An Evaluation of United States Federal Oil Spill Regulations:

Deepwater Horizon vs. Bouchard B120

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ABSTRACT

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The purpose of this study is to compare and contrast the background, impacts and treatment of two major oil spills and investigate the appropriateness of existing environmental policies and any need for new and/or different policies. The study traces the growth of relevant policy development and looks at historic and contemporary policy changes and applies this to the in-depth examination of the Bouchard B120 and the Deepwater Horizon spills.

Policy recommendations are made based on conclusions drawn from the examination of the two case studies. It is recommended that a new classification system be implemented so that each company in the oil industry is appropriately and equally monitored. An important conclusion of this study is that successful oil spill policy is one that stresses preventative measures and is well-enforced by the appropriate agency

Chapter I: Major Environmental Problems Associated with Oil Spills

Introduction

Chapter I discusses the major problems that are associated with oil spills. The focus is on the environmental problems and concomitant difficulties such as health concerns that are created. In Section I, the negative impacts on marine life and habitats are examined by focusing on both the immediate and long-term consequences of an oil spill. The first section will demonstrate the effects of oil spills on both resilient and sensitive habitats, including the species that live there.

Chapter I also explores and examines the negative impacts oil spills have on humans. In Section II, issues associated with public health, local economies and community stressors that are results of oil spills are evaluated. The second section of Chapter I, highlights the direct and indirect effects that oil spills have on local human populations.

Section I: Impact on Habitats and Marine Life

I. Coastal/ Inshore

a. Highly sensitive habitats

Introduction

The negative effects oil spills have on coastal habitats as well as marine life will be examined and will include the impact on sensitive habitats such as mangroves, coral reefs, and salt marshes. The status of the marine life living in these habitats will be discussed and highlight impacts on marine mammals, seabirds, fish and shellfish.

Mangroves

Mangroves are shrubs or small trees that inhabit saline or brackish waters (Sanctuary 2011). Mangroves appear similar to shrubs, except they have the unique ability to survive and grow in intertidal zones. They can be found in the intertidal zones of the tropics and subtropics,

taking up about 150,000 square kilometers (Hoff et al., 2014). These shrubs can survive conditions that would kill most vegetation such as, frequent flooding and high concentrations of salt in the water (AMNH 2019). These intertidal shrubs provide shelter for many important species inhabiting the tropics or subtropics, making them a critical habitat for marine life. Not only are mangroves a vital habitat, but they have the very important job of protecting the shoreline from the tough intertidal conditions (Hoff et al., 2014). In addition to providing physical protection from the ocean, they also act as a water filter, by trapping sediments and stirring up excess nutrients from the water. Marine life may not live in the mangroves, but they benefit from its ability to keep water clean. Mangroves are crucial to the success of their ecosystem, but they also have a larger global role of being a carbon sink that removes excess CO_2-emissions from the atmosphere (Hoff et al., 2014). Even though mangroves tend to be recovery well from most natural disasters, they are especially sensitive to the consequences of oil spills.

Since mangroves act as the barrier to the shoreline, they are highly sensitive to the negative impacts of oil spills. These intertidal shrubs, can feel the consequences of an oil spill, because it can kill them in as little as a few weeks. However, the death of mangroves could be delayed for several years, because the toxins in oil could slowly weaken the shrub's resilience overtime (LERC 1995). The amount of destruction that occurs depends on the type of oil spilt and the amount of time that the mangroves have been exposed to the oil. For instance, heavier oils result in the physical smothering and coating of mangroves, whereas lighter oils tend to be more toxic for them (Hoff et al., 2014). In addition to dying or physical smothering, mangroves exposed to oils could suffer major impairments to functions that are necessary for their survival (Hoff et al., 2014). Whether or not mangroves are smothered by oil that remains on the shore for

an extended period of time, depends heavily on the wind and current conditions. For instance, wind can either spread oil far up the shore or it can trap it in the intertidal zone. An incoming tide is bad news for mangroves, because it brings oil right to the intertidal zone (LERC 1995). In fact, cleaning up after oil spills is tricky enough, but some techniques stand to cause more damage and destruction to mangroves than others. Therefore, it is crucial to understand that using chemical dispersants is good in the sense that it reduces the amount of time that mangroves are exposed to oil, but could make for a more toxic environment (Hoff et al., 2014). This is because even though oil is being removed from the water, it is being replaced by the addition of more chemicals. Even after the oil is removed, the impact that it has on mangroves could last for years and eventually lead to complete habitat loss.

It is crucial that mangroves are protected from potential oil spills because their survival is already being threatened by invasive species and sea level rise (Feller et al., 2018). Therefore, mangroves cannot afford to be weakened or destroyed by toxins found in oils. It is nearly impossible to stop the rising sea level or the invasion of exotic species, but it is possible to protect and prevent mangroves from being exposed to oils. Mangroves are more than just a habitat, they play a critical role in their ecosystem, by providing the conditions that are necessary for species that live there to survive.

Coral Reefs

Coral reefs are completely underwater and have a rock-like base, that is home to thousands of marine species (EPA 2019). Amongst those species are thousands of coral polyps, and photosynthetic algae called zooxanthellae (US DOC 2013). Therefore, when oil is exposed to coral reefs, thousands of important species are affected as well. Coral reefs are similar to mangroves in that they are an oceanic habitat that is also very sensitive to the effects of oil spills.

Coral reefs can be found in tropical waters, especially those closest to the equator (Yender et al., 2010). Many plant and animal species may not live directly in a coral reef but they benefit from growing or living close to them. Even though humans do not live in coral reefs, they still benefit from the protection it provides the shorelines, and how it supports fisheries, recreation and tourism ("What are Coral Reefs" 2019). It is clear that coral reefs are a vital part of their ecosystem and anything that destroys them, would in turn have major impacts on the rest of the ecosystem.

Oil spills have negative consequences on any environment that they occur in, however coral reefs are particularly sensitive to its effects. Similar to mangroves, the type of oil and the amount of exposure determines the severity of the impacts. Heavier oils are only a concern for coral reefs if they are in the water for a long enough time and can sink to the bottom, which poses a potential smothering issue. Heavier oils, such as crude oil poses a threat to corals because it sticks to the coral and physically smothers them (Shigenaka 2001). Coral reefs can die from crude oil sticking to them, but they also can experience impairments of necessary functions that they need to survive. Oil exposure can kill coral reefs directly from tissue and larval death, thus making it very difficult for them to survive (Shigenaka 2001). Among the negative effects that coral reefs suffer from as a result of oil exposure, the death of certain parts are only one small part of the problem, in comparison to the damage that it causes reproductive organs.

Once they have been exposed to an oil spill, reefs are susceptible to problems with reproduction, growth and behavior (Loya and Rinkevich 1980). Since oil effects the ability of coral reefs to reproduce and survive, it poses a serious threat to the future of the habitat. Coral reefs are a major habitat that is home to thousands of species, therefore anything that disrupts the

productivity of a reef will affect the daily functions of thousands of species. Oil poses such a major threat to coral reefs because, the effects may not appear until it is too late and the reef has died (US DOC 2013). Therefore, it is impossible to know for sure how much damage the oil spill has done, until the coral reefs are dead. Although no type of exposure to oil is good for coral reefs, the lighter oils pose a bigger threat than the heavier ones due to their ability to sink below the surface at a faster rate.

Since the lighter oils have the ability to mix into the water columns they tend to be a bigger threat to coral reefs, than the heavier oils (Yender et al., 2010). For instance, the longer the exposure the more serious the threat, because it could result in the death of coral reefs. Part of what makes coral reefs so sensitive to oil is that the time of year it occurs, determines the severity of the damage. As expected the earlier stages of life are the most sensitive, therefore if a spill happened during these early stages than the damage done to the habitat will be far greater, than if it happened during adulthood (Yender et al., 2010). Similar to mangroves, the removal process for oil is difficult because it involves adding more chemicals to an already sensitive habitat. The dispersants used to clean up and remove oil from the coral reef habitat can actually do more harm than good. The use of chemical dispersants are especially toxic for coral reefs in the early stages of development because it can change their behaviors, decrease the amount of corals that settle on a reef and increase death rates ("Dispersants" 2019). Therefore, the best way to protect coral reefs from these issues caused by oil dispersants is to do everything possible to prevent an oil spill from occurring.

Both mangroves and coral reefs have stressors in their environment that threaten their survival without an oil spill ever occurring. Just as oil spills are a result of human activity so are the other disruptions that negatively impact coral reefs. For instance, divers, boat anchoring, and

runoff from golf courses impair the necessary functions of life for coral reefs (PRI 2019). Coral reefs are an important habitat that provides shelter and protection to numerous species, whom without it would not be able to survive. Therefore, it is critical that humans find ways to protect coral reefs from their activities, especially those like oil exposure, that can easily be prevented.

Salt marshes

Salt marshes are highly sensitive to oil spills, just like coral reefs and mangroves. They can be found all over the world, but are most common in mid to high latitudes (Michel and Rutherford 2013). In fact, about half of the salt marshes in the United States can be found on the Gulf Coast, which is where a lot of offshore oil drilling occurs. Salt marshes support a wide variety of plants and vegetation that require, constant or frequent flooding. Therefore, it is clear that they are an important ecosystem, because by providing the conditions to allow so much vegetation to grow, it is supporting plants, microbes and animals (Michel and Rutherford 2013). Salt marshes not only provide the optimal conditions for a variety of vegetation to grow, but it also protects them from harmful situations that occur outside of the ecosystem. However, oil spills threaten this protection that salt marshes provide the species living there because it destroys and damages their habitat.

The severity of the damage that an oil spill can cause salt marshes, depends on the type of oil and the amount of time it spends in the habitat before it is removed. Although lighter oils are more toxic, they tend to do less damage to marshes as it spreads because it thins out. Whereas heavier oils can smother both the leaves as well as the soil and root systems in salt marshes (American Society of Agronomy 2017). However, if only some of the leaves are smothered by oil than the marsh has potential to recover rather quickly, but it all depends on the sensitivity of the plant species growing there. Aforementioned, salt marshes are home to a variety of plant

species, with varying levels of sensitivity, and thus different levels of severity in terms of irreversible damage. Since the extent of damage done depends largely on the speed of clean-up, the role of waves and currents cannot be underplayed. Oil is less of an issue for salt marshes when it thins out, therefore the ability of waves and currents to spread oil out, makes the difference between a smothered ecosystem and a recovered ecosystem (Michel and Rutherford 2013). Although waves and currents reduce the risk of physical smothering in salt marshes, it also makes it nearly impossible to clean-up completely. Although marshes may not be smothered by oil, it can still become trapped in subsequent layers of soil, thus having a long-lasting impact on the productivity of the habitat (American Society of Agronomy 2017).

It is critical that exposure to oil is prevented or reduced for salt marshes, because they are already dealing with other environmental stressors that make survival difficult. For instance, salt marshes have been subject to erosion for quite some time now, and oil spills actually increase the rate at which erosion occurs (Beland et al., 2017). Therefore, not only does exposure to oil causes its own problems for salt marshes, but it also adds on to preexisting problems, making conditions for salt marshes far worse. Erosion of salt marshes means habitat loss for species that call salt marshes home, making oil spills that much more of a threat to the entire ecosystem.

II. Impacts on Species

Marine Birds

Oil spills not only have lethal consequences on species that live in sensitive coastal habitats, but they also have adverse effects on marine life that spend a lot of time offshore. The longer the oil stays on the surface of the water and the farther that waves carry it, the more seabirds that will be harmed. Therefore, it is impossible to determine how many birds will be affected by any given spill, because there is no way of knowing how far waves or currents will

carry oil. Birds are directly killed by the toxicity of oil, like coral reefs, when their wings become covered with oil and causes impairments to functions that are necessary for survival. For instance, when oil gets stuck on their wings it damages the bird's ability to maintain their body temperature, which results in either overheating or hypothermia (International Bird Rescue 2019).

Seabirds try to remove the oil from their wings by preening themselves, but unfortunately this involves the ingestion of oil by the birds. Not only is the oil toxic to the birds, but instinct takes over and removing the oil from their wings takes precedent over eating and protecting themselves (International Bird Rescue 2019). Therefore, if marine birds are not killed by directly ingesting oil, then they are indirectly killed due to the disruption it causes in their daily routine. Seabirds do not lose their habitat as a result of an oil spill, however it is difficult to know how far the waves carried the oil.

The ocean is their habitat, and they rely on it for food, only coming onshore to breed. Therefore, when an oil spill occurs it threatens the survival of seabirds in more ways than just getting their wings stuck together. For instance, the species that they rely on for food may not survive an oil spill, which would force the birds to find other sources (Wildlife Health 2019). Marine birds need food and if they have to expend more energy finding food sources, then that is less time that they can spend performing functions necessary for survival. These functions include, those that marine birds contribute to success of the entire ecosystem.

Since seabirds are a key species in the ocean, what affects them has trickle-down effects on the rest of the ecosystem. Seabirds are responsible for bringing nitrogen to islands, so that the islands can be fertile and productive (Kaiser 2017). Therefore, if seabirds cannot make it to surrounding islands because oil is causing their wings to be stuck together, then the productivity

of the islands suffers greatly. The productivity of islands is crucial not only to the survival of all the animals that live there, but it also gives seabirds a place to breed. Less productivity means less food and less time to breed, yielding issues for the future of marine bird populations. Oil spills pose an even more significant threat to seabirds because many species are already endangered.

In fact, marine bird species are among the most threatened of all bird species worldwide. Since seabirds are threatened without exposure to oil, the presence of oil in their habitat compounds the negative impacts that they already experience (Audubon California 2019). All the pressures and stressors that marine bird species are faced with are consequences of human actions that disrupt their environments. Seabirds are victims of fisheries who increase competition for food, as well as other anthropogenic activities that contribute to climate change (Audubon California 2019). For instance, ocean acidification is a consequence of climate change and it makes it difficult for the prey of marine birds to survive. Adjusting and expanding their diet are just one of the many issues that marine birds will face as a result of climate change (Audubon California 2019). Unfortunately, all the impacts of climate change, will not be known until they happen and seabirds could suffer more severely than initially predicted. Therefore, oil spills only add to these existing problems that marine birds are forced to deal with, making the prevention of oil spills that much more important.

Marine Mammals

Similar to seabirds, marine mammal species are both directly and indirectly affected by oil spills. The severity to which the species are affected by a spill depends on the type of oil spilled and the length of time they are exposed to it. The different species of marine mammals also determines the extent to which they are impacted by an oil spill. The mammals affected by

spills, include: sea otters, sea lions, seals, walruses, manatees, polar bears, dolphins, porpoises and whales (Fisheries and Oceans Canada 2019). Since all of these are species that are important to their ecosystem, the impacts of a spill will be felt by more than just those who are directly affected.

Oil does not have to be ingested by marine mammals, for it to pose a serious threat to them. In fact, those that have fur suffer a similar consequence to that of seabirds, because when oil sticks to their fur it reduces their insulation, which results in hypothermia. Whereas dolphins and whales do not have fur, but still suffer from skin lesions when they come into contact with oil. When mammals swim through oil, they not only suffer from skin lesions, but they also experience eye irritations or their flippers become coated with oil (Fisheries and Oceans Canada 2019). Similar to how a seabird cannot fly when their wings are coated in oil, seals and sea lions cannot swim as fast when their flippers are covered in oil. This makes the smaller and younger seals or sea lions easier prey for their predators, even more so than they normally are (Helm et al., 2015). In addition to the harm done to the outside of their bodies, oil also has the potential to do serious damage to the internal organs of marine mammals.

Once inside of a mammal, oil can wreak havoc on internal structures such as the lungs, kidneys, liver, brain and intestines. For instance, the lungs can become congested and mammals such as sea otters can become sick with emphysema or pneumonia due to the amount of time they spend near the surface of the water (Fisheries and Oceans Canada 2019). These illnesses can kill marine mammals in a short amount of time, therefore they do not have to be exposed to it for a long time in order for it to be life-threatening. The oil attacks the insides of the mammals' bodies, resulting in kidney, liver, brain or intestinal damage (Helm et al., 2015). All of which

would severely impact the mammals' ability to survive and perform necessary functions of everyday life.

Since most marine mammals are key species, what happens to them affects the success of the rest of the those in their ecosystem. Many marine mammals perform important functions that are critical to the success of their ecosystem (National Geographic Society 2019). For instance, whales and walruses act as top level predators, so the loss of them or any of their prey would have a domino effect on the rest of the food chain. Marine mammals that act as top predators are responsible for keeping the prey populations at or below carrying capacity, as not to overrun their ecosystem's resources (National Geographic Society 2019). Therefore, oil spills could have either a direct or indirect effect on the productivity of an ecosystem by disrupting the food chain.

Unfortunately, oil spills are not the only threats that marine mammals are faced with. In fact, many marine mammal species are already endangered without ever being exposed to oil. For instance, illegal hunting, climate change and habitat loss all contribute and compound the impacts of oil spills (Marine Mammal Center 2019). All of these threats not only effect marine mammals, but they also would have adverse effects on the entire ecosystem. Oil spills, hunting climate change and habitat loss are all results of anthropogenic activities that could destroy an entire ecosystem if they are not controlled. Of all of these dangerous human activities, oil spills are among the easiest to prevent from happening by implementing proactive policies.

Fish

Fish are similar to marine mammals and sea birds in that the severity of the effects of an oil spill depends on the type of oil and how long they were exposed to it. However, the depth of the water and whether or not it is a contained body of water or ocean also determines the extent

to which fish are impacted by an oil spill. In the ocean, the oil can spread out and remain on the surface, which has little to no direct effect on fish species. When petroleum oil spills occur in contained, shallow bodies of water, fish die in large numbers, resulting in fish kills (How Oil Spills Affect Fish and Whales 2019*)*. Another important aspect to take into consideration is the time of year that the oil spill occurs, because it does not take much oil to wipe out fish eggs or larvae. The fish in the earlier stages of life are not as strong of swimmers as adult fish are, therefore they cannot be as selective in what they eat and oftentimes they end up eating food contaminated by oil (How Oil Spills Affect Fish and Whales 2019*)*. Therefore, adult fish are less likely to consume food contaminated by oil, whereas the younger fish are more likely ingest it and get sick.

These illnesses plague the larvae population and may not be visible for many years following an oil spill. Since younger fish are smaller, they are more sensitive to the toxins in oil and therefore it does not take much for it severe impacts. Birth defects, heart problems, growth disruption and impairment of other functions necessary for survival are all consequences of exposure to oil (Herbet et al., 2015). Since, some of the effects of oil spills take some time to show up in fish, it is difficult to determine just how many fish will be impacted and for how long. Although the younger fish population is more susceptible to the impacts of oil, than the adult population, does not mean that they are not effected at all. Adult fish can also suffer a reduction in growth, as well as fin erosion, enlarged livers and fertility issues (US DOC and NOAA 2010). When fish populations suffer greatly from oil spills, the rest of the ecosystem feels it too.

Fish may not be the top predator, but their role in maintaining a success ecosystem is just as important. In fact, fish have the very important job providing primary producers with the

nutrients that they need to survive (Earth Day Network 2019). Since primary producers are the base of the ecosystem's food chain, it is critical that they get what they need so that they can give the higher levels the nutrients that they need to survive. Not only do fish play a critical role in the cycling of nutrients, but they are also a direct source of food and energy for top predators, so if fish die it will disrupt the entire food web. The consequences of oil spills may not be immediate but, it does not take much oil to have severe health implications on fish and completely disrupt the productivity of an entire ecosystem.

Oil spills compound other problems and threats that fish are experiencing in their habitat that are making it difficult for them to survive. Fish already have to manage the threats of invasive species, climate change, overfishing and habitat loss, without adding oil spills into the equation (Reid et al., 2013). Since fish are a major food source for many species, therefore if their survival is threatened then the success of the entire ecosystem is also in jeopardy. Most if not all of the major threats that fish are faced with are the results of human activities. Therefore, it is crucial that humans protect fish from events such as exposure to oil because it should be one of the easiest anthropogenic disaster to manage and prevent.

The toxins in oils can have a big impact on fish, because the more oil they are exposed too, the more toxins accumulate in their bodies. It is these toxins that make it difficult for fish to perform their necessary functions of life, such as fighting off diseases and overall growth (Carter 2018). Not only do these chemicals accumulate in individual fish, but each level of the food chain is affected because they eat contaminated fish. This process of toxin levels increasing as the food chain levels get higher is called biomagnification (Carter 2018). The greater amount of chemicals in an organism, the more dangerous it is for not only the individual but for each subsequent level, including humans. Therefore, the chemicals and toxins found in oil do not

disappear once the oil is cleaned-up because it remains in the organisms and accumulates overtime. Similar to fish, shellfish are also popular prey that when exposed to toxins from an oil spill, they will contribute to the biomagnification of those chemicals in the food chain.

Shellfish

When determining the severity of damage that an oil spill has caused shellfish there are three conditions that must be considered: oil type, stage of life and species of shellfish (Region IV Regional Response Team 2019). Therefore, similar to the other marine organisms, the type of oil spilled and the stage of life of the shellfish population are crucial when measuring the damage done. The early life stages are the most sensitive of the shellfish population and therefore stand to suffer the most harm. Whereas the adults will suffer less severe effects such as: disruptions in growth, damage to soft tissues, increased mucous production and decreased respiration rates (Region IV Regional Response Team 2019). Aforementioned, the species of shellfish plays a large role in determining the harm that an oil spill has caused.

Shellfish species such as shrimp, lobsters, crabs, oysters, mussels, scallops and squid will react to oil spills in slightly different ways. Once crustaceans enter an area contaminated by oil they may be unable to leave it due to a decreased reaction time and other mutations that develop when they are exposed to oil (Zdanowicz 2019). If these abnormalities do not kill them by rendering them immobile then it makes them more vulnerable to predators because they are slower than healthy crustaceans. Therefore, exposure to oil makes crustaceans easy prey and makes their predators more susceptible to accumulate toxins in their bodies by consuming contaminated food.

Whereas bivalves, such as oysters are attached to their habitat and cannot move away from an oil spill. This means that oil spills and chemicals used to clean it up, accumulate

overtime, which is especially dangerous for oysters because they are not able to completely remove toxins from their tissues (Hale et al., 2018). Not only is the accumulation of chemicals detrimental to oysters, it also can make them dangerous for humans to consume. Similar to most shellfish species, the portion of the population that is at the earlier stages of life are the most vulnerable to oil spills, and the adults are the least susceptible to harm. This means that the growth and survival rate of oyster larvae will be significantly reduced following the exposure to oil and chemical dispersants.

Similar to crustaceans and bivalves, cephalopods, such as squids are the most sensitive to the effects of oil spills during earlier stages of life. Adult cephalopods, tend to be more resilient when exposed to oil, than their younger counterparts, and therefore do not suffer as severe of consequences (Ober 2019). Squids can come into contact with oil by either eating it, absorbing it or breathing it in, which can result in mutations or impairments to functions necessary for survival (Ober 2019). However, in order for any cephalopod to be exposed to the toxins in oil, means that the oil has mixed deep into the water columns which takes a decent amount of time. It does not mean that it is impossible, but provided that it is cleaned up in a timely fashion than the damage to squids will be minimal. Regardless of the magnitude of the impact, all shellfish provide important ecosystem services and need to be healthy enough to complete them properly.

Although shellfish may include some of the smallest species in the ocean, they have key roles in their ecosystem. Shellfish are very important to the ocean ecosystem because it maintains water quality and it protects the shores from further damage (Northern Economics Inc. 2009). All of these services are necessary for the survival of all the organisms living in the marine ecosystem. Similar to fish, shellfish, contribute to the productivity of all marine wildlife and vegetation, by cycling nutrients. Many shellfish species, play important roles in the survival

of other species by either protecting them from predators or filtering the water in their habitat (Northern Economics Inc. 2009). Shellfish have a critical role in making sure that their ecosystem is functioning correctly, therefore, if something were to happen to them because of an oil spill it would disrupt all marine life involved.

Similar to the rest of marine life, shellfish are not immune to stressors that exist without an oil spill. In fact, shellfish struggle to survive in their ecosystem, with the increase in ocean acidification (Srinivas 2015). Since ocean acidification is a direct result of rising carbon dioxide emissions from anthropogenic sources, it is obvious that humans are responsible for the creation of this environmental stressor. The toxins in oil only make ocean acidification worse and add to the impairments of the necessary functions of shellfish. Oil damages their habitat and contaminates their food sources making it difficult for them to survive (Srinivas 2015). It is crucial that shellfish are protected from the potential of an oil spill because they play an important role in their ecosystem and do not need any other external pressures to deal with. When shellfish consume contaminated food, then the toxins accumulate in them, which can make them unhealthy for humans to eat them.

Shellfish are popular prey and just like fish when they consume oil the toxins remain in their body for a long time. Both fish and shellfish do not eat oil directly, but rather it enters their body when they consume microalgae. However, the difference between fish and shellfish are that shellfish are filter feeders so they do their best to avoid eating algae that could be contaminated by oil toxins (Keegan 2015). In order to avoid consuming poisonous food, shellfish change their behaviors as preventative measures rather than, the changes being a result of eating contaminated algae. These behaviors include an increase in mucus production, changes in their pumping and filtration rates as well abnormal oxygen consumption (Keegan 2015).

Therefore, oil spills have a different type of effect on shellfish because their daily functions are disrupted by their attempt to avoid contamination by oil. Shellfish suffer the consequences of oil spills by either by being poisoned by the toxins in their food or by trying to avoid contamination.

Section II: Impacts on Humans

Introduction

The negative effects oil spills have on human health as well as economic and social costs will be examined. The impact on tourism, fisheries and other recreational activities will be included in this examination. The long term and short term consequences that oil spills have on humans will also be highlighted in this section.

I. Health

Direct Exposure

Similar to marine life and habitats that come into direct contact with oil, there are adverse effects on their health as a result. When an oil spill occurs near where an individual works or lives then the air they breathe becomes contaminated and dangerous to inhale. The length of time that an individual is breathing in chemicals from oil spills, determines the severity of the impact on their health. In a short amount of time, workers or residents can become dizzy, nauseous or get a headache from inhaling oil contaminated air ("Oil Spill Effects on Humans" 2019). However, the longer the exposure and the stronger the smell of the oil fumes, the more serious of a threat it poses on an individual's health (James 2019). The long-term effects of inhaling oil fume include life-threatening damage to organs such as the liver and kidneys ("Home Heating Oil Tanks" 2019). The more potent the smell, the more dangerous it is to breathe, for any length of time. Therefore, oil does not have to touch an individual's skin in order for it to cause major health effects.

Although oil does not have to come into contact with skin, in order to cause health issues, when it an individual's skin is exposed to it, the consequences can be grave. When liquid petroleum makes contact with skin, it will cause a rash and could potentially reach the inside of the body (James 2019). The rash can develop into areas of itchy, blistering or peeling skin, so even though it may not be as serious as kidney or liver damage it is still painful ("Oil Spill Effects on Humans" 2019). Therefore, there are two major ways in which oil can enter the body and wreak havoc on internal organs. Those who work for companies that transport, drill or handle oil in any way are at the greatest risk of coming into direct contact oil that could make them sick.

Indirect Exposure

Unfortunately, direct exposure is not the only threat that oil spills to human health. In fact, an oil spill could happen far away from where they live and work, but they could still suffer the effects. For instance, an individual can swim in a body of water that they believe to be clean because they think that a reasonable amount of time has passed since an incident occurred, making it safe again. However, this is not always the case because if oil is not properly cleaned up, then there could still be toxins present in the water, putting the individual's health at risk. Similar to how the skin can become irritated or internal organs can be damaged by direct contact with oil, the same thing can happen when an individual is indirectly exposed to it ("Oil Spill Effects on Humans" 2019). Not only can recreational activities put humans' health at risk of oil exposure, but they can also come into contact with it through their diet. Following a spill, oil not removed from the water can be ingested by marine life, and accumulate in their bodies overtime. This accumulation of oil is dangerous for humans because the more oil that is accumulated in food that humans eat, the more toxins they will be exposed too ("Oil Spill Effects on Humans"

2019). The toxins that enter the human body via consumption of seafood, can have the same effects on their health as inhaling oil does.

II. Economic Effects

Tourism

Although the health impacts for humans in regards to oil spills are quite serious, they are equally affected by financial losses. Coastal cities, often receive most of their income from the tourism industry due to their fresh seafood and beautiful beaches. Oil washing up onto the shore can be the result of either a coastal oil spill or one that occurred offshore and was carried inland by waves (Itopf 2019). However, when oil washes up on the sand of a popular beach, no one wants to go there. Tourists cannot swim, boat or go to the beach when the water has been contaminated by oil, thus driving down the revenue typically brought in by tourism. Unfortunately, the damage to the tourism industry does not disappear once the oil is cleaned up and it is the perception of the area after the spill that poses an even bigger problem than the oil spill itself ("Effects of Marine Oil Pollution on Economy and Human Health" 2019). Many tourists will actively avoid certain destinations long after the oil has been cleaned up because that place is now associated with pollution in their minds. Since an oil spill has a tremendous long-term effect on the tourism industry of the affected area, it is crucial that there is policy in place to prevent it from ever occurring.

This tremendous, negative impact on tourism, can best be seen in the Gulf of Mexico, following the BP Deepwater Horizon Spill in 2010. Since the oil spill caused many beaches to close and waters couldn't be fished in, the hospitality industry in the Gulf states were hit particularly hard. A research study found that two months following the spill, 60% of hotels said they numerous cancellations and 42% of hotels were struggling to book future events (CRED

2013). This was particularly troubling for the tourism industry because if less people are staying in hotels, then less people are traveling to the Gulf Coast to enjoy the beaches, seafood or other activities. The large number of hotel cancelations following the spill, proved to be problematic for Gulf states, such as Louisiana whose tourism attractions lost $247 million in 2010 (Oceana 2011). Louisiana is just one of the four Gulf states and their tourism loss is already in the millions, which shows that the economic impacts of an oil spill include much more than just the cost of clean-up.

The hospitality industry is not the only one that suffers economic losses because of an oil spill, in fact it has a snowball effect on the rest of the tourism industry. The less hotel reservations there are, the less tourists there are to go to restaurants, go fishing, or buy souvenirs. Even the businesses that are not directly affected by the oil spill suffer some degree of financial loss because less people means less business for everyone. In fact, following the Deepwater Horizon spill, the BP claims center in New Orleans said that the majority of the claims they saw were made by strip-joint owners, waitresses, dock workers, plumbers and electricians (Webb 2010). Therefore, oil spills have a ripple effect on all industries and businesses in the area, not just the ones like fisheries, which are directly affected.

Fisheries

There can be severe health effects on humans if they eat fish contaminated by oil. Therefore, if an oil spill occurs in a given area, that area becomes closed to fishing for a certain amount of time. If this is an area that is heavily populated with fish, then this will have both short and long term economic effects on fisheries. The short-term effect would be that they would experience an immediate decrease in the amount of fish caught, resulting in less fish being sold. The fisheries could, however be affected on a larger scale, because there is no telling how

many fish will die as a result from the oil spill, or how long they would have to avoid a given area due to contamination (Fisheries and Oceans Canada 2019). Since the economic success of fisheries depends on the quality and quantity of the fish in a given area, the smallest amount of oil could jeopardize the industry.

Fisheries are a major contributor to coastal communities' economies, so if its success is threatened by an oil spill, then it will have negative impacts on the local economies. As a coastal state, Louisiana's fisheries contributes about $2.4 billion a year to the state's economy, while also providing at least 27,000 residents with employment (McKinley 2010). Therefore, the BP Deepwater Horizon Spill was concerning to watch for more than just fishermen, because the fishing industry brings in so much revenue for the state. The only active fishermen are those who catch red snappers and tuna because they are found far out to sea, whereas, the areas where crabs, shrimps and oysters are caught are closed due to the fear of contamination (McKinley 2010). This means that many fishermen are not able to work and any shrimp, crab or oysters caught are considered somewhat rare, which has driven up the price for them at the markets. In fact, the BP Deepwater Horizon oil spill cost fisheries in the Gulf of Mexico $94.7 million to $1.6 billion and roughly 10,000 jobs (Schleifstein 2016). Considering the amount of revenue that the fishing industry generates in Louisiana alone, this amount of financial loss is extremely damaging to local and state economies.

As fisheries are losing revenue from oil spills, individual fishermen are losing income as well. Since areas are closed to fishing due to contamination it is difficult for fishermen to make a profit. Therefore, following an oil spill fishermen make claims based on how much money they lost as a result of the oil spill. These financial claims include damage to fishing equipment and loss of profit due to dead or contaminated fish. After the BP Deepwater Horizon oil spill

thousands of fishermen in Mississippi filed claims that added up to $49.8 million (WLOX 2017). Fishermen rely on the ocean as a source for their livelihood, and an oil spill can greatly jeopardize their way of life, leaving them helpless. Following The Exxon Valdez spill in the Prince William Sound, the average fishermen lost at least 30% of their income, and if they relied on herring, then they lost their entire source of income (Simon and Martin 2010). Since an oil spill can have such an extreme impact on their income, it is likely to have large consequences on other aspects of their lives.

III. Social/Recreational Effects

Aesthetic Effects

Oil spills not only pose health risks for humans and marine life, but it also disrupts the picturesque landscape. When oil washes ashore onto beaches, no one wants to go to those beaches because the idea of a beautiful, clean beach has been tainted by the oil. This means that less people will go to the beach, go boating or fishing for a long time following an oil spill because that area is now associated with pollution. Following the Deepwater Horizon spill, a study was conducted that found that "there were 12.7 million fewer recreation days" in the year and a half after the spill (Tourangeau et al., 2017). Although the aesthetic impacts are not as extreme as the financial or health effects they still disrupt the daily lives of individuals who live in affected areas. Between the destruction of the landscape and the decrease in recreational activities, the aesthetic effects of oil spills could lead to financial losses.

Community Effects

The costs of oil spills for a community are much more than just financial, because they trigger a multitude of social stressors as a result. Oils spills affect humans on both the individual level, as well as the community level because clean up and recovery efforts disrupt the flow of

everyday life. Following a spill, communities are invaded by responders, experts, and news reporters whom, overwhelm the area and those living in it (Gray 2019). This is because each community is unique and has its own routine and when those routines are disrupted by foreign entities it puts stress on the members of the community. In addition to this influx of strangers, there is also competition between companies for who will be contracted to clean-up the spill, creating a divide in the community (Gray 2019). These strains would not exist if an oil spill did not happen, therefore spills put additional, unnecessary stressors on the community.

These strains on the community do not disappear when the spill is cleaned up and the responders leave, because now they have to worry about how they will be compensated. The compensation process, often leads to riffs in the community because a company or individual got more than others think they deserved (Weir 2014). In fact, following the BP Deepwater Horizon spill, communities became increasingly tense as more individuals tended to focus on their own rebuilding and recovery rather than the community's. Rather than leaning on each other for moral and emotional support, neighbors' relationships were strained over arguments about how much they were compensated and whether or not they deserved what they received. As tensions over money build, the tight-knit atmosphere of the community is threatened.

Some residents will want to move on and others will want to fight for policy change so that a spill never occurs in their community again. Due to this divide in mindset, tensions will arise and it will make the return to normalcy that much more difficult. For instance, immediately following the Deepwater Horizon oil spill, the public was very concerned about the environmental damage that it had caused. However, this concern quickly faded and the local government was not able to act on the policy window that the spill had created (Wiest 11/16/19).

Therefore, there were no significant policy changes following the disaster, because the residents cared more about being financially compensated than they did about taking political action.

Mental Health Effects

Although the residents of the community experience a great deal of stress when an influx of workers come to town, the workers who handle the clean-up are also strained. In fact, a study was conducted following the BP Deepwater Horizon oil spill, to see how large of an impact clean-up had on the psyches of the workers. The employees responsible for cleaning up the spill, were found to have a significantly higher rate of depression and post-traumatic stress disorder (Kwok et al., 2017). Oil spill clean-ups are stressful because they are handling chemicals that need to be removed from the environment as quickly as possible. This is because the longer the oil remains in an area, the worse the impacts will be for the environment and all the life that lives there. Therefore, it makes sense that the most stressful jobs would be the ones handling the response and decontamination of oil spills. These jobs also tend to be the lowest paying, despite the fact that they are doing majority of the dirty work. Depression was a result of workers dealing with stressful jobs that expose them to harmful chemicals, while not getting paid well to do so. While, post- traumatic stress disorder was a result of the types of things that the workers might see. For instance, as they are decontaminating the area, they could see things such as burning or flaring oil (Kwok et al., 2017). Although the workers responsible for cleaning up the spill, experience high levels of stress that lead to mental health issues, those who lose work due to the spill, suffer similar consequences.

A study was conducted in two towns following the BP Deepwater Horizon oil spill, one of which was directly affected and the other was indirectly affected (Weir 2014). This study aimed to see how the aftermath of an oil spill affected the mental health of residents that live and

work in the area. In fact, individuals who suffered income loss as a result of the disaster experienced either depression or anxiety or both. Among the residents who reported direct income loss from the oil spill, 83% were diagnosed with clinical depression and 89% experienced high levels of anxiety (Weir 2014). Therefore, the majority of those who suffered financial losses as a result of the oil spill, experienced mental health issues long after the oil was cleaned-up and all the workers left.

Conclusion

Chapter I examines the major issues associated with oil spills, focusing on the environmental problems. The effect of oil spills on marine life and their habitats are examined in the first section of the chapter, to determine the severity of their damage. With a focus on habitats such as mangroves, salt marshes and coral reefs which are particularly sensitive to the toxins in oil. These habitats can be completely destroyed by an oil spill due to the chemicals its exposed to or by the physical smothering of oil. The marine life most effected by oil spills are fish, marine mammals, marine birds and shellfish. Exposure to oil can have grave consequences on these species such as, death, deformities or inability to perform functions necessary for survival. Although, oil spills do not typically result in the death for humans, they can have negative effects on their overall health. The impact of oil spills on humans is examined in section two and it includes health, economic, and social consequences. Oil spills have large effects on humans at both the community and individual level, because it can result in a decrease in state revenue as well as loss of individual income. Since oil spills are a disaster, they have an impact on the way people handle stress, which can put a strain on their mental health. Oil spills are a complex environmental problem because there are direct and indirect consequences that can take minutes to years to recognize, making them seem not as severe of a disaster as they are.

Chapter II: Federal Policies & Legislation Associated with Oil Spills

Introduction

In this Chapter, the major policies and laws regarding oil spill prevention or recovery will be described. The policies will be grouped by the decade that they were enacted, in order to identify what time periods were considered the most environmentally focused. In terms of policies, this chapter will only include descriptions of federal policies.

Section I: Prior to 1970

Outer Continental Shelf Lands Act (OCSLA) 1953

The Outer Continental Shelf Lands Act was enacted in 1953, in order to define what the outer continental shelf was and who was responsible for monitoring oil exploration there. This key piece of legislation, defined the outer continental shelf as all submerged lands lying seaward of state coastal waters, up to three miles offshore (BOEM 2017). According to the OCSLA, any land that falls under the outer continental shelf category would also be under United States jurisdiction (US Fish and Wildlife Service 1984). In addition to defining what land constitutes as the outer continental shelf, the act also appoints one individual as the overseer of oil and mineral development on that land.

In 1953, the OCSLA appointed the Secretary of the Interior as the head of the administration of mineral exploration and development of the outer continental shelf (BOEM 2017). As the head of this administration, it was the responsibility of the Secretary of the Interior to determine who met the criteria necessary to obtain a permit to explore or develop on the outer continental shelf. To obtain a lease for development or exploration, the interested party participates in a bidding process, in which the 'highest qualified responsible bidder' would be granted a lease (OCSLA 2018). In this case, the 'highest qualified responsible bidder' simply

means the bidder willing to pay the most money for a lease, is the one who is able to obtain a lease. However, this is a federal government operation, which means the government wants to make sure that they are conducting sound business with the companies that receive these permits. Therefore, the Bureau of Ocean Energy Management uses a two- step process to evaluate the bidding process after the sale has been made, in order to evaluate the effectiveness of the bids received in federal offshore oil and gas lease sales (BOEM 2016).

The overall purpose of the OCSLA, is to minimize waste and conserve the natural resources that exist in the outer continental shelf. This is where the leasing process comes in, because not just anyone can gain access to land or resources as long as they are defined as part of the outer continental shelf. The Secretary of the Interior is responsible for granting oil exploration and development leases to companies that will conduct their business according to the regulations in OCSLA (BOEM 2016). In addition to protecting the resources found on the outer continental shelf, the OCSLA is also supposed to protect those who work there.

The Outer Continental Shelf Lands Act has the ability to compensate employees who are hurt on the outer continental shelf as a result of gas or oil exploration. This coverage is a natural extension of the Longshore and Harbor Workers Compensation Act, that protects workers who are hurt or injured while on the job. However, in order to be covered by either one of these acts, an individual has to be working on a rig or platform that is beyond state waters (3 nautical miles offshore). Therefore, the OCSLA protects both the environment and the people working in it by establishing criminal penalties if it is found that the company did not comply with the safety regulations in their lease (Martone 2014). These penalties act as incentives for any company conducting business on the outer continental shelf to do so with regard for human and marine life.

National Contingency Plan (NCP) 1968

In 1968, the National Contingency Plan was created by the EPA to act as an outline for how the federal government and the oil industry must respond to oil spills or other forms of exposure of hazardous materials. The goal of the NCP is to coordinate response efforts amongst different levels of government before a disaster occurs. The NCP wants to know how emergency crews and those responsible for the spill are going to go about cleaning up the spill, with specific steps in their response procedure outlined (Cardno 2018). It also calls for a description of who will be called to help with clean-up whether that is a contracted company or local first responders. This is supposed to make exposure time as low as possible by knowing exactly who to call when a spill occurs. If chemicals and dispersants are going to be used in the clean-up process, then those too must also be described in an operations response plan (Cardno 2018). In addition to acting as a guide for hazardous spill response, the NCP is in place to ensure that the response coordination amongst different levels of government remains consistent across the United States. All organizations and emergency workers have to abide by the same rules and regulations when it comes to response efforts, regardless of where they are in the country.

The National Contingency Plan, not only was set up to ensure the coordination of response efforts, but also established a response headquarters, a national reaction team and regional reaction teams (EPA 2019). The goal was to make sure that everyone involved in the clean-up of oil spills knew exactly what they had to do when they were called into action. Perhaps, the most important individual is the one who is pre-assigned as the federal on-scene coordinator, and thus responsible for making sure everyone is doing what they were assigned to do in their reaction plan (EPA 2019). Therefore, it is the responsibility of the on-scene coordinator to make sure that the appropriate resources for clean-up are provided by the federal

government, state government and the party who caused the spill. By putting one individual in charge of coordinating the response according to the plan, it allows all parties involved to work both efficiently and collaboratively.

Section II: 1970s

Port and Waterways Safety Act of 1972

In 1972, President Nixon enacted the Port and Waterways Safety Act in an effort to decrease the damage caused by oil spills on the waters surrounding major ports. The main objective of this piece of legislation was to introduce a new method when it came to dealing with oil spills (Davis 2019). This is because prior to this act, there was a greater focus on the consequences for intentional oil spills than there was for accidental oil spills. The new approach to oil spill policy not only put a greater emphasis on the consequences of accidental oil spills, but it also introduced preventative measures that would be implemented as well (Davis 2019).

These preventative measures included making sure that the probability of an oil spill occurring was a low as possible. In order to do this, the Port and Waterways Safety Act made vessel safety a priority because it guaranteed the protection of marine life, and US waters (US Government 2017). The idea is that the less vessel activity there is surrounding ports the smaller the chances of an oil spill. Therefore, if a port or particular waterway is subject to heavy traffic on a regular basis than it must be monitored carefully and closely by the US Coast Guard (US Government 2017). This monitoring system is a preventative measure that can allow the US government to thwart a spill before it occurs. This proactive system will require the assistance of federal and state entities, since it is their health and businesses that will be affected by an oil spill.

This new approach requires the help of all levels of government, as well as the public because there are many regulations that vessel operators are going to have to abide by. Depending on what county or state the vessel is traveling too, the rules they have to follow will be universal across the US, but it will be helpful for the local entities to provide the operators with some guidance with these rules. This act mandates that vessels that are going to be active in US waters, then it must be in accordance with the rules regarding equipment, staff and necessary updates (US Government 2017). In doing so, the hope is to decrease the possibility of a hazardous spill happening on US waters, due to negligence or lack of maintenance of the responsible party. Another key part of this policy is that materials that could pose a threat to the marine or human life, must be handled in a way outlined by the Secretary of the Department and the Coast Guard (US Government 2017). The overall objective of the Port and Waterways Safety Act is to protect marine life by doing everything possible to prevent an accidental oil spill in their nation's waters.

Spill Prevention Control and Countermeasure (SPCC) 1973

In 1973, another preventative measure was taken in order to combat oil spills that may occur in or near US waters. The EPA wanted to make sure that any facility handling oil knew that they also had the responsibility to prevent, prepare and respond to oil spills. The SPCC mandated that any aboveground oil facility with more than 1,320 gallons or an underground storage of 42,000 gallons or more must create a plan of action (Ramseur 2016). Therefore, the EPA was making it mandatory for all oil operations big and small to not only have a plan for clean-up but also take proactive steps to prevent any exposure of oil. However, having a plan in place is not enough, the SPCC plan also has to be certified by a qualified engineer (Ramseur 2016). The role of the engineer is to make sure that the secondary equipment that a facility

outlines in their plan is in fact reliable and sufficient. There is an exception to this rule, because depending on the track record of the facility they can self-certify their plan (Ramseur 2016). Self-certification is permitted in this instance because SPCC plans do not need to submitted to the EPA or government entity, as other policies require.

Spill Prevention Control and Countermeasure plans apply to non-transportation infrastructures that store large amounts of oil that could potentially contaminate US waters. Therefore, the SPCC typically applies to petroleum and non-petroleum oil facilities, but depending on how much they store it can also be applicable to farms. In order for farms to have to create an SPCC plan, they must have at least 10,000 gallons of oil or more on their land (Ramseur 2016). It is important to note that most farms do not fall under the regulations of SPCC because they store less than 10,000 gallons of oil on their property. However, oil can still contaminate water if there is less than 10,000 gallons present.

Clean Water Act 1972

Two years after President Nixon established the EPA, the Clean Water Act was passed and put into action. This piece of legislation was a result of focusing events, grabbing the attention of the public and thus demanding that more environmental policies are adopted. The objective of the Clean Water Act was to protect the nation's waters from point-source pollution (EPA 2019). The Clean Water Act, focused on point source pollution because the pollution could be traced back to the responsible party and thus easy to regulate. For example, an oil well would be a form of point source pollution because it is a single source that is traceable. Whereas, non-point source pollution is much more difficult to monitor because the source cannot be directly traced back to one party or person. For instance, plastic found floating in the ocean

cannot be traced back to a single person or party. Therefore, the Clean Water Act of 1972 did not address any consequences or set any standards for non-point source pollution.

In fact, as long as humans could fish or swim in the waters, then it got the EPA's stamp of approval (EPA 2019). In order to do so, the EPA gave businesses and facilities permits to pollute through the National Pollution Discharge Elimination System. According to this system any entity that polluted without a permit would face consequences because they did not have permission to pollute there (Holst 2015). The concept behind the polluting permits was that as long as the EPA knew where and who the pollution was coming from than it would be easier to contain or clean-up. Although the Clean Water Act is a federal law, the states are in charge of putting it into action as long as they do so within the parameters provided to them by the EPA (Holst 2015). Therefore, the Clean Water Act sets the national standards for water pollution and it is up to the state governments to interpret and implement them accordingly.

Port and Tanker Safety Act 1978

In 1978, the Port and Tanker Safety Act amended the Ports and Waterways Safety Act that had been implemented earlier that decade (Congress 1978). The Port and Tanker Safety Act, adds specific vessel design and equipment to the Port and Waterways Safety Act. The main change that the Port and Tanker Safety Act made was that where the Coast Guard was once in charge, the Secretary of the Department would now be in control (Congress 1978). Therefore, if the Secretary believes that a vessel operating in US waters is not up to code, then they can mandate the anchoring of that vessel. This is in an effort to make vessel operators responsible for keeping up with any maintenance the equipment or boat may require. The idea is that the more safety regulations that the vessel operators and their crews are expected to meet, the more likely they are to be prepared or prevent an oil spill altogether. Although the importance of the

role that the vessel operators play cannot be understated, the role and responsibilities of the Secretary of the Department are also of great importance.

It is the job of the Secretary of the Department to create and implement safety regulations that are well-researched and thought out. These standards include type of equipment that must be found on a vessel, how many crew members must be on a given vessel, traffic patterns and plans that are appropriate for the given area (US Coast Guard 2012). Not only are these regulations applicable to domestically owned vessels, but they apply to foreign vessels as well, permitting that either their starting or ending points are US ports. It is critical that the all parties operating vessels on US waters abide by the regulations set in this act because they will face criminal or civil penalties if they do not (US Coast Guard 2012). This is because the end goal of the Port and Tanker Safety Act is to protect the marine environment from hazardous waste, such as oil.

Section III: 1980-1990

CERCLA 1980

In response to hazardous waste disasters like Love Canal, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) was enacted in 1980. CERCLA is also referred to as the Superfund, which is dedicated to clean environmental disasters when the perpetrator cannot be determined or cannot afford to pay for clean–up (Pegex 2013). Since the list of Superfund sites is quite lengthy, it is difficult to determine a responsible party for each one, and oftentimes, the EPA has to step in. In order for the Superfund to be able to pay for clean-up, they tax the chemical and petroleum industries (EPA 1980). Hazardous waste disasters can take many forms including, leaks, spills or general neglect of a facility or material (Pegex 2013). Unlike most of the other acts in this chapter which are proactive,

CERCLA is a reactive measure that the EPA has taken in order to hold the responsible party accountable for their actions. The part of CERCLA that mandates that the polluter pays, encourages safe practices among industries that deal with hazardous wastes, in order to avoid having to pay for any potential accident.

In addition to making the polluter pay, CERCLA outlines both a short term and a long-term plan of response, for dealing with hazardous disasters. The short -term responses are for spills or leaks that occur and require immediate attention (EPA 1980). For example, any chemical that would be considered life-threatening as soon as an individual becomes exposed to it, would require a short-response. Whereas, long-term responses are for those incidents that are not immediately dangerous or life-threatening to an individual (EPA 1980). For example, Love Canal took years of remediation and recovery, before people could live there again, but exposure to the chemicals dumped there were not immediately life-threatening.

Oil Spill Liability Trust Fund (OSLTF) 1986

In 1986, the Oil Spill Liability Trust Fund was established to provide the federal government with the money needed to clean-up oil spills (Ramseur 2019). The concept behind the fund was to make sure that any damage that an oil spill caused would be paid back to the affected party in some way. In order to compensate for damages and help aid in clean-up, the federal government needed to get money for the Oil Spill Liability Trust Fund from somewhere or someone. Therefore, it was originally funded by an excise tax per barrel of domestic crude oil and foreign petroleum products (Ramseur 2019). The fund was set up with the concept of "polluter pays" in mind, because those who were most likely to cause an oil spill were also the ones funding the clean-up. However, over the years the excise tax has expired and been brought back a few times, until the fund was capped at 150 million a year (NPFC 2019). This allows

federal response to be quick and effective regardless of the help they receive from the responsible party.

The rules for which the Oil Spill Liability Trust Fund can be used, is interpreted by the US Coast Guard (NPFC 2019). Since it is a federal fund, it can only be controlled by a federal entity such as the US Coast Guard to make sure that it is no one is taking advantage of it. The US Coast Guard uses the money from the OSLTF for clean-up efforts as well as responding to claims made by affected parties and any damage done to natural resources (NPFC 2019). The US Coast Guard evaluates the needs of an area following an oil spill and determines how much money from the fund is going to be used to cover it. Once the oil has been cleaned-up and everyone has been compensated, the money used from the fund is calculated and the entity responsible for the spill gets sent the bill (NPFC 2019). Therefore, even if the responsible party does not immediately pay, the OSLTF makes sure that "the polluter always pays". In order to make sure that one spill does not completely wipe out the fund, a limit of one billion dollars per accident was established (Ramseur 2019). By setting the per incident limit to one billion dollars the federal government is reminding those working with petroleum products just how much a spill could cost them. However, if a spill is large enough to exceed the maximum limit and the company has to pay out of their own pocket, the OSLTF will reimburse them for it (NPFC 2019). Therefore, the overall goal of the fund, remains that oil spills will be cleaned up and the responsible party will be held financially accountable to do so.

Oil Pollution Act (OPA) 1990

A year following the Exxon Valdez spill, the United States government updated existing oil spill regulations by enacting the Oil Pollution Act (EPA 1990). The goal of the Oil Pollution Act was to have plans in place that would allow the EPA to better prevent and respond to oil

spills. For example, one of the most important provisions under the OPA was the mandatory creation of response plans for facilities or vessels (EPA 1990). By doing so, the government was taking proactive measures to ensure that the responsible parties were doing everything in their power to prepare for a potential spill. Response plans for facilities are submitted to and reviewed by the EPA, while the vessels must get their plans approved by the Coast Guard (EPA 1990). In addition to making response plans for vessels and oil facilities the OPA also makes it mandatory that areas near oil operations also have a plan of action in place. These plans are called Area Contingency Plans and they are supposed to organize and streamline clean-up on a regional scale (EPA 1990). For example, this plan coordinates recovery efforts of local emergency crews as well as federal aid and the responsible party.

Overall the objective of the Oil Pollution Act is to implement legislation that was missing during the Exxon Valdez spill, in order to prevent another disaster of that magnitude. This includes increasing the penalties that the responsible party could face if they fail to make the appropriate updates to technology or do not abide by the guidelines for their response plans. For instance, OPA increased the Oil Spill Liability Trust Fund to one billion dollars per incident, in order to compensate for damage to things such as natural resources (US Coast Guard 2019). By doing so, the federal government is trying to incentivize those who work with or handle oil to make sure that their plans, equipment and coordination with local responders are up to the standard set by the OPA. Not only did this legislation increase the potential penalties and liabilities that companies can face following an oil spill, but it also helps fund the development and research of new technology (US Coast Guard 2019).

Section IV: 2000s

Tank Vessel and Facility Response Plans 2004

In 2004, the Coast Guard decided that the requirements for what must be included in the response plans of vessels and oil storage facilities. This new legislation, updated the technologies and processes that are necessary in order to ensure that an oil spill is cleaned up properly (US Coast Guard 2009). The Tank Vessel and Facility Response Plans, focuses on the maintenance of the technology used for oil spill removal. This is to make sure that tank vessels and facilities are using the most up to date and safe technology or chemicals to remove oil from water. As oil spill removal technology continues to develop and change, the legislation in place that are meant to regulate it also must be consistently updated.

Any tank vessel that travels through waters under US jurisdiction, must not only comply to the equipment requirements, but also must submit a response plan to the Coast Guard for approval. The US Coast Guard can deny a response plan if the tank vessel or facility does not abide by the technology or equipment standards (US Coast Guard 2009). In addition to tank vessels, the Coast Guard was also responsible for approving response plans for facilities that were on the coast or had adjoining shorelines with US waters. In order to for a facility or tank vessel to operate on US waters, their response plan had to be submitted to and approved by the US Coast Guard. This is to ensure that anyone who operates or works on a tank vessel or at a facility knew exactly what had to be done should any oil leak into the surrounding waters.

Tank vessel and facility response plans include everything from preparation, drills, training and coordination with local or contracted entities (US Coast Guard 2009). For instance, there are different rules and standards depending on the state that the facility is located in (US Coast Guard 2019). Sometimes, the state regulations can be stricter that those of the Coast Guard and others are more lenient. In New York, unless the facility has 400,000 gallons of oil stored, then it does not need to include local responders in their response plan (US Coast Guard 2019). In

addition to the state and Coast Guard regulations, the facilities and vessels also had to abide by regulations mandated by the EPA. The EPA focuses on non-transportation facilities and the potential of those facilities to expose oil to US waters. Whereas tank vessels, vary in the standards they must meet in their response plans based on how big they are, and how many people are working on the vessel (US Coast Guard 2019). The consequences for failing to get a response plan approved are not that severe because the tank vessel or facility can make the necessary changes and re-submit their plan to the Coast Guard.

Coast Guard and Maritime Transportation Act (CGMTA) of 2006

In 2006, Congress passed the Coast Guard and Maritime Transportation Act, in order to add to previous laws that the Coast Guard had made. This act is organized into nine different titles, detailing the technical corrections that were being made to the previous forms of legislation. These nine titles included sections regarding: Authorization, Coast Guard, Shipping & Navigation, Miscellaneous, Lighthouses, Delaware River Protection, Hurricane Response, Ocean Commission Recommendations and Technical Corrections (CGMTA 2006). Although all of those headings go into great detail regarding the changes and updates being made to various laws, the overall objective is to clarify any questions or concerns that may have been unclear in previous pieces of legislation.

For example, it addresses how much money can be taken annually from the Oil Spill Liability Trust Fund to aid Coast Guard operations (CGMTA 2006). This is important because the Oil Spill Liability Trust Fund is meant to reimburse those who clean up the spill, however it also has to fund construction, repairs and equipment maintenance. In addition to detailing how much money can be used by the Coast Guard, this piece of legislation also explains the role of the Coast Guard in cases involving both foreign and domestic vessels. This clarification was

necessary because it made adjustments in regards to the extension of their powers and responsibilities. These extensions of power not only included how the Coast Guard was to deal with foreign vessels involved with drug smuggling but it also increased the civil penalties for any violations of the Tank Vessel and Facility Response Plans 2004 (CGMTA 2006). By increasing the cost of the consequences for not abiding by the rules, the US government was encouraging vessels and facilities to set stricter standards in addition to those mandated by the Coast Guard. Similar to the operators of tank vessels and facilities, the Coast Guard was also given more rules and responsibilities to abide by.

The Coast Guard was ordered by this act to submit a technology, oversight and deep-water reports, in order to ensure that everything was being maintained and monitored properly (US DOT 2006). This is a critical piece of this legislation because, the success of the response efforts relies on the accuracy of those reports. In addition to filing reports, the Coast Guard is also expected to conduct studies on the environment and infrastructure used for navigation, in order to detect problems before they happen. This self-reporting goes both ways, because it is the duty of the responsible party to notify the Coast Guard as soon as US waters have been exposed to oil (US DOT 2006). It is critical that oil spills are reported to the appropriate authorities immediately in order to ensure a successful clean-up. Therefore, the overall goal of this act is to make sure that all the necessary precautions had been taken, so that when an oil spill did occur everyone would know their role and what they were responsible for.

Section V: Post- Deepwater Horizon Spill 2010s

Pipeline Safety, Regulatory Certainty and Job Creation Act 2011

In 2011, the Pipeline Safety, Regulatory Certainty and Job Creation Act was enacted in order to make the construction and operation of pipelines safer. Therefore, the overall objective of this

legislation is to improve the transportation of oil and other hazardous substances via pipelines (US DOT 2011). One of the major provisions in this act are the improvements made to the pipeline safety programs, which allows owners and operators to build new infrastructures. This is a critical aspect of the new legislation because it ensures that any new pipelines built will be equipped with preventative technology in the event of a leak (US DOT 2011). Therefore, the hope is that as more infrastructure is built, more jobs will be created.

In addition to the creation of more jobs, the Pipeline Safety, Regulatory Certainty and Job Creation Act also increases the penalties a responsible party can face if they are found not to be in compliance with the law (Public Law 112-90 2012). By enhancing both the safety regulations and the penalties that go along with it, the goal is that it will encourage operators to take their own preventative measures in addition to those mandated by the government. This is because before the regulations were put into place, Congress carefully weighed the costs and benefits for all the parties involved (Public Law 112-90 2012). This was to ensure that the policy changes were feasible for those who would be affected by them and could be effectively enforced. Any changes to this new legislation could only be made by Congress, therefore Congress was the ultimate authority.

RESTORE Act 2011

Following the Deepwater Horizon oil spill in 2010, the US government enacted the RESTORE Act in 2011. RESTORE stands for: Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf States (US Senate 2011). The objective of this legislation is to restore and compensate the Gulf States for all the resources, tourism, and ecosystems that were lost as a result of the explosion of the Macondo well. A critical aspect of this act were the provisions added to make sure that no oil spill would cause as much devastation

as the Deepwater Horizon did. However, before they could take preventative measures, the US government had to focus on the recovery of the Gulf States first.

One of the first orders of business that the RESTORE Act takes care of is the financial compensation of the people and businesses who live in the Gulf States. For example, 75% of the funds were allocated to the eight counties who faced the most devastation from the spill, and the remaining 25% would be divided amongst the other counties (US Senate 2011). However, in order to receive these funds, the county or parish had to meet certain guidelines, including a comprehensive land use plan. This land use plan had to describe in great detail to the Federal government, how the county was going to use the funds they were given to restore their community. In order to make sure everyone was fulfilling their role, the Federal government established the Gulf Coast Ecosystem Restoration Council to oversee the changes made under the RESTORE Act (US Senate 2011). All five of the Gulf States were represented by having at least one member on the council. The main goal of the council was to coordinate response plans and policies with numerous governmental entities. In order to make sure no spill causes this magnitude of destruction to the Gulf Coast again, all of the Gulf States had to work together to create future response plans.

In fact, the RESTORE Act stated that the council had 180 days from the law's enactment to submit a comprehensive plan to restore the coast's natural resources, ecosystems, habitats and local economies (US Senate 2011). This was a critical piece of the legislation because it focused on both short term and long-term restoration of the Gulf Coast. For instance, the Council has to meet every five years to make updates or changes to the Comprehensive restoration plan. Therefore, as new technology becomes available, the laws will able to include any new discoveries that could better aid the recovery process.

In addition to the Federal council, the five Gulf States will also have councils in charge of restoration and recovery in their state. Within the guidelines of the Comprehensive plan created by the Gulf Coast Ecosystem Restoration Council, the Gulf state will make their own plans that must be submitted to the Federal council for approval (Olson 2011). This coordination between the federal and state governments is crucial to the success and effectiveness of their restoration plans. However, the states are going to need more financial support than just the Oil Spill Liability Trust Fund, in order to achieve many of the goals outlined in their recovery plans. Therefore, the RESTORE Act also establishes the Gulf Coast Restoration Trust Fund, which can fund state restoration efforts that are approved by the Federal government (Olson 2011). Although this act is specifically for the Gulf Coast, it sets a precedent and creates a model that other coastal communities should follow.

Offshore Production and Safety Act of 2011

In 2011, Congress enacted the Offshore Production and Safety Act, in order to amend the Outer Continental Shelf Lands Act (OPSA 2011). This piece of legislation focuses on the roles and responsibilities of the Secretary of the Interior. For instance, it is the Secretary of the Interior's responsibility to make sure that anyone who is participating in oil exploration, gets their response plan reviewed by a third party (OPSA 2011). The response plan will have to describe every detail, including each step in the process of the containment of oil and eventual removal. It is also the job of the Secretary of the Interior to make sure that all the equipment and technology described in their response plan is effective at cleaning up an oil spill. In addition to new responsibilities for the Secretary of the Interior, the Department of Energy Secretary also has new roles.

In fact, under this new law, the Department of Energy Secretary is in charge of allocating funds for research projects and other studies (Vote Smart 2011). These studies will focus on better ways to clean up after oil spills as well as finding new methods to prevent oil exposures completely. The goal of these studies is to find ways to decrease the overall effect of oil spills on the environment and the species that live there. In order to conduct this research, the Department of Energy Secretary assembled a task force to do so by starting with the Deepwater Horizon blowout (Vote Smart 2011). This allows the US government to find out why the Macondo well exploded and develop technology to make sure that it never happens again. Not only did this legislation mandate research on the Deepwater Horizon disaster, it also made it so the Secretary of the Interior could only issue permits for oil exploration if they could guarantee that all the equipment being used was up to the government's standards (Vote Smart 2011). These standards include safety requirements and proper maintenance of the technology used for clean-up or prevention.

Pioneers Act 2012

In 2012, the US government enacted the Pioneers Act, which stands for "Protecting Investment in Oil Shale the Next Generation of Environmental, Energy and Resources Security act" (House of Representatives 2012). This act followed the Deepwater Horizon disaster, and the US government wanted to do everything in their power to make sure that an accident of that magnitude never happened again. In order for the US to continue oil exploration, they had to set clear guidelines to be followed by all those who planned on participating. In fact, this act wants to create regulations that will not only protect the environment, but will also encourage the continuation of oil exploration and technological developments (Rogers 2012). Since oil is money, the US has to be careful not to exploit it, because it is also a valuable resource.

By encouraging the discovery of oil shales in the United States, the government is also promoting an increased dependence on domestic energy. Therefore, a crucial part of this legislation is the one that addresses the buying, building and working for America as part of the oil or gas industry. This is because the more permits that are given out for oil exploration, the more jobs it will create for Americans. For instance, the Secretary of the Interior must lease at least ten permits within six months of the enactment of the Pioneers Act, as a way to ensure that oil exploration will increase (House of Representatives 2012). The Pioneers Act not only promotes the discovery of oil shales to be used as a domestic energy source, but it also supported the construction of the Keystone XL pipeline (Rogers 2012). The overall objective of the Pioneers Act is to decrease the United States' dependency on foreign oil and create more jobs for Americas by investing more in the technology that can aid and advance the development of oil shales. In fact, the idea behind it is that the more oil that can be acquired domestically, the better it is for national security.

Consolidated Appropriations Act 2012

In 2012, the government passed the Consolidated Appropriations Act in which it determined how much money each agency would receive that year to carry-out their activities (Public Law 112-74 2012). Therefore, this law would outline how much funding the Department of Energy, the Environment and the Interior would receive for the year 2012. This is important because it determines how much money will be allocated to exploration of gas and oil. For example, the Naval Petroleum and Oil Shale Reserves was granted $14,909,000 to their oil related activities (Public Law 112-74 2012). Oil is an extremely valuable resource and is thus a vital aspect of almost every agency in regards to funding.

The funds that each Department receives contributes to studies, research and technological advancements. This act also determines how much entities such as the Coast Guard can take from the Oil Spill Liability Trust Fund (Consolidated Appropriations Act 2012). Although the Consolidated Appropriations Act may not be directly related to oil spill prevention or recovery, the amount of funding each agency receives determines how much oil exploration can be done. For example, the Department of Energy will use the appropriations they receive to grant leases and permits for oil exploration (Consolidated Appropriations Act 2012). The more money agencies like the Department of Energy receive, the more permits for exploration can be given out. The overall goal of the Consolidated Appropriations Act is conduct and allocate money for oil spill research and exploration.

Section VI: Trump Administration Rollbacks 2019

Bureau of Safety and Environmental Enforcement Revisions

In 2019, the Trump Administration began the process of dismantling the safety regulations that Obama put in place following the Deepwater Horizon spill. President Obama made it his mission to make sure that a preventable disaster would not happen again. The Deepwater Horizon was as bad as it was because the blowout preventer failed to keep the well from exploding (Hilzenrath 2019). The Obama administration enacted 342 provisions that increased the strength and the number of safety regulations that the operators of offshore oil rigs had to abide by (Wamsley 2019). However, last year the Trump administration sided with the oil industry by having the Bureau of Safety and Environmental Enforcement (BSEE) revise 59 of the 342 regulations (Wamsley 2019). The goal of these revisions is to reduce the burden for oil rig operators, however it is at the cost of safety. By weakening federal safety regulations, the government runs a greater risk of another Deepwater Horizon incident. Especially considering

that many of the provisions that are being rolled back focus on the safety and design of blow-out preventers.

The idea behind the revisions of these rules is that oil rig operators will be spending less time following rules and which will allow for more time to be spent on oil exploration. Since oil is a major source of energy, it would be of great interest to the United States to increase its domestic production (Hilzenrath 2019). In fact, the more oil that can come domestic sources, the less dependent the United States will be on foreign oil supplies. This would not only be beneficial for the economy and creation of more jobs, but it would also be good for national security purposes.

Section VII: Conclusion

Conclusion

In this chapter, I describe the federal laws that are associated with oil spill prevention, recovery or safety regulations. This chapter focuses on federal policies created by the United States government. All relevant legislation is organized by the decade in which they were enacted or revised. The policies will be grouped by the decade that they were enacted, in order to identify what time periods were considered the most environmentally focused. Depending on public sentiment and the current administration, the implementation of environmental policies can increase or decrease. The effectiveness of the legislation described in this chapter will be made clear when put into the context of case studies in future chapters.

Chapter III- Case Study 1

Bouchard B120 Oil Spill in Buzzard's Bay

Introduction

This chapter describes the oil spill caused by Bouchard B120, in Buzzard's Bay off the coast of Massachusetts and Rhode Island in 2003. The Bouchard B120 was a barge that was owned and operated by a New York based company called Bouchard Transportation Company. The company does not drill for oil or own any wells, because all they do is transport oil and petroleum from one place to another. In this chapter, the effectiveness of the legislation in place prior to spill is examined as well as the policies that were created as a result of the incident. In addition to the political effects, the social, economic and ecological effects of the spill will also be explored.

Section I: Background

What Happened and Why?

On April 27th, 2003 the Bouchard Barge 120, which was owned and operated by a New York based company called Bouchard Transportation Company collided with bedrock in Buzzard's Bay. This 12-foot rupture led to about 98,000 gallons of oil spilling into the bay (NOAA 2019). The barge was carrying oil to the Mirant electricity facility on Cape Cod, when it passed on the wrong side of the navigational marker that was meant to keep barges away from bedrock. The B-120 was performing a routine operation by bringing oil to Cape Cod from Philadelphia, therefore there was good reason to believe that this accident was entirely avoidable. Although the spill was a result of an accident, it was preventable had Bouchard Transportation taken the appropriate safety measures. For instance, the individual in charge of navigating the barge had a poor track record and should never have been responsible for bringing the boat into the bay that night (NOAA 2019). In fact, due to his previous work with Bouchard, he had reports recommending that he not be in charge of navigating barges.

The barge involved in the oil spill was built in 1975 and was single hulled, therefore any specifications for barge structure that came after 1975 would not be applicable to the B120 (NOAA 2019). This did not stop the B-120 from transporting 4,030,000 gallons of oil from Philadelphia to Cape Cod ("Oil Volume" 2020). However, the barge was active until 2003 when the spill happened so all the safety precautions included in the Port and Tanker Safety Act applied to Bouchard. Transportation Company. Due to the fact that its construction no longer complies with current legislation the Bouchard B-120 has been phased out.

In terms of media coverage for the 2003 Buzzards Bay spill, it was very regionally focused. For instance, it was big news for coastal communities in Rhode Island and Massachusetts because they were directly affected by it and they wanted to know who was responsible for it. Therefore, it was a hot topic for local news stations surrounding Buzzards Bay, but it was not big enough to get national attention. Even so, it was not as big of a story as it would have been had the spill happened in July during the peak season for beachgoers, but since it happened in April many felt that it would go away by the time they wanted to go to the beach.

Section II: Prior to Spill

Relevant Legislation Prior to the Spill

In order to determine whether or not the oil spill in Buzzard's Bay was a preventable accident, the legislation and actions of Bouchard Transportation Company needs to be evaluated. Since the spill occurred in 2003, the Federal legislation that was in place to protect against potential spills, included: Outer Continental Shelf Lands Act, National Contingency Plan, Port and Waterways Safety Act, SPCC, Clean Water Act, Port and Tank Safety Act, CERCLA, Oil Spill Liability Trust Fund, OPA. Therefore, in order to classify this oil spill as a freak accident or an avoidable accident, the safety standards mentioned in those policies must be compared to

the actions of Bouchard Transportation Company. These laws focus on taking every safety precaution possible in order to ensure that nothing dangerous would happen as long as it was considered to be preventable.

The B120 had to be up to code in terms of maintenance, equipment and the number of workers on board. However, there is no specification that mandates a certain level of quality or experience when it comes to who is in charge of navigating the barge via tugboat.
When the Coast Guard conducted their official investigation three years after the spill, they found that the "voyage plan" for the B120 was short and just barely covered the minimum requirements mandated by laws like the Port and Tanker Safety Act, National Contingency Plan and SPCC (NOAA 2019). For instance, the plan did not include any information on "nautical references, closest point of approach guidance, data on the currents in the area, any special circumstances or special maneuvers" (Gulf Coast Mariners Association 2006). In addition to finding that a lack of requirements for the voyage plan leads to a lack of preparation, the investigation also discovered that the worker responsible for bringing the barge in that night had a poor track record of doing so. Although much of the spill can be attributed to human error and negligence, it highlighted what was missing from voyage plans and how they are approved.

The legislation that was in place prior to the 2003 spill, failed to outline important details of necessary precautions to take, but it clearly stated how the spill should be cleaned up and who is responsible for doing so. Due to policies such as CERCLA, the Oil Spill Liability Trust Fund and the Oil Pollution Act there was no question as to who was responsible for clean-up costs and how much federal aid could be utilized per incident. Since the B120 barge was owned and operated by a New York company called Bouchard Transportation, the company was considered to be the perpetrator of the pollution and under CERCLA 1980 the polluter pays. The federal

government also created the Oil Spill Liability Trust Fund, to make sure that there was no excuse for an oil spill to not be taken care of, because it could help the responsible party pay for clean-up. In addition to these two policies, the Oil Pollution Act 1990, made certain that the polluter paid, by facing more severe penalties for not abiding by current legislation. Overall the goal of oil spill regulations prior to 2003, was to make sure that the oil industry and response agencies were well prepared for clean-up operations, instead of focusing on prevention measures.

Section III: Impact on Habitats & Marine Life

Impact on Habitats

Tidal marshes

Tidal marshes are one of the most vulnerable habitats to oil spills, therefore it is no surprise that when the Bouchard B120 hit bedrock in 2003, the marshes suffered the consequences. This is because oil can kill the grass on the marshes, exposing the marshes to the elements and thus, more damage. If the salt marsh is exposed to the oil for a long enough period of time then it will seep into the sediments and remain there for many years (NOAA & USFWS 2014). However, the response to the Bouchard B12 was so prompt that the destruction to the marshes was not nearly as bad as it could have been. For instance, the spill was reported immediately and within forty-eight-hours responders had deployed boom equipment to contain the spill (NOAA & USFWS 2014). It also helped that the spill happened at the beginning of the growing season so there was not much grass to be destroyed and the type of oil that was spilled tends not to be as destructive to sediments. However, tidal marshes are highly sensitive to the clean-up methods used so what oil does not damage, the response efforts could destroy if not done carefully (Oil Spill Prevention & Response 2020). Therefore, when performing removal

efforts crews had to be sure to select the appropriate equipment that would do the least amount of damage.

Mudflats

Since nearly one hundred miles of shoreline was covered in oil, the mudflats were no exception. Similar to the tidal marshes, mudflats are not very resilient to oil spills, making them susceptible to greater amounts of damage. Mudflats hold a lot of water and therefore, oil that ends up there stays on the surface until the tide carries them away (NOAA 2020). Similar to most coastal habitats, these tidal flats are home to a variety of important species, many of which burrow beneath the surface, thus allowing oil to seep underground through the openings (NOAA 2020). Therefore, the amount of oil that ended up underground due to the burrowing of marine life is unknown. It is also impossible to know how much oil mudflats were exposed to because the tide took it away but also brought it back until clean-up efforts were complete. Similar to the effects of the changing of tide, the wind also brought oil and took it away from the mudflats. Not only are mudflats sensitive to oil spills but they also can be damaged by clean-up and response efforts (Oil Spill Prevention and Response 2020). This made responding to the Bouchard B-120 spill that much more challenging because they had to use methods that would be both safe to use on the mudflats as well as be effective at removing oil from them.

Beaches

Just like the other shoreline habitats, beaches are home to a variety of species that rely on it for food, shelter and protection. Therefore, when the number six fuel leaked out of the Bouchard B-120 it not only coated the beaches off of Massachusetts and Rhode Island, but it also smothered the smaller organisms that live there. This is because the heavy oil remains on the surface of the sand and does not go anywhere until it is physically removed through clean-up

efforts made by humans. Although the thick oil cannot seep to deeper levels of sand, the water-soluble parts of oil can reach further beneath the surface than the rest of the oil (NOAA and USFWS et. al, 2008). Once those chemicals make their way to deeper layers of sand they tend to remain there for a while because it is difficult to remove them. Since these substances found in oil are acutely toxic they can kill organisms that live in the sand or kill food sources for other marine life (NOAA and USFWS et. al., 2008). If the toxicity of the chemicals does not kill life in the sand, then they could be physically smothered by the heavy, sticky oil that remains on the surface. The longer the oil goes without being removed, the more chemicals can seep into the sand and have long-term contamination effects.

Rocky Shorelines

The Bouchard B-120, exposed almost one hundred miles of shoreline to number six oil, including the rocky shorelines and jetties. The rocky shorelines along parts of Buzzards Bay are home to a variety of marine species, but due to their design they also collected a lot of the oil that spilled on April 27th, 2003. Not only did the formation of the jetties and rocks along the shore trap oil in certain areas of the bay but it also coated the rocks. However, the rocks do not absorb oil, so as long as there is no life using them as a habitat or breeding ground then the rocky shore will be relatively resilient to oil spills (Oil Spill Prevention & Response 2020). Unfortunately, in Buzzards Bay migrant birds tend to favor the rocky shoreline for mating, so having them coated in oil is not favorable for them. Many barnacle species attach themselves to jetties and rocks along the coast and therefore are greatly disrupted by the presence of oil. Rocky shorelines are not sensitive to oil spills and they are not physically destroyed by response efforts either (Oil Spill Prevention & Response 2020). Therefore, the clean-up efforts were not hindered by fear of further damaging the habitat.

Impact on Marine Life

Marine Birds

The Bouchard B-120 oil spill killed many birds, including: the common loon, common and roseate terns, common eider, black scoter, piping plover and the red-throated loon (USFWS 2019). Marine birds were directly affected by the oil spill because the oil physically smothered them and made it impossible to perform necessary functions that they needed to survive. The longer the oil stuck to their feathers the more difficult it became to remove the oil from them and the more likely it was that they would end up dying from it. In fact, following the spill it was determined that an estimated 531 common loons died as a result of the B-120 spill (USFWS 2019).

However, birds were indirectly affected by the spill when they their food supply was covered in number six oil from the B-120 barge. This is because the loons either ingested toxic chemicals from their food or their food died after being smothered by the oil (USFWS 2019). Therefore, this accident not only affected how the birds get their food, but it also disrupted the entire food web of the habitat. Birds also came into contact with oil when they were building nests or were migrating through the area. Nest sites that were supposed to be occupied by common loons had they not been killed by the spill, were now occupied by floaters with lower reproductive rates (USFWS 2019). This made plans for restoration of common loons and other bird species all the more difficult because it took longer to reproduce a fewer amount of birds. However, there were not enough floaters to fill the nests of all the birds that were killed as a result of spill. The restoration plans for common loons and other birds affected by the spill will be evaluated later in the chapter but it is important to note that they emphasize the need for food, nests and breeding grounds.

Shellfish

Buzzards Bay is more than just a nesting and breeding ground for marine birds, but it also has an abundance of shellfish beds. Amongst the shellfish found in the bay are: clams, quahogs, scallops, oysters and lobsters (Shellfish Impacts 2020). For the most part the majority of the shellfish are not sensitive to oil spills, with the exception of soft-shelled clams that live in intertidal zones. Since the clams lived in the intertidal areas, they were exposed to greater volumes of oil number six, which resulted in high mortality rates for their species (Shellfish Impacts 2020). Other than the soft-shelled clams, the major concern with other shellfish is that their meat will become tainted by the toxins found in oil. In some cases, shellfish were not contaminated with toxic chemicals but rather the fear was that they would taste like oil, which would not be good for business. In fact, immediately following the spill majority of the shellfish beds in Buzzards Bay were completely closed due to being covered in fuel oil number six. This had less of an ecological impact and more of an economic impact for the shell fishing and tourism industry.

Turtles

Buzzards Bay is home to more than just marine birds and shellfish, in fact it also has the northern diamondback terrapin turtle. This turtle species uses the bay for nesting and breeding just like the shellfish and bird populations do (MEOEA and USFWS et. al., 2005). Therefore, the oil spill in Buzzards Bay interfered with their ability to perform the necessary functions of life. The only difference is that prior to the Bouchard B-120 oil spill the terrapin species was already listed as threatened under the Endangered Species Act (MEOEA and USFWS et. al., 2005). Therefore, they are that much more vulnerable to the consequences of an oil small be it big or small. The terrapin turtles nest and breed in the salt marshes, which are one of the most sensitive

habitats to oil spills, which means that it will not provide them with much protection from the harmful toxins.

However, what made turtles the most vulnerable following the spill, was that when they came to the surface for water, they inhaled the number six fuel oil that was floating on top of the water. Unfortunately, the turtles could not avoid inhaling oil because they needed to come to the surface to breathe and the number six fuel oil that was spilt floated on the water's surface (NOAA 2016). This means that turtles struggled to perform a task as simple and necessary as breathing, which makes their chances at survival that much more difficult. When the terrapin turtle inhaled the oil, it went in their lungs and mouth and ended coating their insides to the point where they were no longer able to swim (NOAA 2016). In addition to inhaling the oil, turtles in Buzzards Bay struggled to move and see through the waters covered in oil sheens.

Even if the terrapin turtles were not alive at the time of the spill, they could still feel the effects of the toxins that either seeped through their eggshells or ended up in the sediments of the marshes (NOAA 2016). The Bouchard B-120 spill had severe effects on the growth, reproduction and overall health of the northern diamondback terrapin turtles. Similar to its tidal marsh habitat, the terrapin turtles are sensitive to the methods used for oil spill clean-up as well, which required extra caution on those conducting the response efforts (NOAA 2016). Therefore, the focus of the restoration plan for turtles was removing them from their oil covered habitat and cleaning them, in order to prevent further health complications.

Mammals

At the time of the Bouchard B-120 oil spill, there were only a handful of seals and seal pups left in the bay that had not yet made their way north. Therefore, it was not that surprising when response crews in Dartmouth reported finding a few seals covered in oil (MEOEA and

USFWS et. al., 2005). Although, the time of year of the spill was favorable for the majority of the seal population because, had more been in the bay, more would have been exposed to oil. Similar to how the terrapin turtles were exposed to the number six fuel oil when they came to the surface for air, the seals also came into contact with the oil for the same reason ("MEOEA and USFWS et. al., 2005). Seals and seal pups needed to go above water in order to breathe and since oil floats their exposure was inevitable. When the seals poked their heads above water on April 27th 2003, their fur became covered in oil and their eyes and skin became irritated by the toxins in the oil ("Oil Spills at the Water Surface" 2020). Even though the seals did not die in as drastic of numbers as marine birds, the spill still disrupted their ability to perform necessary functions of life. For instance, when their fur became covered in oil it made it that much more difficult for them to maintain the appropriate body temperature ("Oil Spills at the Water Surface" 2020). Therefore, the restoration plans for marine mammals was not as extensive as it was for the turtles and birds, but the focus was still removing them and cleaning them up to the best of their ability.

Section IV: Impact on Humans

Health effects

Although one of the major motivations behind the creation of the Massachusetts Oil Spill Prevention Act was to protect the environment from future harm, it was also made to protect the health of those that live near the bay. Since oil contains dangerous toxins and chemicals it is no surprise that the Bouchard B-120 oil spill affected those who lived nearby. Almost immediately after the Bouchard B-120 leaked number six fuel oil into Buzzards Bay and it made its way ashore, the strong smell of tar came along with it ("Oil Spill Health Issues" 2020). Although the smell is strong it is not toxic or extremely harmful to the human body. However, clean-crews

and members of the Coast Guard who worked closely with the oil for long periods of time, reported that the smell gave them headaches or made them feel nauseous ("Oil Spill Health Issues" 2020). Therefore, the fumes from the oil were not strong enough to cause death or long-term harm, but rather results in short-term discomfort. For the most part, the only contact that response teams were making with the oil was smelling its odor, but a few reports said that touching tar balls resulted in skin rashes ("Oil Spill Health Issues" 2020). Even though the health issues associated with oil are not as severe as for humans as it is for marine life, does not make it any less of a concern.

Economic Effects

In terms of the economic consequences of the Bouchard oil spill, there is the cost of clean-up, loss of tourism and natural resources and the loss of job opportunities. Since so many shellfish beds were contaminated by number six fuel oil and had to be closed off to the public, a lot less shellfish, such as oysters were able to be harvested. By prohibiting the public from taking shellfish from certain areas, the spill impacted both the tourism and the shell fishing industries. So much so that Bouchard Transportation ended up paying municipalities and commercial shellfishermen a combined $2.5 million in damages and lost income (NOAA and USFWS et. al., 2014). Although this might not seem like much in grand scheme of things, it was a lot for a community that depends largely on the shellfish industry. However, the Bouchard spill caused damage to other natural resources besides shellfish and it took years for them to be compensated.

In 2010, residents of the towns surrounding Buzzards Bay finally reached an agreement on how much Bouchard Transportation should pay in damages to their properties. For residents of Mattapoisett Bouchard was responsible for paying them $12 million dollars and all other

towns were given a total of $11.45 million dollars to divide amongst the municipalities ("Oil Spill Costs" 2011). The numbers vary slightly between the two settlements because the calculations are based on the extent of pollution that the spill caused their properties. These figures were based on the Natural Resource Damage Assessment conducted by Massachusetts, Rhode Island and NOAA (NOAA and USFWS et. al., 2014). Bouchard Transportation was liable for paying for damages to resources, pollution and loss of income in addition to the initial clean-up costs.

In fact, the claims agency that worked with Bouchard Transportation said that the company spent $37.2 million dollars on clean-up efforts in Buzzards Bay ("Oil Spill Costs" 2011). This grand total does not include the money spent to pay for damages to resources or job incomes. Although the polluter pays for clean-up, they do not necessarily take part in the physical removing of oil, therefore, majority of the $37.2 million came from the bill that Bouchard's contracted clean-up crews sent them (NOAA and USFWS et. al., 2014). Oil spills are expensive to clean-up and compensate for, but if they were the result of a preventable accident then, it can end costing the polluter more. That's what happened to Bouchard Transportation after pleading guilty in federal criminal court for their negligence on the day of the spill ("Oil Spill Costs" 2011). Since an investigation into the spill brought the Coast Guard to the conclusion that the individual responsible for navigating the tugboat was not paying attention to his radio or taking the proper precautions while operating in the dark, he would be tried in a criminal court. Therefore, by entering a guilty plea, Bouchard Transportation would be responsible for paying either $9 or $10 million dollars depending on what the court determines to be appropriate given the damages ("Oil Spill Costs" 2011).

Political Effects

In terms of protecting the people and the environment there is no better way to do it than create new legislation. The people of the surrounding communities did more for their local and state municipalities in a short period of time than the federal government did. For instance, between the local municipalities and government entities they were able to enact the Massachusetts Oil Spill Prevention Act in 2003 ("Massachusetts Oil Spill Act" 2008). This was a key piece of policy because it was stricter than any preexisting federal laws that were in place at the time. The act protected against the same problem happening again by requiring any barge coming into Buzzards Bay to be escorted by a tugboat. However, the Coast Guard did not love this act because it meant more work for them and they felt that a state could not tell a federal agency what to do.

Although the federal government did not implement any policies that directly correlated with the Bouchard B-120 spill, they did make some beneficial changes. For instance, the Coast Guard enacted the Tank Vessel and Facility Response Act in 2004, in order to make the requirements for vessels and oil storage facilities response plans stricter (Coast Guard 2011). In doing so the Coast Guard made it clear that there would be no excuse for negligence or a lack of preparation on the behalf of the vessels and facilities. This was partially inspired by the fact that the Coast Guard discovered that the Bouchard B-120 had a response plan that just barely checked all the boxes in terms of requirements and it was still severely lacking (Coast Guard 2011). Therefore, the Coast Guard realized that if they want the response plans to be more detailed and include more information than they need to create legislation that would force the tanker vessels and storage facilities to do so. Both state and federal government entities took legislative action following the oil spill, the only difference is the Massachusetts Oil Spill

Prevention Act focused more on making sure the same mistake would not happen twice in Buzzards Bay, whereas the federal policy gave the oil industry more responsibilities to manage

Social Effects

Not only were the daily activities of the locals disrupted but, the communities in the surrounding areas also banded together to make sure that no accident like this would happen to their home again. The surrounding communities partnered with the Department of Environmental Protection, the Buzzards Bay coalition, the Massachusetts Attorney General's Office and local businesses in order to create more protective oil spill policy (Healey 2019). Instead of waiting for the federal government to step in with new legislation, the state and local entities took it upon themselves to take initiative. This proactive action led to the creation of the Massachusetts Oil Spill Prevention Act, which mandated that any barges coming into the bay had to be escorted by a tugboat (Healey 2019). The community felt that this new law was the only way to keep an accident that was entirely preventable from happening again. Therefore, this oil spill acted as a call to action for the citizens of the towns surrounding Buzzards Bay to come together and protect their community and their health.

Aesthetic effects

Buzzards Bay is not only hoe to a host of marine life, but it is also a popular vacation area for both locals and tourists. Therefore, when the B-120 spilled number six fuel oil into the bay, beachgoers were no longer able to enjoy their usual activities. For instance, beaches were shut down, and recreational boaters were restricted to only going in certain areas of the bay (Healey 2019). Many recreational boaters would go out to shellfish beds, but since those were contaminated by oil, they were closed off to the public. Therefore, the amount of locals and tourists who would go out on a boat in Buzzards Bay decreased following the spill. Although the

spill happened during the offseason in terms people going to the beach, there was a concern that balls of tar could continue to wash ashore months later. This made many people weary of going to the beach in the following months because they did not want to swim with tiny balls of tar. In fact, many beach communities did damage control by running press releases and media campaigns to combat the public assumption that the beaches surrounding the bay were 'dirty' or 'unsafe'. However, it is not known for sure if the number of individuals who went to the beaches in Buzzards Bay actually decreased or not.

Section V: Conclusion

Clean-Up & Response

Since Bouchard Transportation Company was responsible for polluting Buzzards Bay with number six fuel oil, they were also responsible for paying for clean-up and any other recovery efforts needed. All of their clean-up crews were contracted out by other companies and local first responders. Aforementioned, Bouchard had to foot the bill for clean-up costs, damages to properties and resources and any loss of income related to shell fishing. Since the coast of Buzzards Bay had a variety of sensitive habitats and marine life the response efforts had to be tailored as to cause a minimal amount of harm to them. The sorbents and biodegradation agents could not always be used in certain areas because it would cause more harm than good to tidal marshes and terrapin turtles (NOAA 2015). This meant that crews had to use a variety of methods to remove the oil making the clean-up operation more expensive for Bouchard. In order to contain the oil in the water, one of the first things crews did was deploy boom equipment to keep the oil from spreading any further (NOAA 2015). For the most part boom equipment was able to contain the oil, but the best tool in cleaning up oil spills is to act as quickly as possible

which was the case for this accident considering the leak was noticed almost immediately after the barge had grounded.

Conclusion

Overall the Bouchard B-120 oil spill was completely avoidable had the mate in charge been less negligent in his actions. For instance, the mate had left the bridge in order to work on the stern of the boat which is not only against company policy but also prevented him from hearing the multiple radio warnings about the dangerous rocks they were heading towards (The Maritime Executive 2020). Following the spill, the first mate was fired and the company apologized for his negligence and that it would not happen again. The first mate is not the only one to blame for the accident because he had only been working for the company for nine months and already had complaints about his ability to do the job after a barge he was navigating collided with a dock in Philadelphia (The Maritime Executive 2020). However, by getting rid of the first mate Bouchard Transportation Company hopes to ensure that an accident like the one in Buzzards Bay will never happen again.

However, the legislation that was in place during the spill made the tank vessel operators and oil storage facility owners responsible for very little in terms of disaster plans. Therefore, the federal government learned that if they only require the bare minimum than the oil industry is only going to concern themselves with the bare minimum when it comes to safety standards. Bouchard Transportation Company cannot be completely blamed for the lack of a comprehensive response plan in the event of an accident because they were doing what they were told and nothing more or less. Although the federal government made improvements to previous oil spill legislation they were not the only government entity that was called to action with the Buzzards Bay oil spill.

In fact, the state of Massachusetts took matters into their own hands by creating and implementing a new law to make sure the Buzzards Bay would never be contaminated by oil because a barge hit bedrock again. Massachusetts set a major precedent here in terms of the power a state government has because following the creation of the Massachusetts Oil Spill Prevention Act the state had stricter rules in place for oil barges than the Coast Guard did. This is the perfect example of how a state can take initiative when the federal government cannot or will not do so.

Chapter IV- Case Study 2

British Petroleum Deepwater Horizon Spill in Gulf of Mexico

Introduction

This chapter describes the oil spill caused by the explosion of the Macondo Well which was owned by British Petroleum (BP) and operated by Transocean. British Petroleum is a British company located in London, England, while Transocean is a Swiss company and Halliburton is an American company based in Texas. British Petroleum is responsible for the exploration, production and refining of oil whereas Transocean is a contracted oil drilling company and Halliburton is a contracted engineering consulting company (BP & Transocean & Halliburton 2020). In this chapter, the effectiveness of the legislation in place prior to the spill is examined as well as policies that were created as a result of the accident. In addition to the political effects, the social, economic and ecological effects of the spill will also be explored.

Section I: Background

What Happened and Why?

On April 20th 2010, the Deepwater Horizon oil rig, was drilling the Macondo Well when the blowout preventer failed and the well exploded. The well was operated by Transocean and

the rig was being leased by British Petroleum when the explosion occurred. The Deepwater Horizon oil spill is the largest spill to date, killing eleven workers, injuring seventeen and leaked an estimated 4,900,000 barrels of oil into the Gulf of Mexico (Pallardy 2010). Although the explosion was an accident it was extensively investigated to see if it could have been prevented. Since the spill was a result of failed technology, any entity that had any part in the operation was looked at as potentially being negligent. The players investigated following the spill were Transocean, BP and the contracted engineering firm, Halliburton, in order to see if this explosion was in fact preventable (Pallardy 2010).

All of the companies listed above played a role in the engineering, monitoring and operating of the Macondo Well and the Deepwater Horizon offshore drilling oil rig. The Deepwater Horizon rig was 396 by 256 feet, with the ability to drill about 30,000 feet deep (National Academies of Sciences, Engineering & Medicine 2012). Therefore, each entity involved had to do their part to make sure that the oil rig would work and be able to perform the tasks that they needed it too. Even more important to the success and safety of the well is its design and construction, which was determined by BP and Halliburton. The Macondo well went down 18,360 feet below sea level, in high pressure, and difficult oceanic conditions (National Academies of Sciences, Engineering & Medicine 2012). Therefore, it was critical that the casing and design would ensure both high levels of productivity and safety. However, BP opted to go the cheaper route when it came to well casing rather than the more secure option and Halliburton ended up stating that the cheaper option was just as safe and secure as the other one. This landed both companies in hot water when the investigation was conducted after the spill and all of BP's decisions were reviewed and examined by the Coast Guard.

This oil spill garnered a lot of media attention in 2010 as large amounts of oil leaked into the Gulf of Mexico. In fact, six weeks after the accident it was still a big news story and people across the country continued to tune in. This is partially because it was the largest oil spill in marine history but there was also a great deal of controversy when it came to determining who was to blame for the incident. It was very important to find out who was responsible for the explosion, not only because they would have to pay to clean it up but also because it killed eleven people. One of the biggest reasons the spill stayed relevant in the news for so long was because search teams were trying to find the bodies of those individuals who died, which made it different from any other oil spill that had been reported before. In addition to claiming the lives of eleven people it also put a massive stain on the tourism industry in the Gulf Coast, therefore it is no surprise that it was the number one news story in 2010 (Holcomb 2010). The effects of the Deepwater Horizon oil spill that were covered so extensively in the media will described and examined in greater detail later in this chapter.

Section II: Prior to Spill

Relevant Legislation

Prior to the 2010 oil spill, there was years of legislation in place to minimize destruction following oil spills. However, there are a few laws and policies in particular that played a major role in the clean-up and recovery of the Deepwater Horizon oil spill. For example, the Tank Vessel and Facility Response Plans 2004, the Clean Water Act 1972, the Coast Guard and Maritime Transportation Act 2006, Oil Spill Liability Trust Fund 1986, and the Oil Pollution Act 1990. These pieces of legislation are important when talking about the Deepwater Horizon Spill, because they focus on updating technology as well as making sure that the polluter pays.

The Clean Water Act 1972

The purpose of the Clean Water Act is to govern any and all types of water pollution (EPA 2020). In the case of Deepwater Horizon spill the oil polluted the water and under the Clean Water Act the Gulf of Mexico had to be restored to its pre-spill conditions. This meant that the waters had to be physically and chemically the same post spill as it was pre-spill. The Clean Water Act allows for discharge of certain pollutants, as long as the responsible party has a permit to do so, and since BP did not have one they were subject to financial penalties (EPA 2020). The Deepwater Horizon spill was considered to be an unlawful discharge of contaminants into national waters since they did not have a permit from the EPA allowing them to do so. Therefore, BP was responsible for paying $5.5 billion dollars in penalties in regard to the Clean Water Act (Mclean and Chapple 2015).

Oil Spill Liability Trust Fund

The Oil Spill Liability Trust Fund puts a limit on how much a responsible party can take from it in order to pay for clean-up charges. In the case of the Deepwater Horizon spill, BP's cap was determined to be $75 million dollars not including clean-up expenses although, BP said that they would be willing to go beyond the cap for legitimate claims (Deepwater Horizon Liability 2010). BP never came out with a clear definition of what they would consider to be a 'legitimate' claim would be that would make them go beyond the $75 million-dollar cap. The issue with the Oil Spill Liability Trust Fund is that the required maximum amount that a facility like the Deepwater Horizon rig had to pay in damages is $150 million dollars and this number has not been adjusted in years (Deepwater Horizon Liability 2010). Therefore, this required amount is no longer reflective of how much damage an oil spill like Deepwater Horizon can cost.

Oil Pollution Act 1990

Under the Oil Pollution Act of 1990, the polluter is liable for paying to clean-up the spill and pay for any damages caused to natural resources in the process. Therefore, since BP was leasing the Deepwater Horizon rig at the time of the explosion, they were responsible for paying for clean-up. The total amount that BP ended up paying under the Oil Pollution Act was $20.8 billion dollars (Department of Justice 2015). Seeing as it was the largest spill in marine history it only makes sense that the amount they had to pay for clean-up was the most expensive in the Department of Justice's history. The $20.8 billion not only went towards paying for the physical clean-up of the spill, but it also covered any damages done to local economies and natural resources. The Oil Pollution Act was put in place not only to make sure that the polluter will pay for the damages but also to make sure that oil was not just left sitting in ocean.

Tank and Vessel Facility Response Plans 2004

The Tank and Vessel Facility Response Plans 2004, emphasized the importance for every oil storing or transportation unit to have a plan in place that would outline how they should respond to an oil spill. These plans are required to include drills, training and coordination with local or contracted response crews in order to ensure that the vessel or facility would know exactly what they had to do if an oil spill were to occur. In the case of the Deepwater Horizon spill, it was found that the workers on board during the time of the explosion lacked the appropriate training necessary to respond to a potential well-blowout (US Coast Guard 2010). Therefore, their Tank and Vessel Response Plan was virtually worthless in a preventing a disaster because the plan was never put into action. However, there was more to this accident then just a lack of experience, because the investigation found that the company culture did not emphasize the importance of safety, which meant employees were less likely to speak up if they

felt something was wrong (US Coast Guard 2010). The Tank and Vessel Response Plan did not fail as legislation but rather Transocean and BP failed to properly implement it.

The Coast Guard and Marine Transportation Act 2006

The Coast Guard and Marine Transportation 2006, updated the technologies and processes that are necessary in order to ensure that an oil spill is cleaned up properly. One of the major provisions included in this act was to increase the oversight of the Coast Guard by having them submit reports on each vessel that navigated in US waters. However, the Coast Guard investigation found that there were a variety of technologies that were not properly maintained and many procedures that were not carried out correctly that made the clean-up process that much more difficult (HSDL Staff 2016). In fact, the Coast Guard realized that regulations regarding vessel inspections are not strong enough to allow crews and companies to conduct them themselves because certain aspects will go unnoticed or ignored. Therefore, the Coast Guard concluded from this investigation that they need to monitor foreign mobile offshore drilling units, because self-regulation allows for too many opportunities for things to go wrong or be missed (HSDL Staff 2016). Overall the holes in the Coast Guard and Marine Transportation Act, were exposed during the aftermath of the spill even though it did not cause the explosion.

Section III: Impacts on Habitats & Marine Life

Impacts on Habitats

Deep Water

Since the explosion of the Macondo Well began under 5,000 feet of water, the deep-water habitat was greatly affected by it. The deep-water habitat was particularly difficult to clean-up because it was not as easy to see as it was to see oil at the surface. In order to remove oil from the deep sea, is to use dispersants, however this also can work against you by making easier for

oil to remain in the water column (National Wildlife Federation 2015). The longer oil remains in a habitat the greater the damage to the habitat and all the species that live there. In June of 2010, a 21- mile plume of oil and gas was found about 3,500 feet below the surface, therefore it is very likely that the dispersants used made this plume possible (National Wildlife Federation 2015). This discovery was made less than two months after the Macondo Well exploded and some oil floated to the surface and some mixed with the water and sunk to the depths of the ocean. The oil that sunk made its way to sediments at the bottom of the ocean, making it impossible to remove and making its effects long-lasting (National Wildlife Federation 2015). Deepwater Horizon will have long-lasting effects on marine life that live on the ocean-floors because the oil will take longer to break down there.

Beaches

The sandy shores of the Gulf Coast were not out of the woods in terms of being contaminated with oil from the Macondo well explosion. In fact, for the months immediately following the accident over 550 miles of beaches reported that oil had washed ashore (National Wildlife Federation 2015). Similar to the deep-water habitat, the beaches were used by a variety of marine life that utilized it for eating, breeding and as a shelter. Therefore, the oiling of the Gulf Coast threatened the survival of many different marine species. In addition to oil washing up on the shore, it was also mixing with sand and creating oil mats, that were very hard to find and remove (National Wildlife Federation 2015). Oil mats were not only difficult to clean-up but they also posed a threat to marine life who would get stuck in them while foraging for food. Since they are difficult to locate and remove, oil mats are likely to continue to wash ashore in the form of tar balls for many years to come (National Wildlife Federation 2015). The Deepwater Horizon oil spill had both immediate and long-term effects on the beaches that make up the Gulf

Coast which will have economic and social implications that will be examined later in this chapter.

Coastal Marshes

In addition to the deep water and beach habitats, the coastal marshes were also greatly affected by the Deepwater Horizon oil spill. In fact, 39% of all the coastal marshes in the United States are found along the Gulf Coast, therefore it was a big deal oil covered 490 miles of it (National Wildlife Federation 2015). The coastal marshes are home to a lot of marine life and they are also responsible for a host of ecosystem functions. The functions that this habitat provides are already in jeopardy because erosion, storm surges and sea level rise has led to a massive loss of wetlands on the coast of Louisiana (National Wildlife Federation 2015). Therefore, the marshes on the Gulf Coast were already vulnerable before the explosion of the Macondo well, so the exposure to oil made a bad situation, worse. The immediate effects of the oil spill included plant death and increased rate of erosion, whereas long-term effects are uncertain but it is likely that the chemicals will remain in the marshes for years to come (National Wildlife Federation 2015). Since coastal marshes were home to such a wide variety of species that it also has a large ecological impact that will be explored more later in this chapter.

Impact on Marine Life

Marine mammals

The Gulf Coast is home to more than twenty different marine mammal species, therefore it is no surprise that they were exposed to large amounts of oil as a result of the Deepwater Horizon spill. In fact, marine mammals can come into contact with oil via epidermal contact, inhalation or ingestion, all of which are problematic to their health (NOS 2017). Marine mammals like dolphins are not made to withstand or breakdown the contaminants that are found

in oil, therefore once it comes into contact with it, the oil will remain in their system for a long time. Response crews discovered that some marine mammals were visibly oiled while others suffered damage on the internal organs by inhaling or ingesting the oil (Marine Mammal Commission 2011). Therefore, it was obvious that marine mammals like dolphins, did not have to be visibly covered in oil to be negatively affected by it. In addition to the chemicals found in oil, the absorbents used to clean-up it up also had negative impacts on the health of marine mammals.

As a result of the Deepwater Horizon oil spill, marine mammals suffered damage to their adrenal and kidney cells which resulted in a decreased ability to perform body regulating functions and form responses to stress (Marine Mammal Commission 2011). If they cannot perform functions necessary for survival than they will not be able to support a new generation either. Not only did the ingestion or inhalation of oil disrupt the reproduction and stress responses of marine mammals but it also has negative health effects on other organs (Helm and Costa et. al., 2014). For instance, it damages their respiratory and digestive systems, making survival that much more difficult for marine mammals. Even though inhaling or ingesting oil was extremely dangerous for marine mammals, they can still suffer health issues from just coming into contact with it. For those mammals with fur, exposure to oil can reduce the animal's ability to keep themselves warm and they can suffer from hypothermia (Helm and Costa et. al., 2014). Therefore, some marine mammals do not even have to inhale or ingest the oil for it to have adverse effects on their health. For those mammals without fur, their eye, skin and mucus membranes became irritated by the chemicals that were found in the oil (Helm and Costa et. al., 2014). Marine mammals living in the Gulf Coast, suffered greatly from the Deepwater Horizon oil spill, unfortunately they are not alone in their suffering.

Marine Birds

Marine birds are especially vulnerable to oil spills because their habitats are either the ocean or the shoreline and the Deepwater Horizon covered both in oil in April 2010. In fact, an estimated 200,000 birds were reported dead in the weeks following the spill, which means that the health impacts of oil exposure were fatal for birds (Haney, Geiger and Short 2014). Therefore, the Deepwater Horizon oil spill must have impaired birds' ability to perform necessary functions of life. Similar to how oil stuck to the fur of marine mammals they it also stuck to the feathers of birds making it either difficult or impossible for them to fly (Balmer 2014). Since birds' ability to fly was impaired by the coating of the oil from Deepwater Horizon it also was unable to form other necessary functions for survival. Therefore, it is not surprising that many birds died as a result of dehydration or starvation because they could not physically get to where their food or water sources were (Balmer 2014). Without the ability to fly or forage, it is no surprise that they were not able to perform other functions such as reproduction.

Birds also ingested oil from the Deepwater Horizon spill, whether it was directly from eating oil on the surface of the water or indirectly from eating contaminated food. A bird's growth and reproductive ability can be damaged by ingesting even a small amount of oil (Waters 2014). Therefore, birds in the earlier stages of life were more vulnerable to the oil exposure because they were not fully grown or developed. It also takes less oil to severely damage the development of a baby bird than it does a fully matured bird.

Sea Turtles

The Gulf Coast is home to a variety of turtle species, that were negatively impacted by the Deepwater Horizon oil spill. Similar to marine birds, many turtle species died or were severely injured from oil exposure. For instance, reproductive rates and nesting sites were

greatly reduced because the places where they would typically go to do so were covered in oil (Wilson 2010). Therefore, it is no surprise that sea turtles suffered many external injuries from exposure to oil. When sea turtles came into contact with oil from the spill, they suffered skin irritations, chemical burns and infections (Wilson 2010). Sea turtles' have very sensitive skin and therefore are that much more vulnerable to the external effects of oil exposure.

Unfortunately, the suffering does not end there for sea turtles, because not only can they come into contact with oil but they can also inhale or ingest it. When sea turtles inhaled the oil it damaged their respiratory tracts, which led to them getting sick with pneumonia (Wilson 2010). Although pneumonia is not always fatal, it still weakens the respiratory system making it difficult for them to perform other necessary functions of life. When sea turtles ingest oil, it damages their digestive tract making it difficult for them to dive and feed themselves (Wilson 2010). Therefore, not only does the oil damage their respiratory system but it also damages their gastrointestinal, making survival very difficult for sea turtles in the Gulf Coast.

Fish

There are a variety of fish species that swim and live in the Gulf Coast, putting them at a greater risk for injuries from exposure to oil. In fact, many of the fish found in the Gulf Coast following the Deepwater Horizon Oil Spill had heart damage from ingesting and inhaling oil (NOAA 2015). This poses even more issues for the fish in the Gulf Coast, because if their heart is not functioning properly than it will be very difficult for them to perform necessary functions of life. In addition to threatening their heart health, exposure to oil also cause developmental issues for fish that were in their earlier stages of life when the spill occurred (NOAA 2015). The earlier in life that a fish comes into contact with oil, the more vulnerable they are to the adverse health effects. The negative health impacts from oil exposure include, impaired development of

gills, blood vessels and embryos (Hale and Graham et. al., 2020). These health issues had fatal effects for many of the fish because they either were directly or indirectly exposed to the oil and its contaminants.

In fact, the fish swimming in the Gulf Coast during the time of the Deepwater Horizon oil spill, suffered both external and internal injuries from coming into contact with the oil. For instance, oil can enter the fish's body via their gills resulting in death, or the contaminants can cause skin irritations, which are damaging but not fatal (Hale and Graham et. al., 2020). Therefore, fish are that much more vulnerable to oil spills because they do not have to ingest it or inhale it for it to enter their bloodstream and kill them. In some cases, the fish did not come into direct contact with the Deepwater Horizon spill, but the food they ate did and had become contaminated as a result (Hale and Graham et. al., 2020). Fish swimming in the Gulf Coast during the time of the spill and the weeks that followed were negatively affected by the chemicals found in the oil that they were exposed too.

Corals

Since corals are found in the deep waters of the Gulf Coast, it is no surprise that they suffered the consequences of the Macondo well also being in the deep water when it exploded. In fact, this close proximity to the wellhead, resulted in all corals within 16 miles to be coated in oil (Braun 2015). There is a large amount, of colonies that are found within 16 miles of the wellhead, which means that the Macondo well explosion damaged a significant percentage of all corals found in the Gulf Coast. Corals became exposed to oil when, heavy oil sank to the bottom, ocean currents mixed oil into the water column or when oil on the surface sinks to the bottom during low tide (NOAA 2013). Since there were multiple ways that a coral could have

been exposed to the oil from the Deepwater Horizon spill, it is no surprise that so many were damaged or died as a result.

When corals come into direct contact with oil, it can physically smother them resulting in death or it can severely impair its ability to reproduce, grow and develop normally (NOAA 2013). A variety of bottom dwellers rely on the corals for shelter and other functions so they were greatly affected when many of the coral colonies in the Gulf Coast died. In fact, of the 40 groups of corals that were damaged by the Deepwater Horizon spill, 90% of them were either dead or dying a matter of months later (Jones 2010). Corals are especially vulnerable to spills like the Deepwater Horizon because they take a long time to recover and to see so many die at the same time is almost unheard of.

Section IV: Impact on Humans

Health Effects

Physical Health

In terms of individuals whose health was physically impacted by the Deepwater Horizon spill, the workers on the rig and those responsible for cleaning it up were the most affected. This is because the explosion killed eleven and injured seventeen other Transocean workers who were on the rig when the blowout preventer failed (Azania-Jarvis 2010). Therefore, making this spill not only the largest one in marine history but also the deadliest one recorded. The injuries suffered by the seventeen workers included severe burns, broken bones and respiratory issues (King and Gibbins 2011). Even though their injuries were not fatal, they would have never sustained these injuries had the correct precautions been taken by BP, Transocean, and Halliburton. However, the workers on board were not the only ones whose health was physically affected by the Deepwater Horizon oil spill.

The individuals who were a part of the clean-up and response crews also reported health problems. Since the response workers were spending a lot of time handling and inhaling oil it is no surprise that their internal organs were negatively impacted. For instance, clean-crews reported worsening hematological, hepatic, pulmonary, and cardiac conditions after completing the clean-up process (D'Andrea and Reddy 2018). All of those who responded to the spill wore the appropriate gear that is required to handle and be around oil, and yet they still experienced health problems. Although the physical ailments of the Transocean workers and those involved in the clean-up process were very serious, many people also suffered from increased mental health issues.

Mental Health

Due to the magnitude of the Deepwater Horizon disaster, it is no surprise that mental health issues increased and intensified in the weeks and months after it. Unlike the physical health effects, negative mental health impacts were not just experienced by the workers and response crews, but residents too. In fact, individuals whose livelihood, safety or vacation spot were damaged or threatened by the spill, reported increased feelings of depression, anxiety and some even said they suffered from post-traumatic stress disorder (Graham and Hale et. at., 2020). It can be concluded that depending on where an individual lived or worked the likelihood that they would experience mental health issues was either increased or decreased.

For instance, the fishing industry in the Gulf Coast is huge and many rely on it as their source of income, so when the water was not safe to fish in, they lost months and months of income which resulted in increased levels of stress and anxiety among fishermen and their family members (Graham and Hale et. al., 2020). With no way to pay their bills and the new public perception that buying fish from the Gulf Coast was not safe, it is no surprise that many

fishermen worried about where their next pay check would come from. The mental health effects felt by the residents and the fishermen were long-term problems because of how long it took the Gulf Coast to return to pre-spill life.

Economic Effects

As mentioned as one of the causes for the increased feelings of stress and anxiety, loss of income was major financial impact suffered by many who worked along the Gulf Coast when the spill occurred. In fact, as a result of the spill and the damage it caused, BP had to pay more than $20.8 billion in claims, with $5.5 billion for Clean Water Act penalties, $8.1 billion for damage to natural resources and $700 million for other damages (Mclean and Chapple 2015). The Deepwater Horizon spill not only cost BP a lot of money but it also created numerous financial burdens for residents and those who work in the Gulf Coast.

One of the most notable industries negatively impacted by the Deepwater Horizon oil spill was the fishing industry. In fact, 88,522 square miles were closed off to fishing and as a result the fisheries lost a great deal of money. BP ended up compensating the Gulf Coast fishing industry $111 million for the loss of revenue following the spill (Upton 2011). Although the fishing industry lost a great deal of money as a result of the spill, it was not the only industry in the Gulf Coast that was financially affected. The tourism industry relies heavily on the cleanliness and safety of their beaches to bring in tourists, which is difficult to do when they are covered in oil.

There is little to no attraction for tourists to visit beaches covered in oil and eat seafood contaminated by chemicals, therefore it is no surprise that there was a decrease in the tourists traveling to the Gulf Coast in the weeks following the spill. In the weeks following the spill 35% of hotels experienced an increase in cancellations, and the amount of cancellations only

increased as more weeks passed (Oceana 2020). The less people there are staying in hotels, the less people there are to buy souvenirs, eat at restaurants and participate in other tourist activities, resulting in a loss of money for many. Since the majority of the Gulf Coast states' economies are in heavily reliant on tourism it is no surprise that Louisiana lost $247 million in visitor spending as a result of the oil spill (Oceana 2020). Even though BP paid for revenue loss, it does not come close to compensating for all the damage that they caused.

What separates the Deepwater Horizon oil spill from other oil spills before it, was the fact that it took the lives of eleven individuals. Although it is nearly impossible to put a price tag on someone's life, BP had to do so, in order to compensate their families. BP ended up paying a total of 18.7 billion dollars that had to split amongst the families of the eleven victims (Allen 2015). It is difficult to legally determine how much someone's life is worth and majority of the victims' families felt that $18.7 billion was not enough, but they struggled to fight a legal battle to change it because BP is a large and powerful company.

Political Effects

Due to its size and severity Deepwater Horizon created a policy window for new oil spill legislation in the months following the disaster. The new laws implemented after the spill included RESTORE 2011, Offshore Production and Safety Act 2011, and Pioneers Act 2012. Each of these policies aimed at making sure that an oil spill like this would never happen again, especially one that could have be prevented. Since both political parties were on board with making sure this type of disaster would never happen again it was relatively easy to pass and implement these news laws.

The RESTORE Act 2011 first focused on aiding recovery efforts in the Gulf Coast states, and then it developed a restoration model that would be in place so that the states would be

prepared for any disaster. This was a major piece of legislation for the Gulf states because it specific to the recovery, restoration and compensation of their resources, jobs, properties and economies. Since it was the largest oil spill in marine history, no state or region was well-equipped to handle the consequences, therefore it was critical that the federal government step in and aid the process. Even though, the RESTORE Act was specific to the Gulf Coast region, it set a precedent for other coastal communities because it set up regional councils that were in charge of oil spill recovery, which played a critical role in the long-term and short-term restoration process.

The Offshore Production and Safety Act of 2011 amended and updated the Outer Continental Shelfs Act, specifically focusing on the roles and responsibilities of the Secretary of the Interior. This piece of legislation stressed the importance of a detailed response plan, by mandating that every vessel and facility had to get their plan reviewed by a third party. It would also be the Secretary's job to make sure that all the equipment and technology described in a response plan is both safe and effective in terms of cleaning up an oil spill. The Offshore Production and Safety Act was implemented to make certain that there would be no excuse for a vessel or facility to not be able to handle the immediate removal and clean-up of oil following a spill. In addition, adding some requirements to response plans, this act also dissolved the Minerals Management Service and created the Bureau of Ocean Management and the Bureau of Safety and Environmental Enforcement in its place (BSEE 2020). Therefore, the Offshore Production and Safety Act increased the amount of federal oversight for offshore drilling and made the ones drilling more responsible for their actions by ensuring that they had a foolproof response plan in place.

The Pioneers Act 2012, like the other two pieces of legislations were focused on making sure that a disaster of this magnitude would never happen again. The act acknowledged the fact that oil is a valuable resource for the United States, but changes had to be made if anyone else wanted to continue oil exploration in national waters. In order to monitor and manage the amount of entities that were exploring oil, the Secretary of the Interior was responsible for giving out permits to do so. This allowed the government to keep track of who was looking for new oil shales but it also encouraged the development of new technology to do so. The federal government and oil industry was particularly happy with this law because it promoted a decreased dependency on foreign oil, while also creating more jobs, and new technology. The Pioneers Act 2012 was just as much an economic policy as it was an environmental policy, thus satisfying all parties involved.

Social Effects

Due to the magnitude of the disaster, it is no surprise that the surrounding communities were adversely impacted by the consequences of the spill. With all the individual stressors going on, it became increasing difficult for communities to worry about anyone but themselves. It is human nature for individuals to want to be sure that their problems are taken care of before their neighbors are. The fact that BP was involved in so many legal settlements with local residents only contributed to the growing tensions in the communities (Austin and Simms 2017). Since not all the claims were of equal financial value, people became upset when they heard their neighbor got more money than they did even though the amount of damage experienced was similar. Although economic issues created a lot of tensions within the community, there were other issues that added to the pressure.

These pressures include the increased number of people coming into their community for clean-up efforts, and disrupting the order of things. Even though majority of these communities are used to many tourists coming into their towns, they were not used to having responders, media, officials, scientists and researchers (Gray 2019). These outsiders do not contribute to the community but rather they disrupt the typical routines of everyone who lives and works in the area. This creates more stress in the communities because the residents feel as though they have lost control of their home and some stranger has taken it over instead (Gray 2019). Therefore, once the outsiders are gone the oil spill is over for them, but it is not over for those who live there and now they have to rebuild the structure of their community as well as deal with the aftermath of the oil spill.

Aesthetic Effects

Due to the magnitude of the spill it acquired a great deal of media coverage for the days and weeks that followed, all of which led to the creation of widespread public sentiment that the Gulf Coast was not the place to vacation. Prior to the spill the Gulf Coast was known for its warm weather and beautiful beaches, but that image was destroyed after the oil covered beaches made national television. The public perception of swimming with tar balls kept people away from the Gulf Coast for months following the explosion of the Macondo well. For example, four weeks after the spill hotel cancellations increased to 44% and six weeks after the spill it increased again to 60% (Oceana 2020). Therefore, this idea of oil covered beaches really kept tourists from traveling to the Gulf Coast. In fact, BP played a large role in restoring the Gulf Coast's image of pristine beaches by making commercials to demonstrate how successful and effective their clean-up was.

Even though the majority of the motivation for cleaning up the Gulf Coast was to bring back tourists, it was also important that the locals get their views back. Much of the attraction to live in one of the Gulf Coast states is the coastal landscape that residents get to see every day, therefore although they cared about the spill for other reasons many were very upset that their beautiful beaches had been tainted. In the minds of many locals their beaches were never going to look or feel the same to them which was a big problem considering they are the ones who have to live there after the clean-up crews leave. Similar to how it took tourists a long time to feel comfortable traveling to the Gulf Coast, it also took residents a long time to restore their perception of their community to its pre-spill glory.

Section V: Conclusion

Clean-Up & Response

Since BP was responsible for contaminating the Gulf of Mexico with oil, they were also responsible for cleaning it up. Clean-up crews were contracted by BP to perform both physical and chemical methods to remove the oil. The first thing response teams did was employ boom equipment to contain the spill and keep it from spreading farther than it already had (The Ocean Portal Team 2018). Once the spill was contained the clean-up crews were focused on removing the oil from the surface of the water as quickly as possible. In order to do so, responders take boats with skimmers out and skim oil off the surface and then they use sorbents to pick up any oil that is still on the surface (The Ocean Portal 2018). These physical methods were the first tactics employed when responders arrived on the scene. However, skimming and sorbents did not remove all of the oil that had spilt, so the clean-up crews had to turn to chemical methods.

The response teams put 1.4 million gallons of chemical dispersants into the Gulf of Mexico in an effort to clean-up the spill (The Ocean Portal 2018). The goal of using these

chemicals was to prevent the oil slick from spreading to vulnerable and sensitive habitats. These chemicals were sprayed from airplanes and due to the size of the spill they were also injected in to the Macondo well (The Ocean Portal 2018). Since there was about 4 million gallons of oil in the water, in order to remove it effectively large amounts of chemicals also had to be applied. After the dispersants were applied, the oil broke down into small droplets that are less likely to form slicks but more likely to mix with the water (The Ocean Portal 2018).

Conclusion

Overall the Deepwater Horizon oil spill was a result of negligence on the part of BP, Transocean and Halliburton. BP went the cheap route when it came to the design of the wellhead cap, even though it was not the safest and most secure option. Halliburton was the contracted engineering consulting firm that advised and allowed BP to use the less secure design and therefore have to take some responsibility for the spill as well. As the owner and operator of the oil rig, Transocean also has to take some of the blame for the disaster as well. For instance, they did the bare minimum in terms of preparing a response plan and the company culture encouraged workers to ignore problems rather than reporting them. Therefore, employees did not speak up when they thought something was going wrong because they feared that if they did then they would be fired. However, the legislation in place at the time had the right idea in terms of what type of rules need to be in place, but it lacked specific details.

For instance, the response plan for the Deepwater Horizon rig, was short and lacked detail because the legislation at the time did not require a detailed outline of how the responsible party would respond to a spill. Since the investigation into the spill highlighted the lack of specificity in response plans, it forced lawmakers to implement policies that would make sure that every vessel and facility would have an in-depth response plan that would outline their

clean-up approach. The positive side of the Deepwater Horizon oil spill is that it opened a policy window to create environmental policies that would make oil exploration a safer process. It also set the precedent that if oil exploration is going to continue in the United States then it is going to be done in a way that both promotes economic growth and protects the environment.

Chapter V: Case Study Comparison

Introduction

This chapter compares and contrasts the Bouchard B120 and Deepwater Horizon oil spill. The objective of this chapter is to evaluate the role that federal legislation played in preparing the responsible parties in both case studies for clean-up and prevention of future spills. I will compare the impacts that each spill had on its respective habitats, marine life, and humans. In addition to comparing the impacts on the spills I will also evaluate whether location, time, company or policy contributed to making the situation better or worse.

Section I: About the Responsible Parties

Organization Comparison

Bouchard Transportation Company is an oil transportation company that is based in New York and on the day of the Buzzards Bay spill, they were delivering oil to the Mirant electricity facility on Cape Cod. In fact, Bouchard is the United States' largest independently owned petroleum transportation company, with a total of 25 barges and 26 tugboats (Bouchard Transportation 2020). Bouchard may be the largest company in the United States, but they do not serve other countries, therefore there are many other, bigger oil transportation companies that work internationally. One of the major reasons that Bouchard never took their work overseas is because it is a family owned company, that is currently in its fifth generation of family owners and therefore they do not want to change what has always been and what has always worked for

them (Bouchard Transportation). Therefore, their staff includes family members who hold positions such as President, but their family is not big enough to staff an entire company, thus they hire employees to work on the barges and tugboats as well as individuals to work in office positions to take care of administrative work. However, it's not the size of the company that matters but rather the size of the spill they create, and Bouchard Transportation caused a great deal of damage to Buzzards Bay in 2003.

Whereas the responsible party in the Deepwater Horizon spill, is an international company, located in London, England known as British Petroleum. BP has 73,000 employees and operates in 78 different countries, making it a very large international company, with a great deal of power (BP 2018). Unlike Bouchard Transportation which only handles one aspect of oil, BP is responsible for the exploration, production and refining of oil. British Petroleum is not a family owned company which is why it has been able to operate in a variety of different countries successfully. Since BP is a multinational company it makes sense that they have 73,000 employees to make sure that everything runs smoothly in every country that they are operating in. Although BP and Bouchard vary in size and purpose of their companies, one thing they do have in common is the fact that they were both responsible for causing oil spills.

About the spills

Both the Deepwater Horizon spill and the Bouchard B120 spill were preventable accidents that occurred as a result of negligence. In fact, both companies made decisions that jeopardized the safety of their operation, because it was safer to be unsafe. For instance, with the Bouchard B120 spill, the individual who was responsible for navigating the barge into the bay had a poor track record doing so, but the company allowed him to bring the barge in that day anyway (NOAA 2019). Therefore, instead of hiring a new employee and spending time and

money training them, they decided to assign their employee with experience but a poor track record to guide the B120 into Buzzards Bay. Whereas BP acted similarly by choosing the cheaper well design even though it was much less safe than the expensive option (Pallardy 2010). Both companies sacrificed safety for the sake of saving money and it ended up making the situation worse than it was. It was these decisions that ended up making both companies appear extremely negligent when they were made public.

Although the two spills have a lot in common, they differ in what their overall purpose is and thus differ in the circumstances that led to the spill. For instance, the Bouchard B120 spill was very obviously, a result of human error, because the first mate brought the boat outside of the buoy markers, so there was no discussion that Bouchard Transportation Company was the responsible party. Whereas with the Deepwater Horizon spill, the explosion of the Macondo well was not immediately declared as human error and once it was, there was a discussion as to whether BP, Transocean, or Halliburton was to blame for the accident. Therefore, there was a lot of finger-pointing that occurred in the days following the Deepwater Horizon oil spill, which was not the case for the Bouchard B120 spill.

Section II: Role of Current Legislation

Relevant Legislation

Although there are still regulations missing from current oil spill legislation to help prevent spills, some of the policies in place were very helpful in regards to clean-up. The most important policies include CERCLA, Oil Spill Liability Trust Fund, Oil Pollution Act, and Clean Water Act. These regulations were critical in making sure that the spills were completely cleaned-up and the responsible party was held accountable for their actions. Even though the Deepwater Horizon spill and the Bouchard B120 spill were of different magnitudes these

policies were able to make the polluter pay for the damage that it had done to natural resources in the area. For instance, between the Oil Pollution Act, CERCLA and the Oil Spill Liability Trust Fund the polluter pays for the damages they caused and the EPA steps in if the responsible party cannot afford to fund all of the necessary clean-up measures. By doing so, these federal regulations make sure that there is no excuse for an oil spill to not be completely cleaned-up and compensated for. The Clean Water Act also played a critical role in the aftermath of the spills because its purpose is to protect the purity of the nation's waters and when they are contaminated by oil the responsible party acquires a fine for doing so (EPA 2020). Overall the legislation that played the most important roles in both spills were those that dealt with reactionary measures rather than proactive ones.

Section III: Impacts on Habitats

Similarities

Both the Deepwater Horizon and B120 spill had profound effects on the surrounding habitats, some with short-term implications and others with long-lasting effects. The two spills exposed beaches and coastal marshes to the harmful contaminants found in the oil that they were operating with. For instance, balls of tar reportedly washed onto the surrounding beaches for months after the spill was determined to be completely cleaned-up (National Wildlife Federation 2015). In both cases the spill was completely cleaned-up once no more oil was visible on the beaches, however what they did not account for was the thinner parts of oil seeping below the surface and remaining there for years to come. Any oil that seeped beneath the surface will take a long time to break down, which means any contaminants in the oil will have fatal effects on smaller organisms living there for a long time (NOAA & USFWS 2014). Both spills had the short- term effect of balls of tar washing ashore as well as the long- term effect of chemicals

leeching into the sand, on all of the beaches surrounding the spills. However, BP and Bouchard also had to clean-up the coastal marshes following the spill in addition to the beaches.

Since coastal marshes are extremely sensitive habitats, they were vulnerable to the oil spills as well as the clean-up methods that were used. Similar to how the thinner parts of oil seeped beneath the sand on beaches, the oil and all its contaminants leeched below the surfaces of the coastal marshes as well. In both cases, the marshes were responsible for a host of ecosystem functions that were severely affected by the smothering of oil that occurred quickly after the spills. Although it was crucial to remove the oil from the marshes as quickly as possible, response teams had to exercise caution considering how sensitive that habitat was to certain clean-up methods. Both the B120 and the Deepwater Horizon spill had the short-term effect of disrupting ecosystem functions and the long-term effects of putting harmful chemicals into the habitat of coastal marshes.

Differences

In terms of differences, the two spills varied in what type of habitats were effected and the severity of the impacts. For instance, the B120 spill happened in the northeastern part of the United States, whereas the Deepwater Horizon happened in the southeastern part, making for slight variations in the surrounding habitats. When the B120 spilled number six fuel oil into Buzzards Bay it spread to the tidal marshes, mudflats, beaches and rocky shorelines that surrounded it (NOAA & USFWS 2014). Whereas the Macondo well was thousands of feet below the waters' surface when it exploded, and the rough waters made it easier for the oil to mix into the water columns and reach the bottom of the ocean. Since Buzzards Bay does not have rough waters like the Gulf of Mexico, hardly any oil reached the bottom of the bay. In

addition to the types of habitats that were affected by the spills, Deepwater Horizon and B120 also differed in the extremity of the damage it caused surrounding habitats.

Although both spills caused a great deal of damage to the surrounding habitats, the impacts from the explosion of the Macondo well were much greater than those from the B120. For instance, the coastal marsh in Buzzards Bay was protected by the fact that it was only the beginning of the growing season so there was not much to destroy. Whereas the marsh surrounding the Gulf of Mexico accounts for 39% of the United States total coastal marsh and following the spill 490 miles of marsh was covered in oil (National Wildlife Federation 2015). The Deepwater Horizon spill exposed more the surrounding habitats to more oil than any other oil spill had in marine history, therefore its impact is going to be greater than that of Bouchard's B120 spill.

Section IV: Impact on Marine Life

Similarities

Marine Mammals

Both oil spills caused damage to surrounding habitats, which acted as shelter, breeding grounds and foraging areas for a variety of species. The Bouchard B120 and the Deepwater Horizon spills had negative impacts on marine mammals, birds, and sea turtles. Marine mammals in Buzzards Bay and the Gulf of Mexico suffered the same fate when they came into contact with the oil spilled. For instance, marine mammals often have to come to the surface for air and when they do so their skin and eyes are exposed to oil, resulting in irritations. This was the case for both oil spills, because marine mammals such as dolphins in the Gulf of Mexico or seals in Buzzards Bay suffered from skin and eye irritations when they were exposed to the spill ("Oil Spills at the Water Surface" 2020). However, marine mammals like dolphins and seals

were not the only mammals that were negatively impacted by oil spills, those with fur also suffered greatly. Marine mammals with fur contracted hypothermia when their coats became covered in oil and could no longer keep them warm (Helm and Costa et. al., 2014). This was the case for the B120 and Deepwater Horizon spills because it does not take much oil to coat their fur and make it difficult for them to perform functions necessary for survival. Unfortunately, marine mammals are not the only species that are negatively impacted by the two spills.

Marine Birds

In fact, marine birds use the shorelines of the Gulf of Mexico and Buzzards Bay as foraging and breeding grounds. Therefore, both the Deepwater Horizon and the B120 spills impaired many bird species from performing necessary functions of life. In both cases, when birds came into contact with oil their feathers became stuck together, making it difficult if not impossible for them to fly (Balmer 2014). Exposure to oil is especially fatal for the birds migrating along the Gulf Coast or Buzzards Bay, because if they could not fly then they could not get the food or water that they would need to survive. Although marine birds were directly affected by the spill, they were also indirectly affected when their food became physically smothered with oil and their breeding grounds were covered in oil (USFWS 2019). Therefore, both spills prevented birds from foraging, flying and reproducing which often had fatal results.

Sea Turtles

In addition to the negative impacts that the two spills had on marine birds, they also had adverse effects on sea turtles as well. Similar to marine mammals, when sea turtles went to the surface for air and came into contact with oil they suffered from skin irritations and infections (Wilson 2010). Therefore, sea turtles living in the Gulf of Mexico and Buzzards Bay were vulnerable to the external effects of oil exposure, but they also inhaled it causing internal

problems as well. In both the B120 and Deepwater Horizon spill, turtles inhaled oil which ended up coating their respiratory and digestive tracks (NOAA 2016). Therefore, making necessary functions of life such as breathing and eating difficult for sea turtles to perform. However, this was not the end of the suffering for sea turtles, because their nesting sites were also covered in oil making it nearly impossible for them reproduce. Not only did the Buzzards Bay and Deepwater Horizon spills have negative impacts on the current sea turtle population but it also grave implications for future populations as well.

Differences

Fish and Shellfish

The Gulf of Mexico is known for its large fishing industry, which depends on the quality and quantity of the fish living there. Therefore, when the largest oil spill in marine history occurred the fish species that inhabit the Gulf of Mexico were adversely effected. Buzzards Bay is better known for its shell fishing industry than they are for their fishing industry, therefore there were no reports on the health of the fish following the B120 spill. For instance, following the B120 spill, many shellfish beds in the bay were closed to shell fishermen, which impacted their income on a temporary basis (Shellfish Impacts 2020). Since the Buzzards Bay spill happened in April it was not peak tourism season for the northeastern part of the United States, therefore shellfish were safe to eat and beds were reopened by the time summer rolled around. However, this was quite the opposite for the Deepwater Horizon spill, because April is the beginning of peak tourism season in the southeastern part of the United States, and no one wanted to travel to the Gulf states to eat contaminated fish. Due to the large amount of oil that spilled in the Gulf of Mexico, fish were either dying, or not safe for humans to consume. Whereas in the case of Buzzards Bay the closing of shellfish beds was more of a precaution than

anything else, the shellfish did not get contaminated to the level and magnitude that the fish along the Gulf coast did. Since fish are not as important to local economies their condition post B120 spill was not reported and for that same reason the health of shellfish was not heavily studied following the Deepwater Horizon spill either.

Corals

One of the biggest differences between the two spills is that one happened in the northeast and the other happened in the southeast, therefore the species that can survive in one place cannot necessarily survive in the other place. This was the case for corals, they are not found in Buzzards Bay and therefore were not included in the report of negatively affected species. However, due to their sensitivity, the health of corals was a major concern following the Deepwater Horizon spill. In fact, a large percentage of all the corals found in the Gulf of Mexico were either severely damaged or died as a result of exposure to oil. This is because when the Macondo well exploded corals became physically smothered by oil, impairing their ability to reproduce, grow and develop as they normally would (NOAA 2013). Corals are an extremely important and vulnerable species, therefore losing such a significant percentage of them was bad news for the deep-water ecosystem, where many bottom dwellers relied on them for shelter. Not only did Buzzards Bay not have any corals, but it also did not lose a large portion of a population of a vital species following the B120 spill either. The damage and loss of corals in the Gulf of Mexico speaks to the magnitude of Deepwater Horizon as the biggest spill in marine history.

Section V: Impacts on Humans

Political Effects

Similarities

Both the Deepwater Horizon and the Bouchard B120 oil spills created policy windows that allowed for new legislation to be passed. Following Deepwater Horizon, lawmakers wanted to do everything in their power to make sure that a disaster of this magnitude would never happen again, therefore they were on board with the proposed oil spill legislation. These new policies were aimed at preventing another large oil spill from happening and they included the RESTORE 2011, Offshore Production and Safety 2011 and the Pioneers Act of 2012 (BSEE 2020). Although it was the largest oil spill in marine history, some good did come out of it because it drew law- makers' attention to holes in existing policies. Even though the Bouchard B120 was not nearly as large of a spill as Deepwater Horizon it also led to the creation of new oil spill regulations in Massachusetts. After the investigation into the Buzzards Bay spill revealed that negligence was the underlying cause of the incident and that the whole thing was entirely preventable had there been a stricter monitoring system in place. Therefore, the state of Massachusetts decided that they did not want a preventable accident like the Bouchard B120 spill to happen to their coastal communities again and decided to implement the Massachusetts Oil Spill Prevention Act of 2003 ("Massachusetts Oil Spill Act" 2011). Even though both oil spills caused a great deal of damage, they also provided both state and federal governments with the opportunity to create legislation that was more protective of its people and environments.

Differences

The biggest difference between the political implications of the two spills was that, one created new federal policies and the other created new state legislation. This is important because the Massachusetts Oil Spill Prevention Act of 2003 was a result of local communities pushing their elected officials to take action and make sure that the same mistake would not happen twice ("Massachusetts Oil Spill Prevention Act" 2011). Whereas the federal legislation

was not a response to public outcry but rather an effort to relieve pressure from the media. The Deepwater Horizon spill received a lot of media attention and for that reason policymakers had to act fast, in terms of implementing new laws. Since Massachusetts decided to create legislation that was stricter than what was mandated by the federal government, that meant that oil transportation into or out of Massachusetts would require more work for the Coast Guard, which they did not appreciate. The federal policies that followed the Deepwater Horizon spill were the result of the collaboration of many federal agencies including, the Coast Guard, therefore they are content with the new legislation.

Social Effects

Similarities

No matter the size or magnitude of the spill, it is going to have adverse impacts on the surrounding communities. In both cases, local municipalities were inundated with an influx of response teams, scientists, news reporters and researchers. Communities surrounding Buzzards Bay and the Gulf of Mexico could handle their share of tourists but they were not used to so many different people coming to their towns and staying for as long as they did. In fact, the media and clean-up crews tended to disrupt the natural flow of the community, making it difficult for residents to return to a sense of normalcy. Therefore, following both spills surrounding communities had to take some time to adjust to an increase in people and attention from outsiders. Even though in both cases the local communities were disrupted by all of the response and media crews coming in, but every community deals with it differently.

Differences

The Bouchard B120 brought residents together, whereas Deepwater Horizon drove them a part. Following the B120 spill, locals banded together to make sure that no accident like this

would ever happen to their communities again. The result of local residents working together was the creation and implementation of the Massachusetts Oil Spill Prevention Act of 2003, which increased the monitoring of oil barges coming into or leaving Massachusetts ("Massachusetts Oil Spill Prevention Act" 2011). However, it was quite the opposite situation for the Gulf state communities following the Deepwater Horizon spill, because individuals were too focused on the damage that it caused them personally to concern themselves with anyone else's. This difference in public sentiment can be attributed to the fact that the Deepwater Horizon spill cause much more damage than the B120 spill and thus made for more individual stressors as well. The damage from the B120 spill affected a much smaller area than Deepwater Horizon did, therefore it may have been easier for a smaller group of people to band together than it would be for a larger group of people spread out over a greater area.

Economic Effects

Similarities

The investigations into both spills determined that both BP and Bouchard Transportation were the responsible parties and therefore had to pay for clean-up operations. Since the polluter pays under CERCLA, both companies had to foot the clean-up bill, which did not include what they had to pay in claims and natural resource damages. As a result of oil coating the coastlines, both Buzzards Bay and the Gulf states lost a great deal of revenue from tourism, which both BP and Bouchard ended up compensating them for it to some degree. In addition to a decrease in tourism, both the shell fishing industry in Buzzards Bay and the fishing industry in the Gulf of Mexico were shut down for a few weeks until it was determined that they were safe to eat again. This led to a temporary loss of income for many locals, who worked in either of the industries and for the most part they were not paid for all that they lost. Not only did the spills have a

financial impact on the people that live and work in the area but it also destroyed many natural resources that BP and Bouchard ended up having to pay for as well. For instance, following both accidents a Natural Resource Damage Assessment was conducted and it determined how much economic damage the spill did to the natural resources in the area (NOAA and USFWS et. al., 2014). Although both responsible parties had to pay for clean-up and the damage they caused, they did not pay the same amount because they caused varying levels of damage.

Differences

The biggest economic difference between the two spills was how much each company paid for clean-up and overall damages. In fact, BP spent a total of $20.8 billion, with $5.5 billion for Clean Water Act penalties, $8.1 billion for damage to natural resources and $700 million for other damages (Mclean and Chapple 2015). Since it was the largest oil spill in marine history it is no surprise that they spent much more on clean-up and damage claims than Bouchard Transportation did. Whereas Bouchard Transportation paid a total of $37.2 million, $12 million of it went to residents of Mattapoisett and $11.45 million of it was given to all other affected communities to divide amongst themselves (Coast Guard 2011). The reason for this difference in cost is mainly due to the fact that the Deepwater Horizon spill was much larger in size than the Bouchard B120, therefore it caused more damage and thus BP had to pay more to clean it up. Perhaps the biggest difference between the Deepwater Horizon spill and the B120 is that BP had to pay the families of the eleven employees that lost their life as a result of the explosion. Although there were any legal disputes surrounding it, BP ended up paying a total of 18.7 billion to be split amongst the eleven families (Allen 2015). The spill in Buzzards Bay did not result in any fatalities and therefore they did not have to pay any families to try to compensate for the loss of their loved ones.

Health Effects

Similarities

After both spills, those who reported the highest rate of health issues from exposure to oil were those who were cleaning it up. The Deepwater Horizon and the Bouchard B120 required a significant amount of clean-up which meant that response crews spent long hours breathing in oil fumes (D'Andrea and Reddy 2018). Although those who physically removed the oil were dressed in protective gear, oil is made up of strong smelling chemicals that can have a nauseating effect even with the appropriate attire. Therefore, the those working to clean-up the oil in both spills suffered temporary discomfort in the form of nausea or headaches but nothing life-threatening ("Oil Spill Health Issues" 2020). In both cases, there were a few reports of individuals coming into contact with oil while trying to clean it up and the result was a skin rash that went away with time. Even though both spills were not fatal for those cleaning it up, it was fatal for others involved and that is what separates Deepwater Horizon spill from the Bouchard B120 spill.

Differences

Part of what makes Deepwater Horizon the worst spill in marine history is the fact that it killed eleven people and severely injured seventeen others. The fiery explosion happened so quickly that many of the Transocean workers were not able to get to a safe location before it happened. Therefore, the injuries sustained by the workers onboard the rig was much worse than skin rashes or headaches because they were surrounded by flames, inhaling smoke, and trying to find the fastest way off of the platform (King and Gibbins 2011). In addition to claiming the lives of eleven individuals and causing severe injuries to seventeen others, the Deepwater Horizon disaster took a large toll on the mental health of many people as well.

Due to the degree of destruction it caused the Deepwater Horizon created new stressors for many individuals who live and work in nearby communities. For instance, feelings of depression, anxiety and post-traumatic stress disorder intensified in the months following the spill for those whose income or safety depended on the Gulf of Mexico (Graham and Hale et. at., 2020). The increase in stress was especially high for those who worked in the fishing or tourism industry because their livelihood was directly affected by the spill. Since the B120 was not as large of a spill as Deepwater Horizon, it did not create new stressors for those who lived and worked in the nearby area. It was not peak tourism season for Buzzards Bay when the spill occurred so their tourism industry did not take as big of a hit as it did in the Gulf States following the Deepwater Horizon spill. When the Macondo well exploded, it created a lot of financial and social stressors for communities and individuals that did not exist prior to that night in April.

Aesthetic Effects

Similarities

Since Buzzards Bay and the Gulf of Mexico border coastal communities, the spills affected the way the public perceived the once popular vacation spots. In both cases beaches were shut down for clean-up, but even when they were reopened not many people wanted to vacation there (Oceana 2020). For instance, media coverage of both incidents show oil sheens in the water and balls of tar washing ashore, both of which are not particularly attractive to tourists. There was this public sentiment that even though the oil had been cleaned up it was not really gone and therefore people were opting to vacation elsewhere rather than swim with oil. Therefore, Buzzards Bay and the Gulf of Mexico were no longer known for their pristine beaches and crystal clear waters because the media had created this idea that oil coated shorelines were permanent condition.

Differences

When the Macondo well exploded, it garnered national attention and the whole country was made aware of the oil that had washed onto the beaches along the Gulf of Mexico. Therefore, there was no way to hide the fact that their beaches and waters had become tainted with oil and were no longer safe for humans. The Gulf states worked hard to recreate the image of pristine beaches and sparkling blue waters in order to bring tourists back. The media coverage of the Deepwater Horizon spill focused more on rebuilding and restoring the Gulf of Mexico to the vacation hotspot that it used to be (Oceana 2020). Whereas the Bouchard B120 made local news but it was not big enough to become a national news story. Therefore, the views surrounding Buzzards Bay were tainted for those who lived nearby, but this sentiment was not felt nationwide because it was not reported nationally. The aesthetic image of the Gulf of Mexico was much more damaged than Buzzards Bay was and much of that can be attributed to the amount of media attention it received.

Section VI: Conclusion

Summary Comparison

Overall both spills caused a great deal of damage to the people and marine life living in Buzzards Bay and the Gulf of Mexico, but there is no disputing that the Deepwater Horizon spill caused more destruction than the Bouchard B120. Some of these differences in damages can be attributed to either the organizations involved, location of the spill or the magnitude of the spill. For instance, the sheer size of the Deepwater Horizon made it the largest oil spill in marine history and therefore caused more harm to the people and marine life along the Gulf of Mexico than any other spill before that. If the Macondo well had dumped 4.9 million barrels of oil into Buzzards Bay it would have been equally as destructive, if not more because it would have been

closer to the shore than it was in the Gulf of Mexico (Pallardy 2010). Even though, the Deepwater Horizon spill was the biggest in marine history, BP is a large international company that had the man-power and money to handle clean-up efforts. Whereas Bouchard Transportation is a much smaller family-owned company, so removing 98,000 of gallons of oil from Buzzards Bay was difficult for them (NOAA 2019). Therefore, it is good thing that the Deepwater Horizon spill was the responsibility of a company as large and powerful as BP because Bouchard Transportation Company would not have been able to stay in business after cleaning up a spill of that magnitude.

In regards to the role of policy changes overtime the Bouchard B120 spill happened in 2003 and one of the biggest pieces of legislation to come out as a result of it was the Tank and Vessel Facility Response Plans 2004. The goal of this policy was to make sure that any individual who owned, operated or worked on a vessel or a tank knew exactly what they had to do in the case of a spill or leak. This was because following a Coast Guard investigation into the Bouchard B120, it was discovered that the current policy in place lacked the inclusion of critical details from response plans (Coast Guard 2011). Therefore, the Tank and Vessel Facility Response Plans 2004 was implemented to ensure that each vessel or tank had a detailed guide that described exactly what needed to be done in case of an emergency. However, the Deepwater Horizon spill happened six years later and following an investigation it was found that the workers on board during the time of the explosion lacked the appropriate training necessary to respond to a potential well-blowout (US Coast Guard 2010). Therefore, with new legislation and adequate time to integrate new rules into their response plan, BP and Transocean still neglected to do so. It is clear that no matter how big or powerful the organization is, the current legislation lacks the ability to enforce the preventative measures in place.

One of the biggest differences between the Deepwater Horizon Spill and the Bouchard B120 is that even though there were fewer and more lenient oil spill policies in 2003, the Deepwater Horizon still caused more damage than the Bouchard B120. Therefore, the existence of new policies did not prevent the Deepwater Horizon from happening but that does not mean that they are not appropriate policies. For instance, the Deepwater Horizon exposed The Tank and Vessel Facility Response Plans of 2004 to be good on paper but poorly enforced. This was also the case for the Coast Guard Marine Transportation Act of 2006 because its overall goal was to make sure that when it came to response plans every individual involved would know what their responsibilities were, however that was not true for those aboard the Deepwater Horizon oil rig. Since the Transocean employees lacked certain aspects of training they were in direct violation of both the Tank and Vessel Facility Response Plans as well as the Coast Guard Marine Transportation Act of 2006. However, the issue with these laws were that both had no penalty unless there was an accident and an investigation into it found that the responsible party was not in compliance with all parts of the law. Therefore, in the next chapter I will explore possible policy recommendations that take a more proactive approach to oil spill legislation.

Chapter VI: Summary & Conclusion

Introduction

This chapter is a summary of my findings from the two case studies in the previous chapters. In addition to providing a short summary of the effectiveness of current oil spill regulations, this chapter will also include recommendations for future policy. Recommendations

for new legislation will be made on what seems to be weaknesses in current policy with the hope of diminishing negative impacts and preventing future disasters.

Section I: Short Summary

Summary

The Bouchard B120 and the Deepwater Horizon oil spills were used as case studies in order to evaluate the effectiveness of current legislation in protecting the environment and those that live in it. A chapter was dedicated to each spill in which their impact on surrounding habitats, marine life and humans were carefully examined. The aftermath of both spills was compared to the legislation that was in place at the time and the new policies that were created as a result of the spill. However, in order to accurately evaluate the effectiveness of the oil spill policies in place at the time of the spill, I had to take into consideration the similarities and differences in between the Deepwater Horizon and the Bouchard B120 were taken into consideration. For instance, the Deepwater Horizon spill caused more damage than the Bouchard B120 but after comparing the two spills it seems that both spills could have been prevented had the legislation been appropriately enforced. The Deepwater Horizon and the Bouchard B120 were the result of negligence, but neither would have happened to the extent that they did had the federal government not been negligent in their enforcement of oil spill policies.

Although the legislation in place at the time of both spills lacked appropriate enforcement, it was not a complete failure. For instance, the Tank Vessel and Facility Response Plans 2004, the Clean Water Act 1972, the Coast Guard and Maritime Transportation Act 2006, Oil Spill Liability Trust Fund 1986, and the Oil Pollution Act 1990 played a critical role in making sure that both spills were appropriately cleaned-up. These policies provided the basis for future oil spill legislation because it set the precedent that the polluter pays for the damages that

they cause and that the oil industry needs to be held more accountable for their actions. The majority of these laws had the right idea in terms of setting guidelines for how a spill should be cleaned-up, it just lacked the ability to enforce preventative actions. Without these policies in place it is likely that the spills would have caused more damage because there would be nothing to hold the responsible party accountable for proper clean-up procedures.

Section II: Recommendations for Policy

The current oil spill legislation takes a reactive approach to incurring financial penalties, which means usually a spill has to occur in order for a company to be held accountable for their actions. Thus, the emphasis is not really on prevention but rather it is on cleaning the spill up. Following a spill the Coast Guard conducts an investigation into everything that the responsible party did up until that point. This investigation avoids having problems swept under the rug or missed. In order to support prevention, it is recommended that an amendment to the Tank and Vessel Facility Response Plans of 2004, be made which allows the Coast Guard to do surprise checks on the response plans making sure that they are in compliance with the law. If the plan is missing any critical information that has been implemented for two years then the company will incur a level one penalty. They will then be given thirty days to make these changes and if they are still not in compliance with the law after thirty days the fine will increase to a level two. All of these violations would be kept on record and in an event of a spill the Coast Guard and other entities will look through the responsible party's history to determine whether or not everything was done in order to prevent the spill from happening. The more violations that are found in their file, the higher the penalty will be, in order to demonstrate to the oil industry that what they do to prevent oil spills is just as important as what they do to clean them up.

The goal of this amendment is to shift the mindset of the oil industry and federal government from one that is reactionary to one that is proactive. Furthermore, due to the magnitude of damage and destruction that oil spills can cause, safety should always be the number one priority when it comes to making decisions regarding the transportation or exploration of oil. One of the main reasons companies opt for the less safe version is because the safest option is often the more-costly option as well, making it difficult to encourage companies to do the right thing. Therefore, another recommendation would be to create a subsidy program for smaller companies that cannot afford to install the safest well-casing. This way the US federal government can promote the exploration and transportation of oil, while also protecting its nation's habitats, wildlife and people

The objective of this proposal would not only be to encourage safe oil exploration practices but it would also promote the development of safer technology as well. By subsidizing safer technology and equipment necessary for any activities involving the exploration of oil, companies have no excuse for not doing everything they can in order to prevent an oil spill. It is hoped is that with a policy in place that holds the government, and the oil industry to higher standards, eventually there will be no more oil spills that happen as a result of negligence.

In order for any of these recommendations to be effective in accomplishing their goals, they need to be adequately enforced. One of the biggest issues with oil spill legislation is not that it lacks certain rules, but rather it is just poorly enforced or not enforced at all. It is difficult to enforce preventative actions equally to all companies that participate in the transportation or exploration of oil, because there are hundreds operating at any given time. In addition to there being hundreds of companies, they all vary in size and financial capabilities. To be sensitive to financial issues, a classification system could be created in which each year every company

involved in the exploration or transportation of oil must register as a small, medium or large company. This classification process would be based on how many employees they have, whether they only operate in the United States or if they have wells in other countries as well, and whether their company transports oil or drills wells and their income and company worth. Penalties would be determined based on these categories in order to equally enforce all oil spill policies equally.

This system would allow enforcement agencies such as the Coast Guard, to enforce the law without putting any company out of business. In order to encourage companies to submit their registration on time, the Coast Guard, the Bureau of Ocean Energy Management and the Bureau of Safety and Environmental Enforcement will suspend their license to operate until they have submitted their classification registration. This could be a helpful incentive and since there are three enforcement agencies and three levels of proposed classification, each agency will be assigned one level. For instance, the Coast Guard could be in charge of the large group, the Bureau of Ocean Energy Management could take the medium group and the Bureau of Safety and Environmental Enforcement could be responsible for the smaller group. The goal of having each agency be responsible for one group, is that they would be able to monitor each company within their group closely. Therefore, with a stronger enforcement system in place, each agency will have the ability to make sure that all companies within their assigned group is in compliance with all oil spill legislation, including the proposed preventative measures.

Federal government rollbacks also need to be addressed. The rollbacks are tricky because although it promotes the domestic exploration and production of oil, it often does so with little to no regard for safety. This is where oil spill legislation becomes a partisan issue because every four years, regulations could be created or rolled back making progress difficult. Oil spill

legislation does not have to put political, social, economic or environmental groups at odds with one another. Bi-partisan solutions, crossing over all these groups needs to be promoted. In addition, good behavior and compliance of oil spill regulation should be economically rewarded, thus providing an economic incentive for companies to take all the necessary precautions outlined in the laws. In order to make this feasible, the government could provide economic incentive just for the first five years of new oil spill policy. This way the oil industry has time to learn what is expected of them and will receive confirmation in the form of financial compensation that they are in compliance with the new policies. This should encourage domestic production of oil as well as guaranteeing the protection of the environment.

In order to make these changes, the public needs to be better educated and has to demand better safety as well as environmental and social protection. Transparent industrial practices and enforcement with economic incentives would also be helpful improvements.

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