

# A Decade After the Largest Marine Oil Spill in History

This tragic disaster, which injured the entire ecosystem of the northern Gulf of Mexico, may have happened more than a decade ago - and by now, largely forgotten - but it continues to plague certain species. Find out what's happening 10 years after the Deepwater Horizon Rig explosion.

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## STORY AT-A-GLANCE

- In 2010, an explosion on the Deepwater Horizon rig in the Gulf of Mexico off the coast of Louisiana, led to the largest marine oil spill in history
- Changes in genetic expression have been identified in Barataria Bay dolphins, an area near New Orleans that's heavily polluted due to the spill
- Molecular profiling revealed shifts in genetic expression in the dolphins linked to immune response, cytoskeletal alterations and mitochondrial dysfunction
- The shift was most pronounced in dolphins thought to be exposed to oil from Deepwater Horizon
- Profiles from 2013 had the greatest alteration in gene expression, including in genes involved in immunity, inflammation, reproductive failure, and lung or cardiac dysfunction
- Previously, conditions including lung disease, inflammation, impaired stress response, altered immune status and reproductive failure have been found in the area's dolphins

In 2010, an explosion on the Deepwater Horizon rig in the Gulf of Mexico off the coast of Louisiana, led to the largest marine oil spill in history.<sup>1</sup> An estimated 210 million gallons of oil were released into the water. Along with 11 human deaths, the disaster killed an estimated 80,000 birds and 26,000 marine mammals.<sup>2</sup>

The area is home to 31 stocks of common bottlenose dolphins, which live in the bays, sounds and estuaries. As top predators, they act as sentinels for ecosystem health and researchers have identified a number of chronic disease conditions in dolphin populations exposed to the Deepwater Horizon oil.

Previously, conditions including lung disease, inflammation, impaired stress response, altered immune status and reproductive failure have been found in the area's dolphins.<sup>3</sup> Now, changes in genetic expression have been identified in Barataria Bay dolphins, an area near New Orleans that's heavily polluted.<sup>4</sup>

## Oil Spill Leads to Gene Expression Changes in Dolphins

Researchers with the University of Connecticut analyzed blood from 60 dolphins living in Barataria Bay and 16 dolphins living the much cleaner Sarasota Bay, looking for molecular differences. The blood was sampled during health assessments conducted from 2013 to 2018. According to the study, which was published in PLOS One, gene

expression profiling, which can sometimes enable early detection of disease, was used:<sup>5</sup>

*"In human and veterinary medicine, gene expression profiling has been used to identify molecular mechanisms underlying toxic responses and disease states. Identification of molecular markers of exposure or disease may enable earlier detection of health effects or allow for health evaluation when the use of specialized methodologies is not feasible."*

Study author Jeanine Morey explained that this type of molecular work can get to the root of the illnesses, helping to reveal what's causing the disease and dysfunction.<sup>6</sup> The profiling revealed shifts in genetic expression linked to immune response, cytoskeletal alterations and mitochondrial dysfunction. The shift was most pronounced in dolphins thought to be exposed to oil from Deepwater Horizon.

Further, profiles from 2013 had the greatest alteration in gene expression, including in genes involved in immunity, inflammation, reproductive failure, and lung or cardiac dysfunction.<sup>7</sup>

## **Changes May Be Passed Down to Future Generations**

Dolphins living in Barataria Bay are still feeling the effects of the oil spill. Study coauthor Sylvain De Guise previously found that 78% of the dolphins that lived through the spill are still suffering from health issues as a result.<sup>8</sup>

In 2022, it was estimated that the dolphin population in Barataria Bay declined by 45% due to the oil spill and will take 35 years to recover to 95% of its baseline population.<sup>9</sup> Further, even though more than a decade has passed, the population is just barely starting to recover.<sup>10</sup>

*"The population is currently at a minimum point in its recovery trajectory and is vulnerable to emerging threats, including planned ecosystem restoration efforts that are likely to be detrimental to the dolphins' survival ... Oil spills can have long-term consequences for the health of long-lived species; thus, effective restoration and monitoring are needed."*

Further, health assessments on the area's dolphins revealed not only long-term immunological alterations but also the potential for multigenerational effects.<sup>11</sup> The immune system alterations could make dolphins more susceptible to infectious diseases and hinder reproduction.

It's estimated that bottlenose dolphins in Barataria Bay have also suffered a 46% increase in failed pregnancies and a 37% increased likelihood of having adverse health effects.<sup>12</sup> According to De Guise:<sup>13</sup>

*"The Barataria Bay bottlenose dolphin population is not doing very well. If recovery is underway, it would be at its very beginning and would be contingent on no additional stressors."*

## **Sea Turtles, Birds Also Harmed by Oil Spill**

Even more than 10 years later, the Deepwater Horizon oil spill continues to harm wildlife. At the time of the spill, up to 7,600 adult sea turtles and 166,000 small juvenile sea turtles were killed, while another 35,000 hatchlings were lost.<sup>14</sup> About 12% of the area's brown pelicans and 32% of laughing gulls also died in the spill, while 1 million offshore and coastal birds also died from the oil.<sup>15</sup>

A report released by the U.S. government in 2015 summed up the damage caused by not only the oil released but also toxic dispersants sprayed into the ocean this way:<sup>16</sup>

*"These injuries affected such a broad array of linked resources and ecological services over such a large area that they can best be described as an injury to the entire ecosystem of the northern Gulf of Mexico."*

A report from the National Wildlife Federation released in 2020 described several species still struggling, including endangered Kemp's ridley sea turtles, Bryde's whales and corals, along with bottlenose dolphins. David Muth, director of the National Wildlife Federation's Gulf of Mexico Restoration Program, explained in the report:<sup>17</sup>

*"For many wildlife in the Gulf, the decade-old Deepwater Horizon oil spill is not over. We will probably never understand the full extent of the damage, but we do know that we have an obligation to restore the Gulf of Mexico and to ensure that a disaster on this scale never happens again."*

## Sources and References

<sup>1</sup> [Britannica, Deepwater Horizon oil spill](#)

<sup>2, 4, 6, 13</sup> [NBC News August 24, 2022](#)

<sup>3, 5, 7, 8</sup> [PLoS ONE 17\(8\): e0272345 | doi: 10.1371/journal.pone.0272345](#)

<sup>9, 10</sup> [Conserv Biol. 2022 Aug;36\(4\):e13878. doi: 10.1111/cobi.13878. Epub 2022 Feb 16](#)

<sup>11</sup> [Environ Toxicol Chem. 2021 May;40\(5\):1308-1321. doi: 10.1002/etc.4980. Epub 2021 Feb 17](#)

<sup>12, 14</sup> [NOAA Fisheries, Marine Life in Distress](#)

<sup>15</sup> [PBS April 7, 2020](#)

<sup>16</sup> [The National Wildlife Federation, Deepwater Horizon's Impact on Wildlife](#)

<sup>17</sup> [National Wildlife Federation, Press Release April 7, 2020](#)

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