Let's Talk Water – Wetlands

By Dr. Mike Strobel

A few years ago, I was doing some research on the interactions between ground water and surface-water in the Great Plains. As part of this research, I visited a number of meadows, wetlands, bogs, and lakes. At one site, a local rancher came by and asked what I was doing and I said I was studying this wetland. He replied "Wetland? Why is that a wetland? It's just a dang swamp. What is there to study?" His comments made me realize that many people do not understand what wetlands are and why they are important.

Wetlands have been an issue of controversy for many years. Hydrologists see these features as important areas of ground-water recharge and discharge. Biologists understand that wetlands are important to a wide range of flora and fauna, and that wetlands have their own complex environments. Some developers see wetlands as legal barriers to new constructions, whereas others see the aesthetic value to property. Some farmers see wetlands on their property as land that could be drained and cultivated. Some ranchers see the value of wetlands as watering holes for livestock. Environmental protection agencies often view wetlands as important filters of pollutants and sediments from streams.

So, the big question is "what is a wetland?" There are various definitions for wetlands and each have a basis in science and legal terms. Possibly the most widely accepted definition for wetlands is one that has been accepted by both the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency.

They define wetlands as "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." USACE (Federal Register, 1982) and USEPA (Federal Register, 1980)

So, that rancher and I were both right…that dang swamp was a wetland too.

Wetlands are protected as part of the Clean Water Act, Section 404, and therefore, accurate delineation of wetlands is important so that these features are not damaged by human activities. There is a whole science in wetland delineation and it takes special training to be able to identify what are wetlands and where the boundaries of the wetlands extend. A number of years ago, I took a week-long training course in wetland delineation and became certified in Minnesota on this topic, but I will be the first to admit that it takes extensive practice, field experience, and overall knowledge of plants, soils and hydrology to accurately delineate wetlands. And what works in one State or region may not be applicable to different environments (Minnesota wetlands are very different from wetlands in Nevada, Florida, or Alaska, and each region is unique).

Wetlands are defined by three characteristics: vegetation, soil, and hydrology. In general, some aspect from all three of these characteristics must be met to be defined as a wetland, but there are exceptions based on abnormal conditions such as prolonged drought.

Wetland vegetation consists of hydrophytic plant life that occurs in areas of permanently or periodically saturated soils. The saturation of the soils needs to have sufficient frequency and duration to be a controlling influence over the types of plants that will exist in these soils. Most wetland vegetation found in the United States has been classified and in most cases scientists can readily identify whether the vegetation qualifies as wetland or upland plants.

Soils that would be indicative of wetlands are called hydric soils. There are many different indications of hydric soil conditions and one would need to spend a lot of time (and numerous articles for this column) discussing soil science to even begin to describe all of the properties. However, one of the indicators would be organic soils (Histosols) where either the upper 32 inches of the soil is at least 50 percent organic material or organic soil materials are directly overlying bedrock surfaces. Other indicators would be soils that exhibit saturated conditions for prolonged periods of time, such as staining from oxidized minerals, gleyed soils (soil horizons of gray color), sulfur (rotten egg) odors from hydrogen sulfide, and a high water content in the upper soil layers. There are many more indicators, but these provide some of the factors that field scientists look for when examining for wetland conditions.

Wetland hydrology occurs in areas that are either inundated or have saturated soils to land surface during parts of the growing season. The presence of water in a wetland environment should have a controlling influence on the types of plants and soils found in an area. The regularity and duration of saturation for an area will impact whether or not a wetland exists. For example, areas that are regularly or seasonally inundated or saturated for a certain percent of time during a growing season would be classified as having wetland hydrology, whereas areas irregularly or intermittently inundated or saturated would not fit this classification.

There are a number of tools scientists use to establish if an area has wetland hydrology. Many government agencies, such as the U.S. Geological Survey, Army Corps of Engineers, Natural Resources Conservation Service, and various State, County, and local agencies have information on streamflow, lake levels, flood hazard and flood control features, and other hydrology data that can aid in delineating wetland conditions. Aerial photographs, satellite images, and other remote sensing data also are useful in identifying areas of regular or prolonged saturation. Field data is possibly the most important piece of information, and this can consist of visual observation, watermarks on trees and rocks, drift lines, sediment deposits, and drainage patterns.

So, it is obvious that wetland delineation is a complex science involving biology, pedology (soil science), and hydrology. Understanding the complex ecosystems of wetlands, ranging from the microscopic life, through the many flora and fauna dependent on wetlands, to the larger animals such as migrating waterfowl and roaming mammals, is

a topic requiring far greater coverage than can be afforded in this article. Likewise, much more in-depth discussion of hydrology would be necessary to understand how wetlands act as points of recharge, discharge, and flow-through for watersheds. But hopefully this discussion provides the basics on how wetlands are defined and why they are important.

If you have questions about wetlands or any other hydrology topic, please contact me in care of the Ely Times or at mstrobel@usgs.gov.

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