

## **OFFSHORE DRILLING AND POTENTIAL IMPACTS ON ALASKA**

Marcella K. DeHart, Sydney K. Egbert, Joshua A. Farnsley, Elijah B. Hall , Abraham J. Meyer

Wasilla High School

Team Name

Tactile Cnidarians

Roger R. Saft, Ph.D. Coach

[roger.saft@matsuk12.us](mailto:roger.saft@matsuk12.us)

Author Point of Contact Marcella K. DeHart

[Marcella\\_14.smiles@yahoo.com](mailto:Marcella_14.smiles@yahoo.com)

**This paper was written as part of the Alaska Ocean Sciences Bowl high school competition.**  
**The conclusions in this report are solely those of the student authors.**

## **OFFSHORE DRILLING AND POTENTIAL IMPACTS ON ALASKA**

Marcella K. DeHart, Sydney K. Egbert, Joshua A. Farnsley,  
Elijah B. Hall, and Abraham J. Meyer

### Abstract

The topic of developing oil prospects in Alaska by offshore drilling concerns of damaging the Arctic environment and the marine life in many ways. The consequences of an oil spill are waters off Alaska are not only financial but oceanic. The offshore drilling affects wildlife directly. The oil platforms when abandoned or sunken rigs on the other hand become marine life habitat. Invasive species introduction and spread are another potential problem with increased offshore oil drilling or production. Species foreign to local areas may be spread by ballast water, equipment transported from elsewhere and from owners of pet fish or algae. Pros of offshore drilling are cheaper gas prices, and reduced national debt and being indebted to other countries. Offshore petroleum endeavors can account for many jobs adding to local economies. Cons are that it may take years plus lots of money to clean up spills of hydrocarbons and resultant debris. And, returning cold weather marine areas to pre-spill conditions is not likely to occur. The Wasilla High School team concluded increased offshore drilling or exploration is not currently desirable. The risks outweigh the financial potential for gain.

## **OFFSHORE DRILLING AND POTENTIAL IMPACTS ON ALASKA**

Marcella K. DeHart, Sydney K. Egbert, Joshua A. Farnsley, Elijah B. Hall, Abraham J. Meyer

### **Developing oil prospects in Alaska**

The Offshore Drilling Problem. Offshore oil drilling is an oil extraction technique which allows oil companies to access deposits of oil buried under the ocean floor. Most typically, offshore drilling sites are situated over the continental shelf, although advancements in drilling technology have made platforms even further out to sea economically and physically feasible. Many people are opposed to offshore oil drilling, due to concerns about its impact on the environment, and the unaesthetic appearance of oil rigs off the coastline. Drilling in the Arctic may be less beneficial than drilling elsewhere due to the additional inherent hazards of cold weather and sea ice. Cleanup of a spill in the Arctic may be more difficult or impossible also due to the freezing conditions. Offshore drilling for crude oil or natural gas in Arctic conditions has many inherent risks: immediate spills of the petroleum product, transport and release of invasive plant and animal species of drilling equipment, damage to wildlife, and discharge of trash and other debris.

Lots of things can go wrong at an oil rig. Extracting oil from the seafloor is dangerous for the environment if something goes wrong. The waste produced by offshore drilling facilities can contain toxic metals like mercury, cadmium, and lead. Each individual oil well creates thousands of gallons of toxic waste, which can go into the ocean. Wells also expel "produced water," which is contaminated by toxins like benzene, lead, arsenic, naphthalene, toluene, zinc, radium, and petroleum hydrocarbons. In addition to polluting the oceans, offshore oil wells also pollute the air, releasing carcinogens that cause respiratory problems. The environmental effects of offshore

drilling are primarily caused by pollution related to poorly maintained and operated rigs. Oil spills around rigs are common, especially at the seafloor, where drilling may stimulate seepage, and heavy metal pollution can also occur. Some people also feel that offshore oil drilling disrupts and confuses marine life, although ironically rigs can also provide shelter to seabirds and fish.

Offshore drilling has an especially harsh impact on the marine ecosystems of the arctic.

According to the Oceana Coalition, the increasing number of oil operations in the arctic may lead to an oil spill. While oil spills are already extremely harmful to oceans, the icy conditions of the arctic would make cleaning them up -- which is already a difficult task - close to impossible.

Already in the arctic, icebreakers, drill rigs, and seismic surveys create large amounts of noise, which disrupt the migratory patterns of bowhead whales; whales that many arctic communities depend on for survival. The constant shifting of the pack ice makes it difficult as well and may even cause pipes breakage ([.http://www.naturalgas.org/naturalgas/extraction\\_offshore.asp](http://www.naturalgas.org/naturalgas/extraction_offshore.asp)).

Offshore drilling can have derogatory effects on people. Recovery attempts are an economic disaster. The spills can impact local fisheries and sea food industries . As the consumption of energy rises onshore petroleum reserves decrease, efforts to find more crude oil and natural reserves will increase. Increased demand may put more pressure on allowing development of offshore oil under Arctic conditions.

[http://www.naturalgas.org/naturalgas/extraction\\_offshore.asp](http://www.naturalgas.org/naturalgas/extraction_offshore.asp)).

2013 marks the cessation of drilling in Alaska due to a Federal moratorium. This can allow time for development of better methods that have less potential to degrade the marine environment.

A reason for the drilling rigs largely located in the northern region of Alaska is due to a small resource potential in the southern Alaska as shown in figure 1. While the northern region of Alaska may have higher resource potential. An example of a drilling rig that is going to be drilling on the northern coast would be the Point Thomson Project by Exxon Mobil (see figure 1). Its location coastline of the Beaufort Sea where it is owned by both Exxon Mobil and British Petroleum. It will have an airstrip, a pier, and camp along with other things. There will be installing another 22-mile onto the pipeline that will go to Point Thomson. Figure 2 shows one of the beginning stages of Point Thomson. <http://www.hdrinc.com/portfolio/point-thomson-third-party-eis>

Consequences of an oil spill. One consequence of an oil spill is the money lost from the discharged product. Different types of discharged products can have different potential impacts on marine species. ([http://www.naturalgas.org/naturalgas/extraction\\_offshore.asp](http://www.naturalgas.org/naturalgas/extraction_offshore.asp)).

The offshore drilling make various forms of pollution which harm the marine life wildlife. Drilling operations result in many different kinds of waste. Many of these can have negative impact on species.

Many years ago, in 1869, offshore drilling is thought to have started. Since then, the offshore drill production, in areas like the Gulf of Mexico, has found major deposits of crude oil and natural gas. Sometimes legs are extended to the sea floor. Others are fixed structures that rest on the sea floor. [http://www.naturalgas.org/naturalgas/extraction\\_offshore.asp](http://www.naturalgas.org/naturalgas/extraction_offshore.asp).

Damage to Wildlife. Wildlife can be harmed by the external coating of oil and by a toxic impact of the petroleum itself.

Seismic disturbances can harm fish and shellfish. The waves are created by air blast of enough magnitude to allow the visualization of the sea floor where drilling is anticipated. This wave can affect the marine life close enough to the blast by affecting sound and vibration sensors.

Marine life like dolphins and whales rely on their hearing to communicate which is their way of life. The ExxonMobil company has had problems with whales beached themselves.

(<http://www.adn.com/2013/09/14/3074475/compass-exxonmobil-makes-progress.html>) .

Offshore petroleum and hydrocarbon operations produce large amounts of waste potentially capable of harming benthic communities. Fish have often been killed by discharged oil. (see figure 3). Offshore drilling operations may affect seafood quality .

Hazards of Towing Offshore Drilling Equipment. A jack up drilling rig went aground according to <http://www.globalpost.com>. The 266-foot conical drill barge first broke free while being towed port in Seattle after a drilling season off the coast of Alaska. The tow vessel lost all of the four engines, and the drill rig became adrift. A line to tow vessel and winds to 70 mph and 40 foot resulted in the release and grounding of the drill rig Kulluk on an uninhabited Western Alaskan island. The environmental concern was potential release of fuel from the drilling vessel.

<http://articles.latimes.com/2013/jan/01/nation/la-na-nn-shell-kulluk-grounded-20130101>

This incident points out that even routine transport of drilling equipment in Alaska is risk and can result in environmental damage. Research to find better ways to transport equipment in the Arctic might be productive in preventing future problems of this nature.

A spill of the petroleum products on board would have had a major impact on wildlife.

A lot of progress has been made since the start of offshore drilling. Perhaps with every disaster that happens with offshore drilling something is learned from it. Whether they find a way to make it safer or they know they can't repeat what they did so they don't do it anymore. Making it safe for the marine life that comes across it. Refer to figure 4 as an example of a device we use today to clean up oil spills.

Invasive Species Brought in on Oil Drilling Equipment. Invasive species (as seen in figure 5) are species that are not native for an ecosystem. Their introduction is can cause economic harm, injure, result in human health problems and cause environmental deterioration. Salt water invasive species are a problem throughout the world. Transporting offshore drilling equipment can spread foreign species of plants or animals. Increased offshore drilling or increasing other industries requiring transportation of equipment from elsewhere can result in transport of invasive species. Pet fish and algae can be associated this problem when they are released into natural waters by their owners. In the state of Alaska the situation might be urgent as there are few invasive organisms. It is time for management to prevent introduction of invasive species.

[http://www.uaf.edu/files/ces/cnipm/otherresources/8th\\_annual/Schrader.pdf](http://www.uaf.edu/files/ces/cnipm/otherresources/8th_annual/Schrader.pdf)<http://www.fs.fed.us/outernet/r10/ro/policy-reports/wfew/R10InvasiveSpeciesStrategy061205.pdf>

Executive Order 13112. 1999 Feb 3. Invasive Species.

<<http://www.invasivespecies.gov/laws/execorder.shtml>>.

The methods used to control foreign species are excluding them from an area, biological and chemical control as well as mechanical control. Ballast water from ships and drill rigs is an area of concern for introduction or spread of invasive species.

[http://www.uaf.edu/files/ces/cnipm/otherresources/8th\\_annual/Schrader.pdf](http://www.uaf.edu/files/ces/cnipm/otherresources/8th_annual/Schrader.pdf)<http://www.fs.fed.us/outernet/r10/ro/policy-reports/wfew/R10InvasiveSpeciesStrategy061205.pdf>

In 2010, Elodea nutallii was discovered growing in a Chena, Alaska slough. The Elodea has the potential to out compete native flora. The most likely source was introductions from pet fish tanks (see figure 5). <http://www.uaf.edu/ces/aiswg/>

Sunken oil rigs as habitat. Both pro-environmental groups and the oil industry have supported using no-longer needed drilling platforms as fish habitat. The advantages of increased marine life habitat are numerous. Such efforts may remediate some damage caused by the oil development operations ( see figures 6 and 7) <http://news.discovery.com/earth/oceans/reef-or-hazard-the-fate-of-sunken-oil-rigs-131019.htm>).

**Pros.** Positive aspects of offshore drilling in Alaska and the rest of the country are gains in U.S. oil independence. Cheaper gas prices may result due to mass oil production. Also more government income can result leading to lower taxes for the rest of us. Less debt to foreign countries might also be a result. Increased national income should happen. Locally state benefits would end in more jobs for people causing money to be spent locally (see figure 8). In short, a better economy is the likely product of increase off shore drilling.

**Cons.** Countering listed pros for offshore drilling in Alaskan waters or further offshore is increased overall pollution. Many environmental hazards can result as well as there being environmental and fish habitat issues for commercial fisherman (see figure 9). Effects on marine species food chains may end up if oil spill causes possible mass destruction of species (see figure 10). The oil platforms attract seabirds which can collide with the rig causing death or injury. Also, the oil rigs dump large amounts of drilling fluid and metal shavings made of lead or chromium into the marine environments.

**Needs.** Vessels, oil drilling rigs, and other equipments ought to be built to last through the weather and oceanic forces possibly encountered. Oil spill response equipment must be staged in Alaska for rapid deployment. Also, research needs to take place on developing methods to remove oil from sea ice and form under ice.

**Critical habitat.** President Obama's administration is designating 187,000 square miles of Alaska as a "critical habitat" for the polar bears. This can place more restrictions on future exploration and drilling operations in Alaska but also may protect the polar bears from harm. (<http://www.latimegblogs.latimeg.com/greenspace/2010/09/interior-secretary-ken-salazar-offshore-oil-drilling-arctic-poll.html>).

**Summary.** Offshore drilling started in 1869 or 144 years and is likely to continue. We need to develop techniques to extract crude oil from offshore safely under normal and Arctic conditions. Alaska is a well-positioned to manage a threat of Invasive Species, but determination and dedication of resources and personnel are very crucial. 21

Of how invasive species are introduced and then spread give clear indication that a Important approach and a high level of cooperation within and outside of the agency are needed. Implementing this program with our partners now, before invasive species become well established, may allow us to avoid the situation where invasive species are Relative to invasive species potentially imported with drilling equipment, Alaska should use the Alaska Region Invasive Species Program and increase the investments in Invasive species control. Offshore drilling is a dangerous process with many possible environmental and wildlife consequences. The process gives jobs to Americans but reduces wildlife, and oil spills resulting can damage entire ecosystems. Expansion of drilling under Arctic conditions needs to be considered relative to risks. With the effect of offshore drilling,

we are left with the argument that offshore drilling is a problem. But with everything there is a pro and a con position. And, we will find solutions for the cons. Even though the offshore drilling methods are currently less than desirable at the moment relative to nature disasters such as seismic waves, we will develop new and better methods. This will change things for the better. Oil rigs and platforms are good and bad relative to invasive species and marine life. When they are towed from other states, countries and nations, they transport foreign species. When they remain in their location for extended periods of time, they create or expand marine habitat and result in increased number of marine species.

Conclusion. Offshore drilling is both beneficial and dangerous at the same time. Further drilling in Arctic waters may ultimately not be beneficial. One has to ask, "Is it really worth it?". We have come a little way from where our knowledge was previously. With every oil spill we find a way to solve the problem. Perhaps this paper will open the eyes of some people to the pros and cons of offshore drilling.

## Figures

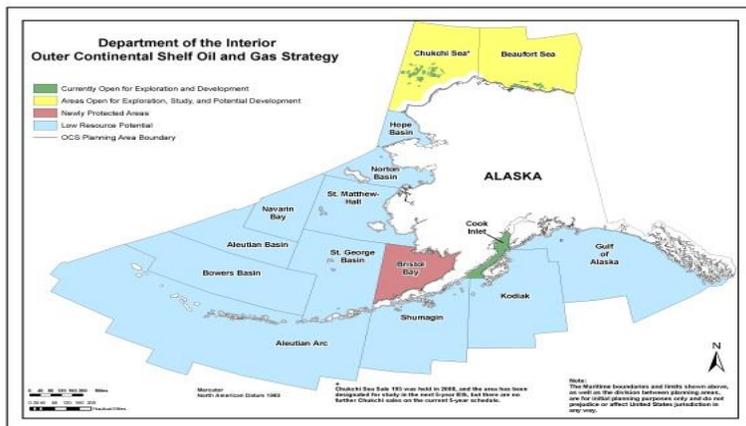


Figure 1. . Federal oil plan for Alaska. <http://www.cbsnews.com/news/obamas-offshore-drilling-plan-conoco-shell-look-north-to-alaska-and-smile/>



Figure 2. Point Thomson project drill site. <http://www.hdrinc.com/portfolio/point-thomson-third-party-eis>



Figure 3.

A dead marine fish from the Gulf of Mexico washes up on a local beach after the recent oil platform explosion. <http://www.Jonbowermaster.com/blog/2012/05/two--years-later-bp-spill-still-killing-gulf-marine-life>



Figure 4. **Cleanup after an oil spill off the coast of Californian. The oils spill skirts border the spill so it does not affect the marine life.**

<http://articles.latimes.com/2013/jan/01/nation/la-na-nn-shell-kulluk-grounded-20130101>



Figure 5. Elodea nutallii in Chena, Alaska slough competing against native flora.

<http://www.uaf.edu/ces/aiswg/>



Figure 6. Decommissioned offshore oil platforms that are sunken or otherwise may stimulate marine life by providing habitat for expanded colonization.

<http://news.discovery.com/earth/oceans/reef-or-hazard-the-fate-of-sunken-oil-rigs-131019.htm>



Figure 7. Oil platforms and drilling rigs that have been abandoned have resulted at times in rich colonies of epiphytic organisms that can also promote increased fish presence.

<http://www.shell.us/aboutshell/projects-locations/gulf-of-mexico-deepwater.html>



Figure 8. The recent Federal ban on offshore drilling was met with protest from people whose livelihoods depended upon the jobs.

<http://www.csmonitor.com/layout/set/rl4/OSA/politics?2010/0727/offshore-drilling-moratorium-good-for-th-Gulf-bad-for-the-economy>.



Figure 9. Plastic and other trash waste if discharged from oil platforms can cause environmental and marine life damage. [www.backyardxGapes.com/blog/tac/garbage\\_island](http://www.backyardxGapes.com/blog/tac/garbage_island)



Figure 10. Polar bear populations are ones that stand to be affected by increase offshore drill or oil extraction. <http://www.latimegblogs.latimeg.com/greenspace/2010/09/interior-secretary-ken-salazar-offshore-oil-drilling-arctic-poll.html>

## Resources

<http://www.latimegblogs.latimeg.com/greenspace/2010/09/interior-secretary-ken-salazar-offshore-oil-drilling-arctic-poll.html>

<http://www.backyardxcapes.com/blog/tag/garbage-island>

<http://www.csmonitor.com/layout/set/r14/USA/politics/2010/0727/offshore-drilling-moritorium-good-for-the-Gulf-bad-for-the-economy>

[http://wiki.answers.com/Q/What\\_are\\_the\\_pros\\_and\\_cons\\_of\\_offshore\\_drilling\\_in\\_the\\_US](http://wiki.answers.com/Q/What_are_the_pros_and_cons_of_offshore_drilling_in_the_US)

<http://myoildrilling.info/pros-and-cons-of-offshore-drilling/>

<http://www.buzzle.com/articles/pros-and-cons-of-offshore-drilling.html>

[http://www.ehow.com/facts\\_5019434\\_pros-cons-offshore-oil-drilling.html](http://www.ehow.com/facts_5019434_pros-cons-offshore-oil-drilling.html)

<http://www.Jonbowermaster.com/blog/2012/05/two--years-later-bp-spill-stil-killing-gulf-marine-life>

<http://www.globalpost.com>

[http://eol.org/info/invasive\\_species?gclid=CJ2f1KnZvLoCFeRxQgodS1kAkA](http://eol.org/info/invasive_species?gclid=CJ2f1KnZvLoCFeRxQgodS1kAkA)

<http://www.shell.us/aboutshell/projects-locations/gulf-of-mexico-deepwater.html>

<http://news.discovery.com/earth/oceans/reef-or-hazard-the-fate-of-sunken-oil-rigs-131019.htm>  
advocated for some decommissioned offshore

[http://www.blm.gov/ak/st/en/prog/invasive\\_species/Invasive\\_Animals.html](http://www.blm.gov/ak/st/en/prog/invasive_species/Invasive_Animals.html)

<http://news.nationalgeographic.com/news/energy/2011/04/110418-future-of-offshore-drilling/>

[http://topics.nytimes.com/top/reference/timestopics/subjects/o/offshore\\_drilling\\_and\\_exploration](http://topics.nytimes.com/top/reference/timestopics/subjects/o/offshore_drilling_and_exploration)

<http://oilandgas-investments.com/2012/investing/offshore-drilling-exploration-investing/>

<http://www.washingtonpost.com/wp-dyn/content/article/2010/03/31/AR2010033100024.html>

<http://news.bbc.co.uk/2/hi/americas/7460767.stm>

[http://usatoday30.usatoday.com/money/industries/energy/2008-07-13-offshore-drilling\\_N.htm](http://usatoday30.usatoday.com/money/industries/energy/2008-07-13-offshore-drilling_N.htm)

<http://www.offshore-mag.com/index.html>

[http://www.ehow.com/about\\_5447704\\_offshore-drilling-affect-ocean.html#ixzz2l1QvPGwe](http://www.ehow.com/about_5447704_offshore-drilling-affect-ocean.html#ixzz2l1QvPGwe)

<http://www.lamor.com/2013/03/6736/>

<http://articles.latimes.com/2013/jan/01/nation/la-na-nn-shell-kulluk-grounded-20130101>

<http://www.adn.com/2013/09/14/3074475/compass-exxonmobil-makes-progress.html>

<http://www.worldviewofglobalwarming.org/shelldrillrig/index.php>

[http://www.cbsnews.com/8301-505123\\_162-43041498/obamas-offshore-drilling-plan-conoco-shell-look-north-to-alaska-and-smile/](http://www.cbsnews.com/8301-505123_162-43041498/obamas-offshore-drilling-plan-conoco-shell-look-north-to-alaska-and-smile/)

[http://www.naturalgas.org/naturalgas/extraction\\_offshore.asp](http://www.naturalgas.org/naturalgas/extraction_offshore.asp)

<http://articles.latimes.com/2013/jan/01/nation/la-na-nn-shell-kulluk-grounded-20130101>

<http://oceana.org/en/our-work/stop-ocean-pollution/oil-pollution/learn-act/impacts-of-offshore-drilling>

[http://www.uaf.edu/files/ces/cnipm/otherresources/8th\\_annual/Schrader.pdf](http://www.uaf.edu/files/ces/cnipm/otherresources/8th_annual/Schrader.pdf)

[http://www.uaf.edu/files/ces/cnipm/otherresources/8th\\_annual/Schrader.pdf](http://www.uaf.edu/files/ces/cnipm/otherresources/8th_annual/Schrader.pdf)<http://www.fs.fed.us/outernet/r10/ro/policy-reports/wfew/R10InvasiveSpeciesStrategy061205.pdf>

Executive Order 13112. 1999 Feb 3. Invasive Species.

<<http://www.invasivespecies.gov/laws/execorder.shtml>>.

USDA Forest Service. 2004a. October 8. National Strategy and Implementation Plan for Invasive Species Management.

<[http://www.fs.fed.us/rangelands/ftp/invasives/documents/Final\\_National\\_Strategy\\_100804.pdf](http://www.fs.fed.us/rangelands/ftp/invasives/documents/Final_National_Strategy_100804.pdf)>.

USDA Forest Service. 2004b. Strategic Plan for Fiscal Years 2004-2008.

<[http://fsweb/pas/documents/R10\\_Strategic\\_Business\\_Plan\\_version\\_2\\_May\\_2005.pdf](http://fsweb/pas/documents/R10_Strategic_Business_Plan_version_2_May_2005.pdf)>.

USDA Forest Service. 2005a. Alaska Region Strategic Business Plan for Fiscal Years 2006-2008.

<[http://fsweb/pas/documents/R10\\_Strategic\\_Business\\_Plan\\_version\\_2\\_May\\_2005.pdf](http://fsweb/pas/documents/R10_Strategic_Business_Plan_version_2_May_2005.pdf)>.

USDA Forest Service. 2005b. Alaska Region Invasive Plant Strategy.

<[http://fsweb/staffs/wfew/index\\_wfew.shtml](http://fsweb/staffs/wfew/index_wfew.shtml)>.

USDA Forest Service. 2005c. Assessment of Invasive Species in Alaska and its National Forests. <[http://fsweb/staffs/wfew/index\\_wfew.shtml](http://fsweb/staffs/wfew/index_wfew.shtml)>.

USDA Forest Service. 2005. Chugach National Forest Invasive Plant Management Plan.

<[http://fsweb.chugach.r10.fs.fed.us/staff/res/weed\\_plan/chugach\\_invasive\\_plant\\_plan\\_012705.pdf](http://fsweb.chugach.r10.fs.fed.us/staff/res/weed_plan/chugach_invasive_plant_plan_012705.pdf)>.

USDA Forest Service Tongass National Forest Invasive Plant Management Plan.