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*Note: The lettering of these appendices do not correspond to the original lettering in the Comeau Stewardship Plan. They have been expanded and reordered for clarity. In addition, the appendices refer to the Hudsonia habitat map, rather than the BDR map in the Easement because this map has more current information and also provided the basis for much of the material in the following document.*

## **INTRODUCTION TO APPENDICES**

The 76 acres of the Comeau are like interlocking pieces of a natural wonder. As Rich Parisio, a naturalist/educator has written *“always there is a sense of human lives lived close to the land here, even as one leaves the built landscape behind and enters the woods.”*<sup>1</sup> The combination of forest and soccer field, wetlands, streams, shrublands and hayfield, old stone walls and vibrant meadows all sitting on a vast network of soil that is often wet with water seeping through the earth presents us with a living “museum” of what our life in the Catskills is like.

Stewardship is land management with environmental ethics. This document is intended to further guide the Town of Woodstock in its process of balancing use and preservation on the Comeau. It includes best practices for the various habitats in order to achieve environmental conservation goals important in land stewardship management such as a healthy and integrated ecosystem and biodiversity in nature. It includes design standards specifically for the property based on proven methods and techniques of site development with added consideration of conservation goals.

Because the Comeau is a heavily used property, attention to the design standards and best management practices is imperative since the area can be easily stressed by human use and natural forces. Underlying each standard is a firm commitment to respect the plants and animals of the Comeau habitat; to safeguard the integrity of the property; to stay out of the way of the natural beauty of the land and yet to provide a recreational area for the many to enjoy.

The Best Management Sections have been divided into the following Conservation Targets:

1. Forest Areas
2. Open Areas

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<sup>1</sup> Rich Parisio, “A Walk on the Comeau”, <http://willnixon.com/insights/parisio-comeau>

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3. Government Areas
4. Wetlands
5. Streams
6. Trails

The intention of the best management recommendations is to highlight the current and potential threats to vulnerable natural areas of the property. Recommendations are made with regard to issues of maintenance, preservation, restoration and enhancement of each area.

The Comeau Stewardship Management Plan and these appendices are a “living document”. Future stewards of the property may choose to add or alter the information presented based on new environmental research as it is developed in the coming years.

## **APPENDIX A: BEST MANAGEMENT PRACTICES: FOREST AREAS**

**Description:** The forest areas on the Comeau consist of Upland Conifer Forest, Upland Mixed Forest, Upland Hardwood Forest, and an area which is in the process of becoming a wetland and is now a mixed swamp.

They include:

1. Upland Conifer Forest: two large areas of upland conifer (mostly pine) forest, one at the western boundary of the property and one along the eastern border of the Comeau. There are also two smaller patches of pine forest along the southwestern side of the property.
2. Upland Mixed Forest:
  - a. A large section of this forest is on the southeastern side of the property along the Sawkill.
  - b. Primary part of Middle Woods
  - c. An area to the south of the soccer field and the Middle Meadow that runs to the Sawkill and the southern border of the property.
  - d. West of the soccer field and next to the western conifer (pine) forest.
3. Upland Hardwood Forest: there are sections of upland hardwood forest throughout the property.
4. Mixed Swamp (see under wetlands) - a patch of forest influenced by soccer field drainage.

The forest areas at Comeau are important both for themselves and because they are part of a larger significant forest patch along the Sawkill, which measures over 200 acres. Extensive forest patches in our area have become increasingly rare. Migratory songbirds, forest-dwelling raptors, amphibians, and many mammals depend on the larger forest patches for survival. Upland forests are often crucial habitat for species of conservation concern.

The forest also protects stream and groundwater quality by allowing efficient water infiltration through the soils. Forests moderate the climate and sequester carbon.

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The dominant trees throughout the Comeau property are American beech, red and chestnut oaks, red and sugar maples, eastern white pine and eastern hemlock. Other species include: white ash, sassafras, tulip tree, black and yellow birch, and shagbark hickory.

The shrub layer in the Comeau forests has been impacted by deer browsing but includes striped maple, laurel, young pines, witch-hazel and hop hornbeam.

In addition to plants such as ferns, Canada mayflower, starflower and partridgeberry, spring wildflowers such as trout lily, Dutchman's breeches, and red trillium may be found.

The forest also acts as a buffer area for the small intermittent woodland pool near the soccer field. This area of the forest needs to be protected from disturbance and soil compaction to help conserve habitat for pool-breeding amphibians. Hudsonia recommendations include protecting the forest for 750 feet around the pool. The intermittent pool may be breeding habitat for amphibian species of NYS Special Concern.

**Uses:** Trails and recreation  
Habitat for animal/plant life  
Erosion control  
Water filtration - maintenance of surface and ground water quality  
Scenic beauty

### **Goals:**

1. Maintaining diversity of habitats
2. Maintaining species diversity
3. Controlling existing invasive species
4. Preventing encroachment of new invasive species
5. Preserving forested areas in their current configuration
6. Preserving recreational opportunities
7. Avoiding further fragmentation of the forest patches

### **Critical Threat Assessment:**

Significant stressors include:

1. Invasive insects such as woolly adelgid and Emerald Ash Borer

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2. Tree diseases such as beech bark disease, ash dieback, and White Pine decline
3. Deer browsing of young hardwoods, making it harder for the mixed forest to regenerate in blowdown areas
4. Overuse for recreation, trail walking and dog-walking. Numerous dogs off-leash impact local wildlife, and dog waste or trampling can destroy or impact wildflowers and small shrubs. Heavy foot traffic causes the trail soils to be compacted. Exposed soil leads to muddy trails, and walkers avoid the muddy areas and cause the trails to become wider and wider, fragmenting the forest.
5. Invasive plants such as barberry, garlic mustard, stilt grass and Bell's honeysuckle, which reduce biodiversity and are less used by wildlife are found in various areas of the forest.

### **Strategies:**

1. Trails – maintain current practices, and regular safety checks.  
In addition:
  - a. Explore re-routing areas which compact soil or are too near the Sawkill.
  - b. Consider planting of riparian buffer plants to prevent or correct erosion. A good resource is the NYSDEC “Trees for Tribs” program, which provides free tree and shrub seedlings for riparian areas.
  - c. Continue to engage dog walkers in forest protection practices.
2. General guidelines for forest conservation:
  - a. Maintain standing dead wood, downed wood and organic debris
  - b. Consider removal of invasive species – manual removal of plants, or injected herbicides or pesticides where appropriate
  - c. Education of public – This could include an educational section of the kiosk devoted to explaining the important role of forests in preserving local biodiversity and moderating climate.
  - d. Possible use of biological controls to control woolly adelgid on Eastern hemlock, Emerald ash borer, and Japanese knotweed
  - e. Periodic evaluation by a forester or arborist to identify and recommend measures for tree health
  - f. Trimming and cutting trees for trail safety - ash trees are currently dangerous as they are dying due to Emerald Ash Borer damage

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- g. Consider measures to reduce deer browsing - deer population reduction, deer exclosures, or limited fencing in areas to encourage young hardwoods
  - h. Where appropriate, tree trimming and cutting should be restricted to winter months to minimize damage to soil, plants, and wildlife.
  - i. "Trees and other vegetation native to Ulster County may be planted and maintained".\*
3. A forest tree inventory should be done to help identify trees in need of attention and hazardous trees. An inventory should be updated regularly.

## References and Resources:

- Ingrid Haeckel's "Letter to the members of the Comeau Stewardship Committee", August 13, 2012
- Haeckel, I. Dominguez, O.V. and Stevens, G. 2012 Significant Habitats in the Town of Woodstock, Ulster County, New York.
- Hudsonia Ltd. Habitat Fact Sheets
- Hudsonia Biodiversity Map
- Local Open Space Planning Guide (2004, published jointly by NYSDEC and NYS Department of State)
- Tree Pests and Diseases <http://www.dec.ny.gov/lands/5252.html>
- Identifying Trees at Risk from Ice and Wind [http://www.dec.ny.gov/docs/lands\\_forests\\_pdf/icewind.pdf](http://www.dec.ny.gov/docs/lands_forests_pdf/icewind.pdf)
- Tree and Forest Health - Cornell Cooperative Extension <http://www2.dnr.cornell.edu/ext/info/pubs/FC%20factsheet/FCFSTreeForestHealth.pdf>
- "Trees for Tribs" program, NYSDEC - <http://www.dec.ny.gov/animals/77710.html>
- "The Scoop on Dog Waste," Maureen Sundberg. <http://www.ecolandscaping.org/03/pests-pest-management/the-scoop-on-dog-waste/>
- \*Comeau Conservation Easement, 4.06C
- FEMA Floodplains Map - <http://msc.fema.gov>

## **APPENDIX B: BEST MANAGEMENT PRACTICES: OPEN AREAS**

**Description:** The open areas on the Comeau consist of different types of lawns, athletic field, shrublands and meadows. The open areas are, in part, adjacent to one another, and together they result in a high quality of open space on the property.

They include:

### ***A: Lawns / Alf Evers Park / Soccer Field***

These areas are significantly altered and intensively managed (i.e. cleared and mowed) but not developed with pavement or permanent structures. Each of these areas is dominated by “use.” At the same time each provides a scenic view shed, and important connectivity between the surrounding less developed habitats of forest, wetlands and meadows. Thus, these areas remain ecologically significant, though of reduced ecological value in themselves. (*Hudsonia*)

- **Lawns:** surround the Comeau house and includes the Great Lawn. This area is regularly mowed by the town
- **Alf Evers Park:** This is the Historical Society lawn which is mowed by the town
- **Soccer field:** This area of approximately 3.7 acres is surrounded by tall pines to the south and a hardwood tree line to the north. A pine forest borders the western edge of the field, a mixed forest swamp and a native wet meadow borders the eastern edge. The field, formerly a native wet meadow, was created by the town in the 1980’s for the Woodstock Youth Soccer program. It is mowed regularly by the town and maintained by the volunteers who participate in the soccer program.

**Maintenance:** Regular mowing for all these areas. Also, regular cut back/pruning of the encroaching forest to maintain the open space, every 2-3 years. For the athletic fields, there will be yearly aeration using a machine to reduce compaction and runoff by encouraging percolation of water.

**Uses:** Cultural Events, Soccer and Frisbee, Picnicking, Winter Passive Recreation, Shakespeare Summer Theater

***B: Shrublands***

The shrublands are open areas that are in transition between meadow and young forest. According to the Comeau Conservation Easement, shrublands are identified as open areas. However, these areas are no longer mowed. Instead, white pines and other shrubs are filling in with the natural meadow grasses. Patches of shrublands occur in an area behind and south of the Comeau house and bordering both the upper and lower parking lots. These sites contain water sources such as swampy areas and seeps, and thus they are of ecological value for nesting sites for birds, small mammals, butterflies, and larger mammals. These areas have potential for enhanced biodiversity.

**Maintenance:** Periodic clearing of white pines and large shrubs such as the invasive multi-flora rose

**Uses:** The shrublands have significant ecological value as habitat and examples of biodiversity – maintained as they are in their undisturbed state.

**C. Catskill Native Wet Meadows**

A wet meadow is botanically diverse, dominated by herbaceous vegetation, and performs important ecological functions. Wet meadows hold pooled water for much of the year that then filters down to recharge ground water. This absorption of surface water prevents run-off into other forested and meadow areas.

- 1. Middle Meadow :** This is the largest area of botanically diverse wet meadow. It lies between the Great Lawn to the east and soccer field to the west. Smaller patches of wet meadow are found within the larger upland meadow, but these are primarily comprised of dense sensitive fern. A botanically diverse wet meadow is an excellent candidate for enhanced biodiversity.

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**Maintenance:** Brush hog infrequently, every three years in late fall when the soils are dry and seeds have fallen, to prevent woody growth from growing in and overtaking the meadow.

**Uses:** A small section of the western trail system passes through Middle Meadow

### 2. South Meadow

A small patch of meadow located west of the Supervisor's office between the Great Lawn to the north and shrublands to the south. This small patch of uncleared and unmowed meadow has potential for biodiversity enhancement.

**Maintenance:** Brush hog every three years

**Uses:** There are no "uses" in this area.

### 3. Stan Longyear Meadow

The Stan Longyear Meadow, a rolling upland meadow of more than seven acres, borders residential homes and Route 212 along the northern boundary of the Comeau property. This upland meadow, with its long sweeping expanse of grasslands and bordering tree lines that run east and west, contains a prominent view shed of Overlook, Meads and Guardian mountains to the north.

This meadow is a complex area of the Comeau property both in its ecology and uses. On the northern slope of the "Comeau hill," its hydrology is rich as it contains an underground spring, a small section of wet meadow, six groundwater seeps, and is considered a reserve aquifer for the Town of Woodstock. An intermittent woodland pool is within 20 feet of the meadow within a forested area. Large amounts of run-off into the meadow are prevented by the wet meadow and mixed forest swamp above the field to the south. This upland meadow is managed as a hayfield and is not a current target for enhanced biodiversity. However, the meadow is a high preservation target due to its expansive and dramatic views and its use as a hayfield.

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**Maintenance:** Clear invasive shrubs, enrich soil.

**Uses:** Hayfield /Western Trail/ View Shed / Sledding Hill - The area of Stan Longyear Meadow, western trail, and the soccer field requires the most intensive management of user groups due to the close proximity of the varied established uses in this area.

**Goals:** Preserving open areas in their current configuration

1. Controlling existing invasive species
2. Preventing encroachment of new invasive species
3. Maintaining and enhancing biodiversity in the wet meadow, small patch of upland meadow and shrublands

### Critical Threat Assessment:

1. Debris and invasive shrubs like barberry and multiflora rose, encroaching in Stan Longyear Meadow and shrublands. This results in reduction of amount of hay that can be mowed from the field.
2. Nutrient level of hayfield
3. Intensive use by recreational groups and events

### Strategies:

1. Removal of invasive species by mowing and manual removal of plants
2. Regular cycle of mowing and soil testing in Stan Longyear Meadow
3. Brush-hog middle and south meadows every three years
4. Education of the public with pamphlets and a kiosk. Information would include the many uses of the property and the sensitive balance that must be maintained between conservation and use.

### References and Resources:

- Hudsonia Ltd., Bard College
- Hudsonia Ltd. September,2012. "Significant Habitats in the Town of Woodstock, Ulster County, New York"
- *MA Audubon Meadow Management*
- *IMap Invasives Team* [www.imapinvasives.org](http://www.imapinvasives.org)

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- *Hawthorne Valley Farmscape Ecology Program – Conrad Vispo and Claudia Knab-Vispo* <http://hawthornevalleyfarm.org>
- Nature Conservancy Conservation by Design Portal
- Xerces Society on Pollinator Conservation

**APPENDIX C: BEST MANAGEMENT PRACTICES: GOVERNMENT AND DEVELOPED AREAS**

**Description:** These areas are significantly altered and developed, with buildings, sidewalks, gravel parking lots and pavement. Each area is characterized by its human uses. At the same time, these areas are part of the larger scenic view shed, and provide important connectivity between the surrounding less developed areas of the forest, meadows and wetlands. The Government Areas/Developed Areas are therefore ecologically significant in the larger scope of the Comeau property and the Comeau Conservation Easement.

They include:

**A. Historical Society**

This area contains limited parking, a gravel driveway, the Historical Society building, a shed, and the Alf Evers Park (discussed under Open Areas).

**Maintenance:** Normal maintenance by the town and Historical Society should continue as it has in the past. Ecologically speaking, it would be preferable to consider all options before using pesticides or herbicides in this area. The present gravel driveway is preferable to any additional paving, which might worsen run-off in this porous area. Erosion due to water coming down the hill and particularly from the main parking lot is an ongoing issue for the Historical Society building, and should be carefully watched and mitigated where possible. Other problems in this area include dying ash trees which may impact visitor safety, soil compaction on the trail to the parking lot, and stream bank erosion behind the building.

**Uses:** Cultural events, archive and historic item storage, access to Alf Evers Park

**B. The Town of Woodstock Offices**

This area contains the former Eames house, now used for Woodstock Town Offices, the Supervisor's Cottage, a garage, several

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sheds, outdoor storage, a paved parking area, a garden area, the Shakespeare Theatre and a gazebo.

**Maintenance:** Normal maintenance by the town should continue as it has in the past. Ecologically speaking, it would be preferable to consider all options before using pesticides or herbicides in this area. Outdoor storage should be monitored to make sure that toxic items or litter do not spread into nearby natural areas.

**Uses:** Municipal government offices, public meetings, storage, cultural events and access. The gazebo is frequently used by walkers. The Shakespeare Theatre presents plays each summer. Other local events are occasionally held on this part of the Comeau.

### C. Main Parking Lot

This area is one of the primary entry points for visitors to the Comeau and is heavily used.

**Maintenance:** Lighting and signage standards as delineated in the easement and Town law needs to be followed. Resurfacing of the parking lot and regular repair should continue as the Town finds necessary. Ecologically speaking, it is important to minimize impervious surface area, and maximize the onsite infiltration of surface water, so the present gravel surface is preferable to paving this area. Runoff has already been a problem from this parking lot, so maintenance personnel need to watch for continuing erosion and runoff problems and promptly restore any degraded areas. The natural buffer areas around the parking lot (lawn, shrubs, trees, etc.) should be preserved to help minimize spread of car-related materials (oil, road salt, etc.) into the nearby habitats.

**Uses:** Parking for all areas of Comeau. A gate provides access to the soccer field and Stan Longyear Meadow areas.

### D. Lower Parking Lot

This lot is used by visitors to Comeau, Historical Society and for general town parking.

**Maintenance:** Resurfacing of the parking lot and regular repair should continue as the Town finds necessary. Ecologically speaking, it is important to minimize impervious surface area, and maximize the onsite infiltration of surface water, so the present gravel surface is preferable to paving this area. The natural buffer areas around the parking lot (shrubs, trees, etc.) should be preserved to help minimize spread of car-related materials (oil, road salt, etc.) into the nearby habitats.

**Uses:** As described above.

### E. Comeau Drive

The entry road for the property.

**Maintenance:** Resurfacing and regular repair should continue as the Town finds necessary. Ecologically speaking, it would be preferable to consider all options before using pesticides or herbicides in the drainage ditches by the road. Safety improvements should be considered - the road is narrow and traffic often moves too fast, endangering walkers. Speed bumps have been recommended by the Comeau Stewardship Advisory Committee.

The Town of Woodstock Planning Board Design Manual states: Internal roads, entrance drives, access aisles, and parking areas must be the minimum width necessary to provide safe access. Short-corner radii and narrow drives are beneficial because they slow traffic speeds, reduce development costs, reduce impervious surfaces, and allow more room for landscaping.

**Uses:** Access to Comeau property

### References and Resources:

- Hudsonia Ltd. Habitat Fact Sheets
- The Town of Woodstock Planning Board Design Manual
- Local Open Space Planning Guide (2004, NYSDEC and Department of State joint publication)

## **APPENDIX D: BEST MANAGEMENT PRACTICES: WETLANDS**

**Description:** The wetland areas on the Comeau consist of wet meadows, mixed forest swamp, hardwood swamp, an intermittent woodland pool, and springs and seeps. For conservation purposes, each of these areas should be considered individually. At the same time, it is important to consider the hydrology of the property as the areas have a significant impact on one another.

According to the 2012 Hudsonia habitat map of the Comeau, the wetlands include:

- **Wet meadows:** Middle meadow, and a small patch in Stan Longyear Meadow
- **Mixed forest swamp:** a section of Middle woods, a section of the forest south and west of the soccer field, and a large section of the forest south of the soccer field where drainage has altered the upland mixed forest
- **Hardwood swamp:** two small areas on the north west outer edges of the property, a narrow band that runs between the forested area north of Sawkill and south of the Comeau Town Office's lawns and adjacent shrublands, and the area north of the lower parking lot
- **Intermittent woodland pool:** a woodland pool, also called the vernal pool, west of the soccer field
- **Springs and seeps:** groundwater discharges in the Stan Longyear Meadow, in the Historical Society area, and in the shrubland south of the lower parking lot.

**Uses:** Wetlands hold water and release it slowly. Because of this process, the wetlands both reduce flooding and, by recharging groundwater supplies, provide a source of water during dry periods. In addition, the wetlands enhance the stability and functions of the streams, provide erosion control, improve water quality and provide crucial habitat for a variety of wildlife. Recreational trails are located through wetland areas on the Comeau.

### **Goals:**

1. Maintaining diversity of habitats
2. Maintaining species diversity

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3. Controlling existing invasive species
4. Preventing encroachment of new invasive species
5. Preserving the woodland pool, its creatures, and current buffer zone
6. Maintaining the current water quality of the pool

### **Threats:**

1. Invasive plants, such as Japanese stilt grass and barberry, which reduce biodiversity and are less used by native wildlife, are found in various wetland areas.
2. The wetlands fed by runoff tend to be more vulnerable to invasive plants than wetlands fed primarily by rainfall or groundwater.
3. Wetland areas are overused for recreation, trail walking and dog-walking. Numerous dogs off-leash have a significant negative impact local flora and fauna.
4. Heavy foot traffic also causes the trail soils to be compacted and leads to greater erosion.
5. Climate change affects the biodiversity of wetland areas.
6. Dogs running into the vernal pool may disrupt O<sub>2</sub> levels necessary to support characteristic species in the pool. O<sub>2</sub> levels are easily disrupted for prolonged periods by turbidity as sediment settles very slowly.

### **Strategies:**

1. Consider delineating an extended woodland pool buffer zone into the forest.
2. Use signage to notify people of the environmentally sensitive nature of the pool and its surrounding area. Signage should expressly prohibit dogs in the pool.
3. Initiate specific educational approaches to help preserve and protect the pool.
4. Provide educational information emphasizing the importance of the wetland habitat and the necessity of remaining on trails.
5. Investigate and possibly implement methods of controlling/removing invasive.
6. Monitor ongoing changes occurring due to drainage from the soccer field and consult with experts to determine any need for mitigation.
7. Continue to engage dog walkers in wetlands protection practice.
8. Maintain current trail practices, including monitoring, maintenance, and, when necessary, rerouting.

## References and Resources:

- Upper Sawkill Creek Erosion and Stabilization Assessment Preliminary report 1999-2002  
Ulster County Soil and Water Conservation District  
652 State Route 209  
Highland, New York 12528
- Sawkill Creek Stream Corridor Assessment Report, 2007  
Integrated River Solutions, Inc.  
9 River Road  
Ulster Park, New York, 12487  
(845) 389-7751  
[RiverSolutions@aol.com](mailto:RiverSolutions@aol.com)
- Chemung County Soil & Water Conservation District. 2006. Stream Processes - A Guide to Living in Harmony with Streams  
<http://www.catskillstreams.org/pdfs/chemungstreamguide.pdf>  
[http://www.catskillstreams.org/stewardship\\_streamsides\\_is.html](http://www.catskillstreams.org/stewardship_streamsides_is.html)
- New York State Department of Environmental Conservation. 1986. Stream Corridor Management: A Basic Reference Manual.  
<http://www.woodstockwaterfallpark.com/history.html>
- "The Scoop on Dog Waste," Maureen Sundberg.  
<http://www.ecolandscaping.org/03/pests-pest-management/the-scoop-on-dog-waste/>

## **APPENDIX E: BEST MANAGEMENT PRACTICES: STREAMS**

**Description:** Streams on the Comeau consist of the Sawkill Creek, which forms the southern border of the property and the Tannery Brook, which runs along part of the northern boundary.

- The Sawkill, which originates at Echo Lake on Overlook Mountain, runs for approximately 19.5 miles linking the communities of Woodstock, The Town of Kingston and Ulster. The section of the stream abutting the Comeau property is between river mile 5 and mile 6. According to the *Sawkill Creek 2007 Stream Corridor Assessment Report*, the section between miles 3-6 coincides with the greatest stream bank erosion.
- For a significant period, according to town historian Richard Heppner, the Tannery Brook, which flows through the center of the village before bordering the Comeau property, “literally powered essential elements of Woodstock's economy.” The floodplain of the Tannery Brook extends from the stream to cover a portion of the lower parking lot.

**Uses:** The streams on the Comeau provide habitats for the propagation and survival of aquatic vegetation and fauna as well as a water supply for the land animals that live on the property. The streams can also be used for secondary contact recreation and aesthetic enjoyment.

### **Goals:**

1. Maintaining diversity of habitats.
2. Maintaining species diversity.
3. Controlling existing invasive species.
4. Preventing encroachment of new invasive species.
5. Preventing further stream bank erosion.
6. Maintaining/improving the current water quality.

### **Threats:**

- Invasive plants, such as Japanese stilt grass and barberry, which alter hydrological patterns, soil chemistry, moisture holding capacity, erodibility, and reduce biodiversity are found in riparian buffer areas.

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- Riparian areas are overused for recreation, trail walking and dog-walking. Numerous dogs off-leash impact local flora and fauna particularly in the water.
- Heavy foot traffic also causes the trail soils to be compacted and leads to greater erosion.
- Climate change affects the frequency and intensity of flooding.
- Bank instability and erosion often results in excessive sediment and increases stream turbidity, restricting the light essential for the photosynthesis of aquatic plants.
- The high frequency of debris-occurrences and high debris-jam potential in the stream areas just above the Comeau contributes to greater bank erosion.

### **Strategies:**

Many of the issues evident in the Comeau streams are a result of conditions that exist upstream. For example, the excessive sediment inputs in the headwaters of the Sawkill are suspected of hampering natural recovery of the sections of the stream in the village of Woodstock. Strategies for protecting the streams, therefore, often require actions at other locations within the stream systems. When dealing with a stream problem, the first step should be working with professionals who will help to identify the cause of the problem and recommend appropriate actions. Some strategies that can be considered for the Comeau include:

1. Investigate, and possibly implement, methods of controlling/removing invasive.
2. Continue to engage dog walkers in riparian buffer protection practices.
3. Maintain current trail practices, including monitoring, maintenance, and, when necessary, rerouting.
4. Consider restoration plantings along the riparian buffer with local native plants and shrubby species, such as willow and dogwood. Plantings in the riparian buffer can slow water, stabilize banks, reduce erosion, filter nutrients/pollutants, provide wildlife habitat, and enhance the scenic beauty. A diverse mix of native plants also has the ability to resist or recover from the disturbances caused by flooding.
5. Consider implementing bank stabilization.
6. Consider minimizing/freeing logjams.

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7. Protect streamside wetlands, since the ability of a floodplain to store water, and reduce flooding, is enhanced in areas with streamside wetlands.
8. Monitor athletic field drainage running south towards the stream in times of high runoff times such as snow melt in the spring. 9.
9. Consider abbreviated Stream Management Plans for each of the streams within the Easement area for specific delineation of the threats.

### References and Resources:

- Upper Sawkill Creek Erosion and Stabilization Assessment  
Preliminary report 1999-2002  
Soil and Water Conservation District  
652 State Route 209  
Highland, New York 12528
- Sawkill Creek Stream Corridor Assessment Report  
Integrated River Solutions, Inc.  
9 River Road  
Ulster Park, New York, 12487  
(845) 389-7751  
[RiverSolutions@aol.com](mailto:RiverSolutions@aol.com)
- Chemung County Soil & Water Conservation District (2006). Stream Processes - A Guide to Living in Harmony with Streams  
<http://www.catskillstreams.org/pdfs/chemungstreamguide.pdf>  
[http://www.catskillstreams.org/stewardship\\_streamside\\_is.html](http://www.catskillstreams.org/stewardship_streamside_is.html)
- New York State Department of Environmental Conservation. 1986. Stream Corridor Management: A Basic Reference Manual.
- <http://www.woodstockwaterfallpark.com/history.html>
- Floodplains map - <http://msc.fema.gov>

## **APPENDIX F: BEST MANAGEMENT PRACTICES: TRAILS**

**Description:** The Comeau trails are a series of paths that provide access to the varied areas on the property. The Western and Eastern trails begin at the upper parking lot and the Historical Society trail extends from lower parking lot to the Historical Society.

The Western trails pass through a small mixed forest and a wet meadow then travels into a larger forested area which also contains sections of bog and swamp traversed by boardwalks and bridges. They pass an access point to the Sawkill Creek on their southern border, and eventually come out of the forest into Stan Longyear Meadow and a magnificent view shed. Here they turn east along the meadow and back to the parking lot.

The Eastern trails enter the forest across Comeau Drive from the parking lot, join an old mill road through a mixed conifer forest, then go uphill and level out where there is a point of access to the Sawkill Creek. The trails again climb uphill and join the Western trails where a right turn leads back to the upper parking lot.

The vitality of the Comeau property greatly depends on the care given to the trail system. The Comeau is a heavily used property, with easily hundreds of trail walkers per week. Maintaining the beauty and functionality of the trails is a core management goal.

**Uses:** Recreation; access to the varied areas of the Comeau property

### **Goals:**

1. Provide safe and sustainable access to the property.
2. Limit the consequences of human traffic and pets in the various habitats.
3. Educate visitors about the trail protocols and the need for observing them in order to protect the property's flora and fauna.
4. Encourage walkers to stay on the trails.

## **Threats**

- Trails are heavily used for recreation, trail walking and dog-walking. Numerous dogs' off-leash impact local flora and fauna.
- Heavy foot traffic also causes the trail soils to be compacted and leads to greater erosion.
- Stream bank instability and erosion can affect the safety of visitors and the viability of the riparian buffer.

## **Strategies:**

1. Affirmative risk management strategies should be incorporated into trail maintenance and building. Trails must be constructed, marked and maintained according to generally accepted standards, guided by the principles of visitor experience, visitor safety and resource protection.
2. Trail-building and natural resource professionals must be consulted on all proposed trail projects and relocations. Proposed locations should be examined in the spring to best understand the water and soils in the area in order to achieve a sustainable construction standard.
3. Protection of the surrounding natural resources, including native rare species of plants and significant ecological communities, must be considered in trail maintenance and construction.
4. The following trail design standards should be observed in all trail maintenance and construction projects, including:
  - Using construction materials and practices that are appropriate to the setting and intended uses, while respecting the goal of sustainability. Gravel, sod, wood-chips and any other material used for the trails should be locally sourced and free of contaminants.
  - Ensuring that trail design meets ADA standards when possible.
  - Using trailhead map and trail markers to guide the visitor experience on the Comeau trails. These provide for visitor safety while the trails should remain free of any other signage or interference with the visitor's experience of the natural environment.
  - Considering turnpike or causeway construction for trail construction on the Comeau due to the property's

## Comeau Stewardship Management Plan

predominance of shallow rooted trees. Widespread removal of too many tree roots creates an unhealthy forest.

5. In relocation of trails, best practices would suggest referencing the Woodstock Wetlands and Watercourse Law that requires a 100 foot distance from a stream to minimize erosion.
6. A kiosk at the trailhead is essential for visitor education about guidelines for using the Comeau trails and education about the unique natural resources of the property that are protected by the Comeau Conservation Easement. A kiosk will help to maintain a quality experience at the Comeau property for all its users as well as good stewardship of the land.
7. Trail-building must always be coordinated with the Woodstock Land Conservancy and the Town of Woodstock to be in accordance with the Comeau Conservation Easement.

### References and Resources:

- Comeau Conservation Easement
- Comeau Trails Task Force Recommendations. October 2009
- Comeau Trails Task Force Report. 2014
- Karl Beard, National Park Service – Rivers and Trails Program, Comeau Site Visit, November 12, 2008 [Karl\\_beard@nps.gov](mailto:Karl_beard@nps.gov)
- Woodstock Wetlands and Watercourse Law
- AMC's Complete Guide to Trail Building and Maintenance by the Staff of AMC's Trail Department, Appalachian Mountain Club Books Boston, MA 2008
- Trail Maintenance Manual 7th Edition, revised 2007, New York-New Jersey Trail Conference, Mahwah, N.J. [www.nynitc.org](http://www.nynitc.org)

## **APPENDIX G: DESIGN STANDARDS: DRAINAGE, EROSION AND SEDIMENT CONTROL**

Comeau's geological symmetry is that of an ice-age "drumlin," a low oval shaped hill formed by the melting glacial waters that ran east from Bearsville. The oldest and lowest soils are lake deposits, silts and clays, from the giant lake formed by the melting glaciers. The higher land is coarse grained sediment, boulders and stones carried and deposited by the glaciers. Specific soil types are found in the appendix from the Soil and Water Conservation District of Ulster County. Special care must be given to drainage and erosion on the Comeau due to its soil types and, as a hill, everything runs downward.

Any proposal for development on the Comeau to gain approval requires both an erosion and sediment control plan and a drainage plan to be approved by the appropriate town agencies according to the design standards in the NYS Stormwater Manual.

As the Comeau is both a municipal and conservation property, when developing a project's drainage and erosion control plans, a professional opinion from a natural resource management professional must be sought early in the planning process. Changes likely to ecologically impact the area's natural environment and conservation values regarding drainage and erosion must be assessed and included in the application in order to incorporate biodiversity conservation principles into the choices of development site, site design and construction practices.

A "walk through" of the site with all parties involved before a project begins is required so that everyone involved has a complete understanding of the project: the limits of the disturbed area, how equipment will enter and exit and where it will be parked.

Plan approval requires erosion and sediment control areas to be marked prior to construction. Marking of the site should take place with all parties present.

## **Comeau Stewardship Management Plan**

Red flags should clearly mark the entire limit of the disturbed area. The disturbed area should include, and it should be pre-determined, where heavy equipment will pass and be parked, as these will cause soil compaction and increased sediment in the air.

The time of year a development project takes place should consider the effects of disturbance to habitat in order to minimize any negative impact.

At the completion of a project, compliance with the plan should be checked by an appropriate specialist and any residual damage should be mitigated.

To help protect the quality and quantity of groundwater and surface water resources, areas of impervious surfaces on the Comeau should be minimized. Onsite retention and infiltration of stormwater runoff should be maximized. Any new development should be designed so that surface runoff from the site during and after construction does not exceed pre-construction runoff volumes.

### ***References and Resources:***

- Comeau Conservation Easement 3.07 Any use or activity that causes or is likely to cause soil degradation or erosion or pollution of any surface or subsurface waters shall be prohibited.
- Easement 3.08 The draining, filling, dredging, or diking of wetland areas including any enlargements thereof shall be prohibited except to maintain or enhance vegetation, prevent flooding or to clear debris and maintain the flow of streams.
- Easement 4.06 Section E Environmental Sensitivity During Construction
- NYS Storm Water Manual - Applicable to the scale of the Comeau property
- Ulster County Soil and Water Conservation District
- Woodstock Zoning Law
- Comeau Baseline Documentation
- Hudsonia Biodiversity Map
- Ingrid Haeckel's "Letter to the members of the Comeau Stewardship Committee", August 13, 2012
- Significant Habitats in the Town of Woodstock, Ulster County, New York. Haeckel, I. Dominguez, O.V. and Stevens, G.2012

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**APPENDIX H: DESIGN STANDARDS: SIGNAGE**

Section 3.05 of the Comeau Conservation Easement refers to Signs and Lighting by stating:

“The display of signs, billboards, or advertisements shall be prohibited, except signs whose placement, number, and design do not significantly diminish the scenic character of the Property. Signs shall be subject to any governmental regulatory requirements.

Section 4.07 states: “Placement of signage may not interfere with a view shed”

In addition, to preserve the integrity of the landscape:

1. Trail markers along the trails will coincide with a map to encourage hikers to stay on the trails.
2. Signs should contain a minimum of information to avoid clutter and confusion.
3. All signs must be of a consistent style and lettering.
4. Guidelines for use of the property should provide guidance without emphasis on overly restrictive language.

## **APPENDIX I: DESIGN STANDARDS: LIGHTING**

The display of signs, billboards, or advertisements shall be prohibited, except signs whose placement, number, and design do not significantly diminish the scenic character of the Property and are related to the use of the Property. Signs shall be subject to any governmental regulatory requirements. Lighting on signs or stages must be focused downward on the sign or stage. Other exterior lighting must be within thirty (30) feet of the centerline of permitted roads and driveways to illuminate such roads and driveways, or placed to illuminate permitted parking areas or structures. To the extent feasible, exterior lighting shall be placed and focused so as to minimize glare off the Property.

It is the goal of the lighting standards for the Comeau property to provide safety in the government areas for municipal purposes, and to protect from glare with a goal of maintaining darkness.

Points to consider:

1. Lighting should illuminate the lowest amount recommended by IES standards.
2. The type of lighting should be reduced to energy lights where possible.
3. No flood lights should be allowed on the Comeau property.
4. All lighting should be on a human scale - not too high.
5. If lighting is considered for some reason in the forest or open areas, wildlife biologists and botanists should be consulted so that any adverse effect of lighting on wildlife or plant species is considered and mitigated.

### **References and Resources:**

- Comeau Conservation Easement, Section 3.05
- The Town of Woodstock Planning Board Design Manual
- Woodstock Zoning Law/Lighting Standards, Section V.A.3.h
- Guidelines for Good Exterior Lighting Plans. Prepared by: The Dark Sky Society (<http://www.darkskysociety.org/>) 2009

**APPENDIX J: DESIGN STANDARDS: LANDSCAPING**

It is the goal of any landscaping on the Comeau property to reflect the harmonious character of the setting and to enhance its environmental value.

To that end we would:

1. Preserve resilient species native to our community
2. Seek the expertise of natural resource professionals such as arborists and botanists to promote ecological health and biodiversity on any proposed project
3. Eliminate invasive species which intrude on fields and meadows and choke forest flora where practical and financially feasible.
4. Avoid high maintenance plantings which require spraying of herbicides or pesticides and require regular fertilization.

As of 2015, the area in front of the Town Offices at the Comeau continues to be landscaped and maintained by the Woodstock Garden Club.

**References and Resources:**

- Hudsonia Ltd. September 2012. Significant Habitats in the Town of Woodstock, Ulster County, New York
- The Woodstock Planning Board Design Manual

## **APPENDIX K: ARCHITECTURAL STYLES**

The main building of the Comeau and the Historical Society are in the Arts & Crafts style.

Therefore:

1. Consistency throughout the property will maintain harmonious themes between nature and design. Any new structures will follow this same consistent approach.
2. Any signage will be done by a graphic artist knowledgeable about the character of the property.

### **References and Resources:**

- The Town of Woodstock Planning Board Design Manual
- Woodstock Zoning Law
- Richard Heppner, Town of Woodstock Historian
- Comeau Conservation Easement

## **APPENDIX L: GLOSSARY**

**biodiversity** - Short for biological diversity. A measure of variation (the number of different varieties) amongst living things. The word is most commonly used to describe 'species diversity'—the number and relative abundance of different species, within a particular area (**local biodiversity**) or within the world (**global biodiversity**), which is not the same as **species richness** (the count or number of **species**).

**conservation easement** - An **easement** that restricts a landowner to use that particular land for functions that are compatible with long-term **conservation objectives** (such as protecting wildlife habitat, agricultural lands, natural areas, scenic views, historic structures, or open spaces). It is a means by which the development rights to that land are secured (by the government), without buying the land itself.

**ecosystem** - Short for ecological system, meaning the natural interacting **biotic** and **abiotic system** in a given area, which includes all of the **organisms** (plants, animals, fungi, and micro-organisms) that live in particular **habitat**, along with their immediate physical environment. Examples include a **lake**, **forest**, or **drainage basin**.

**erosion** - A group of natural **geological** processes by which soil and rock material are loosened (**weathering**) or dissolved (**solution**) and then moved (**transportation**) from their original location. The processes involve transporting agents such as running water, moving ice, or blowing wind, which are active within **rivers**, **coasts** and **oceans**, **glaciers** and **periglacial** areas, and **deserts** and semi-arid areas.

**habitat** - The place or set of environmental conditions (**abiotic** and **biotic**) in which a **plant** or **animal** normally lives. For a **species** to survive in a particular **ecosystem**, its **habitat** must support a **population** large enough to sustain itself by breeding. **Habitats** vary in size according to the species that occupy them.

## Comeau Stewardship Management Plan

**habitat connectivity** - The network of [corridors](#) that links isolated [patches](#) of [habitat](#), which allows organisms to move through an area.

**herbaceous** – Non-woody vegetation that dies back each season.

**hydrological** - Relating to water flow.

**impervious** - A surface through which little or no water will move due to lack of pore space.

**infiltration** - The movement of water from the ground surface into a [soil](#) or into a [porous rock](#) or [sediment](#).

**mitigation** - Any actions that are taken to avoid or minimize negative [environmental impacts](#). This can take various forms, including avoiding the impact by not taking a certain action; minimizing impacts by limiting the scale of the action; rectifying the impact by repairing or restoring the affected environment; reducing the impact by taking protective steps; and compensating for the impact by replacing or providing substitute resources.

**protocol** - A code of correct conduct, or series of formal steps for conducting a test.

**riparian** - Relating to the banks of a [stream](#), [lake](#), or [waterbody](#).

**seep** - A small [spring](#), [pool](#), or other place where water trickles naturally from the ground.

**streamside buffer** - A [buffer](#) zone or strip of permanent undisturbed vegetation (usually forest or grass) that is left between a [stream](#) and an adjacent area of more intensive land use (such as agriculture or urban development). It is designed to reduce [soil erosion](#) and protect water quality by filtering out pollution before it reaches the water. See also [RIPARIAN](#).

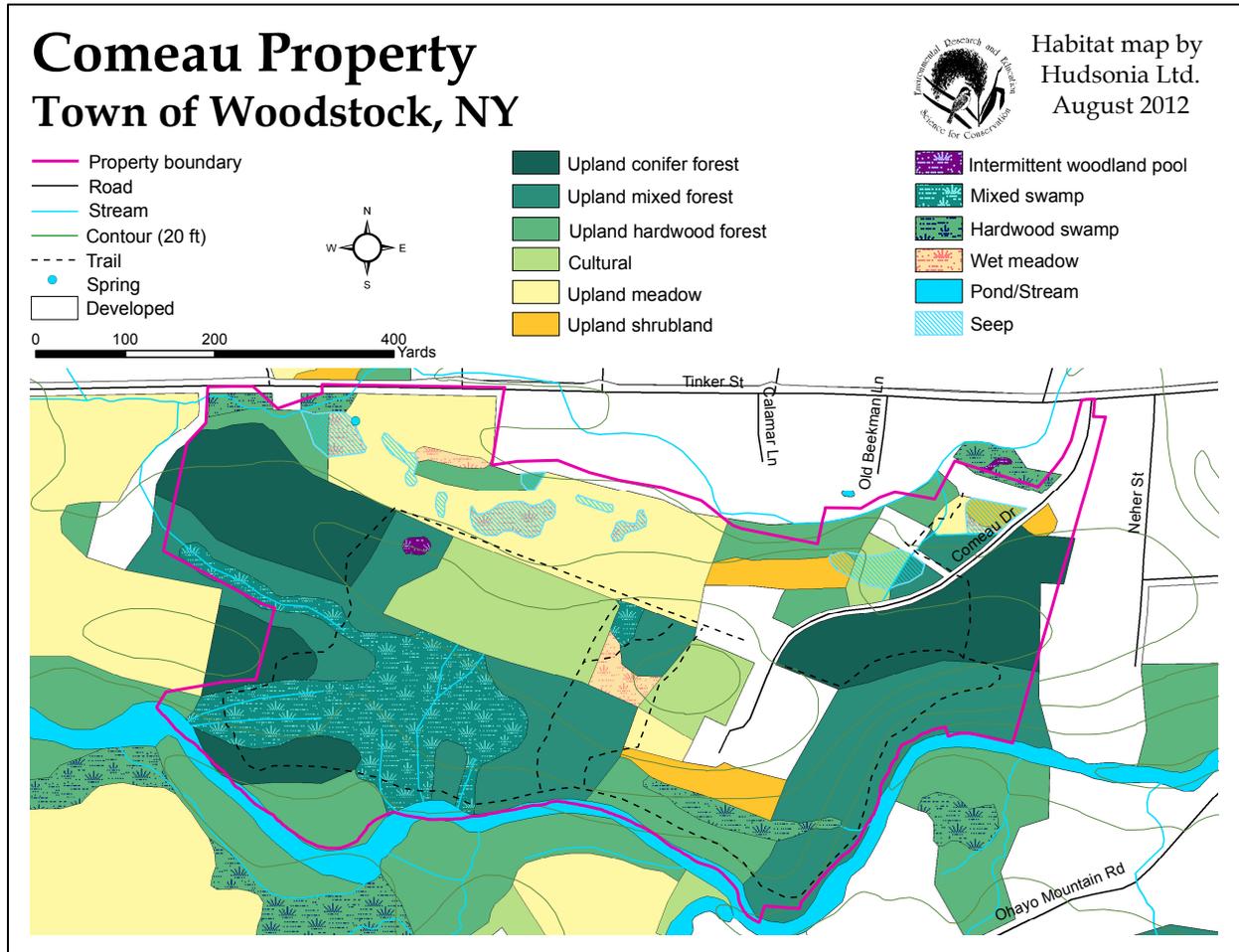
**turbidity** - The degree of cloudiness in water (or air) that is caused by the presence of [suspended solids](#)

## References:

## Comeau Stewardship Management Plan

- A Dictionary of Environment and Conservation, C. Park, Oxford University Press, 2007. (Online edition 2012)

### APPENDIX M: MAP



**APPENDIX N: HUDSONIA HABITAT LETTER**



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August 13, 2012

To the members of the Comeau Stewardship Committee:

Thank you for guiding me around the Comeau property for the Woodstock habitat mapping project during my visits in March and July and discussing various management and conservation related questions of concern. A revised map of the property is attached; the map is based on aerial photograph and map analysis, as well as observations I made during visits to the property. I've included an overlay of the trail network provided by Jerry Washington. The ecologically significant habitats found on your property include upland forest, upland meadow, upland shrubland, wet meadow, swamp, and intermittent woodland pool. A few slopes within the property are characterized by the presence of springs and seeps (where groundwater discharges diffusely to the ground surface).

The forested habitats on the Comeau property form part of a significant forest patch along the Saw Kill for the Woodstock village area measuring over 200 acres. Extensive forested areas that are unfragmented by roads, utility corridors, or developed lots are increasingly rare in the region. Large, undivided areas of forest are critical for the survival of many species, including many migratory songbirds, forest-dwelling raptors, amphibians, and large and small mammals. Forest composition varies based on differing land use history, but generally the dominant tree species throughout the property are American beech, red and chestnut oaks, red and sugar maples, eastern white pine, and eastern hemlock. Species including white ash, sassafras, tulip tree, black and yellow birches, and shagbark hickory are present in lesser abundance. Species in the shrub layer include striped maple, mountain laurel, witch hazel, and hop-hornbeam. Some of the common herbaceous (non-woody) species I observed are Christmas fern, hay-scented fern, Canada mayflower, starflower, and partridgeberry. In the spring, Dutchmen's breeches, trout lily, red trillium, and doubtless many other wildflowers occur throughout the property. Some general guidelines for forest conservation that may apply to your management activities include maintaining the forest canopy and understory vegetation intact and maintaining standing dead wood, downed wood, and organic debris.

Large forested areas are also essential for maintaining surface and ground water quality and quantity, as they efficiently promote water infiltration through the soil. The forest on the Comeau property serves as an important buffer to the Saw Kill; however soil compaction on the trails along the stream may compromise some of the benefits of the forest buffer. Hudsonia generally discourages the alignment of trails along waterway or wetland banks because these tend to be

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biodiversity hot zones and because of potential contribution to stream bank erosion. You may want to consider relocating the stretch of trail that is actively eroding along the Saw Kill below the town offices and to provide a substantial buffer between the trail and the stream wherever possible. To provide visual access to the stream you could establish one or more spur trails that go to a solid part of the bank with an observation platform.

Upland shrublands are typically lands in transition between meadow and young forest. Small patches of shrubland occur on parts of the Comeau property that are no longer mowed and now have young eastern white pine, multiflora rose, and maleberry, as well as hosting a variety of meadow grasses and forbs. Upland shrublands may be used by turtles for nesting, by small mammals for nesting and foraging, and by large mammal predators for hunting. Upland shrublands may also be important nest sites for songbirds of conservation concern such as blue-winged or golden-winged warblers.

Large upland meadows that are maintained by occasional mowing or by grazing can provide important habitat for grassland-breeding birds (such as bobolinks, eastern meadowlarks, and savannah sparrows), which have declined greatly in the northeast with farm abandonment. They can be used as nesting habitat by many species of turtle as well (wood turtle, spotted turtle, box turtle, snapping turtle). Depending on what plants are present, rare species of butterfly may be present. Also, the large populations of small mammals in meadows make them good hunting grounds for raptors, foxes, and coyotes. Plant diversity and wildlife habitat value of meadows can be enhanced through decreasing mowing frequency. The Massachusetts Audubon website ([http://www.massaudubon.org/Birds\\_and\\_Birding/grassland/small.php](http://www.massaudubon.org/Birds_and_Birding/grassland/small.php)) provides recommendations for managing such meadows to maximize the success of grassland birds (such as mowing times, frequencies, patterns, and techniques); these include delaying mowing until after August 1<sup>st</sup> if possible and leaving some areas unmowed each year.

Several patches within the large meadow on the Comeau property host dense sensitive fern and soft rush and are classified as wet meadow. A wet meadow is a wetland dominated by herbaceous vegetation and lacking standing water for most of the year. There is also a large patch of more botanically diverse wet meadow between the town offices and the soccer field hosting marsh fern, fox sedge, woolgrass, and late goldenrod, among other species. Wet meadows with diverse plant communities may have rich invertebrate faunas and provide larval food for a number of regionally-rare butterflies. The wet meadow has scattered shrubs including steplebush, meadowsweet, maleberry, and multiflora rose, as well as young quaking aspen. If left unmowed, the wet meadow may develop into swamp—that is, a wetland dominated by woody vegetation—another valuable habitat type. If the town wishes to maintain the meadow habitat, however, we recommend infrequent mowing, and only when soils are dry, such as in late summer.

Several swamps occur on the Comeau property, most notably the large mixed conifer swamp between the soccer fields and the Saw Kill. This swamp is influenced by runoff from the drainage pipes below the soccer fields and therefore will be highly sensitive to fertilizer application on the fields. Swamps are important to a wide variety of birds, mammals, amphibians, reptiles and invertebrates, especially when swamp habitats are contiguous with other wetland types or embedded within large areas of upland forest. Swamps on the Comeau property

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are relatively shallow, drying nearly completely in the summer months, and are characterized by a canopy of red maple, tupelo, green ash, American elm, and white pine. Shrubs such as winterberry holly, highbush blueberry, spicebush, maleberry, and Japanese barberry are abundant in the swamps, and herbaceous flora includes cinnamon fern, sensitive fern, fowl mannagrass, Japanese stiltgrass, jewelweed, and monkeyflower. Maintaining water quality and minimizing human disturbance in swamp areas is important to the plants and animals of these habitats.

Intermittent woodland pools are small wetlands partially or entirely surrounded by forest, and with standing water during winter and spring that dries up by mid- to late summer during a normal year. These fish-free pools are critical breeding habitat for spotted, marbled, and Jefferson's salamanders and wood frogs. These amphibians spend most of the year in the surrounding upland forest habitat, often travelling long distances (> 750 ft) from their breeding pools and depending on large continuous areas of undisturbed forest. The pool at the edge of the soccer fields was teeming with calling wood frogs during my March visit, indicating the importance of the site to breeding amphibians. When I returned to the pool in late July, the water had nearly dried up completely. To help protect pool-breeding amphibians and the habitat complex they require, Hudsonia recommends protecting all upland forest within 100 feet of the intermittent woodland pool, including protecting soil surrounding the pool from compaction. Forest within 750 ft of the pool should be maintained with as little disturbance as possible to allow for safe overland dispersal of the pool-breeding amphibians during the non-breeding season. Given public interest in the pool, one option would be to design a viewing platform with a designated spur trail from the main trail to minimize the impact of multiple visitors in the sensitive area.

The information from the Comeau property will be included in a town-wide map of wildlife habitats, intended to help landowners, residents, and agencies understand the biological resources present in the town. We will also provide the town with a report that describes in detail all of the habitat types that we have identified in Woodstock and their biodiversity values, and provides recommendations for conservation. Our final presentation of the map and report to the town is scheduled for the town board meeting on October 9<sup>th</sup> in case you are interested in attending.

Please feel free to contact me with any questions regarding the draft map of the property, or the larger mapping project. Thank you again for participating in this project.

Sincerely,

Ingrid Haeckel

Biodiversity Mapping Coordinator  
ihaeckel@bard.edu

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## **APPENDIX O: ACKNOWLEDGEMENTS**

We are honored to have had access to so many talented and committed specialists who have so generously given their time and expertise to this project. As a group of volunteers, we could not have done this work without their help.

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- Paul Elconin, Director of Land Conservation at *Weantinoge* Heritage Land Trust
- Jake Wedemeyer, District Technician, Ulster County Water and Soil Conservation District
- Beth Reichheld, Manager, NYCDEP Stream Management Program
- Mary McNamara, Lower Esopus Watershed Partnership
- Matt Longyear, Farmer, Woodstock, NY
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- Rosalind Dickinson
- Terry Funk-Antman
- Jim Hanson
- Richard Heppner
- Pat Jackson
- Kathy Longyear
- Grace Murphy\*
- Jeff Viglielmo

\*Presently Woodstock Land Conservancy liaison to the Comeau Stewardship Committee