The Western Pacific Fishery Information Network: A Fisheries Information System

DAVID C. HAMM

Introduction

Fisheries in the Pacific have been rapidly changing during the 1980's, and fisheries agencies have been changing with them to obtain and utilize the proper data and information needed to monitor and manage the resources under their jurisdictions. To help meet the ever growing and changing information needs of fishery agencies of the Pacific, the National Marine Fisheries Service (NMFS) established a Pacific Fishery Information Network (PACFIN) for the western coastal states and Idaho, and the Western Pacific Fishery Information Network (WPACFIN) for the U.S.-affiliated

David C. Hamm is with the Honolulu Laboratory, Southwest Fisheries Science Center, National Marine Fisheries Service, NOAA, 2570 Dole Street, Honolulu, HI 96822-2396.

ABSTRACT—The Western Pacific Fishery Information Network (WPACFIN) is an intergovernmental agency cooperative program sponsored by the National Marine Fisheries Service (NMFS) to help participating island fisheries agencies carry out data collection, analysis, reporting programs, and data management activities to better support fisheries management under the Magnuson Fishery Conservation and Management Act; and to help meet local fisheries information and management needs. The WPACFIN is the central source of information for Federal fisheries management of most fisheries in American Samoa, Guam, and the Northern Mariana Islands, and it plays an important role in acquiring fisheries data in Hawaii. This paper describes the development and status of this fishery information system.

fishery agencies in the central and western Pacific island areas of American Samoa, Hawaii, Guam, and the Northern Mariana Islands. This paper is exclusively concerned with WPACFIN.

Through the NMFS WPACFIN program, an organization of cooperating island fisheries agencies has developed a network to share data, information, and technology to improve fisheries management under the Magnuson Fishery Conservation and Management Act and to meet local fisheries management needs. The voluntary and cooperative nature of the network cannot be overemphasized, for these attributes are the backbone of the existence of the system. The information available through WPACFIN has been developed through cooperative efforts of the participating agencies to improve their data collection, compilation, computerization, and summarization capabilities by means of technical assistance provided by the central WPACFIN program at the Honolulu Laboratory and by means of financial assistance from various NMFS and other funding sources.

From the beginning, it has been the philosophy and policy of the WPACFIN program to adopt the general NMFS policy of building upon local fisheries office expertise and capabilities as a means of improving Federal fishery management capabilities. The WPACFIN system embodies the general principles of a Federal and state partnership and a symbiotic relationship in collecting, processing, analyzing, sharing, and managing fisheries data, and builds upon the history of cooperation among agencies. From the standpoint of the NMFS, the overall

functional goal of the WPACFIN system is to provide quality fisheries data needed to develop, implement, evaluate, and amend Federal fishery management plans (FMP's) for the western Pacific region. The information needed to manage Federal fisheries under MFCMA should be a composite subset of information required by fully functional local fisheries agencies. Therefore, the operating philosophy of the central WPACFIN office in working with island agencies has been to assist them in becoming fully functional in obtaining and providing data and information needed to meet both Federal and local fishery management needs. By building upon the capabilities of local agencies, efficiency, benefits, functionality, and data availability can be maximized while overall costs and duplication of effort can be minimized. Accomplishing this requires significant levels of commitment on both sides and a common goal for improved fisheries management.

The WPACFIN system

The use of the term WPACFIN is sometimes confusing because it can be used to refer to any of the three distinct but interrelated major aspects of the system that are embodied in the concept of a cooperative fishery information network, or it can refer to the "system" as a whole. The three aspects of the WPACFIN system are its 1) organization, 2) program, and 3) network. These are all intertwined and inseparable as far as the functionality of the WPACFIN system is concerned.

The WPACFIN organization refers to the combination of participating agencies and how they interact to make

decisions and recommendations for improving fishery management capabilities in the region. The participating agencies of WPACFIN (Fig. 1) include the Western Pacific Regional Fishery Management Council (WPRFMC or Council), the American Samoa Department of Marine and Wildlife Resources (DMWR), the Commonwealth of the Northern Mariana Islands' Division of Fish and Wildlife (DFW), the Guam Division of Aquatic and Wildlife Resources (DAWR) and Department of Commerce (DOC), the Hawaii Division of Aquatic Resources (HDAR), and the Honolulu Laboratory and Pacific Area Office of the NMFS. For simplicity, this paper will refer to the island fisheries offices not based in Hawaii as the "flag state" agencies.

To help coordinate all the participating agencies and to help set goals and priorities for meeting the information needs through WPACFIN, a committee composed of all the heads of the participating fisheries agencies was established in 1982. This committee was originally named the WPACFIN Data Goals Committee, but was later renamed the WPACFIN Fisheries Data Coordinating Committee (FDCC). The FDCC is the advisory body within the WPACFIN organization. The intent of the committee is to ensure that all required data are available to each participating agency and to the Western Pacific Regional Fishery Management Council, its Plan Monitoring Teams, its Scientific and Statistical Committee, and fishery managers, in a form, quality, and time frame necessary to meet their respective fisheries management responsibilities. Specifically stated, the purposes of the WPACFIN FDCC are to:

1) Provide a forum for a regional exchange of ideas about fisheries data and for meeting local and regional fishery management goals;

2) Establish WPACFIN activities and priorities and recommend improvements in efficiency, effectiveness, and timeliness of data collecting and processing activities;

3) Develop and coordinate a WPACFIN Fisheries Data Plan for implementation in each member area;

4) Promote the development and implementation of data collection, storage, and transfer standards to facilitate merging data into WPACFIN; and

5) Designate membership of a Technical Subcommittee and coordinate the Subcommittee's work on technical aspects of implementing WPACFIN.

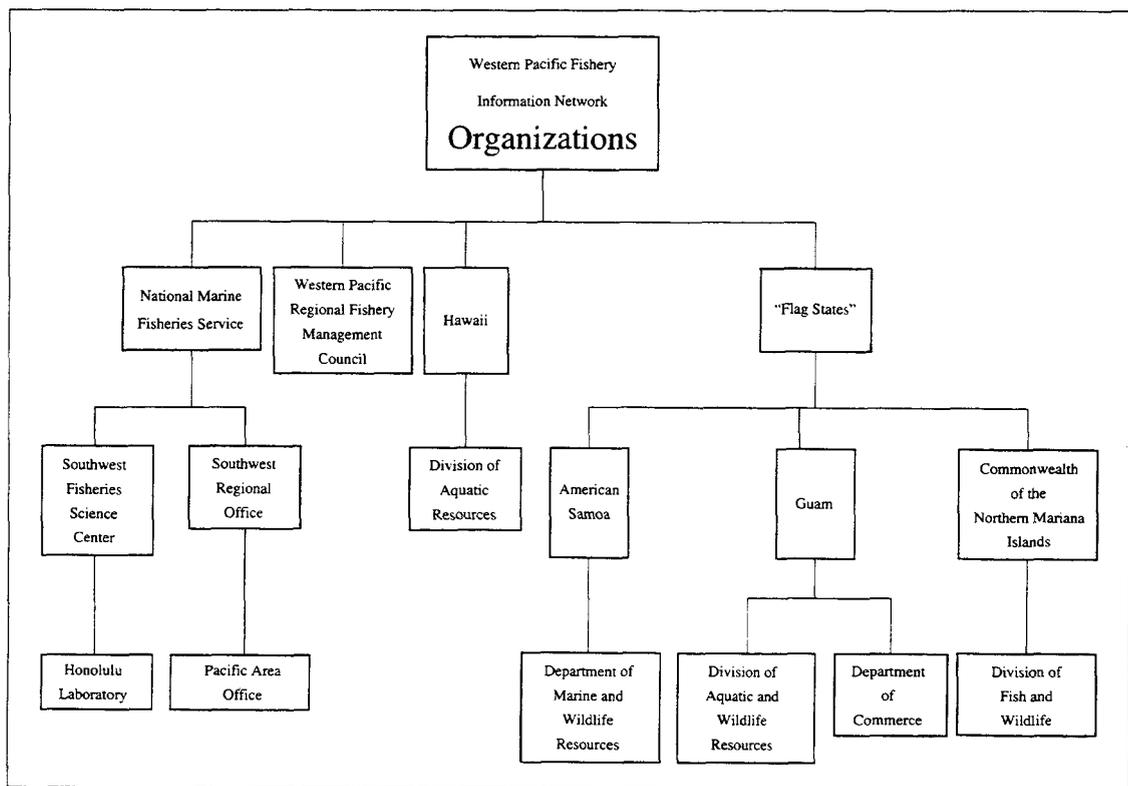The FDCC also established guidelines for the proper exchange and use

Figure 1.—Organizations participating in the Western Pacific Fishery Information Network.

of fishery data and for safeguarding the confidentiality of data submitted by member agencies:

1) WPACFIN will not release confidential data in any format without specific written permission from the agency contributing the data to the system.

2) Requests for raw (nonsummary) data or requests from nonmember agencies will be referred to the donor agency.

3) If access is granted by the donor agency, WPACFIN may provide the data directly to the user from the central system at the donor agency's request.

4) Confidential data submitted to WPACFIN are generally available for NMFS employees to use provided the employee has signed a Statement of Nondisclosure and has a "need-to-know" as defined in NOAA Directive 88–30.

5) Summary and nonconfidential data in WPACFIN are available to all users without obtaining donor agency approval.

6) Specific restrictions may be placed on sensitive data sets submitted to WPACFIN that could limit access to users identified by the donor agency.

The WPACFIN program is a task within the Fishery Data Management Program of the NMFS Honolulu Laboratory's Fishery Management and Performance Investigation. It was established in 1981 to be the nucleus for organizing, implementing, and maintaining the fisheries information network in the western Pacific. The WPACFIN program is headed by the leader of the Fishery Data Management Program, and its staff has expertise in computer systems design, fisheries biology, and computer programming. The types of support offered by the WPACFIN program cover a variety of administrative and technical activities. Because of differences in data collecting and processing systems, political atmosphere, personnel, and level of commitment to upgrade and change, the flag state agencies have been the major focus of implementing the WPACFIN system, and they have been the major users of support offered by the WPACFIN program. Description of some of the major WPACFIN program support activities follows.

1) Administrative support has been provided at all levels for overseeing the WPACFIN program management, budgeting, and planning activities, such as developing and implementing "memoranda of understanding" and data sharing agreements between NMFS and participating agencies, and coordinating meetings of the FDCC and its Technical Subcommittee.

2) Technical hardware and software support has been crucial to developing local expertise.

3) System and survey designs have been studied in all areas, either by using consultant contracts or in-house NMFS expertise and resources (CIC Research, Inc.[1, 2], Omnitrak Research and Marketing Group, Inc.[3], and Malvestuto[4]).

4) Data base management and data processing systems have been established for many data systems such as commercial landings, offshore and inshore creel surveys, tuna transshipment, tournament sampling, vessel inventory, and fishery imports. Integrated, menudriven, user-friendly, data base management systems have been developed and programmed to meet the needs of island agencies.

5) A wide range of training support has been provided to island agencies including on-site and central training workshops on microcomputer hardware and software, data base and file management, data quality control procedures, data collecting, forms design, and detailed training on implementing the data processing applications.

6) Fisheries data bases provided to the system by participating agencies

are maintained at the central WPACFIN program office. Direct on-line access to some of these centralized data bases is a long-range goal.

7) Numerous report generation and data analysis activities, such as filling ad-hoc data requests, assisting in producing the flag state agencies' report modules for the annual bottomfish and pelagics plan monitoring teams (Hamm and Quach[5]; Hamm et al.[6, 7]), and producing the annual catch and effort report series "Fishery Statistics of the Western Pacific" (Hamm et al., var. years[8]).

In addition to providing these support functions to the official WPACFIN agencies, the central WPACFIN program office has provided similar technical guidance and assistance to fisheries offices in other U.S. affiliated Pacific island areas such as the Federated States of Micronesia (Pohnpei, Kosrae, Chuuk, and Yap) and the Republic of Palau, but on a more limited basis. Notwithstanding the limited support provided, at least some "WPACFIN-compatible" data systems have been created in each of these other island areas.

The WPACFIN network refers to the technologies, activities, and meth-

[1]CIC Research, Inc. 1983. A fishery data collection system: Guam. U.S. Dep. Commer., NOAA, Natl. Mar. Fish. Serv., Southwest Fish. Cent., Honolulu Lab., Southwest Fish. Cent. Admin. Rep. H-83–21C, 85 p.

[2]CIC Research, Inc. 1983. A fishery data collection system: Saipan. U.S. Dep. Commer., NOAA, Natl. Mar. Fish. Serv., Southwest Fish. Cent., Honolulu Lab., Southwest Fish. Cent. Admin. Rep. H-83–20C, 74 p.

[3]Omnitrak Research and Marketing Group, Inc. 1988. Sampling methodology for a boat fishing survey design for Hawaii. Honolulu, HI 96813, 173 p.

[4]Malvestuto, S. P. 1991. Recommendations for statistical treatment of Hawaii small boat survey data. Fishery Information Management Systems, Auburn, AL 36830, 6 p.

[5]Hamm, D. C., and M. M. C. Quach. 1988. Bottomfish fisheries of American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands. U.S. Dep. Commer., NOAA, Natl. Mar. Fish. Serv., Southwest Fish. Cent., Honolulu Lab., Southwest Fish. Cent. Admin. Rep. H-88–15, 76 p.

[6]Hamm, D. C., M. M. C. Quach, R. Tokunaga, F. Aitaoto, G. W. Davis, and T. J. Donaldson. 1989. Review of the 1988 pelagic fisheries of American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands. U.S. Dep. Commer., NOAA, Natl. Mar. Fish. Serv., Southwest Fish. Cent., Honolulu Lab., Southwest Fish. Cent. Admin. Rep. H-89–7, 101 p.

[7]Hamm, D. C., M. M. C. Quach, F. Aitaoto, G. W. Davis, and T. J. Donaldson. 1989. Review of the 1988 bottomfish fisheries of American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands. U.S. Dep. Commer., NOAA, Natl. Mar. Fish. Serv., Southwest Fish. Cent., Honolulu Lab., Southwest Fish. Cent. Admin. Rep. H-89–8, 83 p.

[8]Hamm, D. C. et. al. 1986 Vol. I, 1986 Vol. II, 1988 Vol. III, 1989 Vol. IV, 1990 Vol. V, 1991 Vol VI, and 1992 Vol VII. Fishery Statistics of the Western Pacific. U.S. Dep. Commer., NOAA, Natl. Mar. Fish. Serv., Southwest Fish. Sci. Cent. Admin. Rep. H-86–4, 380 p., Admin. Rep. H-86–20, 237 p., Admin. Rep. H-88–4, 352 p., Admin. Rep. H-89–1, 216 p., Admin. Rep. H-90–09, 224 p., Admin. Rep. H-91–1, 230 p., Admin. Rep. H-92–06, 230 p.

odologies upon which the system functions, including all the hardware, software, communication links, data sharing capabilities, and the data bases themselves. The network is the backbone of WPACFIN, and is a physical part of each participating agency. In general, the network is a microcomputer-based means of sharing data and information among fisheries agencies to support fisheries management needs via mail and direct telecommunications. It is more fully described under the WPACFIN evolution section of this paper.

Together, these three aspects of WPACFIN, the organization, program, and network, make the WPACFIN system what it is, a combination of agencies working together in a voluntary and cooperative manner to improve fishery management capabilities in the central and western Pacific region.

Problems and Challenges of Implementing WPACFIN

Implementing an information network among the U.S. affiliated islands of the Pacific required resolving some challenging problems and operating within certain strict limitations. Effective communication is important in any cooperative undertaking, but it is critical in a task such as developing and implementing WPACFIN. The first, and possibly most obvious obstacle limiting communication among participating agencies is the physical size of the area involved. The distances between the central WPACFIN office and the flag state agencies are great, and the Exclusive Economic Zones (EEZ's) are the largest under jurisdiction of any of the Councils, totaling over two million square miles (Fig. 2). To put the size of the area in perspective, if the

central WPACFIN office was in Bangor, Maine, the American Samoa fisheries office would be in Venezuela and the Guam and Saipan offices would still be in the Pacific Ocean well west of California. The distances make costs of on-site visits high, and communication via telephone lines is also quite expensive; thus, overcoming the complications caused by the distances involved was no minor task, but progress was steadily made because of the high level of cooperation and commitment by the flag state agencies. On-site visits to the flag state agencies by central WPACFIN technical staff were well planned and always productive by concentrating a lot of activity into the few days available.

Cultural differences represent a second challenge in communication that is also somewhat related to the size of the area covered. The Samoan, Hawai-
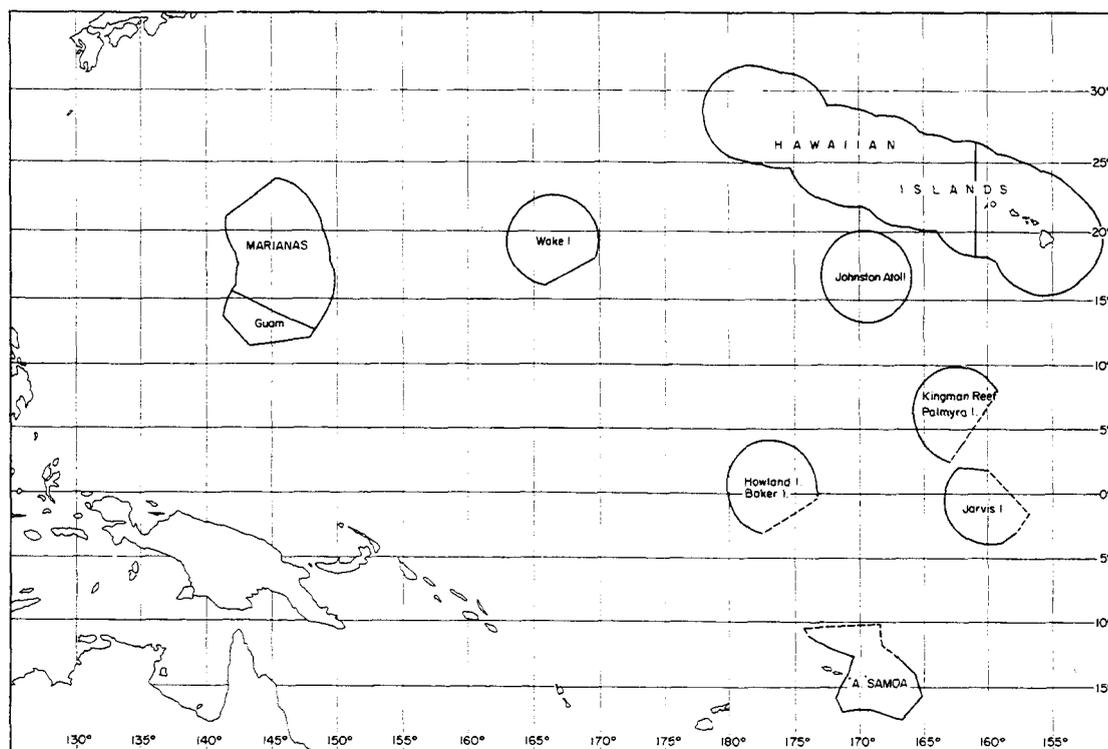

Figure 2.—Boundaries of the Fishery Conservation Zone around Hawaii, American Samoa, Guam, the Northern Mariana Islands, and other U.S. possessions.

ian, and Chamorro/Carolinian cultures are all quite different; even within the Chamorro/Carolinian cultures of Guam and the CNMI, differences exist between islands. Overcoming communication problems and understanding limitations related to cultural differences require sensitivity to and respect for local customs, preferences, inhibitions, attitudes, and sometimes underlying and significant prejudices. It requires time to build relationships, gain confidences, and understand the differences and nuances of each island culture. Not understanding or ignoring cultural differences reduces the effectiveness of communication and is likely to result in less functional and useful data systems. The WPACFIN philosophy embodies these cultural differences as much as possible in developing new or modifying existing data systems. Related to the cultural differences are political differences and stages of development of the bureaucracies of the island fisheries agencies; these too must be considered and overcome.

Several other complications in developing an automated fishery information network in the Pacific may be broadly categorized as infrastructure problems. In 1981, only the State of Hawaii possessed laws requiring the reporting of fisheries statistics. Therefore, historical data for the early years of most island fisheries were inadequate, as was available funding; voluntary reprogramming of available funds by the flag state agencies made implementing data system changes possible. Progress was also hindered by a lack of adequate staff. Fisheries and computer professionals are still very scarce in the Pacific, so the central WPACFIN office has had to provide nearly all computer training and programming support, at least to the flag state agencies. The American Samoa and CNMI offices rely almost exclusively on contract professional biologists from the U.S. mainland. As a result, a high level of turnover, low level of stability in programs, and a poor understanding of the history of the fisheries exist. The WPACFIN program has worked to help the island agencies overcome these problems.

The last noteworthy challenge in implementing and upgrading WPACFIN has been the dynamics of rapid changes in the fisheries, the data needs, and the computer technologies over the past decade. In the early years, fisheries managers required only a few summary tables and enough basic data to categorize the fisheries and document their importance for justifying and implementing fishery management plans. Now, more detailed annual reports are required that document status of the stocks aspects of fishery performance, and selected economic indicators. Fortunately, computer technology capable of handling the increased data and analytical needs has also expanded, but with the expansion has come a challenge of maintaining stability of systems while implementing significant improvements. This has been accomplished successfully in the flag state agencies where levels of cooperation were high and levels of bureaucracy and changes in the basic fisheries were fairly low, but less successfully in Hawaii where the reverse is true.

WPACFIN Evolution

The discussion of the evolution of the WPACFIN system will be divided into the same three aspects of WPACFIN as previously described, the organization, program, and network.

The original members of the WPACFIN organization included all those shown in Figure 1, except the Guam Department of Commerce, which joined in August 1988. Initially, HDAR participation in the FDCC was self-limited to observer status, but in December 1984, with completion of the Hawaii statistical system study (DLNR[9]), they became a full voting member of the FDCC. The FDCC held ten meetings from 1982 to 1989 which mostly dealt with issues such as establishing memoranda of understanding and data share agreements, developing guidelines for operating the FDCC, implementing the first and second generation systems, and seeking additional

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[9]Div. Aquatic Resources, State of Hawaii. 1984. Hawaii fisheries statistics system design study. Division of Aquatic Resources, Div. Land and Natl. Resources, 214 p.

funding to support the network. From 1989 to 1992, the FDCC met eight more times and concentrated its efforts on defining projects and objectives under the new PACFIN initiative, developing a long-term data plan for the Pacific, and redefining the functions, services, and data bases the future WPACFIN system should include. The FDCC's Technical Subcommittee has held several workshops and training sessions and has developed standard guidelines for data quality control and file management procedures to be used by each member agency in developing their own specific procedures to insure that only quality data enter the central WPACFIN files.

The WPACFIN program has been crucial to WPACFIN system development. Established in 1981 by the Southwest Fisheries Center as a separate task within the Honolulu Laboratory, it was initially staffed with one full-time computer systems analyst. Staff size and expertise expanded to improve WPACFIN capabilities in meeting overall fishery information and Council-related needs. Expertise in fisheries biology was transferred into WPACFIN to help with fisheries applications and analyses.

Discussion of the evolution of the WPACFIN network will be limited to the major hardware and software used and will be described in three sections, pre-WPACFIN, first generation WPACFIN, and second generation WPACFIN. Identification of the data bases maintained within the network is found in the next section.

The pre-WPACFIN situation was a fairly unstructured, low technology environment involving no computer use outside Hawaii. Fishery statistics in the flag states were computed by hand or sometimes with the use of desktop calculators. Data collecting systems, where they existed, were fairly rudimentary and typically were not based on valid statistical designs. Data processing at HDAR and the Honolulu Laboratory was performed by keypunch cards, batch processing, and limited time-share processing on state-operated IBM mainframe computers. Data exchanges were limited to periodic

transfer of computer tapes from HDAR to the Honolulu Laboratory. The HDAR had over a two-year backlog of data to process.

The initial steps in implementing the first-generation WPACFIN system consisted of installing a two-station, key-to-disk data entry system at the Honolulu Laboratory and Apple II+ microcomputer systems in each of the original four participating island agency main offices plus central WPACFIN. These Apples were the first microcomputers introduced into any of the flag state agencies. The original off-the-shelf software included a highly structured, but somewhat limited, data base management system capable of all processing steps from data entry through report generation, a spreadsheet system, some rudimentary graphics and statistics packages, word processing, and some basic utilities. By the end of 1982 all island systems had been installed, basic training provided, and data bases established for the major fishery monitoring systems (Hamm[10]). Over the next several years, hardware and software upgrades continued to be made which included additional computers, networked hard drive units in two offices, and extensive custom-programmed processing systems for newly designed and implemented creel survey sampling programs in all flag state areas (Hamm[11]). Additional data bases and improved sampling programs were established in all flag state areas to monitor the resources better. The HDAR began reducing the backlog of landings reports and completed the WPACFIN-funded "Hawaii fisheries statistics system design study" (1984). Some of the newly designed sampling programs for the flag states (e.g., market sampling, size frequency and biological sampling,

some creel surveys) were never implemented or were soon terminated because of lack of funds to conduct the work or because of a lack of demonstrated and reinforced need for these data for federal management purposes. This proved to be most unfortunate as these types of baseline data were later needed by Council Plan Monitoring Teams.

In addition to the Apple II+ hardware for processing centrally stored files, the first generation central WPACFIN hardware environment initially included a time-share link to a PDP 1170 minicomputer. However, the availability of the minicomputer proved to be short-lived, and the Laboratory obtained an in-house CPM-based multiuser-multiprocessor super-microcomputer with over 40 workstations which became the central computer for some WPACFIN applications. This fairly simple first-generation processing environment continued to meet data processing needs into the mid-1980's when it became apparent that a major switch to more modern and powerful processing equipment would soon be needed to meet the ever increasing federal requirements for more sophisticated analysis and reporting.

The evolution to second-generation WPACFIN processing systems began with the microcomputer boom of the mid-1980's.

Whereas most of the first-generation hardware and software systems were provided through central WPACFIN technical and financial support, the evolution to second-generation WPACFIN processing systems required much more financial commitment from the other participating agencies. This was partly accomplished through reprogramming existing Federal grant funds which had already been extensively used to implement improvements in data collecting systems, and partly through the use of other Federal and local funds. The new WPACFIN standard operating environment centered around the IBM-compatible MS-DOS microcomputer and the dBASE data base management system. The microcomputer revolution soon reached all participating agencies, and they began expanding their use of

computers beyond their fisheries data sections to their fisheries biologists, and wildlife and administrative sections. The American Samoa DMWR, CNMI DFW, and Guam DOC offices followed the WPACFIN standard almost exclusively in their expansion efforts, but the Guam DAWR office chose to use the Apple Macintosh system and the HDAR office expanded in several directions simultaneously: into direct use of the IBM mainframe, a newly installed State WANGNET minicomputer system, and into increased use of both Macintosh and IBM-compatible microcomputers.

During the evolution to second-generation computer systems, the major emphasis of the central WPACFIN program was to support the conversion to the new IBM-compatible operating environment by assisting with purchases of hardware and software and by developing much more sophisticated and comprehensive, user-friendly, menu-driven dBASE applications for an increasing number of data collection and analysis systems. The most recent phases of implementing the second generation WPACFIN system include establishing direct computer-to-computer telecommunications links between the central office and all other agencies, and creating an on-line central system for dial-in access to principal island data sets. The evolution into the second-generation operating environment is continuing. As all the basic fisheries data systems become fully functional in the new operating environment, more emphasis will be placed on developing more integrated data systems and additional analysis, assessment, and reporting systems to enhance fisheries monitoring and management.

Current Data Systems

NMFS and each of the four island areas have a variety of data bases and associated collecting and processing systems to facilitate fisheries monitoring and management activities (Table 1), but it is beyond the scope of this paper to document them fully. Each fishery, island agency, and data processing system has its own needs, pe-

[10]Hamm, D. C. 1982. Preliminary description of the Western Pacific Fishery Information Network. U.S. Dep. Commer., NOAA, Natl. Mar. Fish. Serv., Southwest Fish. Cent., Honolulu Lab., Southwest Fish. Cent. Admin. Rep. H-82-2, 11 p.
[11]Hamm, D. C. 1985. Western Pacific Fishery Information Network, organization and design, status and issues. U.S. Dep. Commer., NOAA, Natl. Mar. Fish. Serv., Southwest Fish. Cent., Honolulu Lab., Southwest Fish. Cent. Admin. Rep. H-85-4, 35 p.

culiarities, uses, capabilities, and limitations that make it unique. In general, each agency is responsible for ensuring its data are as accurate as possible before sharing files through the central WPACFIN office. Most data collected by participating island agencies are centrally archived for ready access and data sharing in WPACFIN files at the Honolulu Laboratory. Most data collected by NMFS are maintained at the Honolulu Laboratory by the Fishery Management and Performance Investigation to reduce WPACFIN storage requirements. Not all data are readily available to all users because of confidentiality or sensitivity considerations, or because use of the data is local rather than regional.

From a fisheries monitoring perspective, the most important systems in each island area are the commercial landings, creel survey, and logbook systems. Even though these systems vary significantly in design and degree of implementation from island to island and from system to system (e.g., voluntary vs. mandatory, on-site vs. mail-in, census vs. sample, and local agency vs. central WPACFIN sponsored), they provide the basis for monitoring fisheries of the area. The other data systems operated by fisheries agencies provide important validation cross-checks, biological status, augmentary, and ancillary information on the resources and fisheries exploiting them.

Future Goals of the WPACFIN System

During the past 11 years, significant progress has been made toward meeting fisheries management needs in each of the Pacific island areas under the Council's jurisdiction; however, much more remains to be done. Fisheries management information requirements continue to change, and significant data and information gaps still exist. Filling those gaps will require some reorientation of major activities within the WPACFIN system to implement further improvements in the methods of data collection, processing, analysis, and reporting. Some of the goals of the WPACFIN system for future activities are the following:

Table 1.—Data collecting and processing systems.

System	NMFS	Samoa	Guam	CNMI	Hawaii
Commercial landings		X	X	X	X
Offshore "creel" surveys		X	X	X	X
Inshore "creel" surveys		X	X	X	
"Tuna" transshipment		X	X	X	
Vessel inventory		X	X	X	X
Tournament sampling		X	X	X	
Length/size sampling	X	X	X	X	
Biological sampling	X	X	X	X	
Permits and licenses	X	X	X	X	X
Imports and/or exports			X	X	
HI auction monitoring	X				X
NWHI lobster logbooks	X				
Longline logbooks	X				

1) Analyze existing data systems to document information gaps.

2) Establish additional data collecting, processing, and analyzing standards, and implement changes required to meet those standards.

3) Implement computer-based telecommunications between all participating agencies to facilitate data exchange and system upgrades.

4) Establish dial-in access to centrally archived data bases.

5) Establish integrated central data bases and create a sophisticated query system to improve access to and use of available data.

6) Develop new and improved fisheries assessment and analysis systems to increase the reliability of information used in the fishery management decision making process.

7) Encourage further state and Federal cooperative efforts in meeting fishery management objectives in the western Pacific.

Summary

Over the past 11 years the NMFS's WPACFIN program has assisted island fisheries agencies in advancing from nonexistent or rudimentary manual data systems to sophisticated computerized systems capable of providing useful fisheries monitoring and analysis information on a timely basis. Through the cooperative efforts of all participating agencies, the WPACFIN system has become the common thread that weaves the member agencies to-

gether through sharing data and information about the fisheries of the Pacific in their efforts to protect and manage these resources.

Several critical factors have been identified which influence the level of success obtainable in implementing a complex, intergovernmental, voluntary, and cooperative project such as this fishery information network:

1) Commitment and ability of agencies to implement changes and provide resources to accomplish change.

2) Long-term commitment and quality of individual employees involved in the project, especially those involved in project management.

3) Consideration of local needs, culture, politics, capabilities, limitations, and personnel.

4) Continual contact, support, feedback, and training.

As fisheries change and fisheries management needs grow in complexity and diversity, so must the resolve of the participating agencies grow to meet the new challenges. The most important factor influencing the future of the fisheries of the Pacific will continue to be the desire and the ability of the many agencies to work together to become a unified force in meeting the challenges of rational and effective fisheries management. It is the long-term goal of the WPACFIN system to assist in making effective management a reality. The WPACFIN system continues to evolve to meet needs of rapidly changing fisheries management requirements.