Coast Guard Marine Environmental Response Mission

"Prevent, enforce, investigate, respond to, and to mitigate the threat, frequency, and consequences of oil discharges and hazardous substance releases into the navigable water of the United States." 

Quantitative Analysis

Impact Factor – ES Index

- Utilized NOAA’s Environmental Sensitivity Index (ESI) in OILMAP and ArcGIS
- Adds a semi-quantitative shoreline description to the OILMAP model
- Provides additional attribute information including ESI ranking (1-10, lower to highest sensitivity)
- Technique measures the movement of oil and shoreline sensitivity between scenarios
- Calculates the impact factor (mass of oil multiplied across grid for the shoreline) from the non-boomed scenarios to the boomed scenarios

Multiple-Criteria Analysis

Geospatial “Boomed” Scenarios

- OILMAP model runs simulated prevailing wind at varying wind strength for areas of interest
- Model runs with and without boom strategies were compared to determine the effectiveness of the oil boom placed in the Geographic Response Strategies scenarios
- Characteristics of oil spills with and without boom strategies
- Model runs were run in the OILMAP model to model potential spills for specific geographic zones
- Model runs with and without boom strategies were compared to determine the effectiveness of the oil boom placed in the Geographic Response Strategies scenarios

Mathematical Analysis

- Develops a methodology known as Technique for Order of Preference by Similarity to Ideal Solutions (TOPSIS)
- The grid cell values are multiplied by the mass of oil within that cell to assess impact
- Technique identifies the best and worst impact within each criteria across grid cells and normalizes them to 1-0, respectively, and all other values fall between them

OILMAP Scenarios

- Semi-Quantitative review of Delaware Basin
- Multi-Criteria Analysis for Buzzard’s Bay
- Multi-Criteria Analysis for Delaware Bay
- Multi-Criteria Analysis for Buzzard’s Bay
- Semi-Quantitative review of Buzzard’s Bay
- Submerged release associated with RUL/VIET

Current and Future Coast Guard Applications

New Capability for Federal On Scene Coordinator – Customizable for ACR
- Oil Spills in the Marine Environment
- Semi-Quantitative review of Delaware Basin
- Semi-Quantitative review of Delaware Basin
- Submerged release associated with RUL/VIET

Coast Guard Testimony

- The simulation run by the Coast Guard was in comparison to what occurred during the spill. The spill was estimated to be over 90% accurate. 
- “We are excited to have the USCIA involved in this project as it was a win-win for both units and a great way to test and technologies for a sector that is on the front lines of environmental response. The efforts of Coast Guard members and USCIA have done a great job in proving its efficiency.”

Acknowledgments

We would like to acknowledge the NOAA ERS, brush guard and USCG for their support and guidance during the project. We would like to acknowledge Mr. Michael Persun, LCDR Michael Persun, and LT Rebecca Prendergast for their consistent help and guidance.

References

- https://erma.noaa.gov/atlantic/erma.html#/layers=1+36242+35410+13763+16973+491+16023&x=-74.44265&y=35.67006&z=5.2&panel=layer
- Sector Delaware Bay – Townsends Inlet
- Sector Southeast New England
- Sector Delaware Bay
- Sector Southeast New England
- District 9 – Great Lakes
- District 9 – Great Lakes

05 Feedback – March 2, 2021

“I was excited to have the USCIA involved in this project as it was a win-win for both units and a great way to test and technologies for a sector that is on the front lines of environmental response. The efforts of Coast Guard members and USCIA have done a great job in proving its efficiency.”

- LCDR Michael Persun, Sector Delaware Bay