Northern Great Plains Network
Climate Change Resource Brief

Midwest Region
Inventory & Monitoring
National Park Service
U.S. Department of the Interior

Climate Change in the Northern Great Plains

New work reported in *Nature* in December 2009 shows that plants and animals in temperate grasslands and 'islands', like the Black Hills will have the hardest time moving to keep up with climate change. This work shows that by 2100, fewer than 10 percent of today's terrestrial conservation areas will still experience today's climate somewhere inside their borders.

Vegetation Communities, Exotic Plants and Fire

Changes in precipitation and temperature will affect densities & distributions of plants in all plant communities in the Great Plains. At Niobrara NSR, paper birch - already at its southern-most extent in this park - is declining due to a lack of new seedlings. Increases in exotic plants like cheatgrass and horehound - possibly driven by drier conditions - can alter fire regimes and reduce habitat for endangered species. Climate change will interact with other stressors like increased nitrogen deposition and may cause an increase in diversity and abundance of exotic species, declines or range shifts of native species, and altered fire regimes. The network's vegetation monitoring encompasses riparian, prairie, and forested habitats, measuring community composition, diversity, and structure, and key parameters for fire in cooperation with the Northern Great Plains Fire Ecology Program.

Fire, an integral process, may change in intensity, frequency and size. Plant communities may change form entirely.

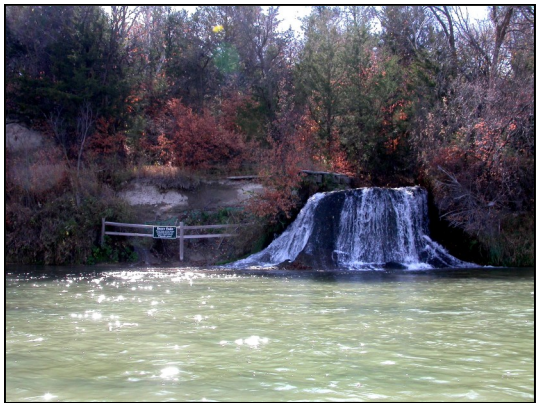
Water and Aquatic Community Monitoring:

Water is a critical resource in the high plains. Dams, irrigation, groundwater depletion, and municipal withdrawals have significantly changed hydrographs of most northern Great Plains rivers. With changes in climate, higher water temperatures and changes in timing, intensity, and duration of precipitation will not only affect water quantity but also water quality in this region. Higher temperatures will lead to reduced dissolved oxygen levels. Reduced streamflow will lead to less dilution of pollutants. Changes in quantity and quality of our water resources will affect not only humans but also aquatic organisms dependent on them. The Network's aquatic resource monitoring program will track several water quality and flow measurements that can be influenced by climate change.

Burrowing owls will face a number of challenges with climate change and continued habitat loss.

Land Bird Monitoring

Birds respond to climate change through changes in population, distribution, and timing of breeding and migration. Even though recent analyses of Christmas Bird Counts have shown a large number of highly adaptable forest and feeder birds have shifted north since 1968, only a small number of grassland species have shifted their range, reflecting the constraints of their already severely-threatened habitat. Burrowing Owl is unable to shift farther north because essential grassland habitat areas have disappeared. A combination of climate change and overuse of grasslands by humans, may exacerbate the already declining grassland bird populations. The Network is developing integrated models to better monitor changes in land bird populations of Great Plains.



High plains rivers and riparian areas, critical habitat for migrating birds and large grazing animals, may have altered flow and loss of cold -adapted species like paper birch at Niobrara .

Phenology and Weather-Climate Monitoring

Weather stations in the northern Great Plains are recording temperature, precipitation, and wind speed. The network will use these data to identify climate trends over time and to interpret data from other network monitoring programs. In addition, work with the Heartland Network and USGS is looking at using MODIS data to examine changes in plant phenology.

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