

Warming Trends Alter Conservation

By Juliet Eilperin

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At the Blackwater National Wildlife Refuge on Maryland's Eastern Shore, sea-level rise threatens to drown the brackish marsh on which migrating shorebirds depend. In Northern California, the shrinking snowpack has reduced stream flows that sustain the delta smelt, a federally threatened fish species. Higher summer temperatures in northern Minnesota have depressed the birthrates of the area's once-populous moose, and just 20 inhabit the Agassiz National Wildlife Refuge that was designed in part to shelter them.

As climate change begins to transform the environment in the United States and overseas, policymakers and environmentalists are realizing that the old paradigm of setting aside tracts of land or sea to preserve species that might otherwise disappear is no longer sufficient. It was an idea that worked in 1872, when one of the reasons cited for establishing Yellowstone National Park was to help preserve the few remaining buffalo.

But as temperatures rise and animals and even plants migrate to more hospitable habitats, fixed boundaries set years ago no longer provide the protection some species need. Experts are exploring new strategies, focusing on such steps as protecting migration corridors, collecting and transplanting seeds, making sanctuary boundaries flexible and managing forests in novel ways.

"We have focused on one single principle: You protect the place where the animals live," said Lawrence A. Selzer, president and chief executive of the Conservation Fund. "That's fine as long as everything's static."

Now, with rapid change, federal agencies, including the Fish and Wildlife Service, the Forest Service and the National Oceanic and Atmospheric Administration are beginning to draft management policies that take global warming into account.

NOAA Assistant Administrator Richard W. Spinrad advocates creation of a national climate service to give agencies across the federal government better access to scientific projections so they can anticipate and plan for eventualities such as extended droughts and changes in water flows.

"Many people felt this was a marginal issue to their particular missions, and now they're realizing it's not," Spinrad said, adding that the new thinking reflects "the accelerated pace in which we are seeing the direct impact of climate change on the environment. . . . The need for a national climate service is as strong now as the need for a National Weather Bureau was 120 years ago."

Coming up with concrete strategies for coping with warming trends is a tougher challenge. Anne Morkill, who manages the Key Deer National Wildlife Refuge north of Key West, Fla., said her staff is working with the Nature Conservancy and Florida

International University on models of sea-level rise to determine to what extent saltwater intrusion will erode the rocky pine habitat that supports the Key deer and other species. The refuge was created in 1957 to protect the rare subspecies of white-tailed deer, which became geographically isolated 20,000 years ago; after dwindling to a low of 25, the population now stands at 500 to 700.

Refuge managers could try to relocate the deer, Morkill said, but "a Key deer outside the Florida Keys is no longer a Key deer." Moreover, she said, officials need to ask themselves: "How much resources should we use today to preserve a habitat that may disappear in 50 years?"

Protecting wildlife, these experts say, can involve setting aside more land for species to migrate, protecting higher-elevation habitats that have lower temperatures and rooting out invasive species that threaten native ones. Scientists are suggesting that managers of marine sanctuaries look for coral reefs capable of withstanding higher temperatures and change sanctuary boundaries if necessary.

"You can change those lines as long as that flexibility is written into the policy," said David Obura, who directs the nonprofit research and advocacy group Coastal Oceans Research and Development in the Indian Ocean.

Teri Rowles, lead marine mammal veterinarian at NOAA's National Marine Fisheries Service, said scientists have recently spotted gray whales north of Barrow, Alaska, in the early months and a humpback whale in the North Slope area, signs that arctic animals are moving north to seek new territory. "That puts them in new areas we have not had to manage before," she said.

Dan Ashe, science adviser to Fish and Wildlife Director H. Dale Hall, said agencies such as his need "to think on much broader scales about conservation" and shift from basing their projections on past climate patterns to an uncertain future. "We have to be much more predictive, which is an uncomfortable place for us to be," Ashe said.

Interior Secretary Dirk Kempthorne created a climate change task force in March 2007 that outlined 80 climate policy options on Dec. 3; the Fish and Wildlife Service issued a more detailed draft climate plan less than two weeks later, urging the agency to find ways to connect broader landscapes and assess which species are at the highest risk because of global warming.

"It would have been better if we had started to address it sooner," Ashe said, "but right now we're in a pretty good spot."

But Patty Glick, senior global warming specialist for the group National Wildlife Federation, said that "it's only in the last year or so the federal agencies are starting to take notice" of how higher temperatures will affect conservation efforts.

Academics and conservation groups have just begun to calculate the costs of trying to

protect landscapes and species in light of climate change. The Wildlife Federation has called on the government to set aside \$7.2 billion annually for the next two decades to help natural resources in the United States adapt to global warming. Sandy Andelman, who directs Conservation International's tropical ecology, assessment and monitoring network, University of Minnesota environmental economist Stephen Polasky and colleagues have calculated that it could cost at least \$5.8 billion overall to safeguard biodiversity in the humid tropics unless the world slashes its greenhouse-gas emissions quickly.

The researchers suggest that countries use some of the future revenue generated from auctioning off greenhouse-gas pollution permits to fund these conservation efforts, but Polasky acknowledged it might be hard to "outcompete" other interest groups that will seek to channel these funds to programs such as "green" technology projects or energy subsidies for low-income Americans.

To prod government officials, conservation activists have begun making projections about the future state of sensitive habitats across the globe. In May, the Wildlife Federation published a report estimating that the sea level would rise 27 inches by 2100 and that the Chesapeake Bay region -- including Blackwater -- would lose more than 90 percent of its tidal fresh marsh, tidal swamp and brackish marsh by the end of the century. The group said the projections were conservative.

The Nature Conservancy has calculated that just maintaining California's Mount Hamilton wilderness in the face of warming will cost more than \$100 million over the next 30 years, triple the current cost, for activities such as land acquisition and restoration and relocation of species.

"The cost analysis is giving a heads-up this is definitely business unusual," said Rebecca Shaw, the conservancy's director of science in California. "We're not going to meet our management goals, and, if we do, we're going to bankrupt the state in the process."

Still, environmentalists say there are ways to prepare for such an unpredictable future. Thomas Dwyer, who directs conservation programs for the northern Pacific flyway at Ducks Unlimited, said he is hoping to preserve wetlands for migrating waterfowl by acquiring conservation easements on farmland lying behind dikes along the Pacific Northwest coast to "let the sea migrate inland" as its level rises. If the water rises high enough, Dwyer reasons, some owners might be willing to let conservation groups buy their undeveloped land and breach the dikes.

"We just need to look down the road 30 or 40 years and make sure we can have options to restore these estuaries," he said.

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