Fishery Data Collection and Research Committee

STRATEGIC PLAN 2022-2026

Hawaii Division of Aquatic Resources

DRAFT

Citation: Fishery Data Collection and Research Committee. 2021. A Strategic Plan to Improve Fishery Data Collection and Coordinate Research: Western Pacific 2022-2026. Western Pacific Regional Fishery Management Council, Honolulu, Hawaii, 96813.

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Preface

The strategic plan[1] for fishery data collection improvements and research coordination in the Western Pacific region is an attempt to enhance fishery data collection programs in American Samoa, Guam, the Commonwealth of Northern Mariana Islands (CNMI), and Hawaii. Majority of the near-shore and coastal fisheries are currently data-limited. This plan focuses on the non-pelagic fisheries and seeks to address the data-poor situation and elevate the data quality standard both at the local jurisdictional level as well as the federal level.

Equally, this plan also aims to coordinate all fishery-related research in the region in order to improve fishery management decision-making through enhanced scientific information. The Plan intends to describe and define how each participating agency/institution will pursue each task element to effect efficient jurisdictional and Council-level management of fishery resources.

This coordinated and collaborative effort seeks to increase leverage in terms of funding support coming from multiple sources. The plan has a five-year horizon, which aligns with the planning timeframes of the Western Pacific Regional Fishery Management Council's (WPRFMC) Program Plan, NMFS-Pacific Island Fisheries Science Center's (PIFSC) Science Plan, and the Five-Year Plans generated by the local fishery management agencies required by the US Fish and Wildlife Service (USFWS) Wildlife and Sportfish Restoration Program (WSRP). This maximizes the coordination and leverage in terms of achieving the various goals described within the plan. We will update the plan at five year intervals, unless circumstances require intermittent modification.

The first FDCRC strategic plan covered 2014-2019 and was developed through a workshop. The 2022-2026 strategic plan update was developed through a series of agency consultation held in April 2021. The results of the consultations were reported to the Technical Committee on their meeting in April 28-29, 2021.

[1] This regional strategic plan should not be taken as comprehensive in any way. This acknowledges the existence of other efforts that may be specific to pelagic and international fisheries and are not covered by this plan. This plan is meant to be a living document and should be updated as needs evolve.

Statement of Commitment

I understand that my role as a member of the Fishery Data Collection and Research Committee is a significant responsibility and will commit to the elements described in this Regional Strategic Plan for Data Collection and Research (hereafter *Plan*). Specifically, I:

- Support the Mission, Vision, Goals of the *Plan*;
- Acknowledge that the strategies described in the *Plan* are aligned with my agency's priorities and internal plans;
- Will offer my agency's expertise to help ensure the success of this endeavor;
- Will contribute significantly to the achieving the objectives of the Plan, including seeking funding support for the task elements described herein;
- Will oversee the implementation of the task elements within my own agency/jurisdiction and report the progress to the FDCRC at its annual meeting and at Western Pacific Regional Fishery Management Council meetings;
- Will actively participate in all requests for my assistance and response.

I have read and agree to this Statement of Commitment and look forward to assisting the Committee fulfill its objectives.

Ms. Kitty Simonds: Western Pacific Regional Fishery Management Council

Signed _____ Date _____

Mr. Taotasi Archie Soliai: American Samoa Department of Marine and Wildlife Resources

Signed _____ Date _____

Mr. Anthony Benavente: CNMI Department of Land and Natural Resources, Division of Fish and Wildlife

Signed _____ Date _____

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Ms. Chelsa Muña-Brecht: Guam Department of Agriculture, Division of Aquatic and Wildlife Resources

Signed _____ Date _____

Mr. Brian Nielson: Hawaii Department of Land and Natural Resources, Division of Aquatic Resources

Signed _____ Date _____

Ms. Monica Guerrero: Guam Bureau of Statistics and Plans

Signed _____ Date _____

Statement of Support – Wildlife and Sportfish Restoration Program

The Sport Fish Restoration (SFR) program was established to fund the priorities and efforts by state, territory and commonwealth governments to improve recreational sport fishing. Within the eligibility guidelines of the SFR program (under 50 CFR 80), the Wildlife and Sport Fish Restoration Program is supportive of efforts to improve recreational sport fish data collection and research. We hope that the collaborative partnership of the territory and commonwealth resource agencies, federal partners, and the Western Pacific Regional Fisheries Management Council will result in improved fishery data collection and research in the U.S. flag jurisdictions.

Mr. Chris Swenson: Wildlife and Sportfish Restoration Program, US Fish and Wildlife Service

Signed _____ Date _____

Statement of Support – National Marine Fisheries Service

In its mission to *provide timely, high-quality applied scientific information to support the conservation and management of fisheries, protected species, and marine habitats in the central and western Pacific Ocean*, The NMFS-Pacific Island Fisheries Science Center acknowledges the efforts of the Fishery Data Collection and Research Committee to improve data collection and enhance research coordination in the Western Pacific region. PIFSC shall complement this coordinated effort through activities described in (but not limited to) the Science Center's strategic and implementation plan.

Dr. Michael Seki: NOAA-National Marine Fisheries Service – Pacific Island Fisheries Science Center

Signed _____ Date _____

Acknowledgements

This regional strategic plan is a product of the collaborative efforts and input by representatives from:

American Samoa: Department of Marine and Wildlife Resources
Guam: Department of Agriculture – Division of Fish and Wildlife
CNMI: Department of Land and Natural Resources – Division of Fish and Wildlife
Hawaii: Department of Land and Natural Resources – Division of Aquatic Resources
the Western Pacific Regional Fishery Management Council, the National Marine Fishery Service – Pacific Islands Fisheries Science Center, Pacific Island Regional Office, United States Fish and Wildlife Service – Wildlife and Sportfish Restoration Program

Agency Consultation Meeting Participants

American Samoa Department of Marine and Wildlife Resources
Domingo Ochavillo – Chief Fishery Biologist

Guam Department of Agriculture – Division of Aquatic and Wildlife Resources
Jay Gutierrez – Division Chief
Brent Tibbatts – Fishery Biologist
Tom Flores – Fishery Biologist

CNMI Department of Land and Natural Resources – Division of Fish and Wildlife
Frank Villagomez – Fishery Biologist
Maria Angela Dela Cruz – Creel Survey Program Manager

Hawaii Department of Land and Natural Resources – Division of Aquatic Resources
Jason Helyer – Commercial Fishery Database Manager
Tom Ogawa – Hawaii Marine Recreational Fisheries Survey Manager

NMFS – Pacific Islands Fisheries Science Center
TTodd Jones – Fishery Research and Monitoring Division
Felipe Carvalho – Stock Assessment Program
Ashley Tomita – Fishery Monitoring Program
Rob Ahrens – Management Strategy Evaluation Specialist

Western Pacific Regional Fishery Management Council
Marlowe Sabater – Marine Ecosystem Scientist

Overview

Fishery data collection has been ongoing in American Samoa, Guam, CNMI, and Hawaii for several decades. Implementation of fishery data collection programs differs by jurisdiction. These programs cannot be standardized due to differences in logistical capabilities and geographic scale of the survey areas. The data generated from these data collection programs are being used for fishery management and scientific studies. However in recent years, management requirements and information needs evolved and the demand for fishery information had increased significantly. Current data collection programs are no longer sufficient to meet modern management requirements, particularly for determining annual catch limits (ACLs) and stock status assessments. Although decades of data collection had generated substantial fishery information, the reliability of the catch estimates[2,3,4,5] and identification of sources of sampling error and bias[6] have only been evaluated sporadically throughout the program's existence. The data from these programs are important and generate the only data sets for the near-shore/coastal fisheries in existence, which were used to specify the crude initial sets of ACLs. The efforts of various data collection programs coupled with a series of data workshops aim to improve fishery information. However, the absence of a strategic plan makes a coordinated, collaborative, and objective-oriented effort to improve data collection more challenging. The first strategic plan was developed in 2014 and covered the activities to 2019.

Instituting a framework whereby all agencies are aware of planned and current research is an enormous task. Each of the fishery management agencies, federal science providers, and universities has been conducting or facilitating research related to fishery stocks and associated habitats. These different research projects and programs are valuable sources of information that have potential to inform the fishery decision making process and enhance management of stocks. The Council, as mandated by the Magnuson-Stevens Fishery Conservation and Management Act, works through its Scientific and Statistical Committee and other advisory bodies and staff, to develop Five Year Research Priorities documents. These are intended to guide the research that needs to be implemented to support quality fishery management decision-making.

[2] Kikkawa, B. 1994. Western Pacific Fishery Information Network Island Data Assessment (WIDA) Project: Small Boat Fishery Survey in Guam 1980-1991. South West Fishery Science Center Administrative Report H-94-03, Honolulu, HI. 80pp.

[3] Kikkawa, B. 1996. WPacFIN Island Data Assessment (WIDA) of American Samoa Small Boat-based Fishery Survey, 1985-1993 and Shoreline Fishery Survey, 1990-1993. South West Fishery Science Center Administrative Report H-96-09, Honolulu, HI. 62pp

[4] Kikkawa, B. 1997. WPacFIN Island Data Assessment (WIDA) of Commonwealth of the Northern Mariana Islands Small Boat Fishery Survey, 1988-93 South West Fishery Science Center Administrative Report H-97-04, Honolulu, HI. 39pp.

[5] Bak-Hospital, S. (draft). Western Pacific Regional Creel Survey Data Historical Summary and Analyses: 1982-2012. Report to the Pacific Island Fishery Science Center.

[6] Bak, S. 2012. Evaluation of Creel Survey Program in the Western Pacific Region (Guam, CNMI, and American Samoa). Western Pacific Regional Fishery Management Council, Honolulu, HI. 59pp.

In order to achieve the goal of improving fishery information for management, the Council established the Fishery Data Collection and Research Committee (FDCRC). This committee is comprised of the heads of the different fishery management agencies, the PIFSC director, the manager of the USFWS Sportfish Restoration Program, and the chair of the Council. The FDCRC is responsible for implementing specific tasks agreed upon by the Committee as recommended to the Council. This committee is supported by a Technical Committee (TC) that is comprised of data collection managers, chief/senior scientists, and research scientists. Whereas the FDCRC members are high level participants, TC members are program and technical staff who collect, process, and/or report data. The TC members know the intricacies of the data programs and their needs, deficiencies, and ability to provide certain types of information. The on-the-ground implementation of the projects will be governed by the Technical Committee with support from the FDCRC members.

The success of this effort rests on the collaborative effort and agreement between the members of the FDCRC. Working relationship between agencies/programs already exist since the establishment of each entity. The Council, PIFSC, and WSRP have supported DMWR, DAWR, DFW and DAR through various programs and projects for decades by providing funding and/or technical support. This plan is meant to further enhance the collaboration through identification of specific tasks and monitoring the progress and accomplishment of all parties.

Accomplishments From The 2014-2019 Plan

The 2014-2019 FDCRC Strategic Plan identified a total of 73 tasks across five different goals (Table 1). A status matrix was developed and circulated amongst the FDCRC members agencies. The responses in the status lines were characterized based on level of completion of the tasks:

1. Not started – no activities conducted to address the task
2. Ongoing – work was initiated addressing the task and still in progress or the work is part of a regular established process
3. Completed – work was completed addressing the task where no further work is required and a product was developed
4. Some area completed – work was initiated in all areas and some areas were able to complete that task while others are still in progress

Goals	Not Started	Ongoing	Completed	Some area completed
Establish a standardized/Comparable and comprehensive data collection system that stores and disseminate quality controlled fisheries information	0	16	20	6
Create a list of priority species for each group/agency	0	0	3	0
Create and maintain an inventory of scientific literature (e.g. gray literature), unpublished/analyzed data set, and unprocessed specimen/samples that is publicly accessible	5	0	0	1
Proactive ecosystem-based fishery management is implemented at local and federal level through coordinated and targeted research to better understand fishery sustainability	4	11	3	1
Increase capacity of local fishery management agencies to collect improved fisheries data, monitor critical fisheries and conduct fisheries ecosystem research	2	1	1	0

Goal 1 “Establish a standardized/Comparable and comprehensive data collection system that stores and disseminate quality controlled fisheries information” deals with improving the fishery dependent data collection system. Forth-eight percent of the tasks was completed in the past five years. The highlights of accomplishments under this goal are

1. Development and implementation of the small boat electronic reporting system called Catchit Logit;
2. Development of the first machine learning software in the region for the purpose of collecting species composition in the island fisheries;
3. Development and completion of the mandatory license and reporting regulation for CNMI and efforts are underway in American Samoa and Guam;
4. Review of the creel surveys through PIFMAPS and internally by PIFSC are underway;
5. Development and launching of the fishery dependent data portal for the Annual SAFE reports through wpcouncildata.org;
6. Ongoing improvements in the FIN system through the MySQL migration from FoxPro;
7. Development of a SHINY mirror database system to monitor progress in data collection including an improved query system through MySQL;
8. Continuous training of data collection staff on techniques, protocol, and analysis;
9. Completion of revision of the Annual SAFE Reports as the standard reporting template;
10. Improvements in the online summaries of the FIN website;
11. Completion of the data sharing agreements between the Council and the territories;
12. Enhanced education and outreach related to data collection

All the tasks associated with Goal 2 "Create a list of priority species for each group/agency" were completed. This was through the implementation of the Ecosystem Component Amendment as well as the revision of the Annual SAFE Reports to monitor prioritized EC species. In contrast, only one of the five task was initiated for Goal 3 "Create and maintain an inventory of scientific literature (e.g. gray literature), unpublished/analyzed data set, and unprocessed specimen/samples that is publicly accessible". The Council posts project reports and gray literature in the Council website. PIFSC also create Admin or Internal Reports for activities that do not meet the Technical Memorandum standards.

The goal that pertains to research for Ecosystem-Based Fisheries Management and stock assessment improvements showed 58% of the tasks as ongoing while 21% not initiated and 16% completed. Some of the highlights of accomplishments under this goal includes:

1. Stock assessment prioritization was completed that includes tier assignments of each MUS;
2. Several project proposals were developed and received funding to address research gaps related to life history, population genetics, ecosystem indicators and thresholds;
3. Incorporation of ecosystem variables in the Annual SAFE Reports;
4. Ongoing work on development of ecosystem models to support EBFM;

Goal 5 is about enhancing capacity building of the FDCRC member agencies: “Increase capacity of local fishery management agencies to collect improved fisheries data, monitor critical fisheries and conduct fisheries ecosystem research”. Twenty five percent of the task was completed with the development of the SHINY application to support tracking of interviews and sampling frequency. The career service enrichment task is currently being done through the Scholarship Program of the Council funded the Council, PIFSC and PIRO where students who graduate from the program work for the territorial fishery department.

Updated Needs

The need for better fishery information has become more pronounced since the Magnuson-Stevens Fishery Management and Conservation Act was re-authorized in 2006. The re-authorization included mandates for the increased use of annual catch limits, allocation schemes, essential fish habitat and habitat of particular concern, and increased quality of information that goes into the Stock Assessment and Fishery Evaluation (SAFE) reports. Other statutes, such as the Endangered Species Act, Marine Mammal Protection Act, and the National Environmental Protection Act also demand for better information. In addition, pressures from non-government organizations on federal, state, territorial and commonwealth agencies to do a better job in conserving the marine resources.

The current near-shore and coastal data collection and research framework implemented by the local fishery management agencies were not designed to meet these emerging demands and must be upgraded to conform to current management information requirements. The need to support these local data collection efforts is critical because these are the only sources of near-shore-coastal data from which fishery management decisions are based. There is also a need to effectively coordinate and implement data improvement projects as well as monitor the progress of the plan, as this has been a serious impediment to success.

Near-shore and coastal fisheries research in the Western Pacific, on a regional level, is often disparate, lacks direction, and not designed to neatly inform fishery management decisions. In general, much of the research has been driven by the nature of the funding and the interests of the researchers, though research done in the Territories does tend to be designed to answer specific questions on a local scale. This locally generated scientific information can contribute to the broader scientific knowledge and can be used for broader fishery management decisions. However, the results are usually not readily available unless published in peer-reviewed scientific journals, which are often not available in a useful time frame. There is a need to consolidate these unpublished works and coordinate fishery research in order to address fishery information needs at multiple levels. This would increase the efficiency of the limited funding resources by addressing fishery information needs at various levels

Vision Statement

Communities benefit culturally, socially and economically from sustainable fisheries and healthy marine ecosystems managed using reliable, relevant and representative data.

Mission Statement

The Fishery Data Collection and Research Committee coordinate and support the improvements in the collection, analysis and dissemination of relevant, reliable and unbiased information and enhance the trusted exchange between stakeholder groups enabling an effective fishery management at all levels.

Goals

Goal 1: Establish a standardized/Comparable and comprehensive data collection system that stores and disseminate quality controlled fisheries information

Goal 2: Create and maintain an inventory of scientific literature (e.g. gray literature), unpublished/analyzed data set, and unprocessed specimen/samples that is publicly accessible

Goal 3: Proactive ecosystem-based fishery management is implemented at local and federal level through coordinated and targeted research to better understand fishery sustainability

Goal 4: Increase capacity of local fishery management agencies to collect improved fisheries data, monitor critical fisheries and conduct fisheries ecosystem research

Strategies

The FDCRC is a collaborative partnership between fishery management agencies, federal counterparts, and academic institutions. The mandates for all entities vary but each has a vital role in contributing to the overarching mission. Each has certain level of expertise and capabilities that can augment the short-fall of others. Through this collaborative effort and unified goals, it is hoped that in the next 5 years fishery data collection has been enhanced and fishery research have been coordinated resulting in a more comprehensive fishery information for management. The following goals and strategies are designed to maximize efficiency in generating improved data and scientific information from limited funding sources.

NOTE: The texts in red are the new tasks identified during the agency consultation meeting and reviewed by the Technical Committee at its April 2021 regular meeting.

Goal 1: Establish a standardized/Comparable and comprehensive data collection system that stores and disseminate quality controlled fisheries information

Objective 1.1: Subject to appropriations, by 2026, this committee will evaluate the delivery of the updated system with online, dynamic, text, and spatial query capability that allows users to download reliable and relevant commercial and non-commercial fisheries dependent data in all US Western Pacific jurisdictions.

Strategy 1.1.1: *Strengthen implementation of existing rules and regulations that supports fishery data collection;*

Task 1.1.1.1: Develop legislation that would support collection of fishery data via mandatory reporting and compliance to data collection in Guam and American Samoa;

Task 1.1.1.2: DAWR to work with the Governor's Office and the Guam Legislature to move the mandatory license and reporting regulation forward by developing a list of potential candidates for the ORMC nominees, coordinate with the Governor's Office on the appointment for the ORMC seats; and support the nominees on securing the necessary documentations to finalize the appointment

Task 1.1.1.3: Finalize the list of commercial vendors and list of fishermen subject to mandatory license and reporting

Task 1.1.1.4 Host a sign up event and issuance of license. Include in the event the registration for CatchIt LogIt

Strategy 1.1.2: *Enhance the local fishery agencies capabilities to carry out the data collection at a statistically adequate yet logistically optimal level;*

Task 1.1.2.1: FDCRC to convey the urgent need to fill in the 2-3 vacant positions at the Data Section of CNMI DFW

Task 1.1.2.2: Conduct an agency status inventory to determine current capabilities within the agencies in terms of hardware, man-power, software etc. to carry out the data collection;

Task 1.1.2.3: Institutional analysis to determine capacity and whether there is a need for technology transfer and capacity building and training;

Task 1.1.2.4: Work with MRIP on the development of the database infrastructure and the QAQC protocols for the tablet-based data entry system

Task 1.1.2.5: Explore the use of the HDAR servers to house the roving creel survey data – 1) Work with the data people at NOAA to get their opinion on the translation of the database format and evaluating which ones are more efficient; 2) Coordinate with PIFSC on plans for a local database development; 3) Develop a data scrubbing program to QAQC the data from the tablet-based data entry;

Task 1.1.2.6: Form a regional MRIP Transition Team for the HMRFS Roving Creel Survey (RCS) and develop the RCS Transition Plan

Strategy 1.1.3: *Improve the accuracy of the data from the existing data collection programs in collecting fishery dependent data;*

Task 1.1.3.1: Improve the DAR QA/QC process for the FRS data by enhancing the follow-up process with the fishermen on inaccurate data submission

Task 1.1.3.2: Conduct an extensive outreach on how to fill in the fisher report. Develop an effective outreach tool for the Hawaii fishermen. Consider conducting the outreach when the fishermen apply for the annual commercial license. For example, update the website for CML to have a mandatory link to an outreach video.

Task 1.1.3.3: Conduct a workshop to explore the QAQC improvement process

Task 1.1.3.4: Conduct workshop with DMWR and DFW to demonstrate the importance of each element of the data collection protocol to enhance awareness of the impacts of deviating from the design

Task 1.1.3.5: Develop safeguards to ensure that the survey protocol are strictly followed

Task 1.1.3.6: Conduct workshop on the data expansion algorithm to enhance understanding how the estimates are calculated

Strategy 1.1.4: *Design, test, and implement new data collection programs that are not adequately covered by the existing survey program;*

Task 1.1.4.1: Local fishery management agencies implement the new data collection system with adequate monitoring of performance

Task 1.1.4.2: Establish a data validation procedure for the uku and Kona crab fisheries in the FRS-Dealer Report System

Strategy 1.1.5: *Upgrade fishery data collection by exploring options and implementing automated systems using current mobile, wireless, and online technology*

Task 1.1.5.1: Develop an mobile electronic data entry for the territorial creel surveys and Hawaii Marine Recreational Fishing Survey

Task 1.1.5.2: Support the database migration and data consistency of the territorial electronic reporting system to the territorial agency and PIFSC

Task 1.1.5.3: Conduct ER training for fishermen in Manua and conduct a WiFi capacity assessment in remote island areas

Task 1.1.5.4: Continued support for the implementation and improvement of existing mandatory reporting by integrating the electronic reporting system;

Task 1.1.5.5: Council and PIFSC to work with the DFW Director on the importance of integrating the CatchIt LogIt with the local data collection efforts and avoid duplication and reinventing the system

Task 1.1.5.6: Develop a reliable remote access system to trouble shoot programming issues in the Guam database system like exploring the use of screen sharing to walk the Guam database staff on trouble shooting the system

Strategy 1.1.6: *Enhance local fishery management agencies' capacity to process collected fishery data in near real-time*

Task 1.1.6.1: Conduct periodic training and technical assistance on the data collection and transcription process

Task 1.1.6.2: Enhance/develop communication framework between agencies and FMP to facilitate easier follow ups and technical questions

Strategy 1.1.7: *Enhance the local fishery management agencies' capacity to summarize and analyze collected fishery data*

Task 1.1.7.1: Integrate the information from various data streams (BioSampling, creel, PRS etc.) to generate reliable fishery data;

Task 1.1.7.2: Evaluate the feasibility of transferring the data entry responsibility of the commercial receipt books to BSP

Task 1.1.7.3: Develop a database system for in-water surveys in Guam

Task 1.1.7.4: Develop analytical capacity at HI-DAR in expanding HMRFS data in-house for species not covered by MRIP

Strategy 1.1.8: *Revisit and enhance the data sharing agreement with the members of the FDCRC and the public to facilitate more efficient generation of data products and scientific information for local and federal fisheries management*

Task 1.1.8.1: Conduct a five year review and renewal of the data sharing agreements;

Task 1.1.8.2: Developing a public request system; mandatory requirement for a data sharing plan (2 years)

Strategy 1.1.9: *Enhance fishermen and vendor participation in the fishery data collection programs*[7]

Task 1.1.9.1: Conduct public outreach to clarify and explain the rules and regulations/purpose and need of data collection to increase compliance and participation

Strategy 1.1.10: *Evaluate the Roving Creel Survey Programs and provide recommendations to improve the data generated by the data collection system;*

Task 1.1.10.1: Conduct and review the Creel Survey Programs in FY 2022. This includes the statistical analysis of the existing creel data to look at bias and errors;

Task 1.1.10.2: Conduct a series of workshop to review the changes in the fisheries, review the design and implementation of the creel surveys. The workshop will include the evaluation of the access points whether it is still viable sampling port. The workshop report will include the documentation of the historical changes in implementation.

Task 1.1.10.3: Provide recommendations to enhance the survey design that meets the needs of the data users;

[7] CNMI BioSampling Program initiated by PIFSC and supported by the Council is a standard to which this strategy can learn from. The Territory Science Initiative by PIFSC in collaboration with the Council seeks to further expand this success.

Task 1.1.10.4: Work with MRIP on certifying the updated creel survey design;
Task 1.1.10.5: HDAR to coordinate with the Council and PIFSC through the MRIP Regional Implementation Team on the review of the territorial creel surveys to determine elements in the development of the roving creel design for Hawaii

Strategy 1.1.11: Review and evaluate the data fields in the DAR FRS to determine which fields are useful and fields that are no longer valid;

Task 1.1.11.1: Conduct a review of the data stream which are used for stock assessments
Task 1.1.11.2: Conduct a review of the data stream which are used for state and federal fisheries management;

Goal 2: **Create and maintain an inventory of scientific literature (e.g. gray literature), unpublished/analyzed data set, and unprocessed specimen/samples that is publicly accessible**

Objective 2.1: By October 2024, dynamic databases will exist with bibliography of fishery research, fishery dependent/independent datasets, and catalogue of specimens for stocks under local and federal fisheries management

Strategy 2.1.1: Develop an inventory of biological and fishery-related information focused on all managed exploited biological resources

Task 2.1.1.1: Execute a contract with a third party entity or graduate student that would compile all information regarding managed exploited biological resources. [NOTE: Ensure that point of contacts are identified for each information archived]

Strategy 2.1.2: Create a compendium of each priority species for each group/agency and make sure the research meets certain criteria focusing on all managed/exploited biological resources

Task 2.1.2.1: Execute a contract with a third party entity that will conduct literature search on various information databases, such as but not limited to: online scientific literatures, gray literatures, library holdings of each agencies. The contractor will also develop a compendium of scientific literature, agency based data holdings, and unprocessed specimen libraries.
Task 2.1.2.2: Conduct an agency-based interview of staff with long-standing affiliation with the agency to document institutional knowledge on what research had been conducted track viable sources of historic information about the fisheries and stocks being managed.
Task 2.1.2.3: Develop a searchable library [EndNote or other online application] compiling all the information generated by the information mining contracts;

Task 2.1.2.4: Establish partnership with FishBase, ScholarSpace, and ERDDAP to establish the database of mined information *(Optional)*

Goal 3: **Proactive ecosystem-based fishery management is implemented at local and federal level through coordinated and targeted research to better understand fishery sustainability**

Objective 3.1: The Council, PIFSC, local fishery management agencies, and academic institutions have determined the stock status of MUS in the priority list within the next 5 years

Strategy 3.1.1: *Amend the Fishery Ecosystem Plans on the stock status determination criteria for each priority species*

Task 3.1.1.1: Council staff shall amend the FEPs to reflect the methodology to which stock status are to be determined;

Strategy 3.1.2: *Improve the information used by stock assessment by analyzing existing data and conducting studies that address the information gaps*[8]

Task 3.1.2.1: Develop proposals and secure funding to conduct targeted research focusing on but not limited to:

- Life history traits (k, L_{inf}, longevity etc.);
- L50 to support the Guam coral reef FMP
- Spatially explicit CPUE;
- Independent measure of population size;
- Estimate total harvest;
- Tagging studies to determine spatial distribution, mortality etc.

Task 3.1.2.2: Analyze the spatial distribution of effort from existing creel, CML, HMRFS and aerial survey data

Objective 3.2: The Council, PIFSC, local fishery management agencies, and academic institutions have jointly developed working ecosystem models for the nearshore ecosystems [scale of which will have to be determined] within the next 5 years that can be used as a tool for making fishery management decisions

Strategy 3.2.1: *Identify critical ecosystem management drivers, specific pressures on ecosystems, investigate stakeholders interests and agendas, and identify patterns of interaction among stakeholders*

Task 3.2.1.1: Conduct scoping session with stakeholders (fishery management agencies, fishing communities and ocean users) at the different island areas in each jurisdiction;

[8] The BioSampling Program provides additional information on life history and length-weight relationship that can support stock assessment.

Task 3.2.1.2: Draft summary of the scoping session and generate white paper on scoping results

Strategy 3.2.2: Conduct targeted research to complete the elements needed run ecosystem models for fishery management

Task 3.2.2.1: Convene a meeting with PIFSC-Ecosystem Science Division to determine elements to build an ecosystem model and identify priority research to fill information gaps;

Task 3.2.2.2: Develop proposals and secure funding to conduct targeted research focusing on but not limited to:

- Estimate area specific biomass information over time;
- Enhance habitat mapping product prioritizing increased bathymetric and relief resolution;
- Determining high resolution species-habitat relationship;
- Estimating fishery productivity;
- Determining trophic interactions and associated grazing/predation rates;
- Estimating recruitment and survival rates;
- Determining system carrying capacity;
- Genetic and ecological connectivity;
- Vital rate responses to various perturbations (or lack thereof) like, but not limited to, pollution, large and small scale habitat degradation, fishing, climate change impacts;
- Life history determination;
- Species shift-effects from con-specific removals;
- Human dimension influence on the fisheries and the compounding effects on fish stocks;
- Estimating ecosystem resilience from phase-shifts;

NOTE: Elements will have to be prioritized based on critical information that will complete a working ecosystem model

Strategy 3.2.3: Develop ecosystem indicators that will be monitored over time which describes the general status of the population and conduct a risk analysis on what perturbation influences the indicators

Task 3.2.3.1: Convene an ecosystem indicator and risk analysis workshop with PIFSC and local agencies to determine which indicators and threats will be used for model simulation

Task 3.2.3.2: Identify and collate data sets that will be used in the ecosystem model

Task 3.2.3.3: Conduct a full assessment to determine the state of all indicators that can be feasibly be quantifies. Identify data and other limitations;

Strategy 3.2.4: Develop ecosystem models for various fisheries and ground truth reliability of model results that can be used for fishery management

Task 3.2.4.1: Execute contract/grant to potential contractors to develop ecosystem models and conduct ground-truthing/result validation;

Task 3.2.4.2: Conduct Management Strategy Evaluation (MSE) to simulate the effect of various existing and upcoming management tools on the ecosystem indicators and how that changes based on the different combination and extent of implementation and enforcement

Objective 3.3: The Fishery Data Collection and Research Committee shall utilize and apply the assessment and the fishery research information to formulate scientifically-sound management strategies within their own jurisdiction that is coordinated at all levels

Strategy 3.3.1: *Apply Management Strategy Evaluation to current fisheries regulation and other related management strategies to determine efficacy and impact on the ecosystem indicators*

Task 3.3.1.1: Conduct an MSE workshop with the local fishery management agencies and other agencies that manages ancillary factors impacting the stocks. The goal of the workshop is to evaluate current regulations and run simulations on its effect on the ecosystem indicators;

Task 3.3.1.2: Conduct a comprehensive fisheries regulatory review focusing on the effectiveness of the different fishery regulations and revise regulations based on the MSE;

Goal 4: **Increase capacity of local fishery management agencies to collect improved fisheries data, monitor critical fisheries and conduct fisheries ecosystem research**[9]

Objective 4.1: In the next 5 year, fishery management agencies have adequate man-power, analytical skill-sets, legislative framework and hardware to conduct improved fishery data collection and research through collaboration within the membership of the FDCRC and other institution the FDCRC identifies as partners.

Strategy 4.1.1: *Implement a regular training session on fishery data collection and fishery data analysis*

Task 4.1.1.1: Continue the Training-Work session cycle at the Annual Joint Archipelagic Plan Team Meeting;

Task 4.1.1.2: Explore options for online lecture series from researchers with relevant fisheries research information;

Task 4.1.1.1: Conduct Fisheries 101 training

Strategy 4.1.2: *Explore options for a career service enrichment program*

Task 4.1.2.1: Work with the Education Committee to establish career service enrichment program;

[9] The BioSamplig Program provides local technical expertise to conduct life history research and will provide local staff with training of life history sampling.

Performance evaluation

Tracking the accomplishment and follow up on the tasks listed in this regional strategic plan will be carried out by the Coordinator of the FDCRC. The FDCRC members will be asked to report on the accomplishments at the Annual Meeting of the Committee and at the Island Reports of each Council meeting. The Coordinator will be following up with the Technical Sub-Committee members on the status of the tasks. The Coordinator will also be responsible for monitoring potential funding availability and coordinate the submission of the proposals.