Proposal for Funding made to:

Atlantic Coastal Cooperative Statistics Program
Operations and Advisory Committees
1050 N. Highland Street, Suite 200 A-N
Arlington, VA 22204

North Carolina biological database enhancements to prepare for transmission of data to the ACCSP

Submitted by:

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Morehead City, NC 28557
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Questions from Reviewers

- NC sends data to TIP yearly. Could the state include the TIP variables so that staff time could be refined and be able to pull data from ACCSP for TIP and ageing folks? Larry B. can be cited as a co- PI.

  Added information about the availability of the data for TIP staff in future transmissions of biological data to ACCSP. The data transmission process will be outlined and completed through a maintenance proposal. The PI will with ACCSP and SEFSC staff on this proposal and will ask for co-PIs during proposal development to ensure the data transmission process meets all of the needs of ACCSP and SEFSC.

- Budget is pretty detailed but wonder where costs come from if contractor is not chosen. Will or have you gone through RFP process? Elaborate on how the budget is determined.

  Added specific information on how the contractor will be hired and how the hourly rate was determined.

- Noted that data appear to be both fishery-dependent and independent – more for committee awareness – *Yes, single flat file.*

  Added in more references to the fact that the data are both fishery-dependent and fishery-independent. Noted that the data are one large flat file. Data entry is the same for both data types. Fishery-independent data will benefit from the updates to the database and data processing enhancements. There is no way to only update the process for fishery-dependent data.

- Is there a flag for dependent or independent?

  Added specific reference to the fact that the data can/will be flagged as dependent or independent based on the sampling program they came from to facilitate transmission of the fishery-dependent data in the future.

Applicant Name: North Carolina Division of Marine Fisheries

Project Title: North Carolina biological database enhancements to prepare
                                   for transmission of data to the ACCSP

Project Type: New

Principal Investigator: Stephanie McInerny
                                   NCDMF Information Technology Section Chief

Requested Award Amount: $153,600

Requested Award Period: For one year, beginning after the receipt of funds.

Original Date Submitted: June 12, 2020

Objective

To enhance the biological database used by the North Carolina Division of Marine Fisheries (NCDMF) to ensure continued use and maintenance of the database on State authorized equipment and to prepare for future transmissions of fishery-dependent biological data to the Atlantic Coastal Cooperative Statistics Program (ACCSP) Data Warehouse.

Background/Need

The development of a comprehensive database to house field sampling collections for the NCDMF was initiated in May 1980 and incorporates data from the 1960s to present. Data are collected from both fishery-dependent and fishery-independent surveys and used in stock assessments and fishery management plans (FMPs) to manage species important to the state as well as those managed by regional and federal management commissions and councils.

Biological data collected are stored in the Biological Database (BDB) which consists of a hierarchical set of 128 byte ASCII records that detail various data collected by the sampling programs conducted by the division. The BDB currently consists of nine record types:

- Record Type 1 - Environmental Data
- Record Type 8 - Fishing Gear Data
- Record Type H - Free Format Header Data
- Record Type 2 - Replicate Data
- Record Type R - Free Format Replicate Data
- Record Type 3 - Species Data
- Record Type 4 - Individual Fish Data
- Record Type 5 - Individual Fish Age Data
- Record Type 9 - Individual Fish Tag Recapture Data

For each biological program, data are typically entered onto biological program data sheets according to set protocols contained in each program's written standard operating procedures (i.e., program documentation). While the data field names on the BDB record are rigorously controlled, the type of data collected in a biological program for a given field may vary dependent upon what information the respective biologist is capturing. Data elements that are required and standard across all programs include the following: collection id (sequence number), program id, date, location, gear, replicate id, species id, species status, and the number of individuals. Specific programs may also record in addition several other data elements such as station number, duration of sample, sediment type, depth, air temperature, dissolved oxygen, pH, weather, current speed, additional data on individuals collected (weight, age, tag number, annulus measurements), etc. The BDB structure allows each program to capture the data elements needed in a flexible and organized manner with like codes and other standards, but no single program captures all the data defined in the BDB record types. Consequently, biological program data elements vary from program to program. This leads to many variations in the biological data or "coding" sheet. At this moment, there are over 125 different coding sheets defined; but, this number could change at any time dependent on new or changing program documentation requirements.

Currently, there are data from over 120 programs within the BDB and 18 million records. ==This includes both fishery-dependent and fishery-independent data types.== These data are important to the management of species in North Carolina as well as regional and federal species. The primary method for data entry into the BDB can only run on a Windows XP machine; therefore, it has been cumbersome to maintain the BDB as built since computer operating systems used by the state upgraded from Windows XP. The need to enhance the BDB and its data entry interfaces has been increasing over time but there is an immediate need to address database structure, data entry tools, and create a plan for improved user

extraction tools as North Carolina State security guidelines currently prohibit PCs not using Windows 10 or newer to be on the state network. This adds an additional level of difficulty in maintaining the BDB and a strong reason for upgrading the database and input/output (I/O) interfaces. In addition, data entry and regular maintenance on the BDB cannot be done via remote access. With the ongoing COVID-19 pandemic, teleworking has been required and is likely to be maintained in some form moving forward.

<u>The NCDMF has been an active participant in transferring selected BDB program data to other regional databases.</u> Two fishery-independent surveys are provided to the Southeast Assessment Monitoring Program (SEAMAP) which is a cooperative program to facilitate the management, and dissemination of fishery-independent data from the waters of the southeastern United States. <u>North Carolina fishery-dependent biological data from the snapper-grouper fishery is provided to the NOAA Fisheries Southeast Fisheries Science Center's Trip Information Program (TIP) which is a major component of the ACCSP. With the upgrades outlined in this proposal, NCDMF will be prepared for future transmissions of data to the ACCSP Data Warehouse to meet the goals and standards of data sharing initiatives between North Carolina and ACCSP. Other than snapper-grouper data, biological data collected by North Carolina are not currently available in the Data Warehouse.</u>

Approach

Before development begins, NCDMF staff will work with North Carolina Department of Information Technology (NCDIT) staff on a requirements document to detail specific needs and expectations of the corresponding I/O interfaces and updated database structure, if needed. ==The current structure of the biological database is one large flat file containing both fishery-dependent and fishery-independent data. The data will be flagged as dependent or independent based on the biological sampling program they were collected from to differentiate between these data types.==

A new interface will be built to facilitate data entry as well as data corrections that can be used on Windows 10 PCs. With this new interface, continued maintenance of the BDB will be easier as standard upgrades to operating systems occur over time. NCDMF staff will work with NCDIT staff to complete this project. Several NCDIT staff are housed at the NCDMF Headquarters office in Morehead City, NC and will be overseeing, assisting, and facilitating this project. A contractor will be hired to complete the interface development and, if needed, database setup/migration.

Upgrades to the database and its I/O processes will prepare North Carolina for transfers of selected fishery-dependent program data from the division to the ACCSP in the future. ==These future transfers could also replace the need for yearly transfers of biological data from North Carolina to the TIP program by providing necessary TIP variables within the ACCSP data transmission. Those data could be retrieved by the SEFSC from the ACCSP Data Warehouse, as needed. Once the ACCSP transfer process is built and refined, the data could be transmitted on a monthly basis which will significantly improve timeliness of NC data to TIP compared to the annual transfer that happens currently.==

Results and Benefits

Successful fulfillment of this project will provide:
- Enhanced data entry and verification functionality for North Carolina biological program data
- Remote access to the BDB by staff that maintain the database, as well as biologists
- The ability for the BDB to meet State security requirements
- Data that can be formatted to facilitate <u>future transmissions of fishery-dependent biological data from North Carolina to the ACCSP Data Warehouse</u> ==which will be accessible by regional partners including SEFSC TIP staff, as needed==

Geographic Location

The NCDMF Headquarters are located in Morehead City, North Carolina. This project may be performed remotely and does not require the position to be located in Morehead City. Other NCDIT contractors working for the division are located in Raleigh, North Carolina.

Data Delivery Plan

Documentation of the enhanced data entry and editing process as well as any database schema changes will be provided to ACCSP as part of the annual report. Biological data will not be transmitted to ACCSP as part of this project but will be prepared for the future transmission of data. The details of the data transmission process will be fleshed out in a subsequent maintenance proposal submitted after successful completion of this project. The PI work with ACCSP and SEFSC staff to prepare the maintenance proposal.

Milestone Schedule (start date depending on time of grant award):

Task	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Hire Contractor	X	X	X									
Develop requirements document	X	X	X									
Database will be evaluated to determine if data should be migrated to another platform				X	X							
Interfaces for data entry and verification will be built and tested. Database migration will occur, if needed					X	X	X	X	X	X	X	X
Finalize documentation											X	X

The contractor is expected to work 40 hours a week on this project. Report writing will follow the requirements of two semi-annual status reports and a final report due at the end of the grant award.

Project Accomplishments Measurement

Projects	Accomplishments
Create requirements document	• Document is completed and describes details needed for Contractor to start database build

Sections of the proposal identified to help with the ranking process are underlined with a summary on page 9. Revisions are highlighted in yellow.

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Create interface for data entry	• Process completed and fully documented • Data are able to be entered into biological database
Create interface for data verification/editing	• Process completed and fully documented • QA/QC tests can be run on data • Data are able to be viewed and edited
Finalize documentation	• Documentation reflects new enhanced process and data structure (if needed)

Project Personnel

Stephanie McInerny—Section Chief, NCDMF IT Section (NCDIT)
Katy West—Northern District Manager, Biological User Group (BUG) Chair, NCDMF
Tina Moore—Southern District Manager, NCDMF
Chris Capoccia—Applications Systems Analyst I, NCDMF IT Section (NCDIT)
George Joyner—Biological Database Administrator, NCDMF IT Section (NCDIT)
Phyllis Howard—Biological Database Clerk, NCDMF IT Section (NCDIT)
Leslie Hester— Biological Database Clerk, NCDMF IT Section (NCDIT)

Funding Transition Plan

This project should be completed within the proposed 1-year grant period. NCDIT and NCDMF staff can maintain the systems developed from this grant; therefore, subsequent years of funding are not needed.

Budget Narrative

The cost summary table below shows an explanation for each budget item for a one-year period. NCDIT will not charge an indirect fee for the Contractor.

NCDIT has convenience contracts in place that can be used to fill the budgeted position in this proposal; therefore, if money is awarded, a job posting will be sent to the temporary agencies used by NCDIT to solicit for applicants. Qualified individuals will be interviewed to select the best candidate for the position. A formal RFP will not be needed to hire a contractor for this project.

The cost for the developer in the summary below is based on the standard rate for a developer that specializes in Microsoft Dynamics CRM which is a customer relationship management software package that NCDIT has been using to replace other legacy systems within the state. If CRM is not the chosen solution for this project, the cost for the developer may be less.

Cost Summary

Category	Expense	Units	Cost	ACCSP Request	State In-Kind	Explanation
Personnel	Contractor	1	$150,000	$150,000		One Analyst @ $100.00/hr for 1,500 hrs (9 months)
	IT Section Chief	1			$26,250	$8,750/month for 3 months
	NCDIT Application Systems Analyst	1			$22,800	$5,700/month for 4 months
	NCDMF District Manager	2			$24,000	Average salary of $6,000/month for 4 months (2 months each)
	NCDMF BDB Administrator	1			$20,772	$5,193/month for 4 months
	NCDMF BDB clerk	2			$11,364	$2,841/month for 4 months (2 months each)
Subtotal				$150,000	$105,186	
Fringe	Retirement, Social Security, Health Insurance				$41,125	Fringe=29.09% of salary ($30,599) plus $6,647/year for health insurance (1 month insurance = $554*19 months combined work=$10,526)
Indirect						No indirect needed
Subtotal				$0	$41,125	
Travel				$1,000		Travel for contractor between work location and Morehead City HQ office for in-person meetings, as needed
Subtotal				$1,000	$0	
Supplies	Computer	1	$2,500	$2,500		
	External Hard Drive	1	$100	$100		
Subtotal				$2,600	$0	
	Column Totals			$153,600	$146,311	Total project cost = $299,911
	Total Request					
	Percent			51%	49%	Percentage calculated from total cost

Summary of Proposal for Ranking Purposes

Proposal Type: *New*

Program Priority

Catch and Effort: 0%

Biological Sampling: 100%

The North Carolina Biological Database (BDB) was developed in 1980 to house field sampling data from fishery-dependent and fishery-independent sampling programs. The database contains data from the 1960s to present. There are data from over 120 programs within the BDB and 18 million records. These data are used in stock assessments and fishery management plans to manage species important to the North Carolina as well as those managed by regional and federal management commissions and councils. (see page 4)

Bycatch/Species Interactions: 0%

Social and Economic: 0%

Metadata:
> The NCDMF BDB has extensive documentation for each of the sampling programs that are stored in the database. New documentation on the enhanced database will include data mapping tables that provide a definition of each variable with respect to the old database to ensure data migration is successful and accurate. Any new stored procedures created during this project will include documentation on primary function, data tables being accessed, and corresponding variables within the procedure's SQL code. Documentation will be provided as part of the grant completion report. (see pages 4-6)

Project Quality Factors

Multi-Partner/Regional impact including broad applications:
> Although this project only covers data for North Carolina, future transmissions of biological data to the ACCSP will benefit other partners as the data will be more readily available for data requests and stock assessments. Many species within North Carolina are managed regionally. Regional management agencies such as the Atlantic States Marine Fisheries Commission (ASMFC) and Mid-Atlantic Fishery Management Council (MAFMC) would benefit from having more access to these fishery-dependent data. (see pages 4-5)

Contains funding transition plan/Defined end-point:
> The goals defined in this project should be completed within the grant cycle. (see page 7)

In-kind contribution:
> 49% (see cost table on page 8)

Improvement in data quality/quantity/timeliness:
> The project identified in this proposal will greatly improve data quality and timeliness by providing a more modernized format for the data with enhanced data entry/verification screens and work flows that will prepare North Carolina for transmitting data to the Data Warehouse. (see page 5)

Potential secondary module as a by-product:

None

Impact on stock assessment:

Although this project only covers data for North Carolina, future transmissions of biological data to the ACCSP will benefit other partners as the data will be more readily available for data requests and stock assessments. Many species within North Carolina are managed regionally. Regional management agencies such as the Atlantic States Marine Fisheries Commission (ASMFC) and Mid-Atlantic Fishery Management Council (MAFMC) would benefit from having more access to these fishery-dependent data. (see page 4)

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EXPERIENCE

Information Technology Section Chief (Applications Systems Manager I)   March 2020–Current
North Carolina Department of Information Technology (NCDIT), Morehead City, NC

Supervisory and Management

- Manage 15 technical staff members of IT Section at NCDMF through the North Carolina Department of Information Technology.
  - Directly supervise seven employees to include assigning and reviewing tasks, coaching, mentoring, performance reviews, encouraging enhancement of skills, time management, and hiring.
- Manage six different budgets including budgets that fund NCDMF biological staff
- Currently, overseeing several IT projects occurring simultaneously requiring daily multi-tasking, prioritization of staff and resources, planning, meetings, and organization.
- Oversee and manage applications development, biological database, and GIS staff and activities

License and Statistics Section Chief (Environmental Program Manager I)   2016–2020
North Carolina Division of Marine Fisheries (NCDMF), Morehead City, NC

Supervisory and Management

- Manage around 60 staff members of the License and Statistics Section including office and field staff located in five different offices throughout NC. Had roles in time management, coaching, mentoring, hiring, firing, disciplinary action, performance reviews, encouragement of skills, and training.
- Directly supervise seven employees to include assigning and reviewing tasks, coaching, mentoring, performance reviews, encouraging enhancement of skills, time management, and hiring.
- Manage 20 different budgets including budgets that fund Information Technology (IT) staff and projects. Monies consist of appropriations, receipts, and federal grants totaling over $3 million.
- Responsible for presenting at quarterly Marine Fisheries Commission meetings on license, commercial, and recreational data issues requiring effective communication of complex statistics and data collection programs.

- Currently, overseeing several IT projects occurring simultaneously requiring daily multi-tasking, prioritization of staff and resources, planning, meetings, and organization. Current projects using either Waterfall or Agile application development are listed below:

  Agile development projects:
    - **NCDMF Fisheries Information Network (FIN) replacement project using Agile SCRUM**
    - **NCDMF FIN-GIS for shellfish leases and pound nets** (2 similar projects)

  Waterfall development projects:
    - **NCDMF-ACCSP upload portal interface upgrade and improvement project**
    - **NCDMF Coastal Angling Program Catch U Later project** (i.e., mobile discard reporting for recreational fishermen focused on flounder)
    - **NCDMF Trip Ticket Program VESL project** (web software for seafood dealer reporting)

Data, Statistics, and Committees

- SQL Server Database Schema Design – actively review and comment on schema changes to the FIN Database proposed by developers to improve and simplify data capture and in particular, data analysis by analysts at DMF
- Perform daily data queries of FIN using SAS and SQL (through SQL Management Studio)
- Frequently querying FIN for data related to section programs, license sales, and commercial trip ticket data using SAS, SQL, R, and Crystal Reports
- Serve on the DMF Management Review Team (MRT)
- Serve on Atlantic Coastal Cooperative Statistics Program (ACCSP) Operations Committee
- Serve on ACCSP Commercial Technical committee and ACCSP Information Systems committee
- Serve as Chair of the FIN Software Change Control Board and member of IT Steering Committee.
- Serve on Coastal Recreational Fishing License (CRFL) Joint Review Team

- Serve on Rules Advisory Team (RAT) as well as several RAT subcommittees (Permit NOV subcommittee, Periodic Review Subcommittee, Shellfish Workgroup)

Trip Ticket Data Analyst (Marine Fisheries Biologist II)   2008–2016
North Carolina Division of Marine Fisheries (NCDMF), Morehead City, NC

IT Project Management and Documentation

- Created, led, and managed multiple IT software development projects using Waterfall. Was responsible for drafting scopes of work, database schema review, drafting data specification documents, requirements gathering, review of architectural solutions suggested by DMF IT, communication between IT and business users, prioritizing projects and budget, coordinating resources, and testing. Projects are listed below:
  - **Trip Ticket Data Upload Interface**
  - **ACCSP Automated Update**
  - **Simplification of E-Dealer data importing**
  - **Electronic Import of Quota Monitoring Data**
  - **ACCSP Upload Interface** - Principal Investigator
- Acted as Business Architect and Product Owner for NCDMF during Pega FIN replacement project
- Served as Chair of the FIN Software Change Control Board and member of IT Steering Committee.
- Wrote and/or compiled standard operating procedures and policies for the NCDMF eel monitoring program, NCDMF Biological Database extraction and analysis, and ACCSP data transmission process as well as FIN data entry procedures for Marine Patrol violation data and several Habitat and Enhancement section permits.

Data Analysis, Statistics, and Committees

- Was the primary data analyst for the NCDMF Trip Ticket Program. Performed daily commercial fishery data queries and statistical analyses using programming languages such as SAS, SQL, Microsoft Office Products (e.g., Excel and Access), and R (statistical analysis software) including weight-length regressions, nonlinear growth models, length and age compositions, CV, natural mortality, and landings trends.
- Analyzed data from the DMF Biological Database, when needed and trained staff on extraction and analysis.
- Participated as a member of plan development teams that facilitate fishery management plans for species important to North Carolina.
- Provided commercial data, analyzed life history data, wrote technical reports, and give presentations at data workshops for Southeast Data Assessment and Review (SEDAR) stock assessments for NOAA Fisheries and the Atlantic States Marine Fisheries Commission (ASMFC) as part of the life history and commercial workgroups.
- Accessed, verified, and performed quality control on ACCSP, NOAA, and NCDMF fisheries data for NC using SAS, SQL, Oracle SQL Developer, Microsoft SQL Management Studio, Crystal Reports, and R.
- Involved in training, coaching, and mentoring new and existing employees on procedures and policies of the Trip Ticket Program and SAS programming as well as counseling and mediating conflicts between staff to maintain a team environment.
- Served on the NCDMF Biological Review Team (BRT), BRT Technical Committee, BRT Biological User Group, BRT Life History Subcommittee, and BRT Editorial Subcommittee.
- Served on CRFL Joint Review Team
- Served on ACCSP Committees including Commercial Technical, Information Systems, Outreach, and Conversion Factor Subcommittee.
- Involved in interviewing over 30 applicants for a variety of NCDMF positions as well as evaluating, recruiting, selecting candidates, and hiring for positions within License and Statistics Section, Fisheries Management Section, and Protected Resources Section.

EDUCATION

July 2007   University of North Carolina Wilmington   Wilmington, NC
M.S., Marine Biology with Applied Statistics Certificate

Fall 2006   North Carolina State University   Raleigh, NC
Post Baccalaureate Studies – Quantitative Fisheries Management

December 2002   East Carolina University   Greenville, NC
B.S., Biology/Marine Biology