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Northern Rocky Mountain Science Center
U.S. Department of the Interior
Geological Survey

Linking Geohydrology, Soils, Vegetation, and Waterfowl in Northwest Prairie and Montane Wetlands

Background:
Wetland research in the Northwest is tied to water issues, agriculture, forestry, grazing, and other land management practices. Wetland processes, especially related to hydrology and geomorphology, are not always well understood and can be limiting factors to on-the-ground restoration and management. Research at the Northern Rocky Mountain Science Center (NOROCK) is geared towards helping natural resource managers effectively deal with such topics in relation to wetland dynamics. Waterfowl and migratory birds, native fishes, aquifer change, public land management, and agricultural programs tend to provide our foundation.

Collaborators:
USGS Northern Prairie Wildlife Center, Water Resources Division-National Research Program, and Water Resources Division-Montana; U.S. Fish and Wildlife Service; USDA-Natural Resource Conservation Service.

A researcher installs a monitoring well at Red Rock Lakes National Wildlife Refuge.

Current Projects:

Restoring Montana's pothole wetlands.
Geologic processes from the last ice age have generated extensive areas of pothole wetlands in several Montana landscapes. Wetlands in these landforms are still evolving and are some of the most valuable and vulnerable of Montana's landscapes. NOROCK researchers and collaborators intend to provide the science needed for conservation and protection of these complex wetland systems.

Pothole landscape in Northeastern Montana.

A project in Sheridan County, Montana examines land use practices in relation to sedimentation, groundwater hydrology, wetland vegetation, and greenhouse gas emissions in pothole wetlands, as well as the surrounding uplands which contain thousands of significant wetlands within agriculturally influenced landscapes.

Managing wetlands in the face of shifting agricultural practices, energy development, and hydrologic patterns.
Migratory birds in Western North America, especially those dependent on wetlands, are facing growing pressure on their habitat from increased biofuels production, oil and gas development, climate change, and especially potential shifts out of Conservation Reserve Program grasslands (CRP).

NOROCK researchers and collaborators in Eastern Montana and Western North Dakota are investigating the effects of converting CRP land back into cropland on the movement of oil brine plumes in wetlands at Medicine Lake National Wildlife Refuge and Wildlife Management District. Researchers intend to provide the science upon which land managers can base their decisions regarding water level management and water diversion on refuge wetlands.

Benefits of the project include annual water level recommendations and Comprehensive Conservation Plan data for the refuge and a research model transferable to other wetland ecosystems in the West facing similar changes in land management and potential energy development.

Biologic and geologic assessment of montane wetland communities.

Researchers and managers at Red Rock Lakes National Wildlife Refuge wish to more fully comprehend the effects of activities on the wetlands of this region. The Refuge is a key research site because of USGS collaboration with the U.S. Fish and Wildlife Service, which must optimize water management for wetland birds on the Refuge in relation to water rights, cattle grazing, and wilderness values.

The Refuge has initiated an adaptive resource management plan with the primary objective to return the submerged aquatic vegetation community to historical conditions. As part of this plan, NOROCK researchers have been studying 32 sites since 2003, examining relationships between soils, hydraulic gradients, submergent vegetation, and waterbirds.

Lower Red Rock Lake.

A key aspect is studying near-surface (surficial) geology of the region which controls the shallow ground water flow. Thermal anomalies shown by thermal imagery will be compared to possible geologic features controlling groundwater discharge. Scientist are also linking the ecological connections among specific vegetative communities with groundwater discharge conditions that are driven by the glacial and post glacial geomorphology of the region.

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The Northern Rocky Mountain Science Center is located in Bozeman, Montana and includes three field stations in Montana and one duty station in Wyoming. For more information on NOROCK's research, please visit http://nrmsc.usgs.gov or contact the Center Director: Jeff Kershner 406-994-5304 or jkershner@usgs.gov