The Deepwater Horizon (DWH) oil spill occurred in April 2010, about 50 miles offshore of Louisiana. Nearly 172 million gallons of oil entered the Gulf of Mexico. The five questions below were the most frequently asked by people who depend on a clean and healthy Gulf of Mexico.

**QUESTION #1: Is Gulf seafood safe to eat?**

The DWH oil spill left some consumers with concerns about eating Gulf seafood. During the oil spill, federal agencies, such as the National Oceanic Atmospheric Administration (NOAA), the U.S. Food and Drug Administration (FDA), and the U.S. Environmental Protection Agency (EPA) worked with Gulf of Mexico states to implement a testing program to ensure seafood safety. Additionally, state agencies conducted their own sampling in state waters. Monitoring post spill showed that Gulf seafood harvested from waters open to fishing was safe to eat.
Seafood had to pass a series of tests in order for the waters to be reopened for fishing. In waters free of an oil sheen, scientists collected the edible portion of fish, blue crabs, oysters, and shrimp. If these samples passed a smell and taste test, the scientists ran laboratory tests for polycyclic aromatic hydrocarbons (PAHs), one of the toxic parts of oil, and dioctyl sodium sulfosuccinate (DOSS), a chemical found in dispersants. If the levels of chemicals fell below the FDA’s level of concern, the area reopened for fishing. The level of concern determines how much of a certain chemical will harm a human. By testing seafood samples and making sure the chemicals were below these levels, the FDA could determine when Gulf seafood was safe to eat.

Independent studies confirmed this and found no increased health risks for consumers of Gulf seafood. Since the DWH oil spill, scientists have continued to improve their ability to detect specific types and levels of chemicals in seafood. To learn more about the sampling that occurred and to access the data from these sampling programs, read our outreach publication The Deepwater Horizon oil spill’s impact on Gulf seafood at gulfseagrant.org/oilspilloutreach/publications.

### QUESTION #2: What are the impacts to wildlife?

The Gulf of Mexico is a complex aquatic ecosystem comprised of many species living in connected habitats. When oil enters an aquatic ecosystem, it could flow through the food web and influence entire populations and communities of interacting organisms. Food webs, diseases, and many other elements are all involved in understanding how oil spills impact wildlife. These interactions make it difficult to answer how the DWH oil spill affected wildlife. Scientists use a combination of laboratory and field studies to better understand the DWH oil spill’s effects.

In fish, exposure to oil at levels like those in the surface waters near the wellhead during the DWH oil spill correlates with increases in skin lesions and problems with heart and nervous system development, energy consumption, buoyancy (in embryos), heart function, growth, reproduction, and swimming ability. While the results of these lab and field studies indicate that oil affects individual fish, scientists are still working to understand if populations of fish were affected.

A variety of other animals — such as birds and dolphins — were also impacted by the DWH oil spill. For example, a mass die-off of a population of bottlenose dolphins living in the Gulf was linked to exposure to chemicals from DWH oil. The loss of these dolphins was from disease and other health effects caused by oil exposure from breathing oil and oil vapors and eating contaminated prey, among others. Birds exposed to oil experienced damage to the heart, plumage, liver, and blood, as well as migration problems and death.

While it is difficult to predict overall impacts of the DWH oil spill on the Gulf of Mexico, studying food webs sheds some light. In wetlands, certain animals like gulls, wading birds, and snails are especially sensitive to oil. Scientists think that the loss of those important species could throw wetland food webs off balance. In some reef communities the DWH oil spill reduced the amount...
of zooplankton around reefs for months after the spill. The shift changed the diet of predators like red snapper. The long-term investigation into the interaction between species and their environment continues.

View our outreach publications on the effects of the DWH oil spill on a variety of aquatic life, including oysters, dolphins, sea turtles, coral, fish, as well as fisheries and fisheries landings in the Gulf of Mexico at gulfseagrant.org/oilspilloutreach/publications.

**QUESTION #3: What cleanup techniques were used, and how were they implemented?**

During the DWH oil spill, responders used different methods to remove the oil. Offshore, responders focused on removing the oil using skimmers and controlled burns.

Skimmers are devices that remove oil from the sea’s surface before it reaches the coastline (Figure 2). Boats equipped with skimmers of different sizes removed oil near the site of the spill and in nearshore areas, such as beaches, bays, and around marshes. Responders also removed oil on the surface by enclosing it with fireproof booms and burning it.

Dispersants (Corexit 9527A and 9500A) break up the oil at and below the surface. Chemical dispersants not only help to reduce the amount of oil reaching the shorelines but also break the oil into small droplets. The droplets are more available to the microbes that eat oil and naturally remove it from the water. In the Gulf of Mexico hundreds of species of microbes such as bacteria, archaea, and fungi eat oil as part of their natural diet, removing it from the environment. This process is known as biodegradation. Microbes play a key role in the biodegradation of oil in the ocean and can reduce oil’s overall environmental impact.

Emergency responders applied roughly 1.8 million gallons of the dispersants Corexit 9527A and 9500A (referred to as Corexit in this document) to break-up the oil and reduce the amount of oil reaching the shoreline. Responders applied dispersants in three ways:

- A remotely operated vehicle (ROV) sprayed dispersants directly into the oil and gas coming out from the wellhead.
- Boats applied dispersants at the surface near the well site and drill rigs to control volatile organic compounds (VOCs) that posed health and safety threats to the crews.
- Planes sprayed dispersants at the surface to disperse oil slicks that were more than five nautical miles from the well site.

Closer to shore, emergency responders focused on protecting the affected shoreline, especially sensitive areas, using skimmers and containment booms. Booms float on the surface of the water and act as physical barriers to floating oil. Booms placed across inlets reduce the risk of oil passing through into sensitive areas. In an ideal situation, booms quickly contain floating oil. However, water currents, waves, and wind can cause oil to make its way over and under the boom.

Once the oil made its way to shore, responders surveyed the area to better define the affected habitat and...
determine the appropriate method(s) for cleaning the shoreline. Responders recorded those methods as part of the Shoreline Cleanup Assessment Techniques (SCAT) Program. SCAT teams surveyed the shoreline; recorded the amount of oil, type of shoreline, habitat, and animals found in the area; and noted archeological or historic sites. Based on this information, an appropriate clean-up plan was created.

Shoreline cleanup on beaches involved sifting sand, removing surface residual balls (sometimes referred to as tarballs) on the beach, and digging out tar mats. Responders preferred to let most oiled marshes recover naturally, because of concerns about causing more damage during cleanup of these highly sensitive habitats. However, oiling along 44 miles of marsh shoreline was heavy enough to warrant active removal, using careful methods to minimize damage and speed recovery. Marsh cleanup involved minimally invasive techniques, such as swabbing the marsh with materials that absorb oil or low pressure flushing with water.

Check out our outreach publications on dispersants, including their role, fate, and effects on aquatic life during DWH at gulfseagrant.org/oilspilloutreach/publications.

QUESTION #4: Do dispersants make it unsafe for beachgoers to swim in the water?

Dispersants were used in emergency response efforts during the DWH oil spill. While direct contact with full-strength dispersant can cause respiratory and skin irritation, dispersant becomes diluted in surrounding waters. The dispersants used during DWH oil spill are made up of several compounds, including DOSS. Scientists estimated the level of dispersant in the Gulf post-DWH by monitoring DOSS, a common ingredient in over-the-counter household products, to understand if dispersant could pose a threat to beach-going swimmers. During the spill, emergency responders applied dispersant at the wellhead and distances more than 3.45 miles from shore (Figure 3). Teams of scientists sampled areas around the DWH wellhead in May and June 2010 to understand what the highest levels of dispersant in the environment might be. They collected water samples from the surface down to depths of nearly one mile from more than 26 sites near the wellhead. The highest level of dispersant near the wellhead was one part per million as estimated from DOSS levels. This is 100 times lower than the levels of dispersant that are known to cause harm to the human
liver in studies by the EPA, FDA, and National Institutes of Health (100–250 ppm). Scientists often look to the liver to understand how a chemical may effect human health since the liver is key in breaking down foreign chemicals in the body. Work continues to better understand the public health implications of dispersant and DOSS.

For more information on the intersection between dispersants and human health, please read our outreach publication, Is it safe? Examining health risks from Deepwater Horizon oil at gulfseagrant.org/oilspilloutreach/publications.

**QUESTION #5: Where did the oil go and where is it now?**

Using satellite images, NOAA determined that surface oil from the DWH oil spill reached a maximum area of 29,000 square miles, covering approximately 4.7 percent of the Gulf of Mexico’s surface (Figure 3). During and after the spill, oil mixed with Gulf of Mexico waters and made its way onto the seafloor in some coastal and deep-sea areas. Oil moved with the ocean currents along the continental shelf off Texas and to the coastlines of Louisiana, Mississippi, Alabama, and Florida. The oil reached approximately 1,313 miles of the 3,540 miles of Gulf of Mexico coastline. Scientists found evidence of oil southwest of the wellhead at depths between 3,200 and 4,000 feet below the surface in late May and early June. The subsurface was an area that had elevated amounts of PAHs compared to other areas.

Scientists developed seven categories to describe what happened to the oil:

- **Recovered at the wellhead** — oil was captured directly from the wellhead using a riser pipe insertion tube and top hat system.
- **Skimmed** — thin layers of oil were removed from the surface using skimmers.
- **Burned** — setting fire to freshly spilled oil reduced the amount of oil on the water.
- **Chemically dispersed** — chemicals applied to the oil broke the oil into small droplets and made it more available to microbes.
- **Naturally dispersed** — natural mixing, such as waves, caused the oil to break down and mix into the water column.
- **Evaporated or dissolved** — oil evaporated into the atmosphere when it reached the surface or dissolved in the water.
- **Unaccounted for** — scientists are still not certain what happened to a portion of the oil.

Recent studies show that about three to five percent of the unaccounted oil has made its way onto the seafloor (Figure 4). Oil and oil-derived carbon from the well polluted approximately 1,200 square miles of the seafloor around the well. Oil on the deep seafloor can persist for a long period of time due to cold temperatures, lack of sunlight, and low oxygen levels — all of which slow the breakdown of oil.

**FIGURE 4.** Researchers developed a budget calculator to estimate what happened to approximately 200 million gallons of oil ejected from the Macondo wellhead during the Deepwater Horizon oil spill. (Anna Hinkeldey)
To read more about where the oil from Deepwater Horizon oil spill went in the environment and the use of technology to study the spill, view our outreach publications, *Deepwater Horizon: Where did the oil go?* and *Underwater vehicles used to study oil spills*, at gulfseagrant.org/oilspilloutreach/publications.

**GLOSSARY**

**Aquatic ecosystem** — Communities of organisms that live in the water and are dependent on each other and on their environment. The main types of aquatic ecosystems are marine, estuarine, and freshwater ecosystems.

**Bacteria** — A member of a large group of unicellular microorganisms that have cell walls but lack organelles and an organized nucleus, including some that can cause disease.

**Community** — Groups of different species of organisms interacting with one another and with the environment in a specific region.

**Corexit 9527A and 9500A** — Dispersants approved for use in U.S. waters and those that were used to minimize the presence of surface oil slicks during the Deepwater Horizon oil spill.

**Dioctyl sodium sulfosuccinate (DOSS)** — A primary component of both dispersant formulas used in the Deepwater Horizon oil spill. It increases the attraction between oil and water molecules and hinders the formation of large oil slicks on the surface of the ocean. DOSS can also be found in consumer products such as detergents, cosmetics and laxatives and therefore can be found in coastal waters.

**Dispersants** — Chemicals that are used during oil spill response efforts to break up oil slicks and limit floating oil from impacting sensitive ecosystems such as coastal habitats.

**Food web** — A system of linked food chains within an ecological community.

**Habitat** — The place where an organism, population, or community lives.

**Polycyclic aromatic hydrocarbon (PAH)** — A chemical group found in many sources, including but not limited to oil, tar, ash, coal, car exhaust, chargrilled animal fats, and smoke from burning oil or wood.

**Population** — Organisms of the same species inhabiting a specified area.

**Prey** — An animal that is hunted and killed by another for food.

**Species** — Organisms forming a natural population or group of populations that transmit specific characteristics from parent to offspring.

**Volatile organic compounds (VOCs)** — Gases released from certain solids or liquids, such as oil. Inhaling these compounds for a long period of time can be harmful to one’s health.

**Zooplankton** — Very small animals, and the immature stages of larger animals, drifting in oceans, seas, and bodies of fresh water.

**REFERENCES**


REFERENCES


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