

Project Title: Arctic Oil Spill Modeling

Sub Title: Development of an improved Alaskan shoreline for GNOME modeling

Students Involved: Tristan A. Goers

Mentors: Dr. Caixia Wang

Homeland Security Challenge:

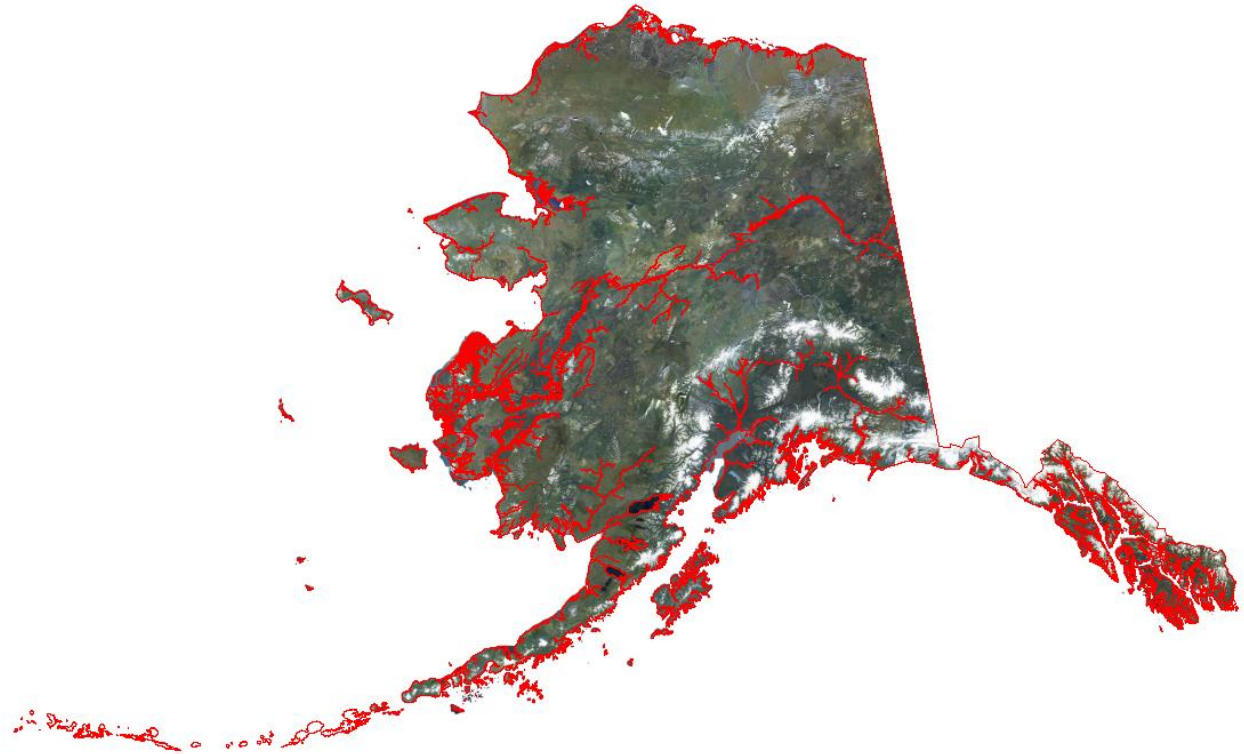
The United States Coast Guard relies on the GNOME oil spill model and NOAA in the event of an oil spill. NOAA's Office of Response and Restoration has a need for an Arctic-capable oil spill model. As part of that model, Alaskan shorelines are required that are best available and useable for GNOME modeling.

Approach / Methodology:

The work is developed based on the best available Alaska shoreline data that comes from many sources including NOAA CUSP, IFSAR, satellite imagery, and aerial photography. This vector data set represents coastal and major river shorelines that cover the entire state of Alaska and is in the geometry of polygons.

The vector shorelines were assessed for quality by comparing it with the most recent and readily available satellite imagery- SDMI SPOT 5 with spatial resolution of 2.5 meters. This imagery meets the 1:24,000 National Map Accuracy Standards. Topology of the shoreline polygons was checked, and no issues were found. Additionally, polygons were broken into smaller ones that adhere to natural geographic boundaries (primarily river estuary). As the GNOME model doesn't apply to interior scenarios, polygons are further reduced to contain inlands that are near the shorelines.

Preprocessed shorelines were simplified using the Bend Simplify algorithm. This method eliminates insignificant bends along the shorelines, thus simplifying the shoreline. Tolerances of .2km, 1km, 5km, and 25km were used. These tolerances were selected to conform to the standards set forth by the Global Self-consistent, Hierarchical, High-resolution Shorelines (GSHHS, now termed GSHHG).

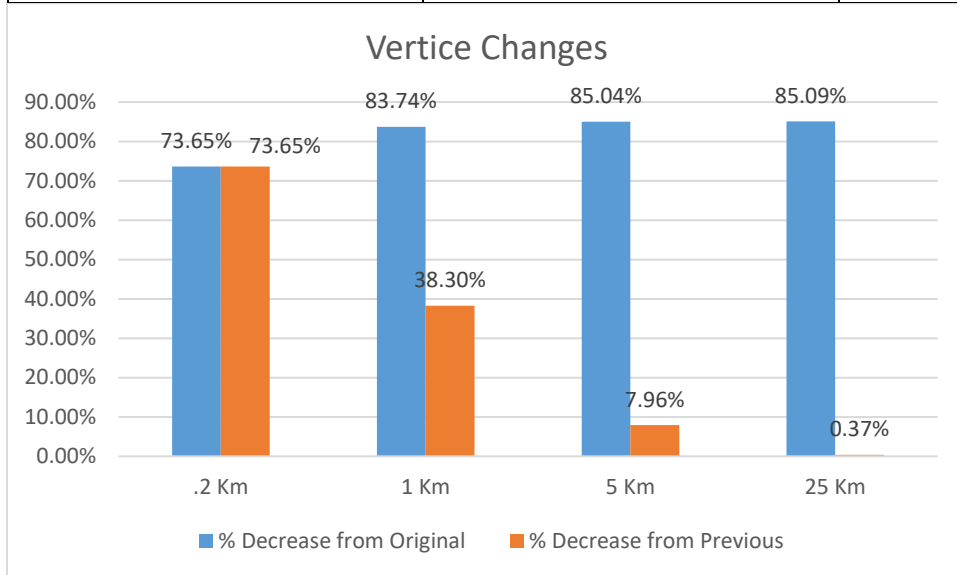


-  25 Kilometers
-  5 Kilometers
-  1 Kilometer
-  .2 Kilometers

Outcomes / Results:

The results were four shapefiles that represent four levels of simplifications. These data will be used as environmental inputs for the Arctic Oil Spill Model. The number of vertices were reduced for each tolerance as shown in the accompanying table.

Tolerance	% Decrease from Original	% Decrease from Previous
.2 Km	73.65%	73.65%
1 Km	83.74%	38.30%
5 Km	85.04%	7.96%
25 Km	85.09%	0.37%



Conclusion:

The resulted shoreline data are best available from a variety of sources as of the start of this project. Through this work, the data provide the best available shoreline information to be added to GNOME model. In addition, it offers five resolutions – from the finest to coarsest – to meet the needs when GNOME is used in different scenarios.

Acknowledgment:

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