Natural Resource Damages using Modeling of Physical Fates, Biological Injuries, and Compensatory Restoration

CLIENT:

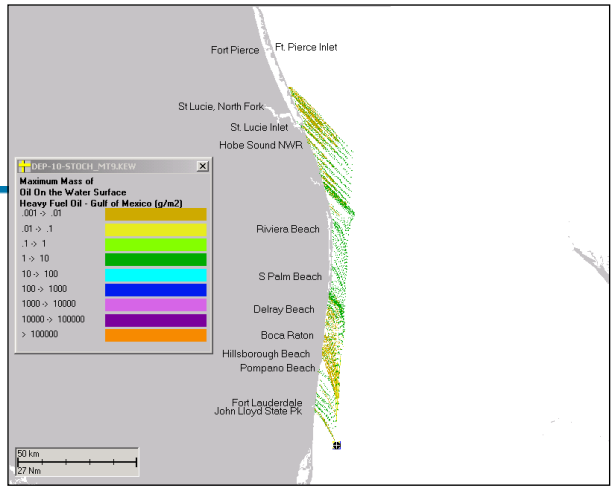
Florida Department of Environmental Protection

PROJECT #:

2001-138

PROJECT ELEMENTS:

- Natural Resource Damage Assessment (NRDA)
- Oil spill impact modeling using SIMAP
- Biological population modeling
- Field data collection



PROBLEM. PURPOSE.

Oil spill modeling was performed to assess natural resource damages (NRDA) for 23 spill cases for Florida Department of Environmental Protection (DEP), who submitted claims to the U.S. Coast Guard Oil Pollution Fund for restoration funding. For each spill case, the objectives were to provide (1) an assessment of the pathways and fate of the oil, and thus estimate exposure to the water surface, shoreline and other habitats, water column, and sediments; and (2) estimates of injuries to wildlife, aquatic organisms, and habitats that were used to scale compensatory restoration.

SCIENCE. SERVICES. SOLUTIONS.

There were four relatively large spill cases in the southeast region that were mystery spills presumably occurring offshore and where oil came ashore on the ocean-facing beaches. A few were moderately sized spills in bays and inlets and the remaining cases were small spills in the Intercoastal Waterway and associated canals, where only small areas of the water surface were oiled.

Bird injuries ranged from less than 1 bird (a probability) to 126 birds. There were sea turtle injuries estimated for the four mystery spill cases on the outer coast, ranging from 527 to 4,262 turtles oiled (almost entirely for hatchlings). No injuries to marine mammals (cetaceans or manatees) were predicted by the model or observed for any of the 23 cases. Fish and invertebrate injuries were negligible (zero) in nearly all cases. This is because of the small spill volumes and/or large dilution volumes (offshore cases), as well as fast weathering in the heat of Florida. The exception was for two cases in the Anclote River resulting in significant oiling of the entire lower river, and so significant impacts to wetlands, birds, fish and invertebrates. A spill in Sarasota Bay also impacted birds, fish and invertebrates to a significant extent.

Compensatory habitat restoration for all quantifiable habitat, wildlife, fish and invertebrate injuries was scaled using Habitat Equivalency Analysis (HEA) and wetland habitat creation as mitigation. For the northeast and southwest regions, saltmarsh is the dominant wetland in the areas impacted, and the scaling was based on this wetland type. In the southeast, mangrove habitat is dominant, but often saltmarsh is restored as a first step, and the mangroves naturally colonize after the wetland is created. Thus, the areas required were scaled as areas of mangrove habitat, the ultimate habitat, but likely saltmarsh plants would be planted over those areas. In the case of sea turtles, wetland restoration is not a direct method of increasing sea turtle production. As sea turtle populations are thought to be limited by the production of hatchlings, a direct method of increasing hatchling survivorship would be more reliable and cost-effective compensation. Thus, demographic population modeling was performed to estimate the number of hatchlings needed to compensate for the sea turtle injuries.

PRODUCTS. RESULTS.

Natural Resource Damage Assessment (NRDA) delivered to Florida Department of Environmental Protection