2.9 Wildlife and Fisheries

Primarily authored by the Schoharie County Soil and Water Conservation District

Water is an essential component to life on earth. Without it humans as well as most other species on this planet would cease to exist. Clean potable drinking water is a staple that helps to sustain a diverse collection of flora and fauna throughout the Schoharie Valley watershed. Human uses of land and water have had far-reaching impacts on natural ecosystems. In order to manage ecosystems for sustainable use, one must understand the basic physical, chemical, and biological components and functions of those systems. The interrelationships between ecosystems must be understood as well (Chiras and Rega, 2002).

Biological Energy within the Stream Environment

Organisms that live within the stream environment can be divided into three categories based on the function they perform: producers, consumers, and predators. Aquatic plants are the producers that provide energy to the stream community through photosynthesis and include diatoms, algae, and macrophytes (larger plants). Bacteria also provide energy through the decomposition of organic matter. Consumers, including invertebrates (insects) and fish, use the energy provided by these plants and microbes. Lastly, predators (fish, birds, mammals) feed on consumer groups for their energy requirements (Chiras and Rega, 2002). These components make up the building blocks of the food web, a complex arrangement which is the essence of all life on earth. Any time there is a change in the availability of one of the components within the schematic of the food web; species within the habitat have one of two choices. One choice is to adapt to the change and redirect their efforts towards other ways to survive with the potential to include abandoning the habitat. The other is to succumb to localized extinction which might be the case if the species is a "specialist" feeder or is limited to a very small "home range" habitat. This is what has prompted fish and wildlife experts to identify what are known as "keystone" species. Keystone species are species that are a critical component to other species within their niche. Once a keystone species is extirpated from a habitat, the symbiotic ties are cut, and that usually means drastic consequences for one or more other species within the habitat.

Biological Energy along the Stream Banks

Riparian areas serve as transitional zones, or ecotones, and have been defined as "zones of direct interaction between terrestrial and aquatic ecosystems" (Gregory et al., 1991). Today, riparian areas are recognized as being transportation corridors, high producers of timber and forage, key habitats for a diversity of wildlife, major components of quality fisheries habitat, prime recreational areas, and areas critical to the overall management of any watershed (Kohler and Hubert, 1999). Frequent disturbance and a shallow water table provide conditions favorable to a riparian plant community dominated by mesic, early successional species (e.g. alder, cottonwood, and willow) and differ markedly from upslope or adjacent plant communities (Gregory et al, 1991). From watershed and fisheries management perspectives, riparian areas provide many important services. Streamside vegetation plays a role in controlling channel morphology. Not only do roots stabilize otherwise easily eroded stream banks, but pieces of large woody debris recruited into the stream from the riparian zone retain sediments that would otherwise be flushed into the stream (Speaker et al., 1984). Large woody debris in conjunction with fluvial processes also creates a diversity of meso-and microhabitats important to stream fishes (Keller and Swanson 1979). Riparian areas also serve to moderate environmental conditions experienced by stream biota including: decreased temperature variations by shade relief, promoting recharging of the aquifer by slowing movement of water within the floodplain, control of non-point source pollution by filtering out sediments from adjacent lands, and reducing nutrient loadings into the aquatic system.

Terrestrial Species that benefit from a Healthy Stream

There are many land dwelling species that need a healthy stream environment to thrive in the wild. Several mammals like beaver, muskrat, shrew, mouse, white tail deer, coyote and black bear to name a few are known to inhabit the Schoharie Valley. There are also countless species of birds that use this region as a home range as well as part of their migratory route up and down the eastern seaboard. The Great Blue Heron (*Ardea Herodias Linnaeus*) for instance, is a large bird that calls the Manor Kill with its diverse landscapes and bordering wetlands home (Photo 2.9.1). The Great Blue Heron has earned federally protected status. The reasons that this bird has obtained protected status are numerous. One of the more significant threats faced by Great Blue Herons is the loss of habitat. New York State has lost over half of its wetlands since

colonization. More recently, loss of wetlands in the Lake Plains portion of the state have been offset as agricultural lands revert back to wetlands, although net losses of wetlands in the Hudson Valley continue (NYNHP 2008).

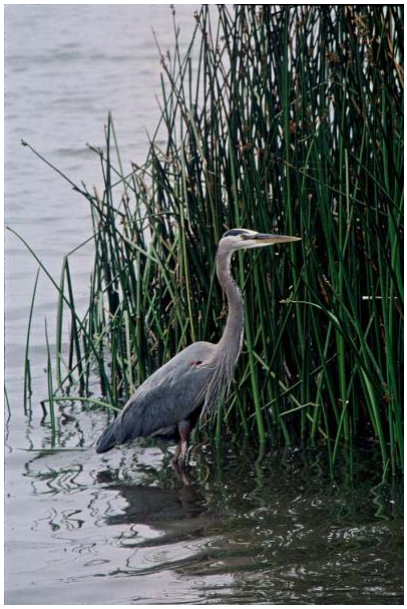

Photo 2.9.1. Great Blue Heron (photo by: Lee Karney)

The Great Blue Heron is just one of many species that would suffer a severe setback in its life history if water quality in its habitat were to become negatively impacted. Eastern Bluebirds which are a member of the thrush family do not eat birdseed. Bluebirds eat insects and native fruits produced by black cherry, winterberry holly, red-osier dogwood, blueberry, sumac, wild grape, bittersweet, and Virginia creeper. This drives home the importance of these native plant species in or near wetlands and stream environments in Schoharie County. There are literally dozens of species of birds, mammals, reptiles, and amphibians that inhabit streamside and wetland habitats in Schoharie County. The Northern Leopard Frog (*Rana pipiens*) is another example of a species that is at risk when its habitat is altered (Photo 2.9.2). This amphibian was once the most abundant and widespread frog species in North America. Massive declines beginning in the 1970s have significantly reduced their numbers earning them threatened status. Scientists have not determined the

Photo 2.9.2. Northern Leopard Frog - an aquatic species that requires a healthy stream habitat.

cause of the declines, but it is likely a combination of ecological factors: pollution, deforestation, and water acidity (http://animals.nationalgeographic.com/animals/amphibians/northern-leopard-frog.html).

Living organisms in streams are part of complex food webs as well. External inputs include light, nutrients, and course particulate organic matter (CPOM) (allochthonous material) from riparian areas. Organic matter is produced in the stream (autochochthonous material) from the growth and reproduction of photosynthesizing algae, bacteria, and plants. Decomposing bacteria and fungi process CPOM into other components, and in turn, stream bacteria and algae are consumed by macroinvertebrates. Various species of fish consume plants, macro-invertebrates, and other fish (Cretaz 2007). This is to say that impacts to the streamside environment can and will have direct impacts to the food web within the stream. This is why when biologists conduct a biological monitoring study they use the presence or absence of fish as well as macroinvertebrates as indicators of stream condition. These indicator species tell watershed managers if something is amiss within the stream environment. Usually the macroinvertebrates will succumb first to a less than desirable aquatic environment followed by the most sensitive fish species like sculpin and trout (Photo 2.9.3). All of these factors, as well as a detailed physical and chemical analysis, help indicate if human intervention is required. DEC has conducted species diversity studies on the Manor Kill for both fish and invertebrate populations. Most recently the State University of New York at Cobleskill conducted electro fishing studies to determine species diversity within the Manor Kill (Photo 2.9.4). They also completed kick net sampling of benthic invertebrates to determine overall condition of the watershed with regards to water quality (Photo 2.9.5).

Photo 2.9.3. Brown trout caught in Manor Kill during 2007 sampling.

Photo 2.9.4. College Students conducting fish sampling on Manor Kill April 2007.

Photo 2.9.5. Stonefly's captured during April 2007 macro-invertebrate study on

Historically, brown and brook trout occur throughout the Manor Kill (Figure 2.9.1). Results of the 2007 fish study were tabulated and compared with historic data from the NYS Dept. of Environmental Conservation (Table 2.9.1). The data collected in the study will be used to compare changes in salmonid distribution in Schoharie County coldwater streams (Nichols, 2007). These techniques allow watershed managers to view biotic changes over a long time frame which may help identify areas if, where, and when changes should be implemented.

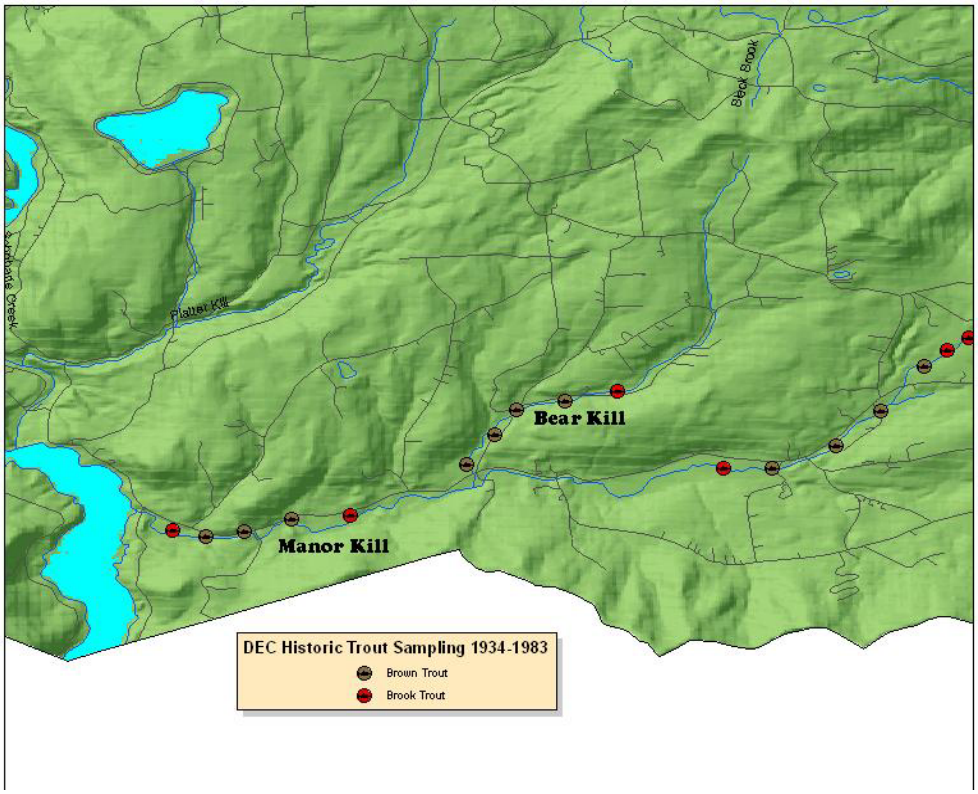

Figure 2.9.1. Map illustrating DEC historic sampling data for two species of trout in two bodies of water in Conesville NY. Created by SUNY Cobleskill.

Table 2.9.1 Manor Kill Fish Species Composition 1934-2008					
Date	SiteName	Species	Date	SiteName	Species
8/3/1934	COOPER	white sucker	9/3/1996	NYS DEC	Eastern Eastern Blacknose Dace
8/3/1934	COOPER	brown trout	9/3/1996	NYS DEC	Brown Bullhead
8/3/1934	COOPER	brook trout	9/3/1996	NYS DEC	Slimy Sculpin
8/3/1934	COOPER	Eastern Blacknose Dace	9/3/1996	NYS DEC	Creek Chub
8/3/1934	COOPER	creek chub	9/3/1996	NYS DEC	Common Shiner
8/11/1955	WFS	Eastern Blacknose Dace	9/3/1996	NYS DEC	Slimy Sculpin
8/11/1955	WFS	creek chub	9/3/1996	NYS DEC	Creek Chub
8/11/1955	WFS	brown trout	9/3/1996	NYS DEC	Eastern Eastern Blacknose Dace
8/11/1955	WFS	common shiner	9/3/1996	NYS DEC	Common Shiner
8/11/1955	WFS	white sucker	9/3/1996	NYS DEC	Eastern Eastern Blacknose Dace
8/10/1961	DIETSCH	brown trout	9/3/1996	NYS DEC	White Sucker
8/10/1961	DIETSCH	creek chub	9/3/1996	NYS DEC	White Sucker
8/10/1961	DIETSCH	white sucker	4/13/2007	Nichols 17	Slimy Sculpin
8/10/1961	DIETSCH	Eastern Blacknose Dace	4/13/2007	Nichols 17	Brook Trout
8/10/1961	DIETSCH	common shiner	4/13/2007	Nichols 17	Brown Trout
7/15/1968	R FIELDHOUSE	common shiner	4/13/2007	Nichols 18	Eastern Blacknose Dace
7/15/1968	R FIELDHOUSE	white sucker	4/13/2007	Nichols 18	Common Shiner
7/15/1968	R FIELDHOUSE	creek chub	4/10/2008	MK1	Longnose Dace
7/15/1968	R FIELDHOUSE	brook trout	4/10/2008	MK1	Eastern Blacknose Dace
7/15/1968	R FIELDHOUSE	brown trout	4/10/2008	MK1	White Sucker
7/15/1968	R FIELDHOUSE	Eastern Blacknose Dace	4/10/2008	MK1	Common Shiner
7/15/1968	R FIELDHOUSE	common shiner	4/10/2008	MK3	Brown Trout
7/15/1968	R FIELDHOUSE	brown trout	4/10/2008	MK3	Brook Trout
7/15/1968	R FIELDHOUSE	Eastern Blacknose Dace	4/10/2008	MK3	Longnose Dace
7/15/1968	R FIELDHOUSE	white sucker	4/10/2008	MK3	Eastern Blacknose Dace
7/15/1968	R FIELDHOUSE	creek chub	4/10/2008	MK3	White Sucker
7/15/1968	R FIELDHOUSE	Eastern Blacknose Dace	4/10/2008	MK4	Slimy Sculpin
7/15/1968	R FIELDHOUSE	white sucker	4/10/2008	MK4	Longnose Dace
7/15/1968	R FIELDHOUSE	creek chub	4/10/2008	MK4	Eastern Blacknose Dace
7/15/1968	R FIELDHOUSE	slimy sculpin	4/10/2008	MK4	White Sucker
7/15/1968	R FIELDHOUSE	brook trout	4/10/2008	MK4	Common Shiner
7/15/1968	R FIELDHOUSE	white sucker	4/10/2008	MK5	Brown Trout
7/15/1968	R FIELDHOUSE	brown bullhead	4/10/2008	MK5	Slimy Sculpin
7/15/1968	R FIELDHOUSE	Eastern Blacknose Dace	4/10/2008	MK5	Longnose Dace
7/15/1968	R FIELDHOUSE	brook trout	4/10/2008	MK5	Eastern Blacknose Dace
7/15/1968	R FIELDHOUSE	common shiner	4/10/2008	MK5	Creek Chub
7/15/1968	R FIELDHOUSE	brown trout	4/10/2008	MK6	Brown Trout
7/15/1968	R FIELDHOUSE	brown trout	4/10/2008	MK6	Brook Trout
7/15/1968	R FIELDHOUSE	creek chub	4/10/2008	MK6	Slimy Sculpin
8/15/1983	K SANFORD	creek chub	4/10/2008	MK6	Longnose Dace
8/15/1983	K SANFORD	longnose dace	4/10/2008	MK6	Eastern Blacknose Dace
8/15/1983	K SANFORD	brown trout	4/10/2008	MK6	Common Shiner
8/15/1983	K SANFORD	brook trout	4/10/2008	MK6	White Sucker
8/15/1983	K SANFORD	Eastern Blacknose Dace	4/10/2008	MK7	Common Shiner
8/15/1983	K SANFORD	common shiner	4/10/2008	MK7	Brown Trout
8/15/1983	K SANFORD	brown trout	4/10/2008	MK7	Slimy Sculpin
8/15/1983	K SANFORD	white sucker	4/10/2008	MK7	Creek Chub
8/15/1983	K SANFORD	common shiner	4/10/2008	MK7	Eastern Blacknose Dace
8/15/1983	K SANFORD	Eastern Blacknose Dace	4/10/2008	MK7	White Sucker

8/15/1983	K SANFORD	SCULPIN	4/18/2008	MK8	Brown Trout
8/15/1983	K SANFORD	creek chub	4/18/2008	MK8	Brook Trout
8/15/1983	K SANFORD	longnose dace	4/18/2008	MK8	Slimy Sculpin
8/15/1983	K SANFORD	brown trout	4/18/2008	MK8	White Sucker
8/15/1983	K SANFORD	Eastern Blacknose Dace	4/18/2008	MK8	Eastern Blacknose Dace
9/3/1996	NYS DEC	Brown Trout	4/18/2008	MK8	Creek Chub
9/3/1996	NYS DEC	Brown Trout	4/18/2008	MK9	Brown Trout
9/3/1996	NYS DEC	Brown Trout	4/18/2008	MK9	Brook Trout
9/3/1996	NYS DEC	Brook Trout	4/18/2008	MK9	Slimy Sculpin
9/3/1996	NYS DEC	Longnose Dace	4/18/2008	MK9	Eastern Blacknose Dace
9/3/1996	NYS DEC	Longnose Dace	4/18/2008	MK10	Brook Trout
9/3/1996	NYS DEC	Brown Bullhead	4/18/2008	MK10	Eastern Blacknose Dace
9/3/1996	NYS DEC		4/18/2008	MK10	Creek Chub

Fish and Wildlife Conservation Recommendations for the Manor Kill, Schoharie County, October 2008

The Manor Kill Watershed contains a high degree of biological diversity with a species assemblage that is typical of the Schoharie Valley. Forests with features such as talus slopes, cliffs, and mature stands are habitat for plants and animals adapted to these conditions. The large, unfragmented nature of the forests creates favorable habitat for wide-ranging animals (such as black bear and bobcat) and wildlife that prefer forest interiors. It is likely that forests of the Manor Kill watershed are important breeding areas for raptors such as broad-winged hawk, Northern goshawk, and sharp-shinned hawk. Forests that occur adjacent to the stream create habitat for a wide range of small mammals, including rarely seen moles, voles, and shrews, and fox, weasel, mink, beaver, and muskrat. The change in elevation from stream valley floor to mountain peaks, and the presence of both evergreen and deciduous forests contribute to the watershed's biodiversity.

In the Manor Kill watershed, abundant streams with cobble beds, undercut banks, and streamside wetlands and forests are habitat for damselflies, dragonflies, stream salamanders, turtles, and frogs. The wood turtle lives almost exclusively in and near streams, while spotted turtles might be found in streamside wetlands. Riparian forests are particularly important breeding habitat for birds such as the Louisiana water thrush and yellow-throated vireo. Stream corridors are the preferred foraging habitat for the many bat species that are likely to occur in the watershed.

Grassy fields, open woods, and shrubby patches make important contributions to biodiversity of the watershed. These open and scrubby areas can provide nesting habitat for the wood turtle and shrub land bird species that are declining in New York State as old farms revert to forests. Young forests are habitat for American woodcock, and ruffed grouse, while open shrub lands and dense thickets are preferred by brown thrasher. A list of other bird species known to utilize habitats within the Manor Kill watershed can be seen below (Table 2.9.2). Many species, like American woodcock, require a complex of different habitats to complete breeding, foraging, overwintering, and migration portions of their life cycles. As a result, maintaining connectivity between the stream and the adjacent uplands is very important for biodiversity conservation.

Schoharie County is fortunate to have the Schoharie County Bluebird Society, which was formed in 1983.The Blue Bird Society has been very instrumental in bringing this New York State bird back to the fore from a time when its numbers were very low. Bluebirds nest in open fields or orchards which the Manor Kill watershed has an abundance of. The fate of the bluebird in Schoharie County was realized by one man. Ray Briggs remembered "a time when he could count almost as many bluebirds as robins". Then something changed: fewer and fewer bluebirds returned in the spring. They disappeared from Mr. Brigg's farm. Their numbers dropped all over the United States. By the 1970s many young people had never seen a bluebird (www.highlightskids.com). There are many reasons this happened, one being the lack of cavities for nesting, like old apple trees, and rotted fence posts. The trees had been cut down and the wooden fence posts replaced with metal. They were also competing with invasive cavity nesters like the English sparrow. There was also a lack of food availability because the fields that used to provide them with as source for insects had been developed, or pesticides were applied to eliminate the insects. By placing, monitoring, and managing nest boxes all over Schoharie County, the county now fledges more bluebirds than any other county in the state (www.highlightskids.com). This is an example of how a species can experience significant decline because of natural and non-natural impacts on its habitat. It also exemplifies how thoughtful human intervention can reverse those trends.

Table 2.9.2. Observed Breeding Bird Species known to inhabit stream and wetland areas in Conesville, NY (http://www.dec.ny.gov/cfmx/extapps/bba/index.cfm).			
Common Name	Scientific Name	Common Name	Scientific Name
Turkey Vulture	*Cathartes aura*	Brown Creeper	*Certhia americana*
Canada Goose	*Branta canadensis*	House Wren	*Troglodytes aedon*
Common Merganser	*Mergus merganser*	Winter Wren	*Troglodytes troglodytes*
Bald Eagle	*Haliaeetus leucocephalus*	Eastern Bluebird	*Sialia sialis*
Red-tailed Hawk	*Buteo jamaicensis*	Veery	*Catharus fuscescens*
Ruffed Grouse	*Bonasa umbellus*	Hermit Thrush	*Catharus guttatus*
Wild Turkey	*Meleagris gallopavo*	Wood Thrush	*Hylocichla mustelina*
Killdeer	*Charadrius vociferus*	American Robin	*Turdus migratorius*
Rock Pigeon	*Columba livia*	Gray Catbird	*Dumetella carolinensis*
Mourning Dove	*Zenaida macroura*	European Starling	*Sturnus vulgaris*
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Cedar Waxwing	*Bombycilla cedrorum*
Yellow-billed Cuckoo	*Coccyzus americanus*	Yellow Warbler	*Dendroica petechia*
Barred Owl	*Strix varia*	Chestnut-sided Warbler	*Dendroica pensylvanica*
Chimney Swift	*Chaetura pelagica*	Magnolia Warbler	*Dendroica magnolia*
Ruby-throated Hummingbird	*Archilochus colubris*	Yellow-rumped Warbler	*Dendroica coronata*
Belted Kingfisher	*Ceryle alcyon*	Black-throated Green Warbler	*Dendroica virens*
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Blackburnian Warbler	*Dendroica fusca*
Downy Woodpecker	*Picoides pubescens*	Prairie Warbler	*Dendroica discolor*
Hairy Woodpecker	*Picoides villosus*	Black-and-white Warbler	*Mniotilta varia*
Northern Flicker	*Colaptes auratus*	American Redstart	*Setophaga ruticilla*
Pileated Woodpecker	*Dryocopus pileatus*	Ovenbird	*Seiurus aurocapilla*
Eastern Wood-Pewee	*Contopus virens*	Louisiana Waterthrush	*Seiurus motacilla*
Alder Flycatcher	*Empidonax alnorum*	Mourning Warbler	*Oporornis philadelphia*
Least Flycatcher	*Empidonax minimus*	Common Yellowthroat	*Geothlypis trichas*
Eastern Phoebe	*Sayornis phoebe*	Scarlet Tanager	*Piranga olivacea*

Great Crested Flycatcher	*Myiarchus crinitus*	Chipping Sparrow	*Spizella passerina*
Eastern Kingbird	*Tyrannus tyrannus*	Field Sparrow	*Spizella pusilla*
Blue-headed Vireo	*Vireo solitarius*	Savannah Sparrow	*Passerculus sandwichensis*
Warbling Vireo	*Vireo gilvus*	Song Sparrow	*Melospiza melodia*
Red-eyed Vireo	*Vireo olivaceus*	White-throated Sparrow	*Zonotrichia albicollis*
Blue Jay	*Cyanocitta cristata*	Dark-eyed Junco	*Junco hyemalis*
American Crow	*Corvus brachyrhynchos*	Northern Cardinal	*Cardinalis cardinalis*
Tree Swallow	*Tachycineta bicolor*	Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Indigo Bunting	*Passerina cyanea*
Bank Swallow	*Riparia riparia*	Bobolink	*Dolichonyx oryzivorus*
Cliff Swallow	*Petrochelidon pyrrhonota*	Red-winged Blackbird	*Agelaius phoeniceus*
Barn Swallow	*Hirundo rustica*	Eastern Meadowlark	*Sturnella magna*
Black-capped Chickadee	*Poecile atricapillus*	Common Grackle	*Quiscalus quiscula*
Tufted Titmouse	*Baeolophus bicolor*	Brown-headed Cowbird	*Molothrus ater*
Red-breasted Nuthatch	*Sitta canadensis*	Baltimore Oriole	*Icterus galbula*
White-breasted Nuthatch	*Sitta carolinensis*	Purple Finch	*Carpodacus purpureus*
American Goldfinch	*Carduelis tristis*	House Finch	*Carpodacus mexicanus*
House Sparrow	*Passer domesticus*		

Management Recommendations

Stream managers should consider the following general recommendations to maintain and protect important stream corridor habitats:

- Limit disturbance and protect both small and large stream corridor wetlands that provide significant habitat for amphibians, reptiles, and breeding birds in the watershed;
- Most shrub land breeding birds are relatively tolerant of human development if appropriate habitats exist, and unlike some grassland birds, do not require large habitat patches for breeding. While open lands should not be created at the expense of

mature, unfragmented forests, agricultural and suburban landowners who maintain shrubby thickets in the uplands adjacent to stream corridors can support shrub land birds;

- Where possible, plant native species appropriate to the pre-existing or predicted ecological community for a site;
- Riparian buffer widths can be established to conserve habitat function, in addition to water quality, hydrologic, and geomorphic functions. It is particularly important to maintain habitat connectivity needed by wildlife to complete their life cycles. To evaluate connectivity, consider the needs of indicator species, or species of conservation concern in the watershed.
- The forest area within 300 ft of the forest edge is considered "edge" habitat. Edge habitats support increased densities of deer and invasive plants, and are avenues for nest predators to enter forests. A minimum 300 ft forested stream buffer will protect forest health and provide better breeding habitat for forest wildlife;
- Riparian forests at least 50 acres in size with an average total width of at least 300 ft can provide forest interior habitat and should be highly valued. Breeding bird diversity increases substantially between 300 and 1,500 ft from the stream's edge;
- Most of the amphibian and reptile observations in this watershed are within or near stream corridors. Seek to create a minimum 500 ft forested buffer around stream corridor wetlands to provide terrestrial habitat required by stream- and vernal pool-breeding amphibians to complete their life cycles, and to protect wetlands from adjacent land uses;
- Buffer widths of 30-100 ft should be maintained for riparian forest canopies to provide enough shading and cooling of streams to maintain trout populations. These buffers need to be nearly continuous. Some studies suggest 80% of banks along a stream supporting trout populations must have forests at least 30 ft wide to provide sufficient shade for trout;
- Minimum buffers of 50-100 ft are often recommended to protect aquatic communities. Large woody debris deposited into streams provides important shelter for fish, and in particular for trout. At a minimum, a 50 ft buffer appears necessary to maintain sufficient woody debris inputs to streams. Riparian vegetation provides

leaves and other forms of litter that feed macro invertebrates. In turn, aquatic macro invertebrates are the major food source for most freshwater fish. A minimum 100 ft buffer is recommended to protect aquatic macro invertebrate and fish abundance.

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Information on Schoharie County Bluebird Society can be found at:

http://www.highlightskids.com/Science/Stories/SS0302_mrBluebird.asp

Information on bird species indigenous to the Manor Kill watershed can be found at:

http://www.dec.ny.gov/cfmx/extapps/bba/index.cfmttp://