Back

How Toxic is Oil?

Assessing the toxicity of oil can be a tricky business. The main difficulty is that "oil" is typically a mixture of many different chemicals. Proportions in the mixture vary even within a single category of oil, like crude oil. For example, Arabian crude oil differs in composition from Louisiana crude oil, which differs from Alaska North Slope crude oil.

Most of the oil residue scientists find in Prince William Sound originated with the *Exxon Valdez* spill. Other potential sources scientists have identified include diesel fuel, nonspecific combustion sources that could include anything from wood stoves to vessel exhaust, and spilled oil not linked to the *Exxon Valdez*.

- Oiled wildlife often dies because oil fouls fur and feathers and destroys their insulation value. Birds and mammals die of hypothermia (they get too cold).

- Some animals eat the oil while trying to clean it off their fur or feathers, or while scavenging on dead animals. Oil is toxic when ingested and can cause sickness or death.

- The oil impacts some animals in ways that don't result in a quick death. It may cause liver damage or blindness, for example. A sick or impaired animal cannot compete for food or avoid predators. Oil can also impair reproduction.

- Smaller organisms, such as aquatic invertebrates (barnacles, periwinkle snails, polychaete worms, clams, etc.), can be smothered by a thick layer of oil washing ashore. These organisms are very important food sources for many organisms, especially insectivores such as fish and birds. Aquatic invertebrates are often important indicator species - scientists use their presence and abundance as indicators of the overall health of an ecosystem.

- Oil also changes the physical environment for plants and animals by forming hard,

Various dead, oiled wildlife collected in Prince William Sound, Alaska, in March 1989. (Photo credit: *Exxon Valdez* Oil Spill Trustee Council)

Oiled sea otter on shore in Prince William Sound. (Photo credit: *Exxon Valdez* Oil Spill Trustee Council)

An example of asphalt "pavement" is seen here as a thick, black deposit on a beach face in Prince William Sound. Such pavements consist of cohesive, heavily oiled surface sediments. (Photo credit: OR&R, NOAA)

asphalt-like pavements, which cover and smother the vegetation and other living things that organisms depend on for food, water, and shelter. Sometimes, the environment has been so extensively altered that the organisms can no longer survive in their old habitat. Imagine a sea otter or a shorebird trying to live on a paved parking lot!

The oil from the *Exxon Valdez* killed or injured many marine organisms in these ways, but no one knows exactly how many died as a direct or indirect result of the spill. Scientists do know that the carcasses of more than 35,000 birds and 1,000 sea otters were found after the spill. These numbers do not include the carcasses that quickly sank into deep waters following the spill, which are thought to be the majority. So, these numbers probably represent only a small fraction of the actual death toll. The scientists' best estimates are that 250,000 seabirds, 2,800 sea otters, 300 harbor seals, 250 bald eagles, up to 22 killer (orca) whales, and billions of salmon and herring eggs died immediately following the spill (source: *Exxon Valdez* Oil Spill Trustee Council).

Scientists studying the effects of the *Exxon Valdez* oil spill on survival and reproduction in Alaskan sea otters carefully take a blood sample from an anesthetized otter. (Photo credit: Paul Snyder, Purdue School of Veterinary Medicine)

It is even more difficult to estimate the number of organisms that may have died from the indirect or long-term effects of oil in the environment. Since that fateful day in 1989, some species have fully recovered from the effects of the spill, but others are still recovering. However, it is difficult to know when a population has "recovered" because it is difficult to distinguish natural changes from the impacts of the oil.

Cleanup workers hose down a rocky shore with hot water under high pressure. Do their presence and the cleanup activities cause more harm than good? (Photo credit: *Exxon Valdez* Oil Spill Trustee Council)

You may ask, ***didn't the cleanup efforts improve the situation following the spill?*** This complicated question is also difficult to answer. Because of the *Exxon Valdez* oil spill, scientists now know that their attempts to clean up an oil spill can also indirectly cause harm to some of the resources they are trying to protect. For example, using hot water or chemicals to remove oil can harm plants and animals. In addition, simply sending a team of cleanup workers into an oiled area can trample sensitive organisms and mix oil more deeply into a beach. The experts who respond to oil spills consider all of these potential problems when evaluating the trade-offs of how far to go in removing spilled oil.

Can you think of other human activities meant to help threatened wildlife that might, in fact, cause more harm than good?

(top)