

South Florida/Caribbean Network

National Park Service
Inventory and Monitoring Division



Standard Operating Procedure SEA03

Creating a Seagrass Layer, Merging with Bathymetry Layer, and Assigning Strata —Version 1.1

Please cite this as:

South Florida/Caribbean Network. 2022. Creating a seagrass layer, merging with bathymetry layer, and assigning strata—Version 1.1. South Florida/Caribbean Network Standard Operating Procedure NPS/SFCN/SOP—SEA03. South Florida/Caribbean Network, Palmetto Bay, Florida.

Purpose

The purpose of this standard operating procedure (SOP) is to characterize the stepwise process to create a seagrass layer and merge that layer with available bathymetry layers. The best available bathymetry layer is modified and reclassified to depict the three depth strata outlined in SOP SEA02 *Stratification*—Version 1.1 (SFCN 2022). Then it is converted from a raster file to a vector polygon shapefile before being merged with the seagrass layer via the intersect tool. The final geospatial product will show seagrass layer features with a corresponding depth stratum.

Revision Log

Revision Date	Author	Changes Made	Reason for Change	New Version #
3/31/2021		Format update	Format update	1.1

Procedures

Create a Layer that Contains only the Seagrass Features from the Offshore Benthic Habitat Layer

This procedure will create a layer containing and displaying only seagrass habitat features from the offshore benthic habitat layer using the selection function in ArcMap.

1. In ArcMap, click the “Selection” menu and choose “Select by Attributes...”
2. In the Select by Attributes window that appears:
 - a. Double-click the appropriate field that displays the benthic habitat information in the attribute table (for example, Level 5 in the 2012 BISC offshore benthic habitat layer). The field should now appear in the text box at the bottom of the Select by Attributes window.
 - b. Double-click on the “=” button.
 - c. Click on the “Get Unique Values” button, and select the appropriate value that depicts seagrass for the field selected in Step 2a. The resulting Select by Attributes code in the text box at the bottom of the window should read something like: “Level5” = ‘SRV.’
 - d. Click the Apply button at the bottom of the Select by Attributes window. The selection query will now run for the offshore benthic habitat shapefile.
3. Right-click the benthic habitat layer and choose “Selection” and then “Create Layer From Selected Features.”
4. The temporary layer created in Step 3 appears in the Table of Contents pane. The layer’s name will contain the original name of the offshore benthic habitat domain shapefile followed by the word “selection.”
5. In the Table of Contents pane in ArcMap, right click on the selection layer created in Step 4 and choose Data > Export Data.
6. In the Export Data window:
 - a. For the “Use the same coordinate system” section, select “this layer’s source data”.
 - b. For the “Output feature class” section, navigate to where the new layer should be saved and name it appropriately (e.g. BISC_offshore_seagrass). Click OK.
7. The new offshore seagrass shapefile has now been created and will appear in the Table of Contents pane.

***Note:** If conducting a post-stratification analysis and the benthic habitat layer has multiple seagrass categories (e.g. Continuous SRV, Discontinuous SRV) under the habitat field, create separate seagrass shapefiles by repeating Steps 1-7 for each distinct category of seagrass that exist in the benthic habitat layer being used.*

Use the ArcMap Dissolve Tool to Create a Singular Seagrass Polygon Shapefile without any Multipart Features

This procedure will create a layer that merges all the separate seagrass habitat features from the shapefile created in the previous section, resulting in a seagrass polygon shapefile with one singular feature/attribute.

1. In ArcMap, click on the Geoprocessing menu and select the Dissolve tool.
2. In the Dissolve tool window that opens:
 - a. For Input Features, select the offshore seagrass shapefile created in the previous section.
 - b. For Output Feature Class, navigate to where the new dissolved layer should be saved and name it appropriately (e.g. BISC_offshore_seagrass_dissolve).
 - c. For the Dissolve_Field(s) option, select the field depicting the highest or most detailed level of habitat classification. For example, the field for the seagrass shapefile (created from the offshore benthic habitat layer in the previous section) that contains this information is “Level5.”
 - d. For the rest of the input options, leave the defaults.
 - e. Click the OK button to create the dissolved offshore seagrass shapefile.
3. The new dissolved offshore seagrass shapefile will now appear in the Table of Contents pane.

***Note:** If multiple seagrass shapefiles were created as specified in the previous section, create a dissolved seagrass shapefile by repeating Steps 1–3 for each of these distinct seagrass shapefiles.*

Smoothing Out the Bathymetry Layer

The focal statistics tool is utilized to smooth out the bathymetry layer. This is one of the first steps needed for the creation of a bathymetry/depth vector layer. The focal statistics tool calculates for each bathymetry cell the mean of the values in a specified neighborhood around the cell.

1. In ArcMap, add the bathymetry raster.
2. Click on the Geoprocessing tab and select ArcToolbox.
3. In the ArcToolBox, click on “Spatial Analyst Tools”, then “Neighborhood” and double-click the “Focal Statistics” tool.

4. In the Focal Statistics window:
 - a. Select the bathymetry layer as the Input raster.
 - b. For Output raster, click on the folder icon and navigate to where the bathymetry layer to be modified should be saved and name it appropriately (e.g. BISC_LIDAR_focal_statistics.tif).
 - c. For Neighborhood, leave the drop-down option as Rectangle.
 - d. For Neighborhood Settings, set the Height to “10,” the Width to “10,” and Units to “Cell.”
 - e. For Statistics type, leave the drop-down as MEAN.
 - f. Click “OK.”
5. The new focal statistics bathymetry layer will appear in the Table of Contents, under the Source view.

Reclassifying the Focal Statistics Bathymetry Layer

The reclassify tool is utilized to reclassify the smoothed (focal statistics) bathymetry layer. This is the second step needed for the creation of a usable bathymetry/depth vector layer. The reclassify tool will change the values for each bathymetry cell based on criteria specified by the user, in this case the three depth strata outlined in SOP SEA02 *Stratification*—Version 1.1 (SFCN 2022).

1. In ArcMap, click on the Geoprocessing tab and select ArcToolbox.
2. In the ArcToolBox, click on “Spatial Analyst Tools”, then “Reclass” and double-click the “Reclassify” tool.
3. In the Reclassify window:
 - a. Select the focal statistics bathymetry layer as the Input raster.
 - b. For Reclass field, the drop-down should automatically display the VALUE field.
 - c. For Reclassification, click on the Classify button. In the Classification window that opens change the Classes option drop-down to “3.” Then in the Break Values text box change the first/top value to “-15” and the second/middle value to “-5.” Click “OK.” The Classification window will close and the Reclassify window will reappear.
 - d. For Output Raster, click on the folder icon and navigate to where the output raster should be saved and name it appropriately (e.g. BISC_LIDAR_focal_statistics_reclass.tif).
 - e. Click “OK.”

4. The new reclassified bathymetry layer will appear in the Table of Contents, under the Source view.

Convert the Reclassified Bathymetry Layer to a Vector Layer

The raster to polygon tool is utilized to convert the reclassified bathymetry layer into a vector polygon. This is the last step needed for the creation of a bathymetry/depth vector layer displaying the three depth strata outlined in *SOP SEA02 Stratification—Version 1.1* (SFCN 2022).

1. In ArcMap, click on the Geoprocessing tab and select ArcToolbox.
2. In the ArcToolBox, click on “Conversion Tools”, then “From Raster” and double-click the “Raster to Polygon” tool.
3. In the Raster to Polygon window:
 - a. Select the reclassified bathymetry layer as the Input raster.
 - b. For Field, the drop-down should automatically display the VALUE field.
 - c. For Output polygon features, click on the folder icon and navigate to where the converted bathymetry layer should be saved and name it appropriately (e.g. BISC_LIDAR_reclass_vector.shp).
 - d. Click “OK.”
4. The new classified bathymetry layer will appear as a vector polygon shapefile in the Table of Contents, under the Source view.
5. In the Table of Contents, right click the new classified bathymetry shapefile and select “Open Attribute Table.”
6. In the attribute table, click on the Table Options icon and select “Add Field.”
7. For the Add Field window:
 - a. Type in “Depth_Stra” for the Name text box.
 - b. For Type, select “Text.”
 - c. For Field Properties, make the Length “20.”
 - d. Click the OK button.
8. Back in the attribute table, click on the Table Options icon and select “Select by Attributes...”
9. In the Select by Attributes window that appears:
 - a. Ensure that Method is set to “Create a new selection.”

- b. Double-click the gridcode field found in the input box beneath “Method.” The field should now appear in the text box at the bottom of the Select by Attributes window.
 - c. Double-click on the “=” button.
 - d. Type in “1.” The resulting Select by Attributes code in the text box at the bottom of the window should read something like: “gridcode” = 1.
- 10. Click the Apply button at the bottom of the Select by Attributes window. The selection query will now run.
- 11. In the attribute table (with the selected records highlighted in blue), right click on the new Depth_Stra field and select “Field Calculator.”
- 12. For the Field Calculator window:
 - a. Select VB Script for the Parser option.
 - b. For the Type option, select String.
 - c. For the “Depth_Stra =” text box below, type in “> 15 meters”.
 - d. Click OK. The Field Calculator tool will run and the selected features will now have the Depth_Stra field populated.
- 13. Go back in the attribute table, click on the Table Options icon and select “Select by Attributes...”
- 14. In the Select by Attributes window that appears:
 - a. Ensure that Method is set to “Create a new selection.”
 - b. Double-click the gridcode field found in the input box beneath “Method.” The field should now appear in the text box at the bottom of the Select by Attributes window.
 - c. Double-click on the “=” button.
 - d. Type in “2.” The resulting Select by Attributes code in the text box at the bottom of the window should read something like: “gridcode” = 2.
- 15. Click the Apply button at the bottom of the Select by Attributes window. The selection query will now run.
- 16. In the attribute table (with the selected records highlighted in blue), right click on the new Depth_Stra field and select “Field Calculator.”
- 17. For the Field Calculator window:
 - a. Select VB Script for the Parser option.

- b. For the Type option, select String.
 - c. For the “Depth_Stra =” text box below, type in “5 - 15 meters”.
 - d. Click OK. The Field Calculator tool will run and the selected features will now have the Depth_Stra field populated.
- 18. Go back in the attribute table, click on the Table Options icon and select “Select by Attributes...”
- 19. In the Select by Attributes window that appears:
 - a. Ensure that Method is set to “Create a new selection.”
 - b. Double-click the gridcode field found in the input box beneath “Method.” The field should now appear in the text box at the bottom of the Select by Attributes window.
 - c. Double-click on the “=” button.
 - d. Type in “3.” The resulting Select by Attributes code in the text box at the bottom of the window should read something like: “gridcode” = 3.
- 20. Click the Apply button at the bottom of the Select by Attributes window. The selection query will now run.
- 21. In the attribute table (with the selected records highlighted in blue), right click on the new Depth_Stra field and select “Field Calculator.”
- 22. For the Field Calculator window:
 - a. Select VB Script for the Parser option.
 - b. For the Type option, select String.
 - c. For the “Depth_Stra =” text box below, type in “< 5 meters”.
 - d. Click OK. The Field Calculator tool will run and the selected features will now have the Depth_Stra field populated.

Dissolve the Bathymetry Vector Polygon Shapefile

The dissolve tool is utilized to aggregate the polygon’s features based on the depth strata field (Depth_Stra).

1. In ArcMap, click on the Geoprocessing tab and select Dissolve.
2. In the Dissolve window that appears:
 - a. Select the classified bathymetry shapefile as the Input Features.

- b. For the Output Feature Class, click on the folder icon and navigate to where the dissolved shapefile should be saved and name it appropriately (e.g. BISC_LIDAR_reclass_vector_dissolve.shp).
 - c. For the Dissolve_Field(s) option, select the Depth_Stra field.
 - d. Click “OK.”
- 3. The new bathymetry strata shapefile will now appear in the Table of Contents pane.

Use the ArcMap Intersect Tool to Merge the Seagrass and Bathymetry Strata Shapefiles

This procedure will create a layer that intersects the dissolved offshore seagrass shapefile with the bathymetry strata shapefile. The resulting shapefile will show seagrass features categorized by depth strata.

- 1. In ArcMap, click on the Geoprocessing menu and select the Intersect tool.
- 2. In the Intersect tool window that opens:
 - a. For Input features, add the dissolved offshore seagrass shapefile and the bathymetry strata shapefile.
 - b. For Output Feature Class, navigate to where the new intersect layer should be saved and name it appropriately (e.g. BISC_offshore_seagrass_LIDAR_intersect.shp).
 - c. For the rest of the input options, leave the defaults.
 - d. Click the OK button to create the new intersected shapefile.
- 3. The new merged strata shapefile will appear in the Table of Contents.
- 4. In the Table of Contents, right click the new merged strata shapefile and select “Open Attribute Table.”
- 5. In the attribute table, click on the Table Options icon and select “Add Field.”
- 6. For the Add Field window:
 - a. Type in “Area_ha” for the Name text box.
 - b. For Type, select “Double.”
 - c. Click the OK button.
- 7. In the attribute table, right click on the new Area_ha field and select “Calculate Geometry.” Note, this field column should be empty as it was just created.
- 8. For the Calculate Geometry window:

- a. Make sure that Property is set to Area.
 - b. For Coordinate System select the option “Use coordinate system of the data source.”
 - c. Set the Units to “Hectares [ha].”
 - d. Click the OK button.
9. The Area_ha field in the attribute table will now have areas (in hectares) calculated for each feature/record in the final strata shapefile.

***Note:** It may be necessary to repeat these steps for any additional seagrass shapefiles. As mentioned in the previous sections, each additional seagrass shapefile used should result in a corresponding dissolved seagrass shapefile, which will then be intersected by the classified bathymetry shapefile to create a final strata shapefile.*

Literature Cited

South Florida/Caribbean Network (SFCN). 2022. Stratification—Version 1.1. South Florida/Caribbean Network Standard Operating Procedure NPS/SFCN/SOP—SEA02. South Florida/Caribbean Network, Palmetto Bay, Florida. Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2285060> (last accessed February 2022).