

## Arctic National Wildlife Refuge: A Global Treasure

### **Introduction**

In the farthest reaches of Northeastern Alaska exists the Arctic National Wildlife Refuge (ANWR), an area renowned for its abundance of wildlife and striking geography that ranges from tundra to boreal forest. The Refuge spans from Beaufort Sea barrier islands in the north, to the Brooks Range in the south, and Prudhoe Bay in the west. The largest and most pristine of U.S. National Wildlife Refuges, its 19.6 million acres is actually a continuum of six different ecozones crossing the length of the Refuge. The remote area serves a range of other interests in addition to ecological conservation, some more sustainable than others. The Gwich'in, known as "People of the Caribou," rely on the preservation of the Refuge for a variety of subsistence activities and customary practices. Additionally, ANWR fulfills international treaty obligations of the United States relating to fish and wildlife and their habitats. Furthermore, the Refuge provides an excellent setting for scientific research on a wide range of flora and fauna. Yet these rich areas are also attractive for their deep reserves of oil, some of which is currently under siege by oil and gas interests. In 1980, the U.S. government passed the Alaska National Interest Lands Conservation Act that enlarged the Refuge to its current size and designated the majority as protected wilderness with the exception of the Coastal Plain area. The Act protected 1.5 million acres of the ecologically significant Coastal Plain, but did not designate this area as wilderness, potentially opening this region of Refuge to oil exploration and production.

Recent studies conclude that the temperatures in the Arctic National Wildlife Refuge have warmed more than 4 degrees Fahrenheit over the last 50 years, leaving the ecological

nutrient web vulnerable to massive disruption. The northern geographical location makes the Coastal Plain and Refuge particularly important for large species conservation, but also as an indicator for the damaging effects of climate change. Much of the ANWR exhibits low elevation topography susceptible to rising sea levels and contains fragile vegetation exponentially at risk due to the northern latitude. The cumulative harmful effects of fossil fuel production and climate change from fuel combustion place ANWR and other Alaskan wildlife refuges at significant risk of irreversible change.

Climate change poses a grave threat to our Nation's most pristine wildlife refuge, exacerbated here by encroaching fossil fuel interests. With a multifaceted issue such as this there is simply no single, clear solution that can remedy all of the symptoms. Instead, the answer must be the product of increased cooperation among all stakeholder groups, realignment of goals that reflect the changing environmental processes, and new Refuge directives that carry the force of law. Thus, this case study will explore these dynamics and illuminate management solutions as they relate to the keystone national refuge, the Arctic National Wildlife Refuge. First, this case study will explore the ANWR's natural and cultural history leading to the Refuge's establishment as a protected area, and will evaluate the impacts of climate change on those interests. Following this section, the paper will explain the Refuge's development and the controversy over drilling rights. Next, this paper will investigate the various management programs under U.S. Fish and Wildlife Service regulation for National Wildlife Refuges, National Oceanic and Atmospheric Administration as a Marine Protected Area, and Native Alaskan representation. Last, this case study will review how these management groups are changing their protection objectives and resulting legal mechanisms to adapt to climate change.

Increased stakeholder participation, evolving regulatory objectives, and subsequent legislative guards will be crucial to protecting the Refuge from the irreparable effects of climate change.

**a. Environmental and Cultural Implications of Climate Change in the Arctic National Wildlife Refuge**

Climate change threatens the ecological health of Arctic National Wildlife Refuge and the livelihood of the people who depend on its lasting sustainability. This section provides an overview of its rich biology and culture, as well as the menacing effects climate change has on those qualities.

**1. Ecology of the Arctic National Wildlife Refuge**

The geography and ecological beauty of the Arctic National Wildlife Refuge is simply unmatched by any of the Country's National Wildlife Refuges (NWRs). Beyond its vast spectrum of arctic ecosystems, the ANWR is home to more than 200 species of birds, 37 land mammal species, 8 marine mammal species and 42 species of fish. (Inkley, 8). All wildlife in the ANWR hold a dynamic role in the sensitive food web given the short periods of growth in the Arctic climates.

At the top of the refuge where the Coastal Plain meets the Beaufort Sea, barrier islands, coastal lagoons, salt marshes, and river deltas provide habitat for about 28 species of migratory seabirds including loons, and grebes, cackling goose, long-tailed duck, northern pintail, Pacific loon, and tundra swan. Coastal lands are routinely used by snow geese in annual numbers ranging from 12,000 to 300,000 birds as an important feeding area prior to their migration south. Birds from around the globe use the area as a stop during the migration period, and birds that generally live in the Refuge during its short summer will migrate to nearly all fifty states in the U.S. (Inkley, 9). In the waters near the shore, fish such as the Arctic Cisco and Dolly Varden

(previously called Arctic Char) are found in great numbers, which also attract polar bears hunting seals, who give birth nearby in coastal dens.

Arctic climate coastlines are often the first indicator of climate change for a variety of reasons. First, the cold water, shallow continental shelves, and high productivity accelerate the absorption of CO<sub>2</sub>, and reduce the deep-water circulation that leads to ocean acidification. Ocean acidification changes the distribution of plankton and forage fish, and thus the seabirds reliant on those feed sources. (Jeziarski, 10). Next, the temperature change diminishes sea ice, causing a loss of significant glacial habitat sheltering seabird and ringed seal populations, as well polar bear hunting prospects. (Jeziarski, 13). In turn, large scale glacial melting contributes to rising sea levels and coastal erosion. Considerable increases in coastal shoreline erosion rates were observed in the Arctic along parts of the Alaskan Beaufort Sea. (Jeziarski, 15).

Moving slightly south towards the Brooks Range, the expansive Coastal Plains are considered the biological center of the Refuge, dominated by many flagship species such as caribou, gray wolves, polar bears, and muskoxen. These animals live among the rolling hills, small lakes, and northern-flowing rivers in tundra vegetation dominated by thick shrubs and mosses. While the birds fly south to parts of the U.S. for the winter, with the exception of the muskoxen, many large herd animals escape the long winters of the Arctic tundra and migrate to other winter grazing grounds. In the short summer months of June and July however, the Plains become rife with herd creatures that return to breed and give birth to their young. Particularly notable are the massive numbers of porcupine caribou that can cover 2,500 miles each year traveling with its herd to the summer calving grounds, the longest migration of any land mammal. (Inkley, 12).

While species that live in boreal forest are slightly more flexible given the temperate climates, tundra species that exist in the Coastal Plain are very sensitive to warming temperatures that eliminate the frozen tundra habitat. The Coastal Plain geography in the Arctic National Wildlife Refuge is considered much spatially narrower than it is elsewhere in the North Slope of Alaska or adjacent areas of Canada. As a consequence, the habitat leaves little room for any forced transition into more temperate climate. (Defenders, 4). Animals that exist in this area are particularly susceptible to changes in precipitation because a shift from relatively dry snow to freezing rain and ice can mean an impenetrable frozen shield over important grazing areas or collapse small mammal tunnels under the snow. (Defenders, 3). Exposing the tundra to climate change disturbances can also affect its resilience. When disturbances do occur, the short growing season and slow growth rate of vegetation prolongs the repercussions.

Coastal plains transition into the mountains of the Eastern Brooks Range, the farthest extension of the Rocky Mountain. The range is also the location of the continental divide, meaning some rivers flow north to the Arctic Ocean and some south to the Yukon River. This range proves a home for the northernmost population of Dall sheep, as well as rare groves of poplar and spruce tress. During summer, peregrine falcons, gyrfalcons, and golden eagles build nests on the cliffs, while grizzly bears and Arctic ground squirrels roam the hills.

One of the most important functions of the Brooks Range flows from the seasonal melting of glacier ice in mountains. (Inkley, 21). Warming climate means less ice capped mountains each year, there by decreasing the albedo and culminating in less ice in subsequent years. Potential diminution of glacier ice high in the mountains could also affect river flows to the coasts and change the habitats of migratory birds, fish, and marine mammals. Additionally, The estuary or point where the freshwater intersects with the ocean provides the crucial function

of altering temporal water stratification and nutrient distribution.

The mountains transition into dense lowland taiga or boreal forests at the southern part of the Arctic refuge beyond the Brooks Range. These forests provide a home for the Porcupine Caribou in the winter and a year round habitat for moose, black and brown bears, wolverines, and wolves. Lightening often ignites the forests, which creates a rich forest tapestry containing different species and ages of trees. (Hinzman, 273).

Due to climate change, however, the Caribou herd is at risk of losing nearly 21% of its wintering habitat within the next century. (Inkley, 21). Although many species that inhabit the boreal forests are more flexible than their tundra counterparts, the dense vegetation composed of lichens, low-bush cranberry shrub, and other plants is extremely susceptible to fire. (Inkley, 21). Loss of habitat would have a detrimental effect on the caribou populations and migration patterns due to the loss winter grazing habitat.

All of these species exhibit very specialized adaptations to extreme Arctic conditions, which results in low species diversity and a simple food chain. (Defenders, 2). The simple food chain means that even small disruptions, such as altered migration periods or extended periods of frosts can result in large fluctuations amplified throughout the chain.

## **2. The Gwich'in Culture and the Caribou**

Although the federal regulatory history of the Arctic National Wildlife Refuge begins in the 20<sup>th</sup> century, human inhabitation of this corner in Alaska dates back thousands of years to 4500 BC. Indigenous Alaskan tribes braved the harsh and frigid conditions and built a deep spiritual connection to the wildlife and the geography, using the area for seasonal hunting and fishing camps. The most predominate group to settle in the region is a subgroup of the Athabascan Indians called the Gwich'in, also known as "People of the Caribou." Currently,

many of the Gwich'in live in villages located just outside the southern border of the Arctic National Wildlife Refuge. The Gwich'in number about 7500 members and are deeply reliant on subsistence hunting and fishing, as well as gathering of seasonal berries, plants, and birch bark. While moose, caribou, beaver and salmon all factor into the traditional uses of the Athabascan people in providing food, clothes and shelter, the culture and life of the Gwich'in has been based around the Porcupine caribou herd for centuries. (AWL, 3). Much of the Gwich'in spiritual tradition reflects the tribe's association with the caribou, as "songs, stories and dances all incorporate the sacred caribou." (Blackmer-Raynolds, 2). So deep is the connection between the caribou and the Gwich'in population that they have named the breeding grounds of the Coastal Plain "Iizhik Gwats'an Gwandaii Goodlit" which translates to 'The Sacred Place Where Life Begins.' (Blackmer-Raynolds, 1). Given the Gwich'in lifestyle and its intimate attachment to the caribou, it is clear that a disruption in caribou populations would devastate this indigenous tribe.

Climate change and fossil fuel development could challenge the Gwich'in way of life and even destroy the culture completely. Despite that many of the Gwich'in have incorporated modern conveniences into their culture, such as television and internet, the tribe still depends on caribou and other wild game for roughly 75% of their diet. (Cultural Survival, 1). Disputes over the economic boon from oil and gas development also created turmoil among tribal leaders and impoverished members who view drilling as the path to a better life. In effect, the dispute pits the traditional way of life against modern development.

**b. Establishing ANWR through the Alaska National Interest Lands Conservation Act and the drilling conflict.**

President Eisenhower first recognized the need to set aside the northeast corner of Alaska in 1957, and sought congressional support to preserve its wildlife and wilderness value. Congress failed to heed President Eisenhower's requests, prompting Secretary of the Interior Fred Seaton

to issue Public Land Order 2214 in 1960, which established the Arctic National Wildlife Range, the precursor to the Refuge. Initially, the 8.9 million acres of the Arctic National Wildlife Range was established “for the purpose of preserving unique wildlife, wilderness, and recreational values.” (Inkley, 6). Yet the ecological health of the rugged Alaskan bush was put in peril the same day the Range was established. Concurrently with the preservation of the Arctic National Wildlife Range, Secretary Seaton also opened 20 million acres just to the west of the Range to commercial oil and gas exploration. A portion of this acreage was offered to the State of Alaska for mineral right ownership and development. The State would ultimately select Prudhoe Bay on Alaska’s North Slope, which would grow to be America’s largest oil field. (Inkley, 6).

Twenty years later, congress passed the Alaska National Interest Lands Conservation Act (ANILCA), which formally designated the Range as the Arctic National Wildlife Refuge and increased the size of the park. Beyond the function of formally designating the area as a Refuge, the law also resulted in fulfilling international treaty obligations, ensuring fish and wildlife conservation, and preserving subsistence way of life for rural residents. To provide for the proper administration of areas under ANILCA, the Act called for the creation of the Alaska Land Use Council to conduct studies and advise stakeholder entities with respect to ongoing, planned, and proposed land and resources uses in Alaska. However, this group was subject to a sunset provision for a period of ten years and was not renewed. The Act also called for a wilderness review to determine the values and conservation goals for Alaskan parks and refuges with explicit deadlines under section 1317, but this was only a one-time requirement.

Nearly all of the newly created Refuge was designated as wilderness and thus received permanent exemption from energy development projects, with the noteworthy exception of the Coastal Plains region. With the Arctic Coastal Plain dominated by tundra vegetation and

harboring the Porcupine Caribou Herd breeding ground, the Plain is essentially the biological center of the Refuge. Section 1002 of the Act (16 U.S.C. § 3142), called for a special analysis of the impacts of oil and gas exploration, development, and production, as well as directed a comprehensive assessment of the inventory of fish and wildlife resources on the 1.5 million acres of the Arctic Refuge Coastal Plain. No exploratory drilling was allowed, however potential petroleum reserves were exposed via surface geological studies and seismic exploration surveys. This area would become known as a “1002 area” due to the assessment provision in the Act, and quickly evolve into the center of conflict. As a result of this exclusion, the Coastal Plains region of the Refuge remains susceptible to potential oil and gas development unless permanent protection is granted through a wilderness designation. While it would also take an act of Congress to permit drilling in the ANWR, both houses have passed bills approving drilling only to be vetoed or blocked at the final hour.

Drilling in the Coastal Plain illustrates the complex political confrontation between national energy security proponents and conservationists. Arctic ice has receded in past years largely due to the effects of climate change, which makes more of the Arctic accessible for drilling. (Tate, 1). Increased drilling would lead to the greater combustion of fossil fuels, creating vicious feedback cycle with no end in sight. Additional concerns arise over the increased infrastructure that accompanies drilling. These effects are much more palpable, and harm the surrounding ecosystem in a very direct way. Despite contentions that oil and gas development can coexist with a thriving ecosystem, the reality is much more bleak. Roads and constructed facilities like drilling pads, pipelines, and housing all leave an enormous physical footprint. Impacts of oil and gas infrastructure include: “disturbance of wildlife, loss of subsistence hunting opportunities, increased predation due to presence of garbage, change in natural drainage

patterns affecting vegetation, local pollution causing haze and acid rain, nitrogen oxides, methane, particulate pollution, and soil and water contamination from oil and fuel spills.”

(Inkley, 19). Ecological destruction caused by oil and gas development is a tangible surrogate for the more distant and abstract affects of climate change

### **c. Management of the Arctic National Wildlife Refuge**

Arctic Refuge management falls under multiple regulatory structures and arrangements, incorporating a range of stakeholders. The primary regulatory body for Arctic National Wildlife Refuge is the United States federal government, particularly the U.S. Fish and Wildlife Service (FWS), as it is a National Wildlife Refuge and not a National Park. Most of the Refuge is protected wilderness, which confers special protections under the Wilderness Act of 1964, 16 U.S.C. § 1131 *et seq.* In addition to federal regulatory provisions that govern refuges, the National Oceanic and Atmospheric Administration (NOAA) provides additional protections for its barrier Islands and coastal area in the Beaufort Sea as a Marine Protected Area (MPA). Lastly, unique Native Alaskan administrative groups represent the Gwich'in economic and cultural interest in their native claims.

#### **1. U.S. Fish and Wildlife Service**

Since 1940, National Wild Refuge management has been the primary responsibility of the U.S. Fish and Wildlife Service, which derives its power from the Congressional delegation of authority to implement policy. Congress did not consolidate the refuges into a single system until 1966 under the Refuge Administration Act, which was substantially updated in the National Wildlife Refuge System Improvement Act of 1997 (NWRISA). The mission of the Refuge System is “to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their

habitats within the United States for the benefit of present and future generations of Americans.” (Meretsky, 2).

With such a comprehensive task, the FWS depends on the integration of scientific information from several disciplines, including understanding the ecological processes as well as the social and economic incentives in those areas. Cooperation with other agencies is crucial to the success of refuge management, and the FWS regularly coordinates and consults with other Federal agencies, State fish and wildlife agencies, Tribes, non-governmental organizations, local landowners, community volunteers, and other partners. Importantly, NWRSA calls for the creation of comprehensive conservation plans (CCPs) for each refuge. Comprehensive conservation plans are valid for 15 years and must include specific, measurable, science-based objectives for maintaining and restoring refuge integrity, making them powerful tools for setting conservation goals. (Meretsky, 3). Consequently, these also guide the determination of which recreational and economic activities are compatible with refuge management under the integrity framework. Plans are then submitted for public comment, a process that reinforces the scientific validity and improves fair representation of interests.

## **2. NOAA management of Marine Protected Areas**

As a Marine Protected Area, the Arctic National Wildlife Refuge has additional protections for its coastal region restricting certain uses. Executive Order 13158 provided a formal definition of MPAs, which defines those areas as: “any area of the marine environment that has been reserved by federal, state, tribal, territorial, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein.” (Wenzel, 1). Owing to its status as an MPA, commercial fishing is prohibited along the coastlines, as it is in any MPA. Most MPAs have legally established goals, conservation objectives, and intended

purposes, such as conserving biodiversity in support of research and education or protecting and interpreting shipwrecks for maritime education. (Wenzel, 2). These designated uses are correlated into a site's conservation focus plan that formalizes the characteristics of the area that the MPA was established to conserve. A conservation focus is then used as guide for management of site, "including its design, location, size, scale, management strategies and potential contribution to surrounding ecosystems." (Wenzel, 2). Given its conservation focus, the ANWR is protected for its national and cultural heritage, as well continued sustainable production of fish for subsistence harvest. Because of the various regulatory bodies administering the Refuge, its management plan under NOAA's MPA is considered a component of a broader, non-MPA programmatic management plan, including some overlap with the International Union for the Conservation of Nature.

### **3. Native Representation and Management**

In 1971, the Alaska Native Claims Settlement Act (ANCSA) was passed to resolve a number of long lasting disputes over Native land claims lingering since Alaska was granted statehood. Early on, there was widespread disagreement over what lands could be claimed by the new state and which were traditional Native lands, often reflecting reserves of newly discovered oil. ANCSA created a unique system of native governments where Alaska native lands were divided into 13 Native regional economic development corporations, each associated with a specific region of Alaska, and the Natives who had traditionally lived there. These corporations were granted a large share of mineral rights, which is passed down to the tribal members, or "shareholders." Rights to income from shares, are largely nontransferable except in certain instances to tribal family members. As a result of the immense mineral reserves and associated wealth, the tribal corporations have become powerful representatives for tribes. In the Arctic

Refuge area, the Arctic Slope Regional Corporation manages oil production from Alaska's largest oil reserves. However, the relationship tribal members have to the corporations as shareholders leads to a perplexing dilemma. One on hand, tribal members can gain from increased drilling, but at the risk of potentially destroying their main food source and culture.

In addition to the tribal corporations, the Gwich'in are represented by the Gwich'in Steering Committee, a group formed by decision of a council of chiefs from all the Gwich'in tribes. The members meet in the Arctic Village each year to discuss the future of the tribe, and reaffirm its commitment to its traditional heritage. Representation through tribal elders is an important aspect of tribal life because communities hold a great deal of respect and confidence for the decisions of Elders.

#### **d. ANWR and the Transitioning Climate: Novel Policies and Solutions**

With a massive and complex problem such as climate change threatening the livelihood of the Arctic National Wildlife Refuge, there is no golden solution. Instead, developing conservation management strategies and proposals that encompass the natural and cultural heritage requires a range of stakeholder participation under principles of adaptive management that can institute protections that carry the force of law. In this section, the case study looks at how the above regulatory bodies are adapting to a changing climate to preserve the biological integrity of the Refuge. For example, many tactics will need to include a range of actions that vary temporally to both alleviate immediate concerns and foster long-term change. The administrative and regulatory responses to climate change disruption for the Refuge will have ecological, societal, and political significance on a global scale.

#### **1. U.S. Fish and Wildlife Service Adapting to Climate Change**

As a function of federal law under NWRSA, the FWS is encouraged to cultivate policies

that attempt to return the landscapes back to historic conditions prior to human related changes to the landscape. (Meretsky, 2). Not only does this “integrity mandate” provide a benchmark condition for Refuges, it also sets planning goals for the integrity of Refuge. As climate change may hinder achieving these baseline conditions, federal laws give refuge managers flexibility in use of “sound professional judgment” during planning to prioritize critical needs of the park and efficient resource use. (Meretsky, 6). The concerns are communicated in the CCP plans for the Refuge.

As previously mentioned, ANILCA had only required a one-time valuation of conservation goals, which was completed in 1988. Successful conservation management is not a one and done process however, and FWS has interpreted its CCP responsibility to apply to ANWR and updated its original Arctic Refuge Management Plan in 2015. The updated plan specifically directs that climate change effects should be considered in Refuge management decisions, and that these effects are to be evaluated through research, monitoring, and local traditional knowledge, and these effects are considered in Refuge management decisions. Specific objective related to climate change include: “evaluating potential effects of climate change on Refuge resources, considering climate change and non-climate stressors when making management decisions, collaborating with others on studying the effects of climate change, avoiding actions that resist the effects of climate change, and monitoring biological components vulnerable to climate change.” (USFWS, ES-2). While much of the planning occurs on a local level, the integrity policy instructs managers to forge solutions to problems arising outside refuge boundaries.

Although largely addressed in the ANWR comprehensive conservation plans, current research recommends a few critical areas that require immediate action to improve the chances

of survival. First, managers need to maintain linkages to areas of tundra adjacent to the Refuge to support migration to areas unaltered by climate change. (Defenders of Wildlife, 6). Connectivity is crucial for large species like caribou and other mammals that need large spaces to survive. This also has the affect of fostering relationships with other agencies that manage adjacent natural areas. ANWR managers also need to continue to invest in research and monitoring of vulnerable species to better predict and assess how climate change is affecting wildlife. (Defenders of Wildlife, 6). Additionally, utilizing the legislative structure, ANWR managers need convey the biological importance of the Coastal Plain area and protect it from oil and gas exploration and development.

## **2. NOAA and Marine Protected Areas Adapting to Climate Change**

In the realm of Marine Protected Areas, managers of MPAs are taking aggressive steps to plan for climate change and use MPAs and MPA networks to alleviate the effects on marine systems. MPAs in general are at a heightened risk of changes in water temperature and oceanic circulation, changing coastal and marine habitats, and ocean acidification. Currently, managers hope to remedy the climate issues plaguing ANWR by treating other stressors that degrade local ecosystems through the protective features of MPAs. (Wenzel, 3). For example, the stable legal and management structures of MPAs can benefit adjacent regions, improving the system as a whole. (Wenzel, 3). Productive systems then build networks that can create corridors for shifting species and habitats, as well as help reduce risk and promote resiliency. Moreover, MPA managers can utilize the MPA networks to share data and research, which allows for a quick response to information and address existing or emerging threats and impacts. In turn, the data can be used to educate the public and local communities. All of these factors better influence decisions about ANWR coastal resource use.

### **3. Tribal Representation Adapting to Climate Change**

Tribal community groups are likely the most powerful entity to push for a ban on drilling in the ANWR, a solution that would preserve the most crucial caribou habitat in ANWR. For example, Native led coalitions, such as the Gwich'in Steering Committee, passed a formal resolution known as the Gwich'in Niintsyaa 2012, or "Resolution to Protect the Birthplace and Nursery Grounds of the Porcupine Caribou Herd." (Gwich'in Steering Committee, 1). This document calls on Congress recognize the rights of the Gwich'in People to continue to live their way of life by prohibiting development in the calving and post-calving grounds of the Porcupine Caribou Herd; and make 1002 area of the Arctic National Wildlife Refuge be made Wilderness to protect the sacred birthplace of the caribou. (Gwich'in Steering Committee, 1). To draw attention to their pleas, the Gwich'in Steering Committee has presented testimony in front of the U.S. Congress and protested in Washington, D.C. The Committee also played an influential role in the development of the ANWR CCP by providing comments during its public review. By protesting unwarranted oil production in the ANWR, the Gwich'in are mitigating the impacts of climate change on their ancestral territory. A major source of support could be the Arctic Slope Regional Corporation if the group would be willing to forego fossil fuel development in the Coastal Plain. Given the potential reserves, this is unlikely.

Public interest groups such as the Alaskan Wilderness League are making strides by promoting legislation that classifies the entire refuge as wilderness, thereby permanently banning fossil fuel production. Recently, the group has gathered the support of Congressmen Jared Huffman (D-CA) and Michael Fitzpatrick (R-PA) and introduced H.R. 239, the Udall-Eisenhower Arctic Wilderness Act, "to preserve the Arctic plain . . . as wilderness in recognition of its extraordinary natural ecosystems and for the permanent good of present and future

generations of Americans.” (Alaskan Wilderness League). Congressman Fitzpatrick and Huffman hope to transform the entire Refuge into protected wilderness. Four agencies manage wilderness areas under the Wilderness Act: the National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service, and the Bureau of Land Management. As the FWS is one of the agencies already managing wilderness, the transition would likely be smooth and the Refuge would benefit from increased federal cooperation among other agencies.

### **Conclusion**

When wilderness areas are confronted with complex problems such as climate change, it is impossible to craft a single policy mechanism or law to remedy the full suite of causes. These problems are too varied temporally, spatially, and in magnitude for a single agency to manage. Coupled with resource constraints, these problems require increased stakeholder involvement abiding by adaptive management that have the power to create management plans and regulations that carry the force of law. With these principles in mind, the serene beauty and integrity of ANWR can last for generations to come.

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