

Abstracts from the M/V *Selendang Ayu* Preassessment Data Reports

The M/V Selendang Ayu ran aground on Unalaska Island on December 8, 2004, spilling over 350,000 gallons of oil into the marine environment. During the “preassessment” phase of the natural resources damage assessment and restoration process, surveys were conducted in the vicinity of the spill to document injuries to natural resources and services.

Terrestrial Vegetation

Vegetation surveys were conducted to assess potential impacts to nearshore vegetation communities off the coast of Unalaska Island, Alaska. Nine paired plots (oiled and control) were selected for the survey. The control plots had significantly greater total plant abundance than the oiled plots, but those differences may have been due to the fact that most of the control plots were located in more landward areas and at somewhat higher elevations. Surveys may be conducted in upcoming growing seasons to better document the damage to, and recovery of, plant communities.

Benthic/Fish – Intertidal/Subtidal & Anadromous Streams

NOAA conducted preassessment surveys from December 27, 2004 through February 1, 2005 and from June 2 through 23, 2005. In the winter surveys, teams examined the shoreline for patterns of oil movement and deposition, but tide conditions did not allow a detailed examination of intertidal habitats for indications of oil impacts. In June, visual surveys of algae and invertebrates in rocky intertidal habitats showed indications of possible adverse impacts at Spray Cape, but at other sites had no apparent impacts that could be attributed to the spill. Shoreline clean-up operations very probably caused additional damage. Between 20 and 23 June 2005, the teams observed beach cleaning operations that resulted in the release of oil into surface waters, apparently causing bleaching and necrosis of marine algae. The U.S. Coast Guard documented additional releases of oil from the wrecked *Selendang Ayu* in October and November 2005, some of which stranded on the shoreline. The observations made, lessons learned from similar spills, and the scientific literature strongly suggest that injury likely occurred to intertidal and subtidal biota.

Fish – Anadromous Streams

Polynuclear aromatic hydrocarbons (PAH) from the *Selendang Ayu* oil spill were detected at detrimental concentrations in 1 of 14 streams examined, likely placing resident juvenile fish and possibly embryos at risk. Assessment began several months after the spill; so concentrations were likely higher before sampling commenced. Estimated hydrocarbons in that one stream were high enough to have negative impacts on survival and growth, but pink salmon embryos were generally absent in the affected river area. This was likely due to marginal habitat quality rather than oil related mortality. Species that reared in oiled reaches of the main channel (Dolly Varden and coho) were also

at risk, and appropriate studies can be conducted if warranted. Although such hydrocarbons were widely distributed in the affected bays, only the water of Skan Bay posed a risk to emigrant juvenile pink salmon during the sampling period. Despite the significant presence of hydrocarbons in Skan Bay, several unknowns precluded definitive assessment of risk in marine water. Overall, we conclude that the *Selendang Ayu* spill placed a relatively small number of pink salmon embryos and fry at lethal and sublethal risk in stream habitat.

Birds – Drift Block

Estimates of the number of marine birds killed by the oil spill depend on variables such as the proportion of birds killed that actually wash ashore. This variable is typically estimated using drift blocks deployed to simulate drifting carcasses. Our block release was relatively near shore, as was the release of the oil, and timed to closely replicate conditions at the time of the wreck. We recovered approximately one and a half times the median rate of other studies (26 of 165 or 16%). Nevertheless, it is clear that only a small proportion of the blocks that we released came ashore in the spill zone.

In this study, not all beaches within the spill zone were surveyed following deployment; therefore, the estimate of blocks recovered is conservative. However, the detection probability for the highly visible blocks was probably better than for carcasses.

Birds – Persistence

Surveys were conducted on beaches in the vicinity of the spill to determine the rate at which carcasses of dead birds remained on the beach. Carcass persistence rate was estimated by experimentally depositing unoiled carcasses in the field and monitoring their state (intact / scavenged) and persistence (present / absent) through repeated visits. The extremely low persistence rate detected through these tests, combined with the relatively low detection probabilities, suggest that only a very small proportion of all deposited carcasses were counted during beach searches on Unalaska Island.

Birds – Detection

Surveys were conducted on beaches in the vicinity of the spill to determine the rate at which searchers found carcasses of dead birds. It is difficult for observers to find all the carcasses on a stretch of beach for various reasons. Since the probability of finding carcasses is less than 100%, it is important to calculate the actual detection probability.

A field study was conducted in which two survey teams each made two passes on a number of beaches. Less than 50% of all carcasses present on a beach segment were detected in a single pass by a survey team. This result, coupled with extremely low persistence rates, suggest that only a very small proportion of all deposited carcasses were counted during beach searches on Unalaska Island.

Birds – Background Mortality

Following the oil spill, crews searched beaches, collecting more than 1,700 seabird carcasses. Some of these probably died from causes unrelated to the spill. To estimate the percentage of these, field studies were performed at two nearby locations assumed to be unaffected by oil released from the

wreck. Protocols for these beach surveys were similar to those used on affected beaches. The data analysis is still underway.

Birds – Aerial Survey

An aerial survey was conducted from 5 January to 2 February to estimate the population sizes of birds in marine habitat near the grounded freighter on the northwest coast of Unalaska Island.

The extensive survey coverage over a large area provided a useful estimate of the average number, species composition, and relative distributions of birds. The most prevalent species were alcids, emperor geese, murrens and scoters.

Because the survey was not initiated until 28 days after the initial wreck, it does not precisely estimate the relative abundance of various species near the wreck at the time of the spill. During December and January, the distribution of migratory birds wintering in the Aleutians Islands is relatively stable. However, many species show local shifts in distribution in response to changing tide, wind, and weather. This range of movement is highly variable among species.

Further, aerial survey detection rates of birds and marine mammals are never 100% even with optimal conditions. Difficulties with detection, turnover as birds move through the area, and spill-related mortality all contributed to the populations in this case. This report is likely an underestimate of birds in the general vicinity of the spill that were at risk.

Birds – Oiled Bird Report

Observations of live, visibly-oiled wildlife in the spill area were recorded during live animal rescue attempts and other operations in the spill zone. Additionally, carcasses of dead birds were collected then identified. Due to strong winds and rough seas, few observations could be made in the vicinity of the wreck until nearly a week after the event, so the list of species of birds that are known to have been oiled is based on observations from mid-December 2004 to mid-February 2005.

We documented injuries to at least 41 species of birds. Aerial surveys documented 8 species of birds in the area for which we had no direct evidence of oiling, but some of these, particularly 5 species of ducks, were likely exposed to the oil but not detected. Further, our methods likely underestimated the relative abundance of live-oiled birds that were foraging or scavenging on oiled beaches, some of which undoubtedly died outside the surveyed areas. Commonly found oiled birds included alcids, (especially auklets), cormorants, waterfowl, gulls, tubenoses, grebes and loons.

Relative abundance of oil birds was likely underestimated for species that were contaminated while foraging on beaches or scavenging oiled carcasses, because some of these likely died outside of surveyed areas

Birds – Seaduck Exposure

In the weeks following the spill numerous bird carcasses were recovered. In addition, aerial surveys assessed the abundance of live birds using the oiled area. Our goal was to determine the acute and

chronic exposure of these live birds to hydrocarbons associated with this spill. In 2005 and 2006, harlequin ducks were captured in three oiled bays and one minimally oiled reference bay. Liver biopsies were surgically obtained and birds released. The biopsy samples were analyzed for hydrocarbon exposure. Evidence of hydrocarbon exposure in ducks in oiled locations were significantly higher than those from a control site in both years. The results suggest that harlequin ducks and possibly other fauna were exposed to sublethal levels of hydrocarbons associated with this spill. Further, the results show that exposure was continuing more than a year after the spill.

Marine Mammals Summary

The trustees compiled information about potential marine mammal injuries from response reports, aerial survey results, and background literature. The summary documents the presence of sea otters, Steller sea lions, and harbor seals in core spill area within weeks after spill, some visibly oiled. In addition, 4 sea otter carcasses and 2 sea otter skeletons were collected following the spill.

Human Use Survey

The trustees evaluated data to determine whether human use services associated with affected natural resources were injured. In compiling the preliminary assessment report, trustees considered existing literature, comments made at public meetings following the spill, and input from a limited number of individuals.

Most residents of Unalaska fish, hunt or gather wild resources. Therefore, to the extent the spill impaired fishing, hunting, and gathering by residents, it resulted in a loss of natural resource services. Visitors to Unalaska may have also lost recreational opportunities.

Limited information gathered to date indicates that the frequency of resource use of Skan and Makushin Bays was limited due to the distance from Unalaska. It also appears that natural resources for subsistence and recreational use were available elsewhere in the area.