

Using GIS to Support Marine Protected Area Delineation in Western Whatcom County, WA

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Pre-processing information

Data for this project was acquired by various means and from a number of sources. The data on which this project hinges was acquired from NOAA Geodas. The data also came to me in various formats ranging from Arc Shapefiles to .xyz point data all of which was converted into ArcGIS usable format and incorporated into a personal geodatabase. Throughout this process I have encountered several problems including the conversion of the .xyz data to a usable format and projection issues. The following is a simplified data dictionary of data used and how it was created/modified.

- bathymetry – Created from .xyz table downloaded from NOAA Geodas server. This process was long and convoluted and is covered in detail in the Methods section.
- Survey_Points – Data personally acquired during rockfish survey in February. Garmin GPS Map 60c used for collection then converted to shapefile following GPS to ArcGIS procedure.
- wcbndy – File removed from J: drive, no conversion necessary.
- Whatcom_copper – Data acquired from Washington Department of Fish and Wildlife collected during a 1999 Rockfish Survey. Wayne Palsson is most likely the contact on this, provide courtesy of David Shull.
- Whatcom_county – File removed from J: drive, no conversion necessary.
- Whatcom_puget – Data acquired from Washington Department of Fish and Wildlife collected during a 1999 Rockfish Survey. Wayne Palsson is most likely the contact on this, provide courtesy of David Shull.
- Whatcom_rfunid – Data acquired from Washington Department of Fish and Wildlife collected during a 1999 Rockfish Survey. Wayne Palsson is most likely the contact

on this, provide courtesy of David Shull. Note – this data will not likely be used in the analysis.

- Whatcom_rock - Data acquired from Washington Department of Fish and Wildlife collected during a 1999 Rockfish Survey. Wayne Palsson is most likely the contact on this, provide courtesy of David Shull.
- Whatcomcounty - File removed from J: drive, no conversion necessary.

Study Area

Initially my study area was going to be all of the marine waters of Whatcom county but that goal is proving unrealistic based on the amount of time spent acquiring and converting the .xyz data. Regardless the focus area of this project will be the area directly west and south of Lummi Island, an area that contains both Lummi and Viti rocks (although Viti rocks are not within Whatcom County). The study area is unique because it makes up a large portion of the 0.6 km² of rocky-reef dominant substrate found within the Gulf-Bellingham area (Pacunski and Palsson 1998). This study area was specifically chosen because of the available data and it is also the location of the ROV survey conducted by my team during February 2007. Although this study areas is limited, expansion of the model to include other areas may be done time permitting.

Methods

Since I'm unsure how long each stage of my analysis will take, I've set up a series of milestones that will allow me to manage my time and effort. Also to monitor my success as well as allow me to make future recommendations for study should I not finish the project in the allotted time.

Milestone 1: Data Acquisition

I've already completed this stage of my methods. I searched out and found the data necessary to perform my analysis. This stage is highlighted in the pre-processing information section.

Milestone 2: Data Transformation

Although most of the data used for this analysis came is as a usable ArcGIS format, the bathymetry data on which this project hinged did not. After spending 30 minutes on the phone with the tech support

from NOAA, we were able to come up with a way to convert .xyz data into an ArcGIS format. The procedures are as follows;

- Convert file to .txt
- Open with Excel
- Add X,Y,Z to header of file
- Save file as .csv (Comma delimited)
- Open ArcCatalog and navigate to working folder
- Right Click – Export to Geodatabase (single)

- Right Click on .dbf – Export XY table
- This converts the data into a useable .shp

This shapefile is then easily converted into raster format by using Interpolation function of the Spatial Analyst Toolbar available in ArcGIS 9.1. Kriging is the preferred method of Interpolation because it is able to interpolate the value of a random field (e.g. the elevation Z of the landscape as a function of the geographic location) at an unobserved location from observations of its value at nearby locations.

This process of converting .xyz data to ArcGIS is quite tedious could easily be expedited using a Python Script. If multiple files are being converted it would be much easier to run a batch process for all the .xyz files than to individually create them. This will be the topic of my specialization, creating a Python Script to batch process .xyz files to .shp files.

Milestone 3: Modeling

This milestone is the bulk of the project and it includes several aspects of GIS. The majority of this project will be completed with Spatial Analyst toolbar in ArcGIS. The features utilized will likely be but not limited to the raster calculator, distance operations, slope, aspect, and hillshading functions. Each of these components is going to be used to examine rockfish habitat in the area. I also hope to incorporate the rocky features found by the WDFW into the model, by creating buffers around the points, using the buffer tool.

At this point I'm not entirely sure what path my project will follow, therefore a data flow diagram of the inputs and processes used in this model will not be created until after the model is completed.

Milestone 4: Validate modeling methods