This could lead to significant bias in estimating levels of bycatch. For example, in fisheries where the responsibility of securing an observer lies with the vessel captain, notification is generally not a problem. **Workshop participants agreed that program managers should be given the authority and ability to calculate fleet fishing effort and participation in a given fishery. Further, due to the difficulty in reaching fishers, the burden to report fishing effort should lie with them and not the agency.**

Participants working with volunteer programs described examples in which the mere suggestion to a fleet that observer coverage could become mandatory was sufficient to improve cooperation and communication between vessel captains and government officials. Doug Beach, NMFS Northeast Region (NER), commented that it is critical to secure active participation and support from the appropriate State agencies. Where this is not the case, fishers may play Federal and State agents against one another.

One problem regarding notification pertains to fisheries where English may not be used in spoken or written communication. Some of the participants have prepared written notifications in several languages. Communication is also greatly facilitated by radio messages broadcasted in several languages.

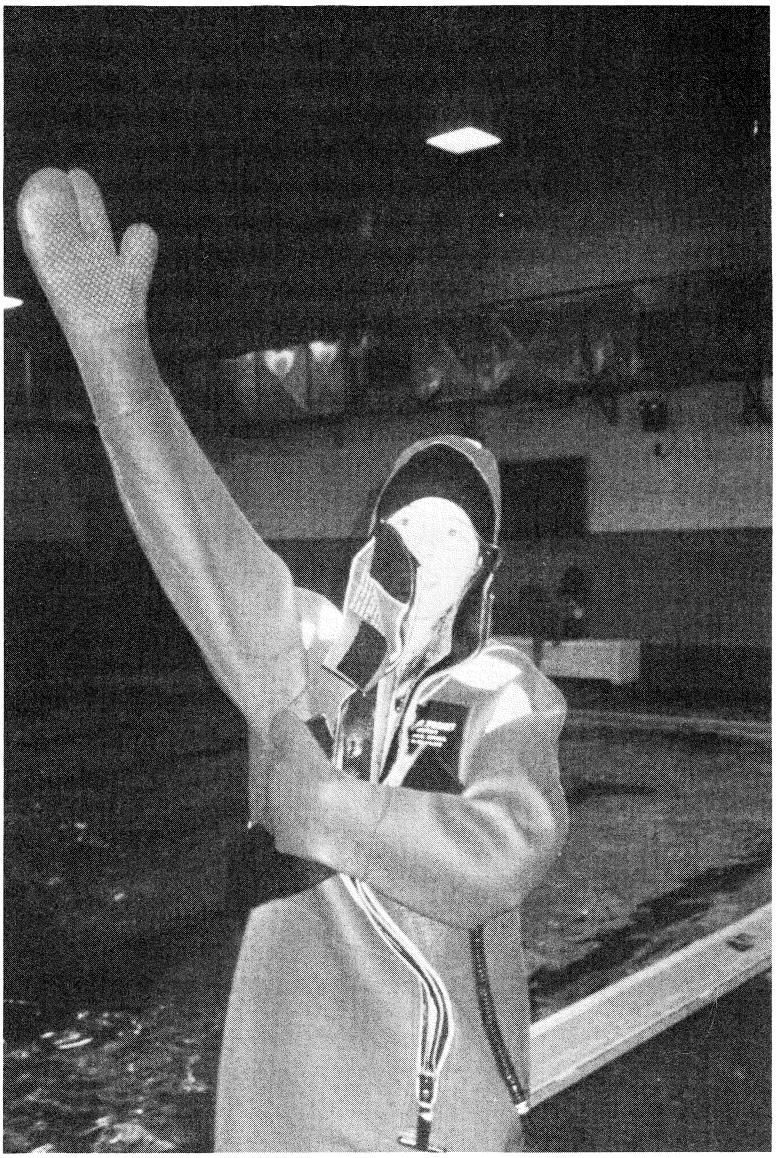
Observer Safety

Observer safety is a primary concern of all of the program managers in operating observer programs (see section on Observer Training). Individuals who have not been at sea as observers are not likely to appreciate how precarious the life of an observer at sea can be. Experienced program staff should be consulted when starting a new observer program.

Workshop participants discussed at length what constitutes a "safe vessel". Commercial fishing is a dangerous business and no vessel is completely safe. Many of the program managers have learned from experience that bad accidents can also happen on well-run and structurally-sound vessels and that even "safe" vessels occasionally sink. Workshop participants felt it was important that vessels meet the minimum U.S. Coast Guard and State vessel safety requirements, but it was unclear where the responsibility for this resided. Additionally, this was not considered sufficient because many types of fishing vessels are exempt from some of the Coast Guard's requirements because of their small size and area of operation. In some instances, the Coast Guard should be asked to evaluate the seaworthiness of a vessel. However, it was also recognized that a safe vessel in the hands of an inexperienced, unqualified operator could also be considered unsafe. It was proposed that observers be trained to recognize and be allowed to make individual determinations regarding what is considered a safe vessel or potentially dangerous situation, and act accordingly.

Many workshop participants felt that documenting the history of a vessel, its operators, and observer safety conditions, including any refusals by observers to board that vessel, would provide a useful refer-

ence for program staff in evaluating the general safety conditions on board the vessel. However, it was noted that several of the observer programs refused to document reasons given by observers or contracting staff for not boarding a vessel because of the potential for liability suits against the government and/or the contractor. It was further recognized that the underlying mission of an observer program could be compromised if fishers claim that the conditions on board their vessels were "unsafe" or by the purposeful neglect of safety standards to avoiding having to carry observers on their vessels. Workshop participants recommended that NOAA General Counsel review NMFS policy regarding the refusal of vessel captains to allow observers to board vessels portrayed as unsafe, or actually determined unsafe for observer placement, especially in fisheries which have mandatory observer coverage requirements. It was further suggested that a subcommittee be established to evaluate the extent to which observer coverage may suffer in fisheries where some or all vessels are considered to be unsafe"



An observer struggles into a survival suit during cold water safety training. ***(NMFS)***

Hall pointed out that observers are put in a very difficult position when asked to make a determination as to whether a vessel is safe. This is clearly the situation when a vessel captain and crew are willing to risk fishing in marginal weather conditions that an observer may consider unsafe. Workshop participants recognized the subjective nature of this type of decision relative to decisions regarding the adequacy of safety and emergency equipment. Hanson noted that in the Prince William Sound gillnet observer

program the decision to board a vessel was based on a consensus agreement between the observer, the skipper, and the observer coordinator. The most conservative opinion ruled. The reasons an observer would not board a vessel were recorded and kept on file in a database. **Participants recommended that NMFS establish guidelines which would ensure that observers: (1) be informed that they will be supported by their employers following a decision not to board a vessel that they have determined to be unsafe, (2) be trained in recognizing and documenting unsafe vessels and situations, (3) be equipped with and trained in the use of safety equipment (e.g., exposure suits, locator beacons, communication equipment, etc.), and (4) be trained in basic seamanship and instructed in how to work safely on a commercial fishing vessel.**

It was noted that inexperienced observers should be given the opportunity to experience life "at sea" before being placed on a fishing vessel for the first time. This training should include sea time on charter vessels, training at maritime schools, extensive training with experienced observers, etc. Mendes commented that it was useless for observers to go to sea fully equipped with survival gear without adequate training and the confidence to use that gear when necessary. There was general agreement among workshop participants that one of the primary goals of training was the development of the observer's self-confidence regarding personal safety while working around fishing operations and in response to emergencies at sea.

The influence of weather conditions on observer safety was also discussed by participants, and it was agreed that observers should not be expected to influence vessel captains regarding a decision to fish in inclement weather. However, providing observers with current weather information before sailing, and when possible, while at sea, could assist observers in deciding when they could safely monitor fishing operations. The effect of inclement weather is exacerbated by small vessel size. Therefore observers have to rely on their own judgement in deciding whether to board a particular vessel, given the available information on local weather conditions. **It was recommended that, where possible, observers communicate directly with experienced observers or their program managers pending a final decision to board a vessel in inclement weather.**

Regarding the issue of catastrophic occurrences (e.g., fire or sinking), workshop participants again recognized the importance of observer training and observer self-confidence. Wherever possible, routine radio communications with "home base" should be established to assess observer well being. Further, observers should have access to dependable radio equipment. Merklein added that program managers should provide comprehensive observer counseling following catastrophic events at sea. In most cases, observers that experience such events will feel isolated from friends and family, and every effort should be made to have observers feel that they have returned to a "safe and secure" environment. Mendes added that contracts with the owners of U.S. tuna vessels are written specifically to insure that fishermen are compensated for loss of fishing time during transport of an injured observer to a medical facility. Hall commented that observers should be insured against personal losses by their employers in the event of a catastrophe.

Legal Implications of Observer Data

Joel LaBissoniere, NOAA General Counsel for Enforcement and Litigation, discussed the legal implications of using observer data for enforcement purposes and pending regulations regarding observer programs. The Office of General Counsel is preparing proposed regulations that would not allow observer data collected in programs without regulatory or statutory authority (i.e., "voluntary programs") to be used by the agency in prosecuting cases. However, fishers themselves may choose to make these data available for enforcement purposes. LaBissoniere added that several exceptions to these proposed regulations would be considered, including: (1) cases where illegal harassment or interference was alleged by an observer, or (2) cases where egregious violations had been alleged, in which case a decision to use data collected by observers placed under "voluntary" authority would rest with a NMFS Regional Director.

Darryl Christensen, NEFSC, raised the issue of whether fishers could be prosecuted for violations of the MFCMA based on a report by an observer placed on a vessel under the authority of the MMPA. LaBissoniere responded that if the observer were placed under voluntary authority, it was unlikely that a fisher would be prosecuted. However, he added that any data collected by an observer under mandatory authority could be used against a fisher.

Several issues were raised related to the operations of a vessel at sea. In general, data collected in a voluntary observer program could not be used to prosecute, but could be used to identify problem vessels or fishers to the Coast Guard. There was some discussion about the use of radio codes by observers to indicate violations at sea, but there was concern that this could endanger the safety of an observer.

Each program manager was then asked to discuss the relationship between their program and the NMFS Office of Law Enforcement. There was a broad range of responses. In some regions, observers and program managers were instructed by their superiors to have no direct contact with enforcement agents. In other regions, all of the data collected by observers was available to enforcement agents. It was recognized that similar problems exist between the managers of NMFS observer programs and U.S. Fish and Wildlife Service enforcement agents over seabird mortalities that occur during legal fishing operations.

Workshop participants recommended that NMFS develop a policy regarding the use of observer data for enforcement purposes and compliance monitoring, and that this policy be applied in a consistent manner in all regions.

Mission Statements for Observer Programs

Workshop participants agreed that each observer program should establish a clear statement of mission, and should review and rewrite the statement as necessary. Additionally, Bob Hofman, Scientific Program Director, Marine Mammal Commission, recommended that NMFS develop an observer program mission statement and he provided a draft of such a document. It was noted that this document should be comprehensive, dealing not only with marine mammals but all non-target species, and a decision was made to delay preparing this statement until the workshop met again. Some observer programs, especially programs where 100% observer coverage

is mandated, were created primarily for the purpose of compliance monitoring. **Workshop participants recommended that following the reauthorization of the MMPA, MFCMA, and ESA, each of the Federal observer programs should reevaluate their mission statements and revise them as necessary.**

Data Collection

Workshop participants recognized that reliable information on bycatch must be reasonably precise. While there was no agreement on what constitutes "reasonable precision", the following guidelines were suggested: (1) the coefficient of variation (CV) of the species-specific mortality estimate should approximately equal the CV of the species specific abundance estimate, (2) CVs should be less than 0.35, where incidental mortality is greater than 25% of the maximum substantiable removal level, (3) when quantifiable data are not available concerning interactions that are thought to be significant, initial rates of coverage should be high (e.g., greater than 20%), and (4) precision of mortality estimates can be improved through optimal allocation of sampling effort. Participants recognized, however, that most of the coverage rates currently achieved by NMFS observer programs are determined by logistic, regulatory, and funding constraints, and not in response to a proper experimental design. **Workshop participants recommended that observer coverage rates of fishing effort should be tailored to achieve a desired level of precision in calculating total catch and estimating incidental mortality caused by commercial fisheries.**

DeMaster led a discussion on how available life history data from marine mammal species collected by observers can contribute to the management of marine mammal-fishery interactions. In particular, life history specimen material can be used for determining stock structure, estimating the maximum rate of net production, and determining whether a population is increasing or decreasing. Sample sizes needed to produce reliable results, however, will vary, depending on what parameters are being studied. For example, the sample size required for stock determination typically ranges from 10 to 50 specimens, while detecting trends in life history parameters requires between 100 and 400 specimens per year. Also, the sex ratio of the marine mammals taken incidental to commercial fisheries is an extremely important parameter in evaluating whether a particular level of removal is sustainable. At a minimum, observer program managers should require observers to determine the species identification and the sex of all marine mammals observed to have been incidentally taken during fishery operations.

Credle noted that in both the House and Senate versions of the MMPA reauthorization bills, a quota-driven management approach has been abandoned in favor of allowing individual fisheries between 12 and 18 months to reduce incidental mortality levels below potential removal levels. In addition, the bills specify that target levels of incidental mortality approaching zero should be achieved within a specified time period. Given this situation, workshop participants recognized that, at a minimum, annual estimates of incidental mortality rates and total mortality need to be made available to resource managers. DeMaster, however, noted that recent work by Dr. Barb Taylor, NOAA post-doctoral fellow at the Southwest Fisheries Science Center (SWFSC), indicated that potential removal levels should also incorporate information on the precision of the abundance estimate. In the population simulations performed by Taylor, where CVs ex-

ceeded 0.5, populations that experienced removals at a rate similar to the removal levels defined by the bills before Congress did not equilibrate between 60% and 100% of a population's carrying capacity (K), unless a conservative estimate of abundance was used (in this case, the lower 95% confidence interval). However, using conservative estimates of abundance to classify interactions as significant would generally inflate the estimated number of critical stocks relative to the actual number of critical stocks, as defined in the Senate MMPA reauthorization bill. Therefore, the workshop participants noted that allowable removal levels should be based on conservative estimates of abundance, while categorization of marine mammal stocks based on interaction levels with fisheries should be made using best available estimates of abundance.

Finally, workshop participants discussed the merit of having observers enter data collected at sea directly into personal computers (PCs). In some programs, observers can enter data into computers at their work stations or on the bridge after sampling. However, the technology for voice- and written-recognition systems for multiple data-sheet formats are not readily available in a useable form. Further, data entry into PCs would generally be in addition to the initial recording on "hard" (paper) forms, which could add to the observer's duties. This may overburden observers if data collection and sampling requirements are already intense. Unless timely estimates of incidental marine mammal mortality are needed for in-season management of marine mammal-fishery interactions, the current systems are adequate. However, workshop participants agreed that vessel tracking information should be logged directly onto PCs, either by observers or vessel operators. Karp recommended that, given the high cost of hardware system development and the limited resources of individual observer programs, every effort should be made to pool resources in developing and testing new technologies.

Data Analysis

Jay Barlow, SWFSC, and Kathryn Bisack, NEFSC, led a discussion on the general biases associated with analyzing observer data for the purpose of estimating incidental mortality of marine mammals and other non-target species. Five types of potential biases were identified: (1) defining the universe of fishing effort, (2) defining effort based on a standard unit such as hour, set, or trip, (3) randomly selecting trips to place observers relative to factors that may effect mortality (e.g., vessel type, vessel size, area fished, season, operator), (4) estimating mortality related to the nature of the fishery, and (5) selecting the appropriate models for estimating mortality.

Participants agreed that it was not possible to define a single measure of fishing effort that would be appropriate for all of the different observed fisheries. Different definitions of effort could lead to different levels of bias in mortality estimates. **Workshop participants recommended that, where possible, several different definitions of effort be evaluated for each fishery, and that take rates be presented based on as many different units of effort as appropriate. Further, it was recommended that all of the assumptions necessary to apply a particular definition of unit-fishing effort be stated explicitly when estimating total mortality.**

Workshop participants considered the problem of random selection of fishing trips to be the major difficulty in minimizing bias in estimation of mortality from

observer data. **It was recommended that in fisheries required to carry observers, it be clearly mandated, by statute, that program managers have the authority and ability to selectively place observers as necessary to allow for the collection of unbiased and accurate data.**

DeMaster recommended that program managers work with assessment biologists to evaluate the degree to which mortality rates vary among vessels and captains. In fisheries where mortality differences among vessels are minimal, sampling bias should be less of a concern. Barlow noted that in fisheries where mortality varies by season, observer coverage must either be optimally allocated or held constant to minimize bias. Bisack commented that using data from the previous year to allocate observer coverage does not always lead to optimal allocation of observer effort, especially if fishing effort varies significantly from year to year. Participants agreed that allocating fishing effort relative to previously observed patterns in mortality should be averaged over the last three to five years.

The following methodological problems were identified in using observer data to estimate incidental mortality of marine mammals or other non-target species: (1) mortality may be underestimated for certain types of fishing gear because dead animals may fall out of the gear prior to being observed during retrieval (referred to as "drop out"), (2) vessel captains may fish differently when carrying an observer and this could lead to differential rates of mortality on observed and unobserved trips (referred to as the "observer effect"), (3) observers may over-sample bycatch for some species, which could cause mortality rates to be overestimated, (4) observers may be coerced into under-reporting mortalities of bycatch species, (5) observers may be restricted from occupying a viewing station, from which gear can be fully observed during retrieval, and (6) viewing conditions at night may be such that gear retrieval is not fully observable. In addition, it was noted that an observer's ability to determine whether an animal released alive is likely to survive may be marginal, regardless of the observer's experience. At present, observers record seriously injured animals separately from mortalities. One could determine a maximum mortality estimate by assuming that all injured animals died shortly after release from the net.

Estimating incidental mortality of marine mammals or other bycatch species requires a certain type of model if observer coverage is less than 100% of total fishing effort. In these situations, either a ratio-type estimator or a general linear model (GLM) is used to estimate mortality and associated variance. Several workshop participants reported a general lack of significance in correlating observed rates of mortality to fishing effort. This is problematic in using either ratio-type estimators or GLMs to estimate mortality; however, it was recognized that the statistical power of such tests is often low. Mortality estimates based on kill-per-set and kill-per-ton were compared, but no general recommendations were made concerning the relative advantages of either approach.

Workshop participants recognized that not all incidental mortalities reported by observers could be identified to the population (or species) level. To reduce bias in estimating total mortality, it is necessary to pro-rate unidentified mortalities to the population level, based on the composition of the known kill. Other problems associated with estimating mortality were reported by Scordino who noted that in some fisheries, additional mortalities beyond

those recorded by observers are known to occur through reports made from recoveries in stranding programs or through reports from the fishers themselves. Occasionally these reports will include species thought to be absent in a particular area. Workshop participants noted that this is not unusual in fisheries where incidental mortality rates and observer coverage rates are low. One proposed solution was to add mortalities, based on salvage programs or vessel owners' logbooks, to the estimate of total mortality. Such an approach, however, would likely underestimate the true level of mortality.

It was recognized that a complete review of all issues pertinent to data collection and analysis was important, yet beyond the scope of this workshop. Consequently, discussions were confined to the most fundamental issues. It was recommended that a separate, more comprehensive workshop on data analysis, and other related topics, be convened in the fall of 1994.

Recommendations for an Observer Program Network

Workshop participants agreed that a national network should be established within the observer program community. This network could: (1) provide access to expertise, (2) develop publications, bibliographies, reference materials, manuals, and safety and training materials, (3) hold meetings and workshops to facilitate the transfer of information among programs, and (4) establish subcommittees to address issues and challenges facing observer programs. Responsibilities of the network could include the following:

Annual Meetings. Annual meetings of representatives from Federal observer programs and others familiar with the operations of observer programs should be arranged to address issues of mutual concern such as safety, insurance, data quality and integrity, uses of advanced technology, and observer deployment. The next meeting could possibly be scheduled following the reauthorization of the MMPA, MFCMA, and ESA, in the fall of 1994.

Data Collection and Analysis Workshop. A workshop on methods of data collection and analysis should be organized. The goal of such a workshop would be to develop a "cook book" of methods for estimating incidental mortality. Ideally, this meeting will take place in the fall of 1994, in coordination with meeting the above-mentioned objectives.

Newsletter. Observer program network information should be disseminated via a bi-monthly newsletter. Topics of primary interest would include safety, advances in technology, and problems and solutions in observer placement.

Developing Safety Standards and Policy. Safety training and procedures differ markedly among observer programs. A subcommittee should be established to develop guidelines and policy regarding the safety of observers and identify specific conditions where the safety of an observer may be compromised.

Safety Manual. A subcommittee should be established to prepare a reference manual that provides lists of recommended safety equipment for observers, discusses safety issues, and recommends the training methods to be used in various observer programs to ensure observer safety.

WORKSHOP CONCLUSIONS

In comparing the various approaches of the different observer programs the following generalizations were concluded by workshop participants:

Importance of Observer Programs. Placement of observers on commercial fishing vessels can result in excellent data on catch and bycatch, information on the behavior of bycatch species around fishing gear, and information to evaluate whether methods to mitigate bycatch interactions are successful. These data are essential to address many state and Federal government requirements for marine resource assessment, management, and enforcement, and are required by law in many cases.

Limitations on Observer Programs. It should be recognized, however, that observer programs require considerable time to establish, are generally expensive, that safety concerns associated with placing observers on commercial fishing vessels are significant, and that observer data may often provide biased information on catches of target species and bycatches of nontarget and prohibited species.

Planning Before Implementation of New Observer Programs. Before any observer program is implemented, great care should be exercised in developing goals, establishing levels of training, and establishing the necessary infrastructure. In many cases a

A gillnetter helps an observer onboard his vessel. ***(Joni Packard, NMFS)***

pilot program should be established and evaluated before a full program is developed.

Monitoring Strandings as an Incentive to Reduce Bycatch. In some cases, surveys by aircraft and other means conducted during the fishing season to monitor strandings of marine mammals, birds, and sea turtles which may be the result of a fishery interaction, may create an incentive for fishers to reduce bycatch.

Authority of Observers. Observers must be authorized to collect the data for which they are responsible. Legislative and regulatory authority is often vague, conflicting across Acts, and open to interpretation. Observer effectiveness will be compromised unless the authority of observers to collect data is clearly mandated by statute and the data are used by management authorities to manage fisheries and protected species.

Observer Placement. In fisheries with less than 100% observer coverage, placement of observers on vessels is very difficult to randomize (leading to potential biases in estimates of bycatch). Program managers need the authority and means to directly control observer placement on vessels to collect accurate date and avoid potential bias.

Calculating Observer Effort. In order to calculate total fleet catch and bycatch, program managers need the authority and ability to secure accurate and timely estimates of total fleet fishing effort.

Placing Observers on Alternate Platforms. In some situations it may be appropriate to place observers on alternate platforms, such as research vessels, aircraft, and shore stations. Such situations may occur when placing observers is too expensive or dangerous (for example, when fishing vessels are very small and weather conditions are inclement). Better overall coverage may be obtained in such situations but certain types of information will be inaccessible. It should be clear that data collection objectives can be addressed before a "remote" observer program is initiated.

Insurance and Liability. Legislation and regulations concerning observer insurance requirements are inconsistent and confusing. It is critical that this issue be reviewed and clarified. The NMFS should take the lead in coordinating action on this issue with NOAA General Counsel, and representatives of the contracting, fishing, and insurance industries.

Training and Maintaining High Caliber Observers. In order to ensure that data are collected in an accurate and safe manner, observers need to be well trained and receive continuous support by the program. It takes considerable time to develop competent observers and staff expertise to operate an effective observer program. Observer programs that retain high caliber observers will be able to operate more safely, provide consistent and reliable data, and will develop more effectively. It was generally agreed that training and debriefing should be tied, and that even when substantial portions of observer programs are contracted out it is preferable that they should be agency responsibilities.

Observer Employment. Observer programs can be implemented successfully when observers are agency employees or when they are hired by contractors directly contracted to the agency. It is important, however, that consistent and equitable terms of employment are established and, in contract situations, that these conditions are carefully monitored. Contractual arrangements will only be successful if

agency authority and responsibility is adequately defined by legislation, regulation, and/or contract. Contractors must contract directly with the agency responsible; when contractors contract with vessel or plant owners to provide observer coverage, agency oversight is inadequate and the potential for conflict of interest is unacceptably high.

Observer Program Network. Observer programs occur nationally yet in the past have been developed in relative isolation with little access to information and expertise. A cohesive support network and infrastructure does not currently exist to address the challenges observer programs face, nor are reference materials, manuals and guidelines readily available. Both current and new observer programs would benefit from the development of a nationwide observer program network.

BIBLIOGRAPHY

Following is a collection of reports, manuals and publications submitted by participants as an example of the diverse range of reference materials and publications generated by marine fisheries observer programs. Many of these documents and manuals describe the sampling methods, sources of data bias, and organizational design of the various observer programs. Workshops participants recognize the value of gathering such references and making them more accessible. To that end, bibliography entries note the size and source of the documents, where known.

This is not intended as a complete bibliography. It has been recommended that one objective of the observer program network would be to generate a more thorough reference collection and bibliography of such materials. The authors would appreciate notification of references and publications that have not been included in this report.

Akin, P.A., K.M. Peltier, R.B. Miller. 1993. Techniques for the preparation and examination of reproductive samples collected from dolphins in the eastern tropical Pacific. NOAA Tech. Memo. NMFS-SWFSC-192. 26 p. La Jolla, CA.

Alaska Fisheries Science Center Domestic Groundfish Observer Program. 1993. Species identification manual. 189 p. Observer Program, NMFS Alaska Fisheries Science Center, 7600 Sand Point Way N.E., BIN C15700, Seattle, WA 98115.

Barlow, J., R.W. Baird, J.E. Heyning, K. Wynne, A.M. Manville,II, L.F. Lowry, D. Hanan, J. Sease, and V. Burkanov. In press. A review of cetacean mortality and pinniped mortality in coastal fisheries along the west coast of the U.S. and Canada and the east coast of the Russian Federation. Rep. Int. Whal. Comm., Special Issue.

Barnett, W., R. Rainbolt, and L. Lampkins. 1993. Feasibility study for marine mammal observations during the Quinault off-reservation set net fisheries. Pacific States Marine Fisheries Commission Report under NMFS Cooperative Agreement #NA90AA-H-FM714. 24 p. Pacific States Marine Fisheries Commission, 45 SE 82 Drive, Suite 100, Gladstone, OR 97027-2522.

Barrowman, J. 1986. The 1985 experimental set-net fishery for sablefish off the Washington coast. NMFS-NWAFC Processed Report 86-03. 86 p. Seattle, WA.

Barss, B. and M. Saelens. 1992. Status report on Oregon's Pacific whiting shoreside observation pilot program for 1992. Oregon Department of Fish and Wildlife, prepared for presentation to the Pacific Fishery Management Council. 12 p. NMFS, Northwest Region, 7600 Sand Point Way, N.E., Seattle, WA 98115.

Barss, B. and M. Saelens. 1992. Status report on Oregon's Pacific whiting shoreside observation program for 1993. Oregon Department of Fish and Wildlife prepared for presentation to the Pacific Fishery Management Council. 6 p. NMFS, Northwest Region, 7600 Sand Point Way, N.E., Seattle, WA 98115.

Beeson, M. 1992. Effort estimates of California gill net fisheries: halibut-angel shark set net, shark-swordfish drift-net, and white seabass-yellowtail set and drift net for quarter 1 (April 1-June 3, 1992) of the 1992-1993 fishing year. Report no. NA27FX0273-01 submitted to NMFS Southwest Region. 7 p. NMFS, Southwest Region, 501 West Ocean Blvd., Suite 4200, Long Beach, CA 90802-4213.

Brennan, J., B. Troutman, B. McLellan and T. Stinnett. 1991. Preliminary summary report on the 1991 Columbia River winter gillnet fishery marine mammal observation program. Pacific

States Marine Fisheries Commission Report under NMFS Cooperative Agreement #NA90AA-H-FM714. 11 p. Pacific States Marine Fisheries Commission, 45 SE 82 Drive, Suite 100, Gladstone, OR 97027-2522.

Brown, R. and S. Jeffries. 1993. Preliminary report on estimated marine mammal mortality in Columbia River fall and winter salmon gillnet fisheries, 1991-1992. Pacific States Marine Fisheries Commission Report. 13 p. Pacific States Marine Fisheries Commission, 45 SE 82 Drive, Suite 100, Gladstone, OR 97027-2522.

Butler, R.W., and N.A. Mendes. 1993. Safeguarding the quality of observer data. 3 p. NMFS, Marine Mammal Observer Branch, Southwest Region, 501 West Ocean Boulevard, Long Beach, CA 90802.

Chivers, S.J. and P.A. Akin. 1991. Sampling effects on the estimation of life history parameters for eastern tropical Pacific dolphins. Rep. Int. Whal. Comm. 41: 525-527.

Chivers, S.J., R.B. Miller, and A.A. Hohn. 1990. Composition of the 1988 incidental kill of small cetaceans in the US purse seine fishery for tuna in the eastern tropical Pacific. Rep. Int. Whal. Comm. 40:455-458.

Chivers, S.J., Miller, R.B. and Hohn, A.A. 1989. Composition of the 1987 incidental kill of small cetaceans in the US purse seine fishery for tuna in the eastern tropical Pacific. Rep. Int. Whal. Comm. 39:315-319.

Cramer, J.C., D.W. Lee, and G.P. Scott. 1992. Vessel-trip sampling plan for the U.S. longline vessels operating in the Atlantic. NOAA, NMFS, Southeast Fisheries Science Center. Miami Laboratory Contribution MIA-91/92-75. SCRS/92/109. 12 p. Miami, FL.

Fitzgerald, S.M. (editor). 1991. High seas driftnet fishery; manual for scientific observers. 180 p. Observer Program, NMFS, Alaska Fisheries Science Center, 7600 Sand Point Way, N.E., BIN C15700, Seattle, WA 98115.

Fitzgerald, S.M., H. McElderry, H. Hatanaka, Y. Watanabe, Y. Gong, J.S. Park, and S. Yeh. 1993. 1990-1991 North Pacific high seas driftnet scientific observer programs. *In* J. Ito, W. Shaw, and R.L. Burgner (editors). Symposium on biology, distribution, and stock assessment of species caught in the high seas driftnet fisheries in the north Pacific ocean. Int. N. Pac. Fish. Comm. Bull. 53(I):77-90.

Gearin, P., L. Cooke, M. Gosho and S. Joner. 1993. Summary report on marine mammal observations in the northern Washington chinook salmon marine set-net fishery in 1992. NMFS/NWR Report. 16 p. NMFS, Alaska Fisheries Science Center, 7600 Sand Point Way, N.E., Seattle, WA 98115.

Gearin, P., J. Cooke, J. Thomason and S. Joner. 1992. Summary report on marine mammal observations in the Makah chinook salmon set-net fishery in 1991. NMFS/NWR Report. 17 p. NMFS, Alaska Fisheries Science Center, 7600 Sand Point Way, N.E., Seattle, WA 98115.

Gearin, P., M. Gosho, S. Joner, and M. Johnson. 1990. Observations of the Makah chinook salmon set-net fishery during 1990. NMFS/NMML manuscript. 26 p. NMFS, Alaska Fisheries Science Center, 7600 Sand Point Way, N.E., Seattle, WA 98115.

General Accounting Office. 1990. Tuna/porpoise observer program, more needs to be done to identify and report harassment of observers. GAO/RCED-91-38. United States General Accounting Office, Washington, D.C. 38 p.

Hare, S. 1989. In search of a viable observer program: cooperation or confrontation. Masters of Science Thesis, University of Washington, Seattle, WA. 184 p.

Helvoort, G.V. 1986. Observer program operations manual. International observer program. Department of Fish-

eries and Oceans, Halifax, Nova Scotia, Canada. FAO Fisheries Technical Paper 275. 207 p.

Herczeg, B., V. Molenaar and A. Abajian. 1992. Summary report on the 1991 fall Columbia River and Willapa Bay salmon gillnet fisheries. Pacific States Marine Fisheries Commission Report under NMFS Cooperative Agreement #NA90AA-H-FM714. 12 p. Pacific States Marine Fisheries Commission, 45 SE 82 Drive, Suite 100, Gladstone, OR 97027-2522.

Herczeg, B. and V. Molenaar. 1992. Summary report on the 1991 summer dip-in salmon gillnet fishery in Willapa Bay and Grays Harbor. Pacific States Marine Fisheries Commission Report under NMFS Cooperative Agreement #NA90AA-H-FM714. 11 p. Pacific States Marine Fisheries Commission, 45 SE 82 Drive, Suite 100, Gladstone, OR 97027-2522.

Herczeg, B., B. Troutman, and V. Molenaar. 1992. Summary report on the 1992 winter Columbia River salmon gillnet fishery. Pacific States Marine Fisheries Commission Report under NMFS Cooperative Agreement #NA90AA-H-FM714. 13 p. Pacific States Marine Fisheries Commission, 45 SE 82 Drive, Suite 100, Gladstone, OR 97027-2522.

Herczeg, B. and L. Fore. 1992. Estimating marine mammal mortality for commercial salmon gillnet fisheries on the Columbia River and adjacent waters. 13 p. Pacific States Marine Fisheries Commission, 45 SE 82 Drive, Suite 100, Gladstone, OR 97027-2522.

Herrick, S.F. Jr., and D. Hanan. 1988. A review of California entangling net fisheries, 1981-1986, NOAA Tech. Memo. NMFS-SWFSC-108. La Jolla, CA.

Holmes, K. 1992. Eyes on the horizon. True north. North Pacific Fishery Management Council. 16 p. North Pacific Fishery Management Council, P.O. Box 103136, Anchorage, AK 99510.

Int. North Pac. Fish. Comm. 1990. Final report of squid and bycatch observations in the Japanese drift net fishery for neon flying squid (*Ommastrephes bartrami*), June-December, 1989 Observer Program. INPFC Doc. Joint report by the National Sections of Canada, Japan and the United States. NMFS, Alaska Fisheries Scienc Center, 7600 Sand Point Way N.E., Seattle, WA 98115-0070.

Jeffries, S. and R. Brown. 1993. Observations of seabird entanglements in Columbia River, Willapa Bay, and Grays Harbor salmon driftnet fisheries, 1991-93. Washington Department of Wildlife. 15 p. Pacific States Marine Fisheries Commission, 45 SE 82 Drive, Suite 100, Gladstone, OR 97027-2522.

Julian, F. 1993. Pinniped and cetacean mortality in California gillnet fisheries Preliminary estimates for 1992. Int. Whal. Comm. Working Paper SC/45/022. 26 p.

Julian, F. 1993. Pinniped and cetacean mortality in California gillnet fisheries: Preliminary estimates for April 1 to June 30, 1992. Admin. Rept. LJ-93-19. 18 p. NMFS, Southwest Fisheries Science Center, P.O. Box 271, La Jolla, CA 92038.

Kajimura, H. (editor). In prep. Harbor porpoise abundance and interactions with Makah salmon set net fishery in coastal Washington waters, 1988-89. NMFS, Alaska Fisheries Science Center, 7600 Sand Point Way N.E., Seattle WA 98115.

Klein, S. 1985. Review of the set-net fishery off the Washington coast, 1982-84. NMFS-NWAFC Processed Report 85-06. 52 p.

Klein, S. 1984. The 1983 experimental set-net fishery for groundfish. NMFS-NWAFC Processed Report 84-03. 42 p.

Lennert, C., S. Kruse, and M. Beeson, and J. Barlow. In press. Estimates of marine mammal bycatch in California gillnet fisheries, for July through December, 1990. Int. Whal. Comm., Special Issue.

Lien, J., G.B. Stenson, S. Carver, and J. Carton. 1991. "How many did you catch?" The effect of methodology on bycatch

reports obtained from fishermen. Presented to the IWC conference on mortality of cetaceans in passive fishing nets and traps. La Jolla, CA.

Loefflad, M. and P. Bearden. 1993. Perspectives and problems in the implementation and management of fishery community development quotas in Alaska. 23 p. NMFS, Alaska Regional Office, P.O. 21668, Juneau, AK, 99802.

Matteson, K. and V. Molenaar. 1992. Summary report on the 1992 summer dip-in salmon gillnet fisheries in Willapa Bay and Grays Harbor. Pacific States Marine Fisheries Commission Report under NMFS Cooperative Agreement #NA90AA-H-FM714. 13 p. Pacific States Marine Fisheries Commission, 45 SE 82 Drive, Suite 100, Gladstone, OR 97027-2522.

Matteson, K., W. Barnett and J. Langton. 1993. Summary report on the 1992 fall Grays Harbor salmon gillnet fishery. Pacific States Marine Fisheries Commission Report under NMFS Cooperative Agreement #NA90AA-H-FM714. 17 p. Pacific States Marine Fisheries Commission, 45 SE 82 Drive, Suite 100, Gladstone, OR 97027-2522.

Matteson, K., W. Barnett and J. Langton. 1993. Summary report on the 1992 fall Willapa Bay salmon gillnet fishery. Pacific States Marine Fisheries Commission Report under NMFS Cooperative Agreement #NA90AA-H-FM714. 12 p. Pacific States Marine Fisheries Commission, 45 SE 82 Drive, Suite 100, Gladstone, OR 97027-2522.

Matteson, K., W. Barnett and J. Langton. 1993. Summary report on the 1992 fall Columbia River salmon gillnet fishery. Pacific States Marine Fisheries Commission Report under NMFS Cooperative Agreement #NA90AA-H-FM714. 17 p. Pacific States Marine Fisheries Commission, 45 SE 82 Drive, Suite 100, Gladstone, OR 97027-2522.

Matteson, K., J. Langton and R. Hadley. 1993. Summary report on the 1993 winter Columbia River salmon gillnet fishery. Pacific States Marine Fisheries Commission Report under NMFS Cooperative Agreement #NA90AA-H-FM714. 29 p. Pacific States Marine Fisheries Commission, 45 SE 82 Drive, Suite 100, Gladstone, OR 97027-2522.

Melteff, B.R. and D.H. Roseburg (editors). 1984. Proceedings of the workshop on biological interactions among marine mammals and commercial fisheries in the southeastern Bering Sea. Alaska Sea Grant Report, 84-1:187-200.

Mendes, N.A. 1975. Observer guidelines and responsibilities. 2 p. NMFS, Southwest Region, Marine Mammal Observer Branch, 501 West Ocean Boulevard, Long Beach, CA 90802.

Mendes, N.A. 1983. Essential attributes for effective executive managers. U.S. Dept. of Commerce, NOAA, Administrative Mid-Management Development Program. 4 p. NMFS, Southwest Region, Marine Mammal Observer Branch, 501 West Ocean Boulevard, Long Beach, CA 90802.

Mendes, N.A. 1989. High seas tuna/porpoise observer, a profile of job conditions. 4 p. NMFS, Southwest Region, Marine Mammal Observer Branch, 501 West Ocean Boulevard, Long Beach, CA 90802.

Mendes, N.A. 1991. Verification of employee work. 14 p. NMFS, Southwest Region, Marine Mammal Observer Branch, 501 West Ocean Boulevard, Long Beach, CA 90802.

Mendes, N.A. 1993. Observer guidelines and responsibilities. 2 p. NMFS, Southwest Region, Marine Mammal Observer Branch, 501 West Ocean Boulevard, Long Beach, CA 90802.

Mendes, N.A. 1993. Observer physical and psychological fitness, status review and recommendations. 10 p. NMFS, Southwest Region, Marine Mammal Observer Branch, 501 West Ocean Boulevard, Long Beach, CA 90802.

Mercy, D. and K. Wynne (editors). 1991. Fisheries observers programs, *In* Alaska Marine Resources, Marine Advisory Program, Alaska Sea Grant, University of Alaska. XI(3), 12 p.

National Marine Fisheries Service, Office of Protected Resources. 1993. Implementation of the Marine Mammal Protection Act Interim Exemption Program 1988-1993. NMFS, Office of Protected Resources. 63 p.

National Marine Fisheries Service, Southeast Fisheries Science Center and Southeast Regional Office. 1991. Shrimp trawl bycatch research requirements. NOAA, NMFS, Southeast Reginal Office. 66 p.

Pacific States Marine Fisheries Commission, Columbia River Marine Mammal Observer Program. 1991. Pacific States Marine Fisheries Commission training manual for the Columbia River area commercial salmon gillnet fishery observation program. 204 p. Pacific States Marine Fisheries Commission, 45 SE 82 Drive, Suite 100, Gladstone, OR 97027-2522.

Peltier, K.M., S.J. Chivers, and W.T. Norman. In press. Composition of the incidental kill of odontocetes in the eastern tropical Pacific US tuna fishery and two California gillnet fisheries for 1992. Int. Whal. Comm. SC/45/SM2.

Peltier, K.M., S.J. Chivers, and S. Kruse. 1992. Composition of the 1991 incidental kill of small cetaceans in the eastern tropical Pacific US tuna fishery and two California gillnet fisheries. Rep. Int. Whal. Comm., 43:401-406.

Peltier, K.M., R.B. Miller, and S.J. Chivers. 1992. Composition of the 1990 kill of small cetaceans in the US purse-seine fishery for tuna in the eastern tropical Pacific. Rep. Int. Whal. Comm., 42:517-520.

Perez, M.A., T.R. Loughlin. 1991. Incidental catch of marine mammals by foreign and joint venture trawl vessels in the U.S. EEZ of the north Pacific, 1973-88. NOAA Tech. Rep. NMFS 104. 57 p.

Perkins, P., J. Barlow, and M. Beeson. 1992. Pinniped and cetacean mortality in California gillnet fisheries: 1990-1991. Southwest Fisheries Science Center Admin. Rep. LJ-91-14. 32 p. NMFS, Southwest Fisheries Science Center, NMFS, P.O. Box 271, La Jolla, CA 92038.

Perkins, P., J. Barlow, and M. Beeson. In press. Pinniped and cetacean mortality in California gillnet fisheries: 1991. Rept. Int. Whaling Commission Working Paper SC/44/SM14.

Perkins, P., J. Barlow, and M. Beeson. In prep. Pinniped and cetacean mortality in California gillnet fisheries: 1988-90. NMFS, Southwest Fisheries Science Center, NMFS, P.O. Box 271, La Jolla, CA 92038.

Ritchie, W., J. Pierce, and R. Kreuziger. 1993. Preliminary findings of seabird interactions with the non-treaty salmon gillnet fishery: Puget Sound and Hood Canal Washington. Washington Dept. of Wildlife, Draft Report. 15 p. NMFS, Northwest Region, 7600 Sand Point Way, N.E., Seattle, WA 98115.

Taylor, B.L. 1993. "Best" abundance estimates and best management:why they are not the same. NOAA Tech. Memo. NMFS-SWFSC-188. 20 p. La Jolla, CA.

Teig, K.T., M.A. Brown, and S. Corey. 1993. Manual for biologists aboard domestic groundfish vessels. 478 p. Observer Program, NMFS, Alaska Fisheries Science Center, 7600 Sand Point Way, N.E., BIN C15700, Seattle, WA 98115.

Vogler, T.J. 1993. Shellfish observer training manual edition 4.0. 224 p. P.O. Box 102771, Anchorage, AK 99510.

Vogler, T.J. 1993. Scallop observer training manual. University of Alaska. North Pacific Observer Training Center, 211 West 7th Ave., Anchorage, AK 99501-3612.

Wall, J.M., K.T. Teig, and R.R. Maier. 1988. Manual for biologists aboard foreign groundfish vessels. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS, Alaska Fisheries Science Center. 380 p. Observer Program, NMFS, Alaska Fisheries Science Center, 7600 Sand Point Way, N.E., BIN C15700, Seattle, WA 98115.

Waring, G.T., P. Gerrior, P.M. Payne, B.L. Parry, J.R. Nicolas. 1990. Incidental take of marine mammals in foreign fishery activities off the northeast United States, 1977-88. Fishery Bulletin, U.S. 88:347-360. 12p.

Weikart, H.G. (editor). 1990. High Seas Squid Driftnet Manual for Observers. 184 p. Observer Program, NMFS, Alaska Fisheries Science Center, 7600 Sand Point Way, N.E., BIN C15700, Seattle, WA 98115.

Wynne, K.M. (no date). Marine mammal interactions with the salmon drift gillnet fishery on the Copper River Delta, Alaska, 1988 and 1989. AK Sea Grant Tech. Rep. AK-SG-90-05. 36 p.

Wynne, K.M., D. Hicks, and N. Munro. 1991. 1990 salmon gillnet fisheries observer programs in Prince William Sound and South Unimak Alaska. Annual Rept. NMFS/NOAA Contract 50ABNF000036. 65 p. NMFS, Alaska Region, Office of Marine Mammals, P.O. Box 21668, Juneau, AK 99802).

Wynne, K.M., D. Hicks, and N. Munro. 1992. 1991 Marine mammal observer program for the salmon driftnet fishery of Prince William Sound Alaska. Annual Rept. NMFS/NOAA Contract 50ABNF000036. 53 p. NMFS, Alaska Region, Office of Marine Mammals, P.O. Box 2166, Juneau, AK 99802.

Wynne, K.M. (compiler). 1991. Prince William Sound drift gillnet fishery marine mammal observer program

PART 3: OBSERVER PROGRAM SUMMARIES

Managers from each regional observer program were asked to provide a summary of their programs before arriving at the workshop, in order to give all participants background information on the many programs that exist. These summaries are presented here, along with points of contact for each regional observer program. Program summaries have been organized according to NMFS regions, starting with the Northeast and continuing clockwise around the country (Southeast, Southwest, Northwest, and Alaska). Some international observer programs have also been included, as represented by the participants at the workshop.

ATLANTIC BOTTOM PAIR TRAWL FISHERY FOR GROUNDFISH

Patricia Gerrior, Coordinator

Mission and Authority:
Mission of the program: to characterize groundfish pair trawl fishery.
Fishery management: Federal.
Mandates and authority to place observers: FCMA.
Funding source: Federal (NMFS base funds).
Vessel selection: fishermen take observers on a voluntary basis.
Program duration: 1992 - 1993.

Fishery Description, 1992:
Fleet size: no specific permit required covered under multispecies trawl permit: 20 vessels.
Seasons and duration of fishery openers: spring-early summer.

Observer Program Management:
Contracted Services: contract for observer services with Manomet Bird Observatory (MBO). Observers hired, deployed and observer data entered by contractor.
In House services: schedules of sea days/trips by month provided by NMFS.
All contract observers are NMFS trained, certified and equipped.

Observer Coverage, 1992:
Unit of fishing effort: not determined.
Estimate (and method) of total fishing effort: not determined.
Estimate (and method) of observer coverage: less than 5%; one vessel observed; eight sea days of observation.

Estimate of Protected Species Taken Annually, 1992:
Observed number taken: none.
Estimation method: not determined.
Coefficient of Variation: not determined.
Confidence Interval: not determined.
Mortality per FV day: not determined.

MID-ATLANTIC COASTAL GILLNET FISHERY

Patricia Gerrior, Coordinator

Observer Program Mission and Authority:
Mission of the program: to define fishery and characterize marine mammal and sea turtle bycatch.
Fishery management: State and Federal.
Mandates and authority to place observers: MMPA.
Funding source: Federal (MMPA).
Vessel selection: fishermen take observers on a voluntary basis.
Program duration: 1993 - present.

Fishery Description, 1993:
Fleet size: 574 MMEP permitted vessels.
Seasons of fishery operation: year round.

Observer Program Management:
Contracted Services: contract for observer services with MBO. Observers hired, deployed and observer data entered by contractor.
In House services: schedule of sea days/trips by month provided by NMFS. All contract observers are NMFS trained, certified and equipped.

Observer Coverage, 1993:
Unit of fishing effort: not determined.
Estimate of total fishing effort: not determined.
Estimate of observer coverage: not determined. Nine vessels and 12 trips sampled; 12 sea days through 9/93.

Estimate of Protected Species Taken Annually, 1993:
Observed number taken: none.

ATLANTIC PELAGIC DRIFT GILLNET FISHERY FOR SWORDFISH, TUNA, AND SHARK

Patricia Gerrior, Coordinator

Observer Program Mission and Authority:
Mission of the program: to define fishery and characterize marine mammal and sea turtle bycatch.
Fishery management: Federal.
Mandates and authority to place observers: MMPA, FCMA.
Funding source: Federal (MMPA).
Vessel selection: NMFS selects vessels to be covered. Coverage is mandatory.
Program duration: 1989 - present.

Fishery Description, 1992:
Fleet size: 115 permit holders; 16 vessels fished.
Seasons and duration of fishery operation: 2 openers; Jan-June; July-Aug.

Observer Program Management:
Contracted Services: contract for observer services with MBO and with individual contract observers. Observers hired, deployed and observer data entered by contractor.
In House services: NMFS staff and individual contract observers deployed and data processed by NMFS. Schedule of sea days/trip schedule and selected provided by NMFS. All observers are trained, certified and equipped by NMFS.

Observer Coverage, 1992:
Unit of fishing effort: catch per driftnet haul.
Estimate of total fishing effort: not determined.
Estimate of observer coverage: first half of season was 65%. Second half season was 35%. Ten vessels sampled, 172 observer days.

Estimate of Protected Species Taken Annually, 1992:
Observed number taken: total mammals - 155; total sea turtles - 20.
Estimation method: not determined.
Coefficient of Variation: not determined.
Confidence Interval: not determined.
Mortality per FV day: not determined.

MID-ATLANTIC FOREIGN MACKEREL TRAWL FISHERY

Patricia Gerrior, Coordinator

Observer Program Mission and Authority:
Mission of the program: to monitor compliance and collect catch and biological data.
Fishery management: Federal.
Mandates and authority to place observers: FCMA.
Funding source: foreign fishing fleet.
Vessel selection: mandatory 100% coverage.
Program duration: 1983 - 1991.

Fishery Description, 1991:
Fleet size: 6 USSR vessels; 3 Netherlands vessels and 9 U.S. vessels.
Seasons of fishery operation: December-May.

Observer Program Management:
Contracted Services: observers hired and deployed by MBO. Foreign representatives submitted quarterly effort plans and MBO prepared projected observer costs based on plans.
In House service: observers trained, certified and equipped by NMFS. NMFS provided limited data entry; detailed catch, effort and incidental take data not entered. NMFS approved quarterly bills and reconciliation of actual annual costs for each participating foreign country.

Observer Coverage, 1991:
Unit of effort: hauls or joint venture transferred catches; towing time.
Estimate of total effort: all foreign fishing hauls observed, no estimate needed; joint venture transfers observed, only estimates of fishing effort where catch not transferred to foreign vessel needed estimation. Estimates not determined.
Observer coverage: 100% as mandated by Magnuson Act.

Estimate of Protected Species Taken Annually, 1991:
Observed number taken (total number taken): marine mammals - 21.
Estimation method: not applicable.
Coefficient of Variation: not applicable.
Confidence Interval: not applicable.
Mortality per FV day: 1988 marine mammal take estimate for Netherlands directed mackerel fishery: 0.58. (Waring et al., Fishery Bulletin 88:347-360,1990).
USSR did not fish, took only U.S. transfers.

NORTHWEST ATLANTIC PELAGIC LONGLINE FISHERY

Patricia Gerrior, Coordinator

Observer Program Mission and Authority:
Mission of the program: to define fishery and characterize marine mammal and sea turtle bycatch.
Fishery management: Federal.
Mandates and authority to place observers: FCMA, MMPA.
Funding source: Federal (MMPA).
Vessel selection: Coverage is accomplished voluntarily. SEFSC selects and prioritizes vessels based on prior year's effort.
Program duration: 1990 - present.

Fishery Description, 1992:
Fleet size: 314 vessels actively fishing, 539 vessels permitted.
Seasons of fishery operation: approximately April-December.

Observer Program Management:
Contracted Services: contract for observer services with Manomet Bird Observatory (MBO). Observers hired, deployed and observer data entered by contractor.
In House service: All observers trained, certified and equipped by NMFS.
Schedule of sea days/trips by month and area provided by NMFS.

Observer Coverage, 1992:
Unit of effort: observed days fished; hauls.
Estimate of total effort: accomplished from logbooks at SEFSC.
Estimated observer coverage: 5%. Fourteen vessels and 21 trips observed; 300 sea days.

Estimate of Protected Species Taken Annually, 1992:
Observed number taken: marine mammals - 12.
Estimation method: not determined.
Coefficient of Variation: not determined.
Confidence Interval: not determined.
Mortality per FV day: not determined.

ATLANTIC PELAGIC EXPERIMENTAL TUNA PAIR TRAWL FISHERY

Patricia Gerrior, Coordinator

Observer Program Mission and Authority:
Mission of the program: to define experimental fishery and characterize marine mammal and sea turtle bycatch.
Fishery management: Federal.
Mandates and authority to place observers: MMPA, FCMA.
Funding source: Federal (MMPA and NMFS base funds).
Vessel selection: mandatory coverage.
Program duration: 1992 - present.

Fishery Description, 1992:
Fleet size: 15 permitted; 11 vessels fished.
Seasons of fishery operation: approximately June-November.

Observer Program Management:
Contracted Services: Observers hired, deployed and observer data entered by contractor (MBO).
In House service: NMFS staff placed on initial trip. Schedule of sea days/trips by month provided by NMFS. Vessels selected, and all observers trained, certified and equipped by NMFS.

Observer Coverage, 1992:
Unit of effort: not determined.
Estimate of total effort: not determined.
Estimated observer coverage: approximately 35%. Nine vessels and trips observed; 66 sea days.

Estimate of Protected Species Taken Annually, 1992:
Observed number taken: marine mammals - 12.
Estimation method: total takes not estimated.
Coefficient of Variation: not determined.
Confidence Interval: not determined.
Mortality per FV day: not determined.

ATLANTIC TUNA PURSE SEINE FISHERY

Patricia Gerrior, Coordinator

Observer Program Mission and Authority:
Mission of the program: to characterize fishery.
Fishery management: Federal.
Mandates and authority to place observers: FCMA.
Funding source: Federal (NMFS base funds).
Vessel selection: coverage is voluntary.
Program duration: 1993 - present.

Fishery Description, 1993:
Fleet size: 5 vessels.
Seasons of fishery operation: small fish: June - August; bluefin: August-October. Open until quota taken.

Observer Program Management:
Contracted Services: future effort will be covered by MBO contract observers.
In House service: since this is a new fishery for observer coverage, NMFS staff were deployed on two trips to gain first hand knowledge of fishery and develop data collection forms. NMFS provided schedule of sea days/trips by month. All observers trained, certified and equipped by NMFS.

Observer Coverage:
Unit of effort: not determined.
Estimate of total effort: not determined.
Estimated observer coverage: not determined. Two vessels and trips observed; 13 sea days. Coverage was scheduled for only the small fish (yellowfin and skipjack) portion of fishery.

Estimate of Protected Species Taken Annually, 1993:
Observed number taken: none.

ATLANTIC SCALLOP FISHERY

Patricia Gerrior, Coordinator

Observer Program Mission and Authority:
Mission of the program: to characterize fishery.
Fishery management: Federal.
Mandates and authority to place observers: FCMA.
Funding source: Federal (NMFS base funds).
Vessel selection: coverage is voluntary.
Program duration: 1992 - present.

Fishery Description, 1992:
Fleet size: 2811 vessels permitted.
Seasons of fishery operation: year round.

Observer Program Management:
Contracted Services: Observers hired, deployed and data entered by contractor (MBO).
In House service: All observers trained, certified and equipped by NMFS.
Schedule of sea days/trips by month and area provided by NMFS.

Observer Coverage, 1992:
Unit of effort: catch per 2 standard dredges per hour tow time.
Estimate of total effort: ratio estimate of standard observer effort per day absent X total weighout days absent; variance estimate to be determined, probable cluster sampling estimate.
Estimated observer coverage: less than 1%. Eleven vessels and trips observed; 186 sea days.

Estimate of Protected Species Taken Annually, 1992:
Observed number taken: none.

NEW ENGLAND SINK GILLNET FISHERY FOR GROUND-FISH

Patricia Gerrior, Coordinator

Observer Program Mission and Authority:
Mission of the program: to define fishery and characterize marine mammal bycatch.
Fishery management: Federal.
Mandates and authority to place observers: MMPA.
Funding source: Federal (MMPA).
Vessel selection: Coverage is mandatory, yet functionally voluntary.
Program duration: 1990 - present.

Fishery Description, 1992:
Fleet size - approximately 345 MMEP permitted; 217 different vessels sampled; 1190 trips and 1400 sea days.
Seasons of fishery operation: year round; some vessels participate seasonally with remaining effort in lobster and/or bottom longline fisheries.

Observer Program Management:
Contracted Services: contract for observer services with MBO. Observers hired, deployed and data entered by contractor.
In House service: Schedules of sea days by month and area provided by NMFS. All observers trained, certified and equipped by NMFS.

Observer Coverage, 1992:
Unit of Effort: number of trips from observer and NEFSC weighout data and total landings from NEFSC weighout data.
Estimate of total effort: not known.
Estimated observer coverage: 10%

Estimate of Protected Species Taken Annually, 1992:
Observed number taken: marine mammals - 98; all sea birds - 321.
Estimation method: Take per trip based on landings and trips estimators; (K/N) ratio of bycatch estimate to average abundance estimate.
Coefficient of Variation: K/N estimate - 22.7%
Confidence Interval: varied by season and area.
Mortality per FV day: not known.

ATLANTIC MULTISPECIES TRAWL FISHERY

Patricia Gerrior, Coordinator

Observer Program Mission and Authority:
Mission of the program: to characterize fishery.
Fishery management: Federal.
Mandates and authority to place observers: FCMA.
Funding source: Federal (NMFS base funding).
Vessel selection: Coverage is voluntary.
Program duration: 1989 - present.

Fishery Description, 1992:
Fleet size: 5,828 permitted vessels.
Seasons of fishery operation: year round.

Observer Program Management:
Contracted Services: contract for observer services with MBO. Observers hired, deployed and observer data entered by contractor.
In House service: all observers trained, certified and equipped by NMFS. Schedule of sea days/trips by month provided by NMFS. Individually contracted observers deployed by NMFS for special fluke trawl vessel coverage.

Observer Coverage, 1992:
Unit of effort: tows; towing time.
Estimate of total effort: not determined.
Estimated observer coverage: less than 5%.

Estimate of Protected Species Taken Annually, 1992:
Observed number taken: marine mammals - 3.
Estimation method: total takes not determined.
Coefficient of Variation: not determined.
Confidence Interval: not determined.
Mortality per FV day: not determined.

PELAGIC LONGLINE FISHERY FOR SWORDFISH AND TUNAS (YELLOWFIN AND BIGEYE)

Dennis Lee, Coordinator

Observer Program Mission and Authority:
Mission of the program: to define fishery and characterize marine mammal and sea turtle bycatch.
Fishery management: Federal.
Mandates and authority to place observers: FCMA.
Funding source: Federal (MMPA).
Vessel selection: random.
Program duration: early 1992 to present.

Fishery Description, 1992/1993:
Fleet size: 314 vessels reported longline sets in 1992, 325 vessels reported in 1993.
Seasons of fishery operation: year round. Due to FMP regulations, some species are controlled by quotas and when these quotas are reached their fishery may be closed (i.e., bluefin tuna, large coastal sharks).

Observer Program Management:
Fishery observer coverage is in U.S. Exclusive Economic Zone of the northwestern Atlantic Ocean, from the Grand Banks to the Caribbean, and the Gulf of Mexico. Coverage is coordinated between the Southeast Fisheries Science Center (NMFS Miami Laboratory) and that of the Northeast Fisheries Science Center (NMFS, Woods Hole Laboratory), accordine to the longline sampling plan. The Pelagic Longline Observer Program (PLOP) is responsible for a 5% coverage of the longline fleet over all areas and within each defined geographical area (SE east coast, Gulf of Mexico, and Caribbean).
Contracted Services: 4 contracted observers in the field, and 3 observers through LSU contract under MARFIN funding.
In House service: NMFS has 5 full time observers. NMFS conducts all observer training and is responsible for the entry of observer data.

Observer Coverage, 1992/1993:
Unit of effort: sets, mainline length, and number of hooks set.
Estimate of total effort: 10,010 sets were estimated from pelagic logbook submission in the Southeast Region, with an overall estimate for all areas of the NW Atlantic Ocean of 15,796 sets. Estimation of number of sets for 1993 is not currently available. (no variance estimation procedure derived).
Estimated observer coverage to date: for 1992, 171 sets were observed in three quarters and coverage achieved was 1.3%, 1.7%, and 5.6% for quarters 2, 3, and 4, respectively. In 1993, 295 sets were observed and coverage achieved was 4.6%, 4.9%, 5.6%, and 7.0% for quarters 1-4, respectively.

PELAGIC LONGLINE FISHERY FOR SWORDFISH AND TUNAS (YELLOWFIN AND BIGEYE) - CONTINUED

Estmate of Catch and Protected Species Taken Annually (3 quarters of 1992 and 2 quarters of 1993):
Observed number taken: 53 fish species (swordfish, tunas, sharks, rays, and finfish); 6 marine mammals (Risso's dolphins and pilot whales); 29 marine turtles (loggerhead, green, leatherback, and unidentified turtles).
Estimation method: total take not determined.
Coefficient of Variation: not determined.
Confidence Interval: not determined.
Marine Mammal Mortality per FV day: not determined.

SHARK DRIFT GILLNET FISHERY

Lee Trent, Coordinator

Observer Program Mission and Authority:
Mission of the program: to define shark drift gillnet fishery and characterize marine mammal and sea turtle bycatch.
Fishery management: Federal.
Mandates and authority to place observers: FCMA.
Funding source: Federal (MMPA).
Vessel selection: mandatory, selection by center (nearly all vessels in fishery are observed).
Program duration: July, 1993 - present.

Fishery Description, 1993:
Gillnet gear is 0.5 to 2.0 miles long and about 40 feet deep. Fishery operates near coastal shelf off Georgia and east Florida. Fishery targets all 4 species of small coastal shark management group (blacknose, Atlantic sharpnose, finetooth, and bonnethead) and 6 of the 22 species of the large coastal shark management group (blacktip, scalloped hammerhead, spinner, bull, sandbar, and sand tiger).
Fleet size: up to 12 vessels.
Seasons of fishery operation: Under quota management the seasons on coastal sharks opens on January 1 and July 1 and each season is expected to last 1-2 months. Although small coastal sharks are not presently under quota management it appears that it will be difficult for fishermen to fish profitably when the season on large coastal sharks is closed and individuals of these species are discarded.

Observer Program Management:
Observers so far have been intermittent NMFS biologists. Three addition NMFS observers will be hired prior to January 1 and trained by our laboratory staff who will provide coordination, scientific guidance, data management and processing support.

Observer Coverage, 1993:
Unit of fishing effort: will be a standard net section fished for one hour.
Estimates of total effort and observer coverage are not yet available.

Estimate of Protected Species Taken Annually, 1993:
No protected species takes in 6-7 sets observed in 1993.

SOUTHEASTERN SHRIMP OTTER TRAWL FISHERY

James M. Nance, Liz Scott, Coordinators

Observer Program Mission and Authority:
Mission of the program: to characterize shrimp trawl bycatch and evaluate various gear types for the reduction of bycatch (particularly red snapper).
Fishery management: Federal.
Mandates and authority to place observers: FCMA.
Funding source: Federal (MARFIN).
Vessel selection: fishermen take observers on a voluntary basis.
Program duration: 1991 - present.

Fishery Description, 1992/1993:
Fleet size: about 7,000 USCG documented vessels and an unknown number of State registered boats.
Seasons and duration of fishery openers: year around; main fishery is from May through December.

Observer Program Management:
Two coordinated observer programs:
Contracted Services: 8 individuals contracted and supervised by Gulf and South Atlantic Fishery Development foundation, Inc. (Foundation). All observers are trained by contract with Texas A&M University.
In House services: 7 NMFS employees supervised by NMFS. Vessels are located through Sea Grant agents, NMFS port agents, Foundation contacts and fishery associations. Each observer group (i.e., NMFS or Foundation) is responsible to get observer to port of departure.

Observer Coverage, 1992/1993:
Unit and Definition of Effort: hours of trawling (nets in the water fishing).
Estimate of Total Effort: about 6 million hours. Estimate is made by average catch per unit of effort for an area (based on dock side trip interviews by NMFS port agents) and total pounds for an area (based on data collection at seafood dealers by NMFS port agents).
Estimate of observer coverage: <1%.

Estimate of Protected Species Taken Annually:
No estimates to date.
Occasional takes of sea turtles. Finfish bycatch includes red snapper, groundfish, with Atlantic croaker and longspine porgy being the dominant species both in number and by weight for the Gulf of Mexico (May 1992 - April 1993).

EASTERN TROPICAL PACIFIC TUNA PURSE SEINE FISHERY

Norman A. Mendes, Manager

Mandatory observers have been fielded from 1976 to present. Authorities: Marine Mammal Protection Act of 1972 As Amended, Endangered Species Act of 1973 As Amended, Dolphin Protection Consumer Information Act, and International Dolphin Conservation Act.

Protected Species Bycatch :
All small cetaceans used by fishermen to locate tuna, especially spotted (*Stenella attenuata*), spinner (*S. longirostris*), and common dolphins (*Delphinus delphis*). Mortalities result from net entanglement. Sea turtle species also may be encircled, but most are released alive.

Fishery Description :
No seasons, the fishery is year-round. In 1976, 155 vessels were active. Today, eight vessels are observed. Three actively fish for tuna associated with dolphin. The remainder pursue tuna without marine mammal involvement.

Observer Program Type :
The Southwest Region continuously has managed this mandatory observer program for over 17 years. Upon medical clearance, all observers are hired as direct Federal employees and receive four weeks of formal training. To date, more than 480 biological technicians have been employed and 1,319 trips observed. Currently, a staff of six biologists and two administrative assistants support two other observer programs and 15 tuna-dolphin observers in all aspects of training and placement. Observers predominately travel to Central America for vessel assignments. Trips typically last 60 to 90 days.

Observer Coverage:
Current observer coverage is mandated at 100 percent. Marine mammal mortalities are tracked against quotas and skipper performance standards. Estimates of mortality are calculated weekly from observer radio reports. Total effort and observer coverage are known.

Estimate of Animals Taken Annually :
For the calendar year 1992, observer coverage was 99 percent and total estimated marine mammal mortality 439. The 1992 take per day was 0.2091. The fishery changed drastically in 1990, when canners adopted their "dolphin safe" policy of not accepting tuna caught in association with marine mammals.
Vessel departures and arrivals are tracked to determine the number of vessel-days at sea. The average observed fleet take per day times the total vessel days at sea yields the overall marine mammal mortality estimate. The Southwest Fisheries Science Center receives observer data and maintains the database to calculate official estimates and produce technical report.

CALIFORNIA SET GILLNET FISHERY TARGETING CALIFORNIA HALIBUT, ANGEL SHARK, WHITE SEABASS, SOUPFIN SHARK, AND YELLOWTAIL

Norman A. Mendes, Manager

Mandatory observers have been fielded from July 1990 to present. This is a Category I Fishery in the Marine Mammal Exemption Program established by the Marine Mammal Protection Act of 1972 As Amended.

Protected Species Bycatch :
California sea lions, northern elephant seals, and harbor seals. Bycatch Involvement Only: harbor porpoise, sea otters, sea turtles, especially loggerhead turtles, cormorants, and common murres.

Fishery Description :
Fishery open year-round. Boats are subject to permit, logbook and observer requirements under Marine Mammal Exemption Program. Exemption Certificates are held by 146 boats, but only about 80 are active.

Observer Program Type :
The Southwest Region has managed this mandatory observer program since July 15, 1990. All observers are hired as direct Federal employees and receive three weeks of formal training. To date, 46 biological technicians have been hired and 2,474 trips completed in which 7,742 net pulls were observed.

Five Port Field Stations, established at central and southern California ports, are supervised by a senior staff biologist who serves as the Coastal Coordinator. Local Port Coordinators currently monitor boat movement and arrange placements for 10 observers. Observers are assigned to each station and usually observe boats only from that port. Boats too small or unsafe are observed from one of two sea going alternate platforms. Trips typically last one day.

Observer Coverage :
Observer coverage was 13% of the fishing days in 1992.

Estimate of Animals Taken Annually - Marine Mammals, 1992:
Estimation method: mean-per-unit estimators with days as the sampling unit. Analytical variances are estimated.
Estimated number taken in 1992: 68 cetaceans of at least 3 species, 4564 pinnipeds of at least 3 species.
Coefficients of variation: from 0.26 for the most common species to 1.0 for the least common.
Confidence intervals - not determined
Mortality per vessel fishing day: 0.85

CALIFORNIA DRIFT GILLNET FISHERY TARGETING SWORDFISH AND THRESHER SHARK

Norman A. Mendes, Manager

Mandatory observers have been fielded from July 1990 to present. This is a Category I Fishery in the Marine Mammal Exemption Program established by the Marine Mammal Protection Act.

Protected Species Bycatch :
California sea lions and northern elephant seals.
Bycatch Involvement Only: common dolphin, Risso's dolphin, Dall's porpoise, Pacific white-sided dolphin, northern right whale dolphin, various beaked whales, and sea turtles, especially leatherbacks and loggerheads.

Fishery Description :
The fishery is closed 200 miles off the coast of California from February 1 to April 30. From May 1 to August 14 the closure changes to 75 miles offshore. Most fishing occurs between August 15 and January 31, when closure restrictions are lifted. Boats are subject to permit, logbook, and observer requirements under Marine Mammal Exemption Program Regulations. Exemption Certificates are held by 147 boats, but only about 113 are active.

Observer Program Type :
The Southwest Region has managed this mandatory observer program since July 15, 1990. Upon medical clearance, all observers are hired as direct Federal employees and receive three weeks of formal training. To date, 47 biological technicians have been hired and 292 trips completed in which 1,552 net pulls were observed.

A staff biologist who serves as the Driftnet Coordinator currently monitors boat activity and determines placements for 14 observers. Port Coordinators at coastal locations assist by tracking boat movement. Boats too small or unsafe are observed from an alternate platform. Trips typically last 6 to 20 days.

Observer Coverage:
Observer coverage was 13% of the fishing days in 1992.

Estimate of Animals Taken Annually - Marine Mammals, 1992:
Estimation method: Ratio estimators with trips as the sampling unit and days-per-trip as auxiliary variable. Analytical variances are estimated.
Estimated number taken in 1992: 601 cetaceans of at least 10 species, 190 pinnipeds of at least 3 species.
Coefficients of variation: from 0.19 for the most common species to 1.0 for the least common.
Confidence intervals - not determined
Mortality per vessel fishing day: 0.18

NORTH CENTRAL PACIFIC OCEAN PELAGIC LONGLINE FISHERY TARGETING BILLFISHES AND TUNAS

Norman A. Mendes, Manager

Observed longline trips currently are voluntary, but through a recent amendment to the pelagic fishery management plan established under the Magnuson Fishery Conservation and Management Act. Mandatory observers soon will be required. Other Authorities: Endangered Species Act of 1973 As Amended, Marine Mammal Protection Act of 1972 As Amended.

Protected Species Bycatch :
All sea turtles, especially greens (*Chelonia mydas*), leatherbacks (*Dermochelys coriacea*) and loggerheads (*Caretta caretta*). Lesser Involvement: Hawaiian monk seals (*Monachus schauinslandi*), a few whale and dolphin species, plus some sea birds, such as the albatross (*Diomedea immutabilis*), Black-footed albatross (*D. nigripes*), and Brown booby (*Sula leucogaster plotus*).

Fishery Description :
No seasons, the fishery is year-round. Federal management measures, already in place, include a limited entry permit program, logbook reporting requirements, and area closures to protect Hawaiian monk seals. In 1992, there were 166 Federally permitted longline vessels registered in Hawaii, but only about 123 were active.

Observer Program Type :
The Southwest Region has fielded voluntary observers since 1990. Upon medical clearance, observers are hired as direct Federal employees. To date, seven biological technicians have been hired and two trips completed.

Currently there are three observers covering the longline fleet. The Port Coordinator with the advice of the Hawaii Program Coordinator determines observer placements. Trips typically last 14 to 42 days.

The Regional Office is transferring the responsibility for the longline observer program from the Pacific Area Office to Long Beach, California. The transition is to be completed by the time regulations are in effect to implement the mandatory observer program recommended by the Western Pacific Fisheries Management Council.

Observer Coverage :
Mandatory observer coverage is proposed at 10 percent. A unit of effort is defined as the number of hooks per set.

Estimate of Animals Taken Annually :
The Pacific Area Office of the Southwest Region receives observer data to calculate official estimates and produce technical reports. No estimates from observed trips.

NORTHWESTERN HAWAIIAN ISLANDS BOTTOMFISH FISHERY TARGETING VARIOUS SPECIES, ESPECIALLY SNAPPERS AND JACKS

Norman A. Mendes, Manager

Mandatory observers have been fielded from July 1991 to present through a bottomfish fishery management plan established under the Magnuson Fishery Conservation and Management Act. Other Authorities: Marine Mammal Protection Act of 1992 As Amended. Endangered Species Act of 1973 As Amended.

Protected Species Bycatch :
Hawaiian monk seal (*Monachus schauinslandi*), spinner dolphin (*Stenella longirostris*), bottlenose dolphin (*Tursiops truncatus*), humpback whale (*Megaptera novaeangliae*), Laysan albatross (*Diomedea immutabilis*), Black-footed albatross (*D. nigripes*), and booby (*Sula sp.*).

Fishery Description :
No seasons, the fishery is year-round. Federal management measures, already in place, include vessel reporting requirements, mandatory observer coverage and area closures to protect Hawaiian monk seals. In 1992, there were 30 bottomfish boats in Hawaii, but only 6 were active.

Observer Program Type :
Upon medical clearance, all observers are hired as direct Federal employees. From the inception of the program to date, seven biological technicians have been hired and 26 trips completed.

Currently there are three observers covering the bottomfish fleet. The Port Coordinator with the advice of the Hawaii Program Coordinator determines observer placements. Trips typically last 10 to 21 days.

The Regional Office is transferring the responsibility for the bottomfish observer program from the Pacific Area Office to Long Beach, California. The transition is to be completed by the time regulations are in effect to implement the mandatory longline observer program recommended by the Western Pacific Fisheries Management Council.

Observer Coverage :
Observer coverage is mandated at 30 percent. A unit of effort is defined as fishing time plus search time. From October 1990 to June 1992 eight trips observed which averaged 10.8 hours of fishing. Total of 412.5 hours of fishing effort.

Estimate of Animals Taken Annually :
The Pacific Area Office of the Southwest Region receives observer data to calculate official estimates and produce technical reports. Twelve monk seal and 17 bottlenose dolphin interactions observed.

NORTHERN WASHINGTON MARINE CHINOOK SALMON SET-NET FISHERY

Joe Scordino, NWR Coordinator; Pat Gearin, Alaska Fisheries Science Center; and Steve Joner, Makah Tribe

Observer Program Mission and Authority:
Mission of the program: to characterize marine mammal bycatch.
Fishery management: tribal.
Mandates and authority to place observers: MMPA.
Funding source: Federal (MMPA).
Vessel selection: random selection of vessels as they depart for fishing.
Program duration: 1989 - 1993.

Fishery Description, 1992:
Fleet size: actual fishing conducted by 4-12 vessels per year; however, as many as 18-20 tribal vessels have registered for this fishery.
Seasons of fishery operation: May to September each year. Fishery is continuously open during season.

Observer Program Management:
Cooperative program between NMFS and treaty Indian tribe involving 1 to 5 NMFS biologists and 1 to 2 tribal fisheries technicians (observers). Data entry, analysis and reports are prepared jointly by NMFS and tribal biologists.

Observer Coverage, 1992:
Unit of effort: effort is in "net days" fished where one net day equals one 100 fathom net set for 24 hours.
Estimate (& method) of total fishing effort: 332 net days fished. Total effort derived by determining total number of nets set x length x time set. Number of nets is derived by actually counting individual nets daily in the fishery during observer vessel surveys.
Estimate (& method) of observer coverage: number of net days observed/total net days fished was 264/331 = 80%. From 27% to 80% of fishing effort was observed from 1989 to 1992.

Estimate of Protected Species Taken Annually, 1992:
Estimated number of harbor porpoise taken = 0. Estimated number of harbor seals taken = 12.5.
Estimation method: extrapolation based on bootstrapping the mean take per net day derived from the observed takes by fishery observers. Standard error and coefficient of variation of the mean take rate also derived by bootstrap method.
Coefficient of Variation: 0.311.
Confidence Interval: 95% C.I. 4.75 to 20.33.
Mortality per Net Day: 0.038.

COLUMBIA RIVER SALMON GILLNET FISHERY

Joe Scordino, NWR Coordinator; Steve Jeffries, Washington Department of Wildlife; and Robin Brown, Oregon Department of Fish and Wildlife

Observer Program Mission and Authority:
Mission of the program: to characterize marine mammal bycatch.
Fishery management: State.
Mandates and authority to place observers: MMPA.
Funding source: Federal (MMPA).
Vessel selection: random selection of vessels as they depart for fishing or while on the water.
Program duration: 1991 - 1993.

Fishery Description, 1992:
Fleet size: 800+ vessels.
Seasons of fishery operation: Winter chinook season (spring chinook) and fall chinook and coho salmon seasons. Duration of openers usually 4 to 5 days per week, but as low as 12 hours.

Observer Program Management:
Cooperative program between NMFS and the States through the Pacific States Marine Fisheries Commission. Involved about 42 observers and biologists during each season in 1991 and 1992. Project leader and State coordinators prepare seasonal summary reports.

Observer Coverage, 1992:
Unit and definition of fishing effort: effort is based on number of drifts. A drift is defined as the time from when the net is deployed until it is retrieved which averages 1+ hours of soaktime.
Estimation of total effort: total effort is derived by extrapolating observed catch of salmon per drift to the total salmon catch during the season; estimated at 16,256 drifts.
Estimated observer coverage: based on observed drifts/total estimated drifts which was 9.5% in 1992.

Estimate of Protected Species Taken Annually, 1992:
Estimated total number of harbor seals taken = 217. Estimated number of California sea lions taken = 28.
Estimation method: based on extrapolating observed take per drift to total number of drifts.
Coefficient of Variation: stratified by area; 0.32 in Zone 1 and 0.45 in Zone 2.
Confidence Interval: N/D
Mortality per Drift: 0.012

WILLAPA BAY SALMON GILLNET FISHERY

Joe Scordino, NWR Coordinator; Steve Jeffries, Washington Department of Wildlife; and Robin Brown, Oregon Department of Fish and Wildlife

Observer Program Mission and Authority:
Mission of the program: to characterize marine mammal bycatch.
Fishery management: State.
Mandates and authority to place observers: MMPA.
Funding source: Federal.
Vessel selection: random selection of vessels as they depart for fishing or while on the water.
Program duration: 1991 - 1993.

Fishery Description:
Fleet size: 300+ vessels.
Seasons of fishery operation: summer and fall chinook and coho salmon seasons. Usually 4 to 5 days per week, but as low as 12 hours at times.

Observer Program Management:
Cooperative program between NMFS and the States through the Pacific States Marine Fisheries Commission. Involved about 12 to 15 observers and biologists during each season in 1991 and 1992. Project leader and State coordinators prepare seasonal summary reports.

Observer Coverage, 1992:
Unit and definition of effort: effort is based on number of drifts. A drift is defined as the time from when the net is deployed until it is retrieved which averages 1+ hours of soak time.
Estimation of total effort: total effort is derived by extrapolating observed catch of salmon per drift to the total salmon catch during the season.
Estimate of total effort: in process of recalculation due to refined catch data.
Estimated observer coverage: based on observed drifts/total estimated drifts.

Annual Estimate of Protected Species Taken Annually, 1992:
Estimated total number of harbor seals taken = 0.
Estimation method: based on extrapolating observed take per drift to total number of drifts.
Coefficient of Variation: N/A.
Confidence Interval: N/A.
Mortality per Drift: 0.

GRAYS HARBOR SALMON DRIFT AND SET GILLNET FISHERY

Joe Scordino, NWR Coordinator; Steve Jeffries, Washington Department of Wildlife; and Robin Brown, Oregon Department of Fish and Wildlife

Observer Program Mission and Authority:
Mission of the program: to characterize marine mammal bycatch.
Fishery management: State.
Mandates and authority to place observers: MMPA.
Funding source: Federal.
Vessel selection: random selection of vessels as they depart for fishing or while on the water.
Program duration: 1991 - 1993.

Fishery Description:
Fleet size: 300+ non-Indian and tribal vessels. Summer chinook and fall chinook and coho salmon seasons.
Seasons of fishery operation: winter set-net steelhead season. Summer fisheries are non-Indian, while fall fisheries consist of tribal driftnet fisheries in Bay, non-Indian drift net fisheries (scheduled at separate times), and tribal set-net fisheries in rivers and estuaries. Usually 4 to 7 days per week, but as low as 12 hours at times.

Observer Program Management:
Cooperative program between NMFS and the States through the Pacific States Marine Fisheries Commission. Involved about 12 to 15 observers and biologists during each season in 1991 and 1992. Project leader and State coordinators prepare seasonal summary reports.

Observer Coverage, 1992:
Unit and definition of effort: effort is based on number of drifts. A drift is defined as the time from when the net is deployed until it is retrieved which averages 1+ hours of soak time.
Estimation of total effort: total effort is derived by extrapolating observed catch of salmon per drift to the total salmon catch during the season. In process of recalculation due to refined catch data.
Estimated observer coverage: based on observed drifts/total estimated drifts.

Annual Estimate of Protected Species Taken, 1992:
Estimation method: Based on extrapolating observed take per drift to total number of drifts.
Estimated total number of harbor seals taken = 1 observed.
Coefficient of Variation: N/D.
Confidence Interval: N/D.
Mortality per Drift: N/D.

SHORESIDE PACIFIC WHITING FISHERY

Joe Scordino, NWR Coordinator; Mark Saelens and Bill Barss, Oregon Department of Fish and Wildlife

Observer Program Mission and Authority:
Mission of the program: to determine incidence of salmon bycatch.
Fishery management: Federal.
Mandates and authority to place observers: FCMA.
Funding source: Federal (NMFS base funds).
Vessel selection: scheduled in advance with processing plant, based on availability of observer.
Program duration: 1992 - present.

Fishery Description, 1992:
Fleet size: 20-25 vessels.
Seasons of fishery operation: continuously open March through October.

Observer Program Management:
Cooperative State/Federal/industry program for on board and shoreside observation and sampling of catch. Industry provides direct funding for on board and shoreside observers in some areas, while States provide staff for sampling in other areas. NMFS and the State cover coordination, training, data processing and analysis costs. NMFS issues Experimental Fishing Permits for implementation of program. Observers and State biological staff involved varies with fishing effort.

Observer Coverage, 1992:
Unit and definition of effort: fishing effort is based landed catch of Pacific whiting.
Estimation of total fishing effort: total effort is obtained directly from State Fish Tickets. About 55,000 metric tons of whiting were caught by vessels delivering shoreside.
Estimated observer coverage: based on mt observed; 46% of the whiting catch was observed (184 at-sea observed trips and 424 shoreside observed landings of unsorted catch).

Estimate of Protected Species Taken Annually, 1992:
No marine mammals have been observed taken in this fishery. Salmon bycatch rate of 0.011 salmon per mt of whiting.

PACIFIC SALMON TREATY ALL-CITIZEN SALMON DRIFTNET AND PURSE SEINE FISHERY

Joe Scordino and Bob Vreeland, NWR Coordinator; Bill Ritchie, Washington Depatment of Wildlife; Jeff June, Natural Resource Consultants

Observer Program Mission and Authority:
Mission of the program: primarily to characterize incidental take of marbled murrelets, a species listed under ESA. Marine mammal bycatch is recorded also.
Fishery management: Federal.
Mandates and authority to place observers: MMPA, ESA.
Funding source: Federal (MMPA).
Vessel selection: voluntary.
Program duration: Pilot program in 1993.

Fishery Description, 1993:
Fleet size: 1100 gillnet vessels and 300+ purse seine vessels.
Seasons of fishery operation: July - November. Duration of openers 11-21 hours; 1-5 days per week.

Observer Program Management:
Cooperative NMFS/WDW/USFWS pilot program involving one State biologist and 5 to 10 observers in the all-citizen (non-tribal) gillnet fishery. Observations in the purse seine fishery are under an industry funded contract to Natural Resource Consultants (NRC). Separately, the treaty Indian tribes through the Bureau of Indian Affairs and the Northwest Indian Fisheries Commission are conducting observations in tribal gillnet fisheries. Non-Indian pilot observation program is dictated by an ESA Biological Opinion issued to NMFS by USFWS.

Observer Coverage, 1993:
Unit and definition of effort: N/D*
Estimation of total fishing effort: N/D*
Estimated observer coverage: N/D*

Annual Estimates:
Estimation method - N/D*
Estimated total number - N/D*
Coefficient of Variation - N/D*
Confidence Interval - N/D*
Mortality per Drift - N/D*

*NOTE - 1993 is the first year of this observer program. It is a pilot program to collect some data on seabird bycatch, but more to collect data needed to assist in developing sampling design and logistical plans for future years observations.

NORTH PACIFIC & BERING SEA GROUNDFISH, TRAWL & FIXED GEAR FISHERY

Bill Karp, Task Leader

Observer Program Mission and Authority:
Mission of the program: to define fishery and characterize marine mammal bycatch.
Fishery management: Federal.
Mandates and authority to place observers: FCMA, MMPA.
Funding source: direct observer costs (industry funded) = $7 million/year.
NMFS operational costs (government funded) = $1.6 million/year.
Vessel selection: mandatory (see observer coverage).
Program duration: 1973 to present. Originally monitored foreign fishing vessels, now 100% domestic.

Fishery Description:
Fleet size: 400 vessels and 30 shore plants.
Seasons of fishery operation: year-round (closures subject to target/bycatch quota limits).

Observer Program Management:
Contracted services: 6 contractors hire & deploy over 600 observers/year.
In house responsibilities: 5 NMFS staff handle training/briefing/gear for majority of observers (some are trained/briefed at Univ. of Alaska-Sea grant), 6 NMFS staff debrief observers, 3 NMFS staff operate two field offices (Kodiak & Dutch Harbor), 9 NMFS staff control program operations, and 14 NMFS staff handle data management (editing, entry, estimations, summary, messages, logistics).

Observer Coverage:
Vessels 125 ft or longer = 100% coverage of fishing days.
Vessels 60 - 124 ft = 30% coverage of fishing days.
Shore plants processing >1,000 mt/mo. = 100% coverage of processing days.
Shore plants processing >500 mt/mo. = 30% coverage of processing days.

Estimate of Protected Species Taken Annually in the Groundfish Trawl Fishery, 1992 (95% confidence interval):
Northern sea lion: (16 to 33)
Walrus: (4 to 10)
Northern fur seal: (3 to 8)
Pac. white-sided dolphin: (1 to 4)
Ringed seal: (2 to 6)
Killer whale: (1 to 4)
Harbor seal: (3 to 8)
Dall's porpoise: (5 to 13)

PRINCE WILLIAM SOUND SALMON DRIFT GILLNET FISHERY

Brad Hanson, Coordinator

Observer Program Mission and Authority:
Mission of the program: to estimate marine mammal bycatch.
Fishery management: State.
Mandates and authority to place observers: MMPA.
Funding source: Federal (MMPA).
Vessel selection: opportunistic placement by the contractor.
Program duration: 1990-1991.

Fishery Description:
Fleet size: 519 permit holders.
Seasons of fishery operation - Mid-May to mid-October. 1-2 openers per week, usually 24 or 48 hours, up 168 hours long.

Observer Program Management:
Contracted services: Alaska Region contracted to Saltwater, Inc.
Observer hiring and training - conducted by contractor for 24 observers, approved by COTR. Contractor deployed observers to 6 contracted research vessels and active fishing vessels from using 2 port coordinators based in Cordova. 1 scientific advisor handled sampling regime, and 2 data management personnel provided data entry and QA/QC.

Observer Coverage:
Unit and definition of effort-set: net set, soak, and retrieval
Estimate of total effort: total number of sets estimated weekly based on observed # of sets made/available number of fishing hours observed X sum (maximum available fishing hours X actual number of fishing days). No variance estimation procedure identified)
Estimate of total effort: 116,000 sets annually (no variance estimation procedure derived)
Estimated observer coverage: # sets observed/totals number of estimated sets ~5.0%.

Number of Protected Species Taken Annually, 1991:
Estimation method: extrapolation based on negative binomial - # of observed deaths/#observed sets to total estimated number ofsets - 0.1% (variance not estimated).
Estimated number taken annually: all species - 83.
Coefficient of Variation: not determined.
Confidence Interval: negative binomial 95% CI - 7 to 296.
Mortality per FV day: 1:230.

NORTH PACIFIC HIGH SEAS DRIFTNET FISHERY, TARGETING NEON FLYING SQUID (SQUID DRIFTNET) AND BILLFISH AND ALBACORE TUNA FISHERY (LARGE MESH DRIFTNET); U.S., CANADA, JAPAN, KOREA, AND TAIWAN

Jim Coe, Linda Jones, Mike Dahlberg, Jerry Wetherall, Russ Nelson, NMFS; Pat Gould, U.S. Fish and Wildlife Service; U.S. Program Managers

Observer Program Mission and Authority:
Mission of the program: to collect accurate and reliable data describing the foreign high seas large-scale drifnet fleets.
Fishery management: Federal.
Mandates and authority to place observers: MFCMA and the Drifnet Impact Monitoring Assessment and Control Act of 1987.
Funding source: Federal and international.
Vessel selection: at the discretion of the host nation.
Program duration: the fishery began in the late 1970's, and ended 31 December 1992.

Fishery Description:
Fleet size: varied.
Seasons of fishery operation - Squid driftnet: Japan, June through December; Korea and Taiwan, May through December. Peak fishing occurred in August. Large mesh driftnet: Japan, September through June. Taiwan, May through December.The northern border of the fishery changes monthly during the season, from 38° N to 46° N and approximates the 30-year average of the 15°C isotherm in order to reduce salmonid bycatch. Japan fishes from 145°W to 170°E, Korea and Taiwan fish from 145°W westward to Japan. There are strong time/area changes in fleet operations.

Observer Program Management:
Observers from 5 nations were deployed to vessels. The Japanese fleet hosted Japanese, Canadian, and U.S. observers. The Korean fleet hosted Korean and U.S. and the Taiwanese fleet hosted Taiwanese and U.S. observers. The U.S. program operated in conjunction with an observer contractor. The contractor handled observer hiring, travel, logistics, salaries, and observer oversight. NMFS conducted observer training, debriefing, and data QA/QC and management. The Canadian program operated jointly between the Department of Fisheries and Oceans and an Observer Contractor. Japan, Korea, and Taiwan all hired observers directly.

Coordination between the field programs was achieved through start-up meetings, common sampling techniques and protocols, exchange of training materials, joint training held by the U.S. and Canada, participation by each nations scientific staff in foreign training sessions, exchange of data, and end-of-season joint scientific data review meetings.

Unofficial

NORTH PACIFIC HIGH SEAS DRIFTNET FISHERY, TARGETING NEON FLYING SQUID (SQUID DRIFTNET) AND BILLFISH AND ALBACORE TUNA FISHERY (LARGE MESH DRIFTNET); U.S., CANADA, JAPAN, KOREA, AND TAIWAN - CONTINUED

Observers travelled to ports in Japan, Korea, and Taiwan and boarded fishing vessels or transport vessels to travel to the grounds. In 1991, Japanese squid vessels hosted 61 observers (30 U.S., 21 Japanese, and 10 Canadian), Korean vessels 23 (10 U.S. and 13 Korean), and Taiwanese 19 (8 U.S. and 11 Taiwanese).

Observer Coverage:
Unit and definition of effort: net panels. Driftnets are constructed by joining net panels of 30-60 meters end to end to create a full net section. Vessels typically deploy nets all composed of similar net panels. For reporting purposes, the number of net panels set or observed are standardized to 50 m lengths.
Total effort: reported as commercial fishing statistics by each host nation. 1991 total effort, Japan = ca. 21.8 million net panels. Korea = ca. 20.4 million. Taiwan = ca. 4.4 million.
Estimated observer coverage, 1991: # net panels observed/total net panels reported set. Japan = 10.0%, Korea = 2.1%, Taiwan = 3.1%.

Annual Bycatch:
Observed bycatch: in the 1991 Japanese, Korean and Taiwanese squid fisheries the total observed bycatch, all fisheries combined, was: marine mammals = 2,454; birds = 19,447; turtles = 200; fishes = 2,341,997. Note that large time/area differences exist among these fisheries and bycatch is not proportional to effort.
Estimated Bycatch (marine mammals): estimation method: both ratio and cross-validated kernel techniques were explored by Larntz and Garrott (report in preparation). The cross-validated kernel estimated total bycatch (all squid fisheries) in 1991 for the combined species northern fur seal, Dall's porpoise, northern right whale dolphin, Pacific white-sided dolphin, and common dolphin was 26,990.

BRITISH COLUMBIA JIGGING FISHERY FOR NEON FLYING SQUID

Barry Ackerman, Canada Department of Fisheries and Oceans; Howard McElderry, Archipelago Marine Research Ltd.

Observer Program Mission and Authority:
Mission of the program: independent monitoring, biological sampling
Fishery management: Federal
Mandates and Authority to Place Observers: Federal Fisheries Regulations
Funding Source: Industry
Observer Placement: Contractor
Program Duration: 1990-1991

Fishery Description:
Fleet Size: 1- 6 foreign ships
Seasons of Operation: Summer

Observer Program Management:

Contracted Services:	Training and Certification
	Scheduling
	Information Processing
In house Services:	Technical Requirements
	Data Analysis

Observer Coverage:
Unit of Effort: observer day at sea
Estimate of Total Effort:
Estimated Observer Coverage: 100%

Estimate of Protected Species Taken Annually:
Observed Number Taken: not objective of program

BRITISH COLUMBIA JOINT VENTURE HAKE FISHERY

Barry Ackerman, Canada Department of Fisheries and Oceans; Howard McElderry, Archipelago Marine Research Ltd.

Observer Program Mission and Authority:
Mission of the program: independent monitoring, regulations monitoring, biological sampling
Fishery management: Federal
Mandates and Authority to Place Observers: Federal fisheries regulations
Funding Source: industry
Observer Placement: contractor
Program Duration: 1987- 1993

Fishery Description:
Fleet Size: 8-18 factory trawlers
Seasons of Operation: summer

Observer Program Management:

Contracted Services:	Training and Certification
	Scheduling
	Information Processing
In house Services:	Technical Requirements
	Data Analysis

Observer Coverage:
Unit of Effort: Observer day at sea
Estimate of Total Effort:
Estimated Observer Coverage: 100%

Estimate of Protected Species Taken Annually:
Observed Number Taken: Not Objective of Program

BRITISH COLUMBIA HIGH SEAS SQUID DRIFTNET FISHERY

Barry Ackerman, Canada Department of Fisheries and Oceans; Howard McElderry, Archipelago Marine Research Ltd.

Observer Program Mission and Authority:
Mission of the program: independent monitoring, biological sampling
Fishery management: Japanese government
Mandates and Authority to Place Observers: Federal fisheries regulations
Funding Source: Canadian government
Observer Placement: contractor/Japan fisheries agency
Program Duration: 1989-1991

Fishery Description:
Fleet Size: >500 ships
Seasons of Operation: May to December

Observer Program Management:

Contracted Services:	Training and Certification
	Scheduling
	Information Processing
In house Services:	Technical Requirements
	Data Analysis

Observer Coverage:
Unit of Effort: observer day at sea
Estimate of Total Effort: N/A
Estimated Observer Coverage: <10%

Estimate of Protected Species Taken Annually:
Estimation Method: information on marine mammal bychtch from this fishery has been reported in several reports produced by the International North Pacific Fisheries Commission.

BRITISH COLUMBIA BOTTOM TRAWL FISHERY

Barry Ackerman, Canada Department of Fisheries and Oceans; Howard McElderry, Archipelago Marine Research Ltd.

Observer Program Mission and Authority:
Mission of the program: independent monitoring, biological sampling
Fishery management: Federal
Mandates and Authority to Place Observers: Federal fisheries regulations
Funding Source: Canadian government
Observer Placement: DFO/Contractor
Program Duration: 1990-1993

Fishery Description:
Fleet Size: 140 fishing vessels
Seasons of Operation: All Year

Observer Program Management:

Contracted Services:	Training and Certification
	Scheduling
	Information Processing
In house Services:	Technical Requirements
	Data Analysis

Observer Coverage:
Unit of Effort: observer day at sea
Estimate of Total Effort: N/A
Estimated Observer Coverage: <10%

Estimate of Protected Species Taken Annually:
Observed Number Taken: Not Objective of Program

BRITISH COLUMBIA SABLEFISH TRAP AND LONGLINE FISHERY ON SEAMOUNTS

Barry Ackerman, Canada Department of Fisheries and Oceans; Howard McElderry, Archipelago Marine Research Ltd.

Observer Program Mission and Authority:
Mission of the program: independent monitoring, biological sampling
Fishery management: Federal
Mandates and Authority to Place Observers: Federal fisheries regulations
Funding Source: industry
Observer Placement: DFO/Contractor
Program Duration: 1990-1993

Fishery Description:
Fleet Size: 40
Seasons of Operation: April to November

Observer Program Management:

Contracted Services:	Training and Certification
	Scheduling
	Information Processing
In house Services:	Technical Requirements
	Data Analysis

Observer Coverage:
Unit of Effort: observer day at sea
Estimate of Total Effort: N/A
Estimated Observer Coverage: 100%

Estimate of Protected Species Taken Annually:
Observed Number Taken: not objective of program

BRITISH COLUMBIA COASTAL SABLEFISH TRAP AND LONGLINE FISHERY

Barry Ackerman, Canada Department of Fisheries and Oceans; Howard McElderry, Archipelago Marine Research Ltd.

Observer Program Mission and Authority:
Mission of the program: biological sampling
Fishery management: Federal
Mandates and Authority to Place Observers: Federal fisheries regulations
Funding Source: industry
Observer Placement: DFO/Contractor
Program Duration: 1990-1993

Fishery Description:
Fleet Size: 40
Seasons of Operation: year round

Observer Program Management:

Contracted Services:	Training and Certification
	Scheduling
	Information Processing
In house Services:	Technical Requirements
	Data Analysis

Observer Coverage:
Unit of Effort: observer day at sea
Estimate of Total Effort: N/A
Estimated Observer Coverage: < 5%

Estimate of Protected Species Taken Annually:
Observed Number Taken: not objective of program

AUSTRALIAN FISHING ZONE

Peter Cassels, Coordinator

Introduction

The Australian Fishing Zone (AFZ) Observer Program provides Australian fisheries managers, research organizations, fishing industry, and the wider community with up-to-date, reliable and accurate information on the fishing catch, effort, and practice of a wide range of vessels operating in the AFZ.

The program is administered by the Australian Fisheries Management Authority (AFMA) in Canberra, but has observer units in Hobart, Brisbane, and Perth. Temporary observers are also employed during periods of intense fishing activity such as the Southern Bluefin Tuna (SBT) season in Tasmania. The management of the program is coordinated through a Program Manager based in Canberra, and consults with government, scientific, and industry representatives through formal working groups and scientific liaison groups. The objectives are reviewed formally on an annual basis, with the liaison group advising more frequently on seasonal and fishery specific objectives.

Objectives

The program's primary objective is to "ground truth" data supplied by vessels in their logbook records, but observers concurrently collect a wide range of information which may include technical details of fishing vessels, gear and operations; biological data on fish and other components of catches, and background data on the interaction of seabirds and marine mammals with fishing gear.

Coverage

In 1992, AFZ observers spent over 2,000 days at sea covering 100% of foreign trawl activity and 5 - 20% (depending on area) of longline activity in the AFZ (observers also monitored high seas trawling and longline activities under special arrangements).

The development of reliable at-sea observer deployment and retrieval techniques, and the availability of a pool of trained personnel means that the spatial and temporal distribution of the program's coverage within the AFZ can be determined in respect to management and scientific priorities, with logistical constraints rarely a determinant.

This coverage has been achieved through human resource strategies designed to provide skilled observers on an efficient and economical basis. The program maintains a small core group of permanent observers based in regional centers linked to fishing activity, supplementing these with seasonally employed temporary observers. The core group, currently 5, provides a continuity in experience and technical oversight for the temporary observers, who have numbered up to 20 at any one time.

Data Collection

The AFZ observer program refines its operational parameters for each fishery in consultation with a wide range of fishery managers and scientists. The data collection methods are relatively wide ranging to accommodate the changing priorities and requirements of associated research and management. Anecdotal and ancillary data are also gathered -- this often helps "arm's length" managers and researchers to gain a feel for the fishery.

APPENDIX 1: WORKSHOP AGENDA

Objective: To discuss the challenges currently facing the Federal Observer Program
Location: Hotel Galvez, Galveston, TX
Conference Rooms A & B, Lower Level

Wednesday, November 10, 1993

8:30 am I. Introductions
II. Overview of Observer Program - *Vicki Credle/Brad Hanson*
8:45 A. Role of OPR in the current Federal observer program
B. Possible amendments to the MMPA, MFCMA, ESA, ATCA affecting observer programs, and funding options
C. Setting priorities for an expanded observer program
D. Format for workshop discussions
III. Current and Recent Observer Programs
9:00 A. North Atlantic swordfish, tuna, and shark drift gillnet fishery, tuna pelagic pair trawl, and groundfish sink gillnet - Comparison of mandatory vs. voluntary observer programs - *Pat Gerrior, NEFSC*
9:15 B. Gulf of Mexico shrimp trawl - Data confidentiality and insurance considerations - *Jim Nance/Liz Scott, SEFSC*
9:30 C. ETP tuna purse seine fishery, CA coastal drift and set net fisheries -
Common elements of observer programs in SW fisheries - *Norm Mendes, SWR*
9:45 D. Australian observer programs - *Peter Cassell, Australian Fisheries Management Authority*
10:00 E. ETP tuna purse-seine fishery - Data management - *Rick Lindsay, IATTC*

10:30 Break

10:45 F. CA drift and set gillnet fisheries - Calculating effort from fishery logbooks and landing data - *Marilyn Beeson, CDF&G*
11:00 G. WA and OR salmon gillnet fisheries - Sampling fisheries with inconsistent effort and patterns - *Joe Scordino, NWR*
11:15 H. North Pacific squid drift gillnet fishery - *Shannon Fitzgerald, AFSC*
11:30 I. Canadian west coast observer programs - *Donna Grant, Archipelago Marine Research, Ltd.*
11:45 J. North Pacific groundfish trawl and longline fisheries - Contractor supplied observers - *Bill Karp, AFSC*
12:00 K. Prince William Sound salmon drift gillnet fishery - Take definitions and observation platforms - *Kate Wynne, AK Sea Grant*

12:30 pm Lunch

IV. Considerations for New Observer Programs

1:45 A. Options for Observer Programs - *Martin Loefflad, AKR*

1. Contracted programs vs. NMFS programs
    a. advantages/disadvantages
    b. operational and fiscal considerations
2. Contracted observers vs. NMFS observers
    a. advantages/disadvantages
    b. operational and fiscal considerations
3. Completely NMFS-based observer program
    a. concept
    b. advantages/disadvantages
    c. operational and fiscal considerations

3:00 B. Observer Training and Performance - *Norm Mendes, SWR*

1. Knowing observer authorities and mandates
2. Effective observer recruitment and hiring
3. Performance expectations and assessments
4. Standards of conduct
5. Observer safety
6. Effective training methods
7. Employment during closures or shoreside duty
8. Observer incentives
    a. temporary vs. permanent job status
    b. rotating duty stations or assignments
    c. career opportunities

4:00 Break

IV. Considerations for New Observer Programs (cont.)

4:15 C. Placement on-board vessels vs. alternate platforms - *Bill Karp, AFSC*

1. Insurance/liability
2. Privacy
3. Costs and logistics

6:00 Adjourn

6:15 No-Host Reception and Product Demonstrations - *Mike Vogel*
Plaza East, Main Level

Global Positioning Systems	Palm-held data entry devices
Satellite communications	Mobile phones/pagers

Thursday, November 11, 1993

IV. Considerations for New Observer Programs (cont.)

8:30 am D. Notifying fisheries of pending observer requirements - *Bill Karp, AFSC*

9:00 E. Observer Safety - *Bill Karp, AFSC*

1. Evaluation of conditions
    a. vessel sea worthiness/safety equipment
    b. weather
    c. observation/work area
2. Catastrophic occurrences
    a. sinking
    b. fire
3. Harassment

10:00 Break

10:15 F. Legal Implications - *Joel LaBissoniere, GCEL*

1. Use of observer data for enforcement purposes
2. Pending regulations regarding observer programs

11:00 G. Data Collection - *Doug DeMaster, AFSC*

1. Determining appropriate levels of observer coverage for estimating fishery specific mortality levels for populations, where total removals exceed 0.5% of population size
2. Experimental design, sampling strategies
3. Variable identification/selection
4. QA/QC and data management
5. Minimum data collection standards
6. Specimen/life history data

12:15 pm Lunch and registration for Biennial Conference

2:15 H. Data Analysis - *Jay Barlow, SWFSC / Kathryn Bisack, NEFSC*

1. Problems in analysis and mortality estimation
2. Effect of these problems on by-catch estimates (positive/negative biases)
3. Methods for correcting or eliminating bias
    a. stratification
    b. changes in data collection
4. Prioritize problems: Which have the largest impact on estimates? Which are the easiest to fix?
5. Identify which problems affect which observer programs

3:30 V. Group discussion

6:00 Adjourn

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