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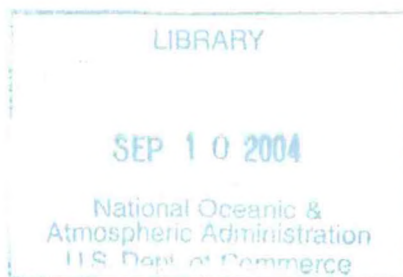
MARCH 1982

PRELIMINARY DESCRIPTION OF THE WESTERN PACIFIC FISHERY INFORMATION NETWORK

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PRELIMINARY DESCRIPTION OF THE
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FISHERY INFORMATION NETWORK

INTRODUCTION

Since the passage of Magnuson Fishery Conservation and Management Act in 1976 there has been a dramatic increase in the need for timely reporting of accurate data on fisheries resources to make management decisions and prepare Fishery Management Plans. As development and management of fisheries resources have evolved, there have been increased data needs by the National Marine Fisheries Service (NMFS), the Regional Fishery Management Councils, and by state and territorial fisheries agencies. Various user and management groups have encountered the following data related problems: lack of a historical fisheries data base, unavailability of existing data for analysis, legal constraints for data exchange, lack of data standardization, and inadequacy of data collection procedures. To help resolve these problems in the Pacific area and provide a central source of region-wide fishery data, the Southwest Fisheries Center (SWFC), NMFS, developed the concept of the Fishery Information Network (FIN).

The FIN is divided into three entities: the California FIN (CALFIN) involving NMFS and California Fish and Game; the Pacific coast FIN (PACFIN) composed of NMFS and the fisheries offices in all the western U.S. coastal states plus Idaho; and the Western Pacific FIN (WPACFIN) comprised of NMFS and fisheries agencies from American Samoa, the Northern Mariana Islands (NMI), Guam, and Hawaii.

The overall purpose of FIN is to provide ready access to quality fisheries data needed for management purposes. To achieve this goal, several broad activities have been identified:

1. Enhancement and modernization of existing fisheries information management and data collection systems.
2. Development and implementation of new information management and data collection systems.
3. Establishment of both central and distributed, computerized data bases containing pertinent fisheries data needed for management purposes.
4. Establishment of a communication network between state, territorial, and NMFS data collecting and processing groups thereby providing a mechanism for the access and exchange of the computerized fisheries data bases.

The FIN has been designed to be implemented in a stepwise and modular approach and to be flexible enough to handle diverse user needs. Having been established earlier, the basic designs of the CALFIN and PACFIN systems have been completed, implementation is progressing, and additional modules are in various stages of development. The basic elements of WPACFIN, have been established thus allowing implementation to begin in a stepwise and modular fashion. The design and implementation steps will be described in greater detail in a separate WPACFIN planning document, although specifics will evolve as user and management needs become better known.

The purpose of this paper is to describe some of the functional aspects of WPACFIN and the current status of the system. The discussion will include an identification of the organizational components of WPACFIN, descriptions of the hardware and software configurations, general scenarios for data flow and data base design, and the current activities and status of WPACFIN implementation.

ORGANIZATIONAL COMPONENTS

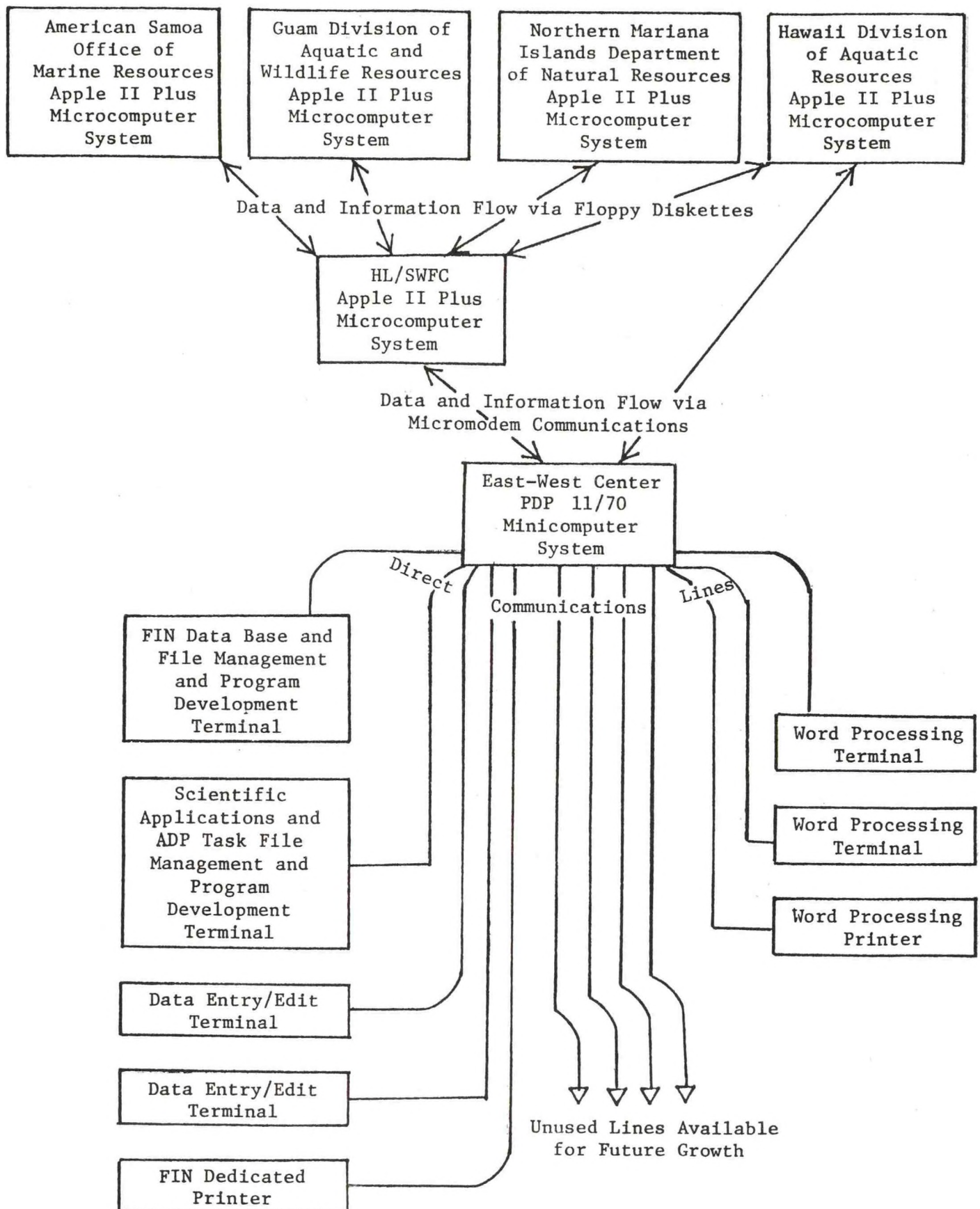
The WPACFIN refers not only to the individuals and agencies associated with all aspects of the implementation and operation of the network, but also to the integration of computer hardware, software and data bases upon which the network is based. The principal agencies involved in the initial design and implementation of WPACFIN include: the Honolulu Laboratory of the Southwest Fisheries Center, NMFS (HL/SWFC), the Hawaii Division of Aquatic Resources (HDAR), the American Samoa Office of Marine Resources (ASOMR), Guam Division of Aquatic and Wildlife Resources (GDAGR), and the Northern Mariana Islands' Department of Natural Resources (NMI/DNR). Initially, the principal users of the system will include all of the agencies listed above, and the Western Pacific Regional Fishery Management Council (WPRFMC) and the Western Pacific Program Office (WPPD) of the Southwest Regional Office, NMFS. All these agencies are participating in the design and implementation of WPACFIN to ensure that user needs are met. As the system develops and user requirements change, other agencies and users may easily become part of WPACFIN.

HARDWARE CONFIGURATION

The configuration of the computer hardware for WPACFIN may be described as a distributed computer system (Figure 1).

FIGURE 1

WPACFIN HARDWARE CONFIGURATION



The major hardware includes a central minicomputer located in Honolulu and five microcomputers distributed among the principal agencies (HL/SWFC, HDAR, ASOMR, GDAWR, and NMI/DNR).

More specifically, the central minicomputer system consists of two components. First there is a PDP 11/70 minicomputer(1), located at the East-West Center, Honolulu, Hawaii that will be utilized on a time-share basis via hard-wired communications lines. The second component consists of four video terminals and one dedicated printer terminal located at HL/SWFC. These terminals have full access to all of the minicomputer processing power. However, for design and implementation purposes, the initial configuration identifies one terminal for WPACFIN data base management and program development functions; one terminal for scientific, file management and program development functions; and two terminals for key-to-disk data entry and edit functions. The system's dedicated printer will have a keyboard and will also be useable as a terminal. Independent of WPACFIN, the HL/SWFC is utilizing two other terminals and one other printer for word processing activities on the East-West Center's computer. These could be used for FIN processing functions should the need arise. Finally, there are four other communication lines already in place between the HL/SWFC building and the East-West Center minicomputer that can be easily connected to additional hardware to facilitate future growth.

The distributed microcomputer systems are composed of 48K Apple II Plus microcomputers with additional 16K RAM language cards, twin 5 1/4 inch floppy disk drives, numeric key pads, and clock/calendar cards. Other peripheral equipment include Epson MX-100 dot matrix printers which can print 132 characters on a line and have built-in graphics capabilities, and NEC 12 inch green screen monitors for visual display. Additionally, 4 amp voltage regulators are included with each system to minimize the problems associated with power surges and voltage fluctuations. Finally, the HL/SWFC and the HDAR microcomputer systems have DC Hayes micromodems to effect communication between the microcomputers and the PDP 11/70 minicomputer.

This hardware configuration is subject to modifications as the system grows and user needs evolve and become better defined. Future enhancements may include the possible conversion from the time shared minicomputer at the East-West Center to use of an in-house minicomputer, additional microcomputers or terminals for WPRFMC and WPPD, and possibly additional computing capabilities for HDAR and the island territories.

(1) Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

SOFTWARE CONFIGURATION

The software that will be used to process and manage WPACFIN data can be divided into two general categories: first, commercially available ("canned") computer programs; and second, specially designed computer programs. Because of the nature of WPACFIN and the persons using the system, user-oriented, canned programs will be utilized whenever possible. When canned programs do not or can not meet the needs of the system, special applications programs will be developed and implemented. The HL/SWFC will provide all general purpose WPACFIN computer programs and will assist user components develop special purpose, WPACFIN software. However, HL/SWFC will not provide assistance to users who want special software and hardware that deviate significantly from the WPACFIN system configuration. The area of software development will be the most dynamic and evolutionary portion of the information network.

The software configuration of the initial WPACFIN is based primarily on canned program packages. The majority of local data entry, edit, summarization, report generation, and file management activities will utilize a comprehensive software package called DB Master, The Data Base Manager, and will include the newly released DB Master Utility Pak #1. Additional calculating and reporting capability will be provided by the VisiCalc 3.3 software for "spread sheet" or matrix format calculations, and by the VisiTrend/VisiPlot package for time series, trend analysis, and plotting capabilities. The software package Apple Pie/Format will provide good word processing and text editing capabilities, while DOS 3.3 Toolkit, Super Disk Copy III, and others will provide some excellent utility programs. Computer languages initially available on the microcomputer systems include Applesoft BASIC, integer BASIC, and FORTRAN. Other languages can be added in the future if indicated by user needs. Documentation will be available for each software package, and user training and user manuals will be provided by HL/SWFC. The main frame computer (the PDP 11/70 at the East-West center) has an excellent selection of utility, file management, text editing, data entry, edit and retrieval programs. Also, most commonly used computer languages are available. File and system backup and security are also excellent.

As development of WPACFIN progresses and user needs become better defined, additional applications programs will be written to meet new data and information needs. User needs relating to three categories of data processing will spawn the greatest number of new applications programs. These categories include local data edit, local data summarization and report generation, and main frame data base query. By nature of the work involved, design and implementation of applications software will be a continuously evolving and time consuming function.

DATA AND INFORMATION FLOW

The WPACFIN has been designed to provide computer support and a communication network to existing fisheries agencies and to utilize and develop the expertise within these agencies for data collection and processing activities. Data collection, entry, and edit will be performed by each island territory agency using the microcomputer systems and software already described (Figure 2). At designated intervals, depending on data volume and priority, copies of the edited data on diskettes will be mailed from the field to HL/SWFC. Once received, the data will be cataloged and transmitted, via the HL/SWFC micromodem communications link, to the proper data bases on the East-West Center PDP 11/70 computer. The data will then be available for summarization and report generation. The integration of data on the main frame computer, and the extra computing power of this machine will facilitate summarization of much larger volumes of data than would be possible or practical on the microcomputer systems. If user needs dictate, data summarizations may be transmitted from the main frame computer to Apple II Plus diskettes for distribution back to the field for local use. This capability completes the data and information communications cycle.

The data flow scenario for HL/SWFC and HDAR follows the same general logic, but is somewhat more complex because these agencies have significantly more data and, therefore, more need for additional computer support than any of the island territory WPACFIN components. Figure 3 depicts the various levels of interaction possible between HL/SWFC and HDAR for accomplishing the transfer of data and information collected and maintained by the agencies. It remains the responsibility of the collecting agency to ensure that all data made available to other users are accurate and free of errors. Figure 3 shows three levels of data entry, historically a problem area, for each agency. As mentioned previously, the HDAR microcomputer system includes a micromodem for direct communication with the PDP 11/70. This direct link capability, via telephone lines, will enable them to utilize the extra computing power of the PDP 11/70 minicomputer to more efficiently perform many of their data entry and edit activities. It will also eliminate the step of data passing through the HL/SWFC microcomputer before being available on the main frame computer. Figure 3 also depicts the many communication links available between the agencies for transfer of automated data and information.

FIGURE 2

ISLAND TERRITORY
DATA AND INFORMATION FLOW

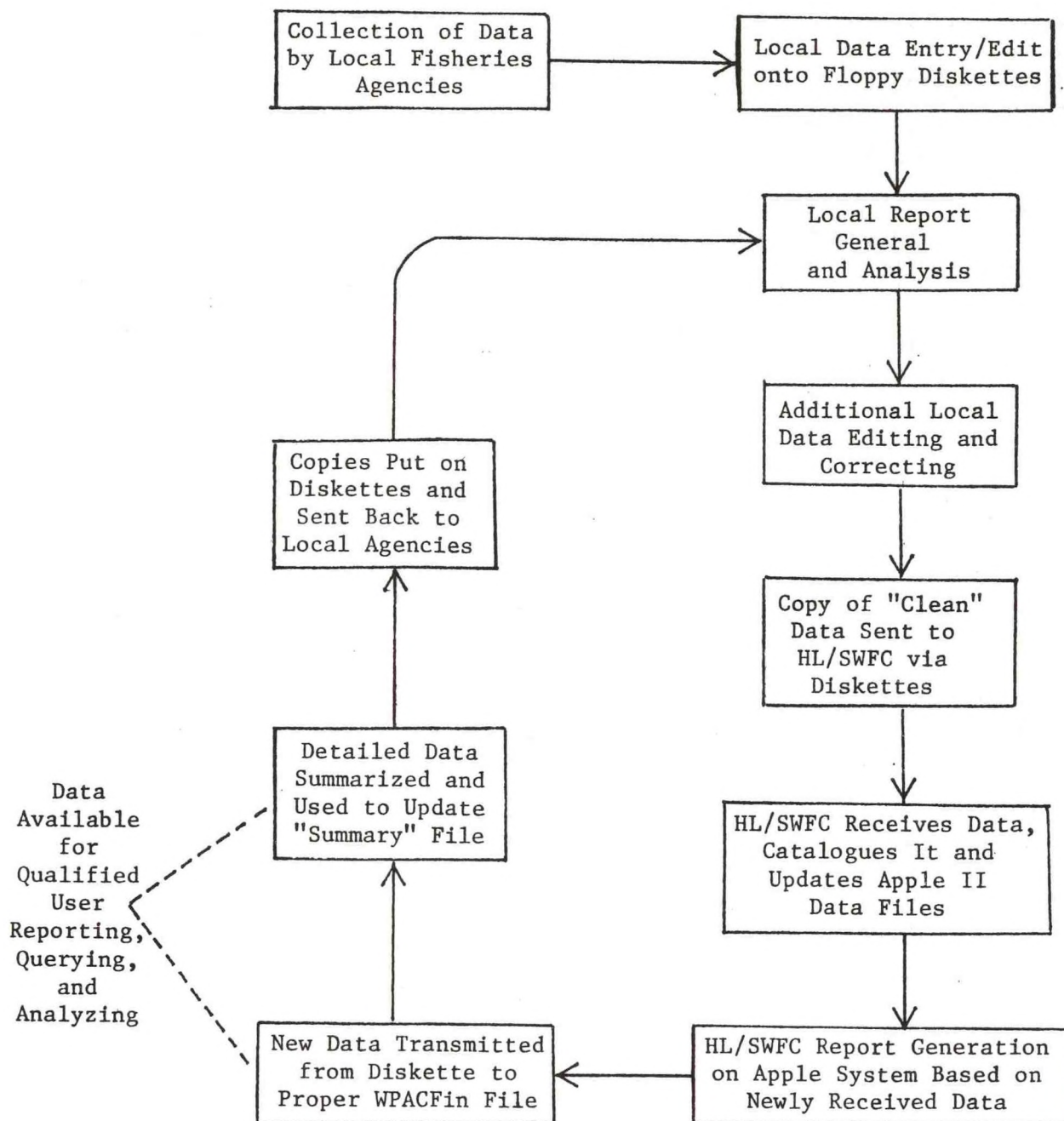
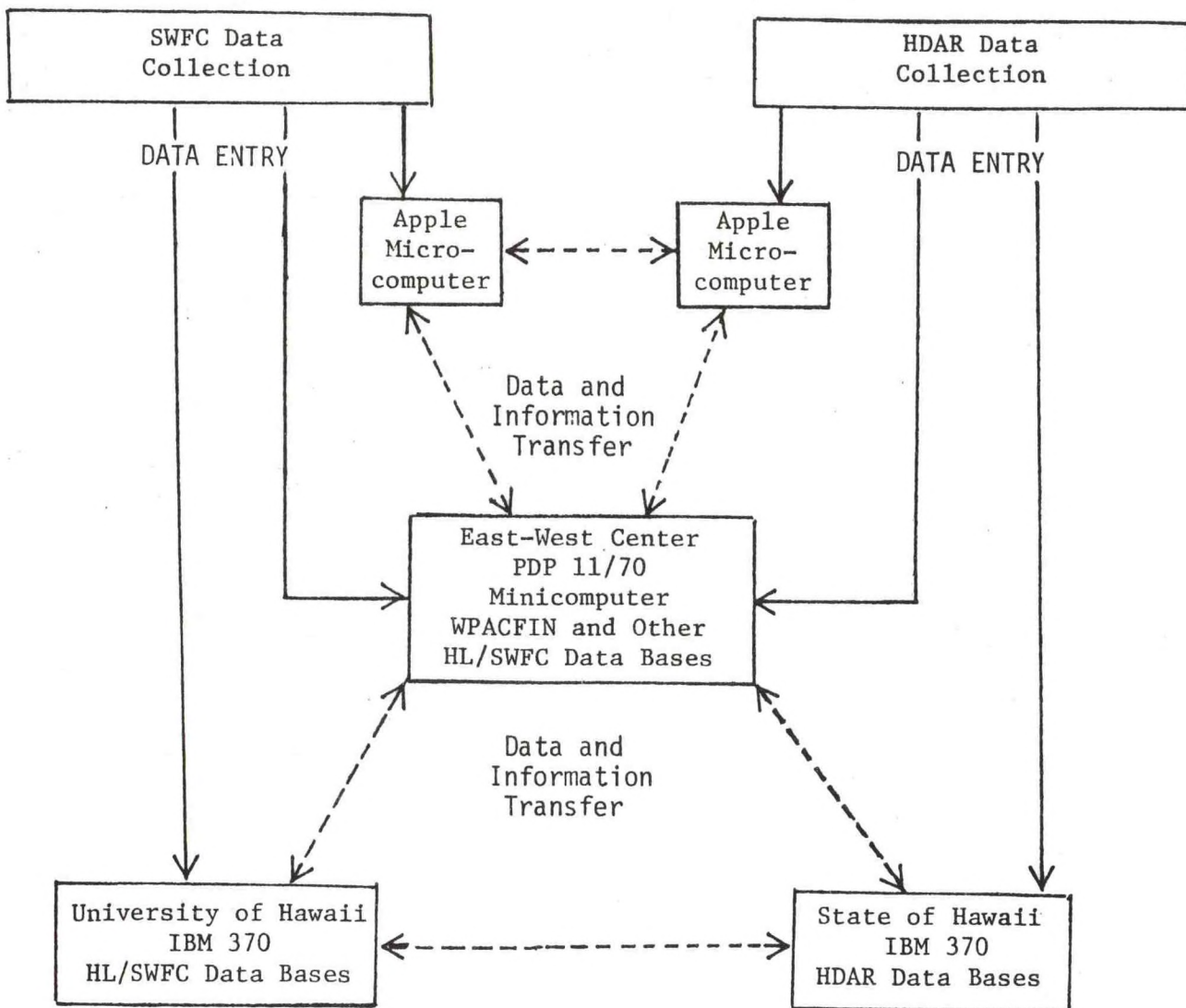


FIGURE 3

SWFC AND HDAR
DATA AND INFORMATION FLOW



DATA BASE DESIGN

The organization and structure of the data base system will reflect the nature of the unique fisheries problems and data collection systems of each of the island components of WPACFIN, but will also, as much as possible and practical, standardize the use of data elements, measurements, and data formats. It is recognized that the island agencies included in WPACFIN are separated by vast distances and that local circumstances may vary greatly with regard to their fisheries as well as to the sophistication, or even existence, of data collection systems.

It is currently envisioned that data bases identified in each island component will be developed and managed as separate entities, and where possible, will be summarized for incorporation into broader scoped, island-integrated data bases. For example, if each island component has a data base providing daily landings by species, then each of these data bases would be maintained as a separate entity, but data formats would be standardized as much as possible. Additionally, daily records could be summarized on a monthly basis and stored in another data base containing landings from all island areas. This scenario can be expanded to include other types of fisheries data, and therefore generally describe the data base structure of WPACFIN.

SPECIFIC GOALS AND ACTIVITIES

It should be emphasized that implementation of WPACFIN is a major undertaking that requires an unprecedented level of coordination and cooperation among the various governmental components. Implementation will require changes by all of the agencies involved, and these changes must be well planned and cooperatively agreed upon before being implemented. Full implementation of WPACFIN will require a firm commitment to the system by all participants. The SWFC is committed to this project and has provided funds for it. It is the general philosophy of FIN to use these funds to upgrade existing data collecting and processing systems and implement new systems in such a way that the existing fisheries agencies will be capable of maintaining the systems without continuous federal funding. However, if a system improvement requires a local agency to perform activities beyond its financial capabilities, additional FIN funding may be made available.

Several general problem areas require consideration and resolution through mutual agreement before WPACFIN can be entirely implemented. These activities include:

1. Identify specific data needs for each island component and develop plans for collecting and processing the data.

2. Identify fishery management data needs and develop data collecting and reporting mechanisms to meet these needs.
3. Establish integrity and continuity of the data collecting and processing systems, and the data and information transfer mechanisms.
4. Designate qualified users of the system.
5. Finalize agreements of data exchange and confidentiality.

A number of specific activities in the implementation of WPACFIN have already been accomplished, are underway at this time, or will be started soon. A brief description of some of these follows:

1. Procurement of the five microcomputer systems was completed in late November 1981 and their installation completed by early February 1982. The microcomputer systems were installed in the following order, HL/SWFC September 29, 1981, HDAR on October 30, 1981, ASDMR on December 14, 1981, GDAWR on January 29, 1982, and NMI/DNR on February 3, 1982. Specific detailed training on data and file management techniques, hardware operation, care and maintenance, and DB Master and other software was provided to agency personnel in each of the island territories where personnel had no previous computer experience. Training of HDAR personnel was less extensive due to their previous computer experience and alternate implementation methodologies. Continued user support and additional training will be provided to all WPACFIN components on an as needed basis.
2. A contract for main frame computer services has been signed with the East-West Center. The communications cable has been installed between the HL/SWFC and East-West Center and all terminals have been connected.
3. Identification and description of historical data available in American Samoa, NMI, and Guam have been accomplished under the WPRFMC Historical Data Compilation Project. Individuals who worked on that project are working closely with HL/SWFC to ensure a coordinated transition from that project to WPACFIN implementation. Additional WPRFMC programmatic funds have been requested to continue funding the individuals involved in this project thus ensuring continuity between the data compilation project and WPACFIN implementation.
4. A "System Study" of the HDAR data collecting and processing procedures is continuing. By necessity, the study schedule has been revised because of the impact of HDAR priorities. Nevertheless, progress is being made not only in terms of the study but also in HDAR's ongoing effort to

improve its data collecting system. A draft report is targeted for completion in April and a final report is scheduled by June 1, 1982.

5. Plans are being formulated and discussed for establishing a WPACFIN Data Goals Committee to be comprised of upper management personnel from each of the major WPACFIN agencies. The Data Goals Committee will be the functional unit deciding what specific projects and data collection systems should be undertaken in each of the island areas to establish the information network. The Data Goals Committee will appoint a Technical Subcommittee composed of technical applications personnel from each of the major WPACFIN components. This subcommittee will deal with the technical and daily operational aspects of WPACFIN to ensure that user information needs are met.

6. A contract for the collection of tuna logbook and length frequency data has been awarded to ASOMR and is expected to be a continuing project. Some improved methods of data handling have been planned and implemented since the installation of the microcomputer system in American Samoa.

7. Meetings have been held with management personnel from all of the WPACFIN major components, and general agreements reached and commitments made regarding the importance and direction of system implementation. An Agreement of Understanding between HDAR and SWFC on the cooperative implementation of WPACFIN was signed in May 1980. Similar agreements have been drafted for American Samoa, Guam, and NMI and may be expected to be signed in the near future.

8. Data bases have been established in American Samoa, Guam, and NMI for the automation of historical catch data and certain related fisheries data.

CONCLUSION

In this preliminary description of WPACFIN, the basic configuration of the network has been described including the agencies cooperating in the endeavor, the hardware and software components, and the data communication links. As mentioned in the Introduction, greater detail will be provided in a separate planning document; however, the design of WPACFIN will evolve with the data needs of the users.