OIL SPILL RESPONSE PLANNING ON THE COLUMBIA RIVER ESTUARY

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ABSTRACT: The Columbia River Estuary lies along the Washington-Oregon state boundary on the west coast of the United States. The entire area is environmentally very sensitive with numerous large, shallow bays, exposed mud flats, wetland areas, and central channels having maximum currents of three to four knots. These features make the area very difficult to protect from an oil spill. Spill response is further complicated because of the many different state, federal, and local jurisdictions with mandated responsibilities in oil spill response and environmental protection.

Under the leadership of the U.S. Coast Guard Marine Safety Office in Portland, Oregon, a steering group was established to guide the development of a response plan for the Columbia River Estuary. A concerted effort was made to include representatives from response organizations, natural resource agencies, and resource users from federal, state, and local governments, and commercial sectors in the planning process. The first draft of an operational response plan was completed the summer of 1990 when the need to develop specific booming strategies for high-priority areas was identified as an after-action item from an earlier oil spill tabletop exercise. The initial planning effort centered on the more industrialized part of the Columbia River in the vicinity of Portland. Eight priority areas for protection were surveyed and photographed. A format for site-specific response action plans was developed to include information on shoreline type and sensitivity; likely oil impact; cleanup logistics; road access, boat launch, boom deployment; boom strategy; and support logistics.

In the summer of 1991, a decision was made to concentrate planning efforts on the lower portion of the Columbia River. The Columbia River Estuary lies along the Washington-Oregon state boundary. The entire area is environmentally very sensitive with numerous large shallow bays, exposed mud flats, wetland areas, and central channels having maximum currents of three to four knots. These features make the area very difficult to protect from an oil spill. Spill response is further complicated because of the many different state, federal, and local jurisdictions with mandated responsibilities in oil spill response and environmental protection.

Key to the success of the plan is ensuring that all the groups responding to an event participate in the planning process together. This process has worked well for the Columbia River Estuary and will serve as a model for response planning for other environmentally sensitive areas along the Columbia River and coastal areas of Washington and Oregon.

Development of the response action plan

On March 3, 1992, about 65 people from local communities, resource agencies of the states of Washington and Oregon, and federal response and planning agencies met in a three-day workshop at Oregon National Guard’s Camp Rilea on the northern Oregon coast to facilitate planning for response to oil spills in the Columbia River Estuary. The area under consideration for this plan was to go from Puget Island (river mile 45) to the mouth of the Columbia River. Although the workshop lasted only three days, it was painstakingly planned to ensure its success as a valuable contingency planning tool and model to be followed for other areas in Oregon and Washington. The workshop was divided into three distinct parts, each on a different day and each designed to produce a different section of the planning puzzle.

Day one of the workshop was dedicated to panels of experts speaking about specific issues in the estuary. The first panel focused on the
physical description of the region. Representatives from NOAA, the University of Washington, and local pilotage and barge companies provided information on circulation patterns, tidal influences, trajectory modeling, typical winds and weather, pilotage problems due to currents, and specific periods of the year when weather or currents pose particular challenges to safe navigation of the channel.

The second panel, made up of representatives from CREST, USFWS, Oregon Department of Fish and Wildlife (ODFW), Washington Department of Wildlife (WDW), and Washington Department of Fisheries (WDF) provided an overview of the environmental, cultural, and recreational activities of the area. They identified the types of resources that might be impacted by the oil and included seasonal variations with respect to life-stages present and specific behavior that could increase sensitivity to oil impact or impact from cleanup activities.

The Coast Guard led the third panel and was accompanied by experts from a local response contractor and NOAA. This panel provided an overview of petroleum transport in the region by summarizing specific products, volumes, and seasonal patterns of transport. The panel discussed state-of-the-art open water and shoreline cleanup technologies, including criteria for evaluating the effectiveness of a technology relative to adverse environmental impact associated with the technology. Technologies suitable for shallow-water estuarine and midstream environments were emphasized.

The task of developing a comprehensive response action plan began at the conclusion of the expert panels. A detailed process based upon five major steps was employed to identify and prioritize resources for protective measures and develop a strategy to implement these measures. The Washington Department of Ecology has undertaken the task of documenting the information gathered in this and other regional workshops in a series of notebooks as part of the Washington State Columbia River Sensitive Areas Mapping Project.

**Step 1: Identification.** The objective was to identify all natural resource areas vulnerable to the effects of oil spills in the designated area.

Participants involved in this initial objective were all either federal or state resource agencies. Using information presented by the expert panels from the previous day, augmented by discussion and clarification by participants familiar with the area, agency representatives identified all the culturally, environmentally, historically, recreationally, or archaeologically sensitive areas in the region. Once identified, the reason for their sensitivity was noted and the areas were marked on a series of charts representing the entire estuary. Information collected during this process is documented in the WDOE workshop notebook.

**Step 2: Prioritization.** The objective was to prioritize the identified sensitive areas.

The agencies involved in the identification process then addressed the task of prioritizing those areas just identified. Each agency was directed to focus on determining priorities based upon the best overall solution for the estuary. Criteria used included likelihood of oil impacting a resource, ability of resource to recover if impacted, potential for significant population effects, risk to threatened or endangered species, and the feasibility of protection. The selection of a facilitator, in this case a WDOE representative, to keep the discussions focused was crucial to the timely completion of this step. Each agency identified its own priority areas. Using the prioritization criteria, the agency representatives negotiated with each other on a particular area’s importance.

![Figure 1. Columbia River Estuary Response Plan. This map defines the geographical boundaries of the Columbia River Estuary Response Plan and shows the location of priority protection sites and oil collection sites. Logistical support areas including proposed command posts, equipment cache locations, interim oily waste storage areas, and communications high site are also shown.](http://meridian.allenpress.com/iosc/article-pdf/1993/1/63/2357506/2169-3358-1993-1-63.pdf)
Step 3: Response strategy development. The objective was to develop response strategies to best protect prioritized areas.

Day three of the workshop focused on Coast Guard Pacific Strike Team, NOAA, and private response contractors developing a strategy for each prioritized area while keeping the concerns of the entire estuarine region in mind. The facilitator for this task was the NOAA Scientific Support Coordinator. Using maps and written information developed by the resource trustees, aerial photographs, and personal spill response experience, the response group familiarized themselves with the specific area and the resources to be protected. The group developed protection strategies for each area identified based upon their knowledge of river currents, access by both land and water, topography, cleanup technology, and size of area to be protected. The feasibility of protection strategies for resources in the wide bays of the lower estuary was considered very low due to the shallow mud banks and large areas that needed protection. The primary protection for these resources would be to collect the oil before it reached the area. Since shallow water restricts the effectiveness of open-water skimmers, the response group identified natural oil collection sites along the shoreline based on historical information of previous spills in the area and locations where debris most commonly collects. Specific strategies to contain and recover oil from these areas were developed. A summary of the protection and collection strategies was printed on the back of the map showing the prioritized areas. (See Appendix for strategies suggested for areas with the top priorities.)

Step 4: Logistics. The objective was to develop a logistical data base and memoranda of agreement where required to streamline response operations.

A separate roundtable discussion was held on day three of the workshop to address the varied logistics issues prevalent in any spill response effort, such as command post location, storage and equipment cache locations, staging areas, helicopter support, access points, communications, and safe havens for the damaged vessels. Representatives from pertinent regulatory agencies, cleanup contractors, consultants, salvage contractors, and the Oregon National Guard participated in the discussion.

The initial, and potentially most important, topic was selection of predesignated command posts from which to coordinate spill response operations. The more important selection criteria included sufficient working space for personnel responding; parking; availability of separate press area; site security; access by air, boat, and road; availability of communications and administrative support services; and availability of housing and messing facilities for personnel. Camp Rilea was chosen as the primary command post for any major oil spill (greater than 100,000 gallons) in the Columbia River Estuary due to its large size, enhanced communications capability, and in-place support services. A summary of the pertinent selection criteria for Camp Rilea is shown in Table 1. Secondary pre-designated command post sites were identified for more localized spills or as secondary operational centers in a major spill. These sites, shown in Figure 1, are located at Ilwaco Harbor, Port of Astoria, Tongue Point, and Clatskanie. Where appropriate, memoranda of agreement are under development to streamline the establishment of command posts at the time of the spill. The remaining logistics issues mentioned above are being addressed in an ongoing process by different members of the CRCPC working directly with the local communities along the Columbia River Estuary.

Step 5: Field verification. The objective was to verify in the field and evaluate feasibility of protection strategies.

Field verification is central to the development of practical response strategies. Key representatives of the groups involved in the workshop participated in a series of field verification trips by land, water, and air. Videos were taken during overflights to familiarize other participants with the area and to facilitate response-strategy planning. For agency representatives not familiar with response operations, these trips reinforced awareness of the magnitude of impact that could result from a major release, as well as the difficulty of protecting such a large, complex region. Several channels, thought earlier to be ideal collection sites, were discovered to be impractical due to rapid currents or lack of access; and other areas overlooked during the workshop were identified as potential sites for recovery.

To obtain a wider range of opinion on the response strategies developed, a half-day workshop was held at the Coast Guard Marine Safety Office attended by a variety of response contractors from local and neighboring regions. Participants were asked to examine each site and rate the feasibility of the proposed protection or collection strategies as having a better than 25 percent, 50 percent, or 75 percent or better chance of success.

A feasibility rating was developed for response strategies for each protection area. This information was presented to the resource agencies as amplifying information to help them prioritize sites for the final response plan.

Step 6: Public review and incorporation in area contingency plans. The objective was to incorporate response action plans into an Area Contingency Plan.

A draft of the Response Action Plan for the Columbia River Estuary is currently being reviewed by a wider audience within the agencies and groups who participated in its development. Once comments and issues arising out of this review have been addressed, the plan will be sent to the Area Response Committee as a tool in preparing the Area

Table 1. Sample survey for pre-designated command post,

<table>
<thead>
<tr>
<th>Admin. space press access parking</th>
<th>Admin. support services</th>
<th>Site security</th>
<th>Air access</th>
<th>Communications</th>
<th>Personnel support</th>
<th>Formal MOA required?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many rooms of various sizes</td>
<td>One Xerox machine</td>
<td>Guarded facility entrance</td>
<td>Helo pad with traffic control, can handle 8 helos</td>
<td>10 trunk lines, 200 phone sets, 60 dedicated numbers</td>
<td>Barracks: 800 person capacity</td>
<td>Formal MOA required?</td>
</tr>
<tr>
<td>Auditorium</td>
<td>Barracks with kitchens, showers, restrooms</td>
<td>Coast Guard Air Station in Warrenton</td>
<td>Cellular coverage in Sept. 1992</td>
<td></td>
<td>Wood huts: 600 person capacity</td>
<td></td>
</tr>
<tr>
<td>Ample furniture and supplies</td>
<td>No trailer connections</td>
<td>Coast Guard Air Station in Warrenton</td>
<td>Communications trailer with radios</td>
<td></td>
<td>Cafeteria style kitchens for 800 persons</td>
<td></td>
</tr>
<tr>
<td>Numerous paved areas for parking vehicles/trailers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separate spaces available for press</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

1. Data collected for location at Camp Rilea.
Conclusions

Although the planning process went smoothly, a number of lessons were learned which both validated the use of the workshop as a forum for decision-making and will improve the process as more areas in the region undergo similar study.

• Natural resource agencies are frequently out of touch with the feasibility of booming in a high-current river, while contractors are unfamiliar with resource sensitivity issues on the river. Both benefit from the workshop format for planning.
• It is beneficial to get all key players involved in the planning process. Early involvement means that they are familiar with the plans, were a part of the decision-making process, and have some ownership of the plan. Equally important, they are familiar with each other prior to responding to an actual spill.
• Resource identification and initial prioritizing of specific resources is most effectively accomplished by small specialized working groups looking at specific resources in each area (i.e., fish, birds, archaeological). Region-wide prioritization requires a larger working group with adequate representation from the different specialized groups.
• Work involved in resolving logistics issues such as developing memoranda of agreement, safe haven agreements, and cataloging of available equipment can be overwhelming and needs to be addressed by as large a group as possible.
• Use of on-site video can greatly enhance planning efforts.
• It is best to solicit advice for response strategies from a varied base of response and industry groups. It gives a broader experience base to draw from; and by soliciting their advice, participants become part of the planning process and can buy in on the strategies.
• All strategies need field verification which should include on-site observation of currents, distances, hindrances, and site processes.
• By consolidating planning efforts, agencies can decrease both financial and time expenditures involved in the development of response and contingency plans.

Future Plans. A greater effort will be made to include oil spill cooperatives, facilities, and local government in the planning process. Under the Oil Pollution Act of 1990, the primary responsibility for spill response falls on petroleum-related industry. Successful implementation of developed protection strategies depends on close cooperation and coordination of all parties concerned. For example, the Clean River Cooperative used the results of the three-day March 1992 workshop to select equipment cache locations identified in its response plan and to develop training scenarios for its members. The Columbia River Estuary planning process described in this paper can be tailored and readily adapted to other areas in the region. During the next two years, the process of identification, prioritization, and strategy development will be applied to the following areas: mid-Columbia River from Puget Island to Portland, upper Columbia River from Portland to the Washington state border, Coos Bay, Yaquina Bay, and Grays Harbor. The Puget Sound Area Committee is currently considering whether to implement this process in their area of response. Initial workshops to begin the process in the mid Columbia River and upper Columbia River were held in the summer of 1992. Completed Response Action Plans for these areas will become geographical annexes to the Area Contingency Plan.

Appendix: Strategies for the highest prioritized areas in the Columbia River Estuary,

Area 1. Cathlamet Channel—strategy: collection; boom required: 2000’ (500’ × 4); feasibility: ≥ 50%

Deploy boom across entrance of Cathlamet Channel where lower current velocities will improve collection capability. Daymarks No. 67 and No. 8 are possible anchor points. Deploy booms for collection along Washington shoreline. Good road access upstream of Nassa Point for vacuum truck recovery operation; no road access and steep cliffs downstream. Log booms typically anchored in area.

Area 2. Clifton Channel—strategy: protection; boom required: 2000’; feasibility: ≥ 25%

Deploy boom at west end of Clifton to divert oil back into main channel away from low lying islands in Lewis and Clark National Wildlife Refuge. Pre-set anchor points required due to strong currents. Current too strong for collection. Under low river flow conditions, may be able to protect interior marshes of refuge islands by deploying absorbent boom across small channels into these wetlands; will not work if river level is too high.

Area 3. Steamboat Slough—strategy: collection; boom required: 1000’; feasibility: ≥ 75%

Deploy boom to divert oil into Steamboat Slough for collection inside east entrance. Good road access on Washington side for vacuum trucks; numerous dolphins on both sides to anchor boom. Secondary containment boom behind collection boom required.

Area 4. Elochoman Slough—strategy: collection; boom required: 900’; feasibility: ≥ 75%

Deploy boom to divert oil into east entrance for collection. Gravel pit on north shore provides good access for collection and staging. Dolphins and trees provide good anchor points for boom. Secondary and tertiary boom required behind collection point. Deploy sorbent boom to protect shallow entrances at west and mid-channel entrances on Hunting Island.

Area 5. Skamokowa Creek/Brooks Slough—strategy: protection; boom required: 400’; feasibility: ≥ 75%

If oil is diverted into Steamboat Slough for collection, deploy boom across entrance of Skamokowa Creek and Brooks Slough using seawall and pilings on west beach as anchors. Second possibility is to deploy boom upstream at bridges on both waterways. Anadromous fish is resource needing protection.

Area 6. Karlson Island—strategy: protection; boom required: 200’; feasibility: ≥ 75%

Deploy boom across breach in dike to protect freshwater marsh and waterfowl in fall, winter, and spring.

Area 7. Miller Sands Island/Lagoon—strategy: protection; boom required: (a) 200’, (b) 2000’; feasibility: (a) ≥ 75%, (b) ≥ 25%

Deploy series of deflection booms (b) to protect bird nesting/foraging areas on east end of island will be complicated by strong currents, shallow water, and lack of permanent anchor points. Deploy shoreline boom along beach face to collect floating oil in intertidal.

Area 8. Grays River—strategy: protection; boom required: (a) 1000’, (b) marsh boom; feasibility: (a) > 75%, (b) ≥ 25%

Deploy boom across river at a point upstream where solid anchor points are available.

possibility of deploying marsh or intertidal boom to protect mudflats at mouth of river, but feasibility is low due to large area and shallow water. Station open-water skimming system in deeper part of bay to collect oil contained by shallow-draft boats towing boom. Most sensitive period for juvenile salmonids is February to July; adult salmonids, September to December.

Area 9. Crooked Creek—strategy: protection; boom required: 100’; feasibility: ≥ 75%

Deploy boom across mouth of creek to protect wetlands.

1. Located on map in Figure 1