2.6 Wetlands & Floodplains

Wetlands are areas where the soil is inundated by surface or ground water often enough that the prevalent vegetation community is adapted for life in saturated soils. The term “wetlands” covers a diverse set of conditions, including swamps, marshes, bogs and fens. The timing and duration of soil saturation largely determines how the soil develops and the particular community of plants and animals living in and on the soil. The prolonged presence of water creates conditions that favor the growth of specially adapted plants (hydrophytes) and promote the development of characteristic wetland (hydric) soils (USEPA, 2006).

Wetlands are recognized as important features in the landscape that provide numerous beneficial functions, include protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters, and maintaining surface water flow during dry periods. These valuable services are the result of the inherent and unique natural characteristics of wetlands (USEPA, 2001).

It has long been accepted that the presence and position of wetlands play a key role in the filtration of dissolved inorganic nutrients and suspended materials from water (Johnston et al. 1990; Welsh et al., 1995; Hammer, 1997). The wetland filtration function buffers our streams, ponds, and lakes from receiving excess nutrients and suspended materials. The addition of excessive amounts of nitrogen and phosphorous to marine and freshwater systems, where nitrogen and phosphorous, respectively, are generally limiting to plant growth, can lead to accelerated eutrophication (USEPA Office of Water, 1997).

Nitrate, the most mobile form of nitrogen, can either be absorbed by vegetation, leach into groundwater or surface water, or be converted to nitrogen gas in the process of denitrification (Welsh et al., 1995). Sediment and phosphorous retention is also an important function of wetland systems, with excess phosphorous tending to be associated with sediment. Wetland trapping and storage of sediment will also trap and store excess phosphorous. However, sediment attached phosphorous is subject to resuspension and movement when wetland sediments are disturbed (Welsh et al., 1995). Fecal coliform bacteria are often associated with suspended materials as well. Many of the organisms associated with fecal coliform bacteria cannot survive for long periods of time outside of their host organism. Therefore, the wetland function of retaining suspended material promotes the die-off of the fecal coliform bacteria (Johnston et al., 1990). This function is threatened with increasing storm water runoff and loss of wetlands. As of the mid 1980's, New York State had lost 60% of its original wetlands (Mitsch, 1993).

Fertilizer application, septic systems, and sewage treatment plant discharges directly affect nutrient exports (Caraco and Cole, 1999; Vitousek et al., 1997). Clearing of land for building lots and agriculture is often associated with a decrease in wetland acreage. The loss of wetlands removes a significant sink for fixed nitrogen leading to an increase in the mobility of nitrogen to streams, rivers, and lakes (Vitousek et al., 1997). Wetland restoration may be the most cost-effective method of decreasing nitrogen pollution (Carpenter et al., 1998). Removal of wetland systems has similar effects on sediment and phosphorous exports.

Federally Designated Wetlands

The National Wetlands Inventory (NWI) of the U.S. Fish & Wildlife Service produces information on the characteristics, extent, and status of the Nation's wetlands and deepwater habitats (USFWS, 2006). According to NWI maps there are 451 federally designated wetlands totaling 2,164 acres, including open water in the Schoharie Creek Watershed. These wetlands are 53.5% Lacustrine, 36% Palustrine, 10.2% Riverine, and 0.3% Upland.

The Lacustrine System includes wetlands and deep water habitats situated in a topographic depression or a dammed river channel, lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% areal coverage, a total area exceeding 8 hectares (20 acres). The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. Wetlands lacking such vegetation are also included if they exhibit all of the following characteristics: are less than 8 hectares (20 acres); do not have an active wave-formed or bedrock shoreline feature; have at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin; and have a salinity due to ocean-derived salts of less than 0.5 ppt. The Riverine System includes all wetlands and deep water habitats contained in natural or artificial channels periodically or continuously containing flowing water or which forms a connecting link between the two bodies of standing water. Upland islands or Palustrine wetlands may occur in the channel, but they are not part of the Riverine System. Upland systems includes all areas not defined as wetland or deep water habitats. ($USFWS_1$, 2006).

In 2003, the dominant wetland type in the Schoharie Creek Watershed was Lacustrine, limnetic unconsolidated bottom wetlands (53%) (Table 2.6.1). These wetlands consist of deep-water habitats (>6.6 feet deep), lacking vegetation over 30% of its area, and must exceed 20 acres in size. These relatively large, deep water habitats have bottoms with more than 25% of their particles smaller than stones (< 6-7cm) ($USFWS_1$, 2006). In the Schoharie Watershed this wetland type includes the Schoharie Creek mainstem and the Schoharie Reservoir. The remaining half of wetlands in the watershed consist of four major types: Palustrine forested (12.8%), Riverine lower perennial (10%), Palustrine unconsolidated bottom (9.6%), and Palustrine emergent (8.1%) (Table 2.6.1). These wetlands are scattered throughout the watershed.

Table 2.6.1 National Wetland Inventory of Schoharie Creek Watershed

NWI Code	NWI Wetland Classification	Acres	%
L1	Lacustrine, Limnetic, Unconsolidated Bottom	1154.8552	53.4
L2	Lacustrine, Littoral	2.8170	0.1
PEM	Palustrine, Emergent	174.8615	8.1
PFO	Palustrine, Forested	277.7922	12.8
PSS	Palustrine, Scrub-Shrub	116.0764	5.4
PUB	Palustrine, Unconsolidated Bottom	207.9089	9.6
PUS	Palustrine, Unconsolidated Shore	1.2294	0.1
R2	Riverine, Lower Perennial	216.2176	10.0
R3	Riverine, Upper Perennial	4.2823	0.2
U	Upland	7.4617	0.3

Palustrine wetlands are vegetated wetlands including the small, shallow, permanent or intermittent water bodies often called ponds. Palustrine wetlands may be situated shoreward of lakes, river channels, or estuaries; on river floodplains; in isolated catchments; or on slopes. They may also occur as islands in lakes or rivers. Palustrine forested wetlands are characterized by woody vegetation that is 6 m tall or taller. Palustrine emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants. Palustrine unconsolidated bottom wetlands includes all wetlands and deep water habitats with at least 25% cover of particles smaller than stones (less than 6-7 cm), and a vegetative cover less than 30%. Riverine wetlands are confined within a channel and lack persistent emergent or woody vegetation. Riverine lower perennial wetlands have low velocity flows and fine substrates ($USFWS_1$, 2006).

Federally designated wetlands are protected under the Clean Water Act, a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States ($USEPA_1$, 2003). Section 404 of the Clean Water Act established a program to regulate the discharge of dredged and fill materials into waters of the United States, including wetlands. Activities in waters of the United States that are regulated under this program include fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry (USEPA, 2003).

New York State Designated Wetlands

The Freshwater Wetlands Act (FWA), Article 24 of the Environmental Conservation Law, provides NYS DEC and the Adirondack Park Agency (APA) with the authority to regulate freshwater wetlands in the state. The NYS Legislature passed the Freshwater Wetlands Act in 1975 in response to uncontrolled losses of wetlands and problems resulting from those losses, such as increased flooding. The FWA contains the following Declaration of Policy:

"It is declared to be the public policy of the state to preserve, protect and conserve freshwater wetlands and the benefits derived therefrom, to prevent the despoliation and destruction of freshwater wetlands, and to regulate use and development of such wetlands to secure the natural benefits of freshwater wetland, consistent with the general welfare and beneficial economic, social, and agricultural development of the state (ECL Article 24-0103)."

The FWA protects those wetlands larger than 12.4 acres (5 hectares) in size, and certain smaller wetlands of unusual local importance. The law requires DEC and APA to map those wetlands that are protected by the FWA. In addition, the law requires DEC and APA to classify wetlands. Outside the Adirondack Park, DEC classifies wetlands according to 6NYCRR Part 664, Wetlands Mapping and Classification Regulations from Class 1, wetlands which provide the most benefits, to Class IV, wetlands which provide the fewest benefits. Around every regulated wetland is a regulated adjacent area of 100 ft., which serves as a buffer area for the wetland (NYS DEC, 2003).

According to DEC maps, there are 16 NYS DEC designated wetlands totaling 468 acres, within the Schoharie Creek mainstem watershed. Of these wetlands, 22% are Class 1 and 78% are Class 2. The majority of these wetlands are located in the Schoharie Creek headwaters in the Town of Hunter. However, the Class 1 wetlands are located at the confluence of Johnson Hollow Brook and the Schoharie Creek.

Both Federal and NYS Designated Wetlands maps are available at County Soil & Water Conservation District Offices. Streamside wetlands are mapped and described for each management unit in Section 4 Management Unit Summary & Recommendations.

It must be cautioned that these maps should only be used as guidance of wetland locations and boundaries. It is the responsibility of property owners to determine if wetland areas will be disturbed by proposed projects. Smaller wetlands which meet federal criteria may not have been mapped but are still protected by federal regulations. The NYS DEC offers wetland delineation services to landowners when they need more precise information, such as when they are planning to conduct work near a NYSDEC designated wetland area.

Schoharie Creek Mainstem Watershed Wetlands Totals by Town

Within the Schoharie watershed the greatest acreage of wetlands are in the Town of Gilboa with Hunter a close second (Table 2.6.2). The majority of wetland acreage in the

Town of Gilboa is due to the Schoharie reservoir being classified as a deep water wetland. On average, due to the steepness of the slopes in the watershed the majority of wetlands lie adjacent to the streams, with smaller wetlands scattered throughout the forest near groundwater seeps. These forested wetlands and vernal pools may be underrepresented in table 2.6.2 since aerial photography was used for the NWI study. Within the NWI inventory analysis, wetlands down to an acre in size were identified well with wetlands as small as .005 acres detected. However, wetlands below one acre in size were under detected (Dahl, 2006). These smaller wetlands provide important habitat and water retention within Catskill forests.

Table 2.6.1 Schoharie Creek Mainstem Watershed wetland acreage by Town. (Many of the mapped DEC and NWI wetlands overlap. In most cases the NWI coverage is most comprehensive.)

Town	Acres of DEC wetlands	Acres of NWI wetland
Conesville	0	228
Gilboa	0	572
Hunter	309	430
Jewett	0	151
Lexington	58	201
Prattsville	101	263
Roxbury	0	319

Floodplains

A floodplain is streamside land that gets periodically inundated by floodwaters. Floodplains are important because they temporarily store floodwaters, improve water quality, and provide important habitat for wildlife. Natural floodplains help reduce the heights of floods. During periods of high water, floodplains serve as natural sponges, storing and slowly releasing floodwaters. The floodplain provides additional "storage," reducing the velocity of the river and increasing the capacity of the river channel to move floodwaters downstream. Natural floodplains also help improve water quality. As water courses through the floodplain, plants serve as natural filters, trapping sediments and capturing pollutants (American Rivers, 2003).

One of the largest problems facing floodplain management is the disconnection of a stream from its floodplain. Management practices such as channelization, straightening, development, and loss of riparian vegetation may lead to stream channel *incision* or down-cutting. As the stream incises it will lower the streambed elevation, no longer allowing floodwaters to spill out into the floodplain. As a result flood velocity will increase causing streambank *degradation* until a new floodplain in created at the lower streambed elevation. Building homes within the floodplain is incompatible with proper floodplain function. Many people want to live by streams but as they develop the floodplain, they often increase stream degradation by undertaking stream management activities to protect their property from flooding.

The Federal Emergency Management Agency (FEMA) performs hydrologic and hydraulic studies to produce Flood Insurance Rate Maps (FIRM), which identify flood-prone areas (FEMA, 2003). These studies analyze the data from local streamflow gages to predict how frequently different floods will occur, and to determine the magnitude of the benchmark "100-year flood". This is the flow that has a statistical probability of recurring once every 100 years, but because it is a statistical prediction, based on historical record, "100-year floods" could be seen more or less frequently than every hundred years, especially if changes in climate or land use occur. An engineering model is then used to map the predicted boundaries of the 100-year flood on the floodplain. Towns then use these maps to help determine areas where the risk of flooding is high enough to warrant special precautions or review of land development. Towns are required to pass a floodplain protection ordinance that sets certain limits on building in the 100-year floodplain in order to participate in the National Flood Insurance Program.

Some towns develop other ordinances that help focus review of development on lands that could affect stream and floodplain function. One example of an innovative model in effect locally is the ordinance that was adopted by the Town of Woodstock. The text of this ordinance can be found at http://www.woodstockny.org/Laws/WWLAW9.pdf

Digital Flood Mapping Project

The NYSDEC Bureau of Program Resources and Flood Protection has developed new digitized floodplain maps, using topographic information derived from an airborne laser imaging technology called LIDAR (Light Detection and Ranging). LIDAR data, together with updated computer HEC models and digital aerial photography, enable engineers to produce extremely detailed and accurate maps. Modeling with this new data allows for flood contour lines indicating various depths of water under 100-year and other flood conditions.

FEMA's new hardcopy Flood Insurance Rate Maps (FIRMs) are a vast improvement over their predecessors. One of the most obvious improvements is the inclusion of base map imagery utilizing the 2004 orthoimagery from New York's statewide orthoimagery program. A New York State Floodplain Management Map (NYSFMM) series has also been developed to provide floodplain managers, municipal planners, and other professionals with a tool for mitigation and planning. In addition to the information found on a FIRM, the NYSFMMs also contain department-set survey reference marks and flood depth contours (NYS DEC, 2006).

The new FIRM hardcopy maps are available for viewing at County Soil & Water Conservation District Offices and most town halls. Using GIS mapping software, Greene County Soil & Water Conservation District (GCSWCD) is able to overlay tax parcel boundaries with digital floodplain boundaries to asses if a property falls within a flood zone. This service is available to all interested. Floodplain maps of each management unit can be found in Section 4 Management Unit Summary & Recommendations.

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