

Transcript of “Habitat Mapping in the Town of Clinton”

Presented to the Clinton Town Board and the public on 12th of February 2013

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Slide 1: title

Hello, my name is Chris Graham, and I’m a biologist with Hudsonia in Annandale, NY.

For any of you not familiar with Hudsonia, it is a small nonprofit, non-advocacy environmental research institute based here in Dutchess County, but we work all over the Hudson Valley and elsewhere in the Northeast. I’ll point out up front that because we’re non-advocacy, no part of this talk or our work intends to tell the town what to value; we give recommendations for how to conserve biological resources *should* you want to.

For the last year and a half, other Hudsonia biologists and I have identified and mapped habitats throughout the Town of Clinton. The project was funded by grants to the town from the New York State Environmental Protection Fund and by the Millbrook Tribute Garden through the Dutchess Land Conservancy; and we received a lot of logistical help and support from members of the Clinton C.A.C. and from Town Supervisor Jeff Burns.

Slide 2: Importance of habitats

Why do we do this kind of work? Functioning ecosystems are what we depend on for climate moderation, oxygen to breathe, clean drinking water, flood attenuation, and other resources. We can’t always predict the consequences of the decline or loss of a certain species or habitat, but we do know that the cumulative effects of land use without planning for conservation ultimately decrease the land’s ability to support natural communities, including humans.

Slide 3: purpose

We do these projects for several reasons. Most places have never been visited by biologists, so very little is known about their ecosystems and biological resources. Yes, we do have some natural resource information, such as wetland, soil, and geology maps. However, detailed habitat data, which can be used to make useful biological inferences, are usually not available from any existing source. Our project provides site-specific and landscape-scale biological information, both of which are important for conservation.

Most important land-use decisions are made at the local level by land-owners, developers, and town agencies. Having habitat information allows future development projects to be designed in ways that avoid the most sensitive, uncommon, or otherwise important habitats, balancing human needs and conservation. And seeing

the whole picture, across the entire town, can help town agencies and residents set long-term goals and priorities for development and conservation.

Slide 4: why a habitat approach?

A habitat is simply the environment, including biological and physical elements, that an organism uses for one or more of its life history needs, like nesting, foraging, or overwintering.

Habitats are good surrogates for individual species, communities of species, and biodiversity. Once you know what habitats you have, you can make some pretty good inferences about what kinds of plants and animals are likely to use those habitats.

Conversely, habitat loss and degradation are the leading causes of species declines and extinctions, regionally and world-wide. A focus on habitats rather than on individual species can throw an umbrella over many species of conservation concern.

Conveniently, many habitats can easily be recognized by most people. Upland conifer forest, meadow, marsh: these are all terms that make sense and conjure up clear images to most folks.

Habitats are also discrete, stationary units, and thus can easily be integrated into site designs and local ordinances.

Slide 5: Ecologically significant habitats

In this project we mapped all the ecologically significant habitats that we could find in Clinton. What do we mean by “ecologically significant”?

Certainly we include habitats that are rare or declining in our region, such as acidic bogs, and habitats that are important to rare or declining species. But we also include common habitats such as upland meadows and forests. These are the “matrix” habitats that contain many of the other habitats and help support many of the plant and animal species of conservation concern.

Our definition of significant habitats excludes developed areas and small fragments of upland habitats between developed areas.

Slide 6: Methods: remote data and habitat predictions

The mapping process starts with the gathering of several different types of maps and photographs. We use sources like traditional USGS topographic maps, soil maps, geology maps, and aerial photographs, which we view and integrate using GIS software. This allows us to lay them all on top of each other, turn them on and off, and analyze and compare them. We also use physical stereoscopic aerial photos that give us a three-

dimensional view of the landscape, allowing us to see details that are not evident with a two-dimensional view.

Slide 7: Preliminary mapping

Then, using all these data sources, we identify and delineate habitat boundaries onscreen over aerial photographs. It's a prediction, really, but in most cases, a really good prediction. We also draw in predicted streams and write questions where we have them. This process of preliminary mapping works very well for many habitats, such as forests, upland meadows, and hardwood swamps, but there are other habitats, such as calcareous meadows or fens, that have to be seen on the ground to be identified.

Slide 8: Field checking

Finally, the fun part. We take all our pretty preliminary maps and go out into the field, and with the help of land-owners who have given permission, we traipse about answering our questions, checking our predictions, and gathering basic habitat information. Some typical questions are 'Is there a woodland pool here? Where's the boundary of this wet meadow? Are there rock outcrops in this area, and are they calcareous?' We then make corrections to our digital map, and extrapolate our findings from field visits to similar areas in the town that we could not visit.

Slide 9: Results

So, across the 25,000 acres or so of Clinton, we defined and mapped 29 different types of ecologically significant habitats. While I won't have time to discuss many of these habitats tonight, each is addressed in detail in our report. About 85% of the Clinton land area, or 21,000 acres, constitutes significant habitat; and about 55% of this I was able to see in the field.

Here is a small section of the completed map. Each color represents a different habitat, and the habitats are labeled with an abbreviation, for instance um for upland meadow and hs for hardwood swamp. The white areas are non-significant habitats and developed areas – here is a road, houses, a driveway. These cross-hatchings represent rocky crest, ledge, and talus areas, and these blue hatched areas (if you can see them from where you're sitting) indicate seepage on hillsides.

Slide 10: Results: all habitats

The entire habitat map looks like this. After completing the mapping, we produced large-format wall maps and prepared a substantial written report.

As you might expect, the most abundant habitat type by far was upland hardwood forest, followed by upland meadows. Overall, over half the town, 57%, was forested. This is good, because forests are also excellent at

providing key ecosystem services for humans and other animals. They are possibly the most effective land cover for capturing rainwater and snowmelt, promoting infiltration to the soil, and preventing runoff. This recharges groundwater, reduces soil erosion and siltation into streams, and protects water quality. Forests also store large quantities of carbon, helping to offset human carbon emissions.

About a fifth of the town was in meadow, much of it agricultural, and 13% of the land area was wetland of one type or another.

Slide 11: Priority habitat: large forests

While we consider everything that we've mapped to be ecologically significant, certain habitats are of particular conservation concern because they are uncommon in our region, are particularly vulnerable to disturbance, or are important to rare or declining species. Forests of all sizes can provide valuable habitat, but large forests are especially important to many species of conservation concern. Large mammals like bobcat and black bear; raptors, like red-shouldered hawk and barred owl; and many songbirds, including wood thrush, scarlet tanager, ovenbird, and numerous other warblers require landscapes with large forests to maintain breeding populations in the long term.

However, forests everywhere are being fragmented by roads, buildings, and long driveways. This development breaks the habitat into separate, smaller pieces. Even in cases where a forest patch is not completely divided, deep intrusions by driveways and other development increase the edge habitat at the expense of what we call interior habitat, which is critical for many forest-dwelling species. Large forests are increasingly important in the Northeast, where the loss of extensive forests is largely driving the decline of numerous species.

Forest fragmentation can also inhibit or prevent animals from moving across the landscape. Many frogs and salamanders, for example, move seasonally from one habitat to another, and have great trouble moving through non-forested areas, being vulnerable to both desiccation and predation.

Slide 12: Contiguous forests

On this map the largest forests (those of 500 ac and larger) in town are shown in the darkest green, and the smallest (those of 100 ac and smaller) in the lightest green. Clinton has 12 patches of forest between 250 and 500 acres, and 4 between 500 and 1000 acres, though I should note that several of these are linear or have waivy or deeply in-cut edges, and therefore relatively little forest interior habitat. Nevertheless, there is quite a wealth of unbroken, high-quality forest habitat in Clinton. Three of the 4 largest patches are in the more rugged northwestern Clinton, where outcrops and conifer forests are prevalent. I'd also like to draw your attention to the only patch of more than 500 acres in eastern Clinton. This is in the area bounded by Shultzville Rd to the west and by Nine Partners Rd and Pumpkin Lane to the north. There's a lot of high-quality, mature hardwood forest here, and not a lot of development extending deep into the patch, so it really stands out in eastern Clinton. If forest interior species or groundwater quality are important to the town, then we recommend keeping the remaining large patches of forest from becoming more fragmented or developed by locating new development along forest edges instead of in forest interiors.

Slide 13: Large contiguous meadows

Meadows can support a wide variety of plant and animal species, including groups like insect pollinators, small mammals, song birds, and raptors. Large meadows in particular are essential breeding habitat for a certain set of birds that nest on the ground in grasslands, including grasshopper sparrow, savannah sparrow, bobolink, and eastern meadowlark. These birds need large open areas with no fences or hedgerows. The populations of these birds are declining in the Northeast because of the loss of large meadow habitats to residential development and to the reversion of abandoned farmland to shrubland and forest. Some grassland-breeding birds are now quite rare in the region.

Slide 14: Meadows (without fragmenting features)

Though it may not have a lot of really large meadows of the kind that some rarer bird species require for successful nesting, Clinton does have much meadowland. This map shows all of the meadows in Clinton, broken down by size; the meadows larger than 100 ac are dark red, those of 50-100 ac are orange, and the smallest meadows are the palest yellow. When hedgerows, fences, and tree-lines aren't considered, e.g. two meadows separated only by a fence are lumped together as one, you can see that Clinton has quite a few meadows larger than 100 acres.

Slide 15: Meadows (with fragmenting features)

However, dividing features like fences and hedgerows can make a big difference to grassland-breeding birds, for these features serve as perches for birds of prey and harbor other predators like weasels and foxes. When we draw such features onto the map, there are very few large meadows; in fact only one larger than 50 acres. As you know, agricultural uses, especially pasturing, haying, and keeping horses, are important in Clinton, economically, culturally, and in terms of the scenic and historic landscape that Clinton has to this day. They can also provide excellent habitat for grassland-breeding birds, especially when managed in certain ways. Towns like Clinton have an excellent opportunity to preserve farmland and provide habitat for many grassland species at the same time. In our habitat report that accompanies the maps we include some recommendations for managing open habitats for grassland birds.

Slide 16: Crest, ledge, and talus

Talus is rare in Clinton, so most rocky habitats take the form of crest and ledge outcrops, which are widespread, with pronounced concentrations in northwestern Clinton and in eastern Clinton near the Taconic Parkway. Such outcrops provide habitat for rare plants, denning and refuge sites for mammals like bobcat and fisher, and denning and basking sites for reptiles such as eastern racer, eastern ratsnake, and eastern hognose snake.

Slide 17: Calcareous clt

Calcareous, or calcium-rich, rock outcrops, support an array of plants that grow preferentially in such places. These include relatively common plants like wild columbine, on the right, and maidenhair spleenwort (upper left); less common species like purple cliffbrake (center) and walking fern; and other much rarer plants.

Slide 18: CLT in Clinton

The map shows the locations of all crest and ledge in the town that we discovered, both calcareous (in yellow) and non-calcareous (in gray). As you can see, the majority of crest and ledge is in northwestern Clinton, where there are extensive areas of rugged terrain dominated by bedrock outcrops. Large portions of this consist of calcareous outcrops, most notably on both sides of Browns Pond Rd. Elsewhere in the town, especially along the Taconic Parkway, there are quite a few moderate sized areas in which rock outcrops are frequent, both calcareous and non-calcareous.

Slide 19: Clinton wetlands

We've mapped numerous wetland types, including hardwood and mixed forest swamps, wet meadows, marshes, and open water bodies.

Slide 20: Clinton wetlands

While all of these are important habitats, I'm going to talk about just a couple of particularly interesting types, which are listed here.

First, though, a little background. Hudsonia maps wetlands that meet the scientific definition of a wetland, by identifying indicators such as wetland plant communities and physical evidence of prolonged soil saturation. Our habitat map includes wetlands of all sizes, including small isolated wetlands. It shows many more wetlands, with more accurate wetland boundaries, than the wetland maps produced by state or federal governments. However, the wetlands shown are only a sketch, are not jurisdictional, and should not be used for detailed site-specific planning.

Slide 21: iwps

Intermittent woodland pools (a subset of vernal pools) are small pools in forest that usually hold water in the winter and spring...

Slide 22: iwp's in summer

...and then dry up sometime in the summer. They are typically isolated from other water bodies or wetlands, and along with the seasonal drying, this prevents the establishment of fish populations. Because fish are major predators on amphibian eggs and larvae, being fish-free is critical to the successful breeding of certain amphibian species. So despite their typically small size, iwp's that hold water through the early summer have been shown to support amphibian diversity higher than that of much larger wetlands.

Slide 23: Priority habitats and conservation zones

Many kinds of wildlife need to use multiple habitat types and large parts of the landscape to fulfill their needs for foraging, breeding, shelter, and overwintering. Generally, then, to protect a habitat and its associated wildlife you have to protect areas around it as well – this could be necessary in order to maintain water quality, to protect other parts of a habitat complex critical to particular species, or to protect wildlife travel corridors. To address this issue, we have delineated “conservation zones” around some habitats of particular importance. These zones encompass the area most important to protect in order to preserve intact habitat complexes. For the purpose of illustration, I'll frame each habitat in terms of a particular species or group of species of conservation concern, and then use the needs of the “focal species” to recommend a “conservation zone”.

For example, a particular group of salamanders and frogs depends on these pools for spring breeding habitat, including wood frog, spotted salamander, Jefferson salamander, and marbled salamander. However, surrounding upland forests, where they spend the rest of the year in and under the litter layer, are just as important to these amphibians. They often travel 1500 ft to ½ mile or more to the forested areas, but biologists have identified the forested area up to 750 ft from a given pool as the core habitat for these amphibians; therefore we have designated a 750-ft conservation zone around each pool. This is a good example of how a complex of habitats--pools and forest-- can be crucial to a species; and by extension, how forest fragmentation can effectively cut off essential habitats to a creature that may have trouble crossing roads and other developed areas.

Slide 24: iwp's in Clinton

As you can see, there are many, and in fact Clinton stands out in the region for its abundance of pools. The tiny dark specks are the pools, and the purple areas are the 750-ft conservation zones. Places where conservation zones of multiple pools overlap can be viewed as pool complexes. These are noteworthy as locations where amphibians are likely to commonly migrate among pools in search of new habitat or mating opportunities, and therefore should be given special attention during planning if woodlands pools are a conservation priority for the town. Western Clinton is particularly rich in these complexes, though they can be found anywhere in the town.

Slide 25: ksp's and bp's

A kettle shrub pool is an unusual kind of shrubby swamp that occurs in glacial outwash terrain. The typical pool is substantially isolated from other wetlands or streams, is dominated by a shrub thicket—often of buttonbush—and contains deep water, often in the form of an open water moat or center. Kettle shrub pools are the core habitat of the Blanding's turtle, a Threatened species in New York, which spends fall, winter, and early spring in such pools. In late spring and summer the turtles often use a variety of other wetlands for foraging, basking, and resting. In spring the females travel—sometimes long distances—to upland nesting sites.

A buttonbush pool appears similar to a kettle shrub pool in general structure and vegetation, but occurs in glacial till terrain instead of outwash. Because of this structure similarity, we think it's possible that Blanding's turtles use them in the same way, so we include them with this priority habitat.

Slide 26: ksp's and bp's in Clinton

We documented 23 buttonbush pools and 10 kettle shrub pools scattered across Clinton. We have designated two conservation zones, in accordance with the findings of Blanding's turtle studies. The 1000-m conservation zone encompasses most of the wetlands that the turtles would use regularly and seasonally, most of the nesting areas, and most travel corridors. The 2000-m area of concern includes the landscape over which the turtles occasionally make long-distance movements to seek mates, new wetlands, or new nesting sites. The Blanding's turtle is another animal that makes use of a complex of different habitats for different activities; a population needs to maintain access to all of these habitats to remain viable. Land development within these complexes can be detrimental to the turtles, in ways such as direct wetland destruction, degradation of water quality, road mortality, human-subsidized predators, and collecting by humans.

Slide 27: cbl's

Silver Lake, Mud Pond, and Long Pond are not just lakes, but are examples of what we call circumneutral bog lakes, a rare type of habitat in the Hudson Valley. Circumneutral bog lakes are spring-fed, calcareous water bodies that commonly supports both acidic bog and calcareous marsh vegetation. They often contain large floating mats of vegetation thick enough to walk on, and peat rafts that drift around the lake surface. The rafts sink below the surface in the fall as biological activity ebbs, and then rise again in spring, propelled by buoyant gases released by decomposing plant matter. These habitats are very special and support many rare plants and animals that thrive in the extremes of either acidic or calcareous environments...

Slide 28: cbl's in Clinton

...such as the NYS-endangered northern cricket frog. Northern cricket frogs only occurs in 3 counties in New York, and Dutchess County is the only one east of the Hudson River. We recommend a conservation zone of

3,300 ft from the lake edge to protect northern cricket frog travel corridors, hydrology, and water quality in the lake.

This map shows the three circumneutral bog lakes in Clinton, which lie in an area of calcareous bedrock known as the Milan Window. Our report describes conservation recommendations for these areas; for example, maintaining vegetated buffers, minimizing road and fertilizer runoff, and preventing leachate from failing septic systems from reaching the lake.

Slide 29: wetland complexes

Groups of wetlands adjacent to or near each other, as well as intervening upland habitat, are valuable from a conservation perspective, and those with large, diverse, or uncommon wetlands are especially important to conserve. Clinton is rich in large, connected wetlands and groups of small wetlands, like pool complexes.

Wetland complexes are important to many species; for instance the spotted turtle, a NYS species of special concern. This map shows a habitat complex with good potential for supporting spotted turtles. The turtles use many different habitats in the course of each year – they overwinter in hardwood swamps and wet meadows, spend spring in one or several woodland pools, and travel to upland meadows in late spring to lay their eggs. During the summer, they use a variety of wetlands for foraging and upland forests for resting. Intact intervening habitats provides safe travel-ways between sites. For many species, the relationship of a habitat to others nearby is critical; maintaining intact habitat complexes usually supports higher biodiversity.

Slide 30: streams

Our habitat map includes both perennial and intermittent streams, the latter usually drying up during parts of the year. The map shows many more streams than are depicted on any other maps in the public domain.

The importance of streams to fish is well known, but they are also important to many other species, including wood turtle, a NYS species of special concern. Intermittent streams are important habitats in their own right and have a direct bearing on the water quality of the perennial streams which they feed. Indeed, anyone concerned about the water quality and habitat quality of perennial streams such as Little Wappinger Creek should pay attention to the condition of the smaller streams in those watersheds and the habitats surrounding them.

Slide 31: Using the maps

We found many interesting, unusual, and ecologically important places in Clinton, including some rarer habitats that we didn't even have time to discuss here, like acidic bogs and rocky barrens. So, what can you do with this information?

Generally, the habitat map and report can help decision-makers understand important biological resources, so that new land uses can be designed to avoid the most sensitive parts of the landscape. The map can be used in

town-wide planning, for the review of site-specific proposals, and as a resource for land-owners in designing such proposals.

Slide 32: Town-wide planning

We believe the map is a valuable tool for comprehensive planning, open space planning, and design of municipal zoning, permit conditions, and conservation easements. Our map and report are, in general, rich sources of information toward fulfilling the goals of the town's new Open Space and Comprehensive Plans. They provide specific information on areas with significant biodiversity and species of concern, plus locations of large habitat patches and habitat corridors and complexes, all of which can help the town set conservation priorities.

Slide 33: Site-specific planning

For site-specific planning of a land development project, the maps can be used to identify priority habitats on or near the site and can illustrate how to best maintain connectivity between onsite and offsite areas, both key elements of the kind of habitat assessment guidelines the comprehensive plan recommends the town adopt. From a land-owners perspective, this information can really give you a jump-start on understanding the most important biological resources and designing your project to avoid those areas right from the start, speeding up the review process and producing better long-term outcomes.

Slide 34: sample subdivision proposal

For example, here is a site for a theoretical subdivision proposal.

Slide 35: sample subdivision proposal

The developer has proposed dividing the property into three lots, outlined in black, with proposed driveways and house-lots shown in red. Existing houses in the neighborhood are shown.

Slide 36: Habitats on the site

The habitat map gives information about the habitats on the parcel...

Slide 37: Habitats surrounding the site

... as well as the immediate surrounding areas.

Slide 38: Priority habitats?

Priority habitats for conservation in the vicinity are large meadows, streams, large forested areas, a ledgy area, and wetland complexes.

Slide 39: What are their conservation zones?

The conservation recommendations for the priority habitats are to keep large forests and meadows intact and avoid construction on steep, rocky slopes. The locations of these houses and driveways, fragment the meadow and forest, and one driveway goes right up the rocky slope.

Slide 40: What are their conservation zones?

And to, as much as possible, avoid construction within the conservation zones of perennial and intermittent streams running through the properties, which are shown in hatched blue here. Two of the proposed driveways are crossing intermittent streams.

Slide 41: What are their conservation zones?

Wetland complexes are another of our priority habitats, though we do not give a specific conservation zone recommendation in our report. At a minimum, state law and Clinton's wetland ordinance should be followed, though as we have discussed, broader habitat complexes that include wetlands and intervening uplands are often necessary to support viable wildlife populations.

Slide 42: Can the proposal be modified

So, can the proposal be modified to minimize damage to these sensitive areas?

Slide 43: Alternative proposal

In this case, the proposal can be modified to at least avoid building the house in the middle of the meadow and avoid the long, snaking driveways up the rocky forested slope, which would cause substantial forest fragmentation. A shared driveway here can avoid crossing intermittent streams; we've stayed out of the 100-ft wetland buffer zone; and although it is difficult to avoid entering the stream conservation zones altogether, the building lots can be situated nearer the edges of these zones, where development already occurs. So this shows you how our map can be used to incorporate habitats into planning and site design in a really concrete, productive way.

Slide 44: Closing

The town now has a map of the habitats on every parcel. While, like any other map, this map is not expected to be 100% accurate, it is a very robust source of information which can inform additional survey requirements for a given site.

We look forward to working with Clinton's Planning Board, Conservation Advisory Council, and others to see how they can best apply the habitat information.

It was my great pleasure to spend time working in the Town of Clinton. I'm happy to answer any questions about the project.