



Climate Change at Hagerman Fossil Beds

About 3.5 million years ago the Hagerman area was a mostly forested floodplain that received more than 20 inches of precipitation a year and provided habitat for many long-extinct species, including bears, birds, horses, and mastodons. Evidence of their existence is preserved in Hagerman Fossil Beds National Monument (HAFO), which has averaged about 10 inches of precipitation a year since the 1980s and now sustains a very different assemblage of plant and animal communities. Ongoing monitoring provides evidence of how this ecosystem is changing as a result of the relatively rapid climate change now underway as well as other stresses such as fire, water diversions, and surrounding land use.

Sagebrush Steppe

Historically, most of the vegetation in the Hagerman area was sagebrush steppe with a sparse understory of perennial bunch grasses. However, the native grasses and forbs have been displaced in many areas of HAFO by non-natives such as cheatgrass (*Bromus tectorum*) and Russian thistle (*Salsola kali*). Climate change is expected to further the spread of invasive species like these, which have wide temperature tolerance and resilient means of dispersal that help them adapt to changing conditions and out-compete native plants. The spread of cheatgrass and other invasive plants in the park's sagebrush steppe is reducing suitable habitat for the desert horned lizard (*Phrynosoma platyrhinos*) and sagebrush lizard (*Sceloporus graciosus*), which are increasingly rare in many parts of their range.



PHOTO BY CHRIS BROWN

Wildland Fire

Areas that are infested with cheatgrass, which is both highly flammable and apt to move into disturbed areas, are more likely to burn and experience further degradation in the event of fire because the native seed stock has been reduced. Fire is a natural process that helps recycle nutrients from dead biomass into growing plants, but cheatgrass may be increasing the frequency of fires in HAFO by providing a continuous layer of flash fuels on some sites. Since the late 1970s, wildland fire has occurred about seven times in HAFO. All of these fires were suppressed as quickly as possible and none exceeded 100 acres until the Long Butte Fire in August 2010. Started by lightning about 30 miles southwest of the park, it burned more than 300,000 acres, including more than 80% of the park's 4,351 acres. In addition to the loss of most of the upland sagebrush steppe, the burning of steep slopes increases the risk of erosion and landslides which can damage the fossil beds.



NPS PHOTO

Most of HAFO's eastern boundary is adjacent to the Snake River.

Riparian Communities

The transformation of the Snake River from a primarily free-flowing, cold-water system to an impounded, slower-moving, warmer habitat has caused the decline of much of its native fauna, including the federally listed sockeye salmon (*Oncorhynchus nerka*), Chinook salmon (*O. tshawytscha*), and Bliss Rapids snail (*Taylorconcha serpenticola*). Climate change is likely to increase the water temperature and the frequency of summertime low flows in the Snake River watershed and encourage the spread of the New Zealand mudsnail. More frequent fire could reduce the native willows, cottonwoods, bulrush, and cattails that shade riparian areas and provide habitat for thousands of migratory waterfowl. These plants have been displaced in many areas along the Snake River by stands of Russian olive (*Eleagnus angustifolia*), purple loosestrife (*Lythrum salicaria*), and other nonnative vegetation.

For More Information

Upper Columbia Basin Inventory and Monitoring Network
<http://science.nature.nps.gov/im/units/ucbn/>



PHOTO BY DAN GARBER, USFWS

American white pelicans (*Pelecanus erythrorhynchos*) make extended stays in HAFO, but they have not been documented nesting there.