Four years after the BP Deepwater Horizon Oil Disaster

Impacts and Studies

Impacted Resource	Known and Published Impacts*
Sea Turtles	• 1,149 sea turtles were collected (613 dead) during the response efforts (4/30/10 - 4/12/11),[1] 456 sea turtles were visibly oiled (18 dead).[2] • Of the total number of sea turtles collected 809 (481 dead) were endangered Kemp's ridley sea turtles.[3] • Tens of thousands of sea turtles were located in coastal waters within the surface oil extent and exposed to oil.[4] • 278 sea turtle nests (14,700 hatchlings) were relocated from the Gulf to the Atlantic.[5]
Birds	• 600,000 to 800,000 coastal (from shore to 40 km offshore) birds died as a result of Deepwater Horizon oil disaster.[6*] • 8,500 live impaired or dead birds were collected as part of wildlife rescue and recovery NRDA operations.[7] • At least, 2,642 birds were visibly oiled (80 percent dead at time of collection or died after collection)[8] • It is estimated that 25 percent of the North American population of Northern gannets was in the Gulf at the time of the well blowout, including more than 50,000 immature birds.[9*] • Important Bird Areas from Louisiana to Florida were oiled.[10] • Mallard duck eggs were tested in lab experiments as a model for toxicity of weathered oil to Gulf waterbirds. Weathered crude oil was toxic to exposed mallard eggs when 8.3 to 14.6 percent of the shell surface was covered.[11*]
Marine Mammals	• Health assessments of dolphins in Barataria Bay found that the Barataria Bay dolphins were 5 times more likely to have moderate to severe lung disease than dolphins at control sites and in previous studies of wild dolphins. Of the 29 dolphins evaluated from Barataria Bay, 48% were given a guarded or worse prognosis, and 17% were considered poor or grave, indicating that they were not expected to survive.[12*] • Aerial surveys observed Risso's dolphins, spinner dolphins, pantropical spotted dolphins, striped dolphins, bottlenose dolphins and sperm whales swimming in oil in offshore waters.[13] • Early NRDA reports suggest thousands of marine mammals were exposed to oil.[14] • 171 cetaceans were stranded during the DWH response phase (4/30/2010 to 5/24/2011). The majority of these were bottlenose dolphins. The total number also included 2 melon-headed whales, 6 spinner dolphins, 2 sperm whales, 2 Kogia spp., and 4 unknown species.[15] • Since February 2010, there has been a cetacean unusual mortality event (UME) in the Gulf. In total, 1,164 cetaceans have stranded (95% dead). The majority of these have been bottlenose dolphins. [16] • 1050 cetaceans stranded during and since the Deepwater Horizon response (April 30, 2010 to April 6, 2014).[17] • An unusual number of premature, stillborn, or neonatal dolphins stranded in 2011.[18] • Cetacean deaths are thought to be underestimated. One analysis suggested that carcasses are recovered, on an average, from only 2 percent of cetacean deaths.[19*] • An unusually cold winter and historically high volumes of freshwater entering the Gulf

	also occurred during the unusual mortality event. These stressors plus the BP DWH oil disaster are thought to contribute to the dolphin deaths and illnesses in the Gulf.[20] * • Passive acoustic monitoring results indicate that sperm whales activity decreased at stations nine miles from DWH well.[21]*
Oysters	• Oysters in Louisiana in 2010 suffered high mortality rates on both public and private grounds in Brenton Sound and Barataria Basin.[22] • Some sites had 100 percent mortality of seed and sack size oysters.[23] • Spat settlement was reduced or absent in areas through fall of 2011 and 2012.[24]
Gulf Killifish	• Fish had increased expression of the CYP1A protein, a common biomarker for exposure to select polycyclic aromatic hydrocarbons (PAHs).[25]*, • Fish eggs exposed to oil developed with damage to gill tissue.[26]* • Fish eggs exposed to DWH oiled sediments had delayed hatch.[27]*
Sargassum	• Patches of Sargassum had visible oiling and tar balls.[28] • Sargassum was burned during cleanup.[29]
Deep -Sea Corals	• DWH significantly impacted corals roughly 7 kilometers from the wellhead. Bare coral skeletons were exposed and coral showed signs of tissue damage. The material on corals and the sediment at the base of the corals matched the biomarker for Macondo Oil.[30]* • Multiple coral communities, up to 22 kilometers from the spill site and at depths over 1800 meters, were impacted by the spill.[31]
Shallow-Water Corals	• Settlement and survival of coral larvae decreased significantly following exposure to increased concentrations of DWH crude oil, weathered oil, and dispersant. [32]*
Marine Fish	• On a weekly basis, about 5 percent of bluefin tuna larval were predicted to be affected by surface oil, and about 11 percent by contaminated water.[33, 34*] • There was an estimated 20 percent reduction in the 2010 bluefin tuna larval year class, which is estimated to result in roughly a 4 percent reduction in spawning biomass.[35]* • Lab studies revealed that DWH oil caused deformed or damaged hearts in bluefin tuna, yellowfin tuna and amberjack.[36] • Fish with lesions were documented around the Gulf of Mexico in 2010-2012. Scientists determined that by 2012 the overall frequency of lesions in northern Gulf of Mexico (NGM) fishes in the vicinity of the Deepwater Horizon had declined 53%, with severity also declining Lesions were most prevalent in some bottom-dwelling species along the continental shelf edge north of the Deepwater Horizon site.[37]
Zooplankton	• Zooplankton accumulated oil derived PAHs from the DWH disaster.[38]*
Shorelines & Marshes	• 1,053 linear miles of shoreline were oiled.[39] • A total of 463.8 miles of marsh were oiled around the Gulf: 436.2 miles in Louisiana, 21.5 miles in Mississippi and 6.1 miles in Alabama.[40] • Tarballs were found with elevated numbers of *Vibrio vulnificus* on beaches in MS and AL. *Vibrio vulnificus* is a bacterium that can cause illness in humans.[41]* • Changes in community structure of microbial eukaryotes occurred indicating exposure and response to a disturbance event, such as the oil disaster. Pre-spill assemblages of Metazoa shifted to dominantly fungal communities post-spill.[42]* • 400 – 435 square kilometers of marsh showing signs of stress post-oil in Louisiana. Rainfall was normal and no storm events occurred in study area.[43]* • Marsh erosion amplified in oiled marshes in Louisiana.[44]*

Deep-Sea Sediments	• Reduced species diversity, community shifts and increased chemical loads were documented in the deep-sea benthic environment, indicating significant and moderate impact roughly 24 and 148 square kilometers surrounding the well head, respectively.[45]*
Human Use	• The federal fishery closure included up to 88,522 square miles, or about 37 percent, of federal waters in the northern and eastern Gulf. • State fishing grounds in LA, MS, AL and FL were closed for different durations, affecting commercial, recreational, and subsistence fishermen. • May - August of 2010, the number of for-hire fishing trips in MS, AL, LA and west FL decreased 98, 80, 60 and 33 percent, respectively, compared to the 10 year average in each of those states. • May - August 2010, the number of angler trips in personal or rented boats declined between 13 to 23 percent from the 10-year average in AL, LA and MS. In west FL the effort was redirected.[46, 47] • Over ten million recreational user days were lost.[48]

*The starred impacts have been published in peer-reviewed scientific journals.

Resource	Observations and Preliminary Findings
Red Snapper	• Preliminary results indicate that red snapper had low recruitment rates in both 2011 and 2012.[49]
Offshore Seaweed	• Pre-spill rubble habitats associated with unique deep banks (45-90m) were prominent features harboring the highest known seaweed diversity in the northern Gulf. However, preliminary results indicate that this diversity was severely depressed or absent in four post-spill collecting cruises.[50]
Foraminifera	• Deformed foraminifera were observed in 8 out of 42 deepwater benthic samples.[51] • Preliminary findings indicate that heavy oiling reduced standing stock and species composition of foraminifera in oiled Bay Jimmy marsh in Louisiana. Four percent of total assemblage of marsh foraminifera deformed. [52]
Oysters	• Preliminary results from lab experiments found that oil and dispersant were more toxic to oysters together than alone and that some larvae had a decreased ability to swim when exposed.[53]
Copepods	• Preliminary findings show that copepods exposed to oil and/or dispersants had lower escape velocities and trajectories than copepods not exposed to oil and/or dispersants. This could result in a reduced ability to escape predation.[54]
Insects and spiders	• Preliminary results from coastal Louisiana: ◦ Terrestrial arthropod density at oiled sites was suppressed by 50% compared to control sites.[55] ◦ The number of ant colonies is significantly lower in oiled sites versus reference sites.[56] ◦ More than two years post-spill, insects in cages in oiled marshes exhibited a greater mortality than those in unoiled reference marshes.[57] Possible exposure to aerosols from asphalt mats may be related to mortality.[58] ◦ Number of katydids was lower in first 45 meters of oiled marshes than in reference sites.[59]
Deep-Sea sediments	• Upper layer of sediment was oil rich down to 9 centimeters in February 2011. [60] • Ten times the amount of marine snow after well blowout.[61] • Preliminary results indicate that macrofaunal abundance was associated with increased hydrocarbon concentrations in sediments near deepsea corals.[62]
Whale sharks	• Whale shark sightings data indicate a potential shift in distribution and/or abundance of whale sharks during 2011.[63] • Fewer sightings of whale sharks in the Gulf during 2011 than expected from 2003 -2009 trend.[64] • More than one third of 2002 - 2009 sightings overlapped 2010 oil footprint.[65]
Blue Crabs	• Preliminary results from laboratory toxicity experiments indicate that dispersed oil was more toxic to megalopae than either oil or dispersant alone.[66]
Birds	• Researchers for the Minnesota Department of Natural Resources have found evidence of petroleum compounds and the chemical used to clean up the DWH oil in the eggs of pelicans nesting in Minnesota.[67] • Preliminary results indicate that seaside sparrows had less successful nests at oiled sites compared to control sites in 2012 and 2013.[68] • Early findings indicate that shorebirds at sites that were heavily disturbed following the oil spill had significantly different fat stores than those at undisturbed sites.[69] • Based on estimated oiling rates of collected shorebirds, 92,000 shorebirds were potentially oiled by the Deepwater Horizon oil disaster.[70]
Sperm Whales	• Sperm whale tagging study preliminary results indicate that some whale locations overlapped the oil footprint,[71] and that whales changed their behavior to avoid areas impacted by oil.[72]

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