Gulf Coast Monitoring and Assessment Portal (GCMAP)

Project/Program Information Review

This editable Portable Document Format (PDF) form has been populated with information describing the project/program, Oyster Population Monitoring for Fisheries Management

We have included some general instructions as well as a glossary of terms to help complete the review and/or revision of this information. Once completed, the CMAP team will incorporate your edits for the project/program(s) records into the GCMAP database.

Please let us know if you have any questions regarding the process or technical issues with the PDF. We greatly appreciate your participation in the GCMAP effort.

Instructions for review:

- PDF form may be opened and edited in Adobe Acrobat Reader (free download here)
- Review program information and make revisions as necessary
- Provide missing information
- Save your edits (if any)
- If no additions or changes are needed please confirm your review and let us know that no revisions are necessary
- Return modified PDF to Jacob.Howell@noaa.gov or Randy.Clark@noaa.gov along with any additional comments

Reviewer feedback:

Please specify one of the following options in the return email:

1. *Return with no changes necessary*
   Your program information will be considered final.

2. *Return includes updates*
   Your program information will be considered final once comments (if applicable) or edits are addressed.

Note: In the event that we do not receive a response from you after a follow up, then we will consider the current entry for the project/program as final.

If assistance is needed during this review process, please contact our GCMAP project staff at Jacob.Howell@noaa.gov or Randy.Clark@noaa.gov.

Overview

Program title

Provide the name of the program/project. Please spell out any acronyms.

Oyster Population Monitoring

Website URL

Please provide website link(s) relevant to the program/project

https://myfwc.com/research/saltwater/mollusc/eastern-oysters/monitoring-metrics/

Program description

Please provide an abstract or brief description of the program (i.e., who, what, when, where, and how)

Commercial oyster landings in Florida declined sharply in 2013 and have remained substantially lower than those recorded since 2000. Most of that decline can be attributed to the collapse of the fishery in Apalachicola Bay. From 2007 through 2011, the Apalachicola Bay fishery accounted for over 90 percent of the annual oyster harvest in Florida with average landings of 2.5 million pounds; however, since that time landings have steadily decreased, reaching the lowest recorded values since 1985 when only 0.27 million pounds were landed in 2017. In response to this fishery failure, the commission closed Apalachicola Bay to harvest in 2020 for a five year period. This current program focuses on annual monitoring of commercially fished oyster bars in Apalachicola Bay to monitor the population trends. Monitoring includes semi annual density and demographic sampling, monthly collection of live oysters for analysis of physiological condition, disease prevalence and intensity, and gonadal development state. In addition, when the Apalachicola Bay fishery reopens, pre- and post-commercial season density assessments of oyster bars and monthly monitoring monitoring of larval settlement rates will continue as part of this state monitoring program. Funding for this research is provided by the State of Florida through a legislative budget request that was approved and initiated on July 1, 2015.

Executing agency(ies)

Please provide the name of the leading agency and any partner agencies.

Florida Fish and Wildlife Conservation Commission (FL FWC) Florida Fish and Wildlife Research Institute (FWRI)

Executing agency type(s)

Select all that apply.

- ☐ Federal
- ☑ State
- ☐ Regional
- ☐ Local
- ☐ Private
- ☐ Non-Governmental Organization (NGO)
- ☐ Consortium
- ☐ International
- ☐ Academic
- ☐ Tribal

Funding agency(ies)

Agency(ies) or organization(s) funding the program. Please list all.

State of Florida

Funding source(s)

Funding source(s) for the program (i.e., Grant, legislation, etc)

Legislative budget request approved and initiated on July 1, 2015

Funding amount

Total funds allocated to the program

$139,744 allocated each fiscal year (July 1 - June 30)

Point of Contact

Please provide or correct the below information for the primary point of contact for this program/project.

Name

Ryan Gandy

Office name

Florida Fish and Wildlife Conservation Commission (FL FWC) Fish and Wildlife Research Institute (FWRI)

Phone number

(XXX-XXX-XXXX Ext. XXX)

727-502-4886

Email address

ryan.gandy@myfwc.com

Job title

Research Administrator II

Timeline

Status

Is the monitoring/data collection currently active or inactive? Please select one.

- ✔ Active
- ☐ Inactive

Start date

What is the start date of data collection? (YYYY or MM/DD/YYYY if possible)

2016-01-01

End date

What is the end date of data collection? (YYYY or MM/DD/YYYY if possible)

Current

Program Type

Does this program incorporate volunteer or citizen science? Please select one.

- ☐ Yes
- ✔ No

Habitat types—and associated aquatic settings

Please select all habitat type-aquatic setting pairs which fall within the extent of the program/project.

	AQUATIC SETTING							
HABITAT TYPE	Upland	Riverine	Palustrine	Lacustrine	Estuarine	Marine nearshore (<30 m)	Marine offshore (30–200 m)	Marine oceanic (>200 m)
Water column (Groundwater)	☐	☐	☐	☐	☑	☑	☐	☐
Oyster/bivalve bed (Oysters, mussels)	☐	☐	☐	☐	☑	☑	☐	☐
Emergent marsh (Fresh marsh, saline marsh)	☐	☐	☐	☐	☐	☐	☐	☐
Forest (Swamp, upland forest, riverine forest)	☐	☐	☐	☐	☐	☐	☐	☐
Shrub scrub/Grassland	☐	☐	☐	☐	☐	☐	☐	☐
Beach/dune	☐	☐	☐	☐	☐	☐	☐	☐
Barrier island	☐	☐	☐	☐	☐	☐	☐	☐
Mangrove	☐	☐	☐	☐	☐	☐	☐	☐
Tidal flat	☐	☐	☐	☐	☐	☐	☐	☐
Hard/Rock bottom	☐	☐	☐	☐	☐	☐	☐	☐
Coral reef	☐	☐	☐	☐	☐	☐	☐	☐
Soft bottom	☐	☐	☐	☐	☐	☐	☐	☐
SAV (Seagrass bed, benthic macroalgae)	☐	☐	☐	☐	☐	☐	☐	☐
Sargassum/floating macroalgae	☐	☐	☐	☐	☐	☐	☐	☐
Deep sea benthic communities	☐	☐	☐	☐	☐	☐	☐	☐
Artificial reef	☐	☐	☐	☐	☐	☐	☐	☐
Urban	☐	☐	☐	☐	☐	☐	☐	☐
Agriculture	☐	☐	☐	☐	☐	☐	☐	☐
Karst/barren (Cave systems, barren, sinkhole, outcrop communities)	☐	☐	☐	☐	☐	☐	☐	☐

Accessibility

Are the data accessible? Please select one.

- ☐ Web accessible
- ✔ Send upon request
- ☐ Not accessible

Data URL

If data are accessible, please provide the URL or contact info for the data source.

Contact POC

Are the data available in a machine-readable format? Please select one.

- ✔ Yes
- ☐ No

Is metadata available? Please select one.

- ✔ Yes
- ☐ No

Metadata standard

What metadata standard format is used? Select all that apply.

- ☐ ISO
- ☑ FGDC (CSDGM)
- ☐ Other

Metadata source

If metadata are available on the web, please provide a URL.

Publications

Provide a citation/link to any relevant publication(s) (or a link to publications page)

https://myfwc.com/media/22097/oimmp-report-2019.pdf

Procedures and QA

Does the program have documented collection procedures for the majority of parameters? Please select one.

- ✔ Yes
- ☐ No

Collection procedures URL

If documentation is available on the web, please provide a link to the website. If it is not available on the web, could you share the file with us?

https://myfwc.com/media/22097/oimmp-report-2019.pdf (see monitoring chapter)

Parker ML. 2015. Oyster monitoring in the northern estuaries on the southeast coast of Florida: Final report (2005–2014). St. Petersburg, FL: Fish and Wildlife Research Institute, Fish and Wildlife

Does the program have documented analytical procedures for the majority of parameters? Please select one.

- ✔ Yes
- ☐ No

Analytical procedures URL

If documentation is available on the web, please provide a link to the website. If it is not available on the web, could you share the file with us?

Contact POC for document

Does the program have a Quality Assurance (QA) protocol? Please select one.

- ✔ Yes
- ☐ No

QA protocol URL

If documentation is available on the web, please provide a link to the website. If it is not available on the web, could you share the file with us?

Contact POC for document

Water Quality

Parameters

Please select all parameters from the following list collected within this program. Select all that apply.

- ☐ **Nutrients**
  - ☐ Total nitrogen
  - ☐ Nitrite
  - ☐ Nitrate
  - ☐ Nitrite + Nitrate
  - ☐ Ammonia
  - ☐ Ammonia + organic nitrogen
  - ☐ Total phosphorus
  - ☐ Soluble phosphorus
  - ☐ Phosphate
  - ☐ Orthophosphate
  - ☐ Silicate
- ☐ **Harmful algal bloom indicators**
  - ☐ Cyanobacteria
  - ☐ Algal toxins (Domoic acid, brevetoxins, microcystin, and others)
- ☐ **Pathogens**
  - ☐ Escherichia coli
  - ☐ Enterococcus
  - ☐ Total coliforms
  - ☐ Giardia
  - ☐ Cryptosporidium
  - ☐ Vibrio
  - ☐ Fecal coliforms
- ☐ **Sediment**
  - ☐ Suspended sediment concentration
  - ☐ Total suspended solids
- ☐ **Mercury**
  - ☐ Total mercury
  - ☐ Methylmercury
- ☐ **Freshwater inflow**
  - ☐ Discharge
  - ☐ Stage
- ☑ **Field parameters**
  - ☑ Conductance (salinity)
  - ☑ Water temperature
  - ☑ Turbidity
  - ☑ pH
  - ☑ Dissolved oxygen
  - ☐ Currents
  - ☑ Water level
  - ☐ Light attenuation
- ☐ **Carbon**
  - ☐ Organic carbon (Total organic carbon, dissolved organic carbon)
  - ☐ Polycyclic aromatic hydrocarbons (PAHs)
- ☐ **Aquatic primary producers**
  - ☐ Phytoplankton
  - ☐ Chlorophyll

Measurement schedule

Select "Continuous" if data is collected in real-time. Select all that apply.

- ☐ Continuous
- ☑ Discrete

Measurement frequency

Select all that apply.

- ☐ More frequently than hourly
- ☐ Hourly
- ☐ More frequently than daily
- ☐ Daily
- ☐ Every two days
- ☐ Twice a week
- ☐ Weekly
- ☐ Twice a month
- ☑ Monthly
- ☐ Every two months
- ☑ Quarterly
- ☑ Biannually
- ☐ Annually
- ☐ Biennially
- ☐ No set frequency
- ☐ Other

Seasonal

Medium

What medium are the parameters measured in? Select all that apply.

- ☑ Water column
- ☐ Porewater
- ☐ Tissue

Are the data units clearly labeled? Please select one.

- ✔ Yes
- ☐ No

Habitat Monitoring

Parameters

Please select all parameters from the following list collected within this program. Select all that apply.

- ☐ **Abiotic**
  - ☐ *Substrate metrics*
    - ☑ Substrate composition
    - ☑ Substrate depth
    - ☐ Substrate geochemistry (Nutrients, redox, metal conc., organic pollutants/content)
    - ☐ Topographic complexity (Rugosity, vertical relief)
    - ☐ Sediment classification (Bulk density, grain size/texture, moisture levels, soil type)
  - ☐ *Coastal processes*
    - ☐ Vertical accretion
    - ☐ Subsidence
- ☑ **Submerged habitat building animals**
  - ☑ *Ecological metrics*
    - ☑ Abundance
    - ☑ Distribution
    - ☑ Composition (Species/community composition)
    - ☐ Cover (% cover, acreage)
    - ☑ Density
    - ☑ Biomass
  - ☑ *Physiology/health*
    - ☑ Disease
    - ☐ Bleaching
    - ☐ Size (Animal height, animal weight, diameter)
  - ☑ *Population dynamics*
    - ☑ Settlement/ recruitment
    - ☐ Survivorship
    - ☑ Mortality
    - ☑ Spawning
    - ☐ Larval transport
- ☐ **Plants/macroalgae**
  - ☐ *Ecological metrics*
    - ☐ Abundance
    - ☐ Distribution
    - ☐ Composition
    - ☐ Cover (% cover, acreage, basal area)
    - ☐ Density
    - ☐ Biomass
  - ☐ *Physiology*
    - ☐ Canopy extent/structure
    - ☐ Growth
    - ☐ Litterfall
    - ☐ Size (Height, weight, diameter at breast height (DBH))
  - ☐ *Population dynamics*
    - ☐ Recruitment
    - ☐ Survivorship
    - ☐ Mortality
    - ☐ Primary production
    - ☐ Reproductive effort (Flowering, fruiting, seedling production)

Measurement schedule

Select "Continuous" if data are collected in real-time. Select all that apply.

- ☐ Continuous
- ☑ Discrete

Measurement frequency

Select all that apply.

- ☐ More frequently than hourly
- ☐ Hourly
- ☐ More frequently than daily
- ☐ Daily
- ☐ Every two days
- ☐ Twice a week
- ☐ Weekly
- ☐ Twice a month
- ☑ Monthly
- ☐ Every two months
- ☑ Quarterly
- ☑ Biannually
- ☐ Annually
- ☐ Biennially
- ☐ No set frequency
- ☐ Other

Seasonal

Mapping

Parameters

Please select all parameters from the following list collected within this program. Select all that apply.

- ☐ Area of habitat types
- ☐ Sea surface height
- ☐ Tides
- ☐ Land use/land cover
- ☐ Subsidence
- ☐ Sediment grain size
- ☐ Soil type
- ☐ Water temperature
- ☐ Sea surface temperature
- ☐ Chlorophyll
- ☐ Turbidity
- ☐ Salinity
- ☐ Backscatter intensity
- ☐ Currents
- ☐ Digital photography
- ☐ Hyperspectral imagery
- ☐ Multispectral imagery
- ☐ Reflectivity
- ☐ Sediment depth
- ☐ Surficial elevation
- ☐ Vertical accretion
- ☐ Water column profiling

Technology

Technology or tools used to collect data. Select all that apply.

- ☐ Multibeam sonar (MBES)
- ☐ Single beam sonar (VBES)
- ☐ Split beam echosounder (SBES)
- ☐ Side scan sonar (SSS)
- ☐ Seismic
- ☐ Subbottom
- ☐ Acoustic doppler current profile (ADCP)
- ☐ Light detection and ranging (LIDAR)
- ☐ Digital photography
- ☐ Radar
- ☐ Synthetic aperture radar (SAR)
- ☐ Interferometric synthetic aperture radar (IFSAR)
- ☐ Real-time kinematic global positioning system (RTK GPS)
- ☐ Total station

Activity

Please select the mapping activities which are relevant to the program/project. Select all that apply.

- ☐ Bathymetry
- ☐ Topography
- ☐ Habitat classification
- ☐ Beach renourishment
- ☐ Marine debris
- ☐ Shoreline
- ☐ Inundation modeling
- ☐ Human use
- ☐ Seafloor characterization
- ☐ Environmental monitoring
- ☐ Hydrocarbon detection
- ☐ Maritime heritage
- ☐ Water column hydrodynamics
- ☐ Restoration

Platform type

If relevant, type of platform technology or tool that was deployed. Select all that apply.

- ☐ Ship/small boat
- ☐ Unmanned aerial vehicle (UAV)
- ☐ Autonomous underwater vehicle (AUV)
- ☐ Human occupied vehicle (HOV)
- ☐ Remotely operated vehicle (ROV)
- ☐ Airborne
- ☐ Satellite
- ☐ Tripod
- ☐ Human (Observation or sampling)
- ☐ Fixed station
- ☐ Mooring/buoy

Classification scheme

If relevant, please select all that apply. Please specify any additional classification schemes used.

- ☐ Anderson Land Cover Classification System
- ☐ Coastal and Marine Ecological Classification Standard (CMECS)
- ☐ Cowardin 1979
- ☐ National Vegetation Classification System (NVCS)
- ☐ Florida Land Use Cover and Forms Classification System
- ☐ Flower Garden Banks Habitat Classification Scheme
- ☐ NERRS Comprehensive Habitat and Land Use Classification System
- ☐ Other:

Spatial resolution

If relevant, please provide the spatial resolution of map products. If produced from scanned analog photography what was scale and dpi (if available)?

Temporal resolution

If relevant, what is the temporal resolution of the data? Was it a single mapping event? Have there been any other year(s) mapped?

Dates

What year(s) correspond to the map(s)?

Spatial Information

Would you be willing to share the footprint boundary and/or sampling site/station locations (longitude/latitude coordinates) for your program/project?

If so, please provide a link or share the files (SHP, KML, CSV formats preferred) via email. Alternatively, if the provided options do not work for you, a team member from our program will contact you to set up a file transfer.

- (•) Yes
  - [ ] Website/download URL:
  - [x] File(s) will be shared via email.
- ( ) No

Would you be willing to share your program's sampling station/site locations with metadata (i.e., specifying what parameters are collected where and at what frequency)?

If yes, a team member from our program will contact you.

- (•) Yes
- ( ) No

Baseline Assessment (Optional)

Does the program include any assessments of baseline conditions?

- ( ) Yes
- ( ) No

Baseline assessment documentation

If assessment information or reports are available on the web, please provide a link to the website.

Living Marine Resources
Marine Mammals

Parameters: *Select all that apply.*

- ☐ Stressors/Threat
  - ☐ Disease
  - ☐ Environmental
  - ☐ Strandings
  - ☐ Bycatch/Boat Strike
- ☐ Population Dynamics
  - ☐ Survivorship
  - ☐ Behavior
  - ☐ Reproduction
  - ☐ Mortality
- ☐ Ecological Metrics
  - ☐ Demography
  - ☐ Abundance
  - ☐ Density
  - ☐ Movement
  - ☐ Distribution
  - ☐ Diet

Survey Type

Species: *Select all that apply.*

- ☐ SpermWhale (*Physeter macrocephalus*)
- ☐ Pygmy Sperm Whale (*Kogia breviceps*)
- ☐ Dwarf Sperm Whale (*Kogia sima)*
- ☐ Short-finned Pilot Whale (*Globicephala macrorhynchus*)
- ☐ Pygmy Killer Whale (*Feresa attenuata*)
- ☐ Fraser's Dolphin (*Lagenodelphis hosei)*
- ☐ Risso's Dolphin (*Grampus griseus*)
- ☐ Clymene Dolphin (*Stenella clymene*)
- ☐ Striped Dolphin (*Stenella coeruleoalba*)
- ☐ Atlantic Spotted Dolphin (*Stenella frontalis*)
- ☐ Pantropical Spotted Dolphin (*Stenella attenuata*)
- ☐ Spinner Dolphin (*Stenella longirostris*)
- ☐ Rough-toothed Dolphin (*Steno bredanensis*)
- ☐ Orca (*Orcinus orca*)
- ☐ False Killer Whale (*Pseudorca crassidens*)
- ☐ Melon-headed Whale (*Peponocephala electra*)
- ☐ Bottlenose Dolphin (*Tursiops truncatus*)
- ☐ Gervais's Beaked Whale (*Mesoplodon europaeus*)
- ☐ Blainville's Beaked Whale (*Mesoplodon densirostris*)
- ☐ Cuvier's Beaked Whale (*Ziphius cavirostris*)
- ☐ Sowerby's Beaked Whale (*Mesoplodon bidens*)
- ☐ North Atlantic Right Whale (*Eubalaena glacialis*)
- ☐ Blue Whale (*Balaenoptera musculus*)
- ☐ Fin Whale (*Balaenoptera physalus*)
- ☐ Bryde's Whale (*Balaenoptera brydei*)
- ☐ Sei Whale (*Balaenoptera borealis)*
- ☐ Common Minke Whale (Balaenoptera acutorostrata)
- ☐ Rice's Whale (*Balaenoptera ricei*)
- ☐ Humpback Whale (*Megaptera novaeangliae*)
- ☐ West Indian Manatee (*Trichechus manatus*)

Measurement Schedule: *Select "Continuous" if data are collected in real-time. Select all that apply.*

- ☐ Continuous
- ☐ Discrete

Measurement Frequency: *Select all that apply.*

- ☐ More frequently than hourly
- ☐ Hourly
- ☐ Daily
- ☐ Every two days
- ☐ Twice a week
- ☐ Weekly
- ☐ Twice a month
- ☐ Monthly
- ☐ Every two months
- ☐ Quarterly
- ☐ Biannually
- ☐ Annually
- ☐ Biennially
- ☐ No set frequency
- ☐ Seasonally
- ☐ Decadally
- ☐ Variable
- ☐ Other

Managed Species: *Select all that apply.*

- ☐ State Managed (Recreational/Commercial)
- ☐ Federally Managed (Recreational/Commercial)
- ☐ Protected

Living Marine Resources
Sea Turtles

Parameters: *Select all that apply.*

- Stressors/Threat
  - Disease
  - Environmental
  - Strandings
  - Bycatch/Boat Strike
- Population Dynamics
  - Survivorship
  - Reproduction/Nesting
  - Mortality
- Ecological Metrics
  - Demography
  - Abundance
  - Density
  - Movement
  - Distribution
  - Diet

Survey Type

Species: *Select all that apply.*

- Loggerhead Sea Turtle (*Caretta caretta*)
- Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)
- Green Sea Turtle (*Chelonia mydas*)
- Hawksbill Sea Turtle (*Eretmochelys imbricata*)
- Leatherback Sea Turtle (*Dermochelys coriacea*)

Measurement Schedule: *Select "Continuous" if data are collected in real-time. Select all that apply.*

- Continuous
- Discrete

Measurement Frequency: *Select all that apply.*

- More frequently than hourly
- Hourly
- Daily
- Every two days
- Twice a week
- Weekly
- Twice a month
- Monthly
- Every two months
- Quarterly
- Biannually
- Annually
- Biennially
- No set frequency
- Seasonally
- Decadally
- Variable
- Other

Managed Species: *Select all that apply.*

- State Managed (Recreational/Commercial)
- Federally Managed (Recreational/Commercial)
- Protected

Living Marine Resources
Birds

Parameters: *Select all that apply.*

- [ ] Stressors/Threat
  - [ ] Disease
  - [ ] Environmental
  - [ ] Bycatch
- [ ] Population Dynamics
  - [ ] Survivorship
  - [ ] Reproduction/Nesting
  - [ ] Mortality
- [ ] Ecological Metrics
  - [ ] Demography
  - [ ] Abundance
  - [ ] Density
  - [ ] Movement
  - [ ] Distribution
  - [ ] Diet
  - [ ] Biomass

Survey Type

Group: *Select all that apply.*

- [ ] Land Birds
- [ ] Wading Birds
- [ ] Marsh Birds
- [ ] Waterfowl
- [ ] Raptors
- [ ] Shore Birds
- [ ] Seabirds

Measurement Schedule: *Select "Continuous" if data are collected in real-time. Select all that apply.*

- [ ] Continuous
- [ ] Discrete

Measurement Frequency: *Select all that apply.*

- [ ] More frequently than hourly
- [ ] Hourly
- [ ] Daily
- [ ] Every two days
- [ ] Twice a week
- [ ] Weekly
- [ ] Twice a month
- [ ] Monthly
- [ ] Every two months
- [ ] Quarterly
- [ ] Biannually
- [ ] Annually
- [ ] Biennially
- [ ] No set frequency
- [ ] Seasonally
- [ ] Decadally
- [ ] Variable
- [ ] Other

Managed Species: *Select all that apply.*

- [ ] State Managed (Recreational/Commercial)
- [ ] Federally Managed (Recreational/Commercial)
- [ ] Protected

Living Marine Resources
Fish

Parameters: *Select all that apply.*

- ☐ Stressors/Threat
  - ☐ Disease
  - ☐ Environmental
  - ☐ Bycatch
- ☐ Population Dynamics
  - ☐ Survivorship
  - ☐ Reproduction
  - ☐ Mortality
- ☐ Ecological Metrics
  - ☐ Demography
  - ☐ Abundance
  - ☐ Density
  - ☐ Movement
  - ☐ Distribution
  - ☐ Biomass
  - ☐ Diet

Survey Type

Group: *Select all that apply.*

- ☐ Snappers
- ☐ Groupers
- ☐ Tuna and Mackerel
- ☐ Tilefish
- ☐ Billifish
- ☐ Swordfish
- ☐ Elasmobranchs
- ☐ Drums and Sea Trout
- ☐ Flatfish
- ☐ Forage Fish
- ☐ Sturgeon and Paddlefish
- ☐ Demersal - General
- ☐ Reef - General
- ☐ Pelagic - General
- ☐ Estuarine - General

Measurement Schedule: *Select "Continuous" if data are collected in real-time. Select all that apply.*

- ☐ Continuous
- ☐ Discrete

Measurement Frequency: *Select all that apply.*

- ☐ More frequently than hourly
- ☐ Hourly
- ☐ Daily
- ☐ Every two days
- ☐ Twice a week
- ☐ Weekly
- ☐ Twice a month
- ☐ Monthly
- ☐ Every two months
- ☐ Quarterly
- ☐ Biannually
- ☐ Annually
- ☐ Biennially
- ☐ No set frequency
- ☐ Seasonally
- ☐ Decadally
- ☐ Variable
- ☐ Other

Managed Species: *Select all that apply.*

- ☐ State Managed (Recreational/Commercial)
- ☐ Federally Managed (Recreational/Commercial)
- ☐ Protected

Living Marine Resources
Invertebrates

Parameters: *Select all that apply.*

- ✔ Stressors/Threat
  - ✔ Disease
  - ☐ Environmental
  - ☐ Bycatch
- ✔ Population Dynamics
  - ☐ Survivorship
  - ✔ Reproduction
  - ✔ Mortality
- ✔ Ecological Metrics
  - ✔ Demography
  - ✔ Abundance
  - ✔ Density
  - ☐ Movement
  - ☐ Distribution
  - ☐ Diet
  - ✔ Biomass

Survey Type

Quadrat ; Representative Sampling ; Laboratory Analysis

Group: *Select all that apply.*

- ☐ Sponges
- ☐ Corals
- ☐ Jellies
- ☐ Nematodes
- ☐ Polychaetes
- ☐ Sea Stars
- ☐ Sea Urchins
- ☐ Sea Cucumbers
- ☐ Crabs
- ☐ Shrimp
- ☐ Lobster
- ✔ Bivalves
- ☐ Gastropods
- ☐ Squid

Measurement Schedule: *Select "Continuous" if data are collected in real-time. Select all that apply.*

- ☐ Continuous
- ✔ Discrete

Measurement Frequency. *Select all that apply.*

- ☐ More frequently than hourly
- ☐ Hourly
- ☐ Daily
- ☐ Every two days
- ☐ Twice a week
- ☐ Weekly
- ☐ Twice a month
- ✔ Monthly
- ☐ Every two months
- ✔ Quarterly
- ✔ Biannually
- ☐ Annually
- ☐ Biennially
- ☐ No set frequency
- ☐ Seasonally
- ☐ Decadally
- ☐ Variable
- ☐ Other

Managed Species: *Select all that apply.*

- ☐ State Managed (Recreational/Commercial)
- ☐ Federally Managed (Recreational/Commercial)
- ☐ Protected

Thank You!