

The National Wildlife Refuge System and Resource Management in a Watershed Context

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Abstract

The National Wildlife Refuge System (NWRS) is a national network of 548 Refuges, 37 Wetland Management Districts, and nearly 7,000 Waterfowl Production Areas. The NWRS encompasses 97 million acres, with at least one National Wildlife Refuge in each state. The NWRS is unique among Federal land management agencies in that our core mission is the conservation of wildlife and wildlife habitat. Key management activities within the Refuge System include providing habitat for breeding and migratory waterfowl, preserving threatened and endangered species, and restoring and maintaining wildlife habitats. Essential to the continued success of these activities, and to the Refuge System mission as a whole, is the maintenance of reliable supplies of clean, fresh water. With the exception of some of our largest refuges, we generally share watersheds with other stakeholders and multiple land uses. Refuges operate within this larger landscape context and usually manage water supplies according to State laws. Protecting water supplies requires a dedicated effort to inventory sources and monitor water quantity and quality. A major challenge for the Refuge System is assessing our water resources nationwide: inventorying water rights and water sources, quantifying use, identifying threats, and evaluating water quality. Such data are particularly lacking for many of our refuges in the eastern States, where competition for water is increasing. Assessing water resource issues from a landscape/watershed perspective is especially important in the East, where State riparian water laws require sharing of available

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water supplies among users. Water quality issues are best examined in a watershed context, and we are currently engaging in a pilot program with the Environmental Protection Agency (EPA) and U.S. Geological Survey (USGS) to identify refuge water quality issues within such a landscape perspective.

Keywords: refuge, NWRS, water management, wildlife

Introduction

The National Wildlife Refuge System (NWRS, or Refuge System) is a system of 548 Refuges dedicated to the conservation of wildlife and wildlife habitats. Administered by the U.S. Fish and Wildlife Service, the NWRS is unique among Federal land management agencies in that its core mission is wildlife conservation. The NWRS encompasses 97 million acres, with at least one refuge in each state. In addition, the NWRS manages 37 Wetland Management Districts and nearly 7,000 Waterfowl Production Areas, concentrated primarily in the Prairie Pothole region of the Upper Midwest.

Each refuge was established for a specific purpose or purposes, and these help guide the day-to-day refuge management operations. Many refuges have been established to provide habitat for migratory or breeding waterfowl. At these refuges, the ability to manipulate water levels in wetlands is important in order to provide the habitats necessary at critical times in the birds' annual cycle. In most cases, these manipulations mimic the natural flooding regimes of wetland systems that have been lost or greatly diminished over time.

Another important refuge purpose is the preservation of threatened and endangered species. The Refuge System provides habitat for over 250 Federally-listed plants and animals, and many refuges are actively

involved in maintaining or restoring habitat for these species.

Essential to the continued success of these activities, and to the Refuge System mission as a whole, is the maintenance of reliable sources of clean, fresh water.

Water Management in the Refuge System

With the exception of relatively few refuges with Federal reserved water rights, the NWRS acquires and manages water according to State water laws. Like other users, refuges are subject to the regulations and restrictions on how, where, and when we may use water, as determined by each state.

Water is often described as the “lifeblood” of the Refuge System, but it is also the lifeblood of agriculture, industry, energy production, and municipalities. A major challenge for the NWRS is protecting our existing water supplies and ensuring we have adequate water for the future in the context of increasing human populations and the uncertainties of climate change.

A major task for the Refuge System in the near future will be a nationwide assessment of refuge water resources: inventorying water rights and water sources, quantifying use, identifying threats, and evaluating water quality. Such assessments are particularly lacking at refuges in the eastern United States, where traditionally there has been less emphasis on perfecting water rights than in the more arid West, but where there has been increasing pressure on surface and groundwater supplies. All of these assessments will require hydrological, biological, and legal expertise, some of which currently exist in-house within the NWRS and some we are in the process of developing, especially in the East.

Watershed Issues

Except for some of our largest refuges, we generally share watersheds with other stakeholders and multiple land uses. Our watershed issues and research questions relate primarily to water quantity and quality and how these interact with our refuge management operations on a landscape level. We are mostly a user, rather than a generator, of research.

One particular issue related to both water quality and quantity that the NWRS is encountering with increasing frequency is the use of treated effluent in refuge wetlands. Refuges sometimes receive proposals from municipalities to place such effluent on refuge wetlands in order to further remove organics and nutrients from the water. On the positive side, it may be an opportunity for a refuge with insufficient water supply to increase the amount of water available for wildlife. However, care must be taken that we are not introducing potentially harmful materials, including pathogens, metals, and endocrine-disrupting compounds, into refuge waters. This is an area where further research and specific guidance are necessary.

Because refuges often share watersheds with other landowners, water quality issues may arise from either materials entering the refuge from adjacent land uses, or materials leaving the refuge and affecting downstream users. An example of the former is Horicon NWR in southern Wisconsin. The refuge occupies the northern 21,000 acres (8,500 ha) of the 32,000-acre (12,950-ha) Horicon Marsh. The marsh is situated in the West Branch of the Rock River, in a landscape dominated by intense agriculture. The marsh and the refuge have received 10,000 tons of sediment and significant influxes of nitrogen and phosphorus. It is estimated that over 85 tons of phosphorus have been deposited into the marsh. These nutrients have caused significant changes in the vegetation community—resulting primarily in monocultures of cattails—and have reduced a once healthy fishery into one dominated by invasive carp. The refuge has partnered with the State, other Federal agencies, and private landowners to reduce the sediment and nutrient loads entering the marsh, but because we lack sufficient funds to adequately monitor water quality, progress has been difficult to measure.

Watershed issues that the Refuge System has faced highlight the importance of working with other stakeholders. This is particularly important with regard to water quantity issues in the East, where riparian water laws require sharing of water supplies. At Silvio O. Conte NWR in Massachusetts, the refuge partnered with Smith College, four local governments, the University of Massachusetts Cooperative Extension unit, and private landowners in the watershed to demonstrate that the proposed water withdrawals for a local bottling plant would diminish flows in the Mill River and affect endangered mussels. The plant was

allowed to operate, but with restrictions on daily withdrawals.

Other examples of refuges partnering to address watershed issues include the Hanalei NWR working with the Hanalei Watershed Hui, a local nonprofit group, to improve sanitary septic systems on the refuge and to address water quality issues on the Hanalei River. Also, Bitter Lake NWR in New Mexico is partnering with several governmental and non-governmental organizations to restore habitats along the Pecos River.

Addressing Water Quality Issues at a Landscape and Watershed Scale

The NWRS has recently collaborated with the U.S. Environmental Protection Agency (EPA) and the U.S. Geological Survey (USGS) to look at the relationship of impaired waters with National Wildlife Refuges. As states identify impaired waters and develop total maximum daily loads (TMDLs) to address these impairments, refuges may be put in a position to alter their management operations in order to comply with TMDL regulations.

Collaboration with EPA will allow us to examine the geospatial relationships of impaired waters with refuge boundaries and identify refuges where water quality issues may arise. We will then be in a position to prioritize research into the causes of impairment, and the USGS will assist us in examining landscape and watershed factors in this regard. This research will allow us to identify and address water quality issues in refuges and provide wildlife with quality habitats.

Conclusions

Water is indeed the lifeblood of the National Wildlife Refuge System, a Federal system of lands dedicated to conservation of wildlife and wildlife habitats.

Assessing and protecting our water supplies now and in the face of future climate uncertainties is a major challenge for the Refuge System. Because refuges are often integrated into a diverse landscape, an integral component in protecting water quantity and quality is working with other stakeholders in a watershed context. Although such an approach is not always successful at resolving issues or completely eliminating conflicts, we feel it is the best first step in addressing landscape-level water quality and quantity issues.