Improving Oil Spill Environmental Sensitivity Maps with ShoreZone Imagery, Examples from Prince William Sound
Erich R. Gundlach, Ph.D.  (ErichEti@cs.com)
E-Tech International Inc., 15 River Park Drive, New Paltz, NY 12561

Summary

Environmental Sensitivity Index (ESI) mapping proposes to provide accurate representation of an area's environmental vulnerability to oil spills. However, the maps often lack detail and accuracy. Today, large sections of the Alaskan coastline have been flown by the ShoreZone program which has captured high-resolution still photographs (able to resolve shoreline features of ~0.3 m and less) and lower resolution continuous video imaging taken from a low- and slow-flying helicopter. Both video and still photographs are readily available at (http://alaskafisheries.noaa.gov/habitat/shorezone/szintro.htm) specific location at any time. A voice-over recorded during the survey is also available, but not online.

Background

Historically, shorelines in the area were studied and characterized by aerial photographs. For ESI maps, one or two observers flying in an aircraft and photographing the shoreline were used. The first maps were drawn on paper and reproduced photographically, making their distribution costly and very limited. The first ESI maps lacked the resolution and photographic quality needed to properly characterize the shorelines. The distribution of these maps was limited (NOAA website: www.esihq.noaa.gov). In contrast, maps can be obtained at lower cost and detail using ShoreZone images (Geophysical Processing Systems). ShoreZone images enable the linkage of video digital imaging, high-resolution digital photographs, and a web-based reader which allows viewer to literally fly the shoreline and confirm shoreline type characterization. This review utilizes the digital files from “Prince William Sound, Alaska – July 2000, Environmental Sensitivity Index Maps, Digital Data re-release, April 2007”. Digital files were projected and compared in ArcMap.

Areas Reviewed – ESI Shoreline Types

Example 1: Northern Port Chalmers, Montague Island

Figure 1 shows the location of ShoreZone images in Alaska and a view of the new user interface showing the location of video and high-definition still photographs. Reference associated with the program are found at: www.PosterPresentations.com. This review uses the digital files from “Prince William Sound, Alaska – July 2000, Environmental Sensitivity Index Maps, Digital Data re-release, April 2007”.

Example 2: South Port Chalmers – Montague Island

Figure 3 compares the existing ESI shoreline characterization with that derived using ShoreZone Images. Examples supporting shoreline images are shown in Figure 6. Major changes to the existing ESI shoreline characterization from north to south include:

- Exposed tidal flat along north shore added.
- Mudflats (7A) are added to the northeast corner.
- Mudflats (7A) are located on the eastern side of the cove.
- Sheltered tidal flats (7A) are located north of the beach.
- Exposed tidal flat along north shore added.
- Exposed tidal flat along north shore added.

Example 3: Stockdale Harbor – Montague Island

Figure 7 shows shoreline types for Stockdale Harbor. The ShoreZone images show several sections of exposed and sheltered tidal flats (7 and 8A), as well as marshes (10A) which are not marked on the ESI maps (2007 re-release).

Example 4: Stockdale Harbor (cont.)

This example from Disk Island shows that the ShoreZone images enable a much more detailed and accurate characterization of the shoreline.

Conclusions

ShoreZone imagery offers an economical method of improving the quality of ESI shoreline characterization. The high-definition digital photographs offered in particular, are useful. The available digital video images are still able to differentiate shoreline features but not used in locating the specific site of the digital photograph which is in a location where digital photographs are not available. The ability to access these images from the web makes it possible to verify and document results previously available to shoreline mappers.