



# Impacts of Climate Change on Tribes in the United States

*Submitted December 11, 2009 by the National Tribal Air Association*

## ***Foreword***

This document was created pursuant to a request made by Assistant Administrator Gina McCarthy, USEPA, Office of Air and Radiation (OAR) during a conference call held on November 23, 2009. This call, co-sponsored by the USEPA and the National Tribal Air Association, brought together OAR officials and representatives of over 65 Tribal Nations to discuss the real and pressing impacts of climate change currently faced by Tribes.

This document is not intended to be a comprehensive study of the impacts of climate change on Tribes. Instead, it is a compilation of comments and papers received from Tribes pursuant to Assistant Administrator McCarthy's request.

The focus of the document is on climate change impacts currently experienced by Tribes. The comments have been grouped by geographic region. Other concerns regarding potential impacts have also been noted throughout the document. For more information on these concerns, please see the attached documents.

As Tribes have been directly experiencing the effects of climate change for a long time, they have put a great deal of thought into what steps need to be taken to address these issues. A summary of these recommendations is included at the end of the document.

As the Environmental Protection Agency may want to follow up directly with the participating Tribes to get more information on these issues, a Table of Contacts has been provided, and all of the reports have been cross referenced.



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Native Peoples Native Homelands Climate Change Workshop II: “An Indigenous Response to the Challenge” 15

Itep “Tribes & Climate Change” website \_\_\_\_\_ 15

Indian Country Today Article “Climate change, drought transforming Navajo’s dunescape to a dust bowl” \_ 15

Report: “Effects of Climate Change on Native Americans” \_\_\_\_\_ 16

EPA Region 10 Tribal Climate Change Adaptation White Paper \_\_\_\_\_ 16

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## Northeast

### *Impacts*

#### **Invasive Species Inhibiting Blueberries**

Invasive plant species including a grass usually found in Southern New England have inhibited the harvest and production of blueberries on the Passamaquoddy Tribe's Northeast Blueberry Company (NEBCO), at nearly 5,000 acres one of the largest wild blueberry farms in the world. <sup>A</sup>

#### **Ocean Acidification Threatening Shellfish**

Ocean acidification is being monitored by the Tribal Environmental Department. The pH of Passamaquoddy, Cobscook Bays and Bay of Fundy was around 8.03 during the 1990's and has now dropped to 7.92. If, or when, the level falls to 7.90 the shellfish including clams, scallops and lobster will be unable to fix CaCO<sub>3</sub> and will die. There are 107 Tribal members with clam licenses that depend in varying degrees on income from clams. This resource could be gone within the next decade. <sup>A</sup>

#### **Changes in Composition of Forest**

The Tribe has forestry operations on most of its 130,000 acres, harvesting spruce and fir for the paper industry. When a lot is cut, maple and birch replace the spruce/fir, with the result that in the next generation there will be no spruce/fir. The market, methods, and machinery are different for the maple/birch and if there are no resources for the harvesters to adapt by obtaining new machinery and training, this will be a lost resource. <sup>A</sup>

#### **Loss of Medicinal Plants**

Some boreal medicinal species (those with northern ranges) are no longer found on the reservation, impacting cultural and spiritual uses. Southern species with similar uses will probably move into the area, but this has not been documented perhaps due to lack of knowledge by the elders of the use of these new plants. <sup>A</sup>

## Midwest

### *Impacts*

#### **Increased Moose Mortality**

Many northern wildlife species are on the southern edge of their range in northern MN (moose, lynx, pine marten, etc.). A changing climate may lead to their local extinction. Moose mortality rates have been correlated with increasing heat in MN <sup>C</sup>

#### **Increased Pesticide use**

A change in climate will result in increased pesticide use for new types of "pests." More rainfall will result in an increase in the number of mosquitoes in summer months, which also causes environmental health concerns. <sup>B</sup>



### **Decreased Indoor Air Quality**

Longer winter type days have resulted in increased exposure to particulate matter (PM) from residential wood smoke.<sup>B</sup>

### **Shorter Harvest Periods**

The Cherokee nation has experienced shorter harvest periods for some localized production crops. Shorter time periods available to gather subsistence foods and cultural items also leads to overuse and over collection.<sup>B</sup>

### **Increased Deer Populations affecting Forest Regeneration**

Deer populations in northern MN are controlled in part by long periods of deep snow. Milder winters may lead to increasing deer numbers and increased pressure on plant communities. Many plant species in northern MN forests are not adapted to heavy browse pressure. White pine, red oak and others now need to be protected from deer browse.<sup>C</sup>

### **Decrease in Maple Syrup Supply**

Elders have stated that the maple syrup harvest season hasn't changed in duration. However, the periods within the season when the run slows or stops have become longer and more frequent, meaning less syrup gathered.<sup>D</sup>

### **Increase Rate of Mortality among Maple Trees**

Tribal Forester noted that the Bruce spanworm season is longer and while it is normal for the worm to defoliate the sugar maples, the longer worm season is actually leading to a higher mortality rate in maples.<sup>D</sup>

### **Shorter Growing Season**

The vegetable gardens are subject to more frosts on either side of the growing season which has changed the kinds of vegetables that can be grown.<sup>D</sup>

### **Algae Blooms Endangering Fish**

The water program director noted that the dry weather conditions followed by a high rainfall caused an algae bloom that resulted in extremely low O<sub>2</sub> levels in the lake that came very close to killing all of the fish.<sup>D</sup>

### **Decreased Lake Water Levels**

Water levels in lakes in the region have been drastically decreased, with some lakes completely dried up.<sup>D</sup>

### **Concerns**

- Climate issues directly are tied to tribal energy issue efforts, including wind energy availability. There is a great need for weatherization efforts in tribal homes due to climate extremes.<sup>B</sup>
- Forests may not be able to react to changes quickly enough to adapt;<sup>C</sup>
- GHG regulations may take away prescriptive burning tools needed for maintaining forest health; pest infestations in forests can expand due to warmer winters; Forest County Potawatomi<sup>C</sup>



- Water level fluctuations due to extreme weather events are very harmful to wild rice stands; <sup>C</sup>
- Drinking water supplies may be at risk due to decreased precipitation; <sup>C</sup>
- Wetland types may change in unpredictable ways due to weather extremes; <sup>C</sup>
- Warmer weather may bring in wildlife species detrimental to wetlands; <sup>C</sup>
- Native ceremonial and medicinal plants may be lost; <sup>C</sup>
- Invasive plants may expand their range; <sup>C</sup>
- Fond du Lac is already at the southern edge of the wild rice growing area and does not want to lose this traditional food source. <sup>C</sup>
- Limited Tribal participation in GHG source permitting- the Tribes have very little influence on State' s permitting decisions without TAS. There are 6 proposed coal-fired power plants in MI now. <sup>E</sup>

## Southwest

### *Impacts*

#### **Extreme Wind Events<sup>F</sup>**

Impacts felt in the Phoenix, AZ area include erratic weather patterns, including powerful microbursts that cause damage and result in high PM10 exposure as well.

#### **Reduced Amounts of Drinking Water<sup>G</sup>**

Future water availability from CAP with reduced water to Colorado River reservoir system.

#### **Drought<sup>H</sup>**

Has affected cattle ranching & water availability. <sup>H</sup> Reduced rainfall to the Sonoran Desert will negatively impact native plants, some of which are culturally important to the Tribes. <sup>G</sup>

#### **Increased Utility Costs**

Utility costs have increased to desert Tribes who depend upon air conditioning for summer survival. <sup>G</sup>

#### **Invasive Species – Buffel Grass, Bark Beetle, Tamarisk**

Exotic plants, such as Buffel grass, are taking over the land, greatly increasing the risk of wildfires <sup>G, H</sup>

Arizona forests are negatively impacted by the bark beetle which is no longer slowed by freezing temperatures; some tribes have forest products businesses. <sup>G</sup>

The Hualapai Nation has been removing Tamarisk from its reservation. <sup>I</sup>

#### **Loss of Biodiversity <sup>H</sup>**

Traditional plants and animals – being affected <sup>J</sup>

#### **Deteriorating Indoor Air Quality <sup>J</sup>**

Pueblos/tribes of NM are concerned about health issues related to air quality, specifically the correlation to asthma. The use of wood burning stoves during winter months as source of heating may



increase with colder winters, increasing exposure to particulate matter which may contribute to upper respiratory problems

## Rocky Mountain West

### *Impacts*

#### **Invasive Species – Cheat Grass**

The Reno Sparks Indian Colony has experienced an invasion of Cheat Grass, leading to increased fire hazards.<sup>K</sup>

#### **Changes in Stream Temperature and Weather**

The Washoe Tribe is located east of the Sierras at approximately 4,700 feet elevation. Climate change is easily observable. Washoe Tribal Elders have reported observing cold water streams becoming warm water streams, cloud "bubbles" passing over warmer developed areas instead of dropping rain as they would in the past and less snow in the winter.<sup>L</sup>

#### **Lake Tahoe Temperature Increasing**

New study on Lake Tahoe shows the water temperature has increased approximately 1 degree, which in longevity could be devastating to the entire eco-region.<sup>L</sup>

#### **Drought Increasing Pressure on Tribal Water Resources**

The Washoe Tribe is suffering from drought impacts on tribal lands and waters, and is also suffering the impacts that drought is making on others. Off-reservation agriculture is extracting more from the rivers, and development is extracting more from the ground. All the new wells that are being over allocated are mostly along tribal borders and overlay zones, all of which are making very large impacts to sovereign waters.

#### **Rapid Disappearance of Glaciers and Snowfields**

Glaciers and snowfields are disappearing at an incredible rate. These are vital for water, water storage, drinking water, and water for irrigation in the foothills and basins that are water starved. This is especially noticeable in the months of July and August, when water is most needed by the crops and when most glacial melting would normally occur and be released.<sup>M</sup>

#### **Loss of Unique Species affecting food chain**

At the same time, there is a corresponding loss of the unique cold monomictic lakes and their unique biota. An example is the loss of a unique copepod, called *Diaptomus shoshonij* and named after the Shoshone tribe. These simple food chains are collapsing and the end users, such as the once plentiful golden and cutthroat trout, are threatened.<sup>M</sup>

#### **Jacaloups**

Four years ago a lake confined within Grasshopper glacier melted out. The released water caused extensive flash flooding and the whole Dinwoody valley below this glacier, and for miles downstream, became a wall of water. It is a miracle that there were no hikers or backpackers in the valley at this



time. This kind of event is rare in these latitudes and on this reservation, but are becoming more and more common in more northerly glaciated latitudes. In Sweden they have named these events “jalcaloups.” The EPA and the tribes in Alaska should be aware that these kinds of events can occur in drainages with glaciers upstream. The effects can be an immediate danger to downstream villages and the safety of people, often many miles away.

### **Cloud Seeding affecting food chain**

Water is vital to the western United States. As water levels diminish and there is an ever increasing need for water, many western states and some tribes have turned to cloud seeding to potentially increase their winter snow packs. Silver iodide crystals are shot into the atmosphere from ground based propane generators or are spread from air craft to create condensation nuclei for rain drops to form on. Silver is not very toxic to mammals and humans, but in its free form is the most toxic metal there is to plankton, especially diatoms. The environmental risk to the food chains (often diatom based) in high altitude alpine and sub-alpine lakes and other water bodies has not been evaluated by any Federal Agency to date.

### **Increase in Diatom Population**

For instance, in the last five years, we have seen many of our foothills and basin streams impacted by devastating population explosions of the diatom *Didymosphenia geminata*. These have impacted macro invertebrate populations in certain stream reaches and the dependent fisheries. This diatom may be undergoing these population explosions because of warmer temperatures and more exposure to light because of less ice and snow cover in the winter and spring. An Internet search will show many areas in the world suffering from this diatom.

### **Big Horn Sheep Mortality Increasing**

The largest herds of Big Horn sheep in the lower 48 states are located on the Wind River Reservation's north west boundary and just off the Reservation in what is called the Whiskey Basin herd. There have been devastating declines in the number of lambs that are surviving and the long term outlook for this herd is dismal.

### **Increased Air Quality Problems Due to Dry Lake Beds**

At the Pyramid Lake Paiute Reservation, the loss of Winnemucca Lake (sister lake to Pyramid Lake) combined with nearby seasonal lake beds (Honey Lake, Owens Lake - CA) being without water for longer periods of time has resulted in increased Asthma/respiratory problems.<sup>N</sup>

## **Pacific**

### **Decreased Rainfall**

Climate change is underway and is impacting our tribe (in CA Central Valley) right now. For example rainfall over the last 5 years is down more than 50%.<sup>O, P</sup>



### **“Water Wars” starting**

As above, climate change is affecting CA and the state's rainfall is down (reduced) significantly. Consequently, CA is now beginning to experience 'water wars' where various agencies, cities, counties, etc. are starting to fight over water supplies.<sup>o</sup>

The Los Angeles Department of Water and Power owns most of the water rights in our valley where the Lone Pine Paiute-Shoshone Reservation is located. Warmer temperatures and drier winters are leading to a decrease in snowpack. This results in LA exporting a larger percentage of the total runoff, leaving the Tribe with a water shortage.<sup>p</sup>

### **Increased Wildfires due to Drought**

Increased drought over the past several years has resulted in large summertime wildfires.<sup>p</sup> There are concerns about forecasts for increasing wildfires/smoke and O3 (ozone). Increased forest fire risk to both forest and wildlife resources as well as the urban / forest interface. The fires have also resulted in impacts to air quality, tribal member health (asthma and other factors.)<sup>q</sup>

### **Invasive Species**

Native vegetation has been destroyed in these fires and exotic species are growing in their place.<sup>p</sup> These species include Tamarisk (Salt Cedar), Giant Cane,<sup>r</sup> the bark beetle (Mountain Pine Beetle) and the ring neck dove (Change in migration patterns).<sup>p</sup>

### **Shifts in timing of Klamath River peak temperatures**

A few months ago the Yurok Tribe Self Governance office took the subject of climate change to the elders committee and gathered some anecdotal information. Most of them given their age were comparing back to the late twenties and thirties. They clearly said that it is warmer now then it was then. Cold snaps happened more frequently and lasted longer. They spoke of the Klamath River having frozen enough that people were walking across the river on the ice. Chunks of ice the size of automobile used to flow down the river. Certain ponds and lakes on the up-river sections of reservation use to freeze over annually and everyone in the area would go ice skating for a couple of days. There were a few other stories as well. We have documented that over the last three years the peak water temperature on the Klamath River at Weitchpec has shifted two weeks every year. So we have seen changes in the timing of when water temps peak but not in the maximum temps. More analysis would need to occur to answer this question accurately.<sup>s</sup>

### **Severe Flooding of Coastal Tribes Requires Relocation**

In November 2009, severe storms caused wide scale flooding which directly impacted two Tribes – the Quinalt Indian Nation and the Hoh Tribe. Tribal villages on the Pacific Ocean are in danger and need to be moved to higher ground. Tribal villages have roads that are on the ocean. We have no exit from the villages, the roads are in danger from climate change events on the ocean.<sup>t</sup>

### **Changing runoff patterns in the Sierra Nevada**

Evidence suggests that change is already occurring: increasing temperatures have changed the runoff pattern of several watersheds of the Sierra Nevada. The trend is to have more runoff in the winter season and less in the spring-summer season. Sierra Nevada snowmelt driven streamflows are likely to



peak earlier in the season under global warming due to increased atmospheric greenhouse gas (GHG) concentrations. <sup>P, U</sup>

### Concerns

- Tribes are being left out of California's climate change initiatives (Tribes are only asked to comment after initiatives are prepared). <sup>O</sup>
- Impacts on forests from increased temps, changes in seasonal precipitation and increases in disease that may shift tree species and habitats. <sup>P, T, U</sup>
- Concerns about role of increased temperatures and atmospheric deposition (behavior of chemicals and toxics in the environment), and critical loads dramatically altering ecosystem health, and the resulting negative effects to treaty hunting, gathering, and fishing resources and rights. <sup>S</sup>
- Concerns about present stream flow and temperature impacts on salmon and concerns about the forecasts for dramatic negative impacts on treaty fisheries overall. <sup>S</sup>

## Alaska

### Rising temperatures and storms causing problems with erosion, food cellars, permafrost, open dumps, water tables and potential contaminants<sup>2</sup>,

Northwest Alaska villages are experiencing massive permafrost melting causing havoc for both the ecosystem and the drinking water resources throughout the region. Many of the river banks have huge sink holes along the rivers causing concerns of changes in fish migration and chemistry changes in the drinking water for all. Permafrost melt and warmer climates are also causing our underground food cellars to become ineffective created for their purpose, which is preserve food for the winter. Flooding due to river ice flows during the early winter and early spring time is causing grave concern for humans and well as the mammals that live on land. <sup>V</sup>

### Permafrost melting endangering Alaska Pipeline

It is estimated that the permafrost has already receded north about 60 miles. The 800 mile pipeline crosses three mountain ranges and over 800 rivers and streams, and a breach would directly impact several Alaska Native Villages (Stevens Village, Livengood, Wiseman, Fairbanks, Delta Junction, Copper Center, Rampart and Tonsina, among others). A major spill would totally destroy subsistence food resources and tribal lands; and that would be totally irreplaceable. <sup>W</sup>

### Severe Coastal Erosion Endangering Communities

The Chinik Eskimo Community recently flooded and had to be evacuated, almost lost power plant to erosion. <sup>X</sup> Traditional harvesting grounds and areas have been washed away <sup>Y</sup> In Kivalina, a storm erased 300 feet of sea wall in a single night, with the erosion ending only 27 feet from the school. In November 2009, a “50 year” storm occurred, and this was at the start of the storm season. <sup>AA</sup>



### **Extreme Changes in Weather Patterns**

Stronger more frequent storms have been experienced, especially during the spring and fall. The seasons are not as distinct as before, there seems to be one constant season. Definite variances in the temperatures, rainfall and snow have been reported. <sup>Z</sup> Although warming seems to be the general trend, some communities report some of the coldest weather in their history – 48 below zero was reported at Fort Yukon. <sup>BB</sup> Flooding has become more frequent in the fall and spring. <sup>BB</sup>

### **Invasive species**

Plants and wildlife not common to the area have been encroaching, including a species of caterpillar that has been eating the berries harvested by some of the villages. <sup>Z, Y</sup>

### **Loss of Natural Subsistence Food**

Due to changes in the weather and other pressures outside of Tribal control, the subsistence foods that Alaska Tribes rely on for their survival is becoming more difficult to obtain. Warmer water is not good for fish, and low fish counts have been observed. <sup>BB</sup> Tribes in Alaska are facing nothing less than the loss of their entire culture. <sup>Y</sup> Warmer water temperatures and lower water tables threaten every species of salmon. <sup>AA</sup>

### **Changing Migration Patterns putting Subsistence lifestyle at Risk**

Fort Yukon reports that the Caribou have been moving further away from the village because the food sources are now available farther north <sup>BB</sup>

### **International Impacts**

Western Alaska is only 150 miles from Siberia. Impacts to Siberia affect tribes too. <sup>CC</sup>

### **Endangered Species**

There is stark evidence that iconic species such as the beluga whales and polar bears are in extreme danger of extinction. <sup>Y</sup>

## **Tribal Recommendations**

### **Look at the Big Picture**

The cumulative effects of Climate Change, ecosystem disturbance and fragmentation by humans, pollution, introduced species, etc. needs to be looked at as a whole. These factors could be coming together to create a “perfect storm” of environmental devastation in the form of a cascade of events effecting the entire ecosystem. One must be careful to see the big picture and not to compartmentalize the environment into; The Forest, The Air, The Water, etc. We must be vigilant not to fall into science and politics love affair with semantics (pros/cons) to delay real work from occurring to address these threats. We’re quickly approaching the point of no return when it comes to the disastrous effects of human-made disturbances to the biosphere. There is enough scientific evidence to determine the cumulative impacts of anthropogenic disturbance to the biosphere, it is time to realize that our behavior must change and soon. Any actions that are not environmentally sustainable should never be considered economically sustainable, as it is not money that sustains us but the environment. <sup>DD</sup>



## **Link the Montreal Protocol and the GHG Rule together, expand the GHG Rule coverage to all sulphur fluorides instead of just SF6, and include nitrogen fluorides into the GHG Rule.**

In a recent Purdue University and NASA study, chemicals such as chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur and nitrogen fluorides stood out in their warming potential because of their efficiency to trap radiation in the atmospheric window, adding to the atmospheric heat-storage. The 1987 "Montreal Protocol on Substances That Deplete the Ozone Layer" addresses elimination of CFCs and Hydrochlorofluorocarbons (HCFCs), while the proposed Greenhouse Gas Rule addresses only carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>).<sup>EE</sup>

## **Include Tribes in Federal and State Climate Change Initiatives**

Tribes need to be included as full participants in state climate action plans.<sup>FF</sup> Solutions can only be developed at a regional collaborative level, with government-to-government relationships where Tribes are at the table developing and implementing solutions.

## **Create a Tribal/Federal Climate Change Advisory Committee**

The Passamaquoddy Environmental Department suggests that EPA Air Program form an advisory panel consisting of Tribal and Federal representatives to address climate change impacts and assist in identifying adaptation and mitigation strategies. This advisory committee could be similar to the Tribal Energy Policy Advisory Committee (TEPAC) headed by DOI Energy and Economic Development that includes up to 15 tribal representatives from all regions of the US, and representatives from DOI, EPA, Mineral Management Service, DOE, USDA, USGS, and Corps of Engineers. Because climate change impacts tribal health we suggest CDC and IHS be represented as well. To properly address this issue, resources from a number of federal agencies must be pooled. The committee would advise the EPA Air Climate Change Department in developing a strategy for the Obama Administration to provide aid and assistance to Tribal Country in addressing climate change adaptation and mitigation practices required to allow survival of Tribal culture.<sup>A</sup>

## **Respect Tribal Diversity, Sovereignty, and Right to Economic Development**

- ANY impact to tribal resources due to climate change is largely the result of decades of emissions from sources outside of Indian Country (even the most developed and industrialized tribal carbon footprint is miniscule);
- WHERE there are major air sources operating and emitting pollution from within an Indian reservation, their emissions are miniscule in the grand scale of the global problems (and reflects the poor job of past and current regulation by the federal government);
- TRIBAL GOVERNMENTS that are in the process of developing and sustaining viable economies on their lands, for their citizens living on Indian reservations, should be able to continue on the path toward self determination without new barriers stemming from climate change policy;



- CO2 Management and Reduction is a growing part of many tribal governments criteria in utilizing their existing natural resources such as coal, natural gas and oil (basically when tribes can regulate their own pollution with adequate resources to do so, there is a better outcome for the environment).<sup>GG</sup>

## Funding

- Although Tribal sources are not a significant cause of climate change, they are the ones most keenly feeling the effects. As the EPA and Congress consider various regulatory options, it should direct some of the resources generated to Tribes to help them adapt to these impacts, not just the industries that caused the problem.<sup>F</sup>
- Continued and increased funding for Tribal EPA programs and environmental grants including air quality, water quality, wetlands, and forestry and fisheries programs. The Yurok Tribe has been collecting and reporting environmental data related to air quality, water quality, forest and fisheries resources for over 10 years. This data has been shared with outside entities and agencies for management and restoration purposes. In many areas, the Yurok Tribe is the only entity collecting significant environmental data that will be critical for creating accurate climate models for the Lower Klamath.<sup>S</sup>
- Climate Change research and assessment requires increased and long term funding for the Clean Air Act, particularly to Tribes. Clean Air Act funding to Tribes is currently insufficient and unreliable yet many Tribes, including the Yurok Tribe have established Air Quality Programs with extremely limited funding. Air quality data is some of the most critical data needed to monitor and model Climate Change impacts and mitigation measures. There is a significant need for increased funding to Tribes for air quality programs. Many Tribes are actively collecting air quality data on many reservations throughout the US. This data is essential for predicting and modeling Climate Change, impacts, developing mitigation and adaptation strategies, and measuring the results of management decisions.<sup>S</sup>
- Climate Change will impact both water quality and quantity throughout the globe, particularly in the western US. Changes in water quality and temperature must be closely monitored as Climate Change models are being developed and as mitigation plans are being implemented. Tribes require more funding to continue and expand the high quality water quality research and monitoring that they currently perform. Clean Water Act funding to Tribes needs to be increased to aid in the collection and analysis of data on environmental conditions within the Klamath watershed.<sup>S</sup>
- Specific Tribal Set Aside Grants to address climate issues, including pilot project grants that would allow tribes to gather information to determine impacts of climate change. This dedicated funding is required because some issues are prevalent and sudden while others are slowly changing and not immediately recognizable.<sup>C</sup>
- Additional support for independent tribal monitoring of climate impacts<sup>C</sup>



## **Assist Tribes to Develop Climate Change Adaptation/Mitigation Plans**

Swinomish has a model plan to do climate impact assessments and is willing to share with other tribes. <sup>HH</sup>

The Passamaquoddy Environmental Department also suggests that EPA OAR provide grants for Tribes to develop a climate change adaptation and mitigation strategy.<sup>A</sup> Plan for accommodation of climate change refugees <sup>C</sup> EPA's Regional Offices should plan to assist Tribal Nations to help develop Tribal Environmental Programs' ability to gear up for Climate Change rules and regulations <sup>II</sup>

Climate Change research and assessment is not enough to protect Tribal Trust resources and Tribal Lands. Climate Change impact mitigation plans are currently being developed by many local, state and federal governments and agencies. Funding is needed assist Tribes in responding to Climate Change impacts on natural, cultural, economic and subsistence Tribal Trust resources. The development, preparation and implementation of Climate Change Adaptation and Mitigation plans needs to coincide with the continued and expanded collection and analysis of environmental data that can be used to model and monitor Climate Change impacts and the effectiveness of any mitigation measures. Funding and technical support are needed by the Tribe to prepare and implement mitigation and adaptation plans in response to Climate Change. Many states and local governments in the US west are actively engaged in Climate Change planning for mitigation and adaptation, yet little consultation on the development of such plans is occurring between these entities and Tribal governments. <sup>S</sup>

### **Research Needed:**

#### **Climate Change case study for the Klamath River and watershed.**

Much of what is known about potential impacts of Climate Change is based upon global climate models, yet these models are not sufficient for predicting impacts at the regional or local scale. Due to the complexity and biodiversity of the Klamath River ecosystem and its once-historic salmon runs, a localized and regional model needs to be developed. Most mitigation and adaptation plans will be developed based upon climate modeling for predicting impacts. Without accurate and precise modeling, based on reliable data, Climate Change impacts may not be adequately identified and as a result mitigation/adaptation plans may be incorrect or insufficient. The Tribe intends to be a active participant and leader in Climate Change research and management within the Yurok Reservation and the Klamath River. <sup>S</sup>

#### **Impacts to Endangered and Threatened Species**

Climate Change research is needed for impacts to endangered and threatened species. Climate Change will result in increased stressors for endangered species and their vital habitats. Species, such as salmon, are vulnerable to climatic changes and changes in seasonality or environmental conditions that can confuse and disrupt migration and spawning patters. <sup>S</sup>

Climate Change research and mitigation must include wetlands restoration and protection. Increased funding to Tribes is needed for wetlands programs under the Clean Water Act. Wetlands protection, restoration and creation will be critical to minimizing impacts of ocean surges and river flooding



resulting from Climate Change, both on Tribal Trust resources and Reservation communities. Wetlands are critical for protection of property and communities, habitat and endangered species, and a wide range of culturally significant species to Indian People. Proposed Cap and Trade programs for Green House Gas (GHG) emissions need to include wetlands protection and increased funding for Tribal wetlands programs. Many Tribes, including the Yurok Tribe, have established Tribal wetlands programs for the purposes of protecting and enhancing wetlands within their reservations with little and unreliable funding. The important role that wetlands play in Climate Change mitigation requires that Clean Water Act funding is increased in the future. <sup>5</sup>

### Other Recommendations

- EPA should apply the precautionary principle to all of its policies.<sup>JJ</sup>
- General assistance to encourage and implement sustainable lifestyles <sup>C</sup>
- Energy Conservation, no more coal EGUs (if any are permitted, equal number of antiquated EGUs, by MW, must be retired) <sup>C</sup>
- Equitable concessions in energy consumption (i.e. those who use the most, reduce the most) <sup>C</sup>
- Additional monitoring of disease spread <sup>C</sup>
- Meaningful action at Copenhagen <sup>C</sup>
- EPA should adopt the tribal cumulative impact assessment protocol developed in Region 5.<sup>JJ</sup>

### Additional Resources Regarding Tribes and Climate Change:

#### Native Peoples Native Homelands Climate Change Workshop II: “An Indigenous Response to the Challenge”

On November 18–21, 2009, over 300 Tribal participants gathered on the homelands of the Shakopee Mdewakanton Sioux Community to discuss climate change and its impacts on Tribes. More information at: <http://www.nativepeoplesnativehomelands.org/>

#### ITEP “Tribes & Climate Change” website

The Institute for Tribal Environmental Professionals has a website that provides “information and resources tailored to helping Native people gain a better understanding of climate change and its impacts on their communities. Here you'll find basic climate-change information; profiles of tribes in diverse regions of the U.S., including Alaska, who are coping with climate change impacts; audio files of elders discussing the issue from traditional perspectives; and resources and contacts you can use to develop climate change mitigation and adaptation strategies.”

<http://www4.nau.edu/tribalclimatechange/index.asp>

#### Indian Country Today Article “Climate change, drought transforming Navajo’s dunescape to a dust bowl”

by Terri Hansen, Today correspondent, Published: Dec 1, 2009

<http://www.indiancountrytoday.com/national/76233607.html>



**Report: “Effects of Climate Change on Native Americans”**

A Report Published by the Natural Resources Law Center at the University of Colorado Law School in Conjunction with the Western Water Assessment at the University of Colorado. See **Attachment R**

**EPA Region 10 Tribal Climate Change Adaptation White Paper**

See **Attachment S**.

**List of Attachments**

- Attachment A. Climate Change Impacts on the Passamaquoddy Tribe at Pleasant Point
- Attachment B. Ocean acidification Quoddy Tides
- Attachment C. Temperature Mediated Moose Survival in Northeastern Minnesota
- Attachment D. Hualapai Tribe - Summary of Climate Change Issues
- Attachment E. R9 CC Questionnaire - Reno Sparks Indian Colony
- Attachment F. R9 CC Questionnaire - Washoe Tribe
- Attachment G. CC Impacts on the Wind River Indian Res
- Attachment H. Effects of CC on Pyramid Lake Paiute Tribe
- Attachment I. Climate Change impacts - Owens Valley - 09-08-2009
- Attachment J. R9 CC Questionnaire - San Manuel
- Attachment K. R9 CC Questionnaire - Yurok Tribe
- Attachment L. CC Impacts - Yurok Tribe - Kate Sloan
- Attachment M. Quinault Comments on GHG Rule
- Attachment N. Quinault CC Policy Resolution 09-21-88
- Attachment O. Quinault CC article
- Attachment P. CC Impacts on Greenville Rancheria - Mike Despain
- Attachment Q. R9 CC Questionnaire - SoCAL Tribes- Niina – NAEPC
- Attachment R. Effects of Climate Change on Native Americans\_Report\_Exec\_Summary
- Attachment S. Tribal Climate Change Adaptation White Paper 6-26-09



## Table of Tribal Contacts for More Information

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