Ecological effects of Gulf oil eruption will last for years

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The following article, written by an ecologist living in Wisconsin, was submitted to the WSWS.

After gushing untold thousands of barrels of oil per day for more than six weeks, the environmental disaster of the Deepwater Horizon oil rig collapse has become manifest in oil covered beaches, dead and dying birds and sea turtles, and destroyed wetlands along the coast of Louisiana and Alabama.

These visible effects of the release of toxic oil into the Gulf, as horrific as they are, represent only a small fraction of the devastation underway. The ultimate magnitude of ecological damage caused by this unnecessary and ill-conceived attempt to tap oil reserves in the deep sea will only be revealed after decades. Species declines and disappearance, disrupted food webs, and habitat degradation will continue long after the beaches are scrubbed of oil and the corpses of the wildlife are disposed of.

Given that the BP oil spill will doubtless end up the worst in history, our ability to predict the effects by reviewing past spills is limited. However, enough studies have been conducted on the general effects of marine oil spills that we can grasp the breadth of the disaster.

Estimating the direct mortality oil spills cause to bird species is complex. Factors that affect the outcome include the time of year relative to breeding season, bird colony sizes and distances, and how the birds feed (on the surface of the water or just underneath). A loose “rule-of-thumb” is that total mortality of a seabird species is 4-5 times the total body count.

Of the seven species of sea turtles in the world, five live in the Gulf of Mexico. The US Fish & Wildlife Service lists as either threatened or endangered with extinction all five species. Sea turtles are air breathing marine reptiles, spending their entire lives at or near the surface of the water. Oil spills can therefore be especially fatal for them.

What makes the BP oil eruption especially damaging to these species is the timing. May is the peak of breeding and egg laying, and this occurs near shore. After traveling thousands of kilometers in the open ocean, adult turtles return to their natal beaches, forming large breeding congregations offshore. The females then crawl out of the water to dig holes in sand and lay eggs. The young hatchlings emerge in August and head directly for the sea.

If the oil from eruption coincided with a large number of turtles congregating offshore, there may have been massive mortality. On shore, any beaches fouled by oil would not be used for egg laying and eggs in nest sites covered by oil subsequent to laying would cease to be viable.

In their “endangered resources” website, NOAA states: “While the probability of any given spill affecting sea turtles is low, even one spill—if it occurred at just the wrong time and place—could be catastrophic to one of these endangered species. Sea turtles are likely to be at greatest risk from oil spills, for example, when they are gathering in a particular area to nest, right after hatching, and when foraging in ocean convergence zones.”

The timing and extent of the Deepwater Horizon spill may well result in the loss of an entire generation of some turtle species in the Gulf of Mexico. When one considers the rarity of these species and their demographics (long-lived [30 – 40 years]; do not reach breeding age for nearly a decade after hatching), the magnitude of this loss may be catastrophic. The loggerhead, green, hawksbill, and leatherback sea turtles have breeding grounds outside of the Gulf of Mexico. The highly endangered Kemp’s Ridley sea turtle, however, is restricted to the Gulf and is, therefore, especially sensitive to disasters in the region.

Following the Exxon Valdez oil spill in Prince William Sound, Alaska, in 1989, effects were observed across a wide range of habitats and species. This will be true of the BP spill, more so because of the magnitude of the disaster.

As with Exxon Valdez, in addition to direct mortality of highly visible species, scavenging terrestrial birds, such as bald eagle gulls and crows will suffer direct mortality and reproductive losses. Populations of important prey species, such as small fish that live just at the waters’ edge, will

decline by possibly more than 40 percent, and the effects of the contamination will still be evident on these species until at least 7 years post-spill.

In the Gulf, as in Alaska, we can expect the oiling of spawning habitats to affect breeding of fish species and lower survival and slower growth for fish that forage on oiled shorelines.

Shorebirds, including sandpipers, plovers, and oystercatchers, that feed on tiny crabs and other crustaceans at the edge of the tides will be affected for at least 5 years after the spill—partially due to the persistence of oil contamination in prey species. Female shorebirds subject to this diet of low-level toxicity will experience declines in chick production.

Decrease in overall body condition of birds subjected to oil contamination will lead to high mortality during periods of food stress in winter months for up to 10 years after the spill. The experience of Prince William Sound in 1989 taught us that delays in the recovery of avian and mammalian predators of fishes and invertebrates persists long after the initial impacts of the spill. These delayed effects are not usually incorporated into risk assessments, thus substantially underestimating the impacts of a spill.

Over time, the nature of the threat and the effects of oil spills change. Weathering processes alter the composition of spilled oil, resulting in wide variations in biological effects. Oil exposed to the atmosphere for 1-2 days loses the most toxic chemical components to evaporation. Non-toxic effects, including habitat alteration and coating, become the most devastating issue for fish and wildlife. This is especially true in wetlands, where mechanical removal of oil is ineffective.

Some ecological effects of the Exxon Valdez oil spill were still being discovered a decade after the disaster. Indirect effects included changes in plant and algae communities, with less productive species replacing species that originally supported a rich diversity of animals. Abundance of the types and numbers of creatures that live in the sediment on the ocean floor declined and densities of clams were reduced directly. For about 4 years, there was reduced eelgrass density and hence a loss of breeding and feeding grounds for crabs, scallops, and a large variety of other sea life. Abundance of several toxin-sensitive amphipods (tiny crustaceans that countless species of fish feed on) declined dramatically and had not recovered by 6 years post-spill.

Even relatively small events, such as a spill of fuel oil at West Falmouth, Massachusetts, in 1969, have profound effects. There, the density of crabs declined, the ratio of females to males declined, juvenile settlement (a measure of how quickly the population will recover) declined, and there was heavy overwinter mortality. Beyond the population effects, oil was found incorporated into crab body tissues, behavioral disorders such as locomotor impairment became prevalent, and abnormal burrow construction resulted in lower survival. Recovery of the marsh was still incomplete after 7 years.

Whether the latest attempts to stem the gushing of oil into the Gulf are successful or not, the oil will eventually stop flowing. When that occurs, BP and the government agencies will claim success and move on to “mitigation” measures. These will doubtless include payments to fisherman who lost their livelihoods, some scraping and removal of sand from tarred beaches, and a few grants for research to study the effects of the disaster. The television cameras will turn to the next story, and tourists will be invited back to the beaches with reassuring slogans. Images of sunbathers on white sand beaches will belie the damage caused by the Deepwater Horizon spill.

The ecological, economic, and social effects will be felt for decades in decreased fish, shrimp, and oyster stocks; in disrupted ecological services; in the loss of the unique culture of the coastal populations.

Sources

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