Probable Cumulative Impact of an Oil Spill On Coastal Resources Near Port Angeles and Neah Bay Based Upon a 82 Hour Trajectory and Fate Model

The northern shoreline of the Olympic Peninsula hosts a wide range habitat supporting shellfish, waterfowl, fish, mammals and a wealth of marine flora. Oil spilled in the Strait would poison shellfish beds and denude critical intertidal areas; birds and some mammals perish in huge numbers as they lose insulation after they become saturated with oil.

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Legend

Shoreline Sensitivity:
- Highly Sensitive
- Sensitive
- Moderately Sensitive
- Oiled Shoreline

Accident Site: July 10, 1998 7:00 PST 335,000 Gallons

Cities

Oil Exposure
- Light to Moderate
- Severe

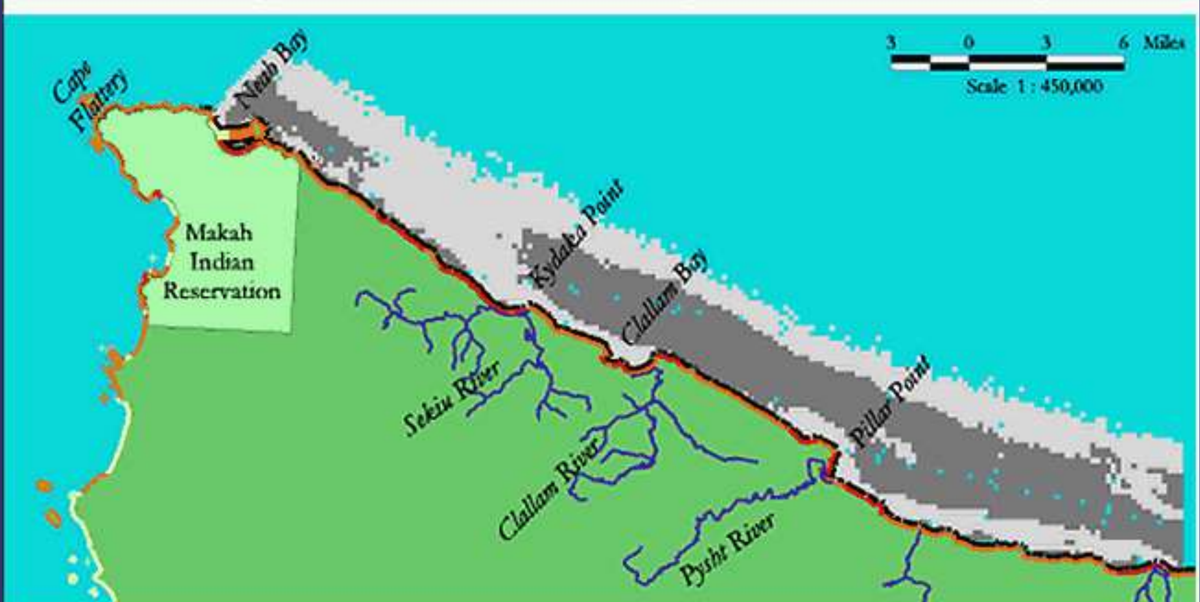
Dungeness NWR

Native American Lands

Land

Water

Salmon/Trout Bearing Rivers



Data Sources:

- Land Use Coordination Office of British Columbia
- Oil Spill Trajectory and Fate Modeled by SeaConsult Marine Research of Vancouver BC
- National Oceanic and Atmospheric Administration
- Washington State Department of Fish and Wildlife
- Washington State Department of Natural Resources

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Strait of Juan de Fuca Oil Spill Study

Questions and Answers

How do you know the oil slick on this map illustrate what would happen in a real-life scenario?

The oil slicks depicted on the map is based on a oil slick computer model. Information on weather, season, currents, wind, and the natural characteristics of the spilled oil are analyzed to determine the probable motion of a quantity of oil in a given situation. No one can predict ahead of time the actual distribution pattern of an oil spill event in Puget Sound. Wind and waves "weather" or degrade an oil slick at varying rates; currents shift throughout the day and wind patterns abruptly change directions. This model represents a possible outcome based on circumstances surrounding actual incidents reported to the Washington State Department of Ecology.

The weather and current parameters of this scenario were chosen to represent typical conditions in the Straits at this time of year. After a spill some oil evaporates; some sinks down into the water column; more spreads across the surface, eventually mixing with surf and waves to form an toxic, hard to clean emulsion known as a "mousse". While the characteristics of crude oil and other petroleum products coming into Puget Sound may vary greatly, this model is based on the properties of Alaskan crude which is what approximately 88% of the inbound tankers to Puget

Sound contain.

Are the conditions that lead to this spill plausible?

Records indicate that the Strait of Juan de Fuca and Northern Puget Sound have witnessed more than a dozen near misses involving major tankers, cargo ships or barges since 1994. The specific circumstances surrounding this spill are based on actual incidents in the Straits of Juan de Fuca reported to the Washington State Department of Ecology.

In October 1998, the tanker ARCO Alaska was approaching the Port Angeles pilot station boarding area under clear weather conditions. Traveling on a direct collision course with the tanker was the fishing vessel Alyeska, heading along the outbound lanes of the straits. Turning directly into the bow of the oncoming tanker, the Alyeska did not respond to numerous communiques from the tanker and the vessel tracking system (VTS). After the fourth collision warning sounded from the ARCO Alaska which had made a series of defensive maneouvers, the Alyeska finally altered course and slipped by the tanker within 100 feet of its port side.

How were the highly sensitive areas determined?

The Washington State shoreline includes some of the most productive temperate marine environments and habitats in the entire nation. Thousands of harbors, bays and estuaries shelter a rich diversity of aquatic and marine life as well as scores of fish and mammal species. It is clear from only a quick glance over a shoreline map of the Straits of Juan de Fuca, the San Juan Islands and Puget Sound that a major oil spill in the basin could not avoid dramatic impact of miles of sensitive habitats and resources. Research suggests that the effect on the fisheries and shellfish beds would be devastating. Marine birds would be hit most immediately and a spill along the Northern Coast could wipe out the entire endangered sea otter population of Washington State.

Habitat vulnerability is greatly affected by the conditions created by waves and surf in the immediate area. The greater the wave and tidal energy, the better toxic compounds disburse or weather. So exposed tidal flats and marshes are dominated by porous muds and clays absorb oil and are difficult if impossible to clean. Sheltered tidal areas are most at risk while exposed, rocky coastlines cleanse themselves more readily. Vulnerability is thus partly based on the composition of the substrates that compose the shoreline and how exposed the area is to open tides.

Why are the shoreline sections marked by this map particularly sensitive and vulnerable to an oil spill in the Straits?

Different species of plants and animals are affected by oil spills in different ways. Whether an individual is an adult or juvenile, whether the spill occurs during mating or nesting periods and the weather at the time of the spill are all critical factors that influence total impact. This classification system synthesizes data from numerous sources in order to assign coastline sections a value assessing their overall vulnerability.

Areas receiving the highest vulnerability scores on this map are particularly rich in biological and recreational features. They support numerous bird species, may offer spawning or rearing habitat to herring or commercial marine life like oysters, clams and geoducks or may have been otherwise designated critical habitat by the Washington State Department of Natural Resources. The presence of waterfowl and shorebirds as well as mammals are indicated by the corresponding point features, further illustrating how biodiversity varies along the shore.

In addition to evaluating the biologic resources along these coastal zones, the evaluation system incorporates other issues of concern to citizens such as recreational value and built shoreline features. Local communities will be dramatically affected by a spill which will reduce tourists who come to dig shellfish, fish, and enjoy the coastal reserves.

Why isn't there more information explaining what makes these areas more or less sensitive?

Many state and federal agencies produce "Environmental Sensitivity Indexes" that quantify the variety and location of key resources at risk from an oil spill. The sensitivity of a particular location is a measure of its vulnerability to a spill and is a function of biological diversity, shoreline characteristics, accessibility and exposure to tidal energy. It is standard to aggregate these characteristics into a single measure of overall sensitivity for ease of representation and rapid decision making. This is considered more accurate than the use of an "indicator species" designed to represent the impacts of a spill on a wide variety of plant and animal species.

The limitations of the map prevent us from displaying more detail explaining the specific factors that contribute to the aggregate vulnerability ranking of each shoreline section. To determine the vulnerability of shoreline sections, this analysis system synthesizes three data sources:

1. Washington State Department of Ecology Spill Compensation Schedule: ranks defined shoreline sections on a scale of 1 to 5 for vulnerability in six categories including habitat, marine birds, marine fisheries, shellfish, salmon, marine mammals and recreation;

2. Shoreline characteristics;

3. Washington State Department of Fish and Wildlife data representing location and extent of key marine wildlife habitat.

These various risk evaluation systems were integrated using the following guidelines.

Shorelines dominated by soft bottom habitats surch as salt marshes, mudflats and estuaries are more at risk than those dominated by rocks or sand.

Coastal areas exposed to high energy wave action self-cleanse better than sheltered coastline and are thus less vulnerable to major spill effects.

Shellfish beds are considered highly vulnerable due to the sensitivity of the organisms and the nature of the shallow tidelands habitat in which they are found.

Coastal kelp and eelgrass beds contribute significantly to this analysis; they support numerous offshore life forms and are critical players on marine ecosystems.

Why aren't salmon on the map?

The Sensitivity Index calculates the relative vulnerability of various geographical areas to oil spill impacts in order to prioritize response or illustrate impacts to habitats. While the impacts of a spill to migrating salmon and those present in estuarine areas could be substantial, their presence or absence was not considered in this evaluation. Key salmon/steelhead rivers along the Straits of Juan de Fuca are represented however.

Wouldn't the spill be contained by the response team before it could spread along the coastline?

Past experience demonstrates that numerous factors may inhibit the ability of response teams to contain a spill. Identifying the point of leakage and determining a means of stemming it may require engineers and spill response experts; preservation of the safety of crew members may necessitate a stabilization of the ship prior to addressing the leak; an open sea collision under difficult weather conditions may prevent rescuers from deploying teams and equipment.

In Valdez, three days passed before officials acted to contain oil. On Saturday, December 21, 1985, the ARCO Anchorage ran aground off Port Angeles, WA, rupturing its hull and two fuel tanks. The leak was not isolated until Monday evening after other attempts to stabilize the ship and reduce the leakage rate were put in place. In the meantime, the Anchorage drained 238,000 gallons of crude oil into the Straits of Juan de Fuca.

Containment relies on efficient, expeditious deployment of booms and skimmers to protect critical areas and absorb surface oil. But weather, marine conditions and time of day may dramatically influence the success of these efforts. Booms and skimming equipment are less effective in choppy waters and stormy conditions. Fog and the fall of night render overflights that are key to predicting the disbursion of oil slicks impossible.

The scenario represented on this map represents a spill of approximately 300,000 gallons of oil. It is based on the assumption that containment occurs after 10 hours, a conservative assumption based on past spill data. While this would be the greatest volume ever released in the Puget Sound area, it is a mere fraction of what most laden tankers carry into the Sound. A full sized tanker may hold as much as 32 million gallons of crude oil. The Valdez spilled 11 million into Prince William Sound.

Wouldn't the Vessel Tracking System (VTS) used by commercial ships transiting through the Straits help prevent a collision?

The VTS established by the US Coast Guard to guide vessels through the Straits and Puget Sound is one of the best in the world. Nevertheless, it can not do more than provide navigational assistance to ships. The Oil Spills Program in the Washington

State Department of Ecology reports numerous incidents where Puget Sound VTS monitors have alerted vessels of imminent danger, only to have communications problems prevent these ships from taking corrective measures.

For example, in January 1997, a fishing vessel and a bulk freighter were destined for a collision north of Port Angeles. VTS officials vainly attempted to reach the fishing vessel which did not respond. Only dramatic maneurvering by the tanker avoided a collision as the two vessels passed within 150 yards of one another while monitors at VTS looked on in vain.

In another incident in 1996, the vessel ARCADIA lost steering and began to make a port turn, crossing the bow of the southbound tanker ARCO FAIRBANKS. VTS contacted the vessel's tow, which failed to respond. The captain regained control in time to right course but only after both ships had sounded a collision warning.

And while the VTS helps monitors to track vessel movement, it is of little or no help in mitigating the risk of a ship that has lost power or steerage. When a major vessel loses either of these, it may drift for several miles before receiving assistance. In 1996 a tanker en route to British Columbia in the Straits west of Port Angeles lost propulsion due to an electric problem. The tanker drifted seven hours before it could anchor near Freshwater Bay. Given the inordinately long time and distance required to alter the direction and velocity of vessels the size of those that regularly ply the Puget Sound and Straits, the VTS can not provide 100% assurance against collision or accident, paricularly when a major ship suddenly begins to drift without control across lanes and toward rocks or shore.

In these cases, the VTS was a critical resource alerting some but not all of the parties involved of imminent danger. However it is not, by any means, an assurance against collisions or other incidents.