

The Applicability of Geographic Information Systems (GIS) and Remote Sensing in Identifying Polybrominated Diphenyl Ethers (PBDEs) sources using NOAA National Status & Trends Mussel Watch Program Data

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With an ongoing assessment of more than two decades, the Mussel Watch Program is one of the longest running contaminant monitoring programs in the coastal ocean with more than 20 years of data. Mussel Watch uses bivalves (Mussels, Oysters, and Zebra Mussels) as a means to assess water quality. The purpose of the program is geared towards assessing contaminants nationally. Utilizing formats such as Geographic Information Systems (GIS) and Remote Sensing data assessment, this project to identifies possible releasers of effluent waste into the major coastal watershed regions pertaining to ongoing research conducted within monitored mussel watch sites.

The categorization of possible contaminating locations is made available through the development of a large dataset. This dataset utilizes those derived from agencies such as the United States Environmental Protection Agency (U.S. EPA) and other state government databases such as the National Oceanic and Atmospheric Administration (NOAA), and the United States Geological Survey (USGS).

Utilizing platforms such as ESRI® ArcMap™ software, spatially referenced locations, via point data, vector data, line data, and polygons depicting points and sites of interest were created using latitude and longitude information. Points and areas of interest (AOI) were verified using Remote Sensing imagery. As such, Polybrominated Diphenyl Ethers (PBDEs) within observable mussel watch sites were assessed by NOAA's Center for Coastal Monitoring and Assessment (CCMA). Using this data, researchers are able to identify possible sources of contributors to the present contaminant.

In the attempt to identify possible contributors of the PBDEs contaminant, with NOAA's National Status & Trends Mussel Watch Program, a suite of software, including ESRI® ArcMap 9.3™ was utilized in assessing and compiling the acquired data. ArcGIS 9.3 was used as the primary platform in manipulating the dataset used in this project. Remote Sensing imagery acquired from ESRI™ database served as the primary base map within this project. Microsoft Office Excel was used to read, combined, sort and refine collected attribute data. Data was manipulated for desired results using the available Microsoft suite. Importantly the above remote sensing imagery was used to verify Points of Interest (POI).

Data collected from the United States Geological Survey (USGS), a national shapefile utilizing polygons depicting respective watershed region that encompasses NOAA mussel watch sites was created. The file was edited to show coastal watersheds reflective of Mussel Watch Program and observed coastal regions.

A national dataset which comprised information regarding active NPDES permits was collected from the U.S. EPA. This data set yielded information for 49 states, Washington D.C., and United States territory of Puerto Rico. NPDES information for Alaska was gathered on an individual basis. It should be noted that Alaska was the only state unidentified in the U.S. EPA dataset.

Wastewater treatment facilities were closely examined as contaminant release sites due to their potential to release untreated wastewater. Other major contributors of contaminated water source that were included within this study, included brownfields, superfund sites, power plants, hazardous waste sites, unidentified NPDES permitted facilities, and CSOs. The above facilities and sites were also identified from information provided by U.S. EPA. The data gathered was analyzed and checked for irregularities, corrected, and projected using World Geodetic System (WGS 1984), unless previously provided with a projection. This paper details the work of applying GIS and remote sensing techniques in identifying PBDE sources using NOAA National status and Trends Mussel Watch Program data.

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