NATIONAL *fish, wildlife & plants*
CLIMATE ADAPTATION STRATEGY

case study
eastern brook trout

The West Fork of the Kickapoo River in Wisconsin is an angler's paradise. Its cool, shaded waters and pools abound with native brook trout.

CHUCK KRUEGER / GREAT LAKES FISHERY COMMISSION

But brook trout require cold water to reproduce and survive—and water temperatures are already rising.

By the end of this century, the self-sustaining population in the West Fork could be gone. In fact, up to 94 percent of current brook trout habitat in Wisconsin could be lost with a 5.4°F increase in air temperature[1].

Although climate change has not caused the loss of any brook trout populations to date, the warming effects on air temperature is projected to significantly reduce the current range of brook trout in the eastern United States.

The threat is not limited to Wisconsin or to brook trout. Climate change is viewed as one of the most important stressors of fish populations, and cold-water fish species are especially susceptible to rising temperatures[1]. Declining populations would have serious ecological and economic consequences, since these fish are key sources of nutrients for many other species and provide major fishing industries in the Northeast, Northwest, and Alaska[2].

In some cases, adaptation measures may help reduce the threat. The first step is measuring stream water temperatures and flow rates to identify which trout habitats are at greatest risk. Monitoring efforts have already shown that some trout streams are at lower risk because they have water temperatures far below lethal limits, while other streams are not likely to see increases in water temperatures even when air temperatures rise, since adequate amounts of cool groundwater sustain the stream's baseflow in summer. This information enables fisheries managers to focus on the streams »

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Brook trout fishing in Beaverkill, NY

GERALD BARNHART

and rivers that are at greater risk from climate change and from changing land-use that would decrease groundwater discharge rates.

In some streams, these deteriorating conditions are unlikely to be reversed. In other streams, adaptation strategies can be implemented to reduce stream water temperatures such as planting trees and other stream bank vegetation for shade, or narrowing and deepening stream channels to reduce solar heating. Protecting and enhancing water infiltration rates on land is another adaptation strategy that can increase cooler groundwater discharge rates during the critical summer low flow conditions.

This "triage" stream assessment approach is similar to how accident or battlefield responders work, where efforts are focused on those most likely to respond to treatment. Thus, limited funding is directed toward streams that are at higher risk from the effects of rising temperatures, and on streams where adaptation actions are more likely to have a positive impact.

This is just one of many real examples of strategies that can be taken to adapt fish, wildlife and plants in a changing climate found within the National Fish, Wildlife and Plants Climate Adaptation Strategy. Please visit the website for more information.

SOURCES

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CLIMATE ADAPTATION STRATEGY

case study
paper birch

What happens to Tribal identity if birch bark disappears?

Climate change models suggest that by 2100, the paper birch tree may no longer be able to survive in its habitat in the upper Midwest and northeastern United States, from northern Wisconsin to Maine[1].

This would be not just an ecological loss, but a devastating cultural loss as well. Some species are so fundamental to the cultural identity of a people through diverse roles in diet, materials, medicine, and/or spiritual practices that they may be thought of as cultural keystone species[2]. The paper birch is one such example.

It provided native peoples with transportation, thanks to birch bark canoes. It was used for food storage containers to retard spoilage, earning it the nickname of the "original Tupperware™". It was a material on which fungi was grown for medicines and for tinder in sacred fires. It is an extremely durable material and is still used as a canvas on which traditional stories and images are etched, contributing to the survival of Native culture and providing a source of revenue. Indeed, birch bark is crucial for the economic health of skilled craftspeople who turn it into baskets and other items for sale to tourists and collectors. Paper birch is central to some of the great legends of the Anishinaabe or Ojibwe peoples (also known as Chippewa).

These rich cultural and economic uses and values are at risk if the paper birch tree disappears from the traditional territories of many U.S. tribes. Already, artisans in the Upper Midwest are concerned about what they believe is a diminishing supply of birch bark.

CHARLIE RASMUSSEN

Paper birch bark has been crucial for American Indians throughout the Northeast and Alaska Native tribes since time immemorial.

This is just one of many real examples of the impacts of climate change on tribal communities and species of cultural significance illustrating the importance of adaptation strategies found within the National Fish, Wildlife and Plants Climate Adaptation Strategy. Please visit us for more information.

SOURCES

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case study
sea level rise

A rising sea combined with sinking land creates a watery future. The state of Delaware is experiencing both.

GREG THOMPSON / USFWS

Relative sea levels are expected to rise at the rapid rate of one inch every eight years[1]. That is a big problem in a state where more than 10 percent of the land lies less than eight feet above sea level and no spot is farther than 35 miles from the Atlantic Ocean, Delaware Bay, or Delaware River.

Residences, communities, and industries are at risk. In fact, the state is already experiencing worrisome coastal flooding. Breaches in the sandy shoreline at Prime Hook National Wildlife Refuge, for instance, have allowed saltwater into freshwater marshes that provide important waterfowl habitat.

Keenly aware of the threat, the state of Delaware has created a Sea Level Rise Initiative to understand the impacts of sea level rise, prepare for inundation in some areas, respond where necessary, and keep the public informed. Prime Hook National Wildlife Refuge is collaborating with the state of Delaware to implement short-term adaptation strategies to address inundation and saltwater intrusion into freshwater impoundments by re-establishing the shoreline.

This is just one of many real examples of the impacts of climate change on communities and ecosystems and the adaptation strategies that can be taken to address these concerns found within the National Fish, Wildlife and Plants Climate Adaptation Strategy. Please visit the website for more information.

For more information see <www.dnrec.delaware.gov/coastal/pages/sealevelriseadaptation.aspx>

SOURCE

1 NOAA (National Oceanic and Atmospheric Administration). 2009. Sea level variations of the United States 1854-2006. Technical Report NOS CO-OPS 053, Silver Spring, MD.

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case study
lesser prairie-chicken

The lesser prairie-chicken, which resides mainly in the grasslands of the southern Great Plains region, is a species in trouble.

LARRY LAMASA

The conversion of native rangelands to cropland, decline in habitat quality due to herbicide use, petroleum and mineral extraction activities, and excessive grazing of rangelands by livestock have all contributed to a significant decline in population leading to its Candidate status under the federal Endangered Species Act[1].

Climate change is expected to make the bird's plight worse. Climate change models project that temperatures in the lesser prairie-chicken's range will climb by about 5°F and that precipitation will decrease by more than one inch per year by 2060[2]. Such changes would likely harm the lesser prairie-chicken's chances of survival.

The good news is that simple management steps can make a big difference. Under existing USDA conservation programs, farmers and ranchers are compensated to take land out of production to create wildlife habitat. In fact, a landscape-scale geospatial analysis has shown that restoring native prairie grasses and sagebrush on 10 percent of land enrolled in Conservation Reserve Program, if properly targeted, could offset the projected population decline of lesser prairie-chicken from climate change[3].

This is just one of many real examples of the impacts of climate change on species and the strategies that can be taken to adapt fish, wildlife and plants in a changing climate found within the National Fish, Wildlife and Plants Climate Adaptation Strategy. Please visit the website for more information.

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1 NRCS (Natural Resources Conservation Service). 1999. Lesser Prairie-Chicken (Tympanuchus pallidicinctus). Fish and Wildlife Habitat Management Leaflet 6.

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