OCEANA

Hindsight 2020:

LESSONS WE CANNOT IGNORE FROM THE BP DISASTER

Hindsight 2020:

LESSONS WE CANNOT IGNORE FROM THE BP DISASTER

APRIL 2020

Photo Credit: U.S. Navy

Contents

Authors: Patrick Mustain, Sarah Giltz, PhD, Christine Ayala and Diane Hoskins

Designer: Jessica Howard

Photo Credit: U.S. Coast Guard

Executive Summary

On April 20, 2010, the BP exploratory rig *Deepwater Horizon* exploded, killing 11 workers and setting off the largest oil spill in U.S. history. Oil gushed from the seafloor for 87 days, ultimately spewing hundreds of millions of gallons of oil into the Gulf of Mexico.[1]

Chaos and uncertainty ensued. Residents across the Gulf watched helplessly as oil crept toward their shores, while the government, BP and its contractors scrambled unsuccessfully to contain the spill for months.

It was one of the worst environmental disasters this country has ever seen. Oil washed up on 1,300 miles of shoreline, from Texas to Florida, oiling beaches and wetlands — and killing tens of thousands of birds, sea turtles, dolphins and fish.[2] Despite the vast resources spent on oil removal efforts, the government estimated that as much as 60 million gallons of oil remained in the environment.[3]

The economic impacts began almost immediately. Tourism to the Gulf Coast declined, and businesses dependent on coastal tourism lost revenue and were forced to lay off workers.[4] The prospect of oiled beaches depressed real estate values.[5] Fisheries closed and demand for Gulf seafood plummeted.[6] A government study estimated the loss in the seafood industry at nearly $1 billion, and the recreation industry, as a whole, lost more than a half-billion dollars.[2,6]

Ten years later, it is important to look back at how this catastrophe happened; how it impacted the Gulf's ecology and economy; how those effects are still being felt today; and if the disaster changed the industry's approach to offshore oil drilling. To answer these questions, Oceana reviewed government documents, media coverage, scientific studies, reports from nonprofit organizations and interviewed Gulf Coast residents, scientists, business owners and policy experts.

What we found was disturbing. The poor safety culture and inadequate government oversight that set the stage for catastrophe persists. If anything, another disaster is more likely, because the industry is drilling deeper and farther offshore, which increases the likelihood of a spill and makes responding to a spill more difficult.[1,7] The reckless push to massively expand the footprint of offshore drilling to new areas comes at the same time the Trump administration is rolling back the already too-few safety measures that were put in place after the spill.[8]

Years later, large swaths of the ocean floor around the wellhead resemble a toxic waste dump, devoid of the kinds of marine life that typically lives there.[9,10] Surveys of animals throughout the water column have found declines of certain fish, shrimp and squid ranging from 50% to 85%.[11] Important marshes that protect the coast from storm surges and erosion were lost, and many of them may never recover.[12,13]

Alarmingly, at least one new study revealed that hundreds of thousands of gallons of dispersants released underwater were apparently less effective than previously thought. The high pressure at the depth of the well caused the oil and gas mixture

that was released in the blowout to disperse on its own, and researchers concluded that the already dispersed oil could not be dispersed any further.[14] So, this study suggests that those chemicals may have been dumped into the Gulf for no benefit at all.

Oil is toxic on its own and dispersants are also hazardous. More than 100,000 people were involved in the BP *Deepwater Horizon* oil removal and response, and many were exposed to crude oil or chemical dispersants.[15] Workers reported a range of health problems, including tightness of the chest and burning in the nose, eyes and lungs that in some cases continued for years after exposure.[16] Workers showed persistent or worsening health problems even seven years after the *Deepwater Horizon* disaster, including blood disorders and heart problems.[17]

Some workers and coastal residents who were exposed to waste materials may not have been aware of the dangers oil production poses. Many waste materials from both oil exploration and production are exempt from the federal safeguards meant to protect people and the environment from exposure.[18] This exemption is the apparent result of the oil and gas industry's lobbying.[19] For example, benzene is considered a human carcinogen by the Environmental Protection Agency (EPA).[20] But, if benzene waste is generated in the production or exploration of oil, it is treated as nonhazardous, even though it is known to cause cancer.[18]

Overall, BP's response to the disaster was slow, inadequate and incomplete. Before it could begin drilling, BP submitted a spill-response plan. A review of this plan should have revealed that in no way was BP prepared to manage a blowout. BP's response plan contained embarrassing mistakes, including a reference to seals and walruses — animals not found in the Gulf of Mexico — indicating that at least portions of the plan had been copied and pasted from documents related to drilling in the Arctic.[1] The only effort named in the pre-drilling plan to stop an oil spill at its source was drilling a relief well — a process that takes months.[1]

The dangers of offshore oil drilling are not limited to huge disasters like the BP *Deepwater Horizon*. The infrastructure footprint of the oil and gas industry in the Gulf is massive. As of 2016, there were 2,165 offshore platforms and more than 26,000 miles of pipeline in the Gulf of Mexico — more than enough to circle the Earth.[21] Each of these is a potential spill waiting to happen, and indeed, hundreds of oil spills occur in U.S. waters every year.[22] Between 2007 and 2018, more than 7,000 oil spills occurred in federal waters, an average of nearly two every day.[22]

All these dangers — the environmental impacts, economic impacts and health impacts — now threaten many more coastal communities. President Trump proposed to open nearly all U.S. waters to offshore drilling.[23]

This would be a direct threat to coastal economies that depend on clean beaches and healthy oceans. Fishing, tourism and recreation support more than 2.6 million jobs and generate nearly $180 billion in GDP in U.S. East and West Coast states.[24]

Photo Credit: Department of Energy

Key Findings:

- The BP *Deepwater Horizon* disaster had catastrophic impacts on Gulf ecosystems and economies, and many impacts are still felt today.
- Offshore oil drilling remains dirty and dangerous 10 years after the BP *Deepwater Horizon* disaster. It is not a matter of whether another spill will occur, but when.
- We may never know the full extent of just how much damage the disaster caused.
- BP's response to the catastrophe was slow, inadequate and incomplete. Following a national commission's review of the disaster, far too few recommendations were implemented.
- Government regulators and the offshore oil and gas industry remain poorly suited to prevent and deal with a similar scenario today.
- Housing markets across the Gulf Coast region experienced a decline in prices between 4% and 8% that persisted for at least five years.[25]
- The BP disaster directly reduced popular recreational activities — including boating, fishing and beach visits — between May 2010 and November 2011.[26] This translated to a loss in the recreation industry of more than $500 million.[2]
- Fisheries closed and demand for Gulf seafood plummeted.[6] A government study estimated the loss in the seafood industry at nearly $1 billion.[6]

This report details those findings and demonstrates that expanding this dirty and dangerous industry would put human and environmental health and safety at risk — as well as millions of jobs and billions of dollars in GDP.

Recommendations:

President Trump should halt all efforts to expand offshore drilling to new areas.

President Trump should direct the Bureau of Safety and Environmental Enforcement (BSEE) to reverse efforts to weaken safety regulations.

President Trump should direct the Bureau of Ocean Energy Management (BOEM) to deny all pending geological and geophysical seismic permits for oil and gas in the Atlantic Ocean.

Congress should enact a moratorium on expanded offshore drilling.

Congress should incentivize investments in clean, renewable energy.

Photo Credit: Konoplytska/ Shutterstock

Introduction

The meeting of the Mississippi River and the Gulf of Mexico was once an unspoiled network of estuaries. This rich ecosystem provides sustenance and habitat to many species of plants and animals. Over the last century, however, these wetlands have been dramatically altered for the sake of coastal development, seafood processing, navigation and other industrial activities – including a massive amount of oil and gas production.

In the 1890s, oil and gas companies began building piers to extend their reach out into the Gulf of Mexico to tap wells offshore. In March 1938, workers on the Creole platform – the first freestanding offshore oil production facility – drilled a well in 14 feet of water a mile and a half off Louisiana's coast.[1] Since that first offshore rig, companies all over the world have lobbied for rights to tap fossil fuels buried deep below the ocean floor.

The expansion of oil and gas drilling into deeper and more remote waters over the subsequent decades has been marked by oil spills, shipping disasters and rig failures. Despite technological advances and adoption of limited safety standards, the risks inherent in offshore drilling persist.[8] And so, the birthplace of offshore drilling also became the site of its latest catastrophe.

On another spring day, about 70 years after the Creole platform workers drilled their first well, workers on another rig in the Gulf — BP's *Deepwater Horizon* — were sealing an exploratory well when a preventable tragedy struck.

A high-pressure surge of gas from the well caused the drill pipe to buckle. The device meant to seal off the pipe in case of such a surge — the blowout preventer — failed. The resulting blowout led to an explosion that killed 11 workers — and for the next 87 days, more than 200 million gallons of oil poured into the Gulf of Mexico.[1]

Investigators would later find that a chain of bad decisions and mistakes made by multiple companies and government regulators laid the groundwork for the disaster, and had they been implementing proper safety measures and oversight, the initial surge that started the disaster could have been prevented.[1]

The BP *Deepwater Horizon* disaster was the worst oil spill in U.S. history, but it was hardly an isolated incident.[27] Hundreds of oil spills occur in U.S. waters every year. Within the last 60 years, 17 spills have released 42,000 gallons of oil or more.[28] With offshore oil and gas activities, spills can happen during each phase of the process, including exploration, production, transportation and use.[28]

This disaster should have been a wake-up call. Instead of curtailing offshore oil and gas production and beginning the much-needed transition to clean energy, President Trump is proposing opening nearly all U.S. waters to offshore oil and gas activities in his draft proposed five-year plan for offshore drilling.[23,29]

By looking back at the conditions that led to the BP spill, and the hundreds of others that happen every year, we have a painfully clear view of the future that other coastal communities can expect, should the government's drilling plans move forward. In hindsight, we have an opportunity to examine how that catastrophe continues to impact the Gulf.

Photo Credit: U.S. Coast Guard

Industry Snapshot: Unsafe, Unprepared, Eager to Expand

In 2019, Oceana released a report examining the safety record and culture of the oil industry prior to the BP disaster, and how the safety and regulatory landscape changed afterward.[8] The report found that decades of poor safety culture and inadequate government oversight laid the conditions for the country's worst oil spill to date.

A decade later, the safety culture has not improved, and oversight of the industry remains deficient. In fact, the oil industry is successfully lobbying the Trump administration to roll back the limited safety rules that were put in place after the spill.[8]

Wherever there is drilling, there is spilling, and some spills are more devastating than others. In 1969, Union Oil Company's platform in the Santa Barbara Channel released an 800-square-mile oil slick, 30 miles off California's coast — an estimated 3.36 million to 4.2 million gallons of oil.[1,30]

In 1989, the tanker Exxon Valdez ran aground on Bligh Reef in Prince William Sound, releasing more than 11 million gallons of oil, covering more than 1,300 miles of shoreline.[31] The spill directly killed more than 300 harbor seals, 2,800 sea otters, 250,000 seabirds and up to 22 killer whales.[32] More than 30 years after the spill, some killer whale and seabird populations in Alaska have not recovered.[33] Even a small amount of oil can injure commercially important fish, like herring and salmon, potentially harming fish populations for years.[34] The local Prince William Sound Pacific herring fishery collapsed after the Exxon Valdez spill and after decades has not recovered.[35] After an oil spill of this magnitude, the ecosystem is never the same.

The spills that make news headlines are not the only threats to coastal ecosystems and economies. In United States federal waters, at least 7,000 oil spills occurred between 2007 and 2018 — an average of nearly two spills every day.[22] Despite still causing environmental damage, smaller spills receive less media attention, less regulatory oversight and even fewer cleanup resources.[36]

Drilling Is Getting Riskier

In recent decades, the offshore drilling industry has made technological advances to move farther offshore into deeper water, but the technology to deal with a disaster at these new depths has not kept pace.[1] The great depth and increased pressure of deep water wells can make preventing, stopping or cleaning up an oil spill even more difficult and dangerous than it was in the past.[1] A 2013 study found that for an average platform, every 100 feet of added depth increases the probability of an incident by 8.5%.[7]

Photo Credit: Healthy Gulf

A 2014 Government Accountability Office (GAO) study highlighted the increasing vulnerability of U.S. energy infrastructure to severe weather driven by climate change.[37]

In 2005, high winds and flooding from Hurricanes Katrina and Rita caused extensive damage to the region's natural gas and oil infrastructure, destroying more than 100 platforms, damaging 558 pipelines and shutting down numerous refineries.[37]

In 2004, a mudslide triggered by Hurricane Ivan sank a Taylor Energy oil platform located off the coast of Louisiana, burying numerous wells deep beneath sub-surface mud.[38] As a result, oil and gas leaked into the Gulf of Mexico for almost 15 years unchecked — marking the longest offshore disaster in U.S. history. The leak is temporarily contained, but there is no permanent solution.[38] Years of uncontained pollution caused a persistent oil slick, which coated miles of ocean water around the site.[38] If the chronic leak is not permanently stopped, it could continue for another 100 years or more.[39] With the predicted increase in hurricane intensity, nearshore and offshore oil infrastructure will be increasingly in danger of storm damage.[40,41]

Drilling Industry's Safety Culture Is Lacking

The Bureau of Safety and Environmental Enforcement (BSEE) is the agency tasked with promoting offshore safety, protecting the environment and conserving offshore resources through regulatory oversight and enforcement.[42] The agency was created in 2011 when investigations into the causes of the BP disaster revealed conflicts of interest between the industry and government regulators.[1,43] But in 2016, the GAO still found severe inadequacies in BSEE's ability to carry out effective investigations, ensure environmental compliance and conduct enforcement.[44] GAO noted that BSEE lacks the capabilities to properly utilize enforcement tools (i.e., warnings and fines) and continues to rely on many of the same policies and procedures that were used before the BP *Deepwater Horizon* disaster.[44,45] These practices were insufficient to prevent the catastrophe, yet many are still being relied upon today.

It is not surprising, then, that from 2007 to 2018 there were 115 fires and explosions in federal waters on average every year — that's roughly one every three days.[46,47] There were also nearly 50 fatalities, over 3,000 injuries and 42 losses of well control over that same period.[47]

After its investigations into the BP disaster, BSEE issued new safety standards in what is known as the Well Control Rule in 2016.[48,49] One of the weaknesses Oceana pointed out repeatedly in the rulemaking process was the authority for BSEE to grant waivers to the safety provisions, raising questions as to whether they would be meaningfully applied. In fact, in 2019, Politico reported that BSEE granted 1,700 waivers to safety requirements put in place after the BP *Deepwater Horizon* disaster.[50] Politico reported that BSEE allowed numerous safety provisions of the Well Control Rule to be sidestepped by operators, including testing requirements for blowout preventer systems — the device that failed to prevent the BP *Deepwater Horizon* blowout.[50]

President Trump in 2017 issued an executive order that directed the Department of the Interior (DOI) to consider revising several regulations affecting offshore oil and gas operations.[51] As a result, BSEE is rolling back offshore safety measures under the guise that these rules are overly burdensome to industry compared to the safety benefits they would provide.[52,53] A recent analysis by the Center for American Progress showed that in the last two years, BSEE has conducted fewer inspections of offshore oil and gas operations than in previous years even though worker injuries and oil spills increased.[54]

Critics of the agency's "industry knows best" approach to regulation say it runs counter to its mandated role, which is to promote safety, protect the environment and conserve offshore resources.

"The only significant thing that happened was that BSEE did issue a regulation around blowout preventer devices," said Cyn Sarthou, executive director of the New Orleans-based environmental policy organization Healthy Gulf. "Under the new administration, they have rolled that back. Even that one regulation, which was very little … has now been rolled back."

"It's a regulatory agency and they [tout] how the amount of production had increased in the Gulf — not how much safer it was, not how much more

> **It looks like we didn't learn enough from *Deepwater Horizon*.**
>
> **TRACEY SUTTON**
> *NOVA SOUTHEASTERN UNIVERSITY*

regulated it was — but how much more production had happened under their watch, which is not actually their job," Sarthou said. "Their job is to regulate and ensure safety."

The poor safety culture and lack of oversight that led to the BP disaster persist. Instead of strengthening safety regulations, the industry and the Trump administration are dismantling the few protections that had since been put in place. Without effective oversight and a more robust safety culture, another disaster at the level of *Deepwater Horizon* may be just as likely today as it was 10 years ago.

President Trump has also proposed expanding future oil and gas leasing to the Atlantic, Pacific and Arctic oceans, as well as off Florida's Gulf Coast.[23,29] If this plan goes forward, the industry will bring its unsafe drilling practices and its associated risks to new coastal communities.

"The deeper you go drilling, the greater the odds of another accident," said Tracey Sutton, who researches the ecology of the Gulf from the surface down to the deep sea at Nova Southeastern University in Fort Lauderdale, Florida.

Deepwater Horizon was drilling in about 1,500 meters of water (almost a mile deep).[1] In 2017, 52% of the offshore oil from the United States came from ultra-deep wells, which are 1,500 meters or more.[55] "That's the majority of our oil production. So, the industry is still going deeper," Sutton said.

"The ultimate hope is that we would have learned lessons from *Deepwater Horizon* that would affect the behavior of oil and gas exploration. The problem right now is that we're in a current culture where the desire — you could call it greed — for product and for profit is exceeding the safeguards," Sutton said.

Industry's Response to Spills Is Inadequate

Methods for cleaning up oil have remained largely unchanged since the 1989 Exxon Valdez disaster released 11 million gallons of oil into Alaskan waters.[1,31] These outdated cleanup techniques include deploying floating barriers called booms to prevent oil from spreading along the ocean surface, skimming to remove oil from the surface, burning the oil and using chemical dispersants to break oil into smaller droplets.[56]

These methods are far from effective. Following the 2010 BP disaster, oil removal efforts left an estimated 60 million gallons of oil in the Gulf of Mexico — more than five times the amount released by Exxon Valdez.[3,57]

Stopping the flow of oil into the environment can take months or even years. It took more than 14 years before the Taylor Energy spill was contained. Although now the oil is being captured and disposed of, the well is still leaking to this day.[39,58] The 1979 Ixtoc spill in the Gulf of Mexico, which gushed about 1 million gallons per day, took almost 10 months to stop.[59] BP's *Deepwater Horizon* could not be capped for 87 days following the blowout in 2010.[1]

Not only are they difficult to prevent, contain and clean up, but spills are also typically far larger than reported. Satellite images show that spills are on average more than four times larger than reported by oil companies.[60]

Photo Credit: Elliott Cowand Jr./ Shutterstock

Photo Credit: Julie Dermansky

BP *Deepwater Horizon*: A Disaster Waiting to Happen

The *Deepwater Horizon* was an exploratory rig that tapped the Macondo Prospect — a sub-seafloor oil reserve about two and half miles from the ocean's surface.[1]

On April 20, 2010, as workers were attempting to cap the well, a surge of high-pressure gas buckled the drill pipe, which prevented the blowout preventer device from being able to cut and seal off the pipe. High-pressure oil shot up the pipe to the rig, where it ignited and exploded, killing 11 workers. Oil would continue to pour into the Gulf of Mexico for the next 87 days. Investigators later identified a series of mistakes from the industry that led directly to the disaster, and that had proper safety measures been followed, the surge may never have happened in the first place.[1]

The spill released oil at the rate of one Exxon Valdez-sized oil spill every week, for 12 weeks — the largest offshore oil spill in U.S. history.[26] Oil slicks on the water extended for over 43,000 square miles, an area almost the size of Louisiana.[26] However, those slicks did not reflect the full extent of the spill. A recent study found that the toxic footprint of the spill extended far beyond the area that the satellite images had indicated.[61] Oil knows no state boundaries and washed up on at least 1,300 miles of Gulf shoreline, from Texas to Florida, including 687 miles of wetlands, mostly in Louisiana.[62,63] Heavily oiled sites saw plant cover decrease by up to 53%.[62] Oil washed up on 600 miles of sandy beach.[62] Responders removed approximately 100 million pounds of oiled waste material.[62] Scientists estimate that 1,235 square miles of seafloor around the well — about the size of half a million football fields — contained oiled sediments.[62] The spill killed tens of thousands of birds, sea turtles, dolphins and fish.[2]

Julian MacQueen is the founder of Innisfree Hotels, a company that owns multiple hotels from Pensacola, Florida to Orange Beach, Alabama. He recalled the horror many Pensacola residents experienced as the oil slowly made its way toward their shores.

“We had people come to the beach and look at it like they were looking at [the beach] for the last time. We didn't know if the beaches were going to be black forever,” MacQueen said. “We didn't know if our investment after 30 years was doomed.”

Investigating What Went Wrong

On May 21, 2010, President Obama created the National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling — a nonpartisan body

Photo Credit: Environmental Protection Agency

tasked with investigating the causes of the disaster, improving the government's ability to respond to oil spills and recommending reforms to make offshore energy production safer.[64]

After an extensive investigation, the commission determined that the root causes of the blowout were systemic failures of both industry management and government oversight of the offshore oil and gas industry.[1] To address these issues, the commission recommended numerous measures to increase safety in the industry, which prompted the government to institute regulatory and oversight reform.[1,65] However, a 2016 GAO report concluded that these reforms fell short of what was needed to improve offshore drilling safety.[44]

Botched Response: Slow, Inadequate, Incomplete

Initially, BP believed the blowout preventer mechanism had done its job and stopped the flow of oil after the spill began. But three days after the blowout, underwater cameras showed oil spewing into the ocean, and a new plan was needed.

BP and government partners first estimated that the flow rate was 1,000 barrels per day, but this was later countered by an estimate from the National Oceanic and Atmospheric Administration (NOAA) at 5,000 barrels per day.[1] It is unclear how these numbers were reached, but subsequent investigations revealed that oil was actually flowing from the well at a rate of 60,000 barrels per day.[1] BP's initial estimate was only 2% of the actual rate — it was off by 59,000 barrels.

BP was unable to stop the flow of oil for 87 days and succeeded only after multiple failed attempts to contain the spill.[1] The company tried to deploy techniques that had never been used in deep water — including covering the wellhead with a dome to contain the oil and using mud and debris to seal the leak. These techniques failed, and oil continued to pour into the ocean.[1]

Before oil even reached the shoreline, residents could smell it, recalled Dan Green, a Pensacola-based real estate broker. "You could see a glow off to the southwest of the fires where they were just trying to burn it off the surface," he said.

"The spill was pretty catastrophic in all of our minds and because we were so close to it," he added.

Finally, three months later, on July 15, a capping stack — basically a smaller version of a blowout preventer — was lowered onto the well and successfully stopped the flow of oil. Two months later, BP completed a relief well, which it had begun drilling in early May, allowing the company to pump in cement and permanently seal the reservoir. On Sept. 19 — 152 days after the blowout — government responders announced the well was "effectively dead."[1]

There Never Was a Plan

The Minerals Management Service (MMS) was the federal agency responsible at the time for overseeing offshore drilling operations. As part of the permitting process, BP was required to submit to MMS a spill response plan before being allowed to drill. Considering some of the details of this plan, it is not surprising that it took multiple failed attempts, over the course of nearly three months, before the spill was contained.

The only source-control option to stop the flow of oil in the event of a blowout even mentioned by name in BP's plan was drilling a relief well, which takes months.[1] That means, before BP tapped the Macondo well, industry and government experts were aware that a relief well was the only likely and accepted solution to a subsea blowout — a solution they knew would take months. A three-month-long oil spill was therefore a risk considered to be acceptable and agreed upon in exchange for the ability to extract oil in deep water.

Sarthou of Healthy Gulf remembers the empty government assurances. "For years, I had been informed at public meetings that there was nothing that could happen in the Gulf that could not be shut down in 48 to 72 hours. I was told that over and over again. So, this was pretty embarrassing to the federal agencies because they had to admit that neither they nor the company knew how to shut this down," she said.

In its report to President Obama, the National Commission called other aspects of BP's response plan "embarrassing."[1]

"In the plan, BP had named Peter Lutz as a wildlife expert on whom it would rely; he had died several years before BP submitted its plan. BP listed seals and walruses as two species of concern in case of an oil spill in the Gulf, even though these species never see Gulf waters. And a link in the plan that purported to go to the Marine Spill Response Corporation website actually led to a Japanese entertainment site," the report read.[1]

The report authors went on to note that response plans submitted by ExxonMobil, Chevron, ConocoPhillips and Shell were almost identical to BP's — they too suggested impressive but unrealistic response capacity and three included the embarrassing reference to walruses.[1]

Sarthou said it appeared cut and pasted from Arctic response plans. "It became pretty evident that when the response plan talks about … seals and walruses — which don't exist in our ecosystem — that it was not a response plan that was ever intended for this ecosystem," she said.

The company never bothered to devise response plans specifically for this drilling site, or at least to submit response plans written for the Gulf, and the government never forced them to do so. Instead the government accepted insufficient, inaccurate and out-of-date response plans.

The inadequate care and attention put into response plans for an activity with such potentially dire consequences speaks volumes about how important safety is to this industry. Communities facing risks from offshore drilling should keep this in mind when the industry claims that drilling is safe or pledges it will take measures to keep them safe.

Just two weeks before the *Deepwater Horizon* disaster began, American Petroleum Institute's Erik Milito said, "You have blowout preventers — not just one, you have stacks of them — so ... if there's any pressure, 'bam!' It shuts off so that no fluids can get into the environment. ... We have companies that have been just great stewards when it comes to this type of activity. ... We have created a regime where it's very low risk."[66]

The Aftermath

With the well capped, focus turned from containment to recovery and cleanup. But oil removal efforts fell woefully short. A government report claimed that skimming removed only about 3% of the oil, burning removed 5% and roughly 2 million gallons of chemical dispersants broke up only 16% of the oil — although studies dispute even these figures.[3,14] The U.S. government estimated that following response activities to the BP *Deepwater Horizon* disaster, the volume of oil remaining in the environment was as much as 60 million gallons, which is more than five times the amount of oil released by the Exxon Valdez.[3,57]

"The oil essentially just sunk to the bottom and did its damage down there," Sarthou said. "It's still very much in the ecosystem. After storms we still find a lot of tar balls, which are oil, weathered oil. The science indicates that those tar balls are very toxic. But there's not the active response there was at one point, so they're just remaining on the beach."

> "I just have no faith that our government is going to require the oil industry to do all they can to not let this happen again."
>
> **CYN SARTHOU**
> *HEALTHY GULF*

Photo Credit: Elliott Cowand Jr./ Shutterstock

BP *Deepwater Horizon* Disaster Surface Oil Footprint

Photo Credit: Oona Watkins/ Oceana

Photo Credit: Healthy Gulf

What We Know 10 Years Later

Ten years after the BP *Deepwater Horizon* disaster, many animals and Gulf Coast communities have not recovered. Data on environmental conditions before the spill were generally lacking, so it is difficult to fully quantify the scope of the damage.[1]

Despite data shortcomings, these facts remain: Oil is toxic and exposure harms animals, plants and humans.[67] Oil can injure or kill individual animals, entire populations or whole communities of animals and plants.[68] Oil spill impacts last for decades, long after cleanup efforts are abandoned. It has been 30 years since the Exxon Valdez oil spill in Alaska, and several of the local killer whale, seabird and fish populations have still not recovered.[33]

The *Deepwater Horizon* disaster oiled beaches and wetlands, harming sea turtles, dolphins, seabirds and shellfish.[26] The oil caused death, disease and impeded growth, overall making it more difficult for ocean animals to survive and reproduce.[26]

Effects on Animals

Marine Mammals

Marine mammals, like dolphins and whales, are at high risk during an oil spill because they spend a lot of time near the surface of the water, where oil floats.[69] Marine mammals can be exposed to oil through breathing it in, eating oiled food or swimming through it — all of which can cause serious health problems.[69]

Oil exposure was linked to lung disease and pneumonia in dolphins, as well as damage to their immune systems.[70,71] For dolphins, oil can cause anemia, tooth loss, liver damage, reproductive failure and death.[26] Oil can be severely damaging to dolphin pregnancies and has been linked to miscarriages.[71] For five years after the *Deepwater Horizon* disaster, more than 75% of dolphin pregnancies failed in the oiled area.[26]

Bottlenose dolphins were some of the most severely impacted marine mammals. Experts estimate that it will take 30 to 50 years for some groups of dolphins to recover in the Gulf of Mexico.[72]

More than 150 dolphins and whales were found dead during the oil spill response.[73] Over 1,000 whales and dolphins stranded from 2010 to 2014, but the number of deaths could be much higher, as not all mortalities were observed.[74] This event was the longest known marine mammal die-off in the Gulf of Mexico.[74]

Gulf of Mexico Bryde's whales are among the most endangered whales in the world, and oil industry activities are a primary threat to their precarious survival.[75] The *Deepwater Horizon* disaster decreased their population by about 22%.[75]

Birds

Oiled birds cannot regulate temperature or use their feathers for insulation against water and cold

Photo Credit: Julie Dermansky

weather, which can lead to death by hypothermia.[76] Oiled birds can also die from dehydration and exhaustion.[77]

The government estimated that tens of thousands of birds were killed, but some models estimated that 600,000 to 800,000 birds died as a result of the spill.[2,78] More than 1 million migratory shorebirds, including 28 different species, were potentially exposed to oil.[79] As much as 32% of laughing gulls in the northern Gulf of Mexico died after the disaster, along with up to 12% of the area's brown pelicans.[78]

Approximately 8,500 injured or dead birds were collected in the northern Gulf of Mexico during and following the spill.[80] These birds represent more than 100 species collected in all five Gulf Coast states. The collected birds are a fraction of the total number of birds that were killed or impaired as a result of the spill, as collection efforts did not extend throughout all the affected areas.[80]

Sea Turtles

Threatened and endangered sea turtles are vulnerable to oil along the coast at all stages of life — from laying their eggs on beaches, and as juveniles and adults.[73,81,82]

Sea turtles can inhale oil fumes and swallow oil when breathing at the ocean surface in or near oil slicks.[83] Up to 170,000 sea turtles were killed by the spill.[63] More than 600 sea turtles were found dead during the *Deepwater Horizon* disaster response and about 75% percent were endangered Kemp's ridley turtles.[73]

Deep Sea

The spill and oil removal efforts released hydrocarbons, heavy metals and dispersants that significantly altered parts of the deep sea floor, which some scientists have described as a toxic waste dump.[9] Oil from the *Deepwater Horizon* disaster reduced the abundance and diversity of deep-sea animals at the sea floor in an area three times larger than Manhattan.[84] Remote vehicle surveys in 2017, near the wellhead, found that negative impacts on diversity, abundance and health of deep-sea organisms continue.[10] Some deep-sea animals were completely absent near the wellhead, including many species of crustaceans, anemones and sponges that are commonly found at such depths in the Gulf.[10]

"What we saw on the sea floor was something unimaginable and horrible in a place where we

Photo Credit: National Oceanic and Atmospheric Administration

Photo Credit: Patrick Mustain/ Oceana

IMPACT SPOTLIGHT

Dr. Tracey Sutton
Ocean Ecology Researcher
Nova Southeastern University
Dania Beach, Florida

Research Reveals Devastating Impact of *Deepwater Horizon*

Professor Tracey Sutton studies the water column of the open ocean, or pelagic zone, in the Gulf of Mexico. He is also the director and principal investigator of the DEEPEND Consortium, which investigates the impact of the *Deepwater Horizon* disaster.

In April 2010, Sutton was researching sharks and marine life in the Atlantic, although he had worked extensively in the Gulf for his master's thesis and doctoral thesis.

"Just the initial visual impact of seeing oil coming up from a mile deep … and knowing that it was almost certainly accumulating in my beloved deep pelagic zone, it was kind of a real shock," Sutton said.

"Nobody was ready for this scale of pollution," he added.

Given the size of the Gulf, Sutton thought early on the oil might just dissipate. But then he saw models showing unprecedented impact of the *Deepwater Horizon* disaster — a threat to the abundance of life in the Gulf.

"It was an entire Gulf of Mexico-wide event," Sutton said.

"Probably the most unique thing about the oil spill — besides its size and scope, which was unprecedented — was the number of types of ecosystems that it impacted," he said.

Sutton explained that oil sank down to the sea floor, profoundly damaging coral communities deep in the Gulf of Mexico. Oil stayed in the open ocean water column. It found its way north into the coastal zone. It went across the continental shelf all the way up into marshes and estuaries.

"It was nearly half the Gulf of Mexico that you could see a footprint because that water is moving around and it's shuttling this stuff around," he said.

"In the pelagic zone, there's more [types of] fish in the Gulf of Mexico than almost anywhere else on Earth," Sutton said. "It's one of four areas that we'd call hyper diverse. So, there's a lot out there. There's a lot to care about."

Unfortunately, Sutton found a dramatic and persistent decrease in a number of marine animals in the Gulf since the spill. Among some fish, shrimp and squid, he said, declines range from 50% to 85%. As of late 2017, Sutton's research in the Gulf found fish and shrimp eggs containing oil from *Deepwater Horizon.*

"As far as we know, the actual impact of the spill is not over yet," Sutton said.

> "Nobody was ready for this scale of pollution.

normally see pristine environments," said Clifton Nunnally, a research scientist with the Louisiana Universities Marine Consortium (LUMCON), who has been studying the Gulf of Mexico since 2000.

These effects may extend beyond the immediately impacted site, as damage to one part of the ocean food web can have far-reaching consequences.

"There's nothing that you can see from the surface that tells you what's going on down there. And for us, that meant that the devastation of the *Deepwater Horizon* was hidden from plain sight," Nunnally said. "The fact that you don't see it on the beaches, or you don't see it floating around … doesn't mean that it's gone. It means that it's moved to a new ecosystem. And it's a system that operates on the order of millennia, not just years or decades. So, the recovery for a deep-sea ecosystem like this could be a long-term process."

Coastal Habitat and Plants

The BP disaster harmed coastal marsh habitats, which include marsh plants and animals that depend on them, like crabs, shrimp, oysters, dolphins, birds and fish such as flounder and drum.[13] When coastal salt marshes are destroyed by oil, the damage can be permanent.[13] Oil can increase erosion of the coastline because both the oil and removal efforts can damage or kill coastal plants and oyster reefs, which can act as buffers against flooding and storm surges.[13] Storms or hurricanes can also churn up and release oil that was trapped in the sand and dirt, once again harming wildlife even years after initial impact.[85]

Brian Roberts is the associate director of science at LUMCON, who has been studying the *Deepwater Horizon* disaster for most of the last decade.

"We lost a bunch of marsh," Roberts said. "The plants are what make up the marsh. . . . When they get destroyed or killed by the oil, then you not only lose the plants, but you lose the structure that supports the whole rest of that ecosystem," he said.

Roberts explained that marshes are very important for the Gulf Coast because they provide protection for areas farther inland, as well as recreation and productive fisheries — but they are also very susceptible to disturbances like oil.

Photo Credit: Julie Dermansky

Photo Credit: Julie Dermansky

"When you lose that marsh, you never get it back," Roberts said.

Fish and Shellfish

Oily water damages the gills of fish and makes it harder for them to get enough oxygen.[86,87] Oil can kill fish, as well as their eggs, and can be detrimental to growth in young fish.[68,88] Oil damages the hearts of bluefin and yellowfin tuna, disrupting swimming and other behaviors critical for survival.[34] Trillions of larval fish and invertebrates were killed and as many as billions of fish never reached adulthood.[63] The fish that survived suffered many negative effects from the oil, including impaired reproduction and reduced growth.[63]

In a controlled field experiment, LUMCON researchers have been testing how fish in wetlands are impacted by oil exposure. Initial observations revealed fish exhibited decreased abilities to perform necessary behaviors, and even higher exposures proved fatal.

"These are very hardy fish, but [after oil exposure] they don't feed very well. They don't avoid predators very well. And they no longer avoid the oil itself," Roberts said. "All of those are not very conducive to long-term survival."

Oil contains cancer-causing chemicals, and oiled seafood is not safe for human consumption.[88,89] Oil can be consumed by plankton, the base of the food web,[90] which feed larger creatures, and those are consumed by even larger animals. Some of these toxic chemicals can make their way up the food chain, eventually into top predators.[91]

Oil and dispersant exposure in young crabs and oysters can impair development, or cause death.[92–94] During the *Deepwater Horizon* disaster, oil and damage from cleanup activities led to the loss of about 8.3 million oysters.[26]

Oil Removal Impacts

Dispersants

The extensive use of dispersants during the BP *Deepwater Horizon* disaster was unprecedented and controversial.[1,95] Dispersants had never been used at the volume deployed in these cleanup efforts,

MAY 2010

Cat Island in Plaquemines Parish, Louisiana was exposed to *Deepwater Horizon* oil.

Photo Credit: Julie Dermansky

MARCH 2015

Five years after heavy oil exposure, Cat Island had all but eroded away.

Photo Credit: Julie Dermansky

nor had they ever been deployed at the source of flowing oil.[1] One 2018 analysis concluded that the subsurface application of dispersants did not affect the amount of oil that made it to the surface.[14] The manufacturers of the dispersant refused to make its formula public, and toxicologists at the time questioned its safety for humans and animals.[1] In total, almost 2 million gallons of dispersants were released into the Gulf of Mexico, 700,000 gallons of which were injected directly at oil spewing from the wellhead.[96] There are many tradeoffs to dispersant use, balancing potential toxicity with the desire to decrease surface oil.[97] Dispersants can break oil into smaller droplets but do not remove it from the environment and the dispersants themselves can kill marine life, such as blue crabs and coral.[95,98,99]

"The dispersant and the oil together are worse than either alone," Sutton said.

In the case of the BP disaster, it turns out the dispersants released underwater may not have even dispersed the oil. Professor Claire Paris-Limouzy at the University of Miami has been involved in the Gulf of Mexico Research Initiative on the *Deepwater Horizon* since 2010. She found that the models that the American Petroleum Institute used to inform the use of dispersants ignored the effects of the high pressure at the depths of the blowout. She explained that the models she developed showed that "the free gas sitting on top of the reservoir expands so rapidly that it emulsifies the gas-saturated oil even before it exits the wellhead, atomizing the oil into micro-droplets." In other words, the high-pressure blowout itself dispersed the oil.

"The naturally dispersed oil cannot be dispersed further, even with the strongest chemical dispersants," she added.

According to this model, in the end, more than half a million gallons of dispersant may have been released into the environment for no benefit at all.

Generally, dispersing oil may even make its impact worse, because breaking up the oil makes it small enough for tiny animals to eat and allows oil to move up the food chain.[91,100] Chemically dispersed oil has more negative impacts on phytoplankton than crude oil released from the well.[101] So, even though dispersants were meant to have decreased the amount of oil washing up on shore (which may not be the case), they also may have shifted the impact directly into the ocean food chain.

Human Health and Impacted Communities

Industry and government responders did not adequately anticipate or address the magnitude of health impacts from the spill and its aftermath. Many people experienced respiratory problems, headaches and stress along with other health issues.[1]

An NAACP report highlighted negative impacts to communities of color following the BP disaster, especially for Gulf residents who were still recovering from Hurricanes Rita and Katrina.[102] While the oil was still gushing, the representatives from NAACP met with communities in Alabama, Florida, Louisiana and Mississippi, and described far-reaching economic impacts, withering fishing towns, as well as physical and mental health problems.

Texas Southern University Professor Robert D. Bullard examined BP's Oil Waste Spill Summary and found that as of July 2010, BP had disposed of nearly 40,000 tons of waste from the spill at nine landfills in Alabama, Florida, Louisiana and Mississippi.[103] More than half of those were located in communities where most residents were people of color, even though people of color made up only about 26% of the populations in coastal counties at the time.[103]

At the time of the spill, Vietnamese Americans accounted for one-third of all commercial seafood workers in the Gulf Coast area, and at least 80% of people in Asian communities in the southeastern United States relied on the seafood industry for their livelihood.[104]

"That whole 2010 season … [the] fishing industry was wiped out for the Vietnamese fishing community," said Daniel Le, branch manager of Boat People SOS in Biloxi, Mississippi.

This Vietnamese American advocacy group provided assistance to Vietnamese seafood workers after the disaster. Le said many of these workers had limited English proficiency and the group assisted with communications and filing claims for compensation. Le said Vietnamese immigrants chose the Gulf Coast because it is a similar climate to Vietnam and

Photo Credit: Patrick Mustain/ Oceana

IMPACT SPOTLIGHT

Brenda Dardar Robichaux
Former Chief, United Houma Nation
Raceland, Louisiana

The Devastation of Frontline Communities

"They failed our people," said Clarice Friloux, who worked as outreach coordinator for the United Houma Nation during the spill recovery. "At one point, I remember thinking, 'Wow, this could kill off a whole generation of Native Americans living off the coast of Louisiana.'"

The United Houma Nation resides in six parishes along the southeastern coast of Louisiana, where about 17,000 tribal members live along bayous and canals.

Brenda Dardar Robichaux served as principal chief of the United Houma Nation for 13 years. During her tenure, the Houma community endured Hurricanes Katrina, Rita, Gustav and Ike — and the *Deepwater Horizon* disaster.

"I saw firsthand the devastation, whether it was loss of livelihood, loss of culture, loss of land, health. We saw it and lived it on a daily basis," Robichaux said. "The fact that BP could come in and do this to a community and really not suffer any consequences was just criminal."

"What they're allowed to do, the power they have, the impact they have, negative impacts on community and people's health should be addressed," Robichaux said. "They're just not good stewards with the land."

Many Houma people rely on coastal fishing but were unable to fish for months following the spill.

"[Fishermen] were concerned about their livelihood," Robichaux said. "They were concerned about paying their bills. … It was still quite some time before people could actually go out onto their fishing boats and begin trawling again."

"It was a constant 'Are we going? Are we not? When is this season going to open? What is it going to be like?'" she added. "They did open up several areas that people were actually able to go trawl, but there was always a concern about the safety of the seafood. You know, what kind of impact the oil spill has had on it — is it safe?"

The Houma people also navigate by boat along bayous and canals. In some places, coastal erosion has "left these waterways either nonexistent or impassable and in many cases completely open water that requires larger vessels for safe travel," according to the nation's official website.

The Houma people say their culture and land are disappearing underneath their feet.[107]

"As a Native American, I feel like that's destroying our earth. It's destroying us and who we are, who we depend on because we depend on water and the land. It's in our DNA. We're protectors, and all I see is destruction," Friloux said.

Robichaux said tribal communities along the coast are growing increasingly concerned about their future and livelihoods, facing difficult decisions about whether they can remain on the coast.

"It's really disheartening to know that even with the oil spill, even with the downturn in the economy, people haven't looked in another direction to be able to … live a life that is not going to be impacted by oil and gas, to not live in fear that there's going be another oil spill," Robichaux said. "What's going to happen to our ecosystem? What's going to happen to people's health?"

fishing is their livelihood. “When they came over to the United States, they were quickly trying to find a profession that could support their family right away and fishing was the option,” he said.

For many in the Gulf Coast, this fishing tradition has been passed down for generations.

A survey of Vietnamese-speaking people after the spill showed people struggling with loss of income, loss of employment and inability to pay bills.[105] National Public Radio reported the *Deepwater Horizon* disaster hurt the business of Vietnamese shrimpers, crabbers and oystermen, many of whom ran into difficulties receiving assistance from BP because the programs were not set up to effectively communicate with fishermen who spoke limited English.[106]

“Ten years removed from the BP oil spill — the community is still reeling from the impact. For the past two or three years, for the peak fishing season, 50% to 75% of the small fishing fleet were idle because there weren’t shrimp, crab or oysters to be harvested,” Le said. “That leads to a lot of people losing their jobs, losing their boat, losing their home, not able to pay rent, loss of power and utilities. It was a whole host of stuff that came out of that devastation.”

Health of Response Workers

More than 100,000 people were involved in the BP *Deepwater Horizon* response and potentially exposed to oil or chemical dispersants.[15] Cleanup workers responding to a spill can be exposed to oil for months through direct contact or breathing in fumes. In one study, crude oil exposure was reported by more than 50% of responders.[108] Crude oil exposure was linked to coughing, shortness of breath, wheezing, headaches, lightheadedness/dizziness, skin rashes/itching, diarrhea, stomach pain, nausea/vomiting and painful/burning urination during deployment.[108] Long-term studies found that oil-exposed responders had higher risk of chronic respiratory conditions, asthma and skin conditions.[108]

Dispersant exposure can have longer-term impacts as well. It was linked to tightness in the chest and burning in the nose, eyes and lungs that could continue for years after exposure.[16] Workers showed persistent or worsening health problems even seven years after the *Deepwater Horizon* disaster, including blood disorders and heart problems.[17]

But exposure to oil was not the only threat to health. One “cleanup” strategy involved burning the oil. This causes air pollution, including emissions of harmful gases and particles that can be inhaled by cleanup workers and the public.[109]

Mental Health

Exposure to an oil spill is also linked to depression and mental distress.[110] A 2010 Gallup survey of nearly 2,600 Gulf Coast residents revealed that medical diagnoses of depressive illness had increased by 25% since the rig explosion.[111] The “well-being index” included in the Gallup poll showed that coastal residents reported being stressed, worried and sad more often than their inland counterparts.[111] Adults and children who were directly exposed to oil were on average twice as likely to report new physical or mental health issues as those who were not.[112] Between April and June 2010, the Administration for Children and Families observed a spike in calls to the National Domestic Violence Hotline from Gulf Coast states, most notably in Louisiana.[1]

Economic Losses

Seafood and Fisheries

More than a third of federal waters off Louisiana were closed to fishing at one time following the disaster, negatively impacting commercial fisheries. This involved more than 88,000 square miles, an area about the size of North and South Carolina combined.[113,114]

A government study calculated that the BP disaster reduced total sales in the seafood industry — including from fishermen, dealers, processors, distributors, restaurants and markets — by as much as roughly $950 million.[6] This loss rippled throughout the Gulf economy and did not only impact fishermen. This also translated into lost jobs that depend on the spending of those in the fishing industry, as well as losses in business taxes that governments rely on to provide services.[6]

Fishermen who make a living on the Gulf also face the uncertainty of the long-term effects on fish populations.

“There's some evidence that oil has already gotten into bluefin tuna stocks. We've seen it in shrimp after the spill,” Clifton Nunnally of LUMCON said. “But how long that's going to stay around and where that's going to manifest itself is something we don't know.”

Tourism and Recreation

NOAA’s damage assessment concluded that the BP disaster directly reduced popular recreational activities, including boating, fishing and beach visits between May 2010 and November 2011.[26] This translated to a loss in the recreation industry of more than $500 million.[2]

More than 10 million user-days of beach, fishing and boating activity were lost due to the spill.[80] Respondents in the National Coastal Activity Survey were asked whether they had canceled a trip to the Gulf as a result of the spill. Approximately 10% of the sample reported having done so — representing about 2.3 million people.[115]

Real Estate

The BP disaster reduced real estate values throughout the Gulf Coast region.[5] Even the perception of oiled beaches affected real estate values. St. Petersburg, Florida experienced an 8% reduction in year-over-year sales, even though home sales had been climbing before the spill, and its waters and beaches were clean.[5]

According to appraisers, 24% of real estate brokers reported a negative impact of the *Deepwater Horizon* disaster on their markets.[5] Most brokers reported prices between 5% and 15% lower than the year prior to the spill.[5] A recent study of housing markets across the Gulf Coast region found a decline in house prices between 4% and 8% that persisted for at least five years.[25]

BP Settlement

Ultimately, BP and its industry partners settled with the federal and Gulf state governments for $20.8 billion.[116] This was the largest environmental damage settlement in U.S. history.[117] Additional private claim payments were estimated at $14.8 billion.[117] While many were compensated for their losses, permanent impacts remain.

“There was a settlement,” MacQueen said. “Yes, some people were able to get reimbursed — but some people are left out in the cold.”

MacQueen was among the coastal residents who received some compensation from BP but noted that others impacted did not have the resources to hire an attorney or the knowledge of how to pursue a settlement.

“The whole bureaucratic process was so frustrating because you would go to one person, they would refer you to someone else,” MacQueen said, adding the chain of communication that would often get lost along the way. “It was a desperate situation.”

Robichaux’s father — a lifelong fisherman — was unable to fish in the wake of the BP disaster. She worked alongside her father in an effort to secure compensation for his losses.

“The whole process was insane. … I've lost my religion quite a few times over it,” she said. “We'd have meetings with BP officials. We went to every public hearing there was. ... We left a meeting with BP after he was denied like three times. ... It’s like they were invalidating his entire life, his entire existence. … And for the first time I saw him cry.”

“The whole situation with BP trying to compensate the community, whether it was for loss of income, whether it was for loss of property, whether it was loss of health, they really didn’t compensate people the way that they should have,” Robichaux said.

Photo Credit: Jeff Hutchens/ Getty Images

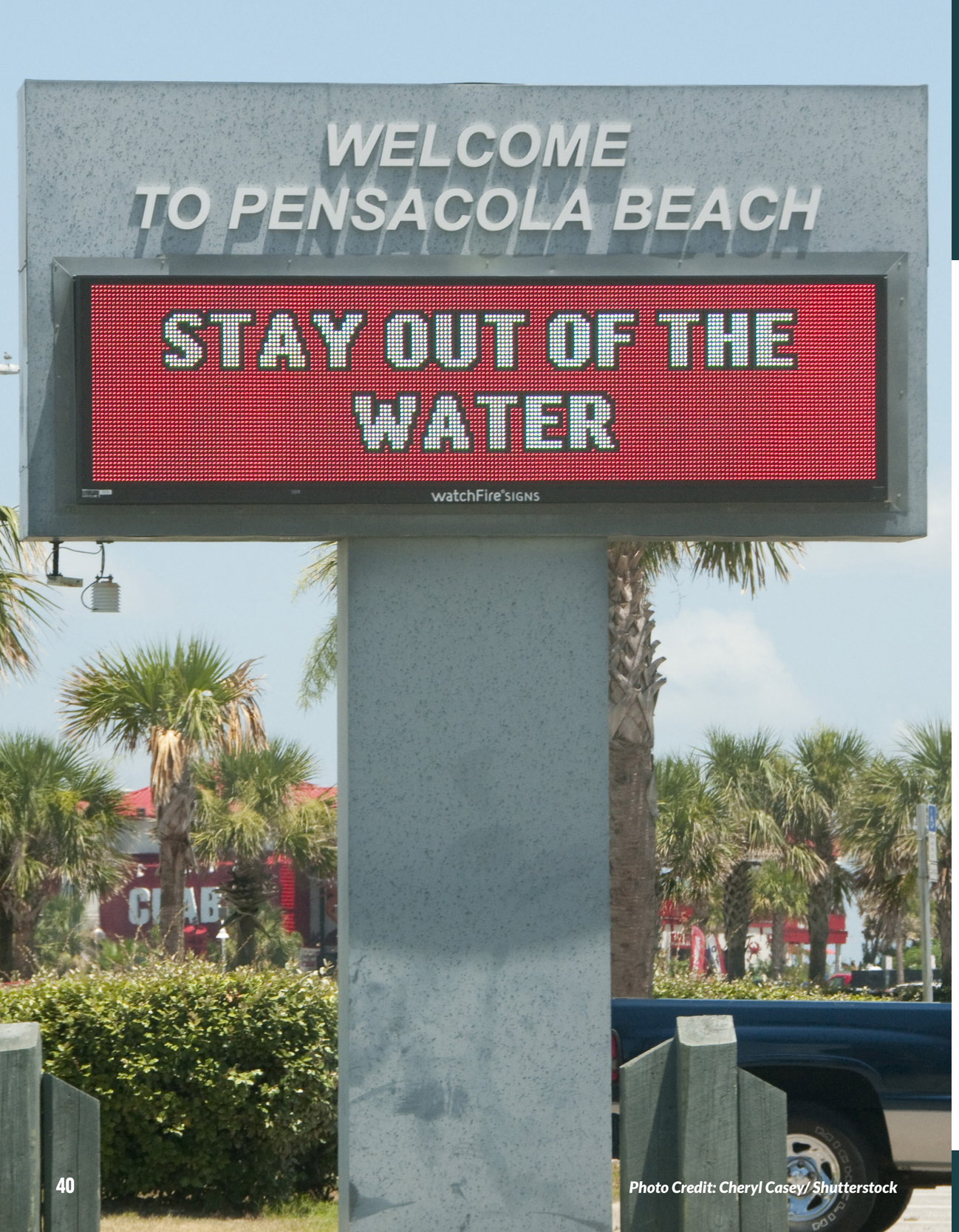


Photo Credit: Cheryl Casey/ Shutterstock

Photo Credit: Patrick Mustain/ Oceana

IMPACT SPOTLIGHT

Julian MacQueen
Innisfree Hotels
Pensacola, Florida

Oil Soaks Beaches and Sinks Economies

For decades, Julian MacQueen has operated a chain of hotels along the eastern Gulf Coast. As a coastal business owner dependent on tourism, he was aware of certain risks that might impact his hotels — *Deepwater Horizon* was not one of them.

"I thought there would be a major hurricane or there'd be some economic disaster. But oil from three states away coming in and destroying everything I spent 30 years to create — that never occurred to me," MacQueen said.

"The BP oil spill was probably one of the single most horrific events of my career," he added.

As news of the rig explosion and ongoing spill spread, new reservations suddenly stopped — before oil even made its way across the Gulf to the sandy shores of his beachfront properties.

"It was the prospect of it coming to the beach that stopped everybody from making any reservations," he said.

MacQueen said the impact of the spill erased about three years of growth for his business. The drop in tourism lingered long after the *Deepwater Horizon* disaster.

"[Tourists] break habits that they had to come to Pensacola Beach, and they go to Myrtle Beach or they go to the mountains or they go down further south in Florida. They go anywhere but Pensacola. And so those vacation cycles are broken," MacQueen said.

In Pensacola, the sugar-white sand turned black. Eventually, the decrease in vacationers to MacQueen's hotels meant he would have to downsize. He laid off 250 employees across his hotels.

"It's a very painful process to say we no longer have tourists here, and therefore, we have to lay you off because we simply don't have the money to pay you," MacQueen said. "In our case, we had about 250 people we had to lay off. And every one of them has a child or a spouse or other dependents."

"It's heartbreaking to walk up to somebody and tell them that you have to lay them off when they're depending on that job and they've maybe moved here from another place. And their life dream was to work at the beach," he added. "And now it's gone."

MacQueen sought a settlement with BP, which he said was a complicated and drawn out process.

"I've got resources to fight it, and I was feeling helpless. I can't imagine what people that don't have the resources and the experience that I have, what they must feel like," MacQueen said.

"I've heard horror stories, real disaster stories of people losing their homes and having to move back in with their parents. I can't imagine the helplessness that must be there when something like this happens."

MacQueen said just thinking about the negative impact of the spill can still make him nauseous to this day — impacts endured by so many along the coast.

"There are thousands of oil rigs out there," he added. "And the probability of this happening again, if nothing has been done as a result, is it's just a matter of time."

Photo Credit: Kari Goodnough/ Getty Images

Oil can injure or kill whole communities of animals and plants.

Deepwater Horizon's Deadly Impacts:

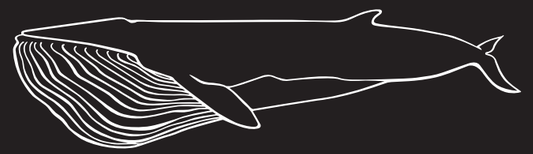
150+
dead dolphins and whales

up to
170,000
dead sea turtles

TRILLIONS
of larval fish and invertebrates killed

up to
800,000
birds died

8.3 M
oysters killed



22% DECREASE
in Bryde's whale population

Photo Credit: Magnus Larsson/ Shutterstock

Other Impacts of Offshore Drilling

A massive spill is the nightmare scenario, but this is not the only impact coastal communities face if President Trump moves forward with his plan to expand drilling to nearly all U.S. waters.

Industrial Infrastructure Accompanies Offshore Drilling

Oil rigs far offshore not only impact the shoreline when they spill, but they also transform the landscape of coastal communities with unsightly industrial infrastructure.

"There are hundreds of pipelines that run through our wetlands. There are hundreds of navigation canals that have been cut to get ships here. There are rail yards and railroads," Sarthou said. "When the oil industry establishes itself, the production of oil is only a small part of the impact it has on the area."

Offshore drilling in the Gulf of Mexico has a massive footprint. According to government data, there are around 2,000 offshore platforms and more than 26,000 miles of pipeline in the Gulf, more than enough to circle the Earth.[21]

There are so many rigs in the Gulf of Mexico that it can be difficult to tell the difference between the sky and the water at night. MacQueen, who is also a pilot, described flying over the Gulf at night.

"When you look at the number of oil wells or oil rigs in the Gulf of Mexico and you look at the stars, you can't make any difference out. It's solid; there is no horizon. It's dotted like stars in the Gulf of Mexico," he said.

When that oil comes to shore, it needs to be stored, processed and transported. This means pipelines, oil trains, storage facilities, canals, tankers and refineries. Each step in the production, refining and transportation processes presents a risk for an accident or spill.

This infrastructure is not just dangerous. It can also be a blight, transforming a coastal beach town into something more industrial and less attractive to tourists. An analysis from the Southern Environmental Law Center found that counties without offshore drilling infrastructure — like pipelines and refineries — netted twice as many

> "If it's not seen, no one knows, no one cares anymore.
>
> **CLARICE FRILOUX**
> *FORMER OUTREACH COORDINATOR FOR HOUMA NATION*

tourism dollars per capita when compared to other Gulf counties and parishes.[118] The average per capita GDP generated by tourism was more than $1,300 in areas without offshore infrastructure. But where refineries are present and pipelines come ashore, the per capita tourism take was less than $700.[118]

Thriving tourism, recreation and fisheries industries across the Pacific, Atlantic and Florida's Gulf Coasts generate more than 2.6 million jobs, and more than $180 billion in GDP.[24] Those are jobs and revenue that would be under direct threat from spills, pollution and the industrialization of the coasts if the plans to expand drilling move forward.

Onshore infrastructure destroys coastal land and beaches, resulting in losses for the tourism industry and destruction of wildlife. Louisiana's canals, many of which were constructed for offshore oil production and exploration, have contributed to extensive loss of habitat, as saltwater from the Gulf intrudes on brackish and freshwater wetlands, killing plants and wildlife.[119] Louisiana is losing, on average, roughly a football field of wetland every 100 minutes.[120] From 1932 to 2016, Louisiana's coastal zone has lost approximately 1,866 square miles, which is about 25% of its area, or an average loss of 22 square miles per year.[120] These wetlands are natural barriers, so their loss increases the damages from future storms and oil spills.[119]

Communities of Color Are Disproportionately Impacted

With each new addition of oil drilling infrastructure, the risks to communities and the environment increase. But not all risks are equal. Communities of color are often disproportionately impacted by environmental pollution.

According to a 2017 NAACP report on energy infrastructure, African Americans are exposed to 38% more polluted air than white Americans, and they are 75% more likely to live in "fence-line" communities neighboring industrial sites than other Americans.[121] In the U.S., most of these communities are low-income and communities of color "who experience systemic oppression such as environmental racism," according to the report.

More than 1 million African Americans live within a half mile of an oil and gas facility.[121] Those within this half-mile radius face potential health impacts from oil and gas toxic air pollution.

"It is not a coincidence that so many African Americans live near oil [and] gas development. Historically, polluting facilities have often been sited in or near African American communities," the report states. "Companies take advantage of communities that have low levels of political power. In these communities, companies may face lower transaction costs associated with getting needed permits, and they have more of an ability to influence local government in their favor."

Waste: A Constant Source of Pollution

In addition to the ever-present threat of another BP-level disaster, the oil industry is a constant source of pollution for communities and the environment. Along with hundreds of spills each year, the industry creates waste simply through its standard operating procedures of drilling and moving oil and gas.[22,122] The waste includes radioactive materials, polluted water, sludges and sediments.[122] More than 18 billion barrels of waste fluids from oil and gas production are generated annually in the United States.[123]

When the waste is not properly disposed, it can lead to ground and surface water contamination and threaten people's drinking water.[123] Oil and gas production can generate radioactive sludge and polluted wastewater that is hazardous to the workers tending it, as well as nearby residents.[123]

According to the EPA, the risks to people working or living near a disposal site include radiation, inhalation of contaminated dust, contaminated well water or contaminated food.[123] But many exploration and production wastes are legally considered "non-hazardous" based on how the waste is produced, not what it contains.[18,124] In other words, waste that contains a chemical like benzene, which is known to cause leukemia, is considered hazardous by the EPA — but if it is used in oil and gas production, it is exempt from the agency's safety regulations.[18,20] Despite the federal legal distinction, using benzene in oil and gas production does not make it any less dangerous.

The year before the industry's special exemption went into place, the EPA sampled materials from several oil and gas waste sites. The agency found pollutants at levels that exceeded100 times EPA's health-based standards.[125] These included benzene, phenanthrene, lead, arsenic, barium, antimony, fluoride and uranium.[125]

Reporting by the Associated Press, following the passage of the exemption, quoted an EPA employee as saying, "This is the first time in the history of environmental regulation of hazardous wastes that the EPA has exempted a powerful industry from regulation for solely political reasons, despite a scientific determination of the hazardousness of the wastes."[126]

Investigative journalists at the DeSmog Blog also uncovered documents, including letters between lawmakers and industry executives, showing clear pressure from the industry to get the oil and gas exemption through the EPA.[19]

> "You can travel down any highway in Louisiana, and you're going to see a pipeline somewhere."
>
> **CLARICE FRILOUX**
> *FORMER OUTREACH COORDINATOR FOR HOUMA NATION*

Waste from the oil and gas industry is often dumped in communities that may not know the potential danger.

"All our lives, we swam in the bayous and we knew there were pipelines crossing in the waterways. We knew that. We could see the abandoned wells, but never thought that … we would have an oilfield waste site," Friloux said.

"It was the smell that really caught us," she said.

Friloux said the facility gave off an odor on and off throughout the years. "We were told that [the waste] was saltwater at one point," she said. "They were bringing in sludge and it was mixed with saltwater. We had no idea. We had no reason to doubt what they were telling us."

People started getting sick, experiencing nosebleeds and having trouble breathing, Friloux said.

"All we asked for was to be able to breathe clean air just like everyone else," she said.

People may think that the government will protect them from the offshore oil and gas industry's waste, but the industry has secured special exemptions. Frontline communities have been left out of decision making and are consequently more vulnerable to the industry's impacts.

Seismic Airgun Blasting

Before companies begin drilling for oil, they have to find it. The very search itself can be devastating to ocean wildlife and ecosystems. This requires geological and geophysical permits for oil and gas exploration, allowing companies to use seismic airgun blasting. This is an extremely loud and dangerous process used to search for potential oil and gas below the ocean's surface and is the first step toward offshore drilling. Large ships tow arrays of airguns that send dynamite-like blasts of sound through the water column and down into the sea floor in search of oil. These blasts are one of the loudest manmade sounds in the ocean.[127] Blasts are repeated as often as every 10 seconds for days, weeks or months at a time.[128,129]

For many marine animals, sound plays an essential role in feeding, mating, communicating and avoiding predators. The threats of underwater noise to marine life are well-documented, including stress, injury and disruption of important life activities,

Photo Credit: Julie Dermansky

which lead to increased risk of death and lowered reproductive success.[130–134] An extensive body of research demonstrates the serious threat of seismic airgun blasting to marine animals.[135] Airgun noise can reduce catch rates for fish and disrupt vital behaviors in marine mammals, like dolphins and whales.[136,137]

Noise from airguns can disturb, injure or even kill marine animals of all sizes, from zooplankton which make up the base of the food web, to large whales.[136,138–142] According to the government's own estimates, the proposed plans for seismic surveys in the Atlantic Ocean would cause hundreds of thousands of injuries and disturbances to marine mammals like dolphins and whales.[129] A healthy ocean teeming with marine life is critical for tourism, fishing and recreation — important drivers of a coastal economy.

Climate Change

"Burning [oil] is causing climate change, that's proven beyond the shadow of a doubt. And the oil itself is a toxic substance," ecologist Tracey Sutton said. "We need to treat oil as something we need to get away from."

Oil spills, coastal industrialization and pollution from oil and gas development are immediate threats to coastal communities. Doubling down on fossil fuels when we should be moving toward a carbon-neutral economy is foolish. Among the greatest threats to our ocean include rising sea temperature and ocean acidification, caused largely by emissions from burning fossil fuels.[143] If we keep burning fossil fuels at current rates, the expected increases in temperature, changes in precipitation, increase in extreme weather and rising sea levels will wreak havoc on not only coastal communities, but also cause global geopolitical instability due to displacement of massive numbers of people affected by food insecurity and extreme weather events.[144,145]

A report from the research and advocacy group Oil Change International found the costs associated with burning fossil fuels, including public health and environmental impacts, range from $350 billion to $501 billion annually.[146] The first of many steps to mitigate a climate disaster is ending new oil and gas development, and sharply decreasing current production. Expanding offshore drilling has no place in a carbon-neutral future.

"Eventually we have to replace fossil fuel as an energy source. It's not sustainable in the first place. And the damages can be horrific," Sutton said.

> **"Burning [oil] is causing climate change, that's proven beyond the shadow of a doubt. And the oil itself is a toxic substance.**
>
> **TRACEY SUTTON**
> *NOVA SOUTHEASTERN UNIVERSITY*

Photo Credit: Steve Bruckmann/ Shutterstock

Industry's False Promises

The oil industry touts jobs, economic development and energy independence as reasons why coastal residents and their elected representatives should support the expansion of drilling off our coasts. But industry claims do not stand up to scrutiny.

Jobs

The Trump administration's proposal to expand offshore drilling threatens more than 2.6 million jobs and nearly $180 billion in GDP in U.S. East and West Coast states.[23,24] This is for only two years' worth of oil and just over one year's worth of gas, at current consumption rates.[24] Oil and gas are finite resources. When the oil runs out, so do the jobs. If ocean resources are protected and well-managed, tourism, fishing and recreation will support local economies for generations to come.

Energy Independence

Energy efficiency improvements and renewable energy sector growth are making significant contributions to the United States' energy independence. In September 2019, the U.S. exported more petroleum products than it imported.[147]

"Oil and gas development is a reality in the Gulf of Mexico, at least the western and central Gulf. But they have not learned the lesson of the disasters here," Sarthou said. "The record shows that we still have thousands of [chemical and oil] spills every year. The infrastructure is getting older, and we are having more and more problems with it. And the [government] is clearly unwilling to regulate industry."

"I can tell you from experience that once the oil industry gets anchored in an area, then there's no going back. So, why even start?" Sarthou said.

> "I think about it, especially when I see people thinking that it's not going to happen again. ... It will. It's going to happen again.
>
> **CLARICE FRILOUX**
> *FORMER OUTREACH COORDINATOR FOR HOUMA NATION*

Opposition Is Strong

Policymakers, business owners and communities up and down the Atlantic and Pacific Coasts agree: Expanded offshore drilling is not needed nor wanted.

Over 380 East and West Coast municipalities.

More than 2,300 local, state and federal elected officials.

All the governors along the East and West Coasts — Republicans and Democrats alike.

Alliances representing over 56,000 businesses and 500,000 fishing families.

Photo Credit: Patrick Mustain/ Oceana

Recommendations

President Trump should halt all efforts to expand offshore drilling to new areas.

Expanding offshore drilling to new areas is expanding risk to human health, ecosystems and economies. Tourism, fishing and recreation industries currently contribute millions of jobs and billions in revenue to coastal states. Threatening these with unsafe offshore drilling and its risks is shortsighted and dangerous.

President Trump should direct BSEE to seek transformative changes to the industry's safety culture and reverse efforts to weaken safety regulations.

Poor safety culture in the oil industry prior to the BP *Deepwater Horizon* disaster fed the conditions that led to it. Ten years later, little has changed and BSEE gutted the very precautions put in place after the BP disaster. BSEE should restore safety measures it removed from the Production Safety Systems Rule and Well Control Rule. Additionally, the industry needs drastic safety reforms in the drilling operations currently underway that are still resulting in hundreds of oil spills every year.

President Trump should direct BOEM to deny all pending geological and geophysical seismic permits for oil and gas in the Atlantic Ocean.

Seismic airgun blasting is dangerous and harmful to marine wildlife. Seismic airgun blasting can disrupt, injure or even kill marine animals from the smallest zooplankton to the largest whales. BOEM should not issue permits to companies that want to blast the Atlantic Ocean with noise, looking for oil reserves that should never be tapped in the first place.

Congress should enact a moratorium on expanded offshore drilling.

For nearly three decades, Congress restricted spending on outer continental shelf (OCS) oil and gas leasing and drilling activities through moratoria renewed annually in appropriations bills. These restrictions were enacted via the annual appropriations in the Interior-Environment Appropriations bill. Congress should reinstate offshore drilling moratoria once again in the FY 2021 bill, and continue to do so, as long as permanent protections are not in place.

Congress should incentivize investments in clean, renewable energy.

We must rapidly end our reliance on fossil fuels and accelerate the transition to clean, renewable energy like offshore wind and solar power to avert the worst impacts of climate change. Congress should enact incentives for investments in developing clean energy to help reduce our energy-related emissions that fuel climate change.

Photo Credit: Frank McMains/ Shutterstock

Conclusion

This Will Happen Again: Where They Drill, They Spill.

President Obama finalized the current 2017-2022 five-year program in 2016.[150] This plan had initially slated a large area off the U.S. Atlantic Coast to be included in offshore oil and gas leasing. However, the voices of opposition from coastal communities and businesses made their way to Washington, and the president listened. His final plan protected the Atlantic Ocean and portions of the Arctic Ocean from new offshore drilling.[150]

But President Trump proposed to reverse those protections in his 2019-2024 draft proposal. It outlined a massive expansion of oil and gas drilling to more than 90% of all federal waters throughout the Atlantic, Pacific and Arctic oceans, as well as off Florida's Gulf Coast.[23,29]

At stake are thriving fishing and tourism businesses, healthy marine ecosystems and coastal ways of life. Ten years ago, we saw the inevitable result of what happens when we recklessly chase oil deep below the ocean surface. People's health and safety are put at risk, ecosystems are irrevocably altered, and economies are shaken. The inadequate safety culture that led to the BP disaster continues to allow hundreds of spills to happen every year. As it stands, another disaster at the scale of *Deepwater Horizon* could happen any day. Considering how unsafe offshore oil and gas drilling is, expanding these activities to new areas is shortsighted and dangerous. Protections from new offshore drilling currently in place must remain.

Without forceful opposition, the plans to drill off our coasts could move forward. Coastal communities must continue to be vocal and active in this interim stage, as President Trump decides when and where to expand offshore drilling. The lessons from the Gulf of Mexico are clear. We must act on these painful lessons and halt all efforts to expand offshore drilling activities.

> "I can tell you from experience that once the oil industry gets anchored in an area, then there's no going back. So why even start?"
>
> **CYN SARTHOU**
> *HEALTHY GULF*

Photo Credit: Oleg Kovtun Hydrobio/Shutterstock

#ProtectOurCoast

Oceana.org/ActNow

Photo Credit: Louisiana Universities Marine Consortium

Acknowledgments

The authors would like to give special thanks to Ted Ent, Clarice Friloux, Dan Green, Daniel Le, Buck Lee, Julian MacQueen, Clifton Nunnally, Claire Paris-Limouzy, Brian Roberts, Brenda Dardar Robichaux, Cyn Sarthou and Tracey Sutton for their time, perspective and expertise, as well as sharing their stories with us.

We also thank Donald Boesch and Sherryl Gilbert for their contributions during the development and review of this report.

We would also like to give sincere thanks to the many Oceana team members who helped with this report, including Paulita Bennett-Martin, Alicia Cate, Dustin Cranor, Anna George, Erin Handy, Allie Judge, Jamie Karnik, Lara Levison, Beth Lowell, Kathryn Matthews, Michael Messmer, Susan Murray, Nancy Pyne, Jacqueline Savitz, Catherine Uden and Oona Watkins.

References

1. National Commission on the BP *Deepwater Horizon* and Oil Spill and Offshore Drilling (2011) Deep Water: The Gulf oil disaster and the future of offshore drilling. Report to the President. Washington, D.C.

2. NOAA Assessing the Impacts from *Deepwater Horizon*. National Oceanic and Atmospheric Administration | US Department of Commerce. Available: https://response.restoration.noaa.gov/about/media/assessing-impacts-deepwater-horizon.html. Accessed Apr 10, 2019.

3. The Federal Interagency Solutions Group (2010) Oil Budget Calculator Science and Engineering Team, Oil Budget Calculator *Deepwater Horizon.*

4. MacQueen J (2020) Personal communication.

5. Clear Capital (2010) Impact of BP Oil Spill Reaches Beyond Gulf Coast. In: *ClearCapital.com*, Inc. Available: https://www.clearcapital.com/impact-of-bp-oil-spill-reaches-beyond-gulf-coast/. Accessed Nov 15, 2019.

6. BOEM (2016) Carroll, Michael; Gentner, Brad; Larkin, Sherry; Quigley, Kate; Perlot, Nicole, et al. An Analysis of the Impacts of the *Deepwater Horizon* Oil Spill on the Gulf of Mexico Seafood Industry. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study BOEM 2016-020.

7. Muehlenbachs L, Cohen MA and Gerarden T (2013) The impact of water depth on safety and environmental performance in offshore oil and gas production. *Energy Policy* 55: 699–705. doi: 10.1016/j.enpol.2012.12.074

8. Oceana, Hoskins D and Voitier M (2019) Dirty Drilling: Trump Administration Proposals Weaken Key Safety Protections and Radically Expand Offshore Drilling.

9. Fisher C, Montagna P and Sutton T (2016) How Did the *Deepwater Horizon* Oil Spill Impact Deep-Sea Ecosystems? *Oceanography* 29: 182–195. doi: 10.5670/oceanog.2016.82

10. McClain CR, Nunnally C and Benfield MC (2019) Persistent and substantial impacts of the *Deepwater Horizon* oil spill on deep-sea megafauna. *Royal Society Open Science* 6: 191164. doi: 10.1098/rsos.191164

11. Sutton T (2020) Personal communication.

12. Roberts B (2020) Personal communication.

13. NOAA Effects of the *Deepwater Horizon* Oil Spill on Coastal Salt Marsh Habitat | response.restoration.noaa.gov. Available: https://response.restoration.noaa.gov/about/media/effects-deepwater-horizon-oil-spill-coastal-salt-marsh-habitat.html. Accessed May 10, 2019.

14. Paris CB, Berenshtein I, Trillo ML, et al. (2018) BP Gulf Science Data Reveals Ineffectual Subsea Dispersant Injection for the Macondo Blowout. *Frontiers in Marine Science* 5 doi: 10.3389/fmars.2018.00389

15. Zock J-P, Rodríguez-Trigo G, Pozo-Rodríguez F and Albert Barberà J (2011) Health Effects of Oil Spills: Lessons from the Prestige. *American Journal of Respiratory and Critical Care Medicine* 184: 1094–1096. doi: 10.1164/rccm.201102-0328ED

16. McGowan CJ, Kwok RK, Engel LS, et al. (2017) Respiratory, Dermal, and Eye Irritation Symptoms Associated with CorexitTM EC9527A/EC9500A following the *Deepwater Horizon Oil* Spill: Findings from the GuLF STUDY. *Environmental Health Perspectives* 125: 097015. doi: 10.1289/EHP1677

17. D'Andrea MA and Reddy GK (2018) The Development of Long-Term Adverse Health Effects in Oil Spill Cleanup Workers of the *Deepwater Horizon* Offshore Drilling Rig Disaster. *Frontiers in Public Health* 6: 117. doi: 10.3389/fpubh.2018.00117

18. EPA (2002) Exemption of Oil and Gas Exploration and Production Wastes from Federal Hazardous Waste Regulations. US Environmental Protection Agency.

19. Horn S (2016) DeSmog. Documents: How IOGCC Created Loophole Ushering in Frackquakes and Allowing Methane Leakage. In: *DeSmog*. Available: https://www.desmogblog.com/2016/04/15/documents-iogcc-loophole-frackquakes-methane-leakage. Accessed Feb 6, 2020.

20. EPA Benzene CASRN 71-43-2. US Environmental Protection Agency. Available: https://cfpub.epa.gov/ncea/iris2/chemicallanding.cfm?substance_nmbr=276. Accessed Feb 19, 2020.

21. BSEE (2016) Bureau of Safety and Environmental Enforcement Annual Report 2016. Available: https://www.bsee.gov/sites/bsee.gov/files/bsee_2016_annual_report_v6b.pdf. Accessed Nov 4, 2019.

22. BSEE (2019) Aggregated Data of OCS Oil and Gas Industry Activities (e.g. production and drilling levels), Work Hours, Incidents and Compliance: 2008-2018. Available: https://www.bsee.gov/sites/bsee.gov/files/summary-tables-2018-updated-8-16-2019.pdf. Accessed Mar 4, 2020.

23. BOEM (2018) 2019-2024 National OCS Oil and Gas Leasing Draft Proposed Program. *Bureau of Ocean Energy Management*

24. Oceana (2018) Clean Coast Economy. In: *Oceana USA*. Available: https://usa.oceana.org/publications/reports/clean-coast-economy. Accessed Feb 25, 2019.

25. Cano-Urbina J, Clapp CM and Willardsen K (2019) The effects of the BP *Deepwater Horizon* oil spill on housing markets. *Journal of Housing Economics* 43: 131–156. doi: 10.1016/j.jhe.2018.09.004

26. NOAA (2016) *Deepwater Horizon* Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement.

27. NOAA Largest Oil Spills Affecting U.S. Waters Since 1969. Available: https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/largest-oil-spills-affecting-us-waters-1969.html. Accessed Nov 5, 2019.

28. BOEM (2016) 2016 Update of Occurrence Rates for Offshore Oil Spills. Bureau of Ocean Energy Management.

29. BOEM Developing a New National OCS Program | Bureau of Ocean Energy Management. Available: https://www.boem.gov/oil-gas-energy/leasing/index-2. Accessed Nov 22, 2019.

30. NOAA Santa Barbara Well blowout | IncidentNews National Oceanic and Atmospheric Administration | US Department of Commerce. Available: https://incidentnews.noaa.gov/incident/6206#! Accessed Dec 13, 2019.

31. Exxon Valdez Oil Spill Trustee Council Lingering Oil. Available: http://www.evostc.state.ak.us/index.cfm?FA=status.lingering. Accessed May 13, 2019.

32. Exxon Valdez Oil Spill Trustee Council Questions and Answers about the Spill. Available: http://www.evostc.state.ak.us/%3FFA=facts.QA. Accessed Feb 26, 2020.

33. Exxon Valdez Oil Spill Trustee Council Status of Injured Resources & Services. Available: http://www.evostc.state.ak.us/index.cfm?FA=status.injured. Accessed Apr 15, 2019.

34. Incardona JP, Carls MG, Day HL, et al. (2009) Cardiac Arrhythmia is the Primary Response of Embryonic Pacific Herring *(Clupea pallasi)* Exposed to Crude Oil during Weathering. *Environmental Science & Technology* 43: 201–207. doi: 10.1021/es802270t

35. Exxon Valdez Oil Spill Trustee Council Status of Restoration Pacific Herring. Available: http://www.evostc.state.ak.us/index.cfm?FA=status.herring. Accessed Feb 19, 2020.

36. NOAA Sea Grant Washington Sea Grant. Education to Prevent Small Oil Spills. Available: https://wsg.washington.edu/wordpress/wp-content/uploads/SOS-FactSheetV2.pdf. Accessed Nov 5, 2019.

37. GAO (2014) U.S. Government Accountability Office. Energy Infrastructure Risks and Adaptation Efforts. Available: https://www.gao.gov/assets/670/660558.pdf. Accessed Nov 5, 2019.

38. NOAA Taylor Energy | NOAA's Damage Assessment Remediation and Restoration Program. Available: https://darrp.noaa.gov/oil-spills/taylor-energy. Accessed Apr 10, 2019.

39. BSEE Incident Archive - Taylor Energy Oil Discharge at MC-20 Site and Ongoing Response Efforts | Bureau of Safety and Environmental Enforcement. Available: https://www.bsee.gov/newsroom/library/incident-archive/taylor-energy-mississippi-canyon/ongoing-response-efforts. Accessed Apr 10, 2019.

40. Walsh J, Wuebbles D, Hayhoe K, et al. (2014) Ch. 2: Our Changing Climate. Climate Change Impacts in the United States: The Third National Climate Assessment. U.S. Global Change Research Program.

41. Zamuda CD, Bilello D, Conzelmann G, et al. (2018) Chapter 4: Energy Supply, Delivery, and Demand. Impacts, Risks, and Adaptation in the United States: The Fourth National Climate Assessment, Volume II. U.S. Global Change Research Program.

42. BSEE About Us | Bureau of Safety and Environmental Enforcement. Available: https://www.bsee.gov/who-we-are/about-us. Accessed Nov 4, 2019.

43. BSEE Reorganization | Bureau of Safety and Environmental Enforcement. Available: https://www.bsee.gov/who-we-are/history/reorganization. Accessed Feb 19, 2020.

44. GAO (2016) U.S. Gov't Accountability Office, Oil and Gas Management Interior's Bureau of Safety and Environmental Enforcement Restructuring Has Not Addressed Long-Standing Oversight Deficiencies.

45. GAO (2017) U.S. Gov't Accountability Office. Report to Congressional Committees High-Risk Series Progress On Many High-Risk Areas, While Substantial Efforts Needed On Others. Available: https://www.gao.gov/assets/690/682765.pdf. Accessed Nov 4, 2019.

46. Eustis S and Hoke R (2018) Oil and Gas in the Gulf of Mexico. Healthy Gulf.

47. BSEE 2017-2018 with 2017 Q4. Offshore Incident Statistics | Bureau of Safety and Environmental Enforcement. Available: https://www.bsee.gov/stats-facts/offshore-incident-statistics. Accessed Mar 4, 2020.

48. BOEM (2011) *Deepwater Horizon* Joint Investigation Team, U.S. Dep't of Interior, Volume Ii: Report Regarding the Causes of The April 20, 2010 Macondo Well Blowout. Available: https://www.bsee.gov/sites/bsee.gov/files/reports/blowout-prevention/dwhfinaldoi-volumeii.pdf. Accessed Nov 5, 2019.

49. BSEE Blowout Preventer Systems and Well Control Rule (published in the Federal Register April 29, 2016) | Bureau of Safety and Environmental Enforcement. Available: https://www.bsee.gov/guidance-and-regulations/regulations/well-control-rule. Accessed Nov 5, 2019.

50. Lefebvre B (2019) Interior hands out nearly 1,700 waivers to offshore drilling safety rules. POLITICO. Available: https://www.politico.com/story/2019/02/25/offshore-drilling-trump-administration-interior-department-1190762. Accessed Nov 4, 2019.

51. -- (2017) Implementing an America-First Offshore Energy Strategy. Exec. Order No. 13,795, 82 Fed. Reg. 20,815, 20,816-20,817. Available: https://www.govinfo.gov/content/pkg/FR-2017-05-03/pdf/2017-09087.pdf. Accessed Nov 5, 2019.

52. BSEE (2018) Blowout Preventer Systems and Well Control Revisions, 83 Fed. Reg. at 22,141-22,142.

53. BSEE (2017) Bureau of Safety and Environmental Enforcement | Promoting Safety, Protecting the Environment and Conserving Offshore Resources. Available: https://www.bsee.gov/newsroom/latest-news/statements-and-releases/press-releases/bsee-proposes-revisions-to-production. Accessed Nov 5, 2019.

54. Lee-Ashley M (2020) Center for American Progress. 10 Years After *Deepwater Horizon*, Oil Spills and Accidents Are on the Rise. Available: https://www.americanprogress.org/issues/green/news/2020/03/03/481027/10-years-deepwater-horizon-oil-spills-accidents-rise/. Accessed Mar 3, 2020.

55. Murawski SA, Hollander DJ, Gilbert S and Gracia A (2020) Deepwater Oil and Gas Production in the Gulf of Mexico and Related Global Trends. In: Murawski S. et al. (eds) Scenarios and Responses to Future Deep Oil Spills. Springer, Cham. In: *springerprofessional.de*. Available: https://link.springer.com/chapter/10.1007/978-3-030-12963-7_2. Accessed Jan 29, 2020.

56. NOAA How does NOAA help clean up oil and chemical spills? National Oceanic and Atmospheric Administration | US Department of Commerce. Available: https://oceanservice.noaa.gov/facts/spills-cleanup.html. Accessed Apr 10, 2019.

57. NOAA Exxon Valdez Oil Spill | National Oceanic and Atmospheric Administration | US Department of Commerce. Available: https://response.restoration.noaa.gov/oil-and-chemical-spills/significant-incidents/exxon-valdez-oil-spill. Accessed Apr 10, 2019.

58. NOAA Taylor Energy | NOAA's Damage Assessment Remediation and Restoration Program. Available: https://darrp.noaa.gov/oil-spills/taylor-energy. Accessed Apr 10, 2019.

59. NOAA IXTOC I | IncidentNews | National Oceanic and Atmospheric Administration | US Department of Commerce. Available: https://incidentnews.noaa.gov/incident/6250. Accessed Apr 10, 2019.

60. Daneshgar Asl S, Amos J, Woods P, Garcia-Pineda O and MacDonald IR (2016) Chronic, Anthropogenic Hydrocarbon Discharges in the Gulf of Mexico. *Deep Sea Research Part II: Topical Studies in Oceanography* 129: 187–195. doi: 10.1016/j.dsr2.2014.12.006

61. Berenshtein I, Paris CB, Perlin N, et al. (2020) Invisible oil beyond the *Deepwater Horizon* satellite footprint. Science Advances 6: eaaw8863. doi: 10.1126/sciadv.aaw8863

62. NOAA (2017) Sea Grant Where did the oil go? A *Deepwater Horizon* fact sheet.

63. NOAA Affected Gulf Resources | NOAA Gulf Spill Restoration. Available: https://www.gulfspillrestoration.noaa.gov/affected-gulf-resources. Accessed Apr 10, 2019.

64. -- (2010) Executive Order 13543-- National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling. In: *whitehouse.gov*. Available: https://obamawhitehouse.archives.gov/the-press-office/executive-order-national-commission-bp-deepwater-horizon-oil-spill-and-offshore-dri. Accessed Feb 6, 2020.

65. BSEE (2016) Reforms Since *Deepwater Horizon* | Bureau of Safety and Environmental Enforcement. Available: https://www.bsee.gov/reforms-since-deepwater-horizon. Accessed Nov 4, 2019.

66. EnergyTomorrow Radio (2010) ETR 104 Obama's Offshore Drilling Announcement: A Step in the Right Direction on Apple Podcasts. Interview with Erik Milito, API. In: *Apple Podcasts*. Available: https://podcasts.apple.com/us/podcast/etr-104-obamas-offshore-drilling-announcement-step/id285536705?i=1000333192957. Accessed Feb 26, 2020.

67. Committee on Oil in the Sea: Inputs, Fates, and Effects, Ocean Studies Board, Marine Board, *et al*. (2003) Oil in the Sea III: Inputs, Fates, and Effects. Washington, D.C.: National Academies Press.

68. Peterson CH, Rice SD, Short JW, et al. (2003) Long-term ecosystem response to the Exxon Valdez oil spill. Science 302: 2082–2086. doi: 10.1126/science.1084282

69. Ziccardi MH, Wilkin SM, Rowles TK and Johnson S (2015) Pinniped and Cetacean Oil Spill Response Guidelines. NOAA Technical Memorandum NMFS-OPR-52. National Oceanic and Atmospheric Administration. US Department of Commerce.

70. Schwacke LH, Smith CR, Townsend FI, et al. (2013) Health of Common Bottlenose Dolphins (*Tursiops truncatus*) in Barataria Bay, Louisiana, Following the *Deepwater Horizon* Oil Spill. *Environmental Science & Technology* 48: 93–103. doi: 10.1021/es403610f

71. De Guise S, Levin M, Gebhard E, et al. (2017) Changes in immune functions in bottlenose dolphins in the northern Gulf of Mexico associated with the *Deepwater Horizon* oil spill. Endangered Species Research 33: 291–303. doi: 10.3354/esr00814

72. Schwacke LH, Garrison LP, Thomas L, *et al*. (2016) Models and analyses for the quantification of injury to Gulf of Mexico cetaceans from the *Deepwater Horizon* oil spill. DWH NRDA Marine Mammal Technical Working Group Report. DWH-AR0105866

73. NOAA (2018) *Deepwater Horizon* Oil Spill 2010 - Sea Turtles, Dolphins, and Whales | NOAA Fisheries. Available: https://www.fisheries.noaa.gov/national/marine-life-distress/deepwater-horizon-oil-spill-2010-sea-turtles-dolphins-and-whales. Accessed May 10, 2019.

74. Graham L, Hale C, Maung-Douglass E, et al. (2017) NOAA Sea Grant. The *Deepwater Horizon* OIl Spill's Impact on Bottlenose Dolphins. MASGP-17-002.

75. NOAA (2019) Gulf of Mexico Bryde's Whale | NOAA Fisheries. In: *NOAA*. Available: https://www.fisheries.noaa.gov/species/gulf-mexico-brydes-whale. Accessed Feb 7, 2020.

76. NOAA Why Are Seabirds so Vulnerable to Oil Spills? | response.restoration.noaa.gov. Available: https://response.restoration.noaa.gov/about/media/why-are-seabirds-so-vulnerable-oil-spills.html. Accessed May 14, 2019.

77. Balseiro A, Espí A, Márquez I, et al. (2005) Pathological features in marine birds affected by the Prestige's oil spill in the north of Spain. *Journal of Wildlife Diseases* 41: 371–378. doi: 10.7589/0090-3558-41.2.371

78. Haney J, Geiger H and Short J (2014) Bird mortality from the *Deepwater Horizon* oil spill. II. Carcass sampling and exposure probability in the coastal Gulf of Mexico. *Marine Ecology Progress Series* 513: 239–252. doi: 10.3354/meps10839

79. Henkel JR, Sigel BJ and Taylor CM (2012) Large-Scale Impacts of the *Deepwater Horizon* Oil Spill: Can Local Disturbance Affect Distant Ecosystems through Migratory Shorebirds? *BioScience* 62: 676–685. doi: 10.1525/bio.2012.62.7.10

80. NOAA (2016) *Deepwater Horizon* oil spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement. Chapter 4 – Injury to Natural Resources.

81. NOAA (2019) Kemp's Ridley Turtle | NOAA Fisheries. Available: /species/kemps-ridley-turtle. Accessed May 10, 2019.

82. NOAA (2010) Oil and Sea Turtles: Biology, Planning, and Response.

83. Hale C, Graham L, Maung-Douglass E, *et al.* (2017) NOAA Sea Grant. Sea turtles and the *Deepwater Horizon* oil spill. TAMU-SG-17-501.

84. Montagna PA, Baguley JG, Cooksey C, et al. (2013) Deep-Sea Benthic Footprint of the *Deepwater Horizon* Blowout.

85. Michel J, Esler D and Nixon Z (2016) Report for the Exxon Valdez Oil Spill Trustee Council Studies on Exxon Valdez Lingering Oil: Review and Update on Recent Findings. Available: http://www.evostc.state.ak.us/Universal/Documents/Publications/04-05-16_March_2016_LO_Update.pdf. Accessed Feb 26, 2020.

86. Law RJ and Hellou J (1999) Contamination of Fish and Shellfish Following Oil Spill Incidents. *Environmental Geosciences* 6: 90–98. doi: 10.1046/j.1526-0984.1999.08039.x

87. Whitehead A, Dubansky B, Bodinier C, et al. (2012) Genomic and physiological footprint of the *Deepwater Horizon* oil spill on resident marsh fishes. *Proceedings of the National Academy of Sciences* 109: 20298–20302. doi: 10.1073/pnas.1109545108

88. NOAA How Oil Spills Affect Fish and Whales | NOAA Office of Response and Restoration. Available: https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/how-oil-spills-affect-fish-and-whales.html. Accessed Apr 30, 2019.

89. Yender R, Michel J and Lord C (2002) Managing Seafood Safety after an Oil Spill. Seattle: Hazardous Materials Response Division, Office of Response and Restoration, National Oceanic and Atmospheric Administration.: 72.

90. Graham WM, Condon RH, Carmichael RH, et al. (2010) Oil carbon entered the coastal planktonic food web during the *Deepwater Horizon* oil spill. *Environmental Research Letters* 5: 045301. doi: 10.1088/1748-9326/5/4/045301

91. Almeda R, Wambaugh Z, Chai C, et al. (2013) Effects of Crude Oil Exposure on Bioaccumulation of Polycyclic Aromatic Hydrocarbons and Survival of Adult and Larval Stages of Gelatinous Zooplankton. Browman HI, editor *PLoS ONE* 8: e74476. doi: 10.1371/journal.pone.0074476

92. Hale C Oysters and Oil Spills. NOAA Sea Grant. Available: http://masgc.org/oilscience/oysters-oil-spills.pdf. Accessed Feb 7, 2020.

93. Giltz SM and Taylor CM (2017) Sublethal Toxicity of Crude Oil Exposure in The Blue Crab, *Callinectes sapidus*, at Two Life History Stages. *Bulletin of Environmental Contamination and Toxicology* 98: 178–182. doi: 10.1007/s00128-016-2000-7

94. Fern R, Withers K, Zimba P, Wood T and Schoech L (2015) Toxicity of Three Dispersants Alone and in Combination with Crude Oil on Blue Crab *Callinectes sapidus* Megalopae. Southeastern Naturalist 14: G82–G92. doi: 10.1656/058.014.0413

95. NOAA What Have We Learned About Using Dispersants During the Next Big Oil Spill? | response.restoration.noaa.gov. Available: https://response.restoration.noaa.gov/about/media/what-have-we-learned-about-using-dispersants-during-next-big-oil-spill.html. Accessed Apr 16, 2019.

96. Kleindienst S, Seidel M, Ziervogel K, et al. (2015) Chemical dispersants can suppress the activity of natural oil-degrading microorganisms. *Proceedings of the National Academy of Sciences* 112: 14900–14905. doi: 10.1073/pnas.1507380112

97. Committee on the Evaluation of the Use of Chemical Dispersants in Oil Spill Response, Ocean Studies Board, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies and National Academies of Sciences, Engineering, and Medicine (2019) The Use of Dispersants in Marine Oil Spill Response. Washington, D.C.: National Academies Press.

98. Anderson Lively JA and McKenzie J (2014) Toxicity of the Dispersant Corexit 9500 to Early Life Stages of Blue Crab, *Callinectes sapidus*. *Bulletin of Environmental Contamination and Toxicology* 93: 649–653. doi: 10.1007/s00128-014-1370-y

99. Goodbody-Gringley G, Wetzel DL, Gillon D, et al. (2013) Toxicity of *Deepwater Horizon* Source Oil and the Chemical Dispersant, Corexit® 9500, to Coral Larvae. *PLoS ONE* 8: e45574. doi: 10.1371/journal.pone.0045574

100. Almeda R, Bona S, Foster CR and Buskey EJ (2014) Dispersant Corexit 9500A and chemically dispersed crude oil decreases the growth rates of meroplanktonic barnacle nauplii *(Amphibalanus improvisus)* and tornaria larvae (*Schizocardium* sp.). *Marine Environmental Research* 99: 212–217. doi: 10.1016/j.marenvres.2014.06.007

101. Bretherton L, Kamalanathan M, Genzer J, et al. (2019) Response of natural phytoplankton communities exposed to crude oil and chemical dispersants during a mesocosm experiment. *Aquatic Toxicology* 206: 43–53. doi: 10.1016/j.aquatox.2018.11.004

102. NAACP (2010) BP Oil Drilling Disaster—NAACP Investigation. Available: https://www.naacp.org/wp-content/uploads/2016/04/BP%20Oil%20Drilling%20Disaster--Investigation%20Summary%20Report--SHORT%20VERSION.pdf. Accessed Jan 29, 2020.

103. Bullard RD and 2010 (2010) BP's Waste Management Plan Raises Environmental Justice Concerns. In: *Dissident Voice*. Available: https://dissidentvoice.org/2010/07/bp's-waste-management-plan-raises-environmental-justice-concerns/. Accessed Jan 30, 2020.

104. LSU (2012) University of Louisiana AgCenter Research Report # 116: Racial and Ethnic Groups in the Gulf of Mexico Region: Vietnamese. Available: https://www.lsuagcenter.com/NR/rdonlyres/D7BD2C54-F5A1-4592-ABE1-EC0CBEEC4680/90008/RR116racialandethnicgroupsinthegulfofmexicoregionv.pdf. Accessed Nov 21, 2019.

105. Ngo D, Gibbons JL, Scire G and Le D (2014) Mental Health Needs in Vietnamese American Communities Affected by the Gulf Oil Spill. *Psychology* 05: 109–115. doi: 10.4236/psych.2014.52017

106. NPR (2010) Oil Spill Impacts Vietnamese-American Workers. Tell Me More. In: *NPR.org*. Available: https://www.npr.org/templates/story/story.php?storyId=126883721. Accessed Jan 30, 2020.

107. -- The United Houma Nation - Official Website of The Houma People. In: *The United Houma Nation*. Available: https://unitedhoumanation.org/. Accessed Jan 29, 2020.

108. Rusiecki J, Alexander M, Schwartz EG, et al. (2018) The *Deepwater Horizon* Oil Spill Coast Guard Cohort study. *Occupational and Environmental Medicine* 75: 165–175. doi: 10.1136/oemed-2017-104343

109. Barnea N Health and Safety Aspects of In-situ Burning of Oil- National Oceanic and Atmospheric Administration. *Office of Response and Restoration, National Oceanographic and Atmospheric Administration*

110. Rung AL, Gaston S, Oral E, et al. (2016) Depression, Mental Distress, and Domestic Conflict among Louisiana Women Exposed to the *Deepwater Horizon* Oil Spill in the WaTCH Study. *Environmental Health Perspectives* 124: 1429–1435. doi: 10.1289/EHP167

111. Witters D (2010) Gulf Coast Residents Worse Off Emotionally After BP Oil Spill. In: *Gallup.com*. Available: https://news.gallup.com/poll/143240/Gulf-Coast-Residents-Worse-Off-Emotionally-Oil-Spill.aspx. Accessed Nov 21, 2019.

112. Abramson D, Redlener I, Stehling-Ariza T, et al. (2010) Impact on Children and Families of the *Deepwater Horizon* Oil Spill Preliminary Findings of the Coastal Population Impact Study. National Center for Disaster Preparedness, Research Brief 2010:8. Columbia University Mailman School of Public Health.

113. BOEM (2017) Catastrophic Spill Event Analysis: High-Volume, Extended-Duration Oil Spill Resulting from Loss of Well Control on the Gulf of Mexico Outer Continental Shelf (1st Revision). Bureau of Ocean Energy Management. Gulf of Mexico OCS Region. 355p.

114. NOAA Gulf oil spill | National Oceanic and Atmospheric Administration. Available: https://www.noaa.gov/education/resource-collections/ocean-coasts-education-resources/gulf-oil-spill. Accessed Feb 26, 2020.

115. Welsh MP (2015) Memorandum: DWH-AR0079605. Available: https://www.fws.gov/doiddata/dwh-ar-documents/940/DWH-AR0079605.pdf. Accessed Nov 15, 2019.

116. DOJ Fact Sheet Proposed Consent Decree With BP For The *Deepwater Horizon*/Macondo Well Oil Spill. Department of Justice.

117. NOAA (2017) *Deepwater Horizon* oil spill settlements: Where the money went | National Oceanic and Atmospheric Administration. Available: https://www.noaa.gov/explainers/deepwater-horizon-oil-spill-settlements-where-money-went. Accessed Feb 19, 2020.

118. SELC (2016) Oil drilling infrastructure drives away tourism dollars. Southern Environmental Law Center. Available: https://www.southernenvironment.org/news-and-press/news-feed/oil-drilling-infrastructure-drives-away-tourism-dollars. Accessed Dec 10, 2019.

119. EPA Coastal Wetlands Initiative: Gulf of Mexico Review (EPA-843-R-10-005D). Environmental Protection Agency.

120. USGS, Couvillion BR, Beck H, Schoolmaster D and Fischer M (2017) Land Area Change in Coastal Louisiana (1932 to 2016): U.S. Geological Survey Scientific Investigations.

121. Fleishman L and Franklin M (2017) Fumes Across the Fence-Line: The Health Impacts of Air Pollution from Oil & Gas Facilities on African American Communities. NAACP and Clean Air Task Force. Available: https://www.naacp.org/wp-content/uploads/2017/11/Fumes-Across-the-Fence-Line_NAACP-and-CATF-Study.pdf. Accessed Jan 29, 2020.

122. EPA (2018) Radioactive Waste Material from Oil and Gas Drilling. In: US EPA. Available: https://www.epa.gov/radtown/radioactive-waste-material-oil-and-gas-drilling. Accessed Jan 24, 2020.

123. EPA O (2015) TENORM: Oil and Gas Production Wastes. In: *US EPA*. Available: https://www.epa.gov/radiation/tenorm-oil-and-gas-production-wastes. Accessed Jan 23, 2020.

124. EPA O (2016) Management of Oil and Gas Exploration and Production Waste. In: *US EPA*. Available: https://www.epa.gov/hw/management-oil-and-gas-exploration-and-production-waste. Accessed Jan 24, 2020.

125. EPA (1988) Regulatory Determination for Oil and Gas and Geothermal Exploration, Development and Production Wastes. Available: https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/pdf/og88wp.pdf. Accessed Feb 6, 2020.

126. Dixon J (1988) EPA Said To Bow To Political Pressure In Oil Wastes Ruling. In: *AP NEWS*. Available: https://apnews.com/87790d67435a0ba3eb1e5ecc5ce86c9c. Accessed Feb 6, 2020.

127. Hildebrand JA (2009) Anthropogenic and natural sources of ambient noise in the ocean. *Marine Ecology Progress Series* 395: 5–20. doi: 10.3354/meps08353

128. Nieukirk SL, Mellinger DK, Moore SE, et al. (2012) Sounds from airguns and fin whales recorded in the mid-Atlantic Ocean, 1999–2009. *The Journal of the Acoustical Society of America* 131: 1102–1112. doi: 10.1121/1.3672648

129. NOAA (2018) Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Geophysical Surveys in the Atlantic Ocean. *National Oceanic and Atmospheric Administration* : 83 FR 63268.

130. Rolland RM, Parks SE, Hunt KE, et al. (2012) Evidence that ship noise increases stress in right whales. *Proceedings of the Royal Society B: Biological Sciences* 279: 2363–2368. doi: 10.1098/rspb.2011.2429

131. Forney K, Southall B, Slooten E, et al. (2017) Nowhere to go: noise impact assessments for marine mammal populations with high site fidelity. *Endangered Species Research* 32: 391–413. doi: 10.3354/esr00820

132. Frantzis A (1998) Does acoustic testing strand whales? *Nature* 392: 29–29. doi: 10.1038/32068

133. Putland RL, Merchant ND, Farcas A and Radford CA (2018) Vessel noise cuts down communication space for vocalizing fish and marine mammals. *Global Change Biology* 24: 1708–1721. doi: 10.1111/gcb.13996

134. Kight CR and Swaddle JP (2011) How and why environmental noise impacts animals: an integrative, mechanistic review. *Ecology Letters* 14: 1052–1061. doi: 10.1111/j.1461-0248.2011.01664.x

135. Nowacek DP, Clark CW, Mann D, et al. (2015) Marine seismic surveys and ocean noise: time for coordinated and prudent planning. *Frontiers in Ecology and the Environment* 13: 378–386. doi: 10.1890/130286

136. Castellote M, Clark CW and Lammers MO (2012) Acoustic and behavioural changes by fin whales *(Balaenoptera physalus)* in response to shipping and airgun noise. *Biological Conservation* 147: 115–122. doi: 10.1016/j.biocon.2011.12.021

137. Engås A, Løkkeborg S, Ona E and Soldal AV (1996) Effects of seismic shooting on local abundance and catch rates of cod (*Gadus morhua*) and haddock *(Melanogrammus aeglefinus)*. *Canadian Journal of Fisheries and Aquatic Sciences* 53: 2238–2249. doi: 10.1139/cjfas-53-10-2238

138. McCauley RD, Day RD, Swadling KM, et al. (2017) Widely used marine seismic survey air gun operations negatively impact zooplankton. *Nature Ecology & Evolution* 1: 0195. doi: 10.1038/s41559-017-0195

139. McCauley RD, Fewtrell J and Popper AN (2003) High intensity anthropogenic sound damages fish ears. *The journal of the acoustical society of America* 113: 638–642.

140. Cerchio S, Strindberg S, Collins T, Bennett C and Rosenbaum H (2014) Seismic Surveys Negatively Affect Humpback Whale Singing Activity off Northern Angola. Roberts JM, editor *PLoS ONE* 9: e86464. doi: 10.1371/journal.pone.0086464

141. de Soto NA, Delorme N, Atkins J, et al. (2013) Anthropogenic noise causes body malformations and delays development in marine larvae. *Scientific Reports* 3 doi: 10.1038/srep02831

142. Farmer NA, Baker K, Zeddies DG, et al. (2018) Population consequences of disturbance by offshore oil and gas activity for endangered sperm whales (*Physeter macrocephalus*). *Biological Conservation* 227: 189–204. doi: 10.1016/j.biocon.2018.09.006

143. IPCC (2019) Summary for Policymakers. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson- Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, M. Nicolai, A. Okem, J. Petzold, B. Rama, N. Weyer (eds.)]. Available: https://report.ipcc.ch/srocc/pdf/SROCC_FinalDraft_FullReport.pdf. Accessed Dec 10, 2019.

144. United States and Army War College (2019) Implications of Climate Change for the U.S. Army. : 52.

145. USGCRP (2016) The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program, Washington, DC. 1–312p.

146. Oil Change International (2014) Cashing in on all of the above: U.S. Fossil Fuel Production Subsidies Under Obama. Available: http://priceofoil.org/content/uploads/2014/07/OCI_US_FF_Subsidies_Final_Screen.pdf. Accessed Dec 17, 2019.

147. EIA (2019) U.S. petroleum exports exceed imports in September - Today in Energy - U.S. Energy Information Administration (EIA). Available: https://www.eia.gov/todayinenergy/detail.php?id=42340. Accessed Jan 30, 2020.

148. U.S. Energy Information Administration (EIA) Short-Term Energy Outlook. Available: https://www.eia.gov/outlooks/steo/. Accessed Jul 22, 2019.

149. Oceana Grassroots Opposition to Offshore Drilling and Exploration in the Atlantic Ocean and off Florida's Gulf Coast. In: *Oceana USA*. Available: https://usa.oceana.org/climate-and-energy/grassroots-opposition-offshore-drilling-and-exploration-atlantic-ocean-and. Accessed Nov 18, 2019.

150. BOEM 2017-2022 OCS Oil and Gas Leasing Program | Bureau of Ocean Energy Management. Available: https://www.boem.gov/oil-gas-energy/leasing/2017-2022-ocs-oil-and-gas-leasing-program. Accessed Feb 26, 2020.

#ProtectOurCoast

Oceana.org/hindsight2020

Photo Credit: Chris Graythen/ Getty Images

OCEANA Protecting the World's Oceans

Oceana is the largest international advocacy organization dedicated solely to ocean conservation. Oceana is rebuilding abundant and biodiverse oceans by winning science-based policies in countries that control one-third of the world's wild fish catch. With more than 225 victories that stop overfishing, habitat destruction, pollution, and the killing of threatened species like turtles and sharks, Oceana's campaigns are delivering results. A restored ocean means that 1 billion people can enjoy a healthy seafood meal, every day, forever. Together, we can save the oceans and help feed the world.
Visit usa.oceana.org to learn more.