ReadMe

This .zip file contains GIS files for Long Island Sound (LIS) associated with the “Reef Benthic Fauna and Sediment Characterization” study. Very briefly, the goal of the study was to utilize the results of multibeam surveys conducted by Roger Flood of SoMAS and NOAA to provide ground-truth data on seafloor sediment properties and information on the benthic macrofauna community characteristics at existing, potentially expanded, and newly proposed reef areas in New York Waters. Existing sites include Rockaway, Atlantic Beach, Hempstead, Yellowbar, Kismet, Fire Island, Twelve Mile, and Smithtown (LIS). On the South Shore, potential expansions are proposed for McAllister, Moriches, and Shinnecock reefs in addition to a new site called Sixteen Fathom. In Long Island Sound, new sites are proposed for Huntington/Oyster Bay, Port Jefferson/Mount Sinai, and Mattituck. A copy of the complete report for both the South Shore and Long Island Sound is saved in the report folder.

All ArcMap project files (\*.mxd) contain the same data layers. They differ only in the type of data displayed as the default when the project opens (sampling stations, grain size, depth, fauna, and faunal summary metrics). A sixth project file \*reefs.mxd is a backup copy in case another project file is corrupted. These project files are templates and not final layouts because the addition of a title and legend, and the format of the scale bar, will differ for each site. In addition, the symbology for species fields and faunal summary metric fields has to be set manually to account for the data range for that field. Species abundances, for example, have quite different data ranges. A folder with layer formats that can be imported in the layer properties symbology tab has been created to provide common templates for species abundances.

An ArcGIS Pro equivalent with all of the maps and layouts of the ArcMap projects is contained in LISReefs.aprx. Please note that the .lyr files from the ArcMap version can be read and used, but if modified and saved, they will be saved as an .lyrx Pro formatted file.

The Bookmarks menu in each project file is the easiest way to navigate to each reef site. There are two bookmarks for each site, one when View, Data View is active and one when View, Layout View is active. The latter are identified with the term “Print” before the name of the site.

The following is a breakdown of the contents of each folder:

**ReefData.gdb** – This is a file geodatabase containing data tables and feature classes generated by the sampling in this project. Specific data layers include:

a) BottomPolygonsClipped – A polygon feature class consisting of geophysical provinces derived from a visual interpretation of multibeam sonar backscatter intensity and texture. This layer assumes that the sonar data is a proxy for natural bottom features that govern faunal patterns. It was used to set sampling locations based on stratified random sampling. Not all provinces could be sampled since the study had constraints on the number of samples at each site, but an attempt was made to sample as many bottom provinces as possible. Polygons were clipped to conform to the outline of the designated reef areas, thus in the Attribute Table for this layer, SHAPE\_Length is the perimeter of the bottom polygon in meters and SHAPE\_Area is the polygon area in square meters.

b) SamplingStations – A point feature class with location information for each sampling station. The Attribute Table contains StatID, the station designator used to identify the location, the grab sample number in the order collected (Sample), and the Latitude and Longitude of the sampling station. SamplesAndStations is a table with the same data.

c) Grain Size and Depth – A point feature class with grab sample penetration depth (cm), water depth (m), and % gravel, sand, and mud (silt-clay) by weight. DepthAndGrainSize is a table with the same data.

d) Fauna – A point feature class whose attribute table contains the number of individuals of each species collected for each sample. ReefSite, StatID, and Sample number are included as well. FaunaCounts is a table with the same data.

e) FaunalSummaryMetrics – A point feature class whose attribute table contains sample summary metrics including total abundance, species richness, Shannon diversity, Equitability, and Simpson’s diversity. FaunalSummary is a table with the same data.

**Charts** - This folder contains georeferenced charts in \*.KAP format.

**DeploymentSummary** – This folder contains a point shapefile (Deployment\_Summary.shp) and a symbology formatting file (Deployment\_Summary.lyr) with existing reef material type and locations. These were obtained from Roger Flood from a DEC source.

**LayerFormats** – \*.lyr files with symbology formats useful for displaying data. Format 0\_25.lyr sets up a graduated symbol format for species with a data range of 0-25 individuals. These are meant as starting templates that can be imported in the Layer Properties, Symbology tab to display data a consistent format for symbol size, color, and number of classes. Once imported, they can be modified to match the specific field being displayed. Several other \*.lyr files are saved outside of this folder. These include BottomPolygonsClipped.lyr which sets the symbology for the bottom polygon provinces, and GrainSizeAndDepth.lyr which sets the grain size pie chart symbology.

**NortheatUSShoreline** - Contains a polygon shapefile (shore\_poly.shp) and a symbology formatting file (shoreline\_poly.lyr) with the outline of the Northeast US.

**ReefLines** – Polygon shapefiles with the outline of the reef areas. The shapefile 2018\_reef\_lines\_Final.shp contains polygons for all of the South Shore sites and Smithtown (LIS). The shapefile Art\_Reef\_Boxes\_2020\_DEC.shp has polygon outlines for the potential LIS reef sites. These were obtained from Roger Flood, SoMAS.

**Sonar** – Sonar layers obtained from Roger Flood, SoMAS (Please do not distribute these without contacting him). These layers are grouped within site in the GIS project using a layer file (e.g., AtlanticBeach.lyr). Individual layers produced by Roger Flood have different file designators for backscatter (\*\_v0\_bs.tif), bathymetry (\*\_v0.flt), sun illuminated hillshade from the NW (\*\_v0\_si.tif), sun illuminated hillshade the NE (\*v0\_sj.tif), and sun illuminated hillshade from the N (\*\_v0\_sn.tif), where “\*” represents the name of the site. Files with \*.prj define the projected corredinate system for these layers (NAD\_1983\_UTM\_Zone\_18N).

A Brief Summary of Sampling Methods

Bottom samples were collected using a modified Van Veen grab (0.04 m2). Subsamples of sediments for grain size drawn from each grab sample. The remaining sediment was washed through a 0.5 mm sieve for fauna. All material left on the sieve was preserved in 10% buffered formalin and stained with rose bengal. Faunal samples were rewashed in the lab and transferred to 70% ethanol before sorting and identification. Individual organisms were identified to species level whenever possible and the total for each taxon enumerated. Abundances was expressed as the number of individuals per sample (i.e., per 0.04 m2).

Sediment grain-size analyses measured percent composition by weight of major size-fractions (gravel, sand, mud). Samples were partitioned into three size-fractions by wet sieving with distilled water through a combination of 2 mm and 63 micron sieves. The >2mm and 2mm-63 micron fractions were placed in a drying oven at 60o C for at least 48 hours to obtain dry weights. Water containing the <63 micron fraction (mud) was brought up to 1000 ml total volume in a graduated cylinder, mixed thoroughly, and subsampled with a 20 ml pipette at a depth of 20 cm, 20 seconds after mixing. Pipette samples were placed in a drying oven at 60o C for at least 48 hours to obtain dry weight estimates of the mud fraction.