Warm Spring Critical Environmental Area
Town of New Lebanon, Columbia County, New York

Critical Environmental Areas

New York State law authorizes municipalities to designate Critical Environmental Areas within the municipal boundaries to alert people to places that deserve special attention in the course of land use planning, regulatory reviews of development projects, and decisions about development and conservation.

A Critical Environmental Area (CEA) is a geographic area with exceptional character with respect to one or more of the following:

- a benefit or threat to human health;
- a natural setting such as fish and wildlife habitat, forest and vegetation, open space, and areas of important aesthetic or scenic quality;
- agricultural, social, cultural, historic, archeological, recreational, or educational values; or
- an inherent ecological, geological, or hydrological sensitivity that may be adversely affected by any change. (6 NYCRR 617.14(g)

A CEA is adopted by the municipal legislative body and then registered with the State of New York. The CEA designation carries no land use restrictions, but simply raises awareness about the important features contained within the CEA—such as wildlife habitat, water resources, unusual landforms, or scenic vistas—and requires consideration and evaluation of potential impacts to the quality of those features when a major new land use is contemplated.

Warm Spring CEA

A Town of New Lebanon working group, including members of the Town Board, the Conservation Advisory Council, the Climate Smart Communities Task Force, and representative to the Columbia County Environmental Management Council, proposed the establishment of the Warm Spring Critical Environmental Area.

This area encompasses the place where the New Lebanon warm spring emerges near the summit of Spring Hill Road in the Lebanon Springs hamlet, and the "contribution area"—the land area deemed to be most important to maintaining the quality and quantity of the springwater. The spring is a unique hydrogeological feature—the only warm spring in the State of New York, and one of very few in the northeastern US (Dunn 1981). The spring has figured prominently in the establishment and economic development of the town, and has been a significant water source for Lebanon Springs households.

The springwater issues from the carbonate bedrock of the Stockbridge Formation at a fault between the carbonates and phyllite bedrock to the east (Hobba et. al 1979, Dunn 1981). In the area of the warm spring, the Stockbridge Formation consists of whitish to grayish marble and beds of dolostone (Ratcliffe 1978). Phyllite (metamorphosed shale) lies to the east, and may act as an impermeable barrier to the movement of water. Hydrogeologists speculate that waters recharging the Stockbridge Formation in the hills to the north-northeast of the spring move deeply into the ground along this fault zone and then rise under artesian pressure to the Lebanon Springs area (Dunn 1981).

Steven Winkley, PG, of New York Rural Water Association digitized the bedrock mapping of Ratcliffe (1978), and delineated the estimated area contributing groundwater to the warm spring based on the outcrop area of the Stockbridge Formation topographically upgradient to the north and northeast of the spring. Faulted phyllites form the eastern boundary of the mapped contribution area. The boundary of the CEA encompasses the contribution area and a 200-foot-wide buffer zone at the perimeter to help provide additional protection. All land in the CEA is in private ownership. The CEA working group has sought support for the CEA from all landowners The parcels of the few that declined to support the CEA have been excluded from the CEA.

The purpose of the CEA designation is to raise awareness of the warm spring contribution area and the kinds of land uses that might affect the temperature, quality, or quantity of the warm springwater.

Significance

The Warm Spring

Groundwater is the water that resides beneath the ground surface in spaces between sediment particles and in rock fissures, seams, and cavities. Groundwater is fed and replenished by rainwater and snowmelt that seeps through soils and other surficial material and through rock pores and fissures. A spring is a place where groundwater emerges at the ground surface under hydrostatic pressure. Springs may originate from a variety of deep or shallow sources. Those from shallow sources may run for just a few days or a few weeks each year, and those from deep sources may run year-round.

Springs are not unusual in the Town of New Lebanon or the region in general. They occur at all elevations, and are most conspicuous where they discharge into upland habitats, but they also discharge unseen into streams, ponds, and wetlands, and provide important water sources for those habitats. Most springs emerge from the ground at temperatures of 45-55 ^{o}F, but the New Lebanon warm spring emerges at temperatures in the range of 65.7 – 71.4 ^{o}F year-round (Hobba et al. 1979).

The New Lebanon warm spring is the only known warm spring in the New York State. The precise water sources of the warm spring remain somewhat mysterious but hydrogeologists believe that the water is warmed by geothermal heat deep in the Earth's crust (Dunn 1981). According to

explorations carried out by the US Geologic Survey, some of the water originates as deep as 0.62 mile (1 kilometer) below the ground surface and as much as 2 miles (3.2 km) distant from where the spring emerges (Steven Winkley, pers. comm.). The seasonal temperature differences indicate that the discharge is a mixture of warm water from deep sources and cooler water from sources closer to the ground surface (Hobba et al. 1979).

Groundwater is much influenced by the volumes and patterns of surface runoff from precipitation and snowmelt and the degree of water infiltration to the soils. The amount and quality of groundwater depends on factors such as the depths and textures of the soils in the watershed, the kinds of vegetation cover, the extent of impervious surfaces (e.g., roads, parking lots, roofs), and the management of stormwater in developed areas. Groundwater can be depleted by overextraction or by inadequate recharge from the surface, and can be degraded by contaminated seepage. In those ways our uses of land and water can significantly affect the quantity and quality of the groundwater, including the water of the warm spring.

Intact forests are perhaps the most effective kind of land cover for protecting groundwater supplies. The forest vegetation, the organic duff on the forest floor, and the biota and structure of the forest soils all help to reduce rapid runoff of rainwater and snowmelt along the ground surface and facilitate infiltration to the soils. A portion of the water that is not dispelled by evaporation or taken up by forest plants and animals is available to replenish the groundwater. The forest soils and soil biota also filter and break down contaminants into less-harmful substances. In these ways, forests help to regulate both the quantity and quality of water that feeds groundwater and streams (Bormann et al. 1969, Likens et al. 1970, Boormann et al. 1974, Wilder and Kiviat 2008). Other kinds of habitats—oldfields, hayfields, shrublands, forested and open wetlands—can also help to supply clean water to underground reserves.

History

The warm spring was long used by Native Americans and then figured prominently in the original European settlement and development of the town, and to this day is an iconic landmark for the people of New Lebanon.

According to Ellis (1878), the Mahican people had used the warm spring for bathing and medicinal purposes for centuries before 1756 when they led the first European to see the spring. James Hitchcock, a captain of the British Army stationed in Hartford, Connecticut, suffered from an (unknown) ailment, and a Mahican suggested that the springwaters might provide a cure. Hitchcock "experienced much benefit from the waters" and soon became one of the first permanent European settlers here. He built a bath house at the spring and "…took a small fee for the use of his bath, which gave him a moderate support." Over ensuing decades, the curative powers of the spring were advertised by "many eminent physicians" (Ellis 1878) and the spring became the centerpiece of a lively resort complex that lasted into the 1920s (Stott 2007). The copious flow of the spring is still

piped to 23 households in Lebanon Springs, and to a public outlet at the Indian's Blessing Fountain on NYS Route 22 in Lebanon Springs.

Habitats and Biodiversity

The land within the CEA is mostly forest and hayfield. Forests of all sizes provide ecological services to the human community and valuable habitat for wildlife and plants. Standing live and dead trees are habitat for invertebrates and fungi, and for cavity-using amphibians, reptiles, songbirds, and mammals. Forests provide important nesting habitat for raptors and songbirds. Large forests are especially important for birds and other wildlife that have large territories or require the conditions of the deep forest interior to maintain populations in the long term. Hardwood trees with loose, platy bark such as shagbark hickory, deeply furrowed bark such as black locust, or dead standing trees with cavities or peeling bark can be used for summer roosting and nursery colonies by bats.

The ecological values of meadows can differ widely according to the types of vegetation present, disturbance histories (e.g., tilling, mowing, grazing, pesticide applications, trampling), and meadow size. Meadows of any size can be valuable habitats for small mammals, butterflies, moths, dragonflies, native bees, and many other invertebrates. Undisturbed meadows develop diverse plant communities and support an array of wildlife, including invertebrates, frogs, reptiles, mammals, and birds. Large hayfields or pastures (e.g., 10+ acres) dominated by grasses and sedges may support grassland-breeding birds, depending on the meadow size and configuration, the mowing schedule, or the intensity of grazing. Grassland breeding bird populations have experienced steep declines in recent decades in the northeastern US.

The land within the CEA has not been assessed for other kinds of habitats, but may include swamps, wet meadows, other wetlands, shrublands, and bedrock outcrops (ledges). General ecological values of such habitats are described in the New Lebanon *Natural Resource Conservation Plan* (Stevens and Graham 2017) and the *Natural Resources Inventory for Columbia County* (Stevens and Travis 2018).

The forests in the CEA are part of a very large forest (5000+ acres) of the Taconic Ridge that extends into Rensselaer County, NY, and Berkshire County, MA. This has been identified by the New York Natural Heritage Program as part of a forest "linkage zone"—providing important connectivity between the even-larger "matrix forests" of the Northeast. Linkage zones represent the parts of the landscape that not only have valuable habitat areas themselves but are also permeable for safe and efficient movement of plants and animals between larger forest blocks. Those migrations may be increasingly important for the persistence of populations in this era of a warming climate.

The Warm Spring CEA is within the Taconic Mountains Significant Biodiversity Area, an area designated by the New York State Department of Environmental Conservation because of the large forests, plants and animals of conservation concern, and importance as a water source feeding the wetlands, streams, and groundwater of the valleys below. This area is also within the "High

Taconics" conservation area identified in the New Lebanon *Natural Resource Conservation Plan* to draw attention to the special habitats of the Taconics, the warm spring, and the scenic importance of these hills visible from places along and westward of NYS Routes 20 and 22.

Threats

Warm spring:

- **Impervious surfaces**: Roads, driveways, parking lots, roofs, and other impervious surfaces prevent infiltration of rainwater and snowmelt to the soils, and are often sources of water contamination—e.g., from de-icing salts, petroleum hydrocarbons, and heavy metals.
- **Pesticides, fertilizers, de-icing chemicals**: Pesticides and petroleum-based fertilizers applied to cropfields and gardens, and de-icing salts or other chemicals applied to roads and driveways can contaminate groundwater and surface water.
- **Other pollutants**: Certain businesses or industries (laundromats, car washes, machine shops, some manufacturing) produce concentrated effluent that can contaminate soils and groundwater.
- **Forest alteration**: Disruption of the forest vegetation or disturbance of the forest floor can reduce the capability of the forest to capture rainwater and snowmelt, recharge groundwater, and maintain the soil biota that promotes a healthy and resilient forest community. Minimizing forest disturbance is usually the best way to promote groundwater recharge, maintain high-quality habitats for wildlife, and maintain the other ecosystem services that forests provide to the human community.
- **Other habitat alteration**: Disruption of other habitats (hayfields, oldfields, wetlands, etc.) in ways that reduce their capabilities for intercepting and processing precipitation and surface runoff can reduce their capacity to protect the quality and quantity of water infiltrating the soils.
- **Water withdrawals**: Over-extraction of groundwater can deplete the groundwater feeding the spring. Further studies would be needed to determine if the volume of a large water withdrawal at a particular location in or near the CEA would significantly affect the spring.

Forests:

- **Fragmentation of forests** by roads, driveways, yards, utility corridors, and buildings divides the forests into smaller blocks that may be unsuitable for the area-sensitive wildlife species that require large habitat areas and are sensitive to human contact or disturbances. Smaller patches of forest have more forest "edge" habitat with higher light and noise levels and infestations of non-native plant species. For example,

fragmentation makes the (formerly) deep interior forest areas newly accessible to songbird nest predators (such as raccoons and domestic cats) and to brood parasites (such as the brown-headed cowbird) whose activities are ordinarily confined to open areas and forest edges. Roads and other developed areas dividing forests can also act as significant barriers and hazards to wildlife movement, and many animals avoid breeding near human activities.

- **Cutting of trees and shrubs** during the nesting season (e.g. spring through mid-summer) can harm nesting songbirds and raptors, and other tree-dependent wildlife. Tree cutting during the period April – October may harm roosting bats.
- **Compaction and other disturbance of the forest floor** (as by large equipment) can harm amphibians, small mammals, and the diverse community of soil invertebrates and microbes, damage the soil structure, and reduce the capability of the soils to absorb rainwater and snowmelt.

Meadows:

- **Many pesticides (herbicides, insecticides, fungicides, etc.) are toxic** not only to the target pest but also to non-target plants and animals, including humans. They can affect habitats adjacent to the application site, and can be carried into surface water and groundwater.
- **Compaction of meadow soils can reduce the capability for absorbing rainwater and snowmelt**, and reduce the water volumes available to recharge groundwater.
- **Fragmentation of large meadows** can diminish or destroy their value for agriculture and for grassland breeding birds. Roads, driveways, hedgerows, and buildings offer avenues of incursion into large meadow habitats that were previously unavailable to nest predators. Increased nest predation resulting from meadow fragmentation is a leading cause of population declines of grassland breeding birds in the Northeast (Ricklefs 1969, Bollinger and Gavin 1992, Askins 1993, Martin 1993, Vickery et al. 1994, Peterjohn and Sauer 1999).
- **Early mowing of hayfields** can destroy the nests of grassland breeding birds, and early mowing of oldfields destroys the sources of nectar and pollen and larval food plants for early-flying pollinators and other insects. Although farmers may require early-, mid-, and late-summer cuts for economic reasons, other landowners may have the flexibility to alter their mowing schedules to accommodate the needs of vulnerable wildlife.

Wetlands:

- **Wetlands are harmed…**
  - by **filling or draining**;
  - by **removing vegetation** within or at the edges;
  - by **altering the volumes or seasonal patterns** of groundwater or surface water feeding the wetlands; and
  - by **fragmenting the landscape** in ways that obstruct travelways between the wetlands and nearby upland and wetland habitats.
- Wetlands and surrounding upland habitats are interconnected ecologically, with much exchange of organisms and materials. **Damage to surrounding habitats is likely to adversely affect the wetland community**.
- **Disturbance of wetland soils** can harm the biological community and release large amounts of carbon to the atmosphere.

Recommendations

Below are recommendations for actions that will help to protect the water of the warm spring, other important ecological services, and habitat values of the CEA. Many of these recommendations can be applied when landowners or town agencies are in the early stages of planning new land uses or new development features within the CEA, or considering new land use legislation.

Groundwater Protection

- **Avoid or minimize applications of toxic substances** to the land, or storage of hazardous materials.
- **Monitor extractive water uses** to make sure that they do not deplete the water sources of the warm spring.
- **Maintain forested land cover** wherever possible to maximize the infiltration of rainwater and snowmelt to the soils.
- **Minimize impervious surfaces** so that groundwater recharge is not impaired.

Forest and Meadow Habitat Protection

- **Avoid fragmenting large forests** with new roads, driveways, yards, utility corridors, and other developed features. Locate new development near forest edges and leave the forest interiors intact wherever possible.
- **Minimize disturbance** of forest trees, shrubs, herbs, and the forest floor. Leave standing snags and downwood in place wherever possible.

- **Limit tree cutting to the period between 1 November and 31 March** to avoid disturbing bats at their summer roosts and nesting birds.
- **Maintain other natural land cover** that will help capture and process precipitation and surface runoff.
- **Avoid fragmenting large meadows** (10+ acres) with new roads, driveways, yards and other developed features. Keeping those features at meadow edges will help to preserve both the agricultural potential and the special biodiversity values of large meadows.
- **Avoid or minimize applications of pesticides** which can harm non-target plants, animals, fungi, and soil microbes that support ecosystem functions.
- For hayfields, **consider a mowing schedule that accommodates ground-nesting birds**.
- For oldfields, **consider a mowing schedule that accommodates early- and late-flying pollinators and other insects.** Leave substantial swaths and patches unmowed each year to provide food and shelter for insects throughout the year.

Wetland Protection

- **Minimize direct disturbance of wetlands,** such as draining, excavating, filling, and removing vegetation.
- **Prevent contaminated runoff** from lawns, gardens, driveways, and roads from reaching wetlands.
- **Maintain broad buffer zones** of undisturbed soils and vegetation outside the wetland perimeter, and **maintain large areas of undisturbed habitats surrounding the wetlands** wherever possible.

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