Restoration Project 97291
Chenega Shoreline Restoration - Monitoring
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How Successful Was Removing Eight Year Old Oil ?

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Exxon Valdez oil was removed from Chenega area beaches in 1997

Auke Bay Laboratory personnel monitored the removal of *Exxon Valdez* crude oil from 10,000 m² of beach on Latouche Island (mostly in Sleepy Bay) & Evans Island in June & July of 1997. Oil was removed at the request of residents of Chenega Bay, restoration was funded by the EVOS Trustees, & cleaning work was conducted by ESC Inc., the Chenega area native corporation, & overseen by the Alaska Department of Environmental Conservation. Lab personnel were to determine whether 50% of oil was removed, & whether intertidal biota or surrounding water were contaminated with disturbed oil or cleaning agent.

The oil removal technique involved injecting compressed air, along with small quantities of a surfactant (PES-51) into oiled sediments, & hosing the resulting loosened oil down the beach using ambient sea water. Oil & surfactant were corralled behind floating booms & collected with oil adsorbent pads.

It is difficult to clean an armored beach

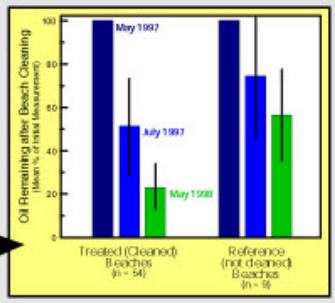
The Sleepy Bay beach was previously cleaned extensively in 1989 & 1990. The long-term oil persistence is due to the protection afforded by large boulders

Where there was access to oil, the removal system worked well.

Sample sites were selected at more than 50 places in the area to be cleaned, & they were sampled before, just after & one year after the cleaning work was done. Each site consisted of three matched adjacent places to put a quadrat (metal square). We surveyed & photographed the locations of the quadrats so they could be put back in place later. We sampled under one square at each site at one of the 3 sample times, excavating until stopped by immovable rock. The samples were extracted & oil quantities reported as grams of oil / meter² of beach.

Cleaning removed oil. Our oil samples showed 57% as much oil on beaches right after cleaning as before, & only 22% as much by the following spring. This was greater than one half the removal desired.

Nature also removed oil, although not as fast. The reference (not cleaned) sites lost 74% & 56%.



BUT where there was *no* access to oil, removal did *not* work well.

Manual cleaning removed available oil, & oil under cobbles

Winter storms move boulders, uncover previously inaccessible oil

May 1997, before cleaning. All three of the oily sampling quadrat locations of one sample site are indicated in this photograph.

Summer 1997

July 1997, after cleaning. Notice how the patches of compacted oil & gravel from the May 1997 photo have been cleaned & converted to three patches of loose gravel.

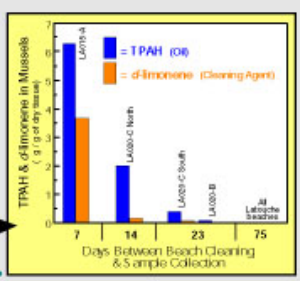
Winter 1997-98

May 1998, a year after cleaning. Winter weather has moved the flat-topped boulder, although it is a meter long. All three of the original oily sampling locations have been completely covered by rocks.

Intertidal biota did NOT suffer major damage.

Which one was cleaned? These are photographs of two typical beach transects, taken before beach cleaning, just after beach cleaning, & one year later. One beach was cleaned & the other was a reference (not cleaned) beach, but as you can see, natural differences (weather, seasons) affect both beaches, while neither shows any affects from the cleaning work.

Intertidal mussels were BRIEFLY contaminated.



Mussels occurring **naturally on the beach**, just down slope from the cleaning area, were the animals most likely to collect oil or cleaning materials during the work, & they did. Mussels filter enormous quantities of water & concentrate contaminants. The most contaminated mussels had oil contents similar to mussels that still live permanently in badly oiled mussel beds.

Contamination was brief. Nearly all of the surfactant was depurated in the first two weeks, & nearly all of the oil was gone within the first three weeks.

Caged mussels were NOT contaminated.

Local mussels moored beneath the water surface, just **outside the work area**, collected only traces of oil & no cleaning materials. When the moorings were retrieved in mid-September, no contaminants were measurable in any of the mussels. We conclude water outside the work area was not contaminated.

The 1997 Sleepy Bay cleaning

1. Removed accessible oil
2. Did negligible biological damage

The 1997/98 winter storms at Sleepy Bay

1. Moved large boulders
2. Exposed previously inaccessible oil