Recommendations for Fishery Dependent Data Needs for US Caribbean Fisheries Stock Assessment

Summary

A primary goal of the Southeast Fisheries Science Center's (SEFSC) Caribbean Strategic Planning project is to reduce gaps in fishery dependent datasets used to inform management. The first step in accomplishing that goal is to identify major fishery dependent data gaps and information to improve fisheries management decisions in the U.S. Caribbean. A working group was established to review previous efforts that identified fishery dependent data sources, develop an inventory format that identifies the information we want to know about each data source, develop a survey to identify collections and identify persons who should be targeted by the survey, establish the inventory as a living worksheet on Google Drive with the intention to later house the inventory on some other platform such as SEFSC ODM (Online Data Management), the Atlantic Coastal Cooperative Statistics Program (ACCSP) Bio-inventory, or Caribbean Regional collaborative knowledge hub, establish a process to move identified data collection information into the Google Drive worksheet, and identify and prioritize gaps in conjunction with other Caribbean Strategic Planning working groups. This document contains those findings.

A deliverable of the Caribbean Strategic Planning Project
Updated February 2025

Table of Contents

Acronyms

Acronym	Definition
ABC	Acceptable Biological Catch
ACCSP	Atlantic Coastal Cooperative Statistics Program
CCL	Caribbean Commercial Logbook
CCR	Commercial catch report
CIMAS	Cooperative Institute for Marine and Atmospheric Studies
CSP	Caribbean Strategic Planning
F	Total mortality
FMSY	Fishing mortality rate to achieve maximum sustainable yield
IUU	Illegal Unreported and Unregulated
MRFSS	Marine Recreational Fisheries Statistics Survey
MRIP	Marine Recreational Information Program
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
ODM	Online Dataset Manager
OFL	Overfishing Limit
PFMC	Pacific Fishery Management Council
PR	Puerto Rico
PR DRNA	Puerto Rico Departamento de Recursos Naturales y Ambientales
PSA	Productivity Susceptibility Analysis
SEDAR	Southeast Data Assessment and Review
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
TIP	Trip Interview Program
USC-A	University of South Carolina-Aiken
USVI	United States Virgin Islands

Working Group

Participant	Email	Role	Affiliation
Rachel Banton	rachel.banton@noaa.gov	Coordinator	CIMAS
Larry Beerkircher	lawrence.r.beerkircher@noaa.gov	Lead	SEFSC
David Behringer	david.behringer@noaa.gov	Member	CIMAS
Todd Gedamke	todd@merconsultants.org	Member	MER Consultants
Daniel Matos-Caraballo	dmatos@drna.pr.gov	Member	PR DRNA
Refik Orhun	refik.orhun@noaa.gov	Member	SEFSC
Grisel Rodriguez Ferrer	grodriguezf@drna.pr.gov	Member	PR DRNA

Please contact a working group member with changes or suggestions.

Introduction

Participants volunteered to join this strategic planning working group. During the initial meeting of the group, the participants developed their purpose, goals, and ideal outcomes, which are documented in the [Team Charter](#). The group met seventeen times over the course of a year and a half to accomplish the goals. Section A contains those goals and what was accomplished under each goal. Section B builds on the accomplished goals and contains specific recommendations for programmatic fishery dependent data collection.

A. Goals & Summary of Actions to Address Goals:

1. Review previous efforts that identified fishery dependent data sources

   Group discussion and literature review indicated that existing reviews of Caribbean fishery dependent data sources were fragmented and non-comprehensive. The SEDAR process has addressed the issue in the past, notably SEDAR Procedural Workshop 3 Caribbean Data Evaluation (2009) and SEDAR 46 on U.S. Caribbean Data Limited Species (2016). Other forums have also touched on sources, such as a Shallow Water Reef Fish Stock Assessment Workshop (Appeldoorn et al. 1992), Exploring Tools for Managing Data-Poor Stocks (CFMC Workshop 2011), and a Gulf and Caribbean Fisheries Institute Workshop (Cummings et al. 2015). However, these mainly described the well-established primary sources of data, at least as available at the time, rather than attempting a more comprehensive listing. At the Caribbean Strategic Planning workshop in 2023, there was a general theme of "we've done this all before" when the subject of catalogs of data sources came up, but clearly an updated and more "one stop shop" inventory is needed.

2. Develop an inventory format that identifies pertinent information for each data source

   An inventory format was developed in order to characterize current/ongoing fishery dependent data collections as well as historical data sources. The inventory sought to capture the groups that funded the collection and implemented the collection, the major species, gears, and spatio-temporal range of the collection, as well as information on the type of collection. A complete list of the variables in the inventory, and the explanation for each, can be found [here](#). The group also sought to assign a metadata quality tier to each data source, running from zero (0), representing we know a study/data collection existed but know nothing about it, to five (5), representing we know virtually complete details about the data collection. The tier system is admittedly subjective.

3. Develop a survey to identify collections and persons who should be targeted by the survey

   The spreadsheet linked above was sent out to various known agencies and collaborators in the U.S. Caribbean (e.g. the Southeast Fisheries Science Center Caribbean Fisheries Branch, Territorial Fisheries Management Agencies, etc.) in the fall of 2023.

4. Establish the inventory as a living worksheet on Google Drive with the intention to later house the inventory on some other platform such as SEFSC ODM (Online Dataset Manager), ACCSP Bio-inventory, or Caribbean Regional collaborative knowledge hub

Significant effort was needed to collate the information received as a result of 3 (above). There were some original lines that were duplications and others that could reasonably be merged into a single line source. Most of the sources identified current or recent collections, however some entries were more historical in nature. The most recent version of the inventory can be found here and an excerpt with some of the data sources can be found in Table 1.

Table 1. Selection of data sources in the Caribbean Fisheries Dependent Data Inventory.

PROGRAM NAME	IMPLEMENTING PARTNER	SECTOR	YEARS	PLATFORM
Trip Interview Program (TIP)	Southeast Fisheries Science Center	Commercial	1985-ongoing	US Virgin Islands (USVI) & Puerto Rico (PR)
SEFSC Highly Migratory Species Logbook Program	Southeast Fisheries Science Center	Commercial	1986-ongoing	USVI, PR, & International waters in the Caribbean Region
Caribbean Commercial Logbook (CCL) PR	PR Departamento de Recursos Naturales y Ambientales (DRNA)	Commercial	1983-ongoing	PR
Commercial Catch Report (CCR) USVI	USVI Division of Fish and Wildlife (DFW)	Commercial	1974-ongoing	USVI & PR
Hogfish And Lane Snapper Life History	University of South Carolina - Aiken	Commercial	2016-2020	USVI & PR
Yellowtail Snapper Life History	University of South Carolina - Aiken	Commercial	2018-2023	PR
Pilot Port Sampling Project and Catch Validation Project	MER Consultants	Commercial	2017-2019	PR
Spiny Lobster Size Selectivity USVI	USVI DFW	Commercial	2020-ongoing	USVI
Marine Recreational Fisheries Statistics Survey (MRFSS)	PR DRNA	Recreational	2000-2013	PR
Marine Recreational Information Program (MRIP)	PR DRNA , USVI DFW	Recreational	2014-2017 USVI 2009-2017 PR	USVI & PR

Technology Support For Recreational Intercept Survey	MER Consultants / PR DRNA	Recreational	2021-ongoing	PR
Atlantic Tournament Registry (ATR)	Southeast Fisheries Science Center	Recreational	1970-ongoing	USVI, PR, & Bahamas

5. Establish a process to move information identified in 1-3 into the worksheet described in 4

The group considers the establishment, updating, and maintenance of the inventory as an important process that should persist in the future. A more formal system (other than a Google Sheet on a Google Drive) is recommended, with the two options being (1) construction of a new database/application through pursuance of external funding, or (2) adapting existing data systems for the task. The latter include the SEFSC data warehouse, or the ACCSP data inventory system.

The group also recommended use of interns to more completely fill out the inventory, especially with regards to data sets collected during historical studies. A large listing of Caribbean studies are on a separate worksheet in the Fishery Dependent Inventory and considerable time will be needed to turn those references into a listing in the inventory where appropriate. The group has two high school (MAST Academy, Miami FL) interns that will work on the data inventory during the school year 2024-2025.

Finally, the group recommends that the identified data sets be ranked in terms of usefulness in stock assessments. This was judged beyond the scope of the group's work, but might be a useful exercise for the SEFSC Sustainable Fisheries Division.

6. Identify and prioritize gaps in fishery dependent data

In order to Identify and prioritize gaps, we communicated with relevant staff in the USVI and Puerto Rico, NMFS SEFSC Caribbean Fisheries Branch, and NMFS Division of Highly Migratory Fisheries, as well as other CSP working groups (e.g., Life History data gap group). The following gaps were identified:

A. Commercial Fisheries
   1. Catch Data

USVI requires fishers to submit commercial catch reports (CCRs) for each trip including details on catch, discards, and effort; these data are assumed to be complete as no independent means of verification or validation of the self-reported data are available. The reporting form used by USVI allows for reporting discards.

In Puerto Rico, DRNA requires individual trip reports but has also conducted a program which compares the data which are reported by fishers to that which is observed at the docks. Periodic saturations of dockside intercepts by DRNA are used to estimate correction factors to produce total landings, discard information is being collected, but educating fishers on the importance of reporting discards needs more effort. The efforts are expensive and have been conducted when staffing and funding has allowed. SEFSC has made extensive efforts in recent years in an attempt to standardize and automate this process, but additional work and funding for IT support, for example, is necessary. The estimated range of under reporting for 2014-2019, which is now used for 2020-2023, is 23% in the West, 54% in the East, 58% in the North, and

53% in the South. Periodic saturations of dockside intercepts by DNRA are used to estimate correction factors to produce total landings, and under-reporting of commercial landings remains a potential gap. In Puerto Rico, discard information is being collected, but educating fishers on the importance of reporting discards needs more effort.

Estimation of the correction factor requires the validation of observed landings by the DNRA port agents. SEFSC is trying to automate this process but this will require more IT support.

The accuracy of, and confidence in, the estimation of total catch quantity and composition is the most critical gap in fishery dependent data in the US Caribbean. The additional efforts by SEFSC and DRNA in analytical approaches and procedures (e.g. outlier removal in lobster assessment, quality control, and use of advanced technology) will both facilitate the use of existing data and provide guidance and confidence in future data collection efforts.

2. Effort Data

As described in the Catch section, USVI CCRs quantify basic units of effort, but there is no way of validating the reported effort. CCRs don't collect any information on fisher efficiency/experience, nor information on habitat quality.

Puerto Rico Caribbean Commercial Logbooks (CCLs) quantify basic units of effort, but as noted in the catch section, there is assumed to be a significant amount of under-reporting.

USVI and Puerto Rico both have commercial licensing requirements, and there is a required small boat permit for fishing for and selling Highly Migratory Species in Federal Waters, but in the latter case no logbook is required. PR does have a very consistent license number history.

Enforcement of licensing is problematic for fisheries in PR with some unlicensed fishers selling catch. Fisher education on license requirements may be a gap.

3. Biological Data

In USVI, Fishers are required to have at least four trips sampled per year; however the timing of port sampling is chosen by the fishermen and therefore is not random nor representative (i.e. fishers will not volunteer to be sampled on high volume days). Sample fractions are very Island dependent; sampling in St. Croix in the last 15 years has been spotty, especially when compared to St. Thomas/St. John. For example, between 2010-2023, St. Croix averaged 40% of total USVI landings, but St. Croix samples made up only 11% of the total length samples for the entire USVI recorded in TIP.

There is no systematic age structure collection in either PR or USVI. Both PR and USVI do some weight collection in addition to length measurements. There has been little to no queen conch TIP sampling in the last 10 years for both USVI and PR. In Puerto Rico specifically, commercial landings of conch are landed meat only, which precludes normal shell lip-thickness sampling.

B. Recreational Fisheries
1. Catch Data

USVI has a voluntary "logbook" online survey and tournament sampling, but it is very limited. Port sampling is lacking, even planned future efforts will concentrate on vessels, not shoreline fishing. Shoreline recreational fishing data collection will continue to be a gap.

PR had MRFSS/MRIP up until 2017. MRFSS/MRIP only sampled finfish, so invertebrates, including lobster and conch, were not sampled. Since then, recreational sampling has been conducted via Sportfish Restoration funding; however the sampling focuses on private and for-hire vessels and does not collect data on shoreline fishing (although some data on shoreline fishing was collected on only the northeast coast from 2014-2020).

Formally, the data collection for PR fishing tournaments began in 2000, and it encompasses all fishing modes, including shore and offshore. Additionally, data from other initiatives and fisher associations from 1953 to 1986 are included in the database.

2. Effort Data

USVI: At the moment, there is no required license. However, in 2025 a required license program will begin that includes mandatory catch/effort reporting for the for-hire sector and voluntary reporting for the other sectors. Private vessel and shoreline recreational effort will continue to be a gap.

For PR, recreational fishing licenses have technically been required since 1998, but the program has never been implemented.

3. Biological Data

None for USVI, PR has MRIP (length, species) sampling.

C. *Validations (applies to all of the above)*

Systematic validation studies are needed for both commercial and recreational catch and effort programs, especially for the USVI. It is likely that basic fishery dependent data collections such as landings by species and suitably detailed effort information will remain problematic. Until confidence in self-reported information is established, regular robust validation studies will be needed to produce reliable correction factors to estimate catch and effort.

B. Specific Recommendations for Programmatic Fishery Dependent Data Collection:

The group discussed and identified the following recommendations to improve fishery dependent data collection:

A. *Commercial Fisheries*
   1. Catch Data
      a. For both PR and USVI, strengthen a culture of commercial catch reporting. This can be done initially through outreach but it is possible enforcement actions will be needed to create a level of compliance that will create increased confidence in self-reported landings. Compatible regulations between territorial and federal

jurisdictions might also facilitate compliance, and greater cooperation between PR DRNA, USVI DFW, SERO, SEFSC, and NMFS HMS is recommended. Easy, reliable methods of electronic reporting should also be used to encourage compliance. Our ability to interpret data is hindered by IUU fishing. Enforcement and compliance with regulations will improve our interpretation of the data. If near census reporting is not practicable, survey designs should be evaluated to implement the most statistically reliable sampling of catch and effort. A standardized methodology which is intended as the long term legacy procedure would allow for more automation in the process and ability to quickly calculate and implement correction factors where needed.

    b. For both PR and USVI, the importance of reporting discards should be emphasized via outreach.

2. Effort Data
   a. See 1a above. Established reporting forms for USVI and PR collect enough information to establish basic units of effort, but levels of reporting compliance, while assumed to be complete for USVI and assumed to be accurately quantified for PR, may need to be improved.
   b. Institute a periodic secondary form to create a fisher profile that would have information on the fisher and/or vessel.

3. Biological Data
   a. In USVI, biological sampling of commercial catches needs to be increased on St. Croix, and overall needs to follow, as much as possible, a randomized design, or at least a process that is more likely to be representative. Changing the sampling requirements from four times a year chosen by the fishers, to a process more distributed across the fishing year, may be beneficial. Resistance to commercial sampling in both USVI and PR may be eased by leveraging advanced technologies that decrease the disruption of fishers' operations.

B. Recreational Fisheries

1. Catch Data
   a. For both PR and USVI, catch reporting surveys (species caught, numbers caught) should be implemented to the fullest extent possible, and the various sectors of the recreational community (for-hire vessels, private vessels, and shoreline angler) should be targeted in proportion to the effort they are assumed to represent. Simplification of catch reporting methods (such as phone apps) and outreach effort to publicize apps might enhance public participation. Collection of data pertaining to recreational fishing in the USVI and PR needs to be institutionalized (applies to 2 and 3 below).

2. Effort Data
   a. The same surveys used for recreational catch should include effort (number of anglers, hours fished, area fished, etc.).
   b. A license or registry system for recreational anglers needs to be fully implemented, at least for the largest sectors of the recreational industry, in both

PR and USVI. This information is critical to estimating recreational catch and effort.

3. Biological Data
   a. A biological sampling program targeting recreational fishing will not only provide key data on the characteristics of the exploited populations, but would also help serve as validation methods for reported catch and effort information.
   b. It may be possible to leverage on-going commercial dockside sampling in both PR and USVI with at least opportunistic recreational sampling.

C. Validations (applies to all of the above) and Other

There is a need to improve the current management history database by making sure it is complete back through time, with management actions implemented by the territories. There is also a need to create a "data collection history" database for longer term fishery dependent data collection programs such as TIP and CCL. Users of these data sets often make assumptions without understanding how these data collections have changed over time. A collection history would be very helpful to fill this gap and better inform time series interpretation. The NMFS metadata system of record, InPort, may be able to serve this purpose; however, InPort is not organized in such a way to easily show collection protocol changes over time. It is possible that the SEFSC Online Data Management history (ODM) might be leveraged to create a database of protocol changes.

Prioritization of improving individual fishery dependent data gaps needs to be informed by, and coordinated with, the availability of funding and current staff capacity. For recreational fisheries, existing funding for fishery dependent data collection comes from the U.S. Fish and Wildlife, whose priorities may not align with the needs of NOAA Fisheries. The fishery dependent data gap group should coordinate with the data governance group (another of the working groups formed in the SEFSC Caribbean Strategic Planning Process) on examining funding sources. At least a few of the improvements suggested by this group (completion and maintenance of a data inventory, completion and maintenance of management and data collection histories) could be carried out at minimal cost by the use of seasonal internships; however, funding limitations are a contributing cause to many of the gaps identified in this report.

The following recommendations were developed in 2009 and are centered around analyzing data during the SEDAR process. If the stock has adequate length and catch data, it is recommended to estimate total mortality (Z) (for example, one approach is to use the Gedamke and Hoenig 2006 base model with multispecies/multigear extensions), compute recent fishing mortality rate by subtracting out an assumed natural mortality rate (F=Z-M), select a proxy for FMSY such as the natural mortality rate or the fishing mortality rate associated with a given spawning potential ratio, and set OFL=FMSY*(recent average catch)/F. If the stock has only adequate catch data, it is recommended to use informed judgement. If a judgment can be reached on a proxy for FMSY and the level of depletion relative to unfished levels, d=(Bfirst-Blast)/B0, then set OFL=(average catch)/(n+d/(0.4*FMSY))-(Alec McCall-DCAC). If a consensus can be reached on a vulnerability scalar from a PSA analysis, then set OFL=(average catch)*vulnerability scalar. If a consensus cannot be reached, adopt a protocol of PFMC i.e., OFL=average catch and ABC=0.5*(average catch). If no relative catch data exist for

the stock, develop a rationale for alternative management measures that do not conform to the framework established in the NS1 guidelines.

In summary, the greatest fishery dependent gap is lack of accurate catch data from both the commercial and recreational sectors. Without being able to accurately quantify removals, all other incremental gap improvements will have a limited impact on the uncertainty surrounding stock assessments in the region.

Appendix

Literature Cited

Appeldoorn, R., J. Beets, J. Bohnsack, S. Bolden, D. Matos, S. Meyers, A. Rosario, Y. Sadovy and W. Tobias. 1992. Shallow water reef fish stock assessment for the U.S. Caribbean. NOAA Technical Memorandum NMFS-SEFSC,304,70 p.

Cummings, N. J., M. Karnauskas, W. Harford, W. L. Michaels, and A. Acosta (editors). 2015. Report of a GCFI Workshop: Strategies for improving fishery-dependent data for use in data-limited stock assessments in the wider Caribbean region. Gulf and Caribbean Fisheries Institute Conference, Christ Church, Barbados, November 3-7, 2014. NMFSSEFSC-681. 25 p. doi:10.7289/V5BK19BN.

Caribbean Fisheries Management Council and Fisheries Forum 2011. Exploring Tools for Managing Data-poor Stocks Workshop. San Juan, Puerto Rico: Caribbean Fishery Management Council.

Gedamke, T., and Hoenig, J. M. 2006. Estimating mortality from mean length data in nonequilibrium situations, with application to the assessment of goosefish. Transactions of the American Fisheries Society, 135: 476–487

SEDAR 2009. Procedural Workshop 03 Caribbean Data review. https://sedarweb.org/assessments/pw-03-caribbean-data-review/

SEDAR 2016. SEDAR 46 U.S. Caribbean Data-Limited Species. https://sedarweb.org/assessments/sedar-46/