Substrate classification of FRAM Trawl Survey Towlines

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22 June 2021

Information and Process Steps:

1. Bizzarro & Yoklavich Substrate Data (filename = wc\_sub\_hms)
   1. Downloaded [here](https://drive.google.com/drive/folders/1B_ta6aG09rirqmiUbmhgHNQ3lrSJn66q?usp=sharing_eip&ts=60a03930) on 1 June 2021
   2. File was Esri grid format, floating raster attribute. UTM zone 10N CRS, 25m grid cell resolution
   3. Converted Esri grid file raster attribute from floating to integer using ArcGIS (v.10.1) and rebuilt VAT
   4. Resulting grid was exported as geotiff and shared with Owen Liu on 21 June 2021.
   5. Resulting grid converted to vector (polygon) format for overlay with FRAM Trawl Survey towline geospatial data layer
2. FRAM Trawl Survey Data
   1. Downloaded haul transects on 23Apr2021 [here](https://www.webapps.nwfsc.noaa.gov/data/map) using the following [API](https://www.webapps.nwfsc.noaa.gov/data/api/v1/source/trawl.operation_haul_fact/selection.csv?variables=trawl_id,date_yyyymmdd,vessel_start_latitude_dd,vessel_start_longitude_dd,vessel_end_latitude_dd,vessel_end_longitude_dd)
   2. Created trawl set lines (line features) in QGIS
      1. Using only records with full geocoords (exclude records with identical begin/ends), attributes of “haul\_characteristics\_line\_features\_raw\_042621.txt” are:
         1. trawl\_id
         2. ves\_end\_lat
         3. ves\_end\_lon
         4. ves\_start\_lat
         5. ves\_start\_lon
      2. Created text file (haul\_characteristics\_4linefeatures\_042621.txt) from aforementioned file that has twice as many rows, but adds a categorical attribute for the start and end of each towline with this format:

Trawl\_ID | vessel\_lat | vessel\_lon | Start\_end

* + 1. In the Start\_end attribute, 1 = BegLat/lon and 2 = End\_Lat/Lon
    2. Loaded text file into QGIS using “Add Delimited Text Layer” and create points layer
    3. Used the Processing Toolbox -> QGIS geoalgorithms -> Vector creation tools -> Points to path
       1. Input point layer = haul\_characteristics\_4linefeatures\_042621
       2. Group field = Trawl\_ID
       3. Order field = Start\_end

1. Extract (overlay) trawl survey towlines on vector substrate data
   1. Used identity tool in ArcGIS to “cut” towline segments at intersections with substrate polygons
   2. Overlay process calculated length of each towline traversing given substrate type
   3. Output table (tab delimited) named “Haul line substrate classification based on Bizzarro & Yoklavich.txt” has following attributes:
      1. TRAWL\_ID
      2. Length\_of\_towline\_outside\_substrate\_domain\_(m)
      3. Length\_of\_towline\_traversing\_hard\_substrate\_(m)
      4. Length\_of\_towline\_traversing\_mixed\_substrate\_(m)
      5. Length\_of\_towline\_traversing\_soft\_substrate\_(m)
      6. Total\_length\_of\_towline\_(m)
      7. Proportion\_outside\_substrate\_domain
      8. Proportion\_hard
      9. Proportion\_mixed
      10. Proportion\_soft