

**NATIVE COMMUNITIES AND CLIMATE CHANGE: LEGAL AND POLICY
APPROACHES TO PROTECT TRIBAL LEGAL RIGHTS**

DRAFT (JAN 10, 2007)

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UNIVERSITY OF COLORADO SCHOOL OF LAW
BOULDER COLORADO**

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EXECUTIVE SUMMARY

Studies have shown that the last century has already seen measurable changes in the climate—rising temperatures, warming oceans, thawing polar ice sheets, and changes in the hydrologic cycle, to name a few. If climate change is not adequately addressed, these trends are expected to continue or even accelerate, and it is certain that all of us will be adversely affected under even the most conservative predictions of future climate scenarios. In light of this concern, there are a growing number of local, state, and regional efforts to tackle the issues presented by climate change. However, because of the complexity of climate change and the widespread nature of its effects, an effective solution to mitigate climate change will certainly require broad national policy and federal legislation.

For any such legal and policy framework to be truly comprehensive, it will be important for policymakers to consider how climate change affects Native American communities. Traditional tribal practices and relationships with the natural world form the spiritual, cultural, and economic foundation for many Native American nations—foundations that will be, and in some cases already are, threatened by climate change. Thus, there are important ethical reasons to take into account the impact of climate change on native communities. Moreover, many aspects of tribal culture—for example, subsistence practices and water rights for tribal lands—have been recognized and protected by treaties, statutes, and judicial decisions. In the event of growing scarcity of natural resources and other effects of climate change, tribal enforcement of these interests could pose problems for current patterns of use and consumption by non-tribal parties. Therefore, the effects of climate change on tribes will also have weighty legal and practical ramifications of which policymakers must be aware.

This report examines the various ways in which climate change will impact tribes, as well as how tribes might address these issues through legal and policy measures. The study first discusses generally-applicable measures such as climate change litigation and various statutory approaches that are beginning to appear on the local, state, and regional levels. It then uses 4 regional case studies—Alaska, the Pacific Northwest, the Southwest, and Florida—to discuss how the effects of climate change will impact tribes differently in each of these areas, as well as legal and policy measures that tribes might employ to protect their legal rights in the absence of broad federal climate change policy.

As sovereign entities, tribes obviously retain control over how to best address the effects of climate change on their communities, and some of the approaches described herein are already being employed by tribes. Nonetheless, for policymakers to ignore the implications of climate change for tribes would almost certainly lead to tension between tribal and non-tribal interests. By including tribes in the process of crafting national climate change policy and legislation, and by forging cooperative relationships with tribes, policymakers can ensure solutions that will be fair and equitable for everyone.

CHAPTER 1: *THE CHANGING CLIMATE*

The fact that the Earth's climate is changing should not be politically controversial. Yet, it can be exceedingly difficult for researchers—especially in the

United States—to discuss climate change science without wandering into a variety of political minefields. For the research community, therefore, the challenge is to be close enough to the political arena to inform the public debate with findings that are clear and defensible, while remaining sufficiently distant to allow ideas to rise and fall based solely on their scientific merit.

It is in this spirit that the Intergovernmental Panel on Climate Change (IPCC) was formed in 1988 to synthesize the work of thousands of researchers worldwide who are active in this vast subject area, periodically convening to offer a state-of-the-science summary of climate change trends, processes, impacts, and potential adaptation and mitigation strategies. Together, the IPCC data, the National Assessment of the Potential Consequences of Climate Variability and Change (National Assessment), and the billions of observations gathered by a diverse network of weather and climate-related monitoring stations provide an increasingly clear picture of climate change both globally and in the United States.

In general, the 21st century is expected to feature an accelerated rate of climate change compared to that of the 20th century, largely due to the build up of atmospheric CO₂ and the accumulation of heat in the oceans. North American may experience:

- **Temperature.** A continued rise in global temperatures, perhaps in the range of 1.4 to 5.8°C (2.5 to 10.4°F) from 1990 to 2100, likely constituting the most dramatic temperature increase in at least 10,000 years.
- **Precipitation.** Precipitation trends are highly region-specific and among the most difficult climate variables to forecast, but many studies suggest that the 21st century will continue the late-20th century trend toward wetter conditions.
- **Water Cycles/Supplies.** In basins where most of the water supply is associated with snowmelt, the result of warmer temperatures is likely to be an increased ratio of rain to snow, earlier snowmelt, a higher snowmelt peak, decreased summer stream flows and, potentially, higher winter stream flows. These trends have already been observed in many basins.
- **Sea Level Rises.** In addition to physically inundating low-lying coastal areas, sea level rises are expected to accelerate saltwater intrusion in many areas, and increase the vulnerability of coastal communities and ecosystems to extreme weather-related events.
- **Environmental Impacts.** Generally, increased global warming is expected to shift many habitat regimes northward, and accelerate extinction pressures on species requiring moderate and/or cold-water habitats. Extreme weather events provide further stress.

CHAPTER 2: *THE LEGAL STATUS OF AMERICAN INDIAN NATIONS*

American Indian nations have a legal status that is unique, not only in the United States, but globally. At the heart of this distinct status is American Indian tribal

sovereignty. American Indian nations have attributes of sovereignty that entitle them to govern their members, their lands, and, with qualifications, their interactions with non tribal members. Many American Indian nations are religiously, culturally, and economically dependent on traditional relationships with the natural world that will be, and in some cases already are, disrupted by climate change. In addition, American Indian nations have legal rights and interests in natural resources, including water, that have the potential to unsettle current patterns of use and consumption by non-Indians in the event of true scarcity. There are therefore not only important ethical reasons to be concerned about the effects of climate change on American Indian nations; there are weighty legal and practical problems that will arise under even the more cautious predictions of future climate scenarios.

Considering the effects of climate change on American Indian nations may point us towards examples of cooperation and mutually beneficial solutions, in addition to cautioning us about the risks of doing nothing. In the water and natural resources contexts, there are models of cooperative agreements that attempt to ensure equitable and sustainable approaches. The co-management of some fisheries in the Northwest provide but one example. While unqualified human and ecological successes may be rare, it is worth learning from these experiences and trying to improve on them. The longer we wait, the harder it will become to adapt to the ecological and legal consequences of climate change on Indian nations, and then it is certain that every one of us in this country will be adversely affected.

CHAPTER 3: OVER-ARCHING STRATEGIES POTENTIALLY AVAILABLE TO TRIBES IN RESPONSE TO CLIMATE CHANGE

The latest data from the IPCC makes clear that climate change needs to be addressed immediately if there is to be any hope of avoiding serious long-term consequences. There are two broad means to address climate change issues that are generally available: (1) climate change litigation, and (2) legislation to implement climate change policy. To some extent, tribes are already participating in these methods, which will likely play an increasingly important role in efforts to avoid the serious impacts of climate change.

In part because of the absence of federal regulation of greenhouse gases, a number of cases have been brought in federal court raising climate change issues. Tribes have not yet joined as plaintiffs in any of the federal litigation, but they might in the future, and there are a number of litigation approaches they could take. One substantive claim in climate change litigation is that federal statutory regimes require agencies to regulate emissions of the greenhouse gases that cause global warming (such as in *Massachusetts v. EPA*, currently pending before the Supreme Court). Another approach that is gaining in popularity is to sue for damages under tort law, claiming that emissions constitute a nuisance for which damages should be available. Other litigation attacking climate change does so on procedural grounds, such as violations of the National Environmental Policy Act.

These and other litigation strategies are an effort to prod the federal government and private actors to reduce greenhouse gas emissions. The ultimate goal for the plaintiffs is to slow, and even reverse, the adverse affects they are experiencing from

global warming. Thus, because climate change stands to have a wide range of effects across the nation, litigation might be an attractive strategy for tribes everywhere to consider. Because climate change litigation is still a relatively new phenomenon, it is unclear as to how these and other issues might be resolved, which will in turn determine whether such litigation will be a feasible or appealing strategy for tribes. The Supreme Court's decision in *Massachusetts v. EPA* case will shed considerable light on the issues of justiciability, standing, and judicial deference and how they will factor into climate change litigation.

While litigation may increasingly play a role in attempts to combat climate change, the widespread nature of the problem and the various policy issues it involves will undoubtedly need to be addressed legislatively as well. The Energy Policy Act of 2005 does contain some provisions addressing climate change issues. However, the Act does not impose any mandatory limits on greenhouse gas emissions. Thus, there is still no comprehensive federal legislative framework for reducing human contribution to global warming.

With strong federal climate change legislation and policy lacking, there are a number of initiatives on the regional, state, and local levels that take various approaches such as cap-and-trade programs for greenhouse gas emissions, greenhouse gas reporting and registry systems, and initiatives to develop renewable energy technologies. Nonetheless, in the long run, solving the problem of climate change will ultimately require national policy and legislation. In the meantime, however, local, state, and regional legislative efforts might present a more readily available means for tribes to engage in discussions with policymakers to ensure that particular tribal needs are addressed by climate change legislation—an important consideration that should be part of a comprehensive national climate change policy.

Litigation and legislation will inevitably be part of the picture as strategies to address climate change. For tribes, cooperative inter-governmental initiatives will likely also be important. Tribes' governmental status and unique legal rights will require such approaches, irrespective of a broader legislative solution. Cooperative efforts among a number of tribes offer the benefits of pooled resources and the strength of collective voice and unified front. Such groups allow tribes not only to share information, co-manage resources, and otherwise combine their efforts within the inter-tribal community, but also to more effectively work with local, state, and federal governmental entities. Therefore, as concern over climate change and its effect on tribes grows, the commission model will be an important and powerful tool for tribes seeking a solution.

CHAPTER 4: A CLOSER LOOK—4 REGIONAL CASE STUDIES

There is a great diversity of culture among Native American tribes due to unique histories and the close connection between any given tribe and its particular geographic location. Likewise, the effects of climate change vary greatly from region to region due to various geographic, hydrologic, and other factors. Thus, each tribe will be affected by climate change differently, and each tribe—or small groups of neighboring tribes—in different areas will likely have to expand their climate change strategy beyond the general strategies discussed previously.

This report uses four case studies that each concentrate on tribes in a particular geographic region: (1) the Pacific Northwest; (2) Alaska; (3) the Southwest; and (4) Florida. First, each case study will examine the effects of climate change specific to that region, and in particular how those effects impact the tribes there. Second, the studies examine the legal rights of the tribes in question that stand to be affected by climate change. Third, each case study will discuss various legal and policy strategies that might be available and particularly relevant for tribes in each region.

CASE STUDY #1—PACIFIC NORTHWEST

For thousands of years, salmon have been an economic, nutritive, cultural, social, and spiritual cornerstone for the Native American tribes of the Pacific Northwest. The right of these communities to expect that salmon populations will survive to continue playing a central role in tribal culture is not based solely on ancient custom, though. Pacific Northwest tribes have long-established treaty rights to fish for salmon just as their ancestors did. Thus, any harm that befalls the Pacific salmon will necessarily harm those tribes whose identity is inextricably bound to these fish.

Climate change stands to affect the salmon in a number of ways. Rising temperatures will translate to warmer water temperatures, threatening salmon spawning, egg incubation, and rearing. Less snow and more rain in the winter months will alter natural streamflow regimes, thus making it more difficult for juvenile salmon to make their way from fresh to salt-water, and making it more difficult for adult salmon to complete the return migration to spawn in their natal streams. Changes to the nature and quality of the aquatic environment could destroy salmon habitat and spawning grounds, diminish food supplies, and increase the incidence of predators and aquatic contaminants. Reductions in salmon populations hastened by climate change threaten to turn this fundamental legal right to fish into little more than a right to drop their lines and nets into waters devoid of salmon.

There are a host of strategies available to tribes as they work to protect salmon and salmon habitat against the impact of climate change:

- **Water Rights Adjudications or Negotiations.** As climate change exacerbates water scarcity and has other detrimental effects on salmon habitat, tribes might pursue solidification of water rights to protect in-stream flows.
- **Endangered Species Act.** With climate change further imperiling already at-risk salmon populations, the ESA could prove a powerful tool to tribes, who could push for further listings or challenge agency decisions not to list particular salmon species.
- **Contract Law Approaches.** Tribes could employ various legal arrangements such as dry-year and split-season leases, as well as forbearance and subordination agreements, to ensure adequate water supplies for salmon.
- **Protecting Public Lands.** Designating land or rivers as protected under the National Park System can be logistically and politically difficult, but can provide protection for critical salmon habitat. The Hanford Reach National

Monument—encompassing a stretch of the Columbia River that is crucial salmon spawning and rearing ground—provides one example of such designation that tribes could advocate be repeated elsewhere.

- **Intertribal and Intergovernmental Cooperation.** By pooling resources and numbers through intertribal and intergovernmental relationships, the tribes will be able to more easily and efficiently integrate climate change research and response strategies into their overall salmon conservation plans. Furthermore, the unified front presented by intertribal commissions seeking to enforce the treaty right to fish can provide tribes with valuable leverage in setting climate change and salmon policy.
- **Dam Policy.** The rivers of the Pacific Northwest are home to some of the most extensive hydroelectric projects in the world, but these dams can wreak havoc on salmon populations. In order to offset the effects of climate change, then, tribes could push for extensive improvements to make dams more “salmon-friendly,” changes in dam releases to protect or enhance in-stream flows, or even advocate dam removal altogether.

CASE STUDY #2—ALASKA

Climate change may have very strong and immediate impacts on indigenous Alaskans, whose cultures depend on the arctic environment and its natural resources. A warming climate will affect the abundance and availability of the species upon which these communities depend for subsistence. Rising sea levels and reduced pack ice threaten coastal villages with inundation and increased vulnerability to storm surges. Changing weather patterns make the traditional knowledge that has allowed these people to survive the harsh arctic environment less reliable. The possibility of increased marine access and offshore oil development due to climatic change in Alaska may impose conflicting impacts on the cultures and economies of Native Alaskans.

Several specific legal rights are implicated by these impacts of climate change on native Alaskan communities. Most important is the right to continue subsistence activities, which is recognized in federal and state statutes, in treaties, and as part of the federal trust responsibility. In addition, there are various federal and state agency programs that provide assistance for the consequences of flooding and erosion. As climate change threatens both the subsistence practices as well as the homes of indigenous Alaskans, enforcement of these rights will become increasingly relevant.

There are a number of legal and policy strategies available to Native Alaskans seeking to protect their legal rights in light of the effects of climate change. Some of these methods are already being employed, while others could be used in the future:

- **Human Rights Petitions.** Recently, the Inuit Circumpolar Conference filed a petition to the Inter-American Commission on Human Rights alleging that the United States, by not reducing its GHG emissions, is violating several obligations under international law. While the Commission does not have the authority to impose mandatory remedies on the U.S., a finding that the effects

of climate change constitute human rights violations would be influential in imposing a rights-based approach to the climate change discussion.

- **Claims to Offshore Hunting and Fishing Rights.** While federal statutory law has extinguished aboriginal claims within Alaska's boundaries, there is case law suggesting that native Alaskans might successfully claim the right to pursue offshore subsistence activities. These aboriginal claims may provide one avenue for Native Alaskans to protect their subsistence rights. The claims could also be a way for Native Alaskans to gain attention and leverage in Congress because the federal government, as well as offshore energy development companies, may hesitate to lease offshore rights until aboriginal claims are settled.
- **Strengthening Subsistence Rights Protections.** Currently, protections for native Alaskan subsistence rights suffer from a number of weaknesses including conflicting federal and state management regimes and a lack of indigenous-specific subsistence priority that leads to greater competition for subsistence resources from non-indigenous Alaska residents. Therefore, native Alaskans could advocate for changes to subsistence protections and greater control over management of subsistence resources.
- **Enhanced Assistance for Flooding and Erosion Problems.** Erosion and flooding are already serious concerns for many Native villages and climate change may increase the severity and frequency of those problems. Financial assistance, technical advisement, and infrastructure projects can all reduce the problems that flooding and erosion may cause for Native Alaskans. The cost/benefit analysis required under many federal programs often prevents Native Alaskan villages from qualifying for assistance. Therefore Native Alaskans could move to be exempted in order to minimize the flooding and erosion problems caused by climate change.

CASE STUDY #3—SOUTHWEST

In the arid southwest, the nature and amount of water resources has long been a concern. Now, with climate change predicted to affect water availability, seasonal flow regimes, ecosystem health, and water quality, the issues of water quantity and quality take on even more urgency. There are a number of ways in which climate change in the southwest will threaten tribal practices and culture, especially due to the intimate cultural and economic association between the tribes and their reservation land and resources. For instance, the culture of many of the tribes in the southwest has historically been based on agriculture and the raising of livestock—activities that depend heavily upon the land and water resources available to the tribes. Thus, warmer and drier conditions will make continued viability of this lifestyle less certain. Furthermore, these adverse impacts of climate change will also extend to the secondary industries into which tribes have begun to diversify, such as tourism, outdoor recreation, and natural resource extraction.

In the southwest, then, secure tribal water rights are a necessity and there are a number of legal and policy strategies available to protect them:

- **Water Rights Adjudications and Negotiations.** For tribes, the primary means for quantifying and securing water rights is through the use of federally reserved water rights tied to their occupation of tribal lands and the customs and histories of the tribes thereon. Because federal reserved water rights generally date back to the creation of the tribal reservation and are not subject to the “use it or lose it” restriction that governs non-tribal western water users under the prior appropriation doctrine, quantifying these rights could be a powerful tool for tribes as climate change amplifies scarce water resources.
- **Comprehensive Natural Resource Management.** One difficulty of natural resource management in the southwest is that current distinctions—such as between tribal and non-tribal land and resources—ignore the complex interrelationships between resources and thus effectively prevent comprehensive and effective management. For instance, mining on non-tribal lands often affects water availability and quality on tribal land. When coupled with the water scarcity impacts of climate change, such practices can be truly problematic. A statutory regime that more adequately recognizes the ways in which resource management decisions cross the boundaries between tribal and non-tribal lands could assist all involved parties in upholding management stability of shared natural resources.
- **Merging Groundwater and Surface Water Regimes.** Another problem is the distinction between surface and groundwater resources in some western states. Because the two are hydrologically connected, use patterns of one can affect the other—for example, excessive groundwater pumping by non-tribal mining interests has seriously impacted the water table on the Hopi and Navajo reservation lands. Yet despite the hydrological nexus between aboveground and subsurface water systems, some western states manage the two under separate statutory schemes. The inconsistent results only worsen the long-standing problem of water scarcity; when considered in conjunction with similar impacts due to climate change, the cumulative effect on water availability will quickly become untenable, and tribes could push for legislative measures to ensure over-arching water management schemes.
- **Relaxing or Abandoning the “Practicably Irrigable Acres” Standard.** The PIA standard is used to quantify tribal water rights based on the traditional tribal agricultural uses. As climate changes increasingly threaten tribes’ agrarian enterprises, tribes could seek to have this standard relaxed or even abandoned altogether in favor of a new system that would provide them with greater flexibility and control over their water rights and how they use them.

- **Economic Subsidies.** The establishment of tribal trust funds and other monetary assistance is already a characteristic of the water-rights settlement process. As climate change continues to implicate water availability, such economic subsidies by federal and state governments could be an increasingly common direction tribes take in association with affirming their water rights.
- **Water Marketing or Leasing.** With temperatures rising and reservoirs dropping, the ability to participate in water marketing for profit is potentially a powerful tool to be exercised by tribes. However, the extent to which tribes are currently able to lease their water rights is not without limitation and debate. On the other hand, non-tribal rights holders free under the prior appropriation doctrine to lease or sell their water rights to other parties so long as it doesn't interfere with the interests of other water rights holders. Therefore, calling for legislation that puts tribes on equal footing with non-tribal parties as regards the ability to transfer water rights could be an attractive policy initiative for tribes to pursue.

CASE STUDY #4--FLORIDA

Climate change in Florida will manifest in a number of ways: rising temperatures; rising sea levels and other effects on water resources; and weather pattern changes, most importantly with regard to precipitation. These impacts in turn hold significant implications for Florida's tourism and agricultural industries, ecosystems, and human health. The effects of climate change could threaten the tribes of Florida in a number of ways.

The Florida coast, especially the low-lying Everglades region, is susceptible to inundation by rising sea level. Such flooding could result in loss of tribal lands, significant portions of which are in such vulnerable areas. Furthermore, as sea levels rise, storm surges will reach further inland and threaten additional damages. Also, saltwater intrusion could threaten tribal freshwater supplies.

Also, these tribes have a long history of subsistence activities such as hunting, fishing, and growing food crops in and around the Everglades. Rising temperatures, changing weather patterns, encroaching sea levels, and saltwater intrusion could all have devastating impacts on the plants and animals upon which the tribes rely to support their traditional lifestyles.

Finally, climate change could seriously affect tribal economies. For example, citrus and sugarcane operations, an important source of tribal income, could be diminished or lost should climate change make it inhospitable for such crops. Also, rising temperatures, water scarcity, increased exposure of disease, and other effects of climate change might prevent the continued viability of cattle ranching, another tribal industry. Even those economic activities which the tribes have relatively recently engaged in to diversify their tribal economies, such as tourism and gaming, could be negatively impacted if rising temperatures and sea levels reduce the number of tourists visiting Florida.

The problems facing Florida tribes—coastal flooding and erosion and other threats to subsistence practices due to climate change—are the same as those facing

Alaskan native communities. To that end, Florida tribes could consider similar legal and policy approaches for mitigating or adapting to climate change:

- **Federal Assistance for Flooding and Erosion.** In addition to statutory assistance available from federal statutes, tribes might also consider pursuing replacement land or relocation assistance.
- **Stronger Subsistence Rights Protections.** Currently the tribal subsistence rights are subject to government determination that they are not ecologically detrimental, but it is unclear as to what standards would be used to make this determination.
- **Protection of the Everglades.** It is important that tribes participate in these efforts. One way to do this is through the South Florida Ecosystem Restoration Task Force (SFERTF), an entity working to protect the natural environment of southern Florida. The membership of this body is statutorily required to include one representative each from the Seminole and Miccosukee among its fourteen members, thereby giving the tribes an opportunity to raise their own concerns, including the effects of climate change on their communities.
- **Climate Change Mitigation Measures.** The various economic activities in which the tribes are engaged offer opportunities for the tribes to incorporate measures to mitigate climate change. For example, both tribes are involved with extensive cattle ranching operations in which they could employ grazing land management practices such as rotational grazing to achieve net greenhouse gas reductions through enhanced soil sequestration.

INTRODUCTION

Studies have shown that the last century has already seen measurable changes in the climate—rising temperatures, warming oceans, thawing polar ice sheets, and changes in the hydrologic cycle, to name a few. If climate change is not adequately addressed, these trends are expected to continue or even accelerate, and it is certain that all of us will be adversely affected under even the most conservative predictions of future climate scenarios. In light of this concern, there are a growing number of local, state, and regional efforts to tackle the issues presented by climate change. However, because of the complexity of climate change and the widespread nature of its effects, an effective solution to mitigate climate change will certainly require broad national policy and federal legislation.

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CHAPTER 1: *THE CHANGING CLIMATE*

1) Introduction

The fact that the Earth's climate is changing should not be politically controversial. Yet, it can be exceedingly difficult for researchers—especially in the United States—to discuss climate change science without wandering into a variety of political minefields, a problem only confounded by the proliferation of individuals and organizations eager to manipulate scientific data and research to support predefined agendas. Climate change does raise a host of political issues, and while scientific questions are best resolved by professional researchers through the scientific process, the political questions are the legitimate domain of public discourse. For the research community, therefore, the challenge is to be close enough to the political arena to inform the public debate with findings that are clear and defensible, while remaining sufficiently distant to allow ideas to rise and fall based solely on their scientific merit.

It is in this spirit that the Intergovernmental Panel on Climate Change (IPCC) was formed in 1988 to synthesize the work of thousands of researchers worldwide who are active in this vast subject area, periodically convening to offer a state-of-the-science summary of climate change trends, processes, impacts, and potential adaptation and mitigation strategies.¹ The latest (fourth) series of IPCC summaries has just been released.² Together, the IPCC data, the National Assessment of the Potential Consequences of Climate Variability and Change (National Assessment),³ and the billions of observations gathered by a diverse network of weather and climate-related monitoring stations provide an increasingly clear picture of climate change both globally and in the United States.

2) Observed Trends

The clearest and most significant trend in global climate research is a consistent warming, hence the frequent description of climate change as global warming. Over the past century, the average surface temperature of the Earth has increased roughly 1°F, with the most significant increases occurring in the most recent decades.⁴ This warming is far from uniform; regional variations are common and often significant. Generally, warming over land is higher than over oceans, warming at high latitudes (including the continental United States) has exceeded that seen at the equator, warming in winter-spring typically exceeds that of other seasons, and daily low temperatures (rather than daily high temperatures) see the largest increases.

Trends regarding precipitation are much less consistent and more difficult to document, but most of the United States has seen an increase in precipitation (roughly 5-10 percent) over the last century, much of this coming from a higher frequency and intensity of extreme events.

The impacts associated with these climate trends vary in their scope and significance. The most salient impacts on North American resources include: higher ratio of rain to snow, longer growing seasons, increased melting of glaciers and permafrost, shifting of ecological habitats northward, more extreme events, and rising sea levels.⁵

3) Extreme Events and Recurring Phenomenon

Global warming is one example of a change in the baseline (average) condition of a climatic variable, but much of global climate change research is focused on better understanding climate variability—i.e., deviations from “normal”—either in terms of extreme events such as droughts or floods, or in recurring phenomenon such as ENSO (the El Niño/Southern Oscillation). Both parameters are important in many facets of resource management; for example, water managers consider averages to establish the basic contours of long-term water availability and system yields, while extreme events (variance) shape the design of spillways, reservoir curves, and safe yield calculations. Both subjects are independently worthy of study; yet it is the combined impact of changing averages and extremes that is often most relevant to understanding the practical significance of changing conditions. As a general rule, a warming climate means greater energy exists in the atmosphere and oceans, creating the potential for more intense extreme events.

Some of the most fruitful research in recent years has focused on recurring phenomena that can create or modify extreme events and can alter seasonal precipitation totals. Of particular interest has been the phenomenon of El Niño, or more generally, the El Niño/Southern Oscillation or ENSO.⁶ El Niño entails modest (roughly 2°F) increases in sea surface temperatures (SSTs) for several thousand miles along the equator in the eastern Pacific.⁷ A cooling of sea surface temperatures is known as La Niña. La Niña often but not always follows El Niño. El Niño and La Niña are associated with different phases of the Southern Oscillation—patterns of surface air pressure changes between north-central Australia and Tahiti. The term ENSO is usually used to refer to this entire suite of related climatic phenomena.⁸

The existence of an El Niño can have dramatic impacts in the “seasonal climate” in a variety of locales throughout the world, such as the western United States, although some regions are largely unaffected. For example, El Niño generally brings increased precipitation to the Southwest and reduced precipitation (and increasing temperatures) to the Northwest, while a generally opposite effect tends to occur during La Niña.⁹ ENSO also influences the probability and magnitude of extreme storms (e.g., hurricanes) and can modify other seasonal weather phenomena such as monsoons. ENSO events are not a new phenomenon and are thus not likely a result of more recent increases in atmospheric carbon dioxide concentrations and global temperatures. However, global climate changes may be influencing the frequency, strength, and length of ENSO events.¹⁰

4) Looking Forward

There is an increasingly settled opinion in the scientific community that observed global warming is caused by human activities. This conclusion has great political implications, and has thus been politicized—particularly in the United States. It is important, however, to distinguish between the scientific and political uncertainties.

The prevailing scientific consensus is that the temperature increases derive largely from the burning of fossil fuels that have dramatically increased atmospheric levels of carbon dioxide and other greenhouse (i.e., heat trapping) gases. While some researchers

suggest this explanation is too simplistic (ignoring, for example, some natural processes and land-use changes), it is increasingly accepted by the IPCC and others that human activities are a significant driver of the observed trends. This conclusion not only suggests responsibility for current trends lies with developed countries such as the USA (which emits 24 percent of global CO₂ emissions), but also suggests controversial directions for any future mitigation and adaptation strategies. In the world of global climate change, the term mitigation is used to describe strategies for reducing global greenhouse gas emissions, which have great implications for many facets of human societies, especially the technologies and resources used to generate energy. Adaptation, meanwhile, refers to coping with expected changes by better managing risks and vulnerabilities, a line of thinking also with great technological, economic, and social implications.

A desire to avoid these delicate issues provides a powerful stimulus not only to ignore measured trends, but also to discount and discredit future projections suggesting accelerated climate changes and increased impacts. Admittedly, there are many reasons to be skeptical of climate projections, as they derive from a complex research process involving several layers of debatable assumptions. The process starts with immense computer programs called GCMs (global circulation models) that describe the motions of the atmosphere and ocean using the fundamental laws of physics. These models employ scenarios estimating future global releases of greenhouse gases, which in turn are often based on projections of global economic activity, population growth, land use trends, the types of energy technologies in use, and several related factors which are all extremely difficult to estimate. The output of GCMs is reported at the scale of rectangular grid boxes that cover the earth, much like the lines of latitude and longitude cover a globe. These boxes are frequently too large to offer predictions of use to particular cities, reservations, water systems, and so on, so a variety of models and statistical techniques are used to “downscale” the projections to smaller regions of concern where local topographic and microclimate forces are important. This requires a variety of additional assumptions and approximations that can introduce new uncertainties, as do efforts to then convert this output into estimated impacts. For these reasons, almost all models offer at least slightly different projections, and even the scientists are quick to point out that no model probably offers the “right” answer. Nonetheless, almost all models agree that future warming is inevitable.

In general, the 21st century is expected to feature an accelerated rate of climate change compared to that of the 20th century, largely due to the build up of atmospheric CO₂ and the accumulation of heat in the oceans. North American may experience¹¹:

- **Temperature.** A continued rise in global temperatures, perhaps in the range of 1.4 to 5.8°C (2.5 to 10.4°F) from 1990 to 2100. This range is largely explained by different emissions scenarios; it would likely constitute the most dramatic temperature increase in at least 10,000 years.
- **Precipitation.** Precipitation trends are highly region-specific and among the most difficult climate variables to forecast, but many studies suggest that the 21st century will continue the late-20th century trend toward wetter conditions, particularly in the high latitudes.

- **Water Cycles/Supplies.** In basins where most of the water supply is associated with snowmelt, the result of warmer temperatures is likely to be an increased ratio of rain to snow, earlier snowmelt, a higher snowmelt peak, decreased summer stream flows and, potentially, higher winter stream flows. These trends have already been observed in many basins. These impacts are likely to be most noticeable in mountainous areas at relatively low altitudes where just a modest temperature increase can noticeably shift the snowline. How this influences water supplies is a function of several site-specific factors including biophysical characteristics (such as evapotranspiration rates and surface water/groundwater interactions), water management practices (such as reservoir operations), and potential changes in water demands.
- **Sea Level Rises.** In addition to physically inundating low-lying coastal areas, sea level rises are expected to accelerate saltwater intrusion in many areas, and increase the vulnerability of coastal communities and ecosystems to extreme weather-related events.
- **Environmental Impacts.** Generally, increased global warming is expected to shift many habitat regimes northward, and accelerate extinction pressures on species requiring moderate and/or cold-water habitats. Extreme weather events provide further stress.

CHAPTER 2: *THE LEGAL STATUS OF AMERICAN INDIAN NATIONS*

1) Introduction

American Indian nations have a legal status that is unique, not only in the United States, but globally. At the heart of this distinct status is American Indian tribal sovereignty. American Indian nations have attributes of sovereignty that entitle them to govern their members, their lands, and, with qualifications, their interactions with non tribal members. Many American Indian nations are religiously, culturally, and economically dependent on traditional relationships with the natural world that will be, and in some cases already are, disrupted by climate change. In addition, American Indian nations have legal rights and interests in natural resources, including water, that have the potential to unsettle current patterns of use and consumption by non-Indians in the event of true scarcity. There are therefore not only important ethical reasons to be concerned about the effects of climate change on American Indian nations; there are weighty legal and practical problems that will arise under even the more cautious predictions of future climate scenarios.

2) The Sovereign Status of American Indian Nations

In the early period of European arrival to North America, European nations consistently adopted a foreign policy of entering into treaties with the indigenous nations of North America. North American Indian nations were, as a legal matter, viewed as sovereigns for the purpose of ensuring peaceful and orderly settlement by the arriving immigrants. After the Revolutionary War, the United States continued to treat American Indians as nations, rather than aggregations of individuals, and early post-colonial policy and the Indian Commerce Clause of the United States Constitution reflect this legal understanding.

Against this historical and constitutional backdrop, the United States Supreme Court, in a series of three decisions authored by Chief Justice John Marshall in the first half of the nineteenth century, defined American Indian nations as “domestic dependent nations,” retaining attributes of sovereignty that they possessed before the arrival of Europeans. The sovereignty retained, according to Justice Marshall, was that necessary to govern internal matters including control of tribal members and tribal territory. The sovereignty that was lost upon “discovery” by the arriving European nations was the power to enter independently into international agreements with other foreign nations. Justice Marshall’s decisions continue to form the basic legal status of American Indian nations, though federal statutes, executive policy, and judicial decisions have altered, refined, and, depending on the era, affirmed or restricted tribal powers of self-governance.

3) American Indian Treaty Rights

Treaties, as well as federal Executive Orders that function as treaties, form the basis of the federal-tribal relationship. The great variety of treaties, and the distinct geographies and histories of the roughly 540 federally recognized Indian nations, make it

difficult to generalize about American Indian treaty rights. In addition, as discussed in detail in the Alaska case study that follows, the Alaska Native Claims Settlement Act created an entirely different set of legal rights for native Alaskans. Still, some common themes can be identified.

First, treaties typically identify the boundaries of a particular land base for American Indian nations. For some tribes, the land base has been subsequently diminished, allotted, or expanded by executive orders or legislation. In the absence of clear congressional intent, however, the boundaries of a particular reservation remain intact for tribal regulatory and jurisdictional purposes. The tribal land base serves as the cultural and political homeland for Indian nations, and related treaty and statutory rights often relate to the size and potential of the reservation.

Water rights are among the most significant legal rights that accompany a treaty right to tribal land. In *Winters v. United States*, decided at the turn of the twentieth century, the United States Supreme Court held that Indian nations have a right to enough water to render their lands fit for agriculture. Significantly, the Court also held that this “reserved right to water” exists irrespective of whether the Indian nation has yet taken any steps to divert or use the water. The priority date for Indian nations is the date of their treaty, which puts many Indian nations at the front of the line when it comes to competing with non-Indian water users. This *Winters* right, as it has become known, makes Indian nations very powerful players in the allocation of that scarce commodity, water west of the 100th meridian in the United States.

Analogous to water rights, many American Indian nations have reserved rights to other natural resources on their reservations. In addition, many treaties recognize explicit rights to hunt, fish, and gather natural resources even off of the reservation. All of these legal rights to use and benefit from nature’s offerings will be affected by the changing climate, and the legal responses by Indian nations could create serious conflicts with non-Indian users, who will also be facing increasing scarcity.

4) The Federal Trust Responsibility

While Native American tribes are sovereign nations, it has long been established that the United States has a special trust responsibility towards Native American tribes. Generally speaking, this relationship imposes upon the federal government a fiduciary duty toward tribal land and resources. As beneficiaries of this relationship, Native Americans might expect the government to ensure continued protection of land and resources that are culturally, economically, and historically valuable to tribes.

Nonetheless, the trust responsibility has narrowed over time and has largely fallen into desuetude as a basis to compel federal action on behalf of the tribes. Thus, it is an unsettled question as to whether a court would be willing to find that the effects of climate change on tribes amount to a breach of this trust responsibility. Certainly, courts will decline to interfere directly with climate change policy on the grounds that such questions are the province of the legislative or executive branches. Nonetheless, should climate change continue to progress and its impact on tribes escalate, courts might be willing to reconsider whether the trust responsibility requires the government to do more than it is currently doing to prevent the total loss of those resources that give tribes their very cultural identity. And while monetary compensation could never replace the value

of these resources to tribes should the resources ever disappear entirely, the mere threat of such a lawsuit is certainly compelling reason for the government to take its fiduciary responsibility more seriously.

5) The Potential for Cooperative Legal and Policy Solutions

American Indian nations have been grappling with their unique legal status for more than two hundred years. Considering the effects of climate change on American Indian nations may point us towards examples of cooperation and mutually beneficial solutions, in addition to cautioning us about the risks of doing nothing. In the water and natural resources contexts, there are models of cooperative agreements that attempt to ensure equitable and sustainable approaches. The co-management of some fisheries in the Northwest provide but one example. While unqualified human and ecological successes may be rare, it is worth learning from these experiences and trying to improve on them. The longer we wait, the harder it will become to adapt to the ecological and legal consequences of climate change on Indian nations, and then it is certain that every one of us in this country will be adversely affected.

CHAPTER 3: OVER-ARCHING STRATEGIES POTENTIALLY AVAILABLE TO TRIBES IN RESPONSE TO CLIMATE CHANGE

1) Introduction

The latest data from the IPCC makes clear that climate change needs to be addressed immediately if there is to be any hope of avoiding serious long-term consequences. This chapter focuses first on two broad means to address climate change issues that are generally available: (1) climate change litigation, and (2) legislation to implement climate change policy. To some extent, tribes are already participating in these methods, which will likely play an increasingly important role in efforts to avoid the serious impacts of climate change. But such involvement will certainly need to increase for tribes hoping to protect their cultural identities from the effects of climate change. As the final section of this chapter discusses, perhaps the most effective and efficient way for this to happen is through combined efforts of tribal commissions.

2) Litigation

In part because of the absence of federal regulation of greenhouse gases, a number of cases have been brought in federal court raising climate change issues. Tribes have not yet joined as plaintiffs in any of the federal litigation, but they might in the future.

One substantive claim in climate change litigation is that federal statutory regimes require agencies to regulate emissions of the greenhouse gases that cause global warming. The most prominent of these cases is *Massachusetts v. EPA*, in which plaintiffs sued the EPA, asserting that the agency's failure to regulate greenhouse gas emissions by new automobiles violated the Clean Air Act.¹² The United States Supreme Court recently heard oral arguments, and a decision will be forthcoming in 2007. A decision on the merits of the case could affect arguments in other pending cases.

Another approach that is gaining in popularity is to sue under tort law. For example, in *Connecticut v. American Electric Power Co., Inc.*, several states, municipalities, and private organizations sued a group of power companies under federal and state common law nuisance claims, claiming that greenhouse gas emissions by defendants caused global warming and thus gave rise to actionable damages.¹³ Likewise, the State of California recently filed suit against the six largest automobile manufacturers on similar grounds.¹⁴

Other litigation attacking climate change does so on procedural grounds. In *Friends of the Earth v. Watson*, several environmental groups and cities sued two independent government agencies for funding foreign energy projects without conducting environmental reviews as to how greenhouse gas emissions by these projects would affect the environment.¹⁵ This, plaintiffs asserted, was a procedural violation of the National Environmental Policy Act (NEPA), which requires such analysis for all "major federal actions significantly affecting the quality of the human environment."¹⁶ The implication is that, once the emissions and subsequent contribution to global warming of such projects are considered, NEPA will mandate that other less harmful alternatives be pursued.

These and other litigation strategies are an effort to prod the federal government and private actors to reduce greenhouse gas emissions. The ultimate goal for the plaintiffs is to slow, and even reverse, the adverse affects they are experiencing from global warming.¹⁷ Thus, because climate change stands to have a wide range of effects across the nation, litigation might be an attractive strategy for tribes everywhere to consider. In fact, Trustees for Alaska, a public interest law firm in Anchorage, has already filed Amicus briefs on behalf of Native Alaskans in both the *Massachusetts v. EPA* and *Connecticut v. American Electric Power Co.* cases. A victory could be one of the most effective ways to begin the long process of mitigating climate change and the attendant social costs. However, there are also a number of obstacles that plaintiffs face when pursuing climate change litigation which demand consideration.

For example, courts may find that plaintiffs in such cases are seeking a remedy that is inappropriate for judicial resolution because it involves issues that are properly the domain of the legislative branch. This is precisely what happened in the *Connecticut v. American Electric Power Co.* case. There, the court noted that “a non-justiciable political question exists when a court confronts ‘the impossibility of deciding without an initial policy determination of a kind clearly for nonjudicial discretion.’”¹⁸ Further noting that the “scope and magnitude of the relief Plaintiffs seek reveals the transcendently legislative nature of this litigation,” the court granted defendants’ motion to dismiss.¹⁹

Another issue that might thwart climate change litigation is the constitutional doctrine of standing. As the United States Supreme Court has stated, for a plaintiff to have standing to bring a claim into court he must be able to show three things: one, actual injury; two, that the injury is traceable to defendant; and three, that a favorable judgment will redress that injury.²⁰ Any of these conditions might prove problematic. First, while tribes could likely show injury at least based on economic losses, there is precedent suggesting that recovery for cultural losses might not be recoverable.²¹ Second, it might be difficult for plaintiff to show causation by defendant because there are so many contributing sources to climate change—that is, it may be impossible to show that it was defendant’s greenhouse gas emissions, as opposed to someone else’s or even non-anthropogenic climate change, that caused the particular harm.²² Third, the redressability element might fail for similar reasons: even if defendant stopped contributing to climate change, climate change would continue because of the sheer volume of other contributors. The *Friends of the Earth v. Watson* court refused defendants’ motion to dismiss, which was based on the claim that plaintiffs lacked standing, but was careful to point out that the standard for determining standing in cases alleging procedural violations was more relaxed than for substantive cases.²³

Moreover, when plaintiffs claim an agency improperly failed to regulate the greenhouse gas emissions causing climate change, the court may show deference to the agency’s decision. The circuit court did just this in *Massachusetts v. EPA*, siding with the EPA’s decision that it did not have jurisdiction under the Clean Air Act to regulate automobile emissions, and that even if it did it would not exercise the power for policy reasons.²⁴

Because climate change litigation is still a relatively new phenomenon, it is unclear as to how these and other issues might be resolved, which will in turn determine whether such litigation will be a feasible or appealing strategy for tribes. The Supreme Court’s decision in *Massachusetts v. EPA* case will shed considerable light on the issues

of justiciability, standing, and judicial deference and how they will factor into climate change litigation.

3) Legislation and Policy

While litigation may increasingly play a role in attempts to combat climate change, the widespread nature of the problem and the various policy issues it involves will undoubtedly need to be addressed legislatively as well. The Energy Policy Act of 2005,²⁵ enacted on August 8, 2005, does contain some provisions addressing climate change issues. Title XVI of the Act focuses on reducing carbon intensity—the ratio of greenhouse gas emissions per unit of gross domestic product—through use of less carbon-intensive technologies.²⁶ However, the Act does not impose any mandatory limits on greenhouse gas emissions, instead establishing only a voluntary national program to encourage use of cleaner technologies. Significantly, the inclusion of other more stringent climate change provisions was debated before the bill was enacted, including a Sense of Congress resolution acknowledging that climate change was a serious problem substantially caused by human activity, and stating:

Congress should enact a comprehensive and effective national program of mandatory market-based limits and incentives on emissions of greenhouse gases that will slow, stop, and reverse the growth of such emissions at a rate and in a manner that – (1) will not significantly harm the United States economy; and (2) will encourage comparable action by other nations that are major trading partners and key contributors to global emissions.²⁷

Even with the nod to the protection of the economy, this resolution did not make it into the final version of the Act. Thus, despite passage of the Energy Policy Act of 2005, there is still no comprehensive federal legislative framework for reducing human contribution to global warming. In light of such absence, a number of other initiatives have been introduced in Congress. Although these bills addressing climate change issues vary in their approach, they generally involve one or more of the following components: promotion of climate change research; incentives for development and use of emission-reduction technologies; monitoring systems for greenhouse gas emissions; and cap-and-trade or other market-based mechanisms to limit emissions.²⁸

With strong federal climate change legislation and policy lacking, there are a number of legislative initiatives below the federal level:

- **Regional.** In December, 2005, the governors of 7 northeastern states signed an agreement to create the Regional Greenhouse Gas Initiative (RGGI), the nation's first mandatory cap-and-trade program for carbon dioxide emissions by power plants.²⁹ In addition, there are a number of other regional initiatives such as the Clean and Diversified Energy Initiative, the Global Warming Initiative, and the Southwest Climate Change Initiative which seek to replace emission-heavy power with cleaner alternatives, develop renewable energy technology, and promote carbon sequestration.³⁰

- **State.** On the state level, a number of different approaches exist.³¹ 12 states have greenhouse gas emissions targets to reduce emission levels; 5 states have carbon emissions caps or offset requirements for power plants; roughly half the states have greenhouse gas reporting and registry programs; more than half of the states have adopted Climate Action Plans, which identify various ways in which states can reduce their contribution to climate change; and in September, 2006, California Governor Arnold Schwarzenegger signed into law the California Global Warming Solutions Act, “the first enforceable state-wide program in the U.S. to cap all GHG emissions from major industries that includes penalties for non-compliance.”³²
- **Local.** Local initiatives abound as well, with perhaps the most widespread being the U.S. Mayors Climate Protection Agreement founded by Seattle Mayor Greg Nickels and unanimously adopted by the U.S. Conference of Mayors in 2005.³³ Signatories to this agreement—currently 328 mayors representing over 53 million Americans—state their goal of meeting or exceeding Kyoto Protocol targets within their own communities.³⁴

In the long run, solving the problem of climate change will ultimately require national policy and legislation. Such a comprehensive federal statutory regime will offer uniformity and efficiency in implementation and enforcement, and will provide predictability to regulated entities across the country. In the meantime, however, such actions by regional, state, and local government entities provide a much-needed first step and possible blueprints for later federal efforts to curb climate change. Furthermore, local, state, and regional legislative efforts might present a more readily available means for tribes to engage in discussions with policymakers to ensure that particular tribal needs are addressed by climate change legislation.

4) Cooperative Efforts—Tribal Commissions and Inter-governmental Collaboration

Litigation and legislation will inevitably be part of the picture as strategies to address climate change. For tribes, cooperative inter-governmental initiatives will likely also be important. Tribes’ governmental status and unique legal rights will require such approaches, irrespective of a broader legislative solution. Cooperative efforts among a number of tribes offer the benefits of pooled resources and the strength of collective voice and unified front.

Such benefits have long been recognized by tribes as an effective way to make progress when the interests of multiple tribes are aligned. For instance, the tribes of Washington, Oregon, and Idaho, united by their shared culture of salmon fishing, have formed the Northwest Indian Fisheries Commission and the Columbia River Inter-tribal Fish Commission as a means to share scientific, policy, and legal expertise. Similarly, the Inter-Tribal Council of Arizona was founded to “provide the member tribes with the means for action on matters that affect them collectively and individually, to promote tribal sovereignty and to strengthen tribal governments.”³⁵ Likewise, the National Tribal

Environmental Council (NTEC), consisting of 184 federally-recognized tribes, is “dedicated to working with and assisting tribes in the protection and preservation of tribal environments.”³⁶ Recognizing that “[w]hile strength exists in the great diversity of tribal cultures and governments, a united approach that respects tribal differences and works towards cleaner tribal environments is also critical,” the NTEC provides policy analysis, technical support, and other services on behalf of member tribes.³⁷ Such groups allow tribes not only to share information, co-manage resources, and otherwise combine their efforts within the inter-tribal community, but also to more effectively work with local, state, and federal governmental entities. Therefore, as concern over climate change and its effect on tribes grows, the commission model will be an important and powerful tool for tribes seeking a solution.

CHAPTER 4: A CLOSER LOOK—4 REGIONAL CASE STUDIES

There is a great diversity of culture among Native American tribes due to unique histories and the close connection between any given tribe and its particular geographic location. Likewise, the effects of climate change vary greatly from region to region due to various geographic, hydrologic, and other factors. Thus, each tribe will be affected by climate change differently, and each tribe—or small groups of neighboring tribes—in different areas will likely have to expand their climate change strategy beyond the general strategies discussed previously.

The aim of this chapter is to explore and discuss in a more focused, localized manner the effect of climate change on tribes. What follows are four case studies that each concentrate on tribes in a particular geographic region: (1) the Pacific Northwest; (2) Alaska; (3) the Southwest; and (4) the Southeast, in particular Florida. First, each case study will examine the effects of climate change specific to that region, and in particular how those effects impact the tribes there. Second, the studies examine the legal rights of the tribes in question that stand to be affected by climate change. Third, each case study will discuss various legal and policy strategies that might be available and particularly relevant for tribes in each region.

CASE STUDY #1—PACIFIC NORTHWEST

1) Introduction

Salmon is iconic to the residents of the Pacific Northwest, and to none more so than the Native Americans of that region. For centuries, the salmon has played a fundamental and cherished part in the cultural, social, economic, and spiritual life of Pacific Northwest tribes. Salmon play such a central role that the right to continue to fish as they always had was at the heart of the treaties by which these tribes ceded millions of acres of tribal land to the federal government in the mid-19th century.

Unfortunately, the salmon have been plagued by numerous problems over the years: commercial over-fishing has caused their numbers to dwindle dramatically, and pollution, deforestation, and urban development have all taken a grave toll on salmon habitat. Now, it is becoming clear that a new and potentially devastating threat exists in the form of climate change and the numerous ways in which it will negatively affect salmon and the rivers in which they live. Left unaddressed, these impacts could eventually push salmon, already teetering on the brink in many cases, to total extinction. The purpose of this chapter is to discuss various legal and policy strategies by which tribes might mitigate or adapt to climate change in order to save salmon, preserve their treaty right to fish, and ensure their tribal identity and way of life.

2) The Climate of the Pacific Northwest—Observed Trends and Predictions of Future Change

Studies have shown that the last century has already seen measurable change in global climate and that such changes are expected to continue. While the effects of such climate change are myriad, this section will focus on certain key aspects that are of

critical importance when considering the effect of climate change on salmon. In particular, this section will discuss observed trends and future projections for temperature,³⁸ precipitation and hydrological cycles,³⁹ and the nature and quality of both the freshwater and ocean environment.⁴⁰

a) Temperature Changes

Over the last 100 years, the Pacific Northwest has experienced a region-wide warming trend of approximately 1.5° F, with the 1990s emerging as the warmest decade of the past century. West of the Cascade Mountains, average yearly temperature in the Puget Sound area rose at an even higher rate, climbing 2.3° F during the 20th century, with much of the warming taking place in the last 50 years.

As for the coming century, it appears that this warming trend will not only continue, but accelerate: climate modeling predicts that average temperatures for the region will rise at the rate of .5° F per decade at least through the middle of the 21st century. In addition, while the majority of climate models predict that the greatest increases in temperature will occur between June and August, these studies further project that temperature levels will generally rise across all seasons.

b) Precipitation and Hydrologic Changes

The Pacific Northwest as a whole experienced an 11% average increase in annual precipitation in the 20th century. However, yearly levels fluctuated significantly within the region and it is not easy to discern as clear a past trend for precipitation as it is for temperature. Nor are predictions of future precipitation levels as certain as temperature projections, although most climate models show little or only slight change in the annual mean precipitation levels through the first half of the 21st century.

But even if the amount of total precipitation in any given future year does not change significantly, it is also important to consider the hydrological cycle—that is, when precipitation occurs, whether it is in the form of rain or snow, and stream flows. Global warming has had a pronounced impact on the hydrological cycle in the Pacific Northwest over the past century. Especially over the last 50 years, these effects have manifested in such changes as reduced snow-pack and earlier spring snowmelt,⁴¹ as well as increased stream flows in winter and decreased stream flows in summer. Because these changes in the hydrological cycle are linked to global warming, it follows that the projected rise in temperatures in the 21st century will be accompanied by continuation of these hydrological impacts.

For instance, scientists predict that warmer temperatures will lead to more winter precipitation falling as rain than as snow, further reducing the amount of snow pack. Because most of the rivers in the Pacific Northwest—including the Columbia basin, which covers the vast majority of the region—are fed by snowmelt, more rain and less snow will result in higher winter stream-flows and lower summer stream flows.⁴² In turn, it is probable that these changes to natural flow regimes will result in increased winter stream flooding and exacerbated low-flow and drought conditions in the summer months, when water is already in high demand and scarce supply.

c) Changes in the Nature and Quality of the Aquatic Environment

Climate change has already affected, and will continue to affect, the nature and quality of the freshwater and marine environment in the Pacific Northwest region. Over the 20th century, warming temperatures have contributed to an estimated 4 to 8 inch rise in global sea levels due to thermal expansion of the ocean as well as to influx of freshwater from increased polar melting. This trend is likely to increase over the 21st century, with changes anticipated of anywhere from 4 to 35 inches in global sea level. Such changes pose a threat of increased shore erosion and landslides, damage to coastal estuarine and salt marsh habitats, and destruction of near-shore marine plants such as eelgrass and bull kelp.

Also, climatic factors influence the circulation and upwelling patterns in the coastal Puget Sound area. Where the freshwater streams of the region meet the saltwater of the Pacific Ocean, a delicately balanced process of tidal stirring mixes the two. However, as previously discussed, climate change will likely alter the timing of freshwater inflow—increasing it in the winter and decreasing it in the summer—which will in turn impact the circulation and stratification of Pacific Northwest coastal waters. And, while not extensively studied, climate change could alter the wind-driven process of oceanic upwelling that pulls cold, nutrient-laden deep water to the surface along the Pacific coast.

Beyond such physical changes to the aquatic environment, there are also a number of ways that climate change stands to adversely affect water quality itself in the Pacific Northwest region's marine and freshwater systems. Rising air temperatures translate to warmer stream and ocean water temperatures. Changes in the amount and quantity of freshwater input to Puget Sound influence the salinity of the marine environment. Water temperature and salinity levels in turn are major determinants for marine stratification, which itself influences upwelling, oxygenation levels, and phytoplankton growth. Increasing carbon saturation of the oceans—driven by human energy use—is increasing the acidity of the oceans, a trend likely to continue in the future as carbon concentrations intensify. Climate change may also contribute to the ongoing problem of contamination of water resources: for example, high levels of winter precipitation have been identified as the likely cause of excessive fecal coliform levels in Puget Sound in the past, and will likely continue to have such effects in the future. Finally, glacial melt due to global warming not only can have significant effects on stream flow and water temperature of some streams, but can also increase stream contamination when pollutants normally stored in the ice are released by melting.

3) The Effect of Climate Change on Salmon and Subsequent Effect on Pacific Northwest Tribes

Salmon are anadromous fish, meaning they hatch in freshwater, remaining there for anywhere from days to years depending on the species, and then migrate to the ocean to mature, finally returning to their natal freshwater stream to spawn. During their lifetime, these remarkable fish make the transformation from freshwater to saltwater, travel thousands of miles from their birthplace, and then navigate considerable obstacles to find their way back to the very spot they were born in order to reproduce. That salmon

have evolved to survive such a gauntlet, though, does not mean they are invulnerable. In fact, because they move through such a wide range of habitat—from freshwater, to estuarine, to marine, and back again—the effects that climate change will have on salmon populations are numerous. Because the salmon plays such an integral role in the culture of the tribes of the Pacific Northwest, harm to the salmon due to climate change will inevitably cause harm to these tribes

a) Effect of Climate Change on Salmon

i) Temperature Changes

Temperature is one of the most critical elements in the life cycle of salmon. Because rising air temperatures translate into rising water temperatures, global warming poses serious risks to salmon vitality. For instance, higher stream temperatures will affect the temperature-sensitive process of egg incubation—that is, when eggs hatch and whether they hatch at all—thereby risking increased salmon mortality. Even if fry hatch rates are not jeopardized, streams might become so warm that they threaten to reach the thermal threshold for salmon survival. In addition, rising stream and marine temperatures could also negatively affect other aquatic organisms, thus interrupting or diminishing food supply upon which salmon rely. Finally, those salmon that do manage to migrate to the ocean and mature there may still find that higher stream temperatures present a thermal barrier to their return migration to spawn.

Moreover, should ocean temperatures change drastically enough, whole salmon populations might abandon their historic migration patterns and habitat ranges altogether as they push northward seeking cooler water. This phenomenon may already be starting: coho salmon have been recently been found over one thousand miles further north than usual.⁴³ Conversely, rising marine temperatures might expand the range of other species into salmon habitat, thus introducing new and increased predation of salmon stocks. For example, large populations of mackerel have already been observed following warmer currents northward into salmon habitat range and devouring juvenile chinook salmon migrating into the ocean.

ii) Precipitation and Hydrologic Changes

As discussed earlier, climate change will manifest in a number of changes to the hydrologic cycle, all of which could negatively impact the health of salmon stocks.⁴⁴ For instance, rising temperatures mean more winter precipitation will fall as rain rather than as snow. This greater winter rainfall will increase both the frequency and severity of stream flooding. Such flooding scours streambeds and thus potentially destroys prime gravel habitat for salmon nests, or redds; also, it increases the risk of landslides, which cause over-siltification of streams and smother salmon eggs. In a related fashion, global warming will reduce the amount of mountain snow pack and cause what snow there is to melt sooner in the year. As a result, the peak spring stream flow, relied upon by young salmon to assist their outgoing migration to the ocean, might deliver the fish to the ocean before their usual food sources are available. Finally, the lower summer stream flows anticipated as a result of climate change will likely further imperil salmon migration and

in-stream residence, which are already threatened by stiff competition for water resources among numerous users during those months.

iii) Changes in the Nature and Quality of the Aquatic Environment

Beyond effects on temperature and the hydrological cycle, salmon will also be affected by changes to the physical nature of their aquatic habitat and to water quality that will accompany climate change.⁴⁵ For example, erosion due to rising sea levels will destroy considerable estuarine habitat that is crucial for protecting juvenile salmon making the adjustment from freshwater to saltwater. Changes to the patterns of sea stratification and upwelling could prevent deep nutrient-rich waters from entering salmon habitat range, and rising ocean temperatures may disrupt the food chain. In addition, changing salinity and acidity levels might likewise have an adverse impact on the aquatic flora and fauna upon which salmon rely for shelter and nourishment. And increased release of contaminants by glacial melting could further harm salmon development.

b) How Climate Change Affects Pacific Northwest Tribes

For thousands of years, salmon have been an economic, nutritive, cultural, social, and spiritual cornerstone for the Native American tribes of the Pacific Northwest. The historical salmon runs were prolific—it is estimated that the Columbia River basin alone once produced 16 million salmon and steelhead per year.⁴⁶ Because migratory cycles of salmon occurred at regular intervals, tribes could count on them for sustenance year-round; moreover, the success of tribal fishing and curing techniques enabled the development of a thriving system of trade using excess catch.⁴⁷ In addition, tribal reverence for salmon is reflected in various tribal legends and artwork, and figures prominently in tribal spiritual practices.

The right of these communities to expect that salmon populations will survive to continue playing a central role in tribal culture is not based solely on ancient custom, though. Pacific Northwest tribes have long-established legal rights to fish for salmon just as their ancestors did. Thus, any harm that befalls the Pacific salmon will necessarily harm those tribes whose identity is inextricably bound to these fish. Reductions in salmon populations hastened by climate change threaten to turn this fundamental legal right to fish—a right that is at the heart of the identities and vitality of Pacific Northwest tribes—into little more than a right to drop their lines and nets into waters devoid of salmon.

4) Tribal Legal Rights Affected by Climate Change: Treaty Fishing Rights

The history of the legal right of various Pacific Northwest tribes to fish for salmon is comprised of two separate parts. First, this section will take a brief look at the legal basis of that right in treaties with the federal government in the mid-1800s. Second, this section will discuss how the meaning, scope, and implications of this right have evolved through subsequent litigation in the past half century.

a) The Stevens Treaties

In 1854-55, Isaac Stevens—the governor of the Washington territory—forged treaties with many of the Native American tribes living in what are now Washington, Oregon, and Idaho.⁴⁸ Stevens secured the cession of millions of acres of tribal land to the United States; for their part, the tribes were given reservation lands and reserved the right to continue practicing their traditional way of life. Although each tribe had its own distinct culture, salmon fishing was so uniformly practiced by all of these Pacific Northwest tribes that Stevens used essentially the same language in each of the treaties to reserve the tribal right to fish. For example, the Treaty with the Tribes of Middle Oregon contains representative language:

The exclusive right of taking fish in the streams running through and bordering said reservation is hereby secured to said Indians; and at all other usual and accustomed stations, in common with citizens of the United States, and of erecting suitable houses for curing the same; also the privilege of hunting, gathering roots and berries, and pasturing their stock on unclaimed lands, in common with citizens, is secured to them.⁴⁹

Through this provision and its analogues, fishing for salmon was not only acknowledged as an important element of tribal culture, but expressly included as a legal treaty right as well.

b) Subsequent Litigation to Interpret the Treaty Right to Fish

That a right to fish was embodied by the treaties has certainly never been at issue—because the treaty language is explicit. But it has taken extensive litigation over many years to interpret the nature and scope of that right. Below are some of the cases that have helped to define the contours of the tribes’ treaty right to fish:

- **1968—*Puyallup I.***⁵⁰ Members of the Puyallup and Nisqually tribes were fishing for salmon and steelhead with set nets, which the Washington state regulations prohibited. The U.S. Supreme Court—affirming the Washington Supreme Court—held that “the manner of fishing, the size of the take, the restriction of commercial fishing, and the like may be regulated by the State in the interest of conservation, provided the regulation meets appropriate standards and does not discriminate against the Indians.”⁵¹
- **1969—*Sohappy v. Smith/United States v. Oregon (Belloni decision)*.**⁵² The United States sued Oregon, with the Warm Springs, Umatilla, Yakama, and Nez Perce tribes as intervenors, arguing that the state must regulate fisheries to ensure that a “fair and equitable” share of anadromous fish are available to tribes. The court held that “treaty Indians, having an absolute right to that fishery, are entitled to a fair share of the fish produced by the Columbia River system.”⁵³ While Judge Belloni did not quantify this term, he did go on to explain: “[the U.S.] Supreme Court has said that the right to fish at all usual and accustomed places may not be qualified by the state...I interpret this to mean that the state cannot so manage the fishery that little or no harvestable portion of the run remains to reach

the upper portions of the stream where the historic Indian places are mostly located.”⁵⁴

- **1974—*United States v. Washington (Boldt decision)*.**⁵⁵ This case was the Washington analogue of the *U.S. v. Oregon* decision. Here, the court found that the “fair and equitable” tribal share of anadromous fish—directed but not quantified in the *Belloni* decision—is fully one half of all the salmon and steelhead not needed for spawning. As Judge Boldt explained: “non-treaty fishermen shall have the opportunity to take up to 50% of the harvestable number of fish that may be taken by all fishermen at usual and accustomed grounds and stations and treaty right fishermen shall have the opportunity to take up to the same percentage of harvestable fish.”⁵⁶ Moreover, the court qualified the state’s right to regulate off-reservation tribal fishing by providing that such regulation could generally only be imposed with tribal or court approval. This decision was affirmed by the U.S. Court of Appeals for the Ninth Circuit in 1975.⁵⁷
- **1979—*Washington v. Washington State Commercial Passenger Fishing Vessel Association*.**⁵⁸ The Supreme Court of the United States affirmed the Boldt decision, holding that the Indian tribes are entitled to a share of each run of anadromous fish that passes through tribal fishing areas, and that this share could be as much as 50% of any given run of fish. However, the Court went on to explain that the treaty fishing right “secures so much as, but no more than, is necessary to provide the Indians with a livelihood—that is to say, a moderate living. Accordingly, while the maximum possible allocation to the Indians is fixed at 50%, the minimum is not; the latter will, upon proper submissions to the District Court, be modified in response to changing circumstances.”⁵⁹
- **1980—*United States v. Washington Phase II*.**⁶⁰ Whereas the Phase I decision addressed the fishing regard with regard to allocation of fish, this second phase decision focused on the related issue of environmental damage risking salmon habitat. The court found that the right to fish includes an implied right to protection of the habitat from environmental degradation. However, the right is not absolute: the state has no affirmative duty to enact new, additional measures to protect salmon environment. Rather, the state need only exercise its existing regulatory power to ensure that it does not allow harm to the salmon habitat. In addition, the right to environmental protection of salmon habitat extends only so far as is necessary to fulfill the purpose of the treaties—in other words, to provide the fair and equitable share of salmon to tribes.

5) Protecting Salmon and the Treaty Right to Fish: Legal and Policy Strategies by which Treaty Tribes May Address the Effects of Climate Change

The effects of climate change stand poised to join a long line of problems already besetting Pacific salmon. Population growth and urban development, industrial and agricultural pollution, deforestation, over-fishing, and other issues have long jeopardized the viability of fish stocks in the Pacific Northwest. It may be, though, that because of

this history of other threats to salmon health—and the considerable efforts already underway to combat them—the treaty tribes of the Pacific Northwest will find themselves better prepared to address the looming effects of climate change.

There are a host of strategies available to tribes as they work to protect salmon and salmon habitat. Some focus more directly on mitigation of climate change itself, while others are geared towards adaptive means to cope with the effects of climate change. Furthermore, certain of these strategies utilize legal means to address the issues, whereas others are based more on setting or changing policy. But just as the problems which salmon face are complex, so too will be the solutions—it will likely be a combination of approaches that proves most effective for tribes in their efforts to protect salmon and salmon habitat, the tribal treaty right to fish, and ultimately the tribes' very cultural identity.

a) Water Rights Adjudications/Negotiations

Water rights adjudications and negotiations can be a powerful tool for water management in the American west, where demand by stakeholders in a given water resource often outpaces supply. Although adjudications and negotiations differ in some respects, the goal of both procedures is the same—to take stock of, quantify, and administer competing claims to water resources in a given area, often on a basin-wide scale. To illustrate some of the benefits and drawbacks of water rights adjudications and/or negotiations as regards Native American tribes concerned with protecting salmon, it will be helpful to consider the recent example of the Nez Perce Tribe and the Snake River Basin Adjudication in Idaho.

In 1986, the Snake River Basin Adjudication (SRBA) was initiated by the Idaho state legislature to address growing tension among competing stakeholders in the Snake River, including the Nez Perce tribe, the State of Idaho, hydropower interests and a number of federal agencies, and agricultural, industrial, and municipal interests. By 1998, the major legal issues common to all users in the entire state were largely settled, and the most significant unresolved claims in the SRBA were those of the Nez Perce. Finally, on May 15, 2004, Idaho Governor Dirk Kempthorne, Interior Secretary Gale Norton, and Nez Perce Tribal Executive Committee (NPTEC) Chairman Anthony Johnson announced an agreement settling the Nez Perce claims, and on March 23, 2005, the NPTEC accepted the final terms of the SRBA.

One of the driving concerns for the Nez Perce was protection of salmon to allow continued commercial, subsistence, and ceremonial exercise of the treaty fishing right. By the terms of the final agreement they were largely successful.⁶¹ For instance, the agreement provides that the federal government will establish a \$50 million water and fisheries trust fund that will enable the tribe to, among other things, acquire land and water rights and otherwise improve salmon habitat and fish production. In addition, in-stream flows are established for roughly 200 streams identified by the tribe as high priority waterways for salmon viability, and the agreement also provides for establishment of flow augmentation regimes to protect fish. Furthermore, the tribe will assume management responsibility for the Kooskia National Fish Hatchery, as well as a co-management role with the federal government of the Dworshak National Fish

Hatchery. Finally, the state will administer various programs and monies to protect riparian habitat and stream flows pursuant to the Endangered Species Act.

Apart from the opportunity to address specific issues related to salmon, there are other more general benefits that adjudications and negotiations can offer. For example, because these processes are often conducted on a river-wide or even basin-wide scale, they provide a way for uniform application of policy across a wide geographic range and among a large number of stakeholders.⁶² Insofar as tribes introduce salmon protection as a policy to consider, the vast scope of the typical adjudication or negotiation can ensure that any such policies included in the terms are comprehensively and uniformly applied. In addition, adjudications can be beneficial to tribes in that they can permanently determine a quantifiable water right with what is usually an early priority date dating back to a tribe's recognition treaty. This can improve tribal water resource planning and management decisions, as well as protect tribes should they become engaged in water disputes.

Nonetheless, water rights adjudications and negotiations can have significant downsides to consider. First, because these procedures occur on such a large scale and deal with water rights—always a contentious issue in western states—they can take huge amounts of time, money, and energy to consummate. For example, the SRBA began twenty years ago, was only recently fully approved by all relevant parties, and will still take a number of years to implement. For tribes interested in protecting salmon, then, limited resources and acute pressures on salmon health might make adjudication or negotiated settlement infeasible. Second, it is entirely possible that a court will find a tribe entitled to less than the tribe expects—an especially worrisome prospect considering the final and binding nature of judicial decisions. The Yakama Nation, for instance, asserted water rights claims based on its recognition treaty in the on-going Yakima River adjudication, only to have the Washington Supreme Court decide that certain federal legislative, judicial, and executive actions subsequent to the treaty actually reduced the tribe's water right. Alternatively, tribes seeking to negotiate a settlement may have to concede some points in order to win others, such as the terms of the SRBA which qualifies Nez Perce in-stream flow rights to allow for future development of domestic, commercial, industrial, and municipal uses. Either way, tribes seeking to protect salmon might ultimately gain less protection than might have otherwise been imposed.

In spite of these shortcomings, the effects of climate change—hydrologic cycle changes and exacerbation of water shortages, degradation and loss of habitat through flooding, plummeting salmon populations, and others—might convince tribes to consider such proceedings as one potential solution, and might complicate federal obligations under the settlements.

b) Endangered Species Act

The Endangered Species Act of 1973 (ESA),⁶³ the most comprehensive federal wildlife conservation law, has a simple but serious purpose at its core: to protect and restore threatened and endangered species. The basic mechanics of the ESA are pretty straightforward. Section 4 provides the process by which species are listed as either threatened or endangered, including designation of critical habitat for that species. Once a species is listed, the ESA makes it illegal to “take” such species without a permit.

Furthermore, Section 7 requires federal agencies to “insure that any action authorized, funded, or carried out by such agency...is not likely to jeopardize the continued existence of any endangered species or threatened species,” and further that no such action will result in “destruction or adverse modification” of critical habitat.⁶⁴ To ensure that their actions satisfy these conditions, federal agencies consult with the Fish and Wildlife Service (FWS) or the National Marine Fisheries Service (NMFS). If the FWS or the NMFS determines that such action is likely to result in jeopardy or adverse modification of critical habitat, a Biological Opinion is prepared and, if necessary, “reasonable and prudent alternatives” are suggested.

Thus, as salmon populations face increasing threat to their numbers due to climate change, the ESA could be a valuable tool for tribes seeking to protect salmon from extinction. Indeed, there are already a number of west coast salmon and steelhead species listed as endangered or threatened,⁶⁵ and—because the ESA permits any interested party to petition for the listing of a species—tribes could suggest other at-risk salmon species for listing and protection under the ESA. Also, tribes could mount legal challenges to agency decisions to *not* list a particular salmon species or to what they feel are inadequate Biological Opinions that fail to recognize the risk of jeopardy to salmon.

It is important to note, however, that there is inherent tension between the ESA and the treaty right to fish. The statute protects listed species by prohibiting takes of such species; while the tribes are also interested in protecting salmon populations, it is precisely so that they can exercise their treaty right to catch those fish as a fundamental facet of their tribal culture and identity. While the ESA does apply to tribes, the federal government has recognized the need to balance the conservation mandate of the ESA with the rights and wishes of the tribes in light of their sovereign status, the federal trust responsibility, and the treaty right to fish.

Thus, while tribes realize that the ESA is “neither the starting point nor end point for salmon recovery,”⁶⁶ it could nevertheless be an important element in any plan to protect not only the salmon themselves, but also the tribal right to fish.

c) Contract Law Based Protections for Salmon Habitat

As already discussed, protecting the treaty right to fish is fundamentally about protecting salmon and salmon habitat so that fish populations remain healthy. Of serious concern, then, is the potential for further alterations to the hydrologic cycle due to climate change—increasingly higher flows in the winter and increasingly lower flows in the summer—which can in turn negatively impact salmon migration, spawning, and survival. Contract law principles might provide another legal means by which tribes of the Pacific Northwest might attempt to secure in-stream flow rights to protect salmon, particularly in the high-demand/low-supply summer months.⁶⁷

One such approach would be for tribes to enter dry-year leases with other water users. Under such an agreement, the parties would agree that during dry years the tribe would be entitled to use the other party’s water right, allowing the tribe to leave the water in the stream to help salmon; in wet years, when stream flows would not be quite as threatened, the other party would be entitled to their normal use of their water right.

Split-season leases are another contract-based means by which tribes might protect in-stream flow rights. Similar to dry-year leases, these arrangements would allow

tribes to contract with an agricultural user to share the use of the other party's water right. However, here the water right would be split not between dry and wet years but rather between early and late irrigation season, with the agricultural user retaining the use of the water at the beginning of the season and the tribe using the water at the end of the season. Again, this would allow tribes to leave water in-stream at a time when stream levels are especially precarious.

Other similar contractual approaches by which tribes could secure the use of water rights from senior holders for in-stream purposes include forbearance and subordination agreements. Under the former, a senior user would agree not to use their water right when specified conditions are present; under the latter, the senior right would agree not to call against the tribe's junior interest.

Of course, the success of these methods may be dependent on a number of other factors: that a tribe's own water right is both quantified and junior to the other party's water right; that a jurisdiction's water law regime would allow such changes in use and point of diversion; that there are no other intermediate users not party to the agreement who might "intercept" water between the upstream senior interest and the tribe; and that tribes have the financial means to enter into such agreements. Nonetheless, with the relative ease and quickness with which these contract-based strategies could be employed, they could be an attractive alternative to other more complex and time-consuming legal or policy measures.

d) Protecting Public Lands—National Monuments, Wild and Scenic Rivers, and Other Designations Affording Protection to Salmon Habitat

Another potentially significant legal tool for protecting salmon habitat is the designation of public land as part of the National Park System. This system already protects vast quantities of federal land under a number of designations, from national parks and monuments to national seashores and wild and scenic rivers. Whatever the nomenclature, though, the purpose of such designations is the same:

[T]o conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.⁶⁸

Tribes might push for further designations as a means of protecting crucial salmon habitat.

Such set-asides of public lands have already been used to some success in the effort to restore and protect salmon and salmon habitat. For example, President Clinton created the Hanford Reach National Monument in 2000.⁶⁹ The monument encompasses nearly 200,000 acres in Washington State and embraces one of the last remaining free-flowing stretches of the Columbia River. This proclamation provides protection to this 51-mile stretch of river that is of critical importance for Columbia basin salmon: approximately 80% of the fall chinook salmon spawn here,⁷⁰ and spring chinook and steelhead use the Reach for migration.

Perhaps the most significant feature of national monument designation, at least as far as salmon preservation is concerned, is that of federal reserved water rights. Essentially, this doctrine provides that when the federal government makes a reservation

of public land, it also makes a reservation of accompanying water rights sufficient to fulfill the specified purpose of the monument.⁷¹ To the extent that a monument like Hanford Reach is created at least in part to preserve fish and wildlife, such designation should thus secure in-stream flows for that purpose and perhaps help to minimize water shortages exacerbated by climate change.

In addition, a number of rivers in the Pacific Northwest have been declared part of the National Wild and Scenic Rivers system, thereby affording similar protections to salmon and salmon habitat.⁷² Rivers can be designated by federal or state legislation as either wild, scenic, or recreational river areas. To qualify as wild, a river segment must have no impoundments and be essentially undeveloped, unpolluted, and accessible only by trail; scenic areas are generally similar but may be accessible to some extent by roads and have minimal development along their shorelines; and recreational river areas may have been impounded at some prior time, and can have more development and road access than the others.

None of these river designations is meant to prevent all future development—the system is sometimes described as a “living landscape”—and uses in accord with any given designated river’s character will generally be allowed. Still, as with national monuments, so long as a designation is originally predicated upon a river’s significance as salmon habitat some protection will be afforded.⁷³ Most importantly, to qualify as any one of the three types, a river must be currently free from any impoundment. This is significant because dams tend to have similar ill effects on habitat as climate change: increased water temperatures, destruction of protective river structure, and loss of spawning and rearing grounds. Without dams contributing to these negative impacts, designated rivers should face relatively less severe conditions.

In sum, while setting aside public land for protection does not directly address the causes of climate change, such a move can still provide some measure of insurance against its negative effects—especially when those impacts are compounded by similar effects of other activities allowed on non-designated lands. Of course, it is necessary to acknowledge that designating public lands can be a considerable undertaking. Logistically, it might be difficult to find contiguous areas of public land or stretches of rivers that are beneficially located and not subject to difficulties posed by private interests. And the politics of designation can often overshadow the conservation purpose, giving elected officials pause over recommending protection. Nonetheless, these difficulties do not necessarily present insurmountable obstacles. For instance, monuments need not contain vast lands on the order of hundreds of thousands of acres, nor must a wild and scenic river stretch for dozens of miles. Furthermore, the initial controversy surrounding past designations has often been replaced by widespread appreciation. Thus, lobbying for such designations could be of great benefit to tribes in the Pacific Northwest seeking to keep salmon and their treaty right to fish alive.

e) Intertribal and Intergovernmental Cooperation

Because of the importance of salmon to the treaty tribes of the Pacific Northwest, these tribes have long been actively involved in assessing and responding to various threats to salmon populations and habitat. This participation has often come in the form of cooperative efforts among the various tribes as well as between tribes and other

government entities. Efforts include sharing scientific and technological expertise, joint involvement in policy setting and decision-making, and combined management of the salmon resource.

Intertribal cooperation has resulted in the creation of two different commissions, one serving the treaty tribes of the Columbia River basin in eastern Washington, Oregon, and Idaho, and the other comprised of the treaty tribes of western Washington in the Puget Sound region. The former, called the Columbia River Inter-Tribal Fish Commission, was formed in 1977 and consists of four tribal nations.⁷⁴ The latter, dubbed the Northwest Inter-Tribal Fish Commission, was formed in 1974 and counts some 20 tribes as members.⁷⁵ The commissions employ scientific staffs—geneticists, hydrologists, biologists, and other scientists—to study salmon and their ecosystem and legal experts to represent tribal interests in salmon.

In addition, the treaty tribes work with various federal agencies such as the Fish and Wildlife Service and National Oceanographic and Atmospheric Administration to co-manage fisheries and hatchery programs, produce joint long-range recover plans, and develop salmon conservation policy. It should also be noted that tribal participation and consideration of tribal interests are expressly or impliedly provided for by various treaties and statutes such as the Pacific Salmon Treaty between the U.S. and Canada⁷⁶; the Columbia River Compact between Washington and Oregon states⁷⁷; and the Northwest Power Act.⁷⁸

By pooling resources and numbers through the intertribal and intergovernmental relationships, the tribes will be able to more easily and efficiently integrate climate change research and response strategies into their overall salmon conservation plans. Furthermore, the unified front presented by intertribal commissions seeking to enforce the treaty right to fish can provide valuable leverage in setting climate change and salmon policy, especially where tribes are guaranteed representation in deciding bodies and statutory frameworks.

f) Dam Policy

The rivers of the Pacific Northwest are home to some of the most extensive hydroelectric projects in the world. These dams provide a number of benefits—plentiful irrigation water that has made the region a key agricultural producer; navigable routes for barges to ship crops; and plentiful electric power that is far cleaner than other technologies. However, these benefits come at a price: dams have transformed wild, free-flowing rivers into chains of lakes and have devastated the once-abundant runs of salmon in these waters. Dams raise water temperatures, inundate and destroy spawning and rearing grounds, physically block off migratory routes, and kill salmon sucked into the turbines. As the effects of climate change compound these problems and pose increasing risk to the health of salmon, re-examining the role of dams and dam policy will play an important part in tribes' efforts to protect salmon.

Tribes may advocate increased recognition of salmon conservation policy in determining timing of water releases, flow regimes and hydropower generation schedules for dams. Specifically, because climate change has already altered and will continue to alter the seasonal run-off patterns, tribes could work to secure augmented flow regimes. Such calculated releases of impounded water during critical low-flow periods can

enhance stream habitat for salmon both by increasing stream flow and decreasing water temperature.

In addition, tribes might seek to force dam operators to install improved fish passage technology. Current attempts to offset harm by dams to young salmon involve massive programs by which the fish are siphoned out of the water and then trucked or barged downstream to be released back into the river below the lowest dam. Not only has this system proven extremely ineffective at reducing population decline, it is also extremely expensive, costing hundreds of millions of dollars per year. But it appears that recent strides are being made to insure improved means for salmon to bypass dams that may be more successful in conserving salmon stocks.⁷⁹

Ultimately, though, it is hard to ignore the fact that even with these protective efforts, dams cause high mortality rates for fish populations. Salmon runs on the Klamath River once numbered as high as 1,000,000 fish; now, girdled by a series of four dams, the river sees only a small fraction of that, and has witnessed massive fish kills due to low water conditions such as one in 2002 in which 70,000 fish died before being able to spawn. And this year, only three sockeye salmon managed to traverse the eight Columbia River and Snake River dams that stand between the Pacific Ocean and their natal waters, Redfish Lake in Idaho—a figure that represents one ten-thousandth of the number that used to successfully make the journey. Consequently, advocacy for dam removal altogether is growing, and has resulted in spirited debate by those in favor of and those opposing dam removals. There are, of course, concerns surrounding dam removal: decrease in the clean energy production of hydropower and resulting rise in electricity rates; considerable costs involved in dam removal; loss of barge shipping routes; and the possibility that breaching dams will cause built-up pollutants and sediment to wash downstream and contaminate or smother salmon habitat.

On the other hand, there are compelling counterarguments to support a policy of dam removal. For instance, the huge amount of money now spent trying to mitigate dam effects on salmon⁸⁰ could be spent to offset costs of dam removal by fostering alternative energy technologies and developing other modes of shipping such as improved rail systems. Furthermore, many of these large dams currently contribute little to the Pacific Northwest power grid,⁸¹ and there is even some evidence to suggest that while hydroelectric power is among the cleanest technologies it nonetheless contributes to global warming due to greenhouse gas emissions from impoundments.⁸² Also, in many cases the projected costs of dam removal are far less than the cost of fitting dams with fish ladders and other measures to protect salmon. Finally, studies have shown that the risk of pollution and sterilization of streams caused by release of sediments is not nearly as great as previously thought.

Beyond these points in favor of dam removal, there are also a number of legal bases upon which dam removal policy can be based. The Endangered Species Act (ESA) prohibits federal agencies from jeopardizing listed species or designated critical habitat. Considering the fact that a number of salmon species are either threatened or endangered, in combination with evidence that dams cause jeopardy to these populations, it could be argued that the ESA mandates dam removal by the federal agencies involved. Likewise, studies have shown that dams warm streams to such a degree as may violate federal and state water quality standards for water temperature and dissolved gas levels.⁸³ These clean water statutes, then, provide another potential legal argument for dam removal.

Certainly the most significant legal basis for dam removal as far as tribes are concerned is the treaty right to fish itself. Dams may represent the single greatest threat to continued survival of salmon, but the negative effects of climate change might be the proverbial last straw for salmon survival. To prevent the treaty right to fish from being eviscerated by the disappearance of salmon, then, dam removal might be a very effective means to do this.

CASE STUDY #2—ALASKA

1) Introduction

Alaska Natives form eleven distinct cultures, which are organized into five groups based on cultural similarities or geographic proximity: (1) the Athabaskan, who inhabit the interior and eastern Alaska, (2) the Yup'ik and Cup'ik, who inhabit western Alaska, (3) the Inupiaq and St. Lawrence Island Yupik, who inhabit the northern and northwestern Arctic of Alaska, (4) the Aleut and Alutiiq, who inhabit south-central Alaska and the Aleutian Islands, and (5) the Eyak, Tlingit, Haida, and Tsimshian, who inhabit the southeastern archipelago of Alaska. Together these groups represent approximately 16 percent of all Alaskan residents.

Climate change may have very strong and immediate impacts on these Native Alaskans. The Arctic Climate Impacts Assessment concludes that “[i]f the scientific projections and scenarios are realized, climate change could have potentially devastating impacts on the Arctic and on the peoples who live there, particularly those indigenous peoples whose livelihoods and cultures are inextricably linked to the arctic environment and its wildlife.”⁸⁴ Several specific legal rights, especially protections for Alaskan Native subsistence activities, may become increasingly relevant with these impacts of climate change. Native Alaskans have already been involved in legal action against parties responsible for climate change and its impacts, but there are several other legal strategies they might adopt. Several policy initiatives could increase Native Alaskans’ ability to adapt to the impacts climate change. Future research aimed at community-level vulnerabilities and adaptive strategies could help Native Alaskans minimize the negative consequences of climate change.

2) Climate Change in the Alaskan Region

The Alaskan climate has already changed significantly over the last half-century and there is little scientific doubt that the region will only become warmer and wetter throughout the twenty-first century.⁸⁵ In Alaska, winter temperatures have increased as much as 3-4° Celsius over the last 50 years. Under a moderate greenhouse gas (GHG) emission scenario, annual average temperatures over land in the arctic region are predicted to rise by another 3-5° Celsius in the next 100 years while annual average temperatures over the ocean will rise by up to 7° Celsius. In addition, winter temperatures are projected to increase more than other seasons: 4-7° C over land and 7-10° C over the oceans.

This warming trend impacts the amount of sea ice in arctic regions as well as sea levels throughout the world. In the past 30 years, the annual average sea ice extent in the

arctic region has decreased by about 8%, an area the size of Texas and Arizona combined. By 2100, the annual average sea ice extent is expected to decline by another 10-50%. Furthermore, the global average sea level is projected to rise anywhere between four inches and three feet during the twenty-first century.

These climatic changes are having, and will continue to have, significant effects on arctic landscapes. Warmer climates favor taller, denser vegetation; as the arctic warms, forests may expand into regions currently dominated by tundra, which may in turn expand into regions currently dominated by polar desert. Also, such phenomena as forest fires and insect infestations are expected to increase in frequency and intensity due to a warming climate. Severe coastal erosion will be a growing problem throughout the arctic as the sea level rise and reductions in sea ice allow higher waves to reach the shore unchecked. Permafrost in the arctic is already thawing, thus adding to coastal vulnerability to erosion.

The effects on the arctic landscape in turn affect the animals that live in arctic regions. Species like polar bears and seals are dependent on sea ice for such activities as breeding, hunting, and resting, and will have difficulty surviving life without abundant sea ice. On land, important breeding and nesting areas for migratory birds are projected to decrease as the tree line moves north and rising sea levels cover the tundra. In fact, some bird species, including a number of endangered seabird species, could lose more than 50% of their breeding area during the next century. Caribou and reindeer populations, dependent upon tundra vegetation for food, might also decline as vegetation zones shift northward.

The changes in the arctic landscape will also directly affect humans. With thawing permafrost, transportation on land will be more difficult as the amount of stable ice roads and tundra to travel on will decrease. This change is already directly impacting the oil industry in Alaska, as the number of days during which oil exploration is allowed on the tundra has been cut in half over the last 30 years due to the warming climate. However, other climatic changes may be favorable to economic development: “the retreat of sea ice in the summer will prolong the shipping season and open new shipping routes. There may also be direct impacts on human health as conditions will be more favorable to the spread of infectious diseases in animals, such as the West Nile Virus.

3) Impact of Climate Change on Native Alaskans

While a certain degree of uncertainty may always be involved in projecting future events, the latest scientific data from the IPCC provides compelling evidence that climate change has the potential to severely impact Native Alaskans. This section looks at several specific ways in which climatic change is affecting, or is predicted to affect, indigenous people of the North American arctic, in particular Native Alaskans.

a) Subsistence Activities

Indigenous people in the Arctic hunt, herd, fish, and gather renewable resources. The ability of Native Alaskans to engage in these subsistence activities is crucial to their well-being and culture. These activities have already been impacted by climate change

and continuing climate change may put severe stress on Native Alaskans by reducing their ability to engage in subsistence activities.

Hunting and other subsistence activities are important to the lifestyle of Native Alaskans in a number of ways. First of all, local food from hunting is often cheaper and more nutritional than imported alternatives.⁸⁶ Additional health benefits come from the physical exertion required to harvest wildlife resources, which contributes to the physical and mental health of individuals. Lastly, subsistence activities are culturally and socially important for Native Alaskans. For example, many communities maintain sharing networks, whereby an animal caught by one hunter will be shared and distributed throughout a community. This process reaffirms “fundamental values and attitudes towards animals and the environment and provide[s] a moral foundation for continuity between generations.”⁸⁷ Thus, “participation in family and community subsistence activities, whether it be clamming, processing fish at a fish camp or seal hunting with a father or brother, provide the most basic memories and values in an individual’s life.”⁸⁸

Climate change has the potential to significantly impact the subsistence activities of Native Alaskans in at least two important ways: (1) changes in the availability and abundance of species, and (2) increased risk and difficulty associated with subsistence activities. First, several important mammals including walrus, polar bears, and some seal species are likely to experience population declines with the predicted climate change. Meanwhile, the migration routes and ranges of other species could change, which may affect animal availability for Native Alaskans. It is important to note, though, that the impact of climate change on subsistence activities depends both on location and on the specific activity in question. For example, the Qikitagrugmiut of northwest Alaska report that the later freeze up results in better harvests of whitefish, clams, spotted seal, and arctic fox, but a shorter ice-fishing season.⁸⁹ In the same region, reindeer herds are being crowded out of their usual territory range by westward migrations of Western Arctic Caribou. By the spring of 2001, caribou had already driven eight of the fifteen Seward Peninsula reindeer herders out of business, which forces these herders to seek income from other sources, such as guiding tourists.⁹⁰

The second important manner in which climate change impacts subsistence activities is by increasing the risk, time, and cost involved in such activities. Pack ice is now further from shore and often too thin for safe travel, and decreased levels of sea ice result in more violent seas, which are more dangerous to hunters. Furthermore, the unstable sea ice makes hunting on the ice edge more difficult and dangerous, and changes in snow cover could make access to hunting and fishing areas more difficult.⁹¹ These dangers are exacerbated by the fact that poor snow conditions mean Arctic hunters are having difficulty building the igloos on which they rely for emergency and temporary shelters. Not only does environmental change increase the risk associated with hunting, but it also increases the time and money required for the hunt, and therefore decreases the capability of the Native Alaskans to continue their subsistence lifestyle.

To provide a clear illustration of the nature and complexity of climate change impacts on subsistence activities, it is helpful to consider the example of caribou hunting, a subsistence activity crucial to several indigenous groups of North America including the Athabaskan and Iñupiat groups of Native Alaskans. The success of such hunts—both in terms of the number of caribou available as well as the hunters’ ability to pursue them—is dependent on a number of variables, many of which are affected by climate.

For example, snow depth and rate of spring snow melt play a role in the health of caribou herds, and at the same time affect hunters' access to the hunting grounds. Importantly, not only do environmental factors affect both the prey and the hunter, but often in opposing manners—low snow levels might increase herd health, while at the same time making access to the herds more difficult. Finally, other factors not as directly impacted by climate change—access to hunting equipment, for example—also need to be considered. While predicting how climate change will affect caribou and the caribou hunt is a complex issue with some degree of uncertainty, it is clear that climate change could have considerable negative impacts on indigenous Alaskan communities. One study of four indigenous communities who use the Porcupine Caribou Herd found that under possible climate change scenarios, within 40 years less than half of the indigenous households would be able to meet half their Caribou needs.⁹²

b) Flooding, Erosion, and Relocation

With a rising sea-level, melting sea-ice, and thawing permafrost, many coastal Native Alaskan villages may be impacted by increased flooding and erosion. A recent study by the General Accounting Office found that over 86 percent of the 213 Alaskan Native villages are already subject to flooding and erosion problems.⁹³ While flooding has long been an issue, the study concluded that, partly due to rising temperatures, coastal villages are becoming more susceptible to the problem. Increased temperatures mean that the shore ice, which ordinarily protects coastlines by buffering the shore from incoming waves, forms later in the year and thus leaves villages more vulnerable to storms. The study also noted that melting glaciers, thawing permafrost, and reduced sea-ice all may contribute to increased flooding.

The Alaska Native villages of Kivalina, Koyukuk, Newtok, and Shishmaref are among several villages that are in imminent danger from these problems and are therefore planning to relocate. These relocations exemplify how real and immediate problems associated with climate change may be for Alaska Natives. For example, Shishmaref sits on an island roughly three miles in length and has approximately 600 inhabitants. During severe storms the village has lost up to 125 feet of land due to erosion. In October of 2002, cracks in the seaside bluffs indicated that the permafrost holding the island together was melting, which put the banks at risk of caving in. Several homes had to be relocated so they would not fall into the sea. The community voted to relocate the village in July of 2002 and is working on selecting a relocation site with the Natural Resource Conservation Service. This process will be very expensive and therefore a serious burden for the community.

c) Effect on Traditional Knowledge

Indigenous people of the arctic have been able to thrive in their harsh environment by developing a rich base of traditional knowledge. This traditional knowledge plays several important roles but “perhaps its greatest value lies in keeping alive the important stories of past places, practices and events, thus facilitating the intergenerational flow of information that depicts dynamic and highly localized environmental histories.”⁹⁴ However, many indigenous people of the arctic note that their

traditional knowledge is becoming less useful due to climate change. For example, experienced hunters and elders are now frequently unable to predict weather using traditional techniques. The Arctic Climate Impacts Assessment reports that:

The weather seems less stable and predictable. From sources of indigenous knowledge across the Arctic come reports that the weather seems more variable, unfamiliar, and is behaving unexpectedly and outside the norm. Experienced hunters and elders who could predict the weather using traditional techniques are now frequently unable to do so... As noted by several elders, 'the weather is harder to know.' This presents problems for many activities, from hunting to drying fish, on which Indigenous Peoples depend.⁹⁵

Being unable to accurately predict the weather is a significant physical danger because it makes travel and hunting more dangerous. It also emotionally distresses elders and hunters who can no longer predict the weather, which demonstrates the potential for emotional impacts on Native Alaskans due to the physical impacts of climate change.

d) Exposure to Contaminants

The arctic environment is impacted by various contaminants, such as mercury, which are predominantly produced at lower latitudes and transported north by natural pathways.⁹⁶ These contaminants bio-accumulate and bio-magnify so that species nearest the top of the arctic food chain, such as indigenous people, are exposed to the most contaminants through food acquired by traditional subsistence practices. The impacts of these contaminants may include immunodeficiency and neurodevelopment problems. While the issue is not well understood at this point, as the climate changes it may influence the exposure of indigenous people of the arctic to contaminants. For example, studies have shown that previous bans and restrictions on pesticides in Canada and the United States decreased the contaminant concentration in arctic species because those pesticides were no longer being transported by the wind to the arctic. However, if climate warming in southern regions causes pests or diseases to emerge or re-emerge in the lower latitudes, and as a result pesticide bans are lifted, it may increase the amount of chemicals in traditional foods consumed by indigenous arctic people. Also, shifts in the range and distribution of animals, along with changes in geochemical cycling due to precipitation changes may affect the amount of contaminants northern inhabitants are exposed to. Changes in the distribution and abundance of primary producers such as algae may also change peoples' exposure to contaminants. For example, if climate change increases the population size of aquatic algae, then contaminant levels in the higher trophic levels, such as fish, may be reduced. Yet another possible source of increased contaminants in the arctic food chain is the improved shipping accessibility and access to offshore oil. Increased sea traffic implies a higher risk of hazardous waste spills, which can significantly increase exposure of indigenous people to contaminants.

e) Effect on Sovereignty and Culture due to Increased Marine Access

The possibility of increased marine access and offshore oil development due to climatic change in Alaska may impose conflicting impacts on the cultures and economies of Native Alaskans. On the one hand, increased offshore oil development and coastal

tourism might provide significant economic development opportunities for many Native Alaskans. For example, the North Slope Borough's Inupiat residents already receive a great deal of tax revenue from oil development, and other residents may see similar benefits. Furthermore, the possible increased availability of jobs and oil revenue may increase the capability of Native Alaskans to purchase the supplies necessary to engage in their subsistence activities. Therefore, the increased marine access may improve Native Alaskans' abilities to engage in traditional subsistence activities. On the other hand, increased coastal development and offshore oil development may harm the subsistence resources that are such an important part of many Native Alaskans' livelihood and culture, and simultaneously draw Native Alaskans away from their traditional culture into a purely wage-based economy.

4) Legal Rights of Native Alaskans That Might be Affected by Climate Change

This section describes some of the legal rights of Native Alaskans that may become increasingly relevant and important with the impacts of climate change. The sources of legal rights of Native Alaskans differ somewhat from those of the tribes discussed elsewhere in this study and therefore this section first provides a basic background on the legal status of Native Alaskans. Then it addresses specific legal rights, predominantly those involving subsistence activities, which may become increasingly relevant with the predicted changes in the Arctic climate.

a) History

In the 1960s, when the state of Alaska began selecting land under the Alaska Statehood Act,⁹⁷ Native Alaskans protested due to their concerns that aboriginal land claims would be compromised. Secretary of the Interior Stewart Udall imposed a freeze on land selection until native land claims could be resolved.⁹⁸ Perhaps because the Prudhoe Bay oil field was discovered after the land freeze, and a pipeline was not economically feasible with the risks of native land claims, legislation was quickly introduced to resolve those claims, and the Alaska Native Claims Settlement Act (ANCSA) became law in 1971. ANCSA extinguished “[a]ll aboriginal titles, if any, and claims of aboriginal title in Alaska based on use and occupancy, including submerged land underneath all water areas, both inland and offshore, and including any aboriginal hunting or fishing rights that may exist...”⁹⁹ In exchange for that extinguishment, Congress permitted Native Alaskans to select for ownership approximately 45 million acres of land, and distributed \$462.5 million in congressional appropriations and \$500 million in anticipated Alaska state oil royalties. Instead of distributing the settlement to existing tribal governments, Congress tried to hasten assimilation of Alaska natives into corporate society by creating village corporations and regional corporations, which received the settlement, selected their own lands, and administered their portion of the settlement money to qualified Alaskan Natives.

b) Subsistence Rights

The ability of Alaskan Natives to practice their subsistence activities may become increasingly stressed with the impacts of climate change. “Alaska Native cultural existence is so intimately bound to subsistence that, if Alaska Natives are to continue as distinct cultures within American Society, their subsistence uses will have to be accorded continued legal protection.”¹⁰⁰ Therefore, their existing legal subsistence rights, and any potential for expanding those rights, play an important role in the adaptability of Native Alaskans to climate change.

i) Federal Statutory Origins

Several federal statutes are relevant to the legal protection of Native Alaskans’ subsistence activities. First of all, on its face ANCSA extinguished all Native Alaskan subsistence claims based on aboriginal use. However, Congress intended that those interests should be protected by the Secretary of the Interior and the State of Alaska. When the subsistence interests of Native Alaskans were not adequately protected, Congress passed the Alaska National Interest Lands Conservation Act (ANILCA),¹⁰¹ which in some sense is a settlement of the Native Alaskan hunting and fishing claims that ANCSA purported to extinguish. This later statute includes a comprehensive definition of subsistence hunting and fishing rights, establishing subsistence protections based not on tribal membership but instead based on rural residency. ANILCA’s provisions, and those of several other federal statutes, include exemptions for subsistence activities from the restrictions the statutes impose, provide federal protection over Native Alaskans’ subsistence activities.

ANILCA, and the cases interpreting it, provide a fundamental source of the Alaskan Native subsistence rights that may be affected by climate change. In ANILCA, Congress formally recognized the importance of subsistence activities in its declaration of findings:

- (1) the continuation of the opportunity for subsistence uses by rural residents of Alaska, including both Natives and non-Natives, on the public lands and by Alaska Natives on Native lands is essential to Native physical, economic, traditional, and cultural existence and to non-Native physical, economic, traditional, and social existence;
- (2) the situation in Alaska is unique in that, in most cases, no practical alternative means are available to replace the food supplies and other items gathered from fish and wildlife which supply rural residents dependent on subsistence uses;
- (3) continuation of the opportunity for subsistence uses of resources on public and other lands in Alaska is threatened by the increasing population of Alaska, with resultant pressure on subsistence resources, by sudden decline in the populations of some wildlife species which are crucial subsistence resources, by increased accessibility of remote areas containing subsistence resources, and by taking of fish and wildlife in a manner inconsistent with recognized principles of fish and wildlife management...¹⁰²

To protect subsistence, ANILCA establishes a priority for subsistence uses by rural residents whereby taking of fish and wildlife on public land for non-wasteful subsistence uses are given priority over takings for other purposes. Furthermore, whenever restrictions on subsistence uses on public lands are necessary, any limitations on subsistence use should be prioritized, based on customary dependence upon the practice as the mainstay of livelihood and availability of alternative resources.

ANILCA also provides Native Alaskans with important influence on federal regulations regarding subsistence. The Secretary of the Interior and the Secretary of Agriculture established the Federal Subsistence Board to oversee subsistence management on federal public lands and water in Alaska. For example, the Board determines what Alaskan areas qualify as “rural” under ANILCA and therefore qualify for the subsistence priority. In 1993, the Board established ten regional advisory councils pursuant to ANILCA. While Native Alaskan involvement in the councils is not required, Native Alaskans are well represented in these advisory councils. The Board is required to consider reports and recommendations that the regional councils have regarding subsistence management. The Board may elect not to follow the regional councils’ recommendations, but only if the recommendation is not supported by substantial evidence, violates recognized principles of wildlife conservation, or would be detrimental to the satisfaction of subsistence needs, in which case the Board must support its denial in writing.

Due to legal complications surrounding ANILCA’s “rural resident” preference, subsistence hunting and fishing are managed differently depending on whether the state or the federal government owns the land. In an attempt to strengthen state subsistence protection, ANILCA provides that Alaska can manage fish and game on federal public lands if the state manages its fish and game resources according to ANILCA’s subsistence requirements. Alaska initially conformed to the federal requirements, including a priority based on rural residency, which resulted in “an improvement in the policies and procedures the state followed in implementing its own subsistence program.”¹⁰³ However, the Alaska Supreme Court ruled that a subsistence priority based on rural residency violated the “equal-access” clauses of Alaska’s constitution and subsequently held that all Alaskans were eligible for the subsistence priority under state law.¹⁰⁴ Therefore the federal government re-assumed control over subsistence on federal public lands using its rural resident priority, while state law governs subsistence for ‘all Alaskans’ on state and private lands. Thus, the subsistence protections of ANILCA only directly apply on federal lands or waters, which comprise roughly 59% of Alaska.

Besides ANILCA, several federal statutes preempt Alaska state law and include provisions aimed at protecting the subsistence rights of Native Alaskans. The Reindeer Industry Act of 1937¹⁰⁵ established a Native Alaskan controlled reindeer herding industry. The act directed the Secretary of the Interior to acquire all non-native owned reindeer and distribute them to Natives. While it has been held not to prohibit non-Natives from owning reindeer acquired outside of Alaska, the Secretary of Interior must discourage alienation of Alaskan deer to non-Natives. The history of the act shows that it was enacted largely out of Congressional concern for Alaskan Native subsistence protection.

The Endangered Species Act¹⁰⁶ (ESA) allows various federal agencies to impose restrictions on takings of species that meet specified requirements. The ESA excepts subsistence uses from its restrictions for both Natives and non-Natives living in Alaskan villages who use fish and wildlife for consumption, handicrafts, or other subsistence purposes. However, subsistence uses of endangered or threatened species may be regulated if the “taking materially and negatively affects the threatened or endangered species....”¹⁰⁷

The Marine Mammal Protection Act¹⁰⁸ imposes a moratorium on the taking of marine mammals, with a broad exception for Alaskan Native subsistence uses. The act permits Alaskan Natives on the coast of the North Pacific Ocean or the Arctic Ocean to take marine mammals in a non-wasteful manner for subsistence uses and to use them for handicrafts or clothing. However, the federal government can impose regulations on those exempted uses for any marine mammal species that becomes “depleted.”

Lastly, the Oil Pollution Act¹⁰⁹ provides that damages may be recovered for the loss of subsistence use of natural resources due to oil discharge. Any claimant who uses natural resources for subsistence may recover, without regard to ownership or management of the resources. Compensation under this act amounts to “the reasonable replacement cost of the subsistence loss suffered by the claimant if, during the period of time for which the loss of subsistence is claimed, there was no alternative source or means of subsistence available.”¹¹⁰

ii) International Treaty Origins

Seven international wildlife treaties, implemented by four statutes, exempt Native Alaskans to some extent from the restrictions the treaties impose, in order to preserve the subsistence capabilities of Native Alaskans.

Four treaties involving migratory birds each preserve to some extent the ability of Native Alaskans to engage in subsistence activities.¹¹¹ The more recent treaties include more liberal and meaningful subsistence provisions than the earlier treaties. For example, the 1916 British/Canadian treaty closed the season on migratory game birds during the only time period when most of those birds were present in the Arctic regions, thereby effectively eliminating the possibility of hunting those birds in Alaska. On the other hand, the more recent Japanese treaty permits people of aboriginal descent to hunt for their food and clothing despite the treaty’s restrictions. However, “[b]ecause each treaty affects substantially the same bird species, the more restrictive provisions of the earlier treaties limit the more liberal provisions of the latest treaty.”¹¹² Although the earlier treaties have been amended to bring them in line with the more liberal provisions of the later treaties, until the U.S. Fish and Wildlife Service sets rules to establish harvest regulations, the restrictive provisions of the older treaties control and limit the ability of Native Alaskans’ subsistence activities involving certain bird species.

The Fur Seal Convention, which prohibits open sea hunting of the North Pacific fur seal, expired in 1984 but continues to have force as domestic law under the Fur Seal Act of 1966.¹¹³ The Fur Seal Act prohibits the taking of fur seals in the North Pacific Ocean but grants an exception to Alaska Natives in the region, who are permitted to take seals for subsistence use.

The International Whaling Convention established the International Whaling Commission, which is empowered to adopt resolutions regulating whale hunting. Resolutions adopted by the Commission are binding on the 39 signatory nations unless a nation objects within 90 days after the resolution is adopted.¹¹⁴ In 1977, the Commission adopted a resolution banning all bowhead whale hunting, which threatened Iñupiat whaling communities. The Iñupiat filed suit, attempting to force the Secretary of State to object to the resolution but the court ruled that such a decision would be an unwarranted judicial interference with foreign affairs.¹¹⁵ The Iñupiat then filed suit against the

Secretary of Commerce, arguing that the Commission was not authorized to limit aboriginal whaling.¹¹⁶ In that case, the court held that the federal implementing act and not the treaty was the governing law and therefore the district court might have the authority to decide issues raised under the statute. The merits of this case were never decided but “it does indicate that aboriginal people may have judicial remedies even in cases where their interest clash with the international interests of the United States.”¹¹⁷ While the Alaskan Natives’ legal challenges to the whaling ban were relatively unsuccessful, they also responded politically, forming the Alaska Eskimo Whaling Commission (AEWC). The AEWC and the federal government convinced the Commission to adopt a limited bowhead harvest quota instead of the ban, and to incorporate aboriginal subsistence concerns into their decision making process.

The Polar Bear Convention prohibits polar bear hunting with a few exceptions, including takings “by local people using traditional methods in the exercise of their traditional rights.”¹¹⁸ Developments involving this convention “evidence a legal trend toward Native management of the polar bear populations in the Chukchi and Beaufort Seas.”¹¹⁹ Two native groups, Alaska’s North Slope Borough and the Inuvialuit Game Council of Canada’s Northwest Territories entered into an international agreement in 1988 that adopts additional restrictions on polar bear takings in the Beaufort Sea region. In the Chukchi Sea region, the United States and Russia are currently developing an agreement for conservation and management of that area’s polar bear population which continues “the trend of sharing responsibility for managing populations of marine mammals with the Native communities that depend on them for their cultural and physical survival.”¹²⁰

iii) Federal Trust Responsibility for Subsistence

“The emergence of a judicially recognized, federal trust responsibility to protect Alaska Native subsistence culture and economy is an important by-product of the various subsistence exemptions found in federal-conservation treaties and statutes.”¹²¹ This doctrine has been recognized, and limited, in three specific cases involving Alaskan Natives

The doctrine first emerged in *People of Togiak v. United States*.¹²² In *Togiak*, the court found that Department of Interior regulations transferring control over subsistence management under the Marine Mammal Protection Act to the state of Alaska were invalid because the act preempted state regulation of subsistence. The court supported its holding by reasoning that the United States has a fiduciary duty toward tribes that includes a duty to protect the subsistence resources of Indian communities. Therefore, the court concluded that allowing the state to regulate subsistence use under the Marine Mammal Protection Act would imply a presumption that the federal government had abandoned its fiduciary responsibility to preserve Native subsistence resources.

In *North Slope Borough v. Andrus*,¹²³ Native Alaskans challenged a proposed offshore federal oil and gas lease sale. The district court held that the federal agency had breached the federal trust responsibility imposed by the Native exemption under the ESA because it had not obtained a sufficient biological opinion as to the effect of the proposed drilling. The circuit court held that the government’s responsibility to the Native Alaskans was met because the federal agency had acted responsibly toward the

environment and given “purposeful attention” to the interests of the Natives. This case arguably demonstrates that “when pitted against often competing public interests of the United States, the federal trust responsibility emerges as an important but not overriding consideration.”¹²⁴

*Adams v. Vance*¹²⁵ appears to demonstrate that the doctrine “is insufficient to warrant direct judicial interference with federal foreign policy interests.”¹²⁶ In that case, the Inupiat filed suit in an attempt to force the Secretary of State to object to an International Whaling Commission ban on Native Alaskan hunting of the bowhead whale. The Inupiat argued that the Secretary’s decision violated the trust obligation to the Eskimos, which they contended was implicit in the laws, regulations, and judicial decisions that clearly recognized Eskimo land, fishing, and whaling rights. However, the court held that the responsibility was insufficient to warrant court intervention. The precedential power of this case is somewhat unclear because at the time the D.C. Circuit issued the decision, the Whaling Commission had already changed its mind and decided to permit subsistence hunting by Alaskan Natives.

iv) State Law Origins

Due to the Alaskan Supreme Court decision that Alaska cannot regulate subsistence based on rural residency without a constitutional amendment that accounts for the equal-access problems such a basis creates. Several attempts have been made to amend the Alaskan Constitution so the state can regulate in compliance with ANILCA, but each has failed. Therefore, regulation of subsistence uses on state and private land differs from regulation on federal public lands.

The relevant state statute does grant subsistence users a priority over other users, but that priority applies to all Alaskan residents instead of only rural residents. When limits are imposed on hunting and fishing, consumptive uses must be eliminated before subsistence uses, and subsistence users can also be distinguished for prioritization based on two factors: the customary and direct dependence on the fish stock or game population by the subsistence user for human consumption as a mainstay of livelihood, and the ability of the subsistence user to obtain food if subsistence use is restricted or eliminated.¹²⁷ Alaska law also differs from federal law because the state’s statute requires the identification of “non-subsistence areas” where there is no subsistence priority. These areas are defined as areas or communities “where dependence upon subsistence is not a principal characteristic of the economy, culture, and way of life.”¹²⁸

c) Rights to Federal Assistance for Flooding and Erosion Damage

With the potential for increased flooding and erosion in Alaska, the ability of Native Villages to qualify for assistance to help deal with those problems may become increasingly important. Several federal and state agencies have programs that provide assistance for the consequences of flooding and erosion. These programs fall into one of several categories: (1) those administered by the Corps of Engineers (Corps), (2) those administered by the Natural Resource Conservation Service (NRCS), (3) other federal programs, and (4) those administered by the State of Alaska. While an in depth look at these programs is beyond the scope of this study, they are briefly described below.

Many federally administered programs could potentially help Native Alaskans who face increased erosion and flooding due to climatic change. First, the Corps has authority under several acts to address problems arising from flooding and erosion. The Flood Control Act of 1946 authorizes flood control projects and activities. The River and Harbor Act of 1968 authorizes the Corps to protect shores of publicly owned property from storm damage and to mitigate erosion caused by federal navigation projects. The Flood Control Act of 1960 gives the Corps authority to help state and local governments manage flood plains. The NRCS also has three programs that provide assistance to problems arising from flooding and erosion: The Watershed Protection and Flood Prevention Program funds projects that reduce erosion and prevent flooding; the Emergency Watershed Protection Program provides assistance where an imminent threat exists; the Conservation Technical Assistance Program allows the NRCS to provide technical assistance to help solve natural resource problems such as erosion. Several other federal programs can provide assistance to problems caused by flooding and erosion. For example, the Federal Emergency Management Agency/National Flood Insurance Program provides flood insurance to residents in communities that manage floodplains in specified ways.

Alaska also has programs that could potentially help Native Alaskans mitigate the harm caused by erosion and flooding. For example, the Alaska Department of Community and Economic Development maintains a floodplain management program, which helps communities reduce losses and damage caused by flooding and erosion.

Currently several restrictions prevent Native Alaskans from fully benefiting from the programs. “Alaska Native villages have difficulty qualifying for assistance under [the Corps] programs – largely because of program requirements that the economic costs of the project not exceed its economic benefits.”¹²⁹ Similarly, few projects for Native Alaskan villages have been funded under the NRCS Watershed Protection and Flood Prevention Program because it also requires a cost/benefit analysis. Thus they more often qualify under the programs that do not require a cost/benefit analysis or that incorporate additional factors into that analysis.

5) Legal and Policy Strategies to Protect Native Alaskan Legal Rights

There are a number of legal and policy strategies available to Native Alaskans seeking to protect their legal rights in light of the effects of climate change. Some of these methods are already being employed, while others could be used in the future. This section will discuss each of these means in turn.

a) Human Rights Petitions

In December of 2005, Sheila Watt-Cloutier, with support from the Inuit Circumpolar Conference, filed a petition to the Inter-American Commission on Human Rights (Commission) seeking relief from human rights violations caused by the impacts the United States is having on global warming.¹³⁰ The petition is on behalf of all Inuit of the arctic regions of the United States and Canada and it alleges that the United States, by not reducing its GHG emissions, is violating several obligations under international law. The Commission does not have the authority to impose mandatory remedies on the U.S.,

but “a Commission reporting finding that human rights violations result from global warming would be an authoritative interpretation of international law, helping to bring a rights-based approach to global warming discussions” and could also draw public attention to the problems faced by the Inuit.¹³¹

After discussing the impacts of climate change and the role of the United States in causing those impacts, the petition claims that the impacts constitute violations of Inuit human rights, for which the United States is responsible. First, the petition argues that the specific human rights of indigenous people require protection of their land and environment because those rights should be determined based on indigenous culture and history. Next, the petition claims that seven specific rights are guaranteed under the American Declaration on Rights and Duties of Man, each of which is violated by the effects of climate change: (1) the right to the benefits of Inuit culture, (2) the right to use and enjoy the lands the Inuit have traditionally occupied, (3) the right to use and enjoy Inuit personal and intellectual property, (4) the Inuit’s right to the preservation of health, (5) the Inuit’s right to life, physical integrity, and security, (6) the Inuit’s right to their own means of subsistence, (7) the Inuit’s rights to residence and movement and inviolability of the home. In the next section, the petition claims that relevant international norms and principles should guide the Commission in its interpretation of the American Declaration of the Rights and Duties of Man. For example, the petition argues that international environmental standards and norms are relevant to the application of the American Declaration. Then, the petition argues that by its acts and omissions, the United States is responsible for violations of the Inuit human rights. To prove the U.S. is responsible for the human rights violations, the petition again notes that the U.S. is the world’s largest GHG emitter. Then it argues that current U.S. policy does not reduce GHG emissions because the “President’s goal of reducing emissions intensity by 18% and the initiatives adopted to implement that goal have had no discernible effect on U.S. emissions, which have increased by more than 13% between 1990 and 2003.”¹³²

b) Claims to Offshore Hunting and Fishing Rights

ANCSA extinguished “[a]ll aboriginal titles, if any, and claims of aboriginal title *in Alaska* based on use and occupancy.”¹³³ From the wording of this settlement, and subsequent court decisions interpreting it, it appears that Native Alaskans may have un-extinguished claims of aboriginal title based on occupancy to areas beyond the state’s political boundaries, including the Outer Continental Shelf (OCS), where the United States maintains title and control.

ANSCA’s extinguishment only applies within the state’s political boundaries, which end three miles off the coast of Alaska. In *People of the Village of Gambell v. Hodel*,¹³⁴ two tribal villages filed suit to enjoin a lease of submerged land off the Alaska coast for oil and gas exploration, claiming subsistence hunting and fishing rights under both ANILCA and common law. The court specifically held that ANCSA only applies to claims within the boundaries of the State of Alaska, which does not include the submerged lands of the Outer-Continental Shelf.

The scope of any possible aboriginal claims to offshore areas more than three miles away from Alaska is not entirely clear at this point. In *Gambell*, the court discussed the “paramourty cases,” which held that the national government has paramount

interests in ocean waters and submerged lands below the low-water mark and therefore any claims inconsistent with that national paramountcy cannot be recognized.¹³⁵ Distinguishing their case from an earlier case where this doctrine applied and prevented a native claim for sovereign rights to a portion of the OCS, the *Gambell* court noted that the villages were not asserting a claim of sovereign rights, but only claiming rights of occupancy and use subordinate to and consistent with national interests. Therefore, because “aboriginal rights may exist concurrently with a paramount federal interest, without undermining that interest” the paramountcy doctrine did not prevent the aboriginal claim to hunting and fishing rights in the OCS.¹³⁶ However, in a subsequent case, the Ninth Circuit found that claims to exclusive fishing rights by a Native Alaskan village were inconsistent with the paramountcy doctrine.¹³⁷ Then, in a 2004 en banc decision, the ninth circuit re-opened the issue when it vacated a district court decision dismissing a Native Alaskan village’s claims and remanded with instructions “that the district court decide what aboriginal rights to fish beyond the three-mile limit, if any, the plaintiffs have,” noting that the court “should assume that the villages’ aboriginal rights, if any, have not been abrogated by the federal paramountcy doctrine or other federal law.”¹³⁸ Thus, while *Gambell* seems to establish that aboriginal claims subordinate to and consistent with national interests that are based on occupancy and use are not barred by the paramountcy doctrine, it is somewhat unclear whether or not that doctrine bars aboriginal claims of exclusive right.

Decisions applying the paramountcy doctrine to aboriginal land claims appear to be wrongly decided because the doctrine’s rationale only applies to claims by states.¹³⁹ States’ property interests are not limited by the rights of the federal government, whereas tribal property rights leave the government with the fee interest in the property and the right to transfer the property rights. The paramountcy doctrine arose due to states’ attempts to lease the right to take resources from the submerged lands off their coasts without federal consent. However, Indian title does not include that right, and therefore the basis for the doctrine is not applicable to aboriginal claims to submerged lands.

These aboriginal claims may become increasingly important with increased marine access and offshore energy development, and may provide one avenue for Native Alaskans to protect their subsistence rights and earn profit from the increased development. The claims may also be a way for Native Alaskans to gain attention and leverage in Congress because the federal government, as well as energy development companies involved in the OCS near Alaska, may hesitate to lease parts of the OCS until aboriginal claims are settled.

c) Strengthening Subsistence Rights Protection

Due to the predicted impacts of climate change on animal species in the Arctic, improving subsistence protections to enhance Native Alaskans’ adaptability to climate change may become increasingly important. The various legal protections for subsistence discussed above ensure that subsistence uses will maintain priority over non-subsistence uses. However, existing legal protections of Native Alaskan subsistence activities can be improved and there are ways Native Alaskans may begin to incorporate climate change concerns into subsistence management in Alaska.

Existing subsistence protection suffers from a number of problems that hinder Native Alaskans' ability to cope with climate change. First of all, there is a great deal of legal confusion generated by the dual land management regime created by Alaska's inability to comply with the ANILCA rural resident subsistence priority. For example, animals are subject to different regulations depending on the classification of the land they happen to be on. This confusion "hampers the enforcement of regulations and decreases user compliance, thus weakening the sound management of fish and game resources upon which the very availability of food depends."¹⁴⁰ Another problem arising from Alaska's inability to implement ANILCA's rural resident priority is that under state law, all Alaska residents benefit from the subsistence priority, and "granting such a general preference to subsistence uses rather than primarily benefiting only rural residents has given rise to major competition for access to resources between residents of subsistence areas and urban residents who travel to subsistence areas to hunt and fish for 'subsistence.'"¹⁴¹ As subsistence resources become increasingly stressed due to climate change, it is important that subsistence resources go to the individuals and groups who rely on them the most and will suffer the most without them.

Another problem with current subsistence protections is that the Alaskan regime and the federal regime may not adequately preserve subsistence protections if development in the region increases. In order to qualify for subsistence priority under the federal regime, an area must qualify as "rural" under Federal Subsistence Board requirements. Similarly, under state law, if the Alaska Board of Fish and Game finds that a community's "dependence on subsistence is not a principal characteristic of the economy, culture, and way of life" than the Board can designate it a "non-subsistence area," where subsistence activities are not permitted. Thus, if the Federal Subsistence Board finds that an area is no longer "rural," the residents will no longer qualify for subsistence protection. Similarly, under state law, if an area is found independent enough from subsistence to warrant classification as a "non-subsistence area," the residents lose their subsistence protections. Thus, "[f]or example, the economic development of a rural area resulting from the discovery and exploitation of non-renewable natural resources or tourism could have major consequences for local residents, who depend on the resources of the land to meet their food needs."¹⁴² With the potential increased marine access and development along the Alaskan coast due to climate change, Native Alaskans who currently qualify for subsistence priorities may lose that protection.

There are several possible ways that current subsistence management can be modified to improve the ability of Native Alaskans to cope with climate change. First of all, the international bird treaties could be improved by completing the process of amending the earliest treaties and thus enabling the stronger subsistence exemptions in the more recent treaties to take full effect. Secondly, Alaska's subsistence preference should be based on rural residency, which would require the state to amend its constitution. Third, regulations to determine what areas are "rural" under the federal regime, and "non-subsistence" under the state regime should be modified so that Native Alaskans cannot lose their subsistence priority based on increased development enabled by climate change. Lastly, empowering Native Alaskans with increased control over their own subsistence management may improve their adaptability to climate change by allowing them to account for the specific changes affecting them.

To promote improvement of their subsistence protection, Native Alaskans could take advantage of their input into subsistence management on federal public lands and attempt to make subsistence management more adaptable to climate change. For example, Craig L. Fleener, chairman of the Eastern Interior Regional Advisory Council, recently commented at a Council meeting about his concerns regarding subsistence management and climate change:

Unless we're going to start being more dependent on food stamps and Quest cards and welfare and government handouts, we need to have the freedom to adapt to the changes that are coming. Which means that the Agencies need to be more open to the ideas of changing seasons, changing bag limits and allowing easier access across the landscape. So these are issues that are very important and they're under the really shiny title of climate change.¹⁴³

As described above, under ANILCA the Federal Subsistence Board is required to consider reports and recommendations that the regional councils have made regarding subsistence management. The Board must follow these recommendations unless they are not supported by substantial evidence, violate recognized principles of wildlife conservation, or would be detrimental to the satisfaction of subsistence needs, in which case the Board must support its denial in writing. These ANILCA requirements provide an avenue for Native Alaskans to make subsistence use regulations more helpful in coping with the impacts of climate change. Natives appear to be well-represented on the advisory councils and the Federal Subsistence Board has been generally receptive to the recommendations presented by the regional councils. Thus Alaskan Natives may be able to use their input into subsistence management to alleviate climate change impacts.

Furthermore, like the Native Alaskan response to the International Whaling Commission's proposed ban on bowhead whale hunting (see discussion above), political organization and activism may help Native Alaskans improve subsistence management. ANCSA, ANILCA, and the other statutes described above indicate that there is strong Congressional concern about preserving and protecting Native Alaskan culture.

d) Enhancing Assistance for Flooding and Erosion Problems

Erosion and flooding are already serious concerns for many Native villages and climate change may increase the severity and frequency of those problems. Financial assistance, technical advisement, and infrastructure projects can all reduce the problems that flooding and erosion may cause for Native Alaskans. As noted above, the cost/benefit analysis required under many federal programs often prevents Native Alaskan villages from qualifying for assistance. Therefore Native Alaskans could move to be exempted from the requisite cost/benefit analysis in order to minimize the flooding and erosion problems caused by climate change.

CASE STUDY #3—SOUTHWEST

1) Introduction

The American southwest encompasses a vast geographic region that is home to

over 70 federally recognized Native American tribes, all of whom will be affected in some capacity by the impacts resulting from climate change. In the arid southwest, the nature and amount of water resources has long been a concern. Now, with climate change predicted to affect water availability, seasonal flow regimes, ecosystem health, and water quality, the issues of water quantity and quality take on even more urgency. As a result, securing and protecting water rights will take on growing importance for the residents of the southwest.

For tribes, the primary means for doing so is through the use of federally reserved water rights—that is, legal rights to water that are tied to the occupation of tribal lands and the customs and histories of the tribes thereon. In a region where water is so critical for survival, such rights provide tribes with the means to protect their economic, cultural, and social identities through continued practice of traditional lifestyles such as agriculture. However, even where tribes have diversified their activities, expanding into newer areas such as tourism, their new enterprises are often still dependent upon water resources. Thus, protecting water rights is an essential way for tribes to cope with the negative effects of climate change.¹⁴⁴

2) Climate Change in the Southwest

The southwest ranges from jutting mountain peaks to parched desert floor, and from rampant urban development to isolated Indian reservations. Such variability of climatic, topographic, social and economic factors makes it difficult to generally assess the impacts of climate change. Nonetheless, one thing is certain: climate change has serious implications for water quantity and quality in the southwest region.

Water in the southwest is extremely vulnerable to climate variability and change for several reasons: the region's watersheds are moisture dependent; there is an increased demand in water as urban development and population influx increases; and the legal framework that dictates water allocation in the southwest leaves little room for forgiveness or flexibility. Climate change has affected the nature and availability of surface and groundwater supplies, has visibly contributed to an earlier shift in flow regimes, and has raised concerns over water quality and ecosystem health in the southwest as a whole.

a) Water Scarcity: Surface and Groundwater Supplies

Much of western streamflow is fed by runoff from mountain snowpack. If, as projected, climate change produces rising temperatures and a concurrent reduction in snowpack, the resulting effect on stream flows in the southwest is easy to discern. One study projected that a 2° C increase in temperatures could result in a 20% reduction in streamflows for the Colorado River Basin; another projected that there could be a 7-20% reduction in releases from Glen Canyon dam, separating the Upper and Lower Basins, by 2098.¹⁴⁵ These possibilities are especially concerning because this massive river system—serving 25 million people in seven southwestern states—already suffers from high demand and frequent low flows. Between 1999 and 2004 alone, the Upper Colorado River Basin experienced five consecutive years of below average flows, dipping to a low of 25% of yearly average in 2002.¹⁴⁶ With the Upper Basin supplying 90% of

streamflow for the entire 1450-mile Colorado River Basin, it is clear that any decrease due to climate change will have far-reaching effects on vast numbers of people.

The extensive use of groundwater as the alternative to surface water also proves problematic.¹⁴⁷ Rates of large-scale pumping might prove unsustainable, as seen in the states of Arizona and Nevada. In addition, there is concern that the current calculable recharge factor for groundwater pumping estimates may not reflect long-term prolonged effects of climate change on the water table. In already-strained water supply systems, the element of climate change only accelerates and compounds the scarcity of moisture-sensitive water resources in this region.

b) Shift in Flow Regimes

Compounding water scarcity is a shift in flow regimes for southwestern rivers. The typical flow regime pattern for this area historically consists of peak flows beginning in late May with a steady decline carrying through July. This cycle of seasonal run-off, marked by a prolonged, gentler peak and steady drop in flows, is important for storage and water use planning purposes which must consider consumption behavior, water management procedures, and evaporation rates.

However, there is evidence to suggest that climate change is leading to a trend of earlier spring run-off characterized by heightened peak flows in the months of April and early May, followed by a steep decline thereafter. Such a change to the flow regimes can lead to a number of problems. For example, earlier and steeper run-off behavior can lead to an overall decrease in summer instream flows, when demand is already high.¹⁴⁸ In addition, brief charged flows that quickly taper off due to rising temperatures present problems for outdoor recreation and tourism industries in the southwest region as well. As a multi-billion dollar industry in the region, outdoor recreation and tourism is a significant source of economic revenue, and thus any effects due to climate change could potentially have grave consequences. Indeed, shifts in flow regimes could cause economic strain not only on the recreational industries themselves, but also generally on nearby “gateway” towns—including Moab, Utah; Telluride, Colorado; and Sedona, Arizona—which rely on the influx of visitors to boost their economies.

c) Water Quality and Ecosystem Health

Stream and riparian health is also threatened by a projected decrease in snowpack resulting from climate change. With such reduction in streamflow, water quality factors such as increased salinity and an increase in water borne diseases are projected. The crucial hydrological flushing mechanisms of western river systems might be compromised by reduced flows, disabling the rivers’ ability to recharge oxygen levels, disperse sediment, and perform other “self-cleaning” functions necessary for stream, riparian, and fish health. Furthermore, effective discharge flows also flush out and disperse pollutants, as well as prevent standing pools of water that could harbor West Nile mosquitoes and water borne diseases.

3) Impact of Climate Change on Southwest Tribes

There are a number of ways in which climate change in the southwest will threaten tribal practices and culture, largely revolving directly or indirectly from issues of water quantity and quality. General impacts induced by climate change might be further intensified with respect to Native Americans due to the intimate cultural and economic association between the tribes and their reservation land and resources. For instance, the culture of many of the tribes in the southwest has historically been based on agriculture and the raising of livestock—activities which depend heavily upon the land and water resources available to the tribes. While tribes have long coped with the issue of water scarcity in the southwest, the effect of climate change on water availability will present new and increased challenges for tribes wishing to maintain their traditional ways.

Furthermore, not only does climate change threaten a loss of these traditional tribal occupations, but adverse impacts will also extend into the secondary industries tribes have begun to diversify with, such as tourism, outdoor recreation, and natural resource extraction. Thus, climate change stands as a real threat to the very livelihood of tribes in the region who rely on natural resources and related services to maintain cultural legacy, traditions, and lifestyle.

a) Agriculture Occupations

The cultivation of land by tribes was decreed by the federal government as a requirement for legal recognition of tribes in the southwest, a tradition that remains for many tribes in this area. The Hopi Tribe, inhabitants of northeastern Arizona since the 12th century, still uses “dry farming” techniques to cultivate corn, beans, and squash. On their 37,000 acres of community and independent farms, the Gila River Indian Community grows cotton, wheat, millet, alfalfa, barley, melon, olives and other crops with an agricultural product value totaling in excess of \$25 million.¹⁴⁹ The Colorado River Indian Tribes, located in western Arizona, cultivate cotton, alfalfa, wheat, feed grains, lettuce, and melons on 84,500 acres, and have an additional 50,000 suitable for agricultural development.¹⁵⁰

The hotter and drier conditions predicted as a result of climate change will have significant implications for these tribes’ and their agricultural economies. Although rising temperatures could potentially yield a longer growing season, a shift in ecosystem dynamics will inherently weaken native vegetation and planted crops due to prolonged moisture deprivation. This will contribute to an overall reduction in healthy crop productivity, which in turn opens the gate for the intrusion of pests, and more hearty invasive species such as cheat grass, Russian olive, or tamarisk. Furthermore, as arid conditions persist, crops can quickly transform into acres of combustible vegetation leading to a rise in fire prevalence. Finally, erratic and more frequent changes in climate undermine traditional knowledge bases and the ability to accurately predict the weather as it relates to growing seasons.

Unfortunately, the lack of economic diversity in tribal revenue, including limited sources of comparable trade or export to supplement poor crops, is already a serious problem besetting many tribes. With 31.6% of southwestern Indians currently living under the poverty line, tribes must look to immediate solutions that compromise traditional ways for necessary financial revenue.¹⁵¹ As maintaining traditional agriculture operations—as well as the accumulated tribal knowledge associated with them—becomes

even more difficult due to climate change, tribes may have to increasingly abandon their historic practices for new ventures and look to off-reservation sources to supplement their economies.

b) Tourism-Based Industry

One of the directions many southwest tribes have taken is to develop tourism-based industry, which has proven lucrative due to the range of available activities: boating, water-skiing, fishing, hiking, biking, skiing, gaming, and related service industries including hotel accommodations and restaurants. While climate change can have positive effects for tourism—rising temperatures can prolong warm-weather outdoor recreation seasons, for example—the opposite is also true. Climate change is anticipated to affect number of user days and consumer surplus (i.e. the amount a user is willing to spend on an outdoor recreation event in comparison to normal daily expenditures) for both warm and cold season activities.¹⁵²

One facet of the tourism industry that stands to be hardest hit is that of aquatic recreation in the southwest region. Boating, whitewater rafting, fishing, and other activities could all potentially suffer due to increasing water scarcity and decrease in spring run-off. With dozens of tribal lakes, many Navajo rely on tourism as a significant source of income. As a result of a warmer and drier climate, tribal recreation areas such as Bowl Canyon Navajo Recreation Center near the AZ-NM border, and the Little Colorado River Tribal Park in western Arizona could see visitor decline. Located on the banks of the Colorado River, the Ahakhav Preserve managed by the Colorado River Tribes could see visitor declines as well. The success of this park, offering a 160 dock marina, canoeing, and swimming could be seriously threatened with depletion of average flows or a shift in typical flow regimes.

Water scarcity is also important for gaming and service-based tourism industries as well, as it could make building and maintaining tourist attractions more difficult as well as limit the number of visitors the infrastructure can support. The industry even stands to be affected in other less obvious ways: the Colorado River Tribes' Blue Water Resort and Casino relies in part on its location on the banks of the Colorado River to attract visitors, an aesthetic draw that could be lost with a significant decrease in flows.

Although not as prevalent, cold-season recreation is an important economic asset for Southwest Tribes residing at higher elevations. A decrease in snowfall will cause increase in reliance on artificial snow for the ski industry, further exacerbating water scarcity issues. The need to generate artificial snow will also raise operating costs that must then be transferred to consumers through increased lift ticket, parking, or resort fees. Thus, the number of skier days will likely decline in lower elevation resorts such as the White Mountain Apache tribe's Sunrise Ski Resort due to projected later snowfall in the winter and earlier melt-off in the spring months. Of course, such ski resorts could see an increase in warm-season activities such as mountain biking or hiking on resort grounds, but it is impossible to know whether this will offset the reduction in winter sport revenue generation.

c) Natural Resource Extraction

Another industry that tribes have begun to develop is that of natural resource extraction. For example, Navajo land is renowned for its prominent mineral-rich land including supplies of coal, gas, oil and uranium, and as of 1988 over 600,000 acres of Navajo land were under lease to develop oil and gas reserves.¹⁵³ With climate change further imperiling the economic viability of agriculture and tourism-based enterprises, tribes might be forced to rely more and more heavily on drilling and mining their natural resources in order to provide income.

However, this shift will not be without its own negative effects. Leasing of tribal lands for non-tribal natural resource development might produce income for the tribes, but can also have the effect of displacing and fragmenting tribal communities, as seen with the Navajo and Hopi in northern Arizona. Also, mining processes can take a heavy toll on ecosystems and other resources. For example, extensive groundwater pumping near Hopi and Navajo tribal land for coal mining interests—3 million gallons a day for 35 years—led to a dramatic drop in the water table as well as water supply contamination concerns for the Navajo and Hopi peoples. Although the power plant fueled by this coal was shut down on January 1, 2006, much damage had already been done. Vernon Masayesva, Executive Director of the Black Mesa Trust, gives a cautionary message stating that “[o]ne billion gallons of our ancient, sacred water, mined to slurry coal, fouled beyond reclamation, evaporates each year in Nevada’s desert skies.”¹⁵⁴ Should mining become an attractive alternative when climate change causes other industries to weaken, tribes need to remain mindful of the toll natural resource extraction can take.

4) Tribal Legal Rights Potentially Affected by Climate Change

As the previous section makes clear, secure water rights are going to be critical for southwestern tribes in order to deal with the negative effects of climate change. Rather than being subject to one single comprehensive legal regime, though, quantifying and protecting water rights is a complex matter that, with respect to tribes, involves a number of related legal doctrines. The doctrine of prior appropriation is the overarching water law regime in the western states, and generally recognizes and prioritizes water rights according to seniority of first use. Tribal water rights, however, are founded in the doctrine of federally reserved water rights, which is interconnected with but distinct from prior appropriation. In addition, determining the scope and nature of tribal water rights also implicates other state water law schemes. This section will examine how each of these helps to determine tribal legal rights to water as well as restrictions on or barriers to its use.

a) Western Water Allocation: The Prior Appropriation Doctrine

The prior appropriation method of allocating water resources reigns supreme in the western states. Governed by a “first in time, first in right” ideology, prior appropriation recognizes and ranks water interests according to the date an individual first appropriated a water resource or portion thereof. This doctrine, then, fulfills in entirety water allotments to senior water right holders prior to releasing any amount to junior holders. During shortage years when there will not be enough water in a given system for all users, a senior interest can place a “call” in order to secure his entire water

amount before any water can be released to any water right holder of lower priority. In addition, prior appropriation regulates water rights under a “use it or lose it” philosophy, whereby a person must continually use their water allotment or risk being stripped of it. The use of water is generally required to be “beneficial,” with each state determining what constitutes such use, some examples being irrigation, municipal and domestic use, and recreation.

As western states have become more populous and demands on finite water resources have grown, inherent weaknesses in the prior appropriation doctrine have arisen. The effect of the use requirement is that individual water right holders have no incentive to conserve their allotment or find more efficient, less consumptive ways to use it. With water scarcity already an issue due to high demand, the compounding effect of climate change on water availability calls ever more into question the efficacy of prior appropriation.

And although the next section will explain how certain aspects of prior appropriation do not apply to tribal water rights, the urgency this system puts on non-tribal interests to use appropriated water in its entirety has significant implications on tribes. Surrounded by high demand and low supply, the tribes are increasingly faced with the difficult question of whether to affirm and protect their water resources for their own use or possibly trade them to others. While the latter can certainly bring in much-needed immediate revenue, the it may also have serious implications for the tribe’s continued well-being and vitality.

b) Federal Reserved Water Rights: The *Winters v. United States* Decision

Tribes of the southwest were federally recognized by the establishment of permanent tribal reservations through acts of Congress, treaties, or Executive Orders. In doing so, the federal government recognizes such reservations as separate entities with the right to occupy and use the land and related surface and subsurface resources. The right to occupy these lands is regarded as the most obvious and fundamental right attached to the establishment of reservations. However, the express right to occupy the reservation implies other rights in order to fulfill the purpose of establishing the reservations—namely, to provide for the tribe’s livelihood and longevity. In the context of the arid southwest, the right to water is perhaps the most important of these implied rights. With its articulation of the federally reserved water rights doctrine, the landmark case United States Supreme Court decision in *Winters v. United States*¹⁵⁵ identified implied water rights for tribal reservations.

The *Winters* case involved resolving competing claims to the waters of the Milk River in Montana—those of the Fort Belknap reservation and those of non-tribal commercial interests. The reservation, established on May 1, 1888, contained land suitable for both grazing and agriculture and thus water from the Milk River was diverted for these purposes. Thereafter defendants, a number of non-tribal commercial interests, constructed dams upstream from the reservoir and thereby deprived the reservation of use of the water. The defendants argued that in establishing the reservation the federal government had not expressly reserved the water rights to the Indians, and thus defendants were free to appropriate it to their own purposes.

The Court found this argument unpersuasive, reasoning that to find no implied reservation of water rights would defeat the very purpose for which the government had established the tribal reservation in the first place—to provide a permanent place for the tribe to settle and thrive. The Court stated plainly that:

[t]he power of the government to reserve the waters and exempt them from appropriation under the state laws is not denied, and could not be. That the Government did reserve them we have decided, and for a use which would be necessarily continued through the years. This was done May 1, 1888.¹⁵⁶

Thus, the Court was willing to find a reservation of water rights even in the absence of express provisions to that end.

Furthermore, the *Winters* decision also announced that such federal reserved water rights for a tribe take effect on the date the tribe's reservation is itself established. That is, unlike other users under the prior appropriation doctrine, tribal water rights date back to the establishment of their tribal reservation, not the date when the tribe actually begins to appropriate the water. Because the entire model for western water allocation is based on date of seniority, legal assignment of water to the date of tribal recognition—in many cases, over a century ago—gives tribes the advantage of high priority water rights. This case laid the groundwork for the assertion of federally reserved water rights and established that such reserved rights “are not dependent upon state law or state procedures,” nor are they subject to the “use it or lose it” or “beneficial use” requirements of the prior appropriation doctrine. The *Winters* doctrine gives tribes a legal bargaining chip to negotiate and secure tribal longevity that will play a significant role as tribes begin planning how to cope with increasing water scarcity in the southwest due to climate change.¹⁵⁷

It must be noted, though, that despite the unmistakable date of priority assigned to a given tribe pursuant to *Winters*, the scope and tangibility of such rights when not yet put into actual use is quite grey.¹⁵⁸ That is, western water law allows for actual use of water by non-Indians even if tribal legal title or right to use such water is in place; if a tribe later tried to convert its paper right to the water into actual use, the issue is whether that water is thus made unavailable for use by other vested parties. Such tribal assertion of water rights has never yet “shut the gate,” so to speak, for other water users, but the impacts resulting from climate change raises the question of how such a situation would be resolved.

c) State Water Law in the Southwest

Tribal water rights, because they are of federal origin, have historically been in tension with the law of prior appropriation that governs non-tribal water rights in the western states. The federal government, as fiduciary towards tribes, has traditionally adopted a protective stance when it comes to securing tribal water rights; states, on the other hand, do not have the same obligation or incentive to look after tribal interests, especially when one considers that water is a scarce resource highly desired by non-tribal interests within a state. To resolve this tension, Congress passed legislation in 1952

known as the McCarran Amendment. Essentially, this law waives the federal government's sovereign immunity to suit, thereby allowing state courts to determine all water rights in a given resource, including federally reserved tribal rights.

This legislation has allowed states to initiate entire stream basin adjudications, and currently over 60 tribal water cases are pending in state courts. There is some sentiment among tribes that state ability to initiate stream adjudications and determine tribal water rights leads to unfair and inconsistent results for tribes depending on political sentiment, relative strength of legal representation, and state budget allocation. On the other hand, the intensification of water scarcity issues will affect tribal and non-tribal interests alike, so the possibility of comprehensive adjudications might become increasingly important to provide all stakeholders with legal certainty regarding their water rights. Furthermore, some adjudications have affirmed considerable quantities of water for tribes—for example, the adjudication of Wyoming's Big Horn River resulted in 400,000 acre-feet of water for use by the Wind River reservation.

5) Legal and Policy Strategies

In the southwest, the most significant effect of climate change will be increasing water scarcity, thereby making secure water rights a necessity. For tribes to protect their tribal water rights there are a number of legal and policy strategies available. The two primary legal strategies are litigation and negotiation. In the southwest, the former is typically in the form of large-scale stream adjudications with the intent to legally quantify, separate, and allocate water resources amongst applicable parties. The latter has the same goal, but is often initiated after formal litigation efforts have stalled, thereby requiring participants to be more willing to make concessions to reach mutually agreeable terms.

Beyond concrete legal strategies like litigation and negotiation that tribes may pursue to protect their water rights in the face of climate change, there are also a number of policy initiatives that could help to mitigate climate change impacts on southwestern tribes. The most obvious and potentially effective are those that would address the issue of water scarcity brought on or exacerbated by climate change. Specifically, legal flexibility and adaptability of natural resource management and water allocation regimes are both feasible policy proposals that could lessen the severity of an increasingly hot and arid climate. Additionally, water marketing and increased economic subsidies are both secondary policy initiatives that can promote tribal economic well-being, facilitate adaptability to changing climate, and provide occasion for quantification or use of important water resources.

a) Water Rights Litigation: the *Arizona v. California* Decision and the 5 Tribes

No other case is more representative of the water rights litigation process or more relevant to the southwestern states than the United States Supreme Court case *Arizona v. California*,¹⁵⁹ which settled allocation disputes over the Colorado River. The Colorado River Basin encompasses nearly a quarter-million square miles spanning seven states—Colorado, Wyoming, Utah, New Mexico, Arizona, Nevada, and California. In addition, this region is home to the Chemehuevi, Cocopah, Yuma, Colorado River, and Fort

Mohave tribes. The river and its tributaries are the lifeblood of the arid southwest, and there was a long history of disputes over apportionment of the basin's waters, with each state asserting its own rights and downstream states worrying that upstream states would reduce the river to a mere trickle. Finally, with *Arizona v. California*, the Supreme Court decreed that the Lower Basin states of California, Arizona, and Nevada would collectively receive an allotment of 7.5 million acre-feet per year. This apportionment would be divided between the states, with California receiving 4.4 million acre-feet, Arizona receiving 2.8 million acre-feet, and Nevada receiving 300,000 acre-feet per year. Significantly, this allotment also expressly included 900,000 acre-feet of water for the five tribes of the region to be used for agricultural purposes to maintain the tribes' livelihood.

While the *Arizona v. California* decision is important for the quantification of these federal reserved tribal water rights, it is equally important for the method it used to do so. Water allocated to the five Tribes was distributed based on the amount of water necessary to irrigate all "practicably irrigable acres" (PIA) on the tribal reservations. This standard was established with the intent of giving tribes access to water resources sufficient to fulfill present and future agricultural needs, and has become the standard method for quantifying tribal water rights in subsequent cases.

Thus, *Arizona v. California* exemplifies some of the benefits of litigation as a strategy for affirming and protecting tribal water rights. First, litigation quantifies and thus solidifies otherwise ambiguous tribal water rights, allowing tribes to know the exact scope of their right. Second, the binding nature of litigation provides tribes with a means to legally protect and enforce their water right in the future, thus protecting them from the sway of political sentiment and the threat of growing demand for ever-scarcer water resources. Third, litigation over water rights establishes precedent that provides tribes with as-yet-unaffirmed water rights a clearer idea of how their own rights might be determined. Fourth, because water allocation litigation is often conducted on a basin-wide scale, the decisions made lend uniformity and consistency for further legal and policy applications for all parties involved. Finally, when litigation includes quantification of tribal water rights among its provisions, this serves as a gesture of recognition that protection and security of tribal cultures holds inherent value.

Nonetheless, despite these benefits of the litigation process, it is also important to consider the potentially negative aspects as well. One is simply the vast amount of time and resources that such a strategy can consume, especially when one considers that the time frame for basin adjudications is measured in years, if not decades. Tribes with minimal financial resources, then, may find it difficult if not impossible to engage adequate legal representation to protect their interests. Furthermore, while the finality of judicial decisions can be a positive characteristic as discussed above, there is also the risk that tribes will walk away with less than they hoped and expected with little recourse. The binding nature of judicial decrees are of special concern when considered in the light of the effects of climate change, which might militate towards allowing greater flexibility in long-term planning and management regimes than might be available following litigation.

Finally, while the PIA method has provided tribes with some certainty as to how unaffirmed tribal water rights would be adjudicated, this standard might prove to be a detriment as the effects of climate change manifest. As further refined by the

adjudication of the Big Horn River system in Wyoming, the PIA standard—and thus water allotments to tribes—is highly dependent upon such factors as salinity content, topography, soil characteristics, number and type of viable crops, and climate parameters. Thus, quantifications of tribal water rights already made using the PIA method will certainly be impacted, if not rendered inadequate, by increasing water scarcity and other elements of climate change. In addition, if climate change diminishes agricultural viability, this could be seen as evidence sufficient to support reduced allotments of water to tribes. Finally, because the PIA standard is specifically designed to provide water for agricultural purposes, it forces tribes to continue these enterprises in order to secure water deliveries despite failing crops or a desire to diversify tribal economies. In conclusion, while climate change will only increase the competition for water resources and necessitate secure water rights for tribes to cope with water scarcity, tribes must consider both the pros and cons of litigation as a means of doing so.

b) Negotiation: the Gila River Indian Community Settlement

Like water rights adjudications, the negotiated settlement process can be an effective strategy for quantifying and allocating water resources among interested parties. Negotiation, however, does not take place within a formal litigation framework, but rather through deliberations between participants in order to reach common terms and conditions that are acceptable to everyone. As a result, negotiation does not result in clear winning and losing parties, and in many ways provides for greater flexibility in shaping the final results. There have been a number of negotiated settlements of tribal water rights in the last several decades. The largest of these has been the Gila River Indian Community (GRIC) settlement in Arizona reached in 2004, which will be discussed in this section to illustrate some of the features common to water rights negotiated settlements.

The GRIC settlement was the result of over two decades of negotiations between the federal government, the tribes, the state of Arizona, and numerous other non-tribal interests over the allocation and division of the waters of the Gila River and its tributaries.¹⁶⁰ In many respects, this settlement is a resounding success for the GRIC. The tribes were allotted a water budget of 653,500 acre-feet per year, as well as \$200 million dollars to be applied to costs of water delivery and infrastructure development. In addition, settlement provisions protect tribal groundwater from non-tribal pumping near the reservation; supply funding to establish a GRIC water quality monitoring program; and, pursuant to certain conditions, allow the tribe to lease their water rights. Clearly, as the GRIC settlement shows, the negotiation strategy can have a number of results that will be very beneficial to tribes, especially in light of climate change: (1) quantified and enforceable water rights in an amount settled upon by the tribes; (2) consideration of groundwater supplies in the process, which is especially important as users are increasingly turning to subsurface water resources as surface supplies have become more scarce; (3) financial settlements, which are crucial to tribes in order to build and maintain the systems needed to utilize their newly-acquired water; and (4) the ability to lease tribal water rights, providing not only additional income, but also giving tribes greater flexibility to diversify tribal economies should climate change make maintaining a predominantly agrarian culture less viable.

However, due to the give-and-take nature of negotiated settlements, every gain comes with a corresponding concession, and the GRIC settlement again provides useful insight into what sacrifices tribes may have to make. First, as with litigation, negotiation can be time-consuming and expensive for tribes—the GRIC settlement, after all, took decades to resolve. Second, as part of the final settlement, tribes will often have to waive additional claims that could otherwise be litigated. In the GRIC settlement, for example, it was conceded that the tribes likely had legitimate claims to the loss of 1.5 million acre-feet of water per year with a potential litigation value in the billions of dollars. Of course, whether these claims would have prevailed is another question entirely, although even if a court had not decreed the full 1.5 million acre-feet to the tribes they might still have gotten considerably more than the 650,000 acre-feet they received through negotiation. Third, benefits received by tribes often come with limitations—for example, while the GRIC tribes are allowed to lease their water rights pursuant to the settlement, it can only be to in-state parties thus limiting their marketability. Fourth, and perhaps most importantly, is the fact that in order to trade their unaffirmed, unquantified federal reserved water rights for rights to concrete quantities of “wet” water, tribes not only subject themselves to the prior appropriation doctrine but will usually have to accept water allocations with a lower priority than their federal rights. As climate change portends increasingly arid conditions and diminishing water availability, this last factor raises the crucial question of whether such “wet” water will be of such low-priority that senior rights will deplete the water resource and leave tribes with no water and no recourse.

Nonetheless, even acknowledging these potential shortcomings of negotiated water rights settlements, tribes might still prefer this strategy to the relative gamble of litigation simply because with negotiation they have more input into the process and thus more control over the final outcome. It is also important to remember that while litigation and negotiation are the two main legal strategies for tribes to affirm water rights, there are a number of other policy strategies that could potentially be useful. Some of these are discussed briefly in the following sections.

c) Comprehensive Natural Resource Management Policy

One difficulty of natural resource management in the southwest is that current distinctions—such as between tribal and non-tribal land and resources—ignore the complex interrelationships between resources and thus effectively prevent comprehensive and effective management. For instance, mining on non-tribal lands often affects water availability and quality on tribal land. When coupled with the water scarcity impacts of climate change, such practices can be truly problematic. A statutory regime that more adequately recognizes the ways in which resource management decisions cross the boundaries between tribal and non-tribal lands could assist all involved parties in upholding management stability of shared natural resources. For example, a possible policy initiative could involve proof by the State that extraction or use of natural resources on or adjacent to tribal lands does not inhibit or cause injury to tribal parties in any foreseeable or substantial way. Alternatively, property tax disincentives surrounding reservations could work as an effective buffer zone promoting continuity in tribal land and water use and management. In terms of policy recommendations for tribal

governments, well-developed tribal codes could demonstrate that regulation of non-tribal members on or off reservation is important to tribal economies and traditional lifestyles. Doing so could further minimize fragmentation and inconsistency in state/local and tribal natural resource management.

d) Merging Groundwater and Surface Water Regimes

Another example of a problematic legal division in natural resource use is illustrated in the current distinction between surface and groundwater resources in the state of Arizona.¹⁶¹ Ground and surface water resources are connected through hydrological, ecological, and geological processes. For example, excessive pumping of groundwater can lower surrounding water table levels and can affect recharge factor of groundwater reserves. As a result, depletion of groundwater resources impacts soil moisture, causing decrease in surface flows due to increase of immediate uptake by vegetation and surrounding ecosystem factors. The Hopi and Navajo have seen such cause-and-effect relationships first hand: pumping of 3.3 million gallons of groundwater by mining companies on land adjacent to the tribes' reservations has led to a dramatic drop in the water table on Reservation lands.

Despite the nexus between aboveground and subsurface water systems, however, the two are managed under separate statutory schemes. The inconsistent results only worsen the long-standing problem of water scarcity; when considered in conjunction with similar impacts due to climate change, the cumulative effect on water availability will quickly become untenable. Thus, Arizona needs to take legislative steps to recognize the inherent interplay between water resources and manage them accordingly.

e) Relaxing or Abandoning the “Practicably Irrigable Acres” Standard

Continued use of the Practicably Irrigable Acres standard of quantifying federally reserved water, as established by *Arizona v. California*, might also prove problematic for tribes looking to protect their water rights in light of climate change projections. If the effects of climate change cause warm and arid conditions to persist or worsen such that agricultural sustainability is diminished, tribes in future water adjudications might find themselves allotted smaller water rights than they would have been entitled to previously. Moreover, inflexible application of the PIA standard might force tribes to continue agricultural operations diminished by climate changes even if tribes wish to pursue other economic markets. For these reasons, policy measures that modify or do away with the PIA standard altogether might be important means for tribes to best decide how to utilize and protect their resources, their legal rights to those resources, and their tribal economies and cultures. At the very least, policy proposals allowing tribes the flexibility to use water quantified under a PIA standard for use in other economic or cultural endeavors could help Tribes deal with the effects of climate change.

f) Economic Subsidies

There are other policy measures that work behind the scenes to mitigate water scarcity and other tribal impacts resulting from climate change. The establishment of

tribal trust funds and other monetary assistance is already a characteristic of the water-rights settlement process. As climate change continues to implicate water availability, such economic subsidies by federal and state governments could be an increasingly common direction tribes take in association with affirming their water rights. That is, tribes may view increased monetary compensation as a way to supplement quantification of a decreased allotment or lower priority water right. Economic subsidies as a component of the settlement process or as a separate policy initiative are beneficial for several reasons. Allocation of monies to tribes rather than to federal agencies assisting tribes gives tribes the ability to put finances where they are needed most as determined by the tribal governments themselves. Financial resources further gives tribes the means to promote local economies, secure additional water resources, and build additional storage or other infrastructure needed to take put their water rights to actual use. In a water scarce region, federal and state governments should seriously consider financial subsidies as a negotiating tool in settling tribal claims to high priority, but un-affirmed, federally reserved water.

g) Water Leasing or Marketing

With temperatures rising and reservoirs dropping, the ability to participate in water marketing for profit is potentially a powerful tool to be exercised by tribes. However, the extent to which tribes are currently able to lease their water rights is not without limitation. As discussed above, even when tribes negotiate leasing provisions in a settlement agreement, they often must accept conditions upon their ability to do so, such as the requirement that the GRIC only lease to in-state interests governed by the same water municipality as the tribes. Outside of a negotiated leasing provision, there is debate as to whether tribes are legally entitled to trade their water rights on the market at all. Some argue that pursuant to the *Winters* and *Arizona v. California* decisions, the federal reserved water rights held by tribes are intended solely to allow tribes to continue traditional agricultural uses of the water; that is, trading tribal water rights for cash on the water market, it is suggested, is a violation of this rule. Furthermore, opponents of tribal leasing opine that because tribes must get federal permission to transfer an interest in tribal land, they must get the same permission to transfer an interest in the appurtenant water.

The counter-argument is that that tribal water rights were reserved to generally promote tribal longevity and well-being; in other words, proponents of leasing argue, the goal of self-sufficiency is best realized when tribes have the ability to exercise free market strategies and lease a valuable commodity for economic gain. In addition, it must be noted that non-tribal rights holders are completely free under the prior appropriation doctrine to lease or sell their water rights to other parties so long as it doesn't interfere with the interests of other water rights holders. Therefore, calling for legislation that puts tribes on equal footing with non-tribal parties as regards the ability to transfer water rights is an important policy initiative tribes could consider. The legal ability to freely sell or lease tribal water rights could generate finances enough to promote construction and maintenance of reservation infrastructure, continuation of important non-agricultural traditional tribal practices, or diversification of tribal commerce and trade—all of which are proactive steps towards mitigating and adapting to climate change.

CASE STUDY #4--FLORIDA TRIBES

1) Introduction

The effects of climate change will be felt from coast to coast, and the state of Florida is certainly no exception. Rising temperatures, rising sea levels, and other results of global warming will have a number of secondary impacts that pose serious threats to the state's agricultural and tourist industries. Among those who will be most affected by climate change in Florida are the two federally recognized Native American tribes in Florida—the Seminole and the Miccosukee. These tribes are descended from tribes across the southeastern United States who migrated to Florida to escape conflict with other tribes and prolonged persecution by European and American forces. Tribes such as the Creek, Hitchiti, Apalachee, Mikisuki, Yamasee, Yuchi, Tequesta, Apalachicola, Choctaw, and Oconee joined together and, along with escaped slaves from southern states, sought freedom and better lives in Florida. In 1957, the Seminole Tribe of Florida was officially recognized by the federal government, followed in 1961 by the recognition of the Miccosukee Tribe of Indians of Florida. The traditional culture of these tribes included agrarian, hunting, and trading enterprises. These practices, along with the more recent addition of tribal gaming and tourism industries, are all susceptible to the projected effects of climate change.

2) Climate Change in Florida

The effects of climate change in Florida will manifest in a number of ways: rising temperatures; rising sea levels and other effects on water resources; and weather pattern changes, most importantly with regard to precipitation.¹⁶² These impacts in turn hold significant implications for Florida's tourism and agricultural industries, ecosystems, and human health. This section will explore each of these issues—effects of climate change on temperature, water resources, and weather patterns—in turn, along with the relevant secondary effects of each that will be felt in Florida.

a) Rising Temperatures

Perhaps the most significant effect of climate change in Florida will be rising temperatures. It is projected that the heat index will increase by as much as 8 to 15° Fahrenheit over the next 100 years. This increase in the heat index will have resultant effects on public health, commercial agriculture and forestry industries, and Florida ecosystems.

Rising temperatures will raise a number of public health issues in Florida. First, as the climate grows warmer, people will become more susceptible to heat-induced illness such as heat stroke. Second, rising temperatures also lead to a decrease in air quality. Third, an increase in temperature will also increase the incidence of disease: the microorganisms that cause water-borne disease survive longer and reproduce faster in warmer water, and warmer temperatures also increase the range of vector-borne diseases spread by insects and rodents.

Rising temperatures will also affect Florida's agricultural industry, whose citrus, sugarcane, and tomato crops provide a significant economic benefit to the state. While some crops might experience an initial benefit due to climate change—decreased freeze losses due to higher temperatures or increased fertilization because of higher carbon dioxide, for example—it is possible that temperatures will rise beyond the optimum range and thus translate into decreased yields. In addition, rising temperatures will produce secondary effects that could also harm agriculture: reduced soil moisture and reduction in water resources available for irrigation; increased exposure to insects and plant diseases; and rootstock damage—particularly for the sugarcane industry—caused by coastal flooding and erosion. Along with the important food crops, Florida's commercial forestry industry will also be similarly affected by rising temperatures and their secondary effects.

Finally, rising temperatures will lead to widespread impacts on Florida's ecosystems. For instance, warmer temperatures might harm native flora and fauna by exceeding optimal temperature ranges or by allowing exotic species to move in and take over. Because Florida's unique natural ecosystems—the Everglades, for example—are a major tourist draw, any effects of climate change that harm them will also have an effect on Florida's economy as well.

b) Rising Sea Levels and Other Effects on Water Resources

Another serious issue regarding climate change in Florida is how it will affect water resources. The most obvious effect is rising sea level as global warming causes expansion of the oceans. Over the next century, a rise of anywhere from 8 to 30 inches is possible, which due to Florida's gradually sloped shoreline could result in horizontal advance of up to several hundred feet. Such encroachment would exceed the maximum width of the majority of coastal beaches, thereby devastating the state's tourist industry, and causing up to a 60% increase in flood damages. In addition, rising sea levels might completely overwhelm barrier islands that serve as a buffer against storm surges; as a result, shoreline erosion will become even more accelerated. Also, as ocean levels go up, sensitive coastal estuarine habitats could be damaged or destroyed as the delicate balance of seawater and freshwater in these regions is upset. Such intrusion of saltwater into groundwater aquifers, which could be as far as several miles inland in some places, might also threaten municipal freshwater supplies.

Beyond rising sea levels, climate change also leads to rising sea temperatures. One serious result of the warming of the oceans is destruction of coral reefs. Effects of climate change such as deepening water levels, more pronounced seasonal extremes of water temperature, increased turbidity, and altered nutrient levels are already killing of coral reefs and will only continue to do so. Because coral reefs are the foundation for marine ecosystems, as the reefs go so might multi-billion dollar commercial and recreational industries such as fishing and diving go as well.

c) Changes in Weather Patterns

The effects of climate change on weather patterns are difficult to predict as accurately as other effects, and past studies result in divergent findings. However, one

effect that most agree on is that climate change will cause the precipitation patterns to change to more intense bouts of rain alternating with longer and more pronounced periods of drought. Thus, Florida could see increased flooding, greater risk of wildfires, growing scarcity of freshwater resources for irrigation and municipal use, and alteration of natural water-dependent ecosystems. Even without a full understanding of precisely how climate change will affect rain cycles, it is clear that the implications for Florida are important.

Interestingly, while at one time it was thought that global warming was contributing to the frequency of hurricanes, scientific evidence now points to the El Niño-Southern Oscillation (ENSO) as the major influence on Atlantic hurricanes. Although climate change might contribute to a modest rise in the severity of individual hurricanes by the end of the century, there is not expected to be any discernible effect due to climate change in the next several decades. Following the World Meteorological Organization's recent 6th International Workshop on Tropical Cyclones, the global community of cyclone researchers and forecasters issued a consensus statement that concluded, among other things, that "[t]hough there is evidence both for and against the existence of a detectable anthropogenic signal in the tropical cyclone climate record to date, no firm conclusion can be made on this point," and that "[n]o individual tropical cyclone [including hurricanes and typhoons] can be directly attributed to climate change."¹⁶³

3) Impact of Global Warming on Native American Tribes in Florida

Although there has not been a significant amount of research on how climate change will specifically impact Native American tribes in Florida, it is clear that neither the Seminole nor the Miccosukee will be immune. The effects of climate change could threaten these tribes in a number of ways: their reservation lands are potentially at risk from coastal inundation and erosion; the traditional activities they practice—farming and subsistence hunting, for instance—could be affected by changes to weather patterns and temperatures, among other climatic factors; and their tribal economic activities could suffer a decline at the hands of climate change.

The Florida coast, especially the low-lying Everglades region in southern Florida, is susceptible to inundation by rising sea level. First and foremost, such flooding could possibly result in the direct loss of tribal lands, significant portions of which are in such vulnerable areas. For example, this rise in water levels could impact both the Hollywood and Big Cypress reservations of the Seminole tribe: the former is located in the coastal area around Ft. Lauderdale and the latter is located in a low-lying wetlands area just southeast of Ft. Myers. The Miccosukee tribe's lands, near Miami and the Everglades in southern Florida, could likewise be affected. Furthermore, even though it is far from certain that tribal lands would be inundated, rising sea levels nevertheless raise other concerns. As sea levels rise, storm surges will reach further inland and threaten additional damages. Also, saltwater intrusion could threaten tribal freshwater supplies that are important for municipal, agricultural, and commercial uses.

The loss or damage to tribal lands threatens not only these tribes' homes, but also their ability to engage in traditional cultural, social, spiritual and economic activities. These tribes have a long history of subsistence activities such as hunting, fishing, and growing food crops in and around the Everglades. Rising temperatures, changing

weather patterns, encroaching sea levels, and saltwater intrusion could all have devastating impacts on Florida's coastal ecosystems and the plants and animals that inhabit them—and upon which the tribes rely to support their traditional lifestyles. Furthermore, if tribes are forced to abandon these practices, they might also begin to lose traditional social and spiritual rites centered around such activities, such as the annual Green Corn Dance ritual that brings tribal clans together to observe the harvest, socialize, and settle tribal disputes. The link between the tribe and the land is so close that members of the tribe believe that if the land dies, the tribe will die along with it.¹⁶⁴

Finally, climate change could seriously affect tribal economies. The Seminole, for example, have developed citrus and sugarcane growing operations that bring in millions of dollars a year. This important source of income could be diminished or lost should the effects of climate change make it inhospitable for such crops. Also, the tribes are involved in cattle ranching activities on their lands, either maintaining tribal herds or leasing tribal lands to commercial ranchers. Again, rising temperatures, water scarcity, increased exposure of disease, and other effects of climate change might prevent the continued viability of this tribal industry. Even those economic activities which the tribes have relatively recently engaged in to diversify their tribal economies, such as tourism and gaming, could be negatively impacted if rising temperatures and sea levels reduce the number of tourists visiting Florida.

4) Tribal Legal Rights Potentially Affected by Climate Change

The Seminole Tribe and Miccosukee Tribe achieved federal recognition in 1957 and 1961, respectively. Subsequently, through a combination of state and federal legislation, the two tribes retained or were granted various reservation lands as well as the right to continue their customary use of these lands for observing tribal ceremonies and for subsistence activities such as hunting, trapping, fishing, and frogging.

In 1987, the Seminole settled a land claims dispute with the state and the South Florida Water Management District,¹⁶⁵ thereby securing their rights to continue traditional ceremonial and subsistence practices.¹⁶⁶ The tribe also retained rights in Everglades National Park and Big Cypress that were already recognized,¹⁶⁷ as well as rights in the Big Cypress area as recognized by the state.¹⁶⁸

The Miccosukee Reserved Area Act reserved a section of the Florida Everglades for the Miccosukee Tribe.¹⁶⁹ This act preserved the rights of the tribe to use lands and waters in the park for such uses as fishing, boating, and cultural and religious observances. In addition, rights to hunt, trap, fish, and continue all usual and customary use of land in the Big Cypress area applies to the Miccosukee the same as it does the Seminole.¹⁷⁰

These rights to inhabit tribal lands and to continue long-standing tribal practices thereon—rights at the very core of these tribes' cultural identity—will both be threatened by climate change. Increasing temperatures and changes in weather patterns, along with secondary effects like more frequent wildfires and greater incidence of pests and disease, could significantly diminish the ability of these tribes to engage in traditional enterprises such as subsistence agriculture. Such effects of climate change might also mean a decrease in the animal populations upon which the Seminole and Miccosukee rely for subsistence hunting. Rising sea levels pose a grave danger to the Everglades, threatening

not only the continuation of the tribal way of life, but the very lands on which it is practiced.

5) Legal And Policy Strategies to Protect Tribal Rights

The problems facing the Seminole and Miccosukee—coastal flooding and erosion and other threats to subsistence practices due to climate change—are the same as those facing Alaskan native communities as described previously. While the situation for the Florida tribes might not presently be as acute as that of the Alaskan natives, it will nevertheless be important for the tribes in Florida to begin planning for climate change. To that end, Florida tribes could consider similar legal and policy approaches for mitigating or adapting to climate change as would be potentially helpful to Alaskan native communities.

- Federal statutory assistance for flooding and erosion, such as through the Flood Control Act of 1946 and the River and Harbor Act of 1968. In addition, while it is unclear as to how much tribal land could be lost to coastal inundation, tribes might consider the possibility of pursuing replacement land or relocation assistance.
- Stronger subsistence rights protections—currently the tribal subsistence rights are subject to government determination that they are not ecologically detrimental, but it is unclear as to what standards would be used to make this determination.
- Protection of the Everglades with special attention paid to the effects of climate change. In 1999, state and federal authorities announced the Comprehensive Everglades Restoration Plan with the goal of returning the Everglades as near as possible to their original condition in the remaining areas of that ecosystem. It is clear that restoring the Everglades is certainly an immense task, in part because such a plan “must be robust in the face of unknown factors such as future climate change.”¹⁷¹ It is important that tribes participate in these efforts, and one way for them to do this is through the South Florida Ecosystem Restoration Task Force (SFERTF), an entity working to protect the natural environment of southern Florida. The membership of this body is statutorily required to include one representative each from the Seminole and Miccosukee among its fourteen members, thereby giving the tribes an opportunity to raise their own concerns.
- Climate change mitigation measures. Beyond their subsistence practices, the Seminole and Miccosukee are today engaged in substantial commercial and agricultural enterprises. The various economic activities in which the tribes are engaged offer opportunities for the tribes to incorporate measures to mitigate climate change. For example, both tribes are involved with extensive cattle ranching operations. By utilizing grazing land management practices such as rotational grazing, the tribes can achieve net greenhouse gas reductions through enhanced soil sequestration.¹⁷²

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¹<http://www.ipcc.ch/>

² Earlier assessments were published in 1990 (first), 1995 (second), and 2001 (third).

³ The National Assessment was called for by the Global Change Research Act of 1990 (PL 101-606), and was administered by the U.S. Global Change Research Program.

⁴ **IMPORTANT EDITING NOTE:** We do not make a serious effort in this draft to feature or cite specific statistics, since they will be immediately updated with new IPCC numbers pending publication (in early 2007) of the fourth assessment reports. To the extent that trends or statistics are included in this draft, they are well documented in past reports and are expected to be generally consistent with updated IPCC figures. Statistics that are provided herein (largely as placeholders) come from the following two sources (unless otherwise specified): (1) Intergovernmental Panel on Climate Change. 2001. *Climate Change 2001: Synthesis Report, Summary for Policymakers* (a.k.a. "IPCC third assessment"); and (2) Water Sector Assessment Team. 2000. *Water: The Potential Consequences of Climate Variability and Change for the Water Resources of the United States* (a.k.a. "National Assessment").

⁵ **EDITING NOTE:** This section will be fleshed out pending publication of the IPCC fourth assessment and the completion of the case study research.

⁶ A somewhat more embryonic area of research involves a phenomenon known as the Pacific Decadal Oscillation (PDO). The PDO is an ENSO-like phenomenon that operates on a much longer time frame (20-30 years for PDO as opposed to 6 to 18 months for ENSO events) and is centered on the North Pacific/North American sector (rather than the tropics for ENSO events). Both "warm" and "cool" PDO cycles can be documented, producing results broadly similar to weak ENSO events. Understanding the combined impact of ENSO, PDO, and possible global climate change is an important and active area of study. (More information about PDO can be found at: *The Pacific Decadal Oscillation: A Brief Overview for Non-Specialists*, by Nathan Mantua.)

<http://tao.atmos.washington.edu/PNWimpacts/Publications/Pub129.htm> Additionally, some research suggests a similar phenomenon in the Atlantic termed the Atlantic Multi-Decadal Oscillation (AMO).

⁷ El Niño is Spanish for "the Christ Child." This name derives from the observation that El Niño sea surface temperatures peak around Christmas.

⁸ For more information on ENSO, see: "Frequently (well, at least once)-asked-questions about El Niño." Billy Kessler, Oceanographer, Pacific Marine Environmental Laboratory, NOAA.

<http://www.pmel.noaa.gov/~kessler/occasionally-asked-questions.html#q17>; and "ENSO Information" from the Climate Diagnostics Center, <http://www.cdc.noaa.gov/ENSO/>.

⁹ The degree to which a region's weather is influenced is known as its ENSO "signal." The stronger the signal, the greater the probability that the seasonal climate will be influenced.

¹⁰ Exploring these connections is an active area of research, but identifying statistically significant linkages is difficult due to the relatively small numbers of ENSO events for which good data exists.

¹¹ **EDITING NOTE.** Again, this brief summary is intended only as a placeholder pending publication of updated IPCC reports.

¹² *Massachusetts v. EPA*, 415 F.3d 50 (2005), *cert. granted by Massachusetts v. EPA*, 126 S. Ct. 2960 (June 26, 2006).

¹³ 406 F. Supp. 2d 265 (S.D.N.Y. 2005)

¹⁴ Bunkley, Nick, *California Sues 6 Automakers Over Global Warming*, New York Times (September 21, 2006).

¹⁵ *Friends of the Earth v. Watson*, 2005 U.S. Dist. LEXIS 42335 (N.D. Cal. August 23, 2005).

¹⁶ 42 U.S.C. § 4332(2)(C). NEPA does not have a citizen suit provision, so jurisdiction for suits alleging NEPA procedural violations are based on the Administrative Procedure Act (APA), which allows for judicial review of "final agency actions." See 5 U.S.C.S. § 701 et. seq.

¹⁷ Indeed, plaintiffs in global warming litigation identify any number of climate-change-induced injuries that certainly could also be claimed by tribes: loss of snow-pack and decline in stream flows, loss of coastal habitat through erosion, saltwater intrusion, impacts on wildlife including fish, etc. See, e.g. *Connecticut v. American Electric Power Co.*, 406 F. Supp. 2d 265 (S.D.N.Y. 2005); *Massachusetts v. EPA*, 367 U.S. App. D.C. 282, 415 F.3d 50, 2005 U.S. App. LEXIS 14311 (2005).

¹⁸ *Connecticut v. American Electric Power Co.*, 406 F. Supp. 2d 265, 272 (2005).

¹⁹ *Connecticut v. American Electric Power Co.*, 406 F. Supp. 2d 265, 272 (2005).

²⁰ *Lujan v. Defenders of Wildlife*, 504 U.S. 555, 560-61 (1992) Specifically, the Court stated:

The irreducible constitutional minimum of standing contains three elements. First, the plaintiff must have suffered an ‘injury in fact’—an invasion of a legally protected interest which is (a) concrete and particularized, and (b) actual or imminent, not conjectural or hypothetical. Second, there must be a causal connection between the injury and the conduct complained of—the injury has to be fairly traceable to the challenged action of the defendant....Third, it must be likely, as opposed to merely speculative, that the injury will be redressed by a favorable decision. *Id.* (internal citations omitted).

In addition, courts will apply the “zone of interest” test, which requires that the complained-of injury be of the kind Congress intended the law in question to address, or that plaintiff be of the class of persons intended to be protected.

²¹ See *Alaska Native Class v. Exxon Corp.* 104 F.3d 1196, 1197 (9th Cir. 1996). See also, ETHAN’S CHAPTER.

²² See David A. Grossman, *Warming up to a Not-So-Radical Idea: Tort-Based Climate Change Litigation*, 28 *Colum. J. Envtl. L.* 1, 22, 24 (2003)

²³ *Friends of the Earth v. Watson*, 2005 U.S. Dist. LEXIS 42335, 8 (N.D. Cal. August 23, 2005).

²⁴ *Massachusetts v. EPA*, 367 U.S. App. D.C. 282 (2005).

²⁵ Pub. L. 109-58, H.R. 6 (2005).

²⁶ Brent D. Yacobucci, Congressional Research Service Report for Congress No. RL32955, *Climate Change Legislation in the 109th Congress* (updated August 4, 2006), available at <http://www.ncseonline.org/NLE/CRSreports/06Sep/RL32955.pdf>. See also, *Energy Policy Act of 2005: Summary and Analysis of the Act’s Major Provisions* 219 (Kevin J. McIntyre, et. al. eds., LexisNexis 2006).

²⁷ Brent D. Yacobucci, Congressional Research Service Report for Congress No. RL32955, *Climate Change Legislation in the 109th Congress* (updated August 4, 2006), available at <http://www.ncseonline.org/NLE/CRSreports/06Sep/RL32955.pdf>.

²⁸ Brent D. Yacobucci, Congressional Research Service Report for Congress No. RL32955, *Climate Change Legislation in the 109th Congress* (updated August 4, 2006), available at <http://www.ncseonline.org/NLE/CRSreports/06Sep/RL32955.pdf>.

²⁹ See http://www.pewclimate.org/what_s_being_done/in_the_states/regional_initiatives.cfm?preview=1. The member states are Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont. *Id.* Additionally, Maryland will join the RGGI by June 30, 2007 pursuant to Maryland’s Healthy Air Act, signed into law by Governor Robert L. Ehrlich on April 6, 2006. *Id.*

³⁰ See http://www.pewclimate.org/what_s_being_done/in_the_states/regional_initiatives.cfm?preview=1.

³¹ See generally <http://www.pewclimate.org>.

³² http://www.pewclimate.org/what_s_being_done/in_the_states/ab32/index.cfm.

³³ <http://www.ci.seattle.wa.us/mayor/climate/>.

³⁴ <http://www.ci.seattle.wa.us/mayor/climate/>.

³⁵ <http://www.itcaonline.com>.

³⁶ <http://www.ntec.org/index.htm>.

³⁷ <http://www.ntec.org/index.htm>.

³⁸ See generally, Climate Impacts Group, University of Washington, *Uncertain Future: Climate Change and Its Effects on Puget Sound*, 13 (October 2005), available at www.psat.wa.gov; <http://www.cses.washington.edu>.

³⁹ See generally, Climate Impacts Group, University of Washington, *Uncertain Future: Climate Change and Its Effects on Puget Sound*, 16 (October 2005), available at www.psat.wa.gov; <http://www.cses.washington.edu>; National Assessment Synthesis Team (Edward A. Parson, et. al.), U.S. National Assessment of the Potential Consequences of Climate Variability and Change: *Mega-Region: Pacific Northwest*, 253, available at <http://www.usgcrp.gov/usgcrp/nacc/pnw-meg-region.htm> (last updated 11 October, 2003).

⁴⁰ See generally, Climate Impacts Group, University of Washington, *Uncertain Future: Climate Change and Its Effects on Puget Sound* (October 2005), available at www.psat.wa.gov.

⁴¹ A study of a number of snowmelt-fed streams in western North America found that peak spring runoff has come anywhere from 10 to 30 days earlier in the year over the second half of the 20th century. Stewart, I.T., D.R. Cayan and M.D. Dettinger, 2004: Changes in Snowmelt Runoff Timing in Western North America under a 'Business as Usual' Climate Change Scenario. *Climatic Change* 62: 217-232. See also, <http://www.cses.washington.edu/cig/pnwc/cc.shtml> (noting that "[t]he greatest trends [of earlier runoff] occurred in the PNW, including the mountain plateaus of Washington, Oregon, and western Idaho"). See also, Climate Impacts Group, University of Washington, *Uncertain Future: Climate Change and Its Effects on Puget Sound*, 16-17 (October 2005), available at www.psat.wa.gov. (noting that for Puget Sound rivers, "timing of snowmelt shifted earlier by 12 days, or 2.1 days per decade" between 1948 and 2003).

⁴² Ordinarily, snow pack acts as a storage mechanism for precipitation; as the snow melts in the spring and summer months, water is released into the river system more slowly. However, with precipitation falling as rain in the winter, it does not get stored and thus enters the river system immediately—leading to higher winter flows and lower summer flows. <http://www.cses.washington.edu/cig/pnwc/cc.shtml>.

⁴³ Babaluk, J.A., J.D. Reist, J.D. Johnson and L. Johnson, First records of sockeye (oncorhynchus nerka), and pink salmon (*O. gorbuscha*), from Banks Island and other records of Pacific salmon in Northwest territories, Canada. *Arctic*, 53(2): 161-64 (2000)

⁴⁴ National Assessment Synthesis Team (Edward A. Parson, et. al.), U.S. National Assessment of the Potential Consequences of Climate Variability and Change: Mega-Region: Pacific Northwest, 259, available at <http://www.usgcrp.gov/usgcrp/nacc/pnw-meg-region.htm> (last updated 11 October, 2003).

⁴⁵ See generally, Climate Impacts Group, University of Washington, *Uncertain Future: Climate Change and Its Effects on Puget Sound*, 29-30 (October 2005), available at www.psat.wa.gov.

⁴⁶ <http://www.defenders.org/wildlife/new/marine/salmon/miracle.html>.

⁴⁷ Meengs, Chad C., and Robert T. Lackey, Estimating the size of historical Oregon salmon runs. *Reviews in Fisheries Science*. 13: 51-66 (2005) available at <http://www.epa.gov/wed/pages/staff/lackey/pubs/estimating.pdf>.

⁴⁸ Kent Richards, "The Stevens Treaties of 1854-1855: An Introduction," *Oregon Historical Quarterly* Fall 2005, available at <http://www.historycooperative.org/journals/ohq/106.3/richards.html>.

⁴⁹ Treaty with the Tribes of Middle Oregon, 12 Stat. 963. The Stevens treaties are as follows: Treaty of Medicine Creek, 10 Stat. 1132; Treaty of Point Elliot, 12 Stat. 927; Treaty of Point No Point, 12 Stat. 933; Treaty of Neah Bay, 12 Stat. 939; Treaty of Olympia, 12 Stat. 971; Treaty with the Nez Perce Tribe, 12 Stat. 957; Treaty with the Umatilla Tribe, 12 Stat. 945; Treaty with the Tribes of Middle Oregon, 12 Stat. 963; Treaty with the Yakima Tribe, 12 Stat. 951

⁵⁰ *Puyallup Tribe v. Department of Game of Washington et al.*, 391 U.S. 392 (1968) (*Puyallup I*)

⁵¹ *Puyallup I*, 391 U.S. 392, 398 (1968).

⁵² *United States v. Oregon*, 302 F. Supp. 899 (1969).

⁵³ *United States v. Oregon*, 302 F. Supp. 899, 911 (1969).

⁵⁴ *United States v. Oregon*, 302 F. Supp. 899, 911 (1969).

⁵⁵ *United States v. Washington*, 384 F. Supp. 312 (1974).

⁵⁶ *United States v. Washington*, 384 F. Supp. 312, 343 (1974).

⁵⁷ *United States v. Washington*, 520 F.2d 676 (9th Circuit 1975).

⁵⁸ *Washington v. Washington State Commercial Passenger Fishing Vessel Association*, 443 U.S. 658 (1979).

⁵⁹ *Washington v. Washington State Commercial Passenger Fishing Vessel Association*, 443 U.S. 658, 686 (1979).

⁶⁰ *United States v. Washington*, 506 F. Supp. 187 (1980).

⁶¹ For a description of the terms, see the SRBA Agreement Summary (May 2004), available at <http://www.idwr.idaho.gov/nezperce/index.htm>.

⁶² The SRBA, for example, comprises approximately 150,000 water rights claims and covers 38 of the 44 counties in the State of Idaho. Fact Sheet on Snake River Water Agreement (May 15, 2004), available at <http://www.idwr.idaho.gov/nezperce/index.htm>. See also, Patricia R. McCoy, *Snake River Adjudication Nearly Complete*, Capital Press (February 10, 2006), available at <http://capitalpress.info/print.asp?ArticleID=22905&SEctionID=67&SubSectionID=792>.

⁶³ 16 U.S.C.S. §§1531 et. seq.

⁶⁴ 16 U.S.C.S. §1536(a)(2).

⁶⁵ The National Oceanic and Atmospheric Administration (NOAA) has compiled the ESA listing status for west coast salmon and steelhead. As of June 8, 2006, there were 5 species of these fish listed as endangered, 21 as threatened, 3 as species of concern, and 1 as proposed threatened.

<http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/upload/1pgr06-06.pdf>.

⁶⁶ <http://www.nwifc.org/recover/index.asp>.

⁶⁷ See generally, Browning, Michael F., Private Means to Enhance Public Streams, *The Colorado Lawyer* Vol. 33, No. 4 (April 2004)

⁶⁸ National Park Service Organic Act, Act of Aug. 25 1916 (39 Stat. 535) as amended at 16 U.S.C. §1 (2006).

⁶⁹ Proclamation 7319, Establishment of the Hanford Reach National Monument (June 8, 2000). See also, Office of the Press Secretary, White House, Hanford Reach National Monument Press Release (June 8, 2000) available at http://clinton4.nara.gov/WH/New/html/20000609_4.html. National Park units can be designated by Congressional legislative action or, in the case of national monuments, by Executive order pursuant to the Antiquities Act of 1906. <http://www.nps.gov/legacy/nomenclature.html>. The use of the Antiquities Act to proclaim monuments, as opposed to legislation, has become the predominant means by which public lands have been set aside for protection over the last several decades; for a thorough history of the Antiquities Act, see *The Antiquities Act: A Century of American Archaeology, Historic Preservation, and Nature Conservation*, eds. Harmon, David, Francis P. McManamon, and Dwight T. Pitcaithley (University of Arizona Press, 2006).

⁷⁰ *Managing the Columbia River: Instream Flows, Water Withdrawals, and Salmon Survival*, National Academies Press (2004) at 130.

⁷¹ See *Arizona v. California*, 373 U.S. 546 (1963) (affirming that the U.S. could reserve water for such reservations of public land as national recreation areas, wildlife refuges, and national forests); *Cappaert v. United States*, 426 U.S. 128 (1976) (stating that intent to reserve water in connection with a federal reservation of land is “inferred if the...waters are necessary to accomplish the purpose for which the reservation was created,” but that this reserves only “that amount of water necessary to fulfill the purpose of the reservation, no more.”). But see, *United States v. Mexico*, 438 U.S. 696 (1978) (finding that unless expressly provided otherwise, federal reserved water rights for national forest designations do not extend to purposes such as aesthetic, recreational, and fish preservation purposes).

⁷² Wild and Scenic Rivers are designated pursuant to the Wild and Scenic Rivers Act, either by Congress or by State legislature. P.L. 90-542, as amended, 16 U.S.C. §§1271-1287 (2006).

⁷³ For example, 10 miles of the Klickitat River in Washington State has been designated as a recreational river area, and currently supports one of only two active Native American dip-net fishing sites in the Columbia basin. <http://www.nps.gov/rivers/wsr-klickitat.html>.

⁷⁴ The CRITFC tribes are the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Confederated Tribes and Bands of the Yakama Indian Nation. <http://www.critfc.org/text/work.html>.

⁷⁵ The NWIFC tribes are the Hoh, Jamestown S’Klallam, Lower Elwha Klallam, Lummi, Makah, Muckleshoot, Nisqually, Nooksack, Port Gamble S’Klallam, Puyallup, Quileute, Quinault, Sauk-Suiattle, Skokomish, Squaxin, Stillaguamish, Suquamish, Swinomish, Tulalip, and Upper Skagit tribes. <http://www.nwifc.org/tribes/index.asp>.

⁷⁶ Pacific Salmon Treaty (16 U.S.C. §§ 3631-3644, March 15, 1985). This treaty provides that the U.S. shall have four commissioners, one of whom is a representative of the treaty fishing tribes. *Managing the Columbia River: Instream Flows, Water Withdrawals, and Salmon Survival*, 108 (National Academies Press, 2004), available at http://print.nap.edu/pdf/0309091551/pdf_image/108.pdf.

⁷⁷ See Oregon Rev. Stat. §507-010. Under the compact, decisions on commercial fishing seasons by the participant states consider, among other factors, the impact on treaty fishing rights. *Managing the Columbia River: Instream Flows, Water Withdrawals, and Salmon Survival*, 112 (National Academies Press, 2004), available at http://print.nap.edu/pdf/0309091551/pdf_image/112.pdf.

⁷⁸ CITE. The Act created the Northwest Power and Conservation Council, which is responsible for “mitigating the impacts of hydroelectric power dams and their operations on all fish and wildlife in the Columbia River basin, including endangered species, through a program of enhancement and protection” with a directive to “pay particular attention to information provided by Native American tribes.” *Managing the Columbia River: Instream Flows, Water Withdrawals, and Salmon Survival*, 113 (National Academies Press, 2004), available at http://print.nap.edu/pdf/0309091551/pdf_image/113.pdf.

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- ⁷⁹ Barnard, Jeff, PacificCorp loses challenge of fish ladders over dams, Associated Press (September 27, 2006) (describing a recent decision in which a power company lost its challenge to federal fisheries agencies to restore free-swimming fish passageways past dams on the Klamath River).
- ⁸⁰ The hatchery and mitigation program on the Columbia River alone has cost \$3 billion dollars over the last 30 years. <http://www.irn.org/revival/decom/brochure/rrdecompt2.pdf>.
- ⁸¹ The Defenders of Wildlife notes that the four Lower Snake River dams “provide no flood control and generate less than 5% of the Northwest’s power.” Defenders of Wildlife, Salmon: Dam Dilemmas, available at <http://www.defenders.org/wildlife/new/marine/salmon/dam.html>. See also, Barnard, Jeff, Salmon Battle Centers on Ladders or Trucks, Associated Press, available at <http://msnbc.msn.com/id/15106246/print/1/displaymode/1098/>
- ⁸² The International Rivers Network notes that “a growing body of evidence indicates that dams and reservoirs are globally significant sources of emissions of the greenhouse gases carbon dioxide and, in particular, methane.” <http://www.irn.org/programs/greenhouse/>.
- ⁸³ Returning Salmon by Restoring Rivers: The Case for Partially Removing Dams on the Lower Snake River, available at <http://www.idahorivers.org/salcasefor.htm>.
- ⁸⁴ ACIA full report 659
- ⁸⁵ Impacts of a Warming Arctic: Highlights of the Arctic Climate Impacts Assessment, 2 (Cambridge University Press, Cambridge UK 2004).
- ⁸⁶ This economic importance of subsistence activities was highlighted by a recent study, which suggested that replacing subsistence foods with imported food would have cost communities between 30 and 50 million dollars in the year 2000 alone. Robert J. Wolfe, Alaska Div. of Subsistence, Subsistence in Alaska: A Year 2000 Update, 2 (2000).
- ⁸⁷ See Mark Nuttal Et Al., Hunting, Herding, Fishing, and Gathering: Indigenous Peoples and Renewable Resource Use in the Arctic, in Arctic Climate Impacts Assessment—Scientific Report, 654 (Cambridge University Press, Cambridge 2004).
- ⁸⁸ Don Callaway, Et. Al, Effects of Climate Change on Subsistence Communities in Alaska, in Proceedings of workshop: Assessing the Consequences of Climate Change for Alaska and the Bering Sea Region, Fairbanks, 29-30 Oct. 1998.
- ⁸⁹ Henry Huntington Et Al., The Changing Arctic: Indigenous Perspectives, in Arctic Climate Impacts Assessment—Scientific Report, at 74-75 (Cambridge University Press, Cambridge, UK 2004).
- ⁹⁰ A. Craver. *Alaska Subsistence Lifestyles Could Disappear in the Next Decade*. Northwest Public Health Fall/Winter 2001: 8-9.
- ⁹¹ Mark Nuttal Et Al., Hunting, Herding, Fishing, and Gathering: Indigenous Peoples and Renewable Resource Use in the Arctic, in Arctic Climate Impacts Assessment—Scientific Report, 660 (Cambridge University Press, Cambridge 2004). An example of the dangers climate change poses to hunters occurred in Arctic Bay, Canada, where 52 Inuit hunters were blown out to sea when a strong wind detached the section of ice they were on. James Ford, Living with Climate Change in the Arctic, World Watch, Sep./Oct. 2005 18:5, 18. The hunters had to be rescued by helicopter and lost valuable equipment. Id. With decreased weather predictability and reductions in stable sea-ice, similar incidents may become more common in Alaska.
- ⁹² Mark Nuttal Et Al., Hunting, Herding, Fishing, and Gathering: Indigenous Peoples and Renewable Resource Use in the Arctic, in Arctic Climate Impacts Assessment—Scientific Report, 684 (Cambridge University Press, Cambridge 2004). (citing J. Kruse Et Al. Sustainability of Arctic Communities: An Inter-Disciplinary Collaboration of Researchers and Local Knowledge Holders, Ecosystems, 7:1- 14, 2004.)
- ⁹³ See General Accounting Office, Alaska Native Villages, Most are Affected by Flooding and Erosion, but Few Qualify for Federal Assistance, Dec. 2003.
- ⁹⁴ Frank Duerden, Translating Climate Change Impacts at the Community Level, Arctic Vol. 57, No. 2, 204-212, 207 (2004).
- ⁹⁵ Id.
- ⁹⁶ Lisa Kraemer Et. Al, The Potential Impact of Climate on Human Exposure to Contaminants in the Arctic, International Journal of Circumpolar Health 64:5, 2005 498-508
- ⁹⁷ 73 Stat. 39 (1958).
- ⁹⁸ See Alaska v. Udall, 420 F.2d 938 (9th Cir. 1969); David Case & David Voluck, Alaska Natives and American Laws 2d ed., 156, (University of Alaska Press 2002).
- ⁹⁹ 43 U.S.C § 1603(b).

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- ¹⁰⁰ David Case & David Voluck, *Alaska Natives and American Laws* 2d ed., 259, (University of Alaska Press 2002).
- ¹⁰¹ 16 U.S.C.A. §§ 3111 et. seq.
- ¹⁰² 16 USC 3111
- ¹⁰³ David Case & David Voluck, *Alaska Natives and American Laws* 2d ed., 290, (University of Alaska Press 2002).
- ¹⁰⁴ See *McDowell v. State*, 785 P.2d 1 (Alaska 1989); *State v. Morry*, 836 P.2d 358, 368 (Alaska 1992).
- ¹⁰⁵ 25 U.S.C.A §§ 500 et. seq.
- ¹⁰⁶ 16 U.S.C.A. §§ 1531 et. seq.
- ¹⁰⁷ 16 U.S.C.A. § 1539(e)(4).
- ¹⁰⁸ 16 U.S.C.A. §§ 1361 et seq.
- ¹⁰⁹ 33 U.S.C.A. § 2702.
- ¹¹⁰ 33 C.F.R. § 136.223(a).
- ¹¹¹ Migratory Bird Treaty with Great Britain (as signatory for Canada) of 1916, Migratory Bird Treaty with Mexico of 1937, Migratory Bird Treaty with Japan of 1974, Migratory Bird Treaty with the Soviet Union of 1976. These four treaties are all implemented by the Migratory Bird Treaty act of 1918. Act of July 3, 1918, ch. 128, 40 Stat. 755, 16 U.S.C.A. §§ 703
- ¹¹² David Case & David Voluck, *Alaska Natives and American Laws* 2d ed., 264, (University of Alaska Press 2002).
- ¹¹³ 16 U.S.C.A. §§ 1151-1187.
- ¹¹⁴ Convention for the Regulation of Whaling, entered into force November 10, 1948 (62 Stat. 1716; TIAS 1849); amended effective May 4, 1959 (10 UST 952; TIAS 4228).
- ¹¹⁵ *Adams v. Vance*, 570 F.2d 950 (D.C. Cir. 1977).
- ¹¹⁶ *Hopson v. Kreps*, 622 F.2d 1375, 1377 (9th Cir. 1980)
- ¹¹⁷ David Case & David Voluck, *Alaska Natives and American Laws* 2d ed., 269, (University of Alaska Press 2002).
- ¹¹⁸ Convention for the Conservation of Polar Bears, entered into force November 1, 1976 (27 UST 3918; TIAS 8409).
- ¹¹⁹ David Case & David Voluck, *Alaska Natives and American Laws* 2d ed., 270, (University of Alaska Press 2002).
- ¹²⁰ *Id.* at 272.
- ¹²¹ *Id.* at 282.
- ¹²² 470 F. Supp. 423 (D.C.D.C. 1979); see also David Case & David Voluck, *Alaska Natives and American Laws* 2d ed., 282, (University of Alaska Press 2002).
- ¹²³ *North Slope Borough v. Andrus*, 642 F.2d 589 (D.C. Cir. 1980), rev'd in part 642 F.2d 589 (D.C. Cir. 1980).
- ¹²⁴ David Case & David Voluck, *Alaska Natives and American Laws* 2d ed., 283, (University of Alaska Press 2002).
- ¹²⁵ 570 F.2d 950 (D.C. Cir. 1978).
- ¹²⁶ David Case & David Voluck, *Alaska Natives and American Laws* 2d ed., 282, (University of Alaska Press 2002).
- ¹²⁷ Alaska Stat. § 16.05.258(b)(4) (Michie 2004); A third criteria based on the proximity of the domicile of the subsistence user to the stock or population is included in the statute but found unconstitutional in *State of Alaska v. Kenaitze Indian Tribe*, 894 P.2d 632, 635 (Alaska 1995).
- ¹²⁸ Alaska Stat. § 15.05.258(c) (Michie 2004).
- ¹²⁹ General Accounting Office, supra note * at 19.
- ¹³⁰ See Ctr. For Env'tl. Law, PETITION TO THE INTER AMERICAN COMMISSION ON HUMAN RIGHTS REQUESTING RELIEF FROM VIOLATIONS RESULTING FROM GLOBAL WARMING CAUSED BY ACTS AND OMISSIONS OF THE UNITED STATES, 1 (2005) available at: http://www.ciel.org/Publications/ICC_Petition_7Dec05.pdf [hereinafter ICC Petition]
- ¹³¹ Donald Goldberg & Martin Wagner, *Human Rights Litigation to Protect the Peoples of the Arctic*, 98 ASILPROC 227, 229 (2004).
- ¹³² *Id.* at 105.
- ¹³³ 43 U.S.C. § 1603(b) (emphasis added).
- ¹³⁴ 869 F.2d 1273, 1278-1279 (9th Cir. 1989).

¹³⁵ In 1953 Congress limited the scope of this doctrine in the Submerged Lands Act, which gives states all rights and title to submerged lands within three miles of their coastlines. See 43 U.S.C. §§ 1301-1315.

¹³⁶ *Gambell*, 869 F.2d at 1276-77.

¹³⁷ *Native Village of Eyak v. Trawler Diane Marie, Inc.*, 154 F.3d 1090, 1096-97 (9th Cir. 1998).

¹³⁸ *Eyak Native Vill. v. Daley*, 375 F.3d 1218 (9th Cir. 2004) (en banc).

¹³⁹ See Cohen, *supra* note ??, at §15.05[d]. “Although the paramountcy doctrine bars state claims to submerged lands, it should not have the same effect on claims to rights in the lands held pursuant to Indian title.”; see also Andrew P. Richards, *Comment: Aboriginal Title or the Paramountcy Doctrine? Johnson v. McIntosh Flounders in Federal Waters off Alaska in Native Village of Eyak v. Trawler Diane Marie, Inc.*, 78 Wash L. Rev. 939, 954-71 (2003).

¹⁴⁰ Sophie Theriault et. al, *The Legal Protection of Subsistence: A Prerequisite of Food Security for the Inuit of Alaska*, 22AKLR 35, 61 (2005).

¹⁴¹ *Id.*

¹⁴² Sophie Theriault et. al, *The Legal Protection of Subsistence: A Prerequisite of Food Security for the Inuit of Alaska*, 22AKLR 35, 66 (2005).

¹⁴³ Eastern Interior Federal Subsistence Regional Advisory Council Meeting, Mar. 2, 2005, at 16. available at:

¹⁴⁴ Lewis, Rodney B., Hestand, John T. *Federal Reserved Water Rights: Gila River Indian Community Settlement*, *Journal of Contemporary Water Research and Education*, Issue 133, Pages 34-42, May 2006.

¹⁴⁵ Christensen, Niklas S., A. Wood, N. Voisin, D. Lettenmaier, R. Palmer., *The Effects of Climate Change on the Hydrology and Water Resources of the Colorado River Basin*. (2004), *Climate Change*, Vol. 62 pp 337-363.

¹⁴⁶ U.S. Bureau of Reclamation, Upper Colorado Region, “Lake Powell, Glen Canyon Dam, Current Status,” n.d. <http://www.usbr.gov/uc/water/crsp/cs/gcd.html>.

¹⁴⁷ Carter, Rebecca H., and B. Morehouse, *An Examination of Arizona Water Law and Policy from the Perspective of Climate Impacts*, CLIMAS Report Series, CL2-01, 2001.

¹⁴⁸ Gleick P.H., and E.L. Chalecki, *The impacts of climate changes for water resources of the Colorado and Sacramento-San Joaquin River basins*, *Journal of the American Water Resources Association*, Vol. 35, (6), 1429-1441, 1999.

¹⁴⁹ http://www.itcaonline.com/tribes_gila.html

¹⁵⁰ http://www.itcaonline.com/tribes_colriver.html

¹⁵¹ Austin, Diane, Gerlak, Sheri, Smith, Carolyn, *Building Partnerships with Native Americans in Climate-Related Research and Outreach*. ISPE/CLIMAS Report Series CL2-00, University of Arizona (November 2000).

¹⁵² Wagner, Frederic H, *Rocky Mountain Great Basin Regional Assessment 2003: Outdoor Recreation and Tourism*; U.S. Global Change Research Program, 2003, pp. 131-143.

¹⁵³“Navajo Economy,” n.d. http://www.westernindian.org/nav_economy.htm.

¹⁵⁴ Sacred Land Films Project, “Black Mesa,” n.d. http://www.sacredland.org/angered_sites_pages/black_mesa.html.

¹⁵⁵ 207 U.S. 564 (1908).

¹⁵⁶ *Winters*, 207 U.S. 564, 577.

¹⁵⁷ The doctrine announced by *Winters*, while still valid, needs to be considered today in the light of subsequent decisions concerning federal reservations of water rights. One of the most significant of these later cases was the 1976 Supreme Court decision in *Cappaert v. United States of America*, which stated firmly that “[t]he implied-reservation-of-water-rights doctrine...reserves only that amount of water necessary to fulfill the purpose of the reservation, no more.” 426 U.S. 128, 141 (1976). *See also*, *Arizona v. California*, 373 U.S. 546, 600-601 (1963) (quantifying federal reserved water rights for tribal lands as that amount needed to irrigate all practicably irrigable acres).

¹⁵⁸ Getches, David H., Chapter 5: *Indigenous Rights and Interests in Water Under United States Law*. University of Colorado, School of Law, Boulder, USA, from the summary of the presentations at the International WALIR Seminar, 4-8 March 2002, Wageningen, The Netherlands.

¹⁵⁹ 373 U.S. 546 (1963).

¹⁶⁰ The GRIC, which is comprised of the Pima and Maricopa tribes, has a centuries-old agrarian culture whose traditional waters were diverted by non-tribal interests in the 19th century, thereby threatening the survival of these tribes. *Gila River Indian Community Water Settlement: Hard Times on the Colorado*

River, power-point presentation by Rodney B. Lewis, general counsel for the Gila River Indian Community, Natural Resources Law Center (May, 2005) available at http://www.colorado.edu/resources/colorado_river/hard_times_conference/Lewis_NRLCpresentation.pdf. (hereinafter *Lewis* PowerPoint) The GRIC has been litigating their water rights claims for roughly a century, but in the last several decades had decided to pursue a negotiated settlement strategy as litigation efforts dragged on with little progress. *Id.* See also, Lewis, Rodney B., Hestand, John T. *Federal Reserved Water Rights: Gila River Indian Community Settlement*, Journal of Contemporary Water Research and Education, Issue 133, Pages 34-42, May 2006 (hereinafter *Lewis et. al.*)

¹⁶¹ Carter, Rebecca H., and B. Morehouse, An Examination of Arizona Water Law and Policy from the Perspective of Climate Impacts, CLIMAS Report Series, CL2-01, 2001.

¹⁶² See generally, *Feeling the Heat in Florida: Global Warming on the Local Level*, Natural Resources Defense Council, Oct. 2001

¹⁶³ Summary Statement on Tropical Cyclones and Climate Change, International Workshop on Tropical Cyclones-VI (November 30, 2006), available at http://sciencepolicy.colorado.edu/prometheus/archives/IWTC_Summary.pdf.

¹⁶⁴ http://www.seminoletribe.com/culture/seminole_land.shtml.

¹⁶⁵ 25 U.S.C.A. § 1772

¹⁶⁶ 53 FR 25214

¹⁶⁷ 53 FR 25214 referencing 16 U.S.C. 410(b), 16 U.S.C. 698 (j) & (k). In 1988 Congress attempted to further define the statutory rights of the Seminole and Miccosukee tribes granted by the Big Cypress Act of 1974 (16 U.S.C. 698f-m) but it was never adopted. See 53 FR 16561.

¹⁶⁸ Section 380.055 Florida Statutes – hunting, trapping, fishing. In addition to these land rights, the agreement also contained a water rights compact.

¹⁶⁹ 16 U.S.C.A.410, Pub. L. 105-313

¹⁷⁰ Section 380.055 Florida Statutes, FL Stat Chapter 285.09, FL Stat Chapter 285.12, 16 USCA 698j.

¹⁷¹ Re-Engineering Water Storage in the Everglades: Risks and Opportunities, 14 (Water Science and Technology Board and Board on Environmental Studies and Toxicology, 2005).

¹⁷² Carbon Sequestration in Agriculture and Forestry: Agricultural Practices that Sequester Carbon and/or Reduce Emissions of Other Greenhouse Gases, available at <http://www.epa.gov/sequestration/ag.html>.