Cooperative Research - What is it?

- Long History of Cooperative & Collaborative Research/Short History of Line Item Funding
- NMFS' National Cooperative Research Program
  - Program still in infancy
  - FY01 & Fy02 Funding Levels & Funding Criteria
  - FY01 Funded Project Categories
- Regional Cooperative Research Programs
- Lessons Learned/Factors for Success

Cooperative Research Objectives

- Improve scientific information
  - both quality & quantity available for fishery management
- Encourage collaboration
  - among industry, Councils, academia, non-government organizations, State agencies & NMFS
- Improve communication
  - mutual understanding & cooperation
- Use fishermen's expertise & vessels
  - increase knowledge-base
  - use fishing vessels as supplemental NOT replacement research platforms
- Involve fishing industry
  - generate information to manage their businesses and solve fishery management problems

National Cooperative Research Program Project Funding Criteria

- Build upon existing programs versus new starts
- Emphasis on projects that involve Regional Councils and constituent partners in development
- Support for projects that have constituents as participants to greater degree versus only providing platform and crew

Some Success Factors for Cooperative Research

- Research projects must remain collaborative from design, through planning, implementation, and analysis
- All participants must maintain an open-mind
- Participants must have realistic expectations
- All research must be subjected to same degree of peer review of science
- Adequate financial and personnel support required
- Fast feedback to participants and open access to data they provided to see how it is being used to inform management decisions

Cooperative Research Funding - FY99 - FY02

- **FY1999 - $5.0M** - For emergency disaster relief in support of NE multispecies fishery failure
- **FY1999 - $1.8M** (emergency supplemental) For research, management, and enforcement activities in NE multispecies fishery
- **FY2000 - $4.0M**- For development of cooperative research & enforcement, enhanced stock assessments/discard mortality monitoring in NE groundfish
- **FY2000 - $2.0M**- For Northeast Consortium - support of cooperative research
- **FY2001 - $15M** - For support of NE cooperative research and management activities by NMFS based on NEFMC recommendations
- **FY2001- $3.0M** - For national cooperative/collaborative research programs w/NMFS constituents
- **FY2001 - $2.5M** - For cooperative research programs in the SE
- **FY2001 - $5.0** - For Northeast Consortium - support of cooperative research
- **FY2002 - $3.75M** - For NE cooperative research
- **FY2002 - $3.0M** - For SE cooperative research
- **FY2002 - $2.75M** - For national cooperative research
- **FY2002 - $2.0M** - For Oregon cooperative research
- **FY2002 - $5.0M** - For Northeast Consortium - support of cooperative research

National Cooperative Research Program

- Program consists of limited funding ($3M in FY01, $2.75M in FY02) distributed to 5 Science Centers
- Designed to provide seed money to develop & expand cooperative research programs w/constituents
- Emphasis on on-going programs that involve constituents in both planning and execution of research & data collection
- Program to encourage information sharing within NMFS in order to overcome technical obstacles to expanded cooperative research projects with industry -
  - Permit hurdles
  - Vessel calibrations

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The EFCL
A New Electronic Information System
For
Collecting, Using and Maintaining Fishery-Dependent Data

Managing fisheries requires information on fishing. Most fishery dependent information is collected on paper, often in different formats and to different standards. Fishers in the NW asked the Northwest Fisheries Science Center (NWFSC) to develop an electronic logbook to allow better use of the data that state law already requires them to collect. Other providers/users of fishery dependent data identified a need for an electronic system to integrate information coming from fishers, observers, fish processors, biologists and resource managers. They noted that fishery dependent data is used in different ways by different user groups and often takes years to collate.

The preference was for a system that could integrate historical and current data, deliver near-to-real time by either satellite, marine or cell phone, operate off a standard PC platform, provide user groups the flexibility of using current forms, and rapidly integrate the various data streams. It would need GPS/ date/time stamps on entries, the highest security and encryption protocols, and the ability to be reported out on disks or by PC communication to a website.

Approach

The NWFSC successfully competed for funding from the Information Technology Innovation Fund (IT Fund). The terms of the grant required a nationwide focus that would result in efficiencies and streamlining through technology development and would return the costs of development to the Fund.

Cooperative Research and Development Agreements (CRADAs) are one of the only statutory mechanisms through which the federal government can work in partnership with the private sector and share in revenue, necessary to return development costs to the IT Fund. The EFCL Project Team, used a competitive process to acquire Scientific Fisheries, Inc (Alaska) as the CRADA (private sector) partner for co-development of the PC onboard application. A requirement in the CRADA required the successful private partner to agree to development of an open connectivity standard (OCX)) for others, meaning that vendor/suppliers of other mapping and charting applications, VMS and satellite equipment providers (such as the new satellite tablets that make use of low orbital satellites) could add the EFCL to their products. This, in turn, would lead to competition and additional enhancements of use to buyers.

The Team was mindful that industry organizations and fishery management agencies might wish to deploy the system differently. Some might want regional or state-by-state deployment, and that even if organizations shared certain operational costs, that there would be differences in how they would want to phase in the system or permit access to data between organizations. They may even want to collect data in different ways. The Team created a system that could be used only for historical data or for historical, current data and future data collection; could be deployed centrally or distributed; could allow organizations to share system components (such as the database) without having to deploy in the same way or collect the same data, or give organizations access to data of another. This

The EFCL A New Electronic Information System *For* Collecting, Using and Maintaining Fishery-Dependent Data (continued)

flexibility could drive efficiencies and still accommodate political concerns. The database and web interface were designed at the NWFSC, consistent with needs defined in user surveys. The business plan envisioned a system that added sufficient value to the data supplied by fishers and others, that the data (in value-added formats) would be as useful, if not more useful, to providers of the data, as to the agency or organization that deploys the system. Much of the programming was done by ARIS Corporation, now CIBER Inc. Pre-deployment independent testing and validation and additional programming was provided by Paladin Data Systems Corporation.

Performance Measures

A prototype should be measured by its ability to cost-effectively meet specific needs in a reasonable time. The EFCL met this test before the prototype was even completed, since a deployment was requested for an observer program. A fully customized system was delivered to the NW observer program in less than 8 weeks, using an Oracle programmer.

Remaining Grant Requirements

The challenge of the Northwest observer deployment delayed independent testing and validation (IT&V) of the system and its supporting documentation. During the delay, it was suggested that the NMFS would need to do its own validation of the system. Licensing negotiations with the CRADA partner, setting the cost of the onboard software application (most likely less than $500) will be conducted by Agency attorneys The Project Team is completing a Technical Memorandum which will describe the policy and technical decisions necessary for organizations to deploy the system. The Technical Memorandum will be reviewed internally prior to release this summer.

System Status

The system is operational and can be deployed now.

Future Considerations

The EFCL Project Team was funded to complete a prototype for delivering real time or near to real time fisheries dependent information. No funding was supplied for deployments. Since the EFCL can be adapted to any scale (national, regional, for one or more fisheries, by one or more user groups or gear types) is modular (permitting use of just the onboard application or just the website or just the database), is adaptable to any needs or circumstances of field data collection, and has straightforward pathways for integrating historical data – there should be few technical barriers to deployment. The State of California has already chosen to begin a pilot with the system this year.

EFCL System Architecture

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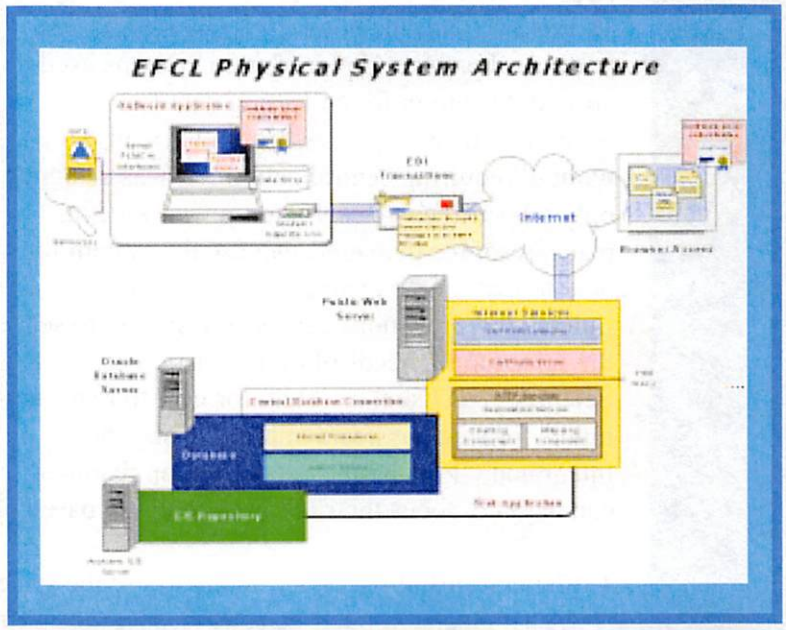
The EFCL combines a PC application, a link to a secure website, and a database. The front-end application has separate executables for different user groups, and, in the case of the fishers, can be implemented to mirror existing logbooks.



The system works like this:

- The software application installs on the fisher or observer's onboard PC (or they can use the web for data entry).
- The EFCL is initialized with a role specific to the user (e.g. observer or fisher). The user is assigned passwords, and provides participant information to the system administrator.
- Certificate authority and encryption is obtained to encrypt messages and verify the identity of the person submitting the information.
- A GPS, connected to the EFCL PC, automatically logs the vessel's location.
- A "trip" is started. The fisher or observer enters data about the catch and whatever other information the organization deploying the system wants to collect.
- The software bundles the trip information into e-mail messages, which can be encrypted and sent (via any system with a TCP/IP protocol) to the central database. (The user can also make a disk copy of the data and upload it to the database via the same or another PC with a web connection.)
- Users can log onto the web site and validate their trip records.
- When the vessel lands, processors enter landing data on their office PCs through the web interface. Port biologists enter sampling data. Processors can also print standard landing ticket forms.
- Managers can see near to real-time locations of fishing vessels, do near to real-time quota management, and generate customizable reports with SQL queries or generate information to standard formats.
- Fishers have the option of entering trip information from a disk after they return from sea. They can see their own entries as well as maps of their fishing activities.
- The design provides for sensors (e.g. CDT) to upload electronically through the application.

The resulting process improvements are immense. Typically, paper reporting occurs *weeks* after fishing is completed, with less than full compliance and many errors. "Roll-up" of data from different sources (e.g. fishers / observers / processors / scientists) may take *years*, if it is done at all. EFCL reporting occurs within *minutes* of data entry, with automatic error and compliance tracking. The EFCL can also "roll up" information in SQL reports that can be displayed on maps and customized to meet user needs.

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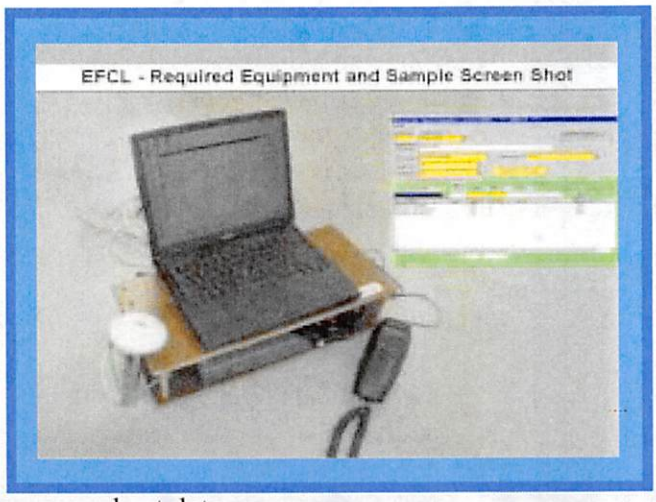
EFCL What User's Need



The EFCL has the potential to standardize the traditional paper and place-based systems used around the nation for collecting data from observers, fishers, processors, and scientists without requiring centralization. It was designed only after extensive user interviews. Once in place, resource managers can use the system for near to real time management of fisheries. Industry organizations can use the system to serve the information needs of their constituents. Scientists can use the system for near to real time inputs for stock assessments and, using the integrated GPS, and the data-collation features, can begin to focus their research spatially based on more robust data.

1. Fishers and observers wishing to use the system *at sea* need:

- A personal computer capable of operating Windows 98, with at least a 133 Mhz processor, 32MB of RAM, 40MB of free disk space, and a CD-ROM
- Microsoft Outlook
- A GPS that is NMEA 0183 compatible and capable of connecting to the PC (location data can also be manually entered)
- An internet service provider
- Either a data capable cellular phone, a satellite phone or (if connections are not required at sea) a connection to a land line
- An encrypted e-mail service (optional for demo versions).

The system has been tested successfully on digital handheld cell phones with standard antennas, fixed 3-watt marine cellular phones with 9 db fixed antennas, and satellite phones. Any communications device with standardized electronic data outputs can be used, meaning that the system can always take advantage of new, less expensive communication equipment. A printer is supported but optional. The application can be easily adapted for other at-sea users, including processors, those interested in using fishing vessels for homeland defense and enforcement personnel.

2. Processors, fishers, port biologists and resource managers wishing to use the system *on land* need a connection to the internet (at 28 Kbps or better).

3. The Central database system requires two servers, a database server and a Web/Email/map server. Chart FX is used to present charts, and maps are derived from a MapObjects Internet Map Server (IMS). Initializing the system requires a system administrator who is knowledgeable in setup and administration of Oracle 8.0x, ASP and VB. Customizing the

What User's Need (continued)

database application may requires knowledge of all or some of the following: IT needs assessments, Microsoft NT Server; SMTP/POP3; Internet Information Server (IIS); Java script and VB script; Oracle PL/SQL; and/ or SQL.

4. Systems Operations: Operating the database requires an Oracle service contract of approximately 10 hours per month. Depending upon how the system is used and the number of users, the following skills are recommended: applications administration, systems administration and web administration/development. Most organizations with a web site that is updated regularly will have the needed web skills. Organizations operating in an Oracle and NT environment may have the skills needed to operate the system. Organizations that have not previously deployed software to new users may benefit from a service contract for applications administration until they can train current staff. All IT skills needed to operate the system are readily available by contract nationwide and in most international locations through local providers.

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