

6 August 2024

Andrew J. Strelcheck
Regional Administrator
NOAA Fisheries Service
Southeast Regional Office
Sustainable Fisheries Division
263 13th Ave. South
St. Petersburg, FL 33701

Exempted Fishing Permit (EFP)

Dear Dr. Strelcheck:

The Fish/Fisheries Conservation Lab at University of South Carolina was recently awarded funding through the Cooperative Research Program to fill in critical gaps in red hind population demographics and life history in preparation for upcoming stock assessments in St. Thomas/St. John (STT/J) and St. Croix (STX), USVI.

Red hind *Epinephelus guttatus* is the top commercially landed grouper species for all three of the U.S. Caribbean Island Management Platforms: Puerto Rico (PR), STT/J, and STX. The 2014 Stock Assessment Report on U.S. Caribbean Red Hind (SEDAR 35) identified basic life history research for red hind as a top priority and emphasized that life history data would provide the greatest benefit to management decisions-making. In spite of this documented need/importance of obtaining life history information for red hind, the U.S. Caribbean still has no comprehensive data on red hind population size/age structure, growth, size/age at sexual maturity and sexual transition, and sex ratios for STT/J and STX. Our collaborative work to do this research began in 2015 through opportunistic randomized collections of fisheries-dependent (FD) samples and working with fisheries-independent (FI) programs for additional samples. In 2021, we successfully validated our age estimation method for red hind via application of bomb radiocarbon analysis. To-date, we have obtained gonads and otoliths for 646 and 481 samples from STT/J and STX, respectively. Our preliminary efforts demonstrate our ability/expertise, dedication, and readiness to do the work to achieve the three objectives for this red hind study:

Objective 1. To investigate age, growth, mortality of red hind from STT/J and STX

Objective 2. To document reproductive biology for red hind, including size- and age-at-sexual maturity, size- and age-at-sexual transition, and reproductive potential/output

Objective 3. Evaluate effectiveness of seasonal/area closures of red hind spawning aggregation sites (Marine Conservation District [MCD] in STT/J and Lang Bank in STX) through replication of past collections and analysis of temporal trends related to size-at-age, sex ratios, and size/age frequency distributions for red hind during spawning events.

Objective 3 is the reason we are submitting this application for an Exempted Fishing Permit (EFP). This objective was identified by our collaborating fishers and the Caribbean Fishery Management Council (CFMC) as extremely important for informing future management. This objective is possible because during past monitoring of USVI red hind spawning aggregations, researchers archived otoliths and gonads. We have processed these samples for age and sex information. STT/J MCD archived red hind aggregation collections include samples from 1999-2000, 2003-2004, and 2016. STX Lang Bank collections include samples from 2004-2005 and 2016. To achieve this third objective, we will work closely with our collaborating fishers to replicate past sampling design for collection of aggregation fish and then process the otoliths and gonads of those samples so we can report on the current status of the two aggregations and analyze the temporal trends as indicated above.

All data collected from our red hind life history sampling efforts will be used in the upcoming stock assessments to provide guidance and management recommendations to the CFMC as well as the USVI Department of Fish and Wildlife.

This project will utilize commercial fishing vessels during the four days around the full moon for the months of December 2024 and January 2025 to collect red hind MCD aggregation samples; and January and February 2025 to collect red hind Lang Bank aggregation samples. We will collect a maximum of 60 red hind from each aggregation site. During a sampling event, we will use up to four fishing rods, each with 2-3 hooks. Once the maximum number of 60 red hind is obtained for an aggregation site, we will cease fishing activities at the site.

I have included all the information requested in the EFP application below. If any further information is needed, please do not hesitate to contact me at shervette@gmail.com.

Cordially,

Virginia Shervette, Ph.D.
USCA Fish/Fisheries Conservation Lab
University of South Carolina

The date the application is submitted and extent of time (research end date) needed to accomplish work.

Submitted: 6 August 2024

Research start and end: 1 December 2024 to 28 February 2025

The applicant's and/or project coordinator's name, mailing address, telephone number, e-mail, and fax number, if available.

**Virginia Shervette
Dept of Biology
471 University Parkway
Aiken, SC 29801**

shervette@gmail.com

A point of contact who can respond to any questions regarding the project that NMFS staff may have during consideration of your application.

**Virginia Shervette
Dept of Biology
471 University Parkway
Aiken, SC 29801**

shervette@gmail.com

A STATEMENT OF THE PURPOSES AND GOALS OF THE ACTIVITY FOR WHICH AN EFP IS NEEDED, INCLUDING JUSTIFICATION FOR ISSUANCE OF THE EFP.

Management of Red Hind Spawning Aggregations in STT/J and STX

Several commercially important grouper species form large fish spawning aggregations (FSA) at specific sites where spawning is concentrated within a couple of months each year. The concentrated nature and short duration of these FSAs render spawning aggregation species susceptible to intense fishing pressure and many FSAs have disappeared or decreased in size (Aguilar-Perera 2006, Olsen & LaPlace, 1978, Beets & Friedlander, 1992). Management of these species has typically focused on FSAs, through seasonal or permanent closures (e.g. Beets & Friedlander, 1997; Nemeth 2005; Nemeth et al. 2007).

Red hind is a protogynous hermaphrodite and changes sex from female to male at 320–410 mm TL (Sadovy et al. 1992). A red hind spawning aggregation can consist of as few as 100 to over 80,000 adults, which occupy an area of 0.02–0.35 km² (Shapiro 1987; Shapiro et al. 1993, Nemeth 2005). In USVI, red hind has a three month spawning season (December-February) and individuals participate in 1-3 spawning periods each year at FSAs and most individuals depart the aggregation site between spawning events (Nemeth et al. 2007).

Assessments carried out in the late 1980's for the region indicated that red hind were both growth and recruitment overfished (Sadovy & Figuerola, 1992), a factor that led to a suite of protective management measures. Over the past 30 years, fishery managers have implemented several regulatory tools to protect spawning aggregation areas used by red hind and other fisheries species in USVI. In 1990 the STT/J Red Hind Bank Marine Conservation District (MCD) was created to protect spawning aggregations. A seasonal closure to fishing in MCD began that same year during the months of December-February. Then in 1999, MCD was closed year-round to fishing. By 1997 red hind sex ratio had shifted from 1:15 males to females to 1:4 and the mean size of spawning red hind increased by over 60 mm (Beets & Friedlander, 1999). Aspects of red hind population characteristics (size structure, abundance) of fishery landings surrounding the MCD also seemed to track the characteristics of the spawning population (Nemeth 2005). However, age data are lacking for the aggregation, but otoliths and gonads were collected during various monitoring efforts and archived then provided to PIs Rivera Hernandez and Shervette for future analysis.

Lang Bank in STX, another red hind spawning aggregation site in USVI, was closed seasonally (December-February) to fishing in 1993 in an effort to protect that aggregation. Periodic monitoring of the Lang Bank aggregation obtained biological samples from red hind in 2005 and 2016 and these samples were also provided to PIs Rivera Hernandez and Shervette for future analysis.

Fishers have consistently mentioned at CFMC meetings throughout the years the need to evaluate the effectiveness of seasonal and area closures implemented in the U.S. Caribbean. During our discussion of preparing this proposal, our collaborating fishers emphasized that this study would be an excellent opportunity to do this for MCD and Lang Bank since we have the archived aggregation otolith and gonad samples and could potentially collect additional aggregation samples as part of this research.

Research Objective directly related to EFP application: This project seeks to evaluate effectiveness of seasonal/area closures of red hind spawning aggregation sites (Marine Conservation District [MCD] in STT/J and Lang Bank in STX) through replication of past collections and analysis of temporal trends related to size-at-age, sex ratios, and size/age frequency distributions for red hind during spawning events

Samples for this project will be collected by a marine biology/fish researcher (Virginia Shervette and/or Jesus Rivera Hernandez) and collaborating fishers, (Daniel Basick, STT/J-recreational charter owner and commercial fisher for collection of red hind in MCD and Gerson Martinez, STX-commercial fisher for Lang Bank). A maximum of eight fishing days will occur at MCD over the two-month period of December 2024 and January 2025; however, once the maximum goal of 60 red hind is obtained for MCD, fishing activities will cease. A maximum of eight fishing days will occur at Lang Bank over the two-month period of January 2025 and February 2025; however, once the maximum goal of 60 red hind is obtained for Lang Bank, fishing activities at this spawning aggregation will cease.

A LIST OF THE SPECIFIC REGULATIONS FROM WHICH AN EXEMPTION IS BEING REQUESTED AND WHY EACH EXEMPTION IS REQUIRED FOR THE EXPERIMENT TO SUCCEED.

We are requesting permission to collect red hind from the spawning aggregation in Red Hind Bank Marine Conservation District (MCD) which is closed year-round to fishing. In 1990 MCD was created to protect spawning aggregations of red hind and other species. A seasonal closure to fishing in MCD began that same year during the months of December-February. Then in 1999, MCD was closed year-round to fishing. Some aspects of the status of the MCD red hind spawning aggregation have been monitored and reported on in several publications (Nemeth 2005, Nemeth and Quandt 2005, Whiteman et al. 2005, Nemeth et al. 2007, Rosemond et al. 2022). However, comprehensive age and reproductive biology information has not been reported from those monitoring efforts; otoliths and gonads were archived from past collections and then eventually transferred to Virginia Shervette and Jesus Rivera Hernandez. To evaluate changes in demographic characteristics of the red hind aggregation at MCD through this current period, we need to replicate collections of individuals from the aggregation and process them for demographics and life history information. This effort will also provide current documentation on the status of the aggregation that can then be used for management and stock assessment.

We are requesting permission to collect red hind from the spawning aggregation in Lang Bank in STX, another red hind spawning aggregation site in USVI that was closed seasonally (December-February) to fishing in 1993 in an effort to protect that aggregation. Comprehensive age and reproductive biology information has not been reported from Lang Bank monitoring efforts; otoliths and gonads were archived from past collections and then eventually transferred to Virginia Shervette and Jesus Rivera Hernandez. To evaluate changes in demographic characteristics of the red hind aggregation at Lang Bank through this current period, we need to replicate collections of individuals from the aggregation and process them for demographics and life history information. This effort will also provide current documentation on the status of the aggregation that can then be used for management and stock assessment.

THE FOLLOWING CATCH INFORMATION:

THE SPECIES (TARGET AND INCIDENTAL SPECIES MUST BE CLEARLY DIFFERENTIATED) EXPECTED TO BE HARVESTED AND/OR DISCARDED UNDER THE EFP.

Target Species

Epinephelus guttatus (red hind)

Potential Incidental Species to be returned to the water using descender devices to ensure minimum harm

Snapper Complex 1: vermilion and blackfin snapper

Snapper Complex 3: mutton snapper

Snapper Complex 4: yellowtail snapper

Grouper Complex 1: nassau grouper

Grouper Complex 3: coney and graysby

Grouper Complex 4: black grouper, red grouper, yellowfin grouper

Grunt Complex 1: white grunt, bluestriped grunt

Wrasses Complex: hogfish

Triggerfish Complex: queen triggerfish

THE NUMBER OR WEIGHT, BY SPECIES, OF SUCH HARVEST AND/OR DISCARD ANTICIPATED TO OCCUR DURING THE EXEMPTED FISHING, REGARDLESS OF WHETHER OR NOT IT IS RETAINED FOR SALE.

Type	MCD Estimated number	Lang Bank Estimated number
Target species		
Red hind	Maximum of 60	Maximum of 60
Discards/potential incidental species		
Snapper Complex 1	< 10 (all returned/discarded)	< 10 (all returned/discarded)
Snapper Complex 2	< 10 (all returned/discarded)	< 10 (all returned/discarded)
Snapper Complex 4	< 10 (all returned/discarded)	< 10 (all returned/discarded)
Grouper Complex 1	< 10 (all returned/discarded)	< 10 (all returned/discarded)
Grouper Complex 3	< 10 (all returned/discarded)	< 10 (all returned/discarded)
Grouper Complex 4	< 10 (all returned/discarded)	< 10 (all returned/discarded)
Grunts Complex 1	< 10 (all returned/discarded)	< 10 (all returned/discarded)
Wrasses Complex	< 10 (all returned/discarded)	< 10 (all returned/discarded)
Triggerfish Complex	< 10 (all returned/discarded)	< 10 (all returned/discarded)

THE EXPECTED DISPOSITION OF ALL REGULATED SPECIES HARVESTED UNDER THE EFP (E.G., WHAT WILL BE DONE WITH THE FISH ONCE IT IS CAUGHT).

Red hind samples are placed in a cooler with ice for transport back to a field lab on shore then measured for standard length, fork length, and total length (to the nearest mm) and weighed (to the nearest g). For each sample, otoliths are removed, rinsed, then stored dry until further processing. Gonads are removed, weighed and then preserved. Eyes, muscle, stomachs, and fin clips are also collected and archived for future research on trophic ecology and population genomics. Carcasses will be returned to the water within 24 hours of processing.

All incidental catch will be immediately released at the location of capture using descender devices to ensure minimum harm.

ANY ANTICIPATED IMPACTS ON FISHERIES, MARINE MAMMALS, ENDANGERED SPECIES, OR ESSENTIAL FISH HABITAT.

Although unlikely, there is a possible entanglement risk with soft corals/sponges and the fishing line, hooks and lead weight.

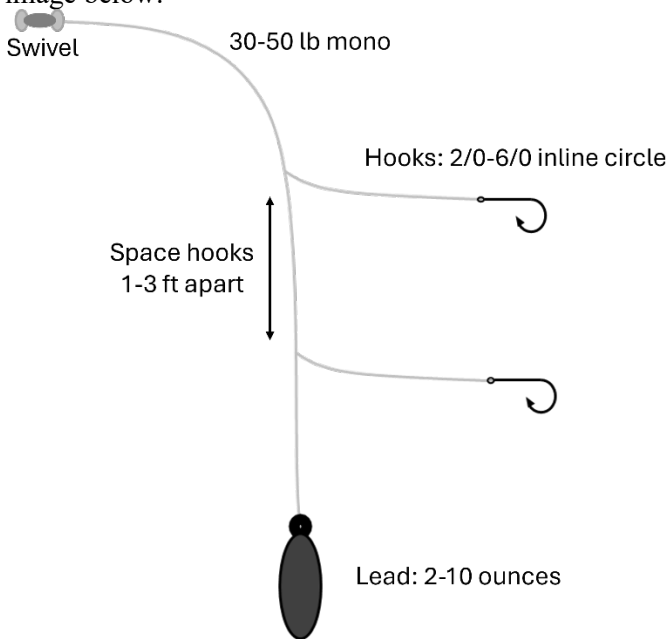
Interaction with marine mammals and endangered species is not anticipated. Any interaction with hook and line will be disentangled immediately by fishers. Any sea turtle interactions will comply with Sea Turtle Safe Handling and Release Guidelines as published in the Federal Register on February 7, 2007 (72 FR 5633).

THE FOLLOWING ANTICIPATED EFFORT INFORMATION FOR EACH VESSEL:

For fixed gear:

Type and size of gear to be used.

Up to four rod-and-reels will be deployed each with 2-3 hooks, from commercial fishing vessel as indicated in image below:



Amount of gear to be used (e.g., number of pots, number of gillnets, etc.).

Up to four rod-and-reels will be deployed at a time. Each rod-and-reel set-up will use a monofilament line connected to a rig containing up to three hooks with the configuration indicated in image above.

Number of gear hauls.

After each cast of a rod, the line will be reeled in after a maximum of 15 minutes and then recast; the maximum amount of time spent fishing at the areas within a day will be four hours. This will yield a minimum of 12 hauls per rod.

Average soak time.

We estimate an average of 10 minute soak time for hook and line fishing.

Sampling months/time of year.

Red Hind Bank Marine Conservation District (MCD)

December 2024: a maximum of four days during the week of the full moon

January 2025: a maximum of four days during the week of the full moon

Lang Bank

January 2025: a maximum of four days during the week of the full moon

February 2025: a maximum of four days during the week of the full moon

Sampling locations (including depth).

Red Hind Bank Marine Conservation District (MCD) from depths of 25 to 75 m.

Lang Bank from depths of 25 to 75 m.

Information for vessels to be used for the EFP as soon as the information is available and before operations begin under the EFP:

Red Hind Bank MCD

Capt. Daniel Basick

Commercial Fishing Vessel: Mary B: 29' Dyer 1976

Home port: Red Hook

State license: VI4537TC

Owner/Capt: Daniel Basick

Lang Bank

Capt. Gerson Martinez

Commercial Fishing Vessel: Syotos Fishing: 27' v-hull custom-made

Home port: Altona Lagoon

State license: VI-2893-CB

Owner/Capt: Gerson Martinez

Onboard observers: Virginia Shervette, Jesus M Rivera Hernandez, Rick Nemeth

Principal Investigator's (including the applicant's and/or project coordinator's) CVs.

See included CVs

Signature of applicant.

See attached signature page.

REFERENCES CITED

- Aguilar-Perera, A. 2006. Disappearance of a Nassau grouper spawning aggregation off the southern Mexican Caribbean coast. *Marine Ecology Progress Series*, 327, 289-296.
- Beets, J., & Friedlander, A. L. A. N. 1992. Stock analysis and management strategies for Red Hind, *Epinephelus guttatus* in the US Virgin Islands. *Proc 42nd Gulf Caribb Fish Inst* 42:66–79
- Nemeth, R. S. 2005. Population characteristics of a recovering US Virgin Islands red hind spawning aggregation following protection. *Marine Ecology Progress Series* 286:81-97.
- Nemeth, R. S., J. Blondeau, S. Herzlieb, and E. Kadison. 2007. Spatial and temporal patterns of movement and migration at spawning aggregations of red hind, *Epinephelus guttatus*, in the US Virgin Islands. *Environmental Biology of Fishes* 78:365-381.
- Nemeth, R. S., and A. Quandt. 2005. Differences in fish assemblage structure following the establishment of the Marine Conservation District, St. Thomas, US Virgin Islands. *Proc. Gulf Caribb. Fish. Inst.* 56:367-381.
- Olsen, D. A., & LaPlace, J. A. 1979. A study of a Virgin Islands grouper fishery based on a breeding aggregation. *Proc 31st Gulf Caribb Fish Inst* 31:130–144.
- Rosemond, R. C., R. S. Nemeth, and S. A. Heppell. 2022. Demographic Recovery of a Reef Fish Population Over 30 Years of Spawning Aggregation Site Protection. *Frontiers in Marine Science* 9.
- Sadovy, Y., M. Figuerola, and A. Roman. 1992. Age and growth of red hind *Epinephelus guttatus* in Puerto Rico and St Thomas. *Fishery Bulletin* 90:516-528.
- Shapiro, D. Y., Y. Sadovy, and M. A. McGehee. 1993. Size, composition, and spatial structure of the annual spawning aggregation of the red hind, *Epinephelus guttatus* (Pisces, Serranidae). *Copeia*:399-406.
- Shapiro D. Y. 1987. Reproduction in groupers. In: Ralston S (ed) *Tropical snappers and groupers: biology and fisheries management*. Westview Press, Boulder, CO, p 295–328.
- Whiteman, E. A., C. A. Jennings, and R. S. Nemeth. 2005. Sex structure and potential female fecundity in a *Epinephelus guttatus* spawning aggregation: applying ultrasonic imaging. *Journal of Fish Biology* 66:983-995.

Exempted Fishing Permit (EFP) Application

Evaluation of the effectiveness of seasonal/area closures of red hind spawning aggregation sites (Marine Conservation District [MCD] in STT/J and Lang Bank in STX) through replication of past collections and analysis of temporal trends related to size-at-age, sex ratios, and size/age frequency distributions for red hind during spawning events

Submitted: August 2024

Research start and end: 1 December 2024 to 28 February 2025

The applicant's and/or project coordinator's name, mailing address, telephone number, e-mail, and fax number, if available.

Virginia Shervette
Dept of Biology
471 University Parkway
Aiken, SC 29801



706-836-5403 (mobile)
shervette@gmail.com

Dr. Virginia Shervette
Fish/Fisheries Conservation Lab
University of South Carolina Aiken
shervette@gmail.com

EDUCATIONAL HISTORY

Doctor of Philosophy, Dept of Wildlife and Fisheries Sciences, Texas A&M University 2006
Masters of Science, Dept Biological Sciences, University of Southern Mississippi 2000
Bachelors of Arts, Biology and Spanish, Mercer University, Macon, GA 1997

RELEVANT PUBLICATIONS (*GRADUATE STUDENTS)

- Overly KE*, **Shervette VR**. 2023. Caribbean deepwater snappers: application of the bomb radiocarbon age estimation validation in understanding aspects of ecology and life history. PLOS ONE *In Revision – Accepted*.
- Shervette VR**, Rivera Hernández JM*. 2022. Illuminating otoliths: New insights for life history of *Balistes* triggerfishes. Journal of Fish Biology 1– 12. <https://doi.org/10.1111/jfb.15233>
- Chamberlin DW*, **Shervette VR**, Kaufman DS, Bright JE, Patterson WF. 2022. Can Amino Acid Racemization Be Utilized for Fish Age Validation? Canadian Journal of Fisheries and Aquatic Sciences.
- Shervette VR**, Rivera Hernández JM*. 2022. Queen triggerfish: validation of otolith-based age, growth, and longevity estimates via bomb radiocarbon ($\Delta^{14}\text{C}$). PLOS ONE
- Shervette VR**, Rivera Hernández JM*. 2022. Report on the status of U.S. Caribbean queen triggerfish *Balistes vetula* age and growth for the SEDAR80 Stock Assessment: SEDAR80-WP04. North Charleston, SC.
- Rivera Hernández JM*, **Shervette VR**. 2022. Photographic guide to extracting, handling, and reading otoliths from *Balistes* triggerfish species SEDAR80-WP-03. North Charleston, SC.
- Shervette VR**, Rivera Hernández JM*, Nunoo FKE. 2021. Age and growth of Gray Triggerfish *Balistes capriscus* from trans-Atlantic populations. Journal of Fish Biology 98: 1120-1136.
- Shervette VR**, Rivera Hernández JM*, Overly K*. 2021. Radiocarbon in otoliths of tropical marine fishes: reference $\Delta^{14}\text{C}$ chronology for north Caribbean waters. PLOS ONE 16(5):e0251442.
- Jones DD*, Rivera Hernández JM*, **Shervette VR**. 2021. Princess parrotfish *Scarus taeniopterus* age, growth, maturity, and transition. Environmental Biology of Fishes 104(5):581-595.
- Sinkus W*, White B, Reed LA, **Shervette VR**. 2021. Mercury accumulation in reef fishes: red grouper, scamp and gag of the Atlantic southeastern U.S. Bulletin of Environmental Monitoring and Assessment 193: 1-13.
- Rivera Hernandez JM*, Pena Alvarado N, Correa Velez K, Nemeth R, Appeldoorn R, **Shervette V**. 2019. Queen Triggerfish *Balistes vetula* reproductive biology in U.S. Caribbean waters. Transactions of the American Fisheries Society 148: 134-147.
- Sinkus W*, **Shervette V**, Ballenger J, Reed LA, Plante C, White B. 2017. Mercury bioaccumulation in offshore reef fishes from waters of the Southeastern USA. Environmental Pollution 228: 222-233.
- Kelly-Stormer A*, **Shervette V**, and five other authors. 2017. Gray triggerfish *Balistes capriscus* reproductive biology, age, and growth off the Atlantic coast of the southeastern U.S. Transactions of the American Fisheries Society 143(3): 523-538.

Smylie M*, **Shervette V**, McDonough C. 2016. Age, growth, and reproduction in two coastal populations of longnose gar. *Transactions of the American Fisheries Society* 145: 120- 135.

RECENT GRANTS

- NOAA Cooperative Research Program. Data-Poor Caribbean Reef Fishes: Addressing Critical Gaps in Red Hind Population Demographics and Life History in Preparation for Stock Assessments in St. Thomas/St. John and St. Croix. \$148,105. Funded (2024-2025).
- NOAA Saltonstall-Kennedy Grant Program. Principle Investigator on Enhancing U.S. Caribbean Deepwater Snapper Fisheries: Collaborative Research to Address Critical Information Gaps for Queen and Silk Snappers. \$299,600. Funded (2023-2025).
- NOAA Cooperative Research Program. Principle Investigator on Data-Poor Caribbean Reef Fishes: Addressing Critical Gaps in Yellowtail Snapper Age, Growth, and Reproduction for Puerto Rico and St. Thomas/St. John, USVI. \$156,053. Funded (2022-2023).
- NOAA Saltonstall-Kennedy Grant Program. Principle Investigator on Maximizing utility of eye lens core isotopic information for fisheries management: ageing validation, natal origins, and ontogenetic habitat shifts of reef fishes across the southeastern U.S. and U.S. Caribbean. \$299,962. Funded (2022-2024).
- NOAA/MARFIN Co-Investigator (PI Laura Grove, NOAA) on Filling in the gaps for data-poor reef fishes in the U.S. Caribbean: research on age, growth, and reproduction for stoplight parrotfish and redtail parrotfish in anticipation of upcoming stock assessments. Shervette subaward \$108,281 (out of \$128,561 total). Funded (2022-2023).
- Caribbean Fisheries Management Council. Principal Investigator on “Lane Snapper: Filling in Critical Gaps for Life History Parameters in U.S. Caribbean Waters” \$65,419. Funded (2021-2022).
- NOAA Protected Resources and Biodiversity Division. Co-Investigator on Filling Caribbean Fish Life History Gaps (PI Laura Grove, NOAA) Shervette subaward \$48,318 (out of \$197,560 total). Funded 2021-2023.
- NOAA/MARFIN. Principal Investigator on “Conservation Genomics and Caribbean Fisheries Management: Stock Structure and Connectivity of Four Parrotfish Species and the Role of MPAs as Recruitment Sources.” \$505,411. Funded (2018-2022).
- NOAA Saltonstall-Kennedy Grant Program. Principle Investigator on “Novel Approaches to Age Validation in Data-Poor U.S. Caribbean Reef Fishes.” \$299,817. Funded (2018- 2021).
- NOAA Cooperative Research Program. Principle Investigator on “Caribbean hogfish: documenting critical life history information for a data-poor species in collaboration with Puerto Rican fishers.” \$153,279. Funded (2017-2020).
- NOAA/MARFIN. Principal Investigator on “Filling critical life history information gaps of data-poor fisheries in U.S. Caribbean waters: Age, growth, and reproduction of queen triggerfish and four species of parrotfish.” \$476,267. Funded (2015-2021).
- NOAA/MARFIN/VIMS. Co-Investigator on “Assessment of maturity in commercially and recreationally important reef fishes from the U.S. Virgin Islands.” Total Amount Awarded (USCA amount): \$332,489 (\$189,139). Funded (2015-2019).

Internal University Grant Programs

- 2019: ASPIRE: PI on Establishment of a Shared USCA Histological Research Facility \$60,173 Funded
- 2018: ASPIRE: PI on Application of the bomb radiocarbon chronometer for validating age estimates of Queen Snapper, a data-poor Caribbean fisheries species \$15,000 Funded