

Effects of Oil in the Marine Environment

The environmental impacts of spilled oil can be severe. The damage caused by a spill depends on location, volume and type of oil spilled, weather conditions, season, and many other factors. Large spills cause widespread immediate impacts, and potential long-term damage to parts of affected ecosystems. However, chronic discharges such as from street runoff and improper oil disposal are also damaging. Cumulative chronic discharges far exceed major spills in volume. Cleanup operations remove some, but not all, oil from the environment; the oil that remains naturally degrades over time. Everyone can help reduce impacts of oil spills. Immediately report oil or chemical spills (800-424-8802), properly recycle used motor oil, carefully fuel cars or boats, promptly repair leaks, and take energy conservation steps. As a voter and consumer, your opinion is valued by your elected officials and companies you patronize.



Dead sea life after the January 1996 *North Cape* spill

Effects of Oil on Coastal Habitats

Coastal areas are particularly susceptible to oil pollution. When a large spill drifts ashore, some of the oil may become trapped and remain for years. This is in contrast to the open sea where currents and diffusion rapidly reduce the concentration of oil.

While shoreline impacts are very situation-specific, immediate effects of heavy oiling may be evident by the death of plants and animals due to smothering and toxicity. In some situations, oil may persist for many years, causing less apparent but harmful chronic effects.

In **rocky shore areas**, stranded oil may coat the rocks and gradually harden by weathering into a tough tarry "skin." This oil is gradually removed by wave erosion, but pools of oil that collect form a skin of weathered oil and may remain for a long time.

On **cobble and sandy beaches**, oil can sink more deeply into the sediments and can remain longer than on bare rocks. Tidal pumping and sediment grain size

effect the rate of penetration. In muddy sediments, penetration is minimal.

Tidal flats are broad low-tide zones, usually containing rich plant, animal and bird communities. Oil may seep into the muddy bottoms and have long term impacts.

Salt Marshes have a wide variety of plant and animal species. Oiling of such systems may reduce the population and growth rate of the marsh plants and dependent species.

Effects of Oil on Marine Life

The two principal causes of harm to wildlife are toxicity and coating. Oil is most toxic during the initial phases of a release, before the lighter components have dissipated. These more toxic portions are also usually more soluble in water putting fish and shellfish at risk.

Birds: Birds are usually the most visible victims of an oil spill. Birds have a high likelihood of exposure, as they float on the water's surface with the oil. Oiled bird feathers no longer repel water, so oiled birds lose body heat rapidly, and may drown. Birds will also ingest any oil that adheres to their body through the activity of preening. This, combined with rapid loss of body heat due to loss of insulation may induce starvation. Oiled wildlife rehabilitation is possible, but survival rates vary based on the oil, species, time, and location. Usually only a fraction of oiled birds are captured for treatment.

Marine mammals: The most common marine mammals at risk in oil spills in U.S. waters are 13 species of seals and sea lions (several are endangered or threatened species). Effects include suffocation or respiratory damage by oil, loss of insulation, and poisoning. Most vulnerable are animals that have fur for insulation such as fur seals and sea otters.

Fish: Fish may be more resistant than other marine organisms to oil because their surfaces, including gills, are coated with oil repellent mucus, although larval fish, which may concentrate at the surface (with the oil) may be more vulnerable. Fish can be affected through the gills, by ingestion, or by eating oiled prey.

Shellfish: A good deal of study has been done on the effects of oil on shellfish, both bottom dwelling (lobsters, crabs, etc.) and intertidal (clams, oysters, etc.) Species living in bays, estuaries and other shallow environments are at particular risk because oil coming ashore may become concentrated. In addition to the toxic effects, heavy oils can literally smother and immobilize some invertebrate species. Sub-lethal effects are also seen, including changes in growth, metabolism, reproduction and behaviors.

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Information and contacts

In the event of a spill

- Contact the National Response Center at 800-424-8802

Suggested References about Effects of Oil on the Environment

- *Oil in the Sea*, National Academy Press 1985
- *Introduction to Oil Spill Physical & Chemical Processes and Information Management*, NOAA / Hazmat
- *NOAA Hazardous Materials Response & Assessment Division Web site*, response.restoration.noaa.gov/
- *EPA's Oil Program Web site*, www.epa.gov/oilspill/
- *Oil Spill Intelligence Report's Oil Spill Basics: A Primer for Students*, www.cutter.com/osir/primer.htm
- *USCG's Marine Safety and Environmental Protection web site*, www.uscg.mil/hq/g-m/
- *National Response Team*, www.nrt.org/
- *Introduction to Coastal Habitats and Biological Resources for Oil Spill Response*, response.restoration.noaa.gov/oilaid.html

Contacts for spill response planning

In the Coastal Zone, contact your local Coast Guard Marine Safety Office

- MSO Portland: 207-780-3251
- MSO Boston: 617-223-3000
- MSO Providence: 401-435-2300
- MSO Long Island Sound: 203-468-4444
- Activities New York: 718-354-4134
- MSO Philadelphia: 215-271-4870
- MSO Buffalo: 761-843-9570

In the Inland Zone, contact the Environmental Protection Agency Regional Office

- Region I (New England): 617-918-1260
- Region II (New York and New Jersey): 732-548-8730