

## Geospatially-Enabled Geographic Response Plans

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### Abstract

Geographic Response Plans (GRPs) are designed to aid in the initial response (first 24 hours) to an oil or other hazardous material spill. Typically distributed in PDF format, GRPs contain sections on Protection/Collection Strategies, Shoreline Countermeasures, Sensitive Resource/Wildlife Areas, and Logistics. The existing PDF Format of these GRP's does not fully leverage geospatial information, separates position and attribute information, and makes it difficult to see geospatial relationships/interactions. By converting these GRPs from a PDF to a fully geospatially-enabled format, the information contained in the GRPs can be more fully leveraged for decision-making during a response situation. This presentation will highlight work done to date, provide some examples of geospatially-enabled GRPs, and discuss lessons learned and future work.

### Introduction

Geographic Response Plans (GRP's) are site-specific response plans for oil and other hazardous materials spills. They are used during the early stages of a spill, which lasts from the time a spill occurs until the Unified Command is operating and/or the spill has been contained and cleaned up. Generally this lasts no more than 24 hours. The response strategies contained in these GRP's are tailored to a specific beach, shore, or waterway, prioritizes resources to be protected, and allows for immediate and proper action. By using this plan, the first responders to a spill can avoid the initial confusion that generally accompanies any spill (Northwest Committee, 2005). Each GRP has two priorities:

"Identify sensitive natural, cultural or significant economic resources; and

Describe and prioritize response strategies." (Washington State Department of Ecology, 2007)

In order to meet these requirements, each GRP is divided into several well defined sections; detailed site description, reference maps, protection and collection strategies, shoreline countermeasures, information on sensitive resources and wildlife, and logistical information.

GRP's are typically developed by the responsible Regional Response Team through collaboration of the Environmental Protection Agency (EPA), U.S. Coast Guard (USCG), state environmental agencies, and other interested parties (shipping and fishing industry, native American tribes). There are 13 Regional Response Teams that have been established by the EPA that are responsible for the planning, training, and coordinated response to an environmental mishap. GRP's are typically distributed via hardcopy or Adobe Acrobat pdf documents.

### The Need for "Geospatially Enabling" GRP's

There are several weaknesses in the current form and format of these GRP's. First, since the spatial information is in the form of hardcopy maps in several separate sections, it is very difficult to see the geospatial relationships/interactions between the protection/collection strategies, shoreline countermeasures, and sensitive resources/wildlife. Response personnel are forced to look at the several maps and attempt to integrate/correlate the spatial relationships visually. This makes it difficult to examine relationships such as shoreline countermeasures and the location of logistical materials needed to implement these countermeasures. Second, the spatial location and non-spatial characteristic (attribute) information are separated into a series of maps and data tables (Figures 1 and 2). As such, response personnel again have to visually connect/link the non-spatial information in the data tables to their spatial location indicated on the map. This makes it difficult, for example, to determine the length and type of boom to be deployed at a location indicated on the protection/collection strategies map. Finally, the logistics section contains contact information for equipment caches, air support, access points/boat ramps,

and staging areas, but no information on the location of these assets. Therefore, it is difficult for response personnel to quickly determine the closest available asset during a response.

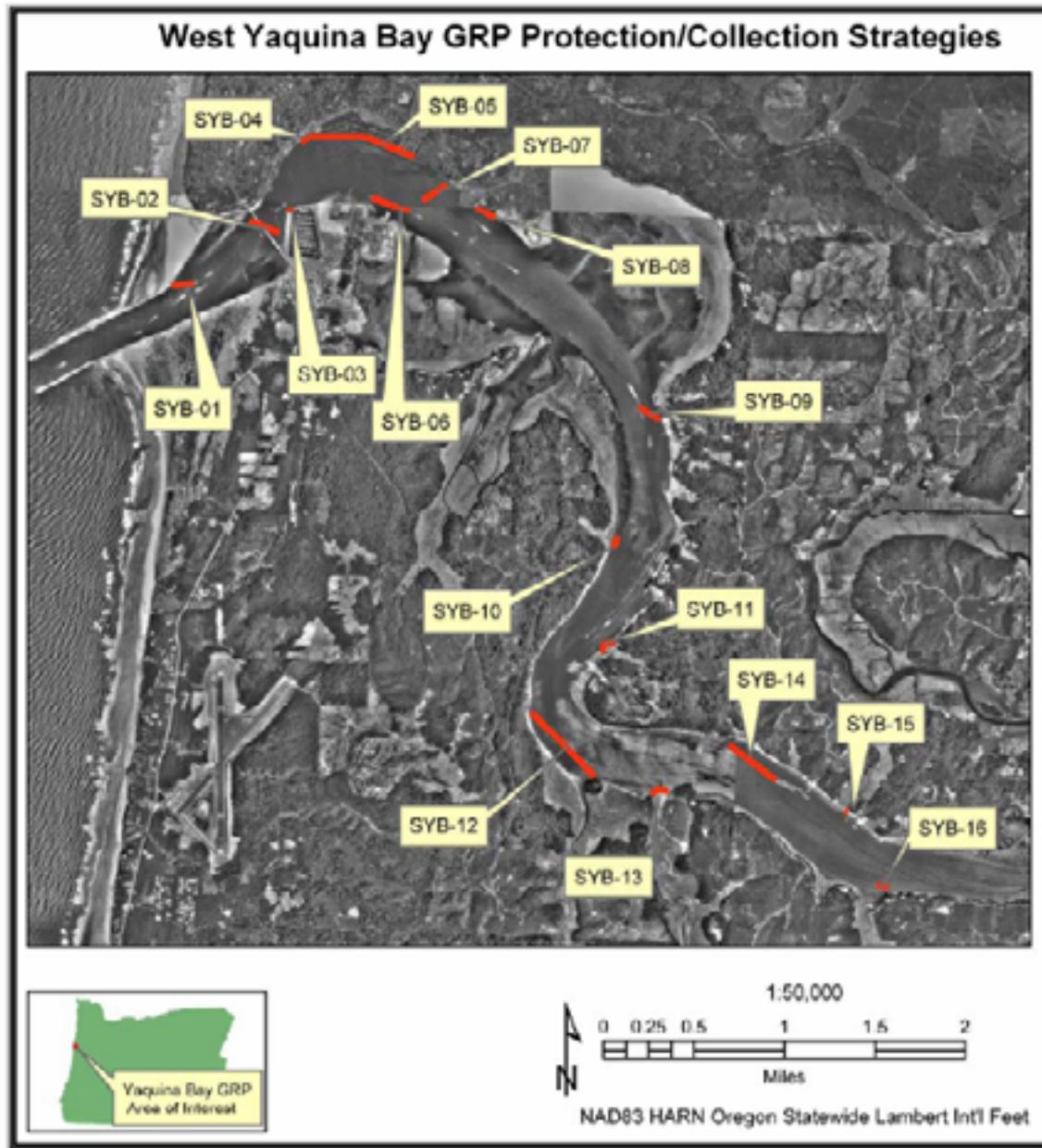


Figure 1. Protection/Collection Strategies Map from Yaquina Bay GRP (Northwest Committee, 2005)

Table 4-1. West Yaquina Bay Protection Collection Strategies Information

Strategy Number	Status	Location	Response Strategy	Length & Type of Boom	Strategy Implementation /Feasibility	Staging Area	Site Access	Resources Protected & comments
SYB-1	Field tested 7/5/2005 Strategy changed	Entrance to Yaquina Bay - N Entrance breakwater jetty 44° 37.1' N 124° 04.07' W	Deflection to S side of entrance for shoreline collection on W side of Marina Jetty.	700' hard	Anchor boom to jetty at [S] point where breakwater jetty begins angling to NE. Boom should extend out to secured to Green buoy #7.	South Beach Marina	By boat from marina or USCG Station. By land from State park.	Yaquina Bay
SYB-2	Field tested 7/5/2005 Strategy changed	Entrance to Yaquina Bay - S Bridge Pier pilings to South Beach Marina W Jetty. 44° 37.52' N 124° 03.65' W	Deflection for shoreline recovery on sand beach	900' hard	Deploy boom on angle from anchoring point on Western most pile protecting S pier of bridge, through fish pier, to anchoring point 1% way down W side of W Marina Jetty. Use fish pier as center anchoring point. Lay any excess boom less than one section along jetty riprap.	South Beach Marina	By boat.	Yaquina Bay
SYB-3	Field Visit 7/5/2005. Was not tested due to marina traffic	South Beach Marina 44° 37.45' N 124° 03.15' W	Protection by Encapsulation	400' hard	Boom from west entrance jetty to east entrance jetty to encapsulate marina.	South Beach Marina	By boat.	Economic & recreational
SYB-4	Field visit 7/5/2005 Replaces SYB-33	Newport Shrimp 44° 37.77' N 124° 03.18' W	Protection	500'	Encapsulate Newport Shrimp and Undersea Gardens.	Newport	Boom should be delivered to site by boat. Water access from shore side is limited.	Economic
SYB-5	Field test 7/5/2005 Replaces SYB-32	Embarcadero 44° 37.72' N 124° 02.42' W To 44° 37.83' N 124° 03.38' W	Protection	3,500'	Deploy 3,500' of boom from an shore-side point E. of Dock E and extending to a shore-side point just E. of Newport Shrimp Plant. Boom should be deployed in overlapping legs of 500-600'. This configuration will allow egress/ingress gates when oil conditions allow for boat movements in and out of harbor.	Newport	Boom can be delivered to site by either truck or boat. Boat will be required to anchor boom in channel.	Economic

Figure 2. Non-Spatial Information associated with Protection/Collection Strategies for Yaquina Bay shown in Figure 1 (Northwest Committee, 2005)

### “Geospatially-Enabled” GRP’s

These GRP’s can be made more effective during a response if all the information contained in the separate sections of the hardcopy GRP were converted to a digital format and incorporated into a geographic information system (GIS). In this format, the reference maps, protection and collection strategies, shoreline countermeasures, sensitive resources and wildlife, and logistical sections would be represented as different thematic layers in the GIS. Spatial relationships/interactions can now be quickly determined by displaying the layers of interest/concern in the same geospatial display to examine gaps, overlaps, and other spatial relationships. In addition, since the location and non-spatial attribute (characteristic) information are combined in any GIS display, response personnel can quickly determine what type of boom has been recommended to be deployed at a given location (Figures 3 and 4), or what type of wildlife is in a sensitive area and the time of year they are actually present in that area. Finally, position information for all logistics assets was determined so that these assets can be displayed and queried.

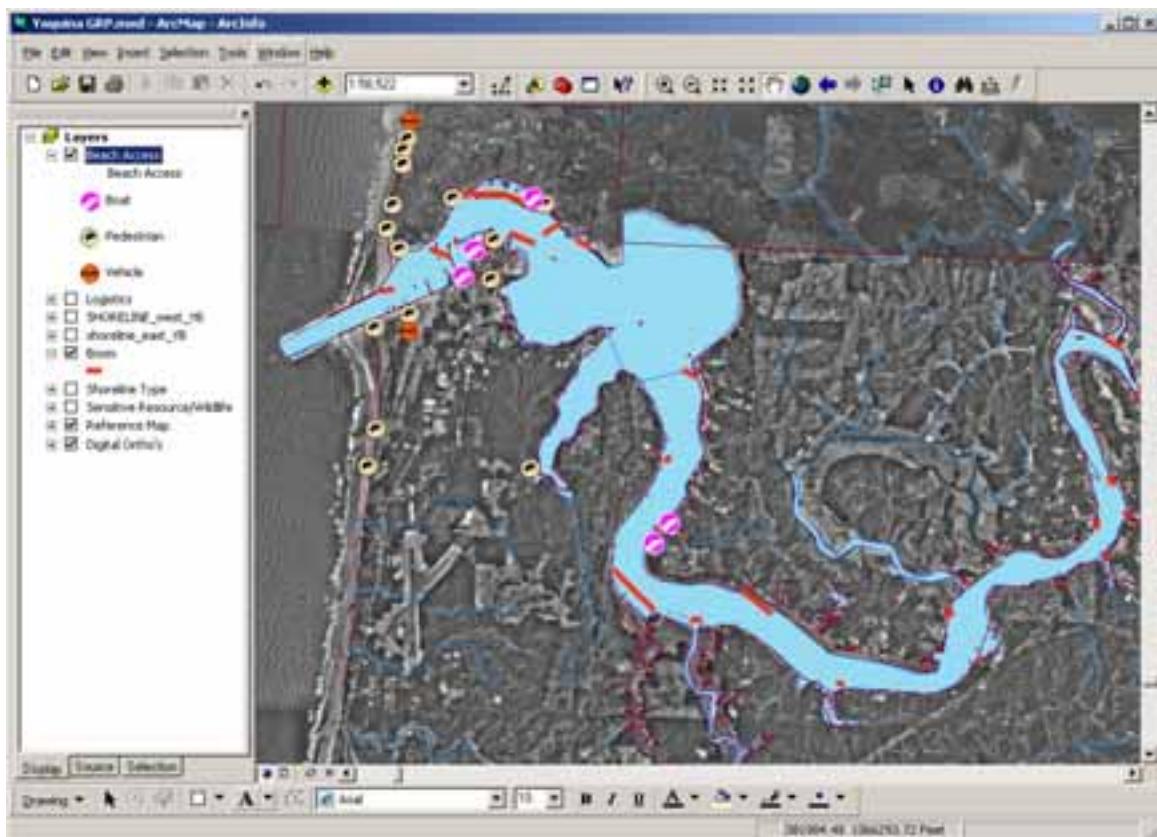


Figure 3. GIS Display of Protection/Collection Strategies for Yaquina Bay with Access Points.



Figure 4. Non-Spatial Attribute Information associated with Strategy Number SY-12 displayed within GIS using Identify Tool.

## Conclusions

“Geospatially-Enabled” GRP’s have been developed for Yaquina and Coos Bay along the Oregon Coast. Plans are to continue development of these plans for the rest of the Oregon Coast. In order to expand this effort further, the various Regional Response Teams must collaborate on the development of a GRP Data Model.

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