

Natural Resource Damage Assessment and Restoration Planning for the *Cosco Busan* Oil Spill: UPDATE

October 2009

State and federal trustee agencies have been assessing the injuries to natural resources and their uses caused by the *Cosco Busan* oil spill of November 2007. This process is known as a natural resource damage assessment (NRDA). The goal of NRDA is to identify and quantify injuries to wildlife, habitat, and lost uses of those resources (including recreational uses), and then to determine how to best restore the resources and compensate for the losses.

This effort has involved over 45 field or lab studies and 30 data compilation and analysis efforts, some of which are ongoing. The summaries presented here are based upon the latest information available as of September 29, 2009; however, this information is preliminary and subject to change as more information becomes available. The trustees have conducted this NRDA in cooperation with parties responsible for the spill. However, they do not agree with all of the information presented here.

Summary of Injuries

- **Birds:** To estimate total mortality, the trustees conducted field studies to examine how long bird carcasses persist on the beach, how difficult it is to find them, and how many are deposited naturally. The number of birds estimated killed (below) is approximately 2.3 times higher than the number collected live and dead. The estimates are:



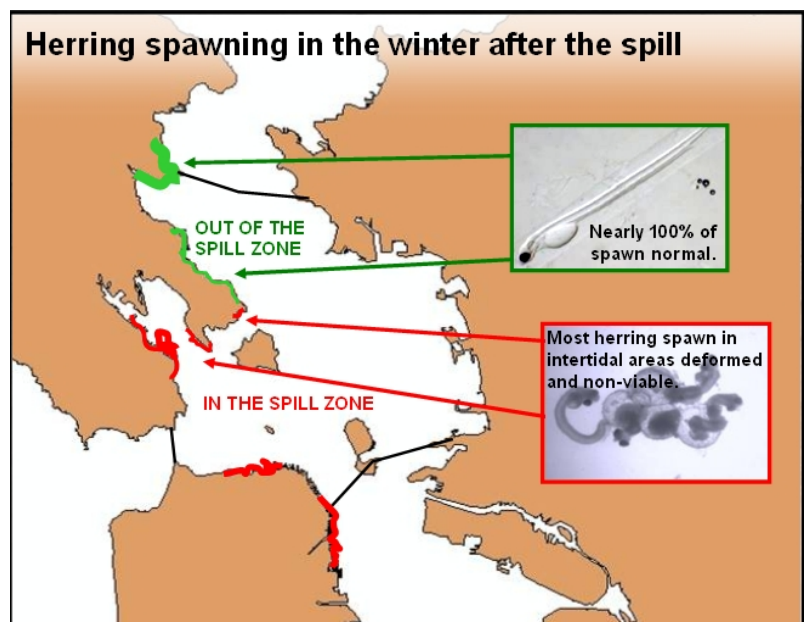
Oiled Clark's Grebe; photo by Glen Tepke.

Diving Ducks (scoters, scaup)	1632
Loons	87
Large Grebes (Western, Clark's)	1133
Small Grebes (Eared, Horned)	494
Northern Fulmar	129
Cormorants	484
Gulls	215
Brown Pelican	21
Common Murre	609
Marbled Murrelet	13
Other Alcids	130
Shorebirds	1421
Other Marsh or Land Birds	318
TOTAL	6688

Because Snowy Plovers do not forage in the water, they are less susceptible to oiling than other species. A detailed study of the estimated 52 oiled Snowy Plovers included 45 banded birds (23 oiled and 22 not oiled) and spanned two winters. The results suggested that nearly all survived the spill.

- **Fish:** The physical characteristics of the fuel oil spilled (IFO 380) made it most likely that impacts to fish and invertebrates would occur in near shore zones. Investigations of the water column and deep sediments did not reveal evidence of suspended or sunken oil. Accordingly, the trustees focused the injury assessment on Pacific herring, a species which spawns annually in near shore areas of San Francisco Bay.

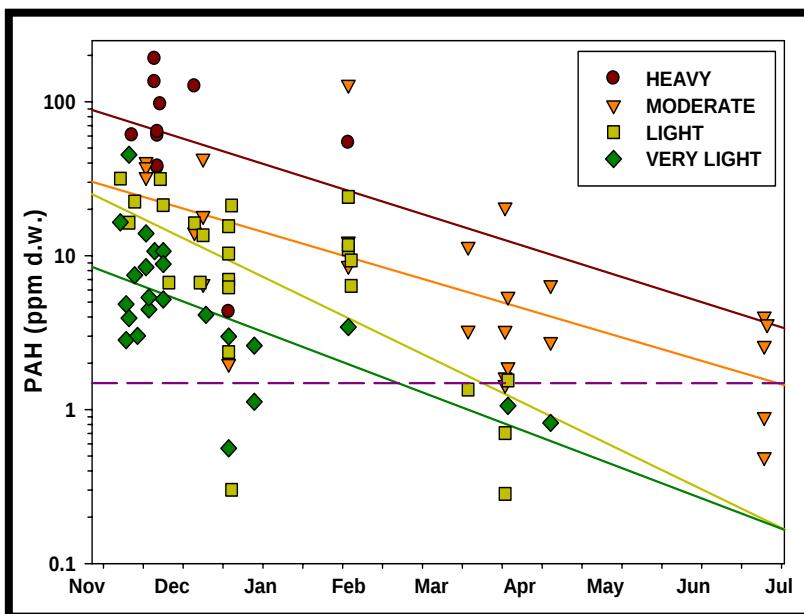
Herring egg samples collected in February 2008 from shallow water within the spill zone revealed high degrees of embryo mortality and abnormalities, while



those collected outside the spill zone were largely normal. Current studies are evaluating the toxicity of the oil. Preliminary results indicate that *Cosco Busan* fuel oil is highly toxic to herring eggs at very low concentrations and that toxicity is further intensified by exposure to UV radiation from sunlight. The degree to which herring and other near shore spawning fish were impacted is still under investigation.

- **Mammals:** While many sea lions and harbor seals were observed with small amounts of oil on them, only three pinnipeds were collected with oil on them (two northern fur seal pups and one harbor seal). Necropsies concluded oil was not likely the primary cause of death. Other field surveys and reproductive health studies suggested no evidence of further impacts.
- **Shoreline habitats:** Total acreages of shoreline habitat impacted were estimated by degree of oiling, based upon surveys conducted during response operations. Further, concentrations of oil were measured in mollusks (clams, oysters, and mussels) collected over time. This data was compared to studies found in the scientific literature that documented lethal and sub-lethal effects of exposure to oil. Also, methodical surveys at previously monitored rocky intertidal sites were conducted to examine changes to plant and animal cover and abundances after the spill.

The estimated recovery times vary across habitats and by degree of oiling; they range from a few months to six years. Most of the habitats have no remaining discernable injury. A total of 1% of the entire area was heavily oiled, 9% was moderately oiled, 18% was lightly oiled, and 72% was very lightly oiled.



SUMMARY OF SHORELINES EXPOSED TO OIL (in acres)

	<u>Heavily oiled</u>	<u>Moderately oiled</u>	<u>Lightly oiled</u>	<u>Very Lightly oiled</u>	<u>TOTAL</u>
Salt Marsh	0.1	0.6	5.0	12	18
Sand/Mud Flats	4.2	255	289	1397	1945
Sandy Beaches	4.3	5.4	147	491	648
Rocky Intertidal	9.7*	16	95	264	385

* Includes areas heavily cleaned as well.



- **Eelgrass:** There are over 900 acres of eelgrass within the spill zone. Some beds were oiled while one site, Keil Cove (below), also suffered direct physical impacts from spill cleanup operations, where a barge left a scar in the bed. This scar may take several years to recover.

The trustees assessed potential injuries through the use of side scan sonar, rhizomal tagging, in-lab pulse amplitude modulated (PAM) fluorometry, phenolic analysis, and push net sampling of invertebrates. The goal was to quantify changes to plant biomass, distribution, density and rhizomal growth, and invertebrate biomass and indicator species. Additionally, sediment cores and plant and animal tissues were collected for PAH analysis. The trustees are currently evaluating the data.

- **Human uses:** Impacts to recreational activities are still being quantified. To estimate baseline use, the trustees conducted extensive counts and surveys one year after the spill, focusing on a wide variety of recreational activities (such as dog-walking, surfing, kite-boarding, boating, and recreational fishing) on multiple days at multiple sites inside the Bay and on the outer coast. Activity levels are being estimated per site with adjustments for weather and day of the week. Using this data, the trustees will then estimate the number of user-days lost due to the spill.



Future Restoration and Next Steps

The Trustees continue to solicit restoration project ideas and are preparing a Draft Damage Assessment and Restoration Plan. This document will describe the injuries as well as propose restoration projects to compensate for the injuries. Following public comment and final review, a final plan will be issued for implementation.

To submit restoration project ideas, use the form at <http://www.darrp.noaa.gov/southwest/cosco/public.html>

Trustees

California Department of Fish and Game
California State Lands Commission
United States Fish and Wildlife Service
National Park Service
Bureau of Land Management
National Oceanic and Atmospheric Administration

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Websites

dfg.ca.gov/ospr/spill/nrda/nrda_cosco-busan.html
darrp.noaa.gov/southwest/cosco/index.html
www.fws.gov/contaminants/Issues/OilSpill.cfm

