

**Unavoidable Adverse Impacts that Warrant Compensatory Mitigation**  
*Northeastern National Petroleum Reserve in Alaska – Regional Mitigation Strategy*

**INTRODUCTION**

This paper summarizes the environmental and sociocultural impacts of oil and gas development within the geographic scope and under the reasonably foreseeable development scenario (RFDS) (BLM 2016) of the Northeastern National Petroleum Reserve in Alaska (NPR-A) Regional Mitigation Strategy (RMS). This paper also discusses how unavoidable adverse impacts are identified as potentially warranting compensatory mitigation in the RMS. The summary of impacts is based on the impact analyses from the NPR-A Final Integrated Activity Plan/Environmental Impact Statement (IAP/FEIS) (BLM 2012) and the Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth One (GMT1) Development Project - Final Supplemental Environmental Impact Statement (GMT1 FSEIS; BLM 2014).

Detailed assessments of the impacts of oil and gas development in the NPR-A are provided in the IAP/FEIS and GMT1 FSEIS. These EISs identified direct, indirect, cumulative, and unavoidable adverse (residual) impacts from oil and gas development in the NPR-A, including effects on:

- The **physical environment**, including air quality, surface and groundwater resources and water quality, soils resources, and paleontological resources.
- The **biological environment**, including birds, fish, terrestrial and marine mammals, vegetation, and special status species.
- **Social systems** and related resources, including sociocultural systems, subsistence, environmental justice, public health, cultural resources, visual resources, recreation, wild and scenic rivers, and wilderness characteristics.

A variety of positive impacts of development, most importantly widespread positive economic impacts for the North Slope Borough, Arctic Slope Regional Corporation (ASRC), and other Alaska Native regional corporations, were also identified in the EISs. The BLM's RMS for future oil and gas development projects in the northeastern NPR-A focuses on unavoidable *adverse* impacts because impact mitigation is appropriate only for adverse impacts. The substantial positive impacts of oil and gas development are recognized and noted, though they are not the focus of this paper.

**PRIMARY SOURCES OF IMPACT ASSOCIATED WITH OIL AND GAS DEVELOPMENT IN THE ARCTIC REGION**

Primary sources of impact associated with oil and gas development in the Arctic region include the construction, operation, and decommissioning of infrastructure, including roads, processing facilities, wells, wellpads, pipelines, airstrips, bridges, communication towers, etc.; activities associated with the various phases of development (exploration, construction, operations, and decommissioning), including human activity, drilling, pumping and storage, operation of vehicles, aircraft, vessels, etc.; and effects from emissions (such as air pollution and dust), waste disposal (such as produced water, lubricants, and garbage), and spills and releases of oil or other hazardous materials.

The mechanisms by which infrastructure, activities, and emissions associated with oil and gas development cause impacts on the physical, biological, and social systems are varied and complex; a detailed assessment is available in the IAP/FEIS and GMT1 FSEIS. Typically, a given impact source will

have multiple effects across resources. For example, infrastructure development effects on biological systems include, but are not limited to direct and indirect habitat destruction or alteration; changes to species distribution; disturbance; displacement; interference with movement/migration; mortality and health effects. These effects may occur directly (e.g., bird mortality by collisions with structures) or indirectly by interfering with a natural process, such as drainage patterns that affect water availability that in turn affects the health and survival of vegetation and animals. Infrastructure development and operation may also affect social systems, for example, when facility construction requires disturbance of a cultural resource site and simultaneously creates a visual impact on nearby villages.

This paper organizes the discussion of impacts based on issues of primary concern to RMS stakeholders, as identified by stakeholders in the RMS workshops conducted in 2015. This approach supports an understanding of the sometimes complex interactions between the various causes of impacts and the interactions between the various effects, which may include direct, indirect, and cumulative impacts.

## **EFFECTS OF OIL AND GAS DEVELOPMENT ON SUBSISTENCE ACTIVITIES**

Of primary concern to RMS stakeholders are the effects of oil and gas development on subsistence activities. Subsistence systems provide food security and other economic values but they are also important social and cultural systems (BLM 2012). Subsistence activities encompass sharing and distribution networks, cooperative hunting, fishing, and ceremonial activities. Subsistence hunting and other features of the subsistence way of life embody cultural, social, and spiritual values that are essential to Alaska Natives. Consequently, direct impacts from oil and gas development either to subsistence resources, or the ability of Alaska Natives to harvest subsistence resources, typically cause a variety of important indirect socioeconomic and health impacts, which are discussed below.

### **Loss of Traditionally Used Areas**

Depending on the location of oil and gas facilities and related infrastructure, the project's "footprint," (i.e., the acreage that is actually occupied by facility components) can have a direct impact on subsistence use areas, particularly those used for fishing and for hunting caribou, geese, and furbearers such as wolf and wolverine. In addition to land areas occupied by the facilities themselves, hunters are likely to avoid areas up to several miles away from the facilities, per the discussion under "Avoidance of Developed Areas" below. As a result, the total area of any development in the planning area and lands around it could be effectively removed from the traditional harvest area of a given community. This can reduce the amount of subsistence harvesting for individuals, or result in additional travel distance or time to obtain subsistence resources in other areas. Reduced subsistence harvesting may have negative health effects, and negative economic and social impacts (see below). The increased travel has a variety of negative effects, including greater expenditure of time for subsistence activities, greater expenditures for vehicle fuel and repairs, and potential health impacts from additional travel-related accidents.

### **Access to Subsistence Areas**

The presence of oil and gas infrastructure and associated facilities (e.g., roads) can limit subsistence users' access to subsistence areas. Subsistence users may be forced to travel longer distances to avoid physical obstacles related to oil and gas infrastructure, experience physical problems using or crossing roads or crossing under pipelines, or find that travel through a certain area may be prohibited or restricted. As a result of reduced access to subsistence areas, subsistence users may have to travel farther to harvest subsistence resources, which increases time, travel, and other costs associated with subsistence activities.

### **Avoidance of Developed Areas**

Subsistence users may avoid areas of oil and gas activities. Reasons for avoiding development include: (1) the concern that discharging a firearm near the various facilities and infrastructure will result in liability for damage, death to a worker, or serious environmental consequences (e.g., an oil spill from a punctured pipeline); and (2) the belief that animals habituated to oil and gas infrastructure are contaminated and not safe for human consumption.

Avoidance of developed areas may extend for several miles from the actual location of facilities, thus potentially affecting a much larger area. As noted above, avoidance of the total area of any development in the planning area and lands around it could effectively remove the area from the traditional harvest area of a given community. If concerns about food contamination lead to reduced consumption of subsistence resources, this may increase the consumption of non-subsistence foods, which can in turn lead to economic problems; food security problems; and social, cultural, and possibly mental (stress, anxiety, depression) and physical (nutrition) health issues.

### **Aircraft Disturbance**

The noise and visual disturbance associated with aircraft overflights can disturb animals and disrupt hunts when low-flying aircraft spook the animals. Reduced hunting success may mean that additional money and time is required for additional hunting expeditions, or to purchase commercial meat. Hunters cannot avoid disturbance from aircraft by avoiding permanent infrastructure, therefore impacts from aircraft can cause more acute stress and disruption, which can sometimes turn into long-term stress and financial and food-security issues throughout the year. Lack of hunting success due to aircraft disruption can lead to reduced subsistence resource consumption, which, as noted above, can have negative economic, social, and health effects. Noise from air traffic could also create a nuisance around individuals' camps and cabins, possibly reducing their use as a base for subsistence harvests.

### **Disruption of Migrating Subsistence Species**

Noise, traffic, odors, and infrastructure associated with oil and gas exploration, facility construction and operation, and decommissioning could affect the availability of key resources such as caribou, waterfowl, and furbearers. Migrating subsistence species such as caribou may be displaced from areas of oil and gas activity, resulting in long-term localized effects. If subsistence species move away from areas of development, they could become more difficult to locate and harvest.

### **Direct Damage to or Contamination of Subsistence Resources and Habitats**

A small number of fish could be injured or killed, potentially affecting harvests in localized areas. Waterfowl might also avoid traditional harvest locations. Oil spills that enter water could contaminate or cause concerns about contamination of marine mammals and fish, which can lead to reduced consumption of subsistence resources, with potential subsequent negative economic, social, and health effects.

### **Cumulative Effects**

Overall, future development is expected to increase the severity of existing impacts, including: continued hunter avoidance of industrial areas, continued disturbance of hunters and wildlife from increased air and road traffic, reduced access to or loss of subsistence use areas, and reduced availability of subsistence resources in developed areas. There could also be substantial cumulative effects from climate change, including the inability to travel during the short goose hunting season.

### **Unavoidable Adverse Impacts**

Impacts including loss of subsistence use areas; restricted access to traditional use areas; user avoidance of developed areas and surrounding lands; reduced availability of key resources such as caribou, waterfowl, and furbearers; and disturbance from aircraft would be unavoidable adverse impacts.

## **SOCIAL AND CULTURAL IMPACTS OF OIL AND GAS DEVELOPMENT**

Oil and gas development has a variety of positive and negative social and cultural impacts. Positive impacts include increased employment opportunities and easier commuting and other travel-related social benefits associated with road development (including seasonal connection via ice road to the Dalton Highway). As noted above, some impacts are indirect effects related to oil and gas impacts on subsistence resources and activities; however, oil and gas development also has social and cultural impacts unrelated to subsistence.

### **Subsistence-related Social and Cultural Impacts**

Subsistence hunting and harvesting activities are central to the cultural identity and social cohesion of North Slope communities. Because the subsistence way of life embodies cultural, social, and spiritual values that are essential to Alaska Natives, impacts on subsistence resources and activities may lead to a variety of important social and cultural impacts.

Impacts on subsistence resources and activities may lead to reduced consumption of subsistence resources, which in turn may lead to economic and sociocultural impacts. However, the devaluation of the cultural landscape is also a direct, indirect, additive, and cumulative impact related to subsistence. Residents believe that the cultural, spiritual, or other personal value placed on their families' camping, hunting, and fishing sites is substantially diminished when industrial infrastructure is developed nearby. There may be a loss of spiritual connection to the land.

If subsistence impacts lead to decreased participation in subsistence activities, this could have impacts on future generations, as harvesters may no longer be able to teach younger hunters about subsistence uses in traditional harvesting areas. Decreased subsistence harvesting and reduced participation in subsistence activities could lead to decreased sharing, decreased cooperative hunting and fishing, as well as decreased participation in subsistence-related ceremonies, all of which contribute to the social fabric of Alaska Native communities.

Finally, issues surrounding subsistence and impacts from oil and gas development on the subsistence lifestyle may be a significant source of stress within North Slope communities. This stress is compounded by concerns over the additional and synergistic effects of climate change, competition with sport hunters, and other impact sources on the subsistence lifestyle.

### **Other Social and Cultural Impacts**

Oil and gas development increases employment opportunities, and new roads may make it easier for residents to travel, including travel to work. However, there are impediments to local employment in the oil field due to cultural issues and the lack of adequately trained local residents.

The permitting process involves a substantial amount of scoping, testimony, interviews, surveys, and requests for comments on observations and impacts. Such questions can elicit emotions and experiences that are linked to several decades of interactions with outsiders requesting information. Anxiety and intra- and inter-community conflict over the continuous overload of bureaucratic and legal

processes involved with permitting and development is a source of frustration and disenfranchisement for Alaska Natives. Keeping track of oil company activities and National Environmental Policy Act (NEPA) or similar processes is a drain on residents' time and resources, and can be overwhelming. Disagreement and conflict over differing attitudes toward development, the use of new roads, and related topics is generated within individuals, families, the community itself, and with other North Slope communities. Although the economic benefits of oil development are substantial and widespread, disparities in the economic benefits accrued by residents (e.g., Alaska Native Claims Settlement Act village corporation shareholders and non-shareholders) that result from development can also be a significant source of tension.

Oil and gas development increases contacts between Alaska Natives and non-Natives, such as non-resident workers. While there are positive aspects to the cultural interactions, negative aspects include, but are not limited to the importation of alcohol into villages or lifestyles in conflict with traditional cultural values, which have both negative social and health impacts.

#### **Cumulative Effects**

Increasing development activities on the North Slope may result in more residents obtaining employment in the oil and gas industry. Climate change could affect subsistence resources and land uses, creating significant social anxiety for the Iñupiat. Expected cumulative impacts include a mixture of sociocultural benefits and adverse impacts that are major in extent.

#### **Unavoidable Adverse Impacts**

Unavoidable adverse sociocultural impacts include disincentives to local employment in the oil field; continued or increased flow of drugs and alcohol into North Slope communities via the seasonal ice road; community conflict over use of the roads, stress related to the permitting process, subsistence and other impacts; the devaluation of the cultural landscape; and disruption to subsistence use areas, resources, and activities.

### **EFFECTS OF OIL AND GAS DEVELOPMENT ON PUBLIC HEALTH**

Oil and gas development may have a variety of positive and negative effects on public health. Increased income for individuals or families may improve health in affected communities through increases in the standard of living, reductions in stress, and opportunities for personal growth and social relationships. Increased income and employment opportunities may also improve diet and nutrition by providing money to fund subsistence activities. There may also be positive impacts on public health as a result of increased access to health care and facilities. Negative impacts on public health could result through changes in diet, nutrition, exercise, environmental exposures, infectious disease, safety, and acculturative stress. Similar to social and cultural impacts, health impacts can result from impacts on subsistence resources and activities, or from other causes not related to subsistence.

#### **Subsistence-Related Public Health Effects**

Subsistence-related public health effects stem primarily from increased travel related to subsistence harvesting and changes in diet, nutrition, and exercise. When subsistence harvesters are forced to travel farther to harvest subsistence resources, this may increase travel times and costs for subsistence activities, and could potentially decrease harvests and increase risk of injury and travel-related accidents.

For some individuals, decreased success in subsistence harvesting leads to various hardships that increase emotional stress, and as noted above, concern about impacts on subsistence activities are a general source of emotional stress for North Slope communities that may lead to negative health effects, especially if it contributes to depression, anxiety, or increased substance abuse. Similarly, individual, intra-community, and inter-community conflict and associated stresses related to oil and gas development concerns may cause emotional stress that results in negative health effects.

Decreased consumption of subsistence resources, regardless of whether it is caused by avoidance of traditional use areas, decreased success at hunting caused by aircraft overflights, inadequate resources, or other causes, may affect diet and nutrition. If residents are unable to obtain adequate supplies of subsistence foods, they may shift to consuming commercially available foods, sometimes referred to as a “Western” diet, which may result in negative health outcomes, such as increased rates of diabetes, metabolic disorders, and associated chronic diseases.

#### **Other Public Health Effects**

Impacts on public health not associated with subsistence impacts include environmental exposures, increases in infectious diseases, safety, acculturative stress, economic impacts, and capacity of local health care services.

Oil and gas development is associated with impacts on air and water quality that can have negative health effects for at-risk populations when they are exposed to hazardous substances, for example, though poor air quality episodes or contamination of food sources or water supplies. An associated public health impact is increased stress associated with concerns about how to respond to health and safety incidents that could occur at oil and gas facilities, such as blow-outs or breaches of pipelines.

An influx of non-resident workers to local communities may increase exposures to communicable disease, alcohol and drug use for local residents, as well as increasing stress and mental health issues associated with these activities. There may also be an increased prevalence of social pathologies, including substance abuse, assault, domestic violence, and unintentional and intentional injuries associated with economic growth.

The development of permanent and seasonal roads in the region also has the potential to induce increase travel and raise the risk of subsequent accidents and injuries.

#### **Cumulative Effects**

Future oil and gas development could cause cumulative effects through impacts on subsistence that have negative health effects, and from impacts on air quality, water quality, or spills. There could also be cumulative effects associated with climate change, through stress related climate change impacts on subsistence and increased injury and trauma from longer and more difficult subsistence harvesting.

#### **Unavoidable Adverse Impacts**

Unavoidable adverse public health impacts would be related to water quality accidents and injuries from new roads in the area; food, nutrition, and subsistence; and non-communicable chronic diseases. Unavoidable adverse impacts may also result from exposure to hazardous materials; actual or perceived contamination of traditional foods; safety concerns relating to catastrophic accidents; and social determinants of health.

## **ENVIRONMENTAL JUSTICE ISSUES ASSOCIATED WITH OIL AND GAS DEVELOPMENT**

Oil and gas development under the RFDS is expected to have substantial environmental justice impacts on local communities, based on findings of major impacts on sociocultural systems and subsistence. Negative impacts will affect lower-income residents disproportionately, as they are more dependent on subsistence resources, but less capable of adapting to subsistence impacts. When subsistence harvests decrease as a result of oil and gas related impacts, or subsistence-related travel costs increase, lower-income residents may be unable to spend more money on fuel and other subsistence-related expenses, and may be less able to shift to more expensive commercial food sources, thereby potentially experiencing decreased food security. The Iñupiat of the North Slope are also disproportionately impacted by climate change. Economic benefits related to oil and gas production are a countervailing positive impact. Other oil and gas projects will result in cumulative environmental justice impacts, and the environmental justice impacts are considered to be unavoidable adverse impacts.

### **OIL AND GAS DEVELOPMENT IMPACTS ON ECOLOGICAL SYSTEMS: AIR, WATER, VEGETATION, FISH, BIRDS, AND MAMMALS**

Oil and gas development under the RFDS will cause impacts on ecological systems, including air and water resources, plants, fish, birds, mammals, and other wildlife, and several Threatened and Endangered species.

#### **Air Quality**

During construction, there could be short-term and transient emissions from fuel-burning equipment, drilling emissions, and fugitive dust sources. During operation, there could be ongoing and long-term emissions from heaters, vehicles, and other stationary and mobile sources; emissions from flaring; and fugitive dust. Cumulative impacts are difficult to estimate but are expected to be minimal. Unavoidable adverse impacts could result from increased air emissions, including fugitive dust, pollutants, and greenhouse gases.

#### **Water Quality**

Long-term impacts on local water resources could result from the placement of new infrastructure, including changes in drainage patterns and changes in stream flow. There would be short-term, temporary impacts from ice infrastructure (e.g., roads and pads). Cumulative effects would probably be small in magnitude and most impacts would be local in nature. Unavoidable adverse impacts could result from changes in surface drainage due to construction of roads and pads, and loss of wetlands and associated functions largely from construction of roads and pads and gravel mine development.

#### **Vegetation**

Expected direct impacts on vegetation include removal as a result of the construction of oil and gas infrastructure, including construction of roads and pads and gravel mine development. There could also be indirect impacts from gravel, spray, and dust deposition near graveled surfaces. Areas of direct and indirect impacts could be within potential wetlands. Climate change, and oil and gas and other development would contribute to cumulative effects. Unavoidable adverse impacts could include loss of upland and wetland vegetation communities and their associated functions; alteration of plant communities as a result of dust deposition, soil salinity change, increased snow drifting, and changes to natural drainage patterns; and increased probability of colonization by non-native, invasive species.

### **Fish**

Expected impacts on fish would include injury at water-use intakes, barriers to fish movement, and impacts associated with altered water quality, physical habitat changes (water quantity, flow patterns, and geomorphology), point and non-point source pollution, increased turbidity and sedimentation. Collectively, these impacts could contribute to reduced success at different life history stages, behavioral changes, diminished condition, susceptibility to pollutants or disease, shifts in fish species distribution, and mortality. Cumulative effects would likely be minor, and localized.

### **Birds**

Expected impacts on birds include mortality and impacts on bird behavior, and nesting, brood-rearing, foraging, and molting habitats through habitat loss and alteration, disturbance from noise and visual activity, displacement from habitats, or attraction to habitats altered by thermokarst and early green-up adjacent to gravel infrastructure. If climate change over the next several decades were to result in substantial changes in weather patterns, then changes to vegetation types and distribution, insect abundance and timing of emergence could occur, and habitat disturbance impacts from oil and gas activities could be exacerbated. Cumulative effects, exacerbated by climate change, could include loss of bird habitat, long-term in duration, localized, and minor. Some unavoidable adverse effects (on a small number of birds) could include direct and indirect loss of habitat, habitat fragmentation and behavioral alternation due to avoidance of developed infrastructure, vehicle traffic, and human activity; and mortality from collisions with human infrastructure or vehicles.

### **Mammals**

Expected impacts on mammals include:

- Physical habitat changes; displacement from (or attraction to) altered habitats; disturbance from noise or activity; obstruction of movement from construction activities.
- Collisions (mortality), disturbance and obstruction of movement from vehicles or air traffic; defense of life and property (mortality); increased hunting; premature den emergence (Grizzly Bear) associated with vehicle and aircraft traffic and human activity during drilling and operations phases.
- Obstruction of movement by pipelines, and spills or leaks causing exposure to toxic materials from pipelines during drilling and operations phases.
- Possible avoidance by parturient female caribou of marginal calving habitat.
- A variety of cumulative impacts, including impacts associated with climate change, vegetation change, and other causes.

Unavoidable adverse impacts include wildlife habitat fragmentation; loss or alteration of habitat; behavioral disturbance by anthropogenic activities resulting in short-term displacement, deflection of movement, or delay of movement; mortality; or altered survival or productivity.

### **Threatened and Endangered Species**

Threatened and Endangered Species subject to impacts under the RFDS include polar bear, spectacled eider, and Steller's eider; however, there are no Steller's eider found within the area of impact under the RFDS, and therefore no impacts are expected.

Expected impacts on polar bears include denning habitat loss or alteration, disturbance or displacement of denning females and cubs, incidental harassment of polar bears transiting the project study area, intentional hazing near occupied work sites, and mortality due to collisions or defense of life kills. There

could be cumulative impacts from climate change, and other development, including near shore or offshore oil and gas development.

Expected impacts on spectacled eiders include habitat loss and alteration, disturbance and displacement, obstruction of movement, mortality from various causes, and impacts from spills. There could be unavoidable adverse impacts on a *small number* of nesting, brood rearing, and staging spectacled eiders. Unavoidable adverse impacts could result from habitat destruction and fragmentation, disturbance, vehicle and air traffic, spills of hazardous materials, including oil spills, and mortality from collisions with human infrastructure or vehicles.

#### **OTHER EFFECTS OF OIL AND GAS DEVELOPMENT**

In addition to the impacts described above, oil and gas development under the RFDS would also have impacts on the following resources or processes:

- **Climate and Meteorology:** Negligible impacts from greenhouse gas emissions.
- **Climate Change:** Negligible impacts from greenhouse gas emissions and particulate matter.
- **Cultural Resources:** Moderate direct and indirect impacts from ground disturbance, effects on subsistence activities and traditional use areas, and visual and noise impacts. Minor cumulative impacts. Unavoidable adverse impacts through direct impacts on artifacts and traditionally used sites and visual and noise impacts.
- **Economy:** Minor positive impacts from increased oil and gas revenues. Negative cumulative impacts from climate change.
- **Geology and Mineral Resources:** Minor impacts from drilling and annular disposal and injection of fluids.
- **Land Use:** Moderate direct impacts from construction of gravel pads, roads, and airstrips; excavation of gravel from the mine site; and installation of vertical support members (VSMs). Change from less to more intensive land uses, and changes arising from new roads providing access to new areas. Cumulative impacts from other oil and gas projects. Unavoidable adverse impacts from development of previously undisturbed areas.
- **Noise:** Minor impacts on communities and wildlife from construction (short term), drilling, gravel mining (short term), vehicles, and aircraft. Cumulative impact from multiple projects. Unavoidable adverse impacts from these activities.
- **Oil, Saltwater, and Hazardous Materials Spills:** Increased risks of spills, primarily related to equipment failure, on land. Minor cumulative impacts from multiple projects.
- **Paleontological Resources:** Negligible impacts expected.
- **Petroleum Resources:** Major impacts from loss of petroleum resources. Cumulative impacts from other oil and gas projects, and from climate change. Unavoidable adverse impacts from loss of petroleum resources.
- **Recreation:** Negligible impacts from the presence of permanent facilities and associated noise. Cumulative impacts from other development and climate change.
- **Sand and Gravel Resources:** Minor impacts from loss of sand and gravel resources and effects from gravel mining. Unavoidable adverse effects from loss of sand and gravel resources.
- **Soils and Permafrost (also Physiography/Geomorphology):** Minor impacts on thermal regime of permafrost from placement of gravel fill on the tundra; snowdrifts caused by gravel

structures, and blockage of natural drainage patterns. Soil compression, displacement, altered soil moisture, and effects of spills from construction and operation of oil and gas infrastructure. Cumulative effects from climate change. Unavoidable adverse impacts from loss of soil productivity from construction of roads and pads and gravel mine development.

- **Transportation:** Minor impacts from construction-related traffic on ice roads; interference with some winter travel on frozen channels from construction activities; additional local transportation options from new roads; and increased air traffic. Cumulative effects from construction of new roads in roadless areas. Unavoidable adverse impacts from alteration of normal transportation routes from difficulties crossing new roads with snow machines in winter.
- **Visual Resources:** Minor impacts from visibility of oil and gas facility construction activities and infrastructure (including lighting at night) during operations. Cumulative effects from other developments, and from climate change. Unavoidable adverse impacts from infrastructure and lighting visibility.

#### **METHOD FOR DETERMINING UNAVOIDABLE ADVERSE IMPACTS THAT WARRANT COMPENSATORY MITIGATION**

The BLM requires that mitigation be used to avoid, minimize, rectify, or reduce over time the impacts of oil and gas development on lands the BLM manages. Numerous best management practices (BMPs) and lease stipulations (identified in the IAP/EIS ROD [BLM 2013] and the GMT1 FSEIS [BLM 2014]) would be required that would lessen the impacts of oil and gas development under the RFDS. However, some unavoidable adverse impacts would occur even with implementation of applicable BMPs and lease stipulations. These unavoidable adverse impacts (noted above) potentially warrant compensatory mitigation.

After identifying expected unavoidable adverse impacts, the determination of whether an impact warrants compensatory mitigation is based on consideration of applicable mitigation standards, what is appropriate, and the potential for any of the following:

- Unavoidable adverse effects that inhibit achieving compliance with laws, regulations, and/or policies;
- Unavoidable adverse effects that inhibit achieving the applicable land use plan's resource objectives, including applicable mitigation standards;<sup>1</sup>
- Unavoidable adverse effects to important, scarce, or sensitive resources that have been previously identified in a mitigation strategy as warranting compensatory mitigation;
- Unavoidable adverse effects to important, scarce, or sensitive resources that are identified through a NEPA process as warranting compensatory mitigation.

If the unavoidable adverse impacts for resources meet one or more of the above criteria, then those impacts warrant compensatory mitigation. To determine which resources are “important, scarce, or sensitive,” conceptual models of the regional ecosystem and socioeconomic systems are used to identify those resources that are critical to healthy functioning of these systems, and the resource conditions and trends are analyzed at all relevant scales to identify at-risk resources and processes in the region.

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<sup>1</sup>Although this is consistent with BLM policy overall, this bullet is not applicable to the NPR-A. The NPR-A is exempt from the Federal Land Policy and Management Act land use planning provisions that require development of land use plans and identification of resource objectives.

Analysis determines how the unavoidable adverse impacts of oil and gas development will affect the status and trend of the regional at-risk resources, and the significance of the unavoidable adverse impacts in the region.

#### **UNAVOIDABLE ADVERSE IMPACTS PRELIMINARILY DETERMINED TO WARRANT COMPENSATORY MITIGATION UNDER THE NPR-A RMS RFDS**

Based on consideration of the expected impacts from oil and gas development under the RMS RFDS, the following impacts have been preliminarily determined to warrant compensatory mitigation:

- Subsistence impacts
- Sociocultural systems impacts
- Environmental justice impacts

Subsistence and sociocultural resources were found to be subject to major impacts from the GMT1 development, as described in the GMT1 FSEIS (BLM 2014), largely because the development would take place within a subsistence use area. Because under the RMS RFDS, several additional oil and gas facilities and associated infrastructure would be constructed and operated in the nearly the same geographic area, the direct, indirect, and cumulative impacts on subsistence and sociocultural impacts would be expected to increase substantially, and thus would warrant compensatory mitigation. The major subsistence and sociocultural impacts from the GMT1 development, as described in the GMT1 FSEIS were found to affect a minority population (Alaska Natives) disproportionately, and were thus identified as causing major environmental justice impacts. The increased level of oil and gas development under the RMS RFDS would have even greater subsistence and sociocultural impacts on Alaska Natives, and thus would also cause major environmental justice impacts that warrant compensatory mitigation.

#### **UNAVOIDABLE ADVERSE IMPACTS THAT MAY WARRANT COMPENSATORY MITIGATION UNDER THE NPR-A RMS RFDS**

Based on preliminary consideration of the expected impacts from oil and gas development under the RMS RFDS, the following impacts may warrant compensatory mitigation:

- Air quality impacts
- Water quality impacts
- Public health impacts
- Impacts on birds (e.g., greater white-fronted goose)
- Impacts on fish (e.g., broad whitefish)
- Impacts on terrestrial mammals (e.g., caribou)
- Impacts on polar bears, a threatened and endangered species (except as required under the ESA)
- Impacts on spectacled eiders, a threatened and endangered species (except as required under the ESA)
- Cultural resources impacts
- Visual resources impacts
- Land use and ownership impacts

Many of these resources are important, scarce, and/or sensitive, but were not found to be subject to major impacts under the GMT1 FSEIS. However, projects under the RMS RFDS could potentially have different and greater impacts, depending on the exact location of the project and associated infrastructure, and other aspects of the project that would be determined at the time a project-specific impact analysis was conducted. While compensatory mitigation for impacts to these resources is not being developed in this RMS, future project-specific impact assessments that identify regionally significant impacts to these resources could indicate that compensatory mitigation is warranted.

#### **UNAVOIDABLE ADVERSE IMPACTS DETERMINED TO BE UNLIKELY TO WARRANT COMPENSATORY MITIGATION UNDER THE NPR-A RMS RFDS**

Based on preliminary consideration of the expected impacts from oil and gas development under the RMS RFDS, the following impacts have been determined to be unlikely to warrant compensatory mitigation:

- Climate and meteorology/climate change impacts
- Economic impacts
- Geology and mineral resources impacts
- Impacts on marine mammals
- Oil, saltwater, and hazardous material spill impacts
- Noise impacts
- Paleontological resources impacts
- Petroleum resources impacts
- Recreation impacts
- Sand and gravel resources impacts
- Soils and permafrost/physiography and geomorphology impacts
- Impacts on Steller's eiders
- Transportation impacts
- Vegetation and wetlands impacts (except those required under Section 404 of the Clean Water Act)

These resources were found either to be subject to minor or negligible impacts under the GMT1 FSEIS (BLM 2014), constitute positive impacts (economic impacts), or already require compensation for impacts for other reasons (petroleum resources and vegetation and wetlands resources), and thus are unlikely to warrant compensatory mitigation for expected impacts under the RMS RFDS. However, projects under the RMS RFDS could potentially have different and greater impacts, depending on the exact location of the project and associated infrastructure, and other aspects of the project that could only be determined at the time a project-specific impact analysis was conducted. While compensatory mitigation for impacts to these resources is not being developed in this RMS, future project-specific impact assessments identifying regionally significant impacts to these resources could indicate that compensatory mitigation is warranted.

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