RESTORE Council Monitoring and Assessment Program Development
Documented Project Assumptions – May 2018

I.   Monitoring Program Types

Water Quality Monitoring
Programs to include those which:
- Implement recurrent monitoring of water quality as a complementary data stream to a biological or other monitoring program

    *Will use a field titled "Medium" to designate the sample medium (water column, porewater, or tissue) from which parameters are collected

General Parameters	Detailed Parameters
Nutrients	Total nitrogen Nitrite Nitrate Nitrite + nitrate Ammonia Ammonia + organic nitrogen Total phosphorus Soluble phosphorus Phosphate Orthophosphate Silicate
Pathogens	*Escherichia coli* *Enterococcus* Fecal coliforms Total coliforms Giardia Cryptosporidium *Vibrio*
Aquatic Primary Producers	Phytoplankton Chlorophyll
Harmful Algal Bloom Indicators	Cyanobacteria Algal toxins
Sediment	Suspended sediment concentration Total suspended solids
Mercury	Total mercury Methylmercury
Freshwater Inflow	Discharge Stage
Field Parameters	Water temperature Conductance

	Dissolved oxygen Turbidity pH Light attenuation
Carbon	Organic carbon Polycyclic aromatic hydrocarbons (PAHs)

Habitat Monitoring

Programs to include those which:

- Gauge the condition or state of habitat through in-situ measurements
- Where possible, habitat data associated with important gulf faunal species-specific monitoring (based on NRDA restoration types)
    - Fish and water column invertebrates
    - Sea turtles
    - Marine mammals
    - Birds
    - Estuarine and marine benthics

General Parameters	Parameter Groups	Parameter Subgroups
Submerged habitat building animals	Physiology/Health	Disease Size Bleaching Growth
	Population dynamics	Settlement/Recruitment Survivorship Larval transport Spawning Mortality
	Ecological metrics	Composition Abundance Coverage Density Distribution Biomass
Plant/Macroalgae	Ecological metrics	Composition Abundance Distribution Biomass Cover Density
	Physiology	Canopy extent/structure Size Growth Litterfall
	Population dynamics	Recruitment Survivorship Mortality Reproductive effort Primary production
Abiotic	Substrate metrics	Substrate geochemistry Substrate composition Topographic complexity Sediment classification Substrate depth
	Coastal processes	Vertical accretion Subsidence

Mapping
Programs (or platforms/satellites/datasets) to include those which:
- Gauge the condition or state of water quality or habitat through remotely-sensed measurements (e.g., LiDAR, SONAR, satellite, aerial, etc)
- Collect primary data which can be used to develop derived products needed to produce a habitat map

- Develop recurrent or foundational map products for one of a variety of targeted habitat types

   *Notes: Records falling under the "Mapping" program type category should:
   - Be constrained to the temporal limitation of 1980 to present (listed below)
   - By default meet duration requirements (listed below) as these datasets provide a "principal source of information"

Mapping Technology/Tools
Programs/projects will be documented as collecting data using one or many of the following technologies or tools:

   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

Mapping Parameters
Programs/projects will be documented as collecting one or many of the following parameters:

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

II.   **Habitat Type and Aquatic Setting**

Habitat Type

Programs/projects will be documented as falling within one or more of the following habitat types:

Water column (includes groundwater)
Oyster/Bivalve bed
Emergent wetland
Forest
Grassland
Beach/dune
Barrier island
Mangrove
Tidal flat
Hard bottom
Coral reef
Soft bottom
SAV (includes seagrass beds and benthic macroalgae)
Sargassum/Floating macroalgae
Deep sea benthic communities
Artificial reef
Urban
Agriculture

Aquatic Setting

Each habitat type documented for programs/projects will fall within one or more of the following aquatic settings:

Upland
Riverine
Palustrine
Lacustrine
Estuarine
Marine Nearshore (0-30 m depths)
Marine Offshore (30 - 100/200m depths - cont. shelf break)
Marine Oceanic (100/200 - 11000 m depths - deep ocean)

III. Temporal Limitations

- 1980 to present
- Active or inactive monitoring efforts
- Program duration (Adoption of the Ocean Conservancy's inventory criteria):
  - Minimum data record of 5 years of recurrent sampling; or
  - Minimum of 2 sample years that will span the 5 year range; or
  - Discrete programs which provide a principal source of information for resource assessment or management meeting 1 of 5 criteria:
    1) Geographic scope
    2) Primary data source
    3) NRDA resource category

4)   Foundational data source

5)   Limited data availability

IV.   Spatial Extent

- Minimum mapping unit
  - To be determined based on the data available
- Proposed project boundary
  - Will use a boundary which includes HUC 10 boundaries (See map below - orange line)
  - If a program has monitoring sites falling:
    - Within and outside of the boundary, we will only include sites for that program which fall within project boundary.
    - Mostly outside of the boundary, we will investigate on a case-by-case basis.
    - Along the US/Mexico border or the Gulf of Mexico/Atlantic Ocean boundary, we will investigate on a case-by-case basis.

V.   Collection of Descriptive Metadata

- Only collecting descriptive metadata about monitoring programs (rather than raw monitoring data)
- Information collected will generally include:
  - Program objectives
  - Program duration
  - Monitoring frequency
  - Geographic extent
  - Funding source

- ○ Funding amount
- ○ Observational accuracy and precision
- ○ Standard operating procedures
- ○ Data access (linking to an outside source where the data is served)
- ○ Program contacts

VI.   Granularity of Spatial and Attribute Data
- ● Three potential representations:
  - ○ Polygons + Program-Level Metadata
    - ■ Could be represented by general extent or custom polygon
  - ○ Points + Program-Level Metadata
  - ○ Points + Site-Level Metadata

VII.   Database Management
- ● The monitoring program inventory and database/web tool will be a one-time snapshot within the 3-year time frame of the project.
  - ○ A potential opportunity for future updates could involve requirement of future grantees to enter descriptive metadata for their projects upon completion.