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Significant Habitats

Town of Stanford, Dutchess County, New York



Shaw Pond, Bontecou Preserve.
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Original 2005 Report by Kristen Bell, Catherine Dickert, Jenny Tollefson,
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Overview

In 2024, Hudsonia updated the habitat map for the Town of Stanford. The desktop analysis was performed by Chris Graham. Sean Carroll from the Dutchess County Land Conservancy, performed the habitat change analysis. The goal of this effort was to update the habitat map and associated figures in order to better inform the Natural Resources Inventory (NRI) that the town is currently preparing. A deeper discussion about the habitats that occur in the Town of Stanford is included in the town's NRI. Additionally, the large format habitat map was created by Sean Carroll and is also included in the NRI. This document also includes updated acreage of the habitats assessed originally in 2005. We suggest referencing this report first and then referencing the 2005 report to learn more about respective habitats and their ecological significance, threats, and relevant conservation recommendations to help protect biodiversity and natural resources.

This document was created as part of A Natural Resources Inventory for the Town of Stanford and has been funded in part by a grant from the New York State Environmental Protection Fund through the Hudson River Estuary Program of the New York State Department of Environmental Conservation. The opinions, results, findings, and/or interpretations of data contained herein are the responsibility of the Hudsonia and do not necessarily represent the opinions, interpretations or policy of New York State.

Methods

Hudsonia biologist Christopher Graham updated the town-wide mapping of ecologically significant habitats, originally completed in 2005, to reflect changes to habitat types. Aerial orthophotos from 2021 were used to compare and re-map habitat boundaries to show updated conditions. Changes in habitat acreage between the original 2005 and the 2024 map were calculated by Sean Carroll. Hudsonia is unable to ascertain further information about what factors led to these changes; however, we discuss notable new features where possible. This project did not include field verification of habitats which would assist with identifying additional information about on-the-ground conditions.

Study Area

The Town of Stanford is located in northeastern Dutchess County. It is approximately 50 mi² (130 km²) in area. Wappinger Creek, a major tributary of the Hudson River, drains most of the town. Mountain Brook, Cold Spring Creek, Hunns Lake Creek, and Willow Brook are four of the larger tributaries of Wappinger Creek within Stanford. Other watersheds include those of Shekomeko Creek, a tributary of the Roeliff Jansen Kill, which begins near Stanford's border with the Town of Northeast; a tributary of Wassaic Creek, which drains the southeast corner of Stanford; and a tributary of Little Wappinger Creek, which drains the northwest corner.

Elevations in Stanford range from 270 ft (82 m) along Wappinger Creek at the southwestern boundary of the town to 1,210 ft (369 m) on the hilltops on either side of Pugsley Hill Road on the eastern town boundary. A band of low-lying land along Wappinger Creek runs southwest through the town just west of Route 82. Large wetland complexes include the area along Wappinger Creek at the north boundary of the town (currently Mashomack Preserve) and the wetlands around Bontecou Lake on the Stanford-Washington border.

Stanford's bedrock geology is dominated by phyllite and large areas of schist and meta-graywacke (Figure 1). Smaller areas of limestone and dolostone are scattered across the town, forming a discontinuous band of carbonate bedrock from southwest to northeast. According to Cadwell (1989), the surficial material is primarily glacial till. There are also extensive areas of exposed or nearly exposed bedrock. Recent alluvium is mapped on the Wappinger Creek floodplain in the southwest corner of town and in the Shekomeko Creek floodplain on the eastern

town border. There are kame deposits scattered throughout the town and other outwash sand and gravel areas associated with the floodplains of Cold Spring Creek, Wappinger Creek, and Willow Brook.

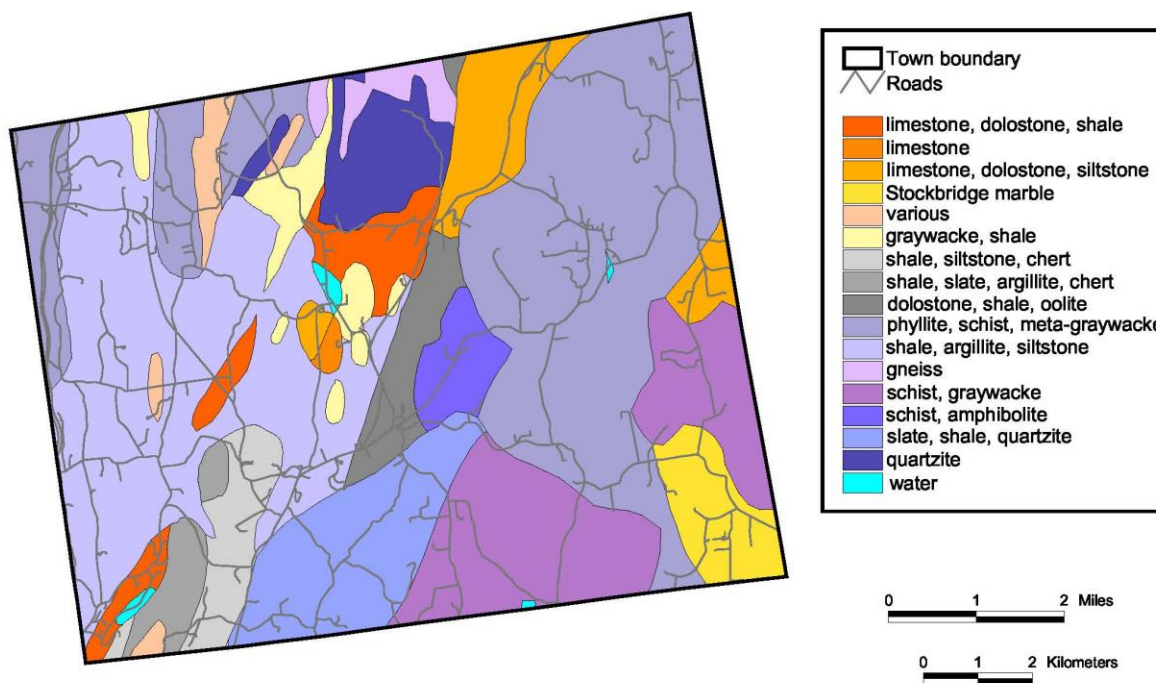


Figure 1. Generalized bedrock geology of the Town of Stanford, Dutchess County, New York. In map key, more calcareous bedrock is at the top of the list (warm colors) and more acidic bedrock is at the bottom (cool colors). Geology data from the New York Geological Survey. Map created for 2004-2005 report by Hudsonia Ltd.

Results

In total, Hudsonia identified 25 unique habitat types throughout the Town of Stanford (Table 1). These habitats are mapped in Figure 2 (this map is also included in the town's NRI). Most habitats underwent some change in total acreage, and it is expected that habitats will change into other habitat types over time due to ecological succession and natural disturbances (Table 2). For example, meadows are likely to become shrubland and shrublands are likely to become forests over time if undisturbed.

Table 1. Ecologically significant habitats identified by Hudsonia in the Town of Stanford, Dutchess County, New York, in 2024.

Upland Habitats	Wetland, Pond, & Stream Habitats
Cultural	Buttonbush Pool
Developed	Calcareous Wet Meadow
Oak-Heath Barren	Circumneutral Bog Lake
Orchard/Plantation	Conifer Swamp
Red Cedar Woodland	Constructed Pond
Upland Conifer Forest	Fen
Upland Hardwood Forest	Hardwood Swamp
Upland Meadow	Intermittent Woodland Pool
Upland Mixed Forest	Marsh
Upland Shrubland	Mixed Swamp
Waste Ground	Open Water
	Wet Meadow
	Spring/Seep
	Stream

Both upland meadows (+3%) and upland shrublands (+19%) increased in Stanford. Red cedar woodlands (-95%) are also expected to become other forest types as other tree species tend to become dominant over time, and although the total acreage was somewhat small in 2005 (313 acres) the loss is not likely solely due to ecological succession. Natural disturbance events, such as fire, are often important in the maintenance and creation of meadow habitats. Wetland habitats are also expected to change over time due to the presence/absence of beaver and other naturally caused disturbances. However, human disturbance is the most common cause of habitat conversion in Stanford. Notably, cultural (+111%) and developed (+15%) areas increased as well as open water habitats (+166%). Interestingly, marsh habitats (+137%) and wet meadows (+6%) both increased whereas other wetland habitats declined or remained stable (open water and constructed ponds are not wetland habitats but are categorized as such in the table below for simplicity). The increased acreage of marsh and wet meadow habitats is likely associated with the significant gain in open water in Stanford (possibly due to the creation of constructed ponds).

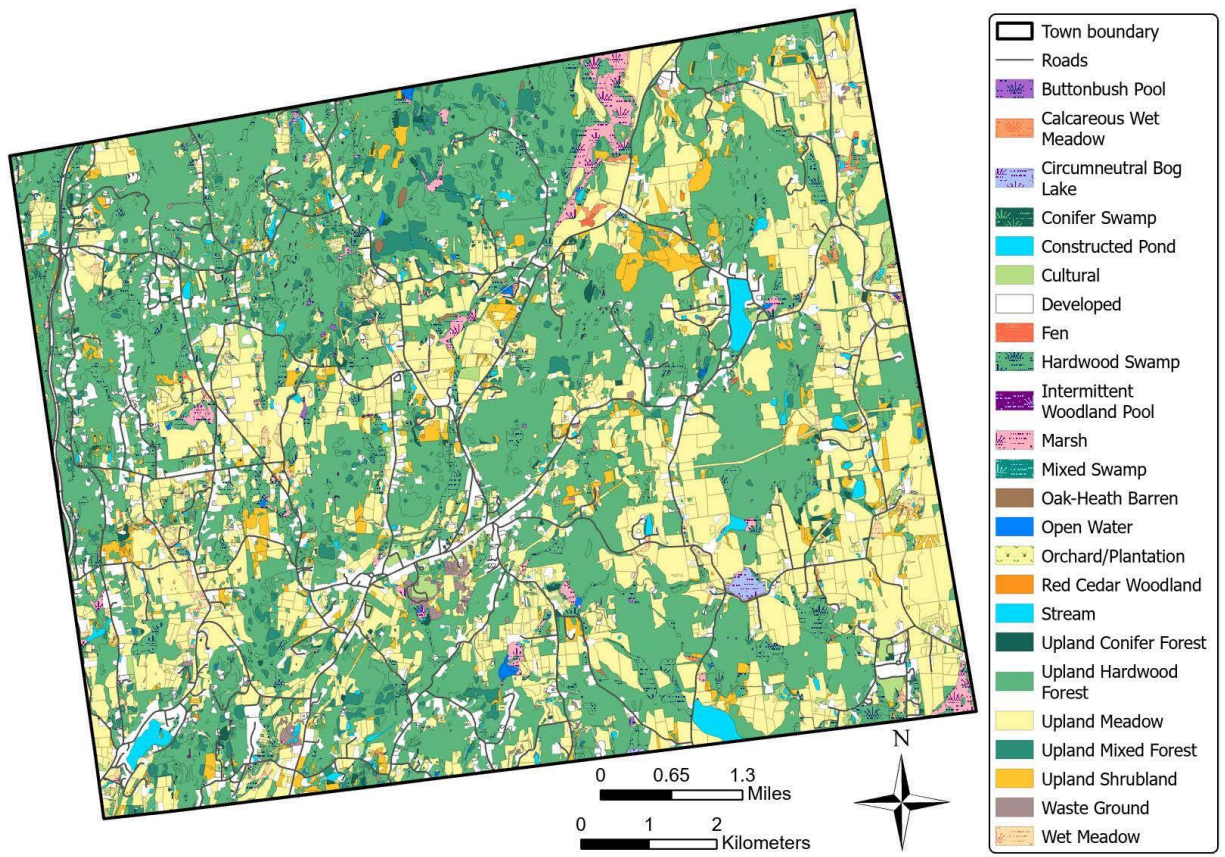


Figure 2. Ecologically significant habitats in the Town of Stanford, 2024. The large format map by Sean Carroll is included in the Town's NRI.

Table 2. A comparison of habitat acreage changes between 2005 and 2024. Loss and gain quality was qualified as minor (<10% change), moderate (10-50%), and significant (>50%).

Springs/seeps and streams are mapped as point and line features which are not included as “habitat types” in this analysis.

Stanford Habitat Type	Habitat Category	Acreage 2005	Acreage 2024	Acreage Change	Percent Change	Loss/Gain	Loss/Gain Quality
Buttonbush Pool	Wetland	16.13	16.00	(0.12)	-1%	Loss	Minor loss
Calcareous Wet Meadow	Wetland	61.73	55.98	(5.75)	-9%	Loss	Minor loss
Circumneutral Bog Lake	Wetland	46.85	43.03	(3.82)	-8%	Loss	Minor loss
Conifer Swamp	Wetland	3.59	0.62	(2.98)	-83%	Loss	Significant loss
Constructed Pond	Wetland	428.49	468.18	39.69	9%	Gain	Minor gain
Cultural	Upland	246.26	519.62	273.36	111%	Gain	Significant gain
Developed	Upland	3,116.73	3,596.60	479.87	15%	Gain	Moderate gain
Fen	Wetland	15.70	13.71	(1.99)	-13%	Loss	Moderate loss
Hardwood Swamp	Wetland	2,114.14	2,027.56	(86.58)	-4%	Loss	Minor loss
Intermittent Woodland Pool	Wetland	19.52	19.47	(0.06)	0%	No change	No change
Marsh	Wetland	173.25	410.24	236.99	137%	Gain	Significant gain
Mixed Swamp	Wetland	14.28	11.37	(2.91)	-20%	Loss	Moderate loss
Oak-Heath Barren	Upland	21.30	14.25	(7.06)	-33%	Loss	Moderate loss
Open Water	Wetland	22.65	60.30	37.65	166%	Gain	Significant gain
Orchard/Plantation	Upland	46.27	25.48	(20.79)	-45%	Loss	Moderate loss
Red Cedar Woodland	Upland	313.00	15.73	(297.27)	-95%	Loss	Significant loss
Upland Conifer Forest	Upland	366.86	129.96	(236.90)	-65%	Loss	Significant loss
Upland Hardwood Forest	Upland	12,515.93	13,093.35	577.41	5%	Gain	Minor gain
Upland Meadow	Upland	9,199.39	9,433.54	234.15	3%	Gain	Minor gain
Upland Mixed Forest	Upland	2,075.10	709.18	(1,365.91)	-66%	Loss	Significant loss
Upland Shrubland	Upland	795.08	947.58	152.50	19%	Gain	Moderate gain
Waste Ground	Upland	139.48	120.70	(18.78)	-13%	Loss	Moderate loss
Wet Meadow	Wetland	332.80	352.07	19.27	6%	Gain	Minor gain
TOTAL		32,084.51	32,084.51				

Since 2004-2005, 1,074 acres appeared to be intentionally converted to either developed, cultural, constructed ponds, or waste ground. We define “cultural” habitats as areas that are significantly altered and intensively managed (e.g., mowed), but are not otherwise developed with pavement or structures. In the Town of Stanford, cultural habitats included gardens, golf courses, playing fields, riding rings, cemeteries, and lawns. Like orchards and plantations, cultural areas can be an ecologically significant habitat type for its potential future ecological value rather than its current value, which is reduced by frequent mowing, application of pesticides, or other types of management. Waste ground is a botanists’ term for land that has been severely altered by previous or current human activity but lacks pavement or structures. This category encompasses a variety of highly impacted areas such as active and abandoned gravel mines, rock quarries, mine tailings, dumps, wetland fill, landfill cover, and abandoned lots. Many such areas have been stripped of vegetation and topsoil; others have been filled with soil or debris but remain substantially unvegetated. Although waste ground often has low habitat value, there are notable exceptions (see original report for further discussion). Constructed ponds include those water bodies that have been excavated or dammed by humans, either in existing wetlands or stream beds, or in upland terrain. These ponds are deliberately created for such purposes as fishing, watering livestock, irrigation, swimming, boating, and aesthetics. Some ponds are constructed near houses to serve as a source of water in the event of a house fire. We also included the water bodies created during mining operations in the constructed pond category. If constructed ponds are not intensively disturbed by human activities, they can be important habitats for many of the common and rare species that are associated with natural open water habitats, however, the ecological value of constructed ponds is often much lower than the original habitats they replace. The habitat values of constructed ponds (and especially intensively managed ornamental ponds) do not ordinarily justify altering streams or destroying natural wetland or upland habitats to create those ponds. In most cases, the loss of ecological functions of natural habitats far outweighs any habitat value gained in the new artificial environments.

Thirteen habitats were converted into some form of developed or managed land, and these habitats included calcareous wet meadows, fens, hardwood swamps, intermittent woodland pools, marshes, orchard/plantations, red cedar woodlands, upland conifer forest, upland hardwood forest, upland meadows, upland mixed forest, upland shrublands, and wet meadows (Table 3). Upland hardwood forest and upland meadows experienced the most significant

changes of these habitats with 284.2 acres and 142.9 acres lost. Upland hardwood forests were primarily converted to developed areas (231.8 acres) and upland meadows were primarily converted to cultural habitats (101 acres). Of wetland habitats, hardwood swamps (46.5 acres) and wet meadows (13 acres) lost the most acreage to some form of development but primarily became either cultural or constructed pond habitats (Table 3).

Table 3. Conversion of ecologically significant habitats into some form of development (i.e. cultural areas, constructed ponds, developed areas, or waste ground.).

	2004-2005 Habitats													
Converted to	Calc. wet meadow	Fen	Hardwood swamp	Intermittent Woodland Pool	Marsh	Orchard/plantation	Red cedar woodland	Upland conifer forest	Upland hardwood forest	Upland meadow	Upland mixed forest	Upland shrubland	Wet meadow	Total
Cultural	0.00	0.00	18.18	0.00	2.06	0.42	0.00	0.10	29.57	101.02	2.66	10.19	8.18	172.4
Constructed Pond	0.42	0.13	14.50	0.00	2.28	0.00	0.00	0.00	7.12	8.96	0.64	0.00	4.75	38.8
Developed	0.20	0.00	11.93	0.02	0.00	0.47	18.32	5.36	231.79	0.00	0.00	0.00	0.00	268.1
Waste ground	0.15	0.00	1.91	0.00	0.00	0.00	1.45	0.04	15.67	32.87	0.46	5.21	0.09	57.8
Total	0.77	0.13	46.52	0.02	4.33	0.89	19.77	5.50	284.15	142.85	3.76	15.41	13.02	537.1

Contiguous Habitats

Hudsonia also updated nine maps of the original report to reflect the habitat changes that the town experienced. Of the total 50-mi² (130-km²) area comprising the Town of Stanford, approximately 88.8% is undeveloped (i.e., without structures, paved roads, etc.). Unfortunately, because existing development is widely dispersed throughout the town, undeveloped land has been fragmented into discontinuous patches. Figure 3 shows blocks of contiguous undeveloped habitat within the town that are <500, 500-1,000, and >1,000 acres (<202, 202-405, and >405 hectares). Several types of common habitats cover extensive areas within these blocks. For example, approximately 51.2% of the town is forested, 32.3% is open meadow (agricultural areas and other managed and unmanaged grassland habitats), and 10.9% is wetland (including open water and constructed pond habitats). Some of the smaller, more unusual habitats we documented include circumneutral bog lakes, fens, and buttonbush pools (which are all included in the total wetland area calculation).

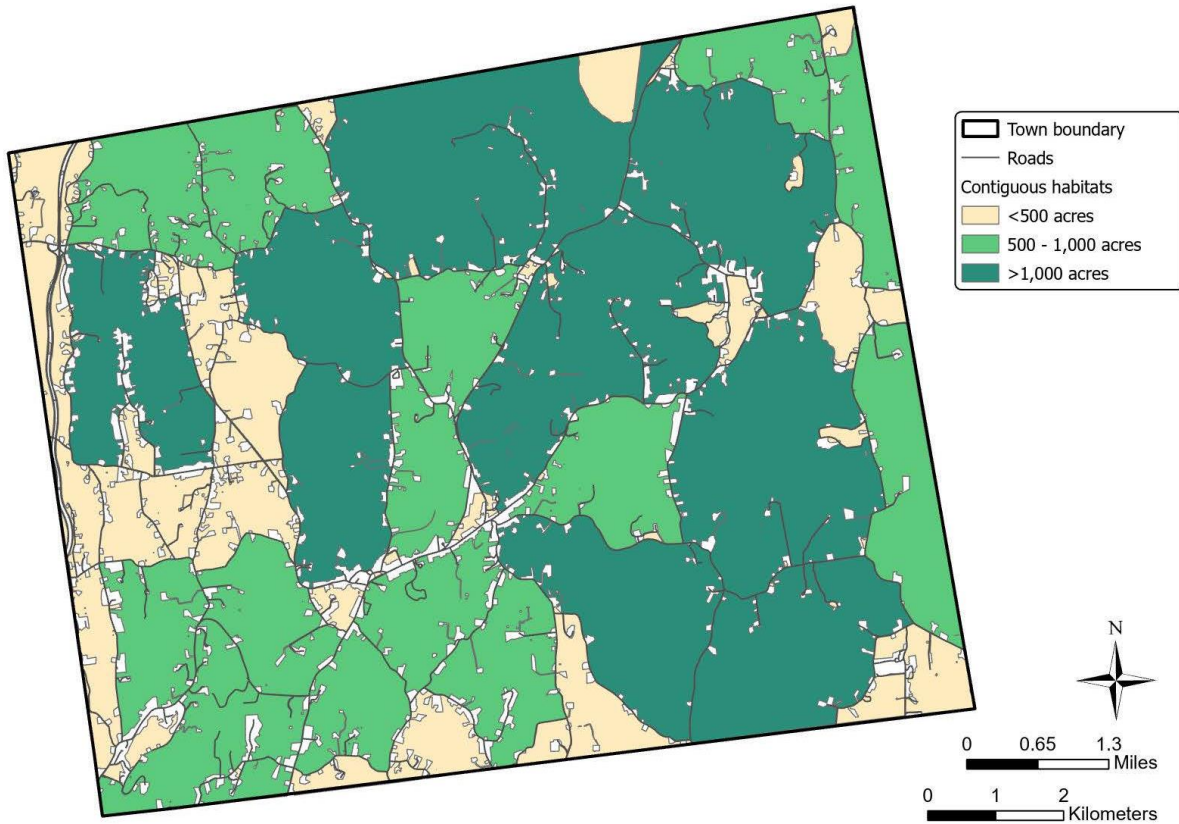


Figure 3. Contiguous Habitat Patches in the Town of Stanford, 2024.

Figure 4 illustrates the location and distribution of forested areas (including forested wetlands as well as uplands) in the Town of Stanford, showing forest patches that are <100, 100-500, 501-1,000, and >1,000 acres (<40, 40-202, 203-405, and >405 hectares). The forest habitats we included in this calculation included hardwood & shrub swamp, conifer swamp, mixed forest swamp, oak heath barren, red cedar woodland, upland conifer forest, upland hardwood forest, and upland mixed forest habitats. The largest areas of forest were those on Stissing Mountain; between Route 82 and Hunns Lake Road; south of Hunns Lake; and between Ludlow Woods and Shuman roads. Nineteen forest areas were greater than 250 acres (100 hectares). In the 2005 report, Hudsonia identified seventeen forested areas larger than 250 acres. This is likely due to small connections having been made between moderately sized forest patches. Upland hardwood forests were by far the most common forest type in the Town of Stanford, amounting to 40.8% of the total land area.

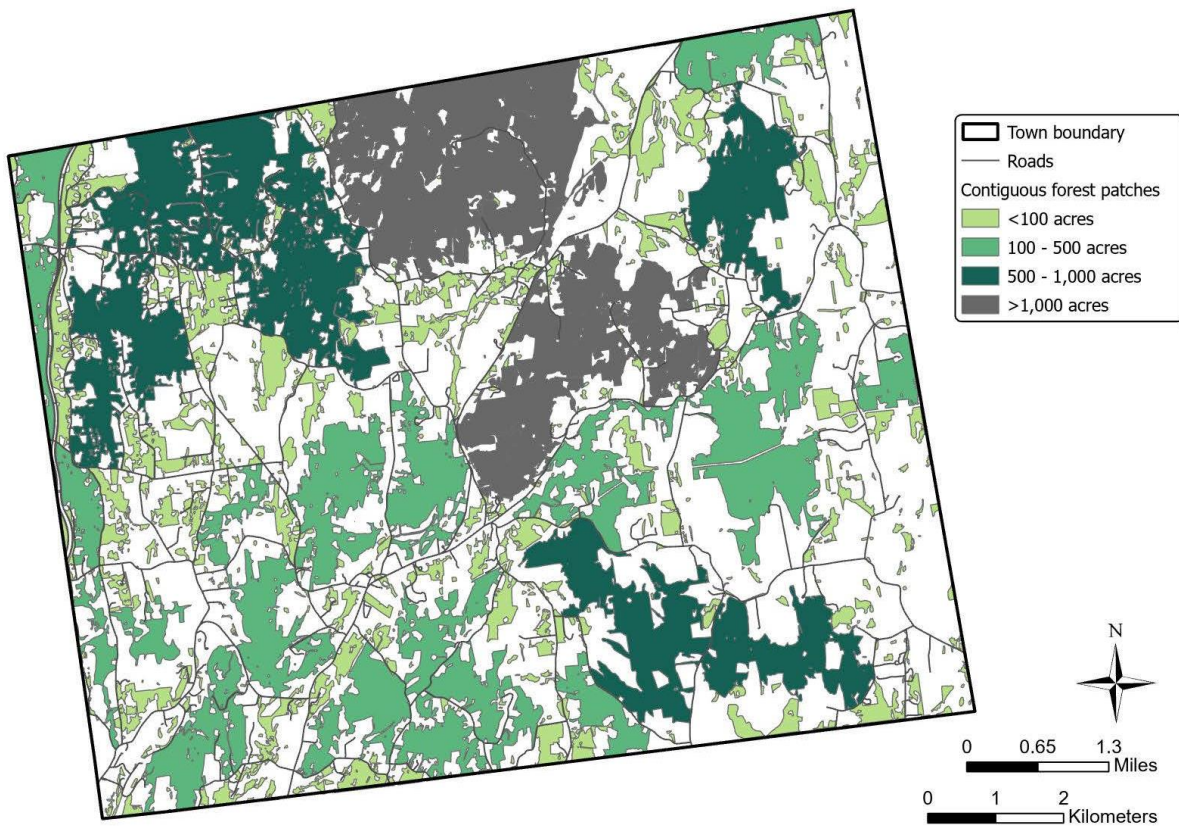


Figure 4. Contiguous forest patches in the Town of Stanford, 2024 (including hardwood, conifer, and mixed forests in uplands and swamps).

Figure 5 illustrates the cover of contiguous meadow patches in the Town of Stanford. These habitats included upland meadows, upland shrublands, wet meadows, calcareous wet meadows, and fens. The figure depicts areas that were <50, 50-100, and >100 acres (<20, 20-40, and >40 hectares). Upland meadow was the second most common habitat type in the Town of Stanford, accounting for approximately 29.4% of the total land area. Upland meadow is a broad category that includes active cropland, hayfields, pastures, equestrian fields, mowed ornamental fields, and abandoned fields (areas typically dominated by grasses and forbs, and cover by shrubs is <20%). There were 27 patches larger than 100 acres. The largest areas of open meadow are in the southwest quarter of Stanford. Other extensive upland meadows occur along eastern Hunns Lake Road and Carpenter Road, and in the Market Lane-Bulls Head Road area.

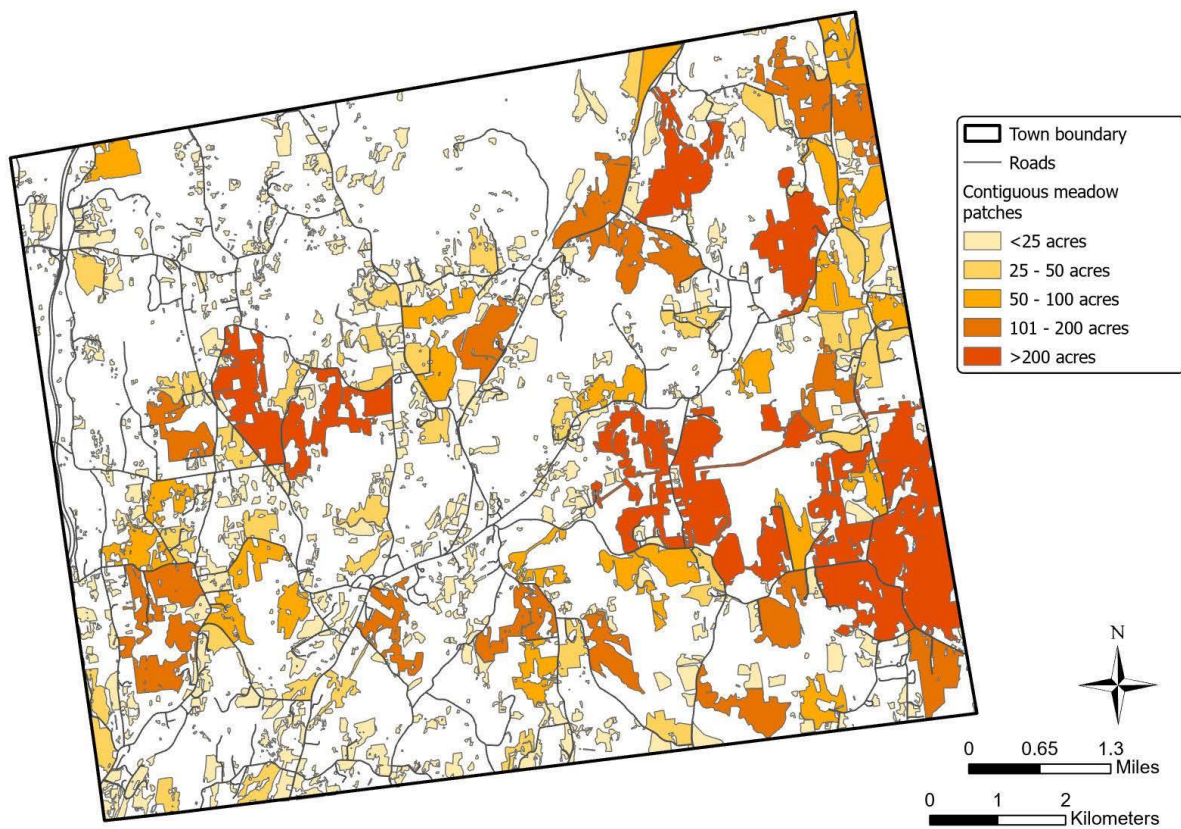


Figure 5. Contiguous meadow patches (including upland meadows, upland shrublands, wet meadows, calcareous wet meadows, and fens) in the Town of Stanford, 2024.

Sensitive Habitats

Crest, Ledge, and Talus

Rocky crest, ledge, and talus habitats often (but not always) occur together, so are described together here. Crest and ledge habitats occur where soils are very shallow and bedrock is partially exposed at the ground surface. They can occur at any elevation but may be most familiar on hillsides and hilltops in the region. Talus is the term for the fields of rock fragments of various sizes that often accumulate at the bases of steep ledges and cliffs. We also included large glacial erratics (glacially-deposited boulders) in this habitat type. Some crest, ledge, and

talus habitats support well-developed forests, while others have only sparse, patchy, and stunted vegetation.

Crest, ledge, and talus habitats occur throughout the town. Extensive areas were found on the east and west slopes of Stissing Mountain, between Route 82 and Hunns Lake Road, and in the southwest part of the town (Figure 6). Large areas of calcareous crest occurred north of Homan Road, between Route 82 and Hunns Lake Road, and just west of Stissing Mountain.

Oak-Heath Barrens

Oak-heath barren is a special subset of rocky crest habitat which typically occur on hilltops and shoulders with exposed noncalcareous bedrock, shallow, acidic soils, and vegetation dominated by some combination of pitch pine, scrub oak, other oaks, and heath (Ericaceae) shrubs. These habitats have special biodiversity value and are shown in red in Figure 6.

Stissing Mountain has several areas of oak-heath barren on its western slopes, the largest of which is 6.6 ac (2.7 ha). The only other mapped occurrence was in the southwest corner of Stanford, reported to us by Ginger Hagan of the Dutchess Land Conservancy (2005 report).

Crest, ledge, and talus habitats (including oak-heath barrens) often occur in locations that are valuable to humans for scenic visits and house sites. However, they host sensitive and unique plant communities that are at risk of direct disturbance (trampling or development) or indirect disturbances such as habitat fragmentation. Barrens on hilltops can be disturbed or destroyed by the construction and maintenance of communication towers. Construction of roads and houses in the low-lying valleys between oak-heath barrens can fragment important migration corridors for snakes, lizards, and butterflies, thereby isolating neighboring populations and decreasing their long-term viability. Because rare snakes tend to congregate on oak-heath barrens at certain times of the year, they are also highly susceptible to killing or collecting by poachers. To protect fragile crest, ledge, and talus habitats and the sensitive species associated with them, activities in the vicinity should be designed to minimize fragmentation, soil erosion, and direct and indirect disturbance to wildlife. We mapped 3,300-foot (1,000 meter) conservation zones around oak-heath barren habitats to signal areas that should be protected in order to reduce negative impacts to these especially fragile and unique communities (Figure 6).

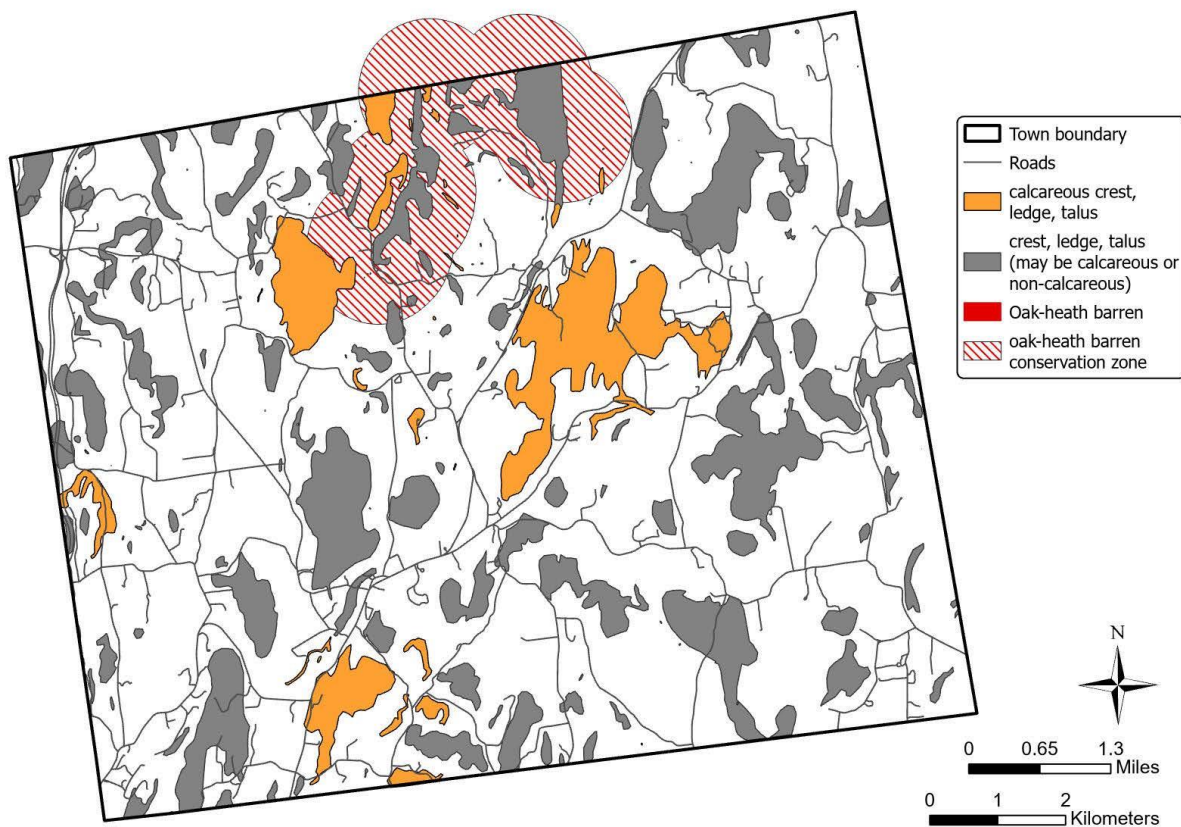


Figure 6. Crest/Ledge/Talus and Oak-Heath Barren Habitats and Associated Conservation Zones in the Town of Stanford, 2024.

Wetland Habitats

We mapped fourteen wetland habitats within the Town of Stanford (Table 1). The extent of only wetland habitats is shown in Figure 7. See the 2005 report or the NRI for further discussion on each wetland habitat found within the town. We mapped four especially sensitive wetland habitats with their associated conservation zones below to aid with conservation and land use planning.

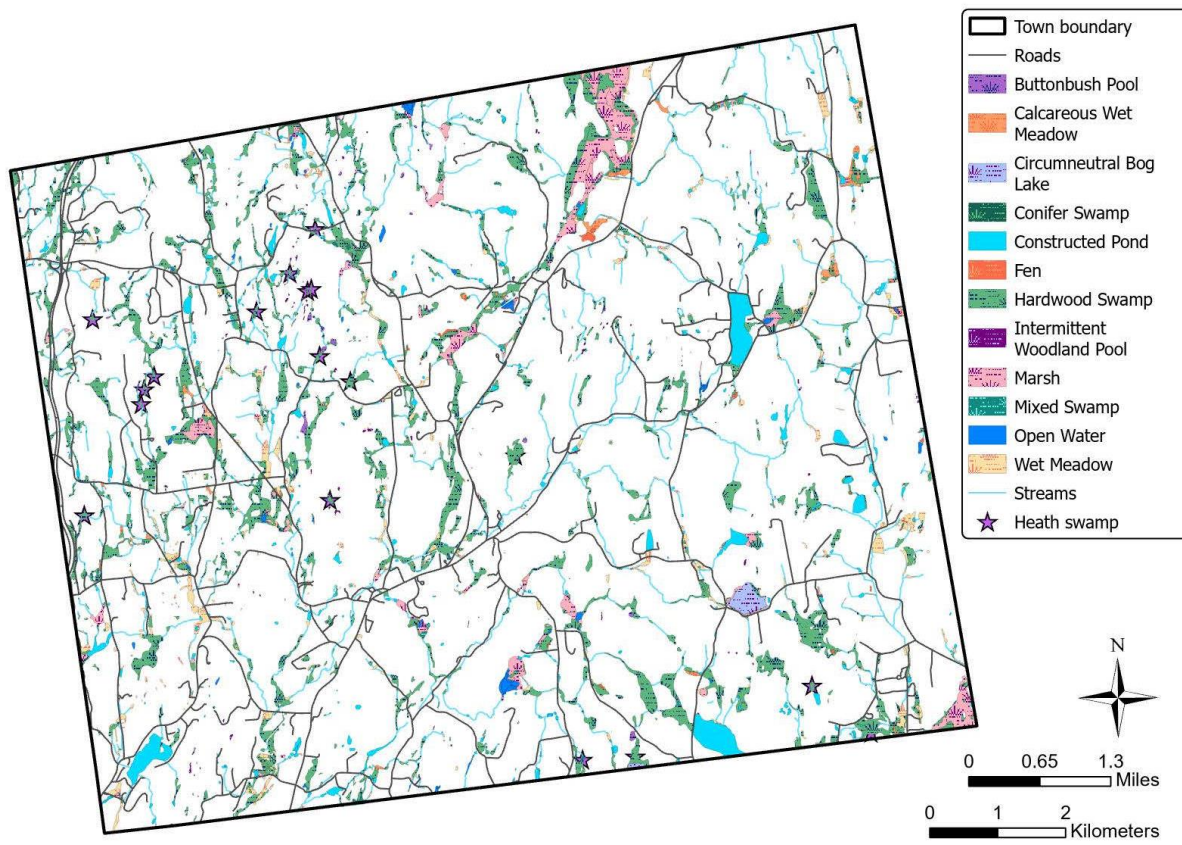


Figure 7. Wetland Habitats, in the Town of Stanford, 2024.

Calcareous Wet Meadow and Fen Habitats and Associated Conservation Zones

A calcareous wet meadow is a special type of wet meadow habitat that is strongly influenced by calcareous groundwater and soils. These conditions favor the establishment of a calcicolous plant community and vegetation is often lush and tall. Calcareous wet meadows often occur adjacent to fens and may contain some similar plants, but calcareous wet meadows can be supported by water sources other than groundwater seepage. Fens and calcareous wet meadows may be distinguished by a combination of factors, such as hydrology (including beaver flooding and abandonment), vegetation structure, and plant community.

We documented over 50 calcareous wet meadows in the Town of Stanford (Fig. 8), totaling 56 acres. The largest of these was 11 acres, but most were less than 2 ac (0.7 ha). Calcareous wet meadows cannot be distinguished from ordinary wet meadows by remote sensing because indicator plants must be identified in the field. It is possible, therefore, that some of the mapped

“wet meadows” are actually calcareous wet meadows. The majority of the calcareous wet meadows in the Town of Stanford were contiguous with swamps, upland meadows, or fens.

A fen is a low shrub- and herb-dominated wetland that is fed by calcareous groundwater seepage. Fens tend to occur in areas influenced by carbonate bedrock (e.g., limestone and marble), and are identified by their low, often sparse vegetation and their distinctive plant community. Tussocky vegetation and small rivulets of seepage water are often present, and some fens have substantial areas of bare mineral soil or organic muck. A fen is a rare habitat type because of the limited distribution of carbonate bedrock, soils, and groundwater seepage, as well as the historic alteration of wetlands. Fens support many species of conservation concern, including rare plants, invertebrates, reptiles, and breeding birds. They comprise the core habitat for the endangered bog turtle in southeastern New York.

We mapped 21 fens in the Town of Stanford (Figure 8). Most were less than 1 acre and the largest was 4.3 acres (totaled 13.71 acres). Most fens were concentrated in the Wappinger Creek valley south of Stissing Mountain, and in the Wassaic Creek drainage in the southeast part of town. Most were located within or along the margin of larger wetlands, which included swamp, marsh, wet meadow, and calcareous wet meadow habitats. Because fens are difficult to identify using aerial photographs, there may be other fens in the town that we did not map. Unmapped fens could occur at the edges or interiors of calcareous wet meadows, swamps, marshes, or wet meadows in low-elevation areas with calcareous bedrock or soils.

Calcareous wet meadows and fens are particularly vulnerable to nutrient enrichment and siltation, which often facilitate the spread of invasive species. Conservation therefore requires attention not only to these habitats themselves, but also to surrounding land uses. Because many of the highest quality fen complexes in the Town of Stanford cross multiple privately owned parcels, fen conservation also requires coordinating across property boundaries. We mapped 2,500-foot conservation zones around fen edges to signal areas that should be protected in order to reduce negative impacts to these especially fragile and unique communities (Figure 8). Like other small wetland habitats, fens and calcareous wet meadows are often omitted from wetland maps and consequently are overlooked in the environmental review of development proposals.

We recommend that calcareous wet meadows near suitable fens be treated as potential bog turtle habitat and given the same level of protection as fens.

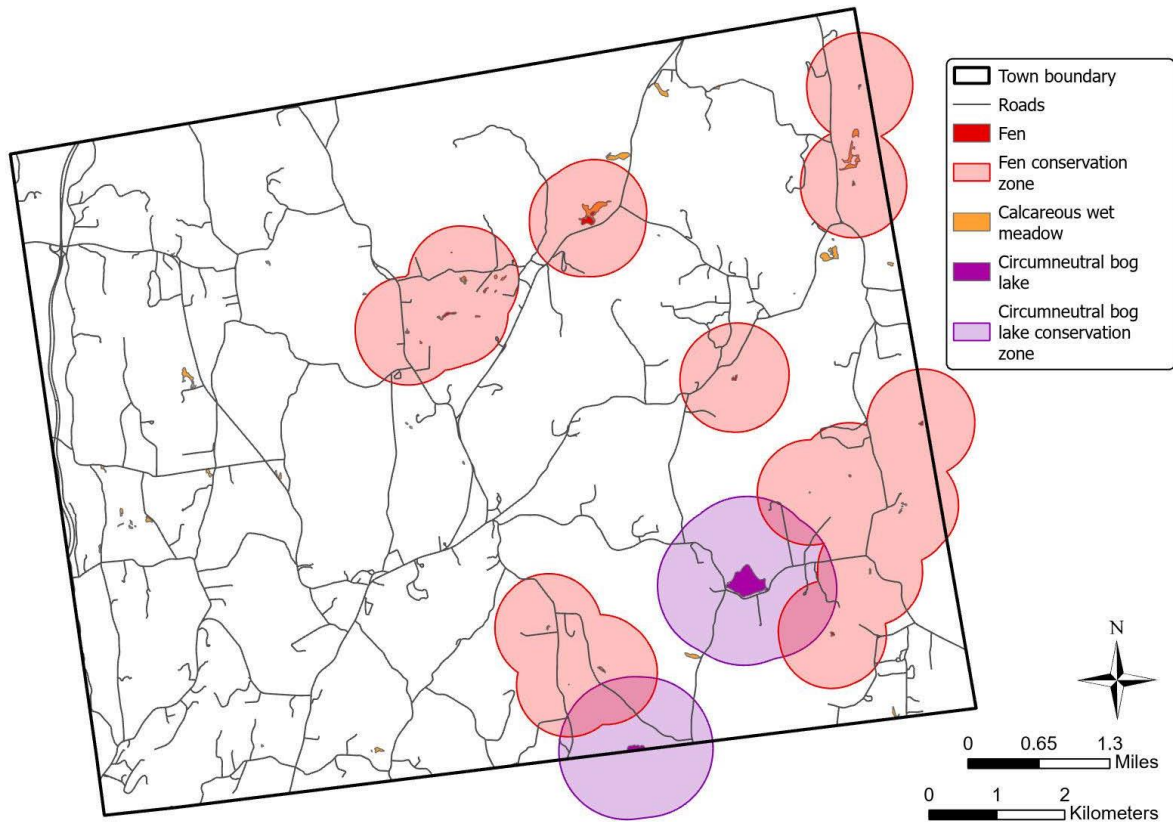


Figure 8. Calcareous Wet Meadows, Fens, and Associated Conservation Zones in the Town of Stanford, 2024.

Circumneutral Bog Lakes and Associated Conservation Zones

A circumneutral bog lake is a spring-fed, calcareous water body that commonly supports vegetation of both acidic bogs and calcareous marshes. The bottom is a deep organic layer, and floating peat rafts are often present. Open water is often covered with pond-lilies; peat rafts and shoreline areas may support cattails, purple loosestrife, water-willow, alder, or leatherleaf. This is a rare habitat type in the Hudson Valley and is known to support many species of rare and uncommon plants and animals.

We identified two circumneutral bog lakes in the Town of Stanford: Ryder Pond and Shaw Pond (Figure 8). Not all waterbodies in the town were field checked in 2004-2005, however, so other such lakes may be present. Ryder Pond measured approximately 42 acres, and Shaw Pond was 29 acres.

Circumneutral bog lakes are often used for activities such as boating, fishing, or hiking. Any recreational use can be a source of garbage and toxins, and motorized boats can be very destructive to organisms and their habitats. We believe that circumneutral bog lakes are extremely sensitive to changes in surface and groundwater chemistry and flows and could be affected by any significant alterations to the watershed such as tree removal, soil disturbance, applications of fertilizers or pesticides, groundwater extraction, or altered drainage. Mechanical disturbance or changes in surface water levels or chemistry could disrupt the floating vegetation mats. Maintaining a forested buffer around the lake is critical for preserving habitat quality and we included a 3,300-foot conservation zones around both circumneutral bog lakes in Figure 8. If land use changes are proposed in the vicinity of a circumneutral bog lake, we recommend that rare species surveys be conducted in the pond and surrounding forests early in the planning process, so that development designs can accommodate the needs of sensitive species. Surveys should include rare plants, amphibians, reptiles, and breeding birds.

Intermittent Woodland Pool and Associated Conservation Zones

An intermittent woodland pool is a small wetland partially or entirely surrounded by forest, typically with no surface water inlet or outlet (or an ephemeral one), and with standing water during winter and spring that dries up by mid- to late summer during a normal year. This habitat

is a subset of the “vernal pool” habitat which may or may not be surrounded by forest. Despite the small size of intermittent woodland pools, those that hold water through early summer can support amphibian diversity equal to or higher than that of much larger wetlands (Semlitsch and Bodie 1998, Semlitsch 2000). Seasonal drying and lack of a stream connection ensure that these pools do not support fish, which are major predators on amphibian eggs and larvae. The surrounding forest supplies the pool with leaf litter, the base of the pool’s food web; the forest is also essential habitat for adult amphibians during the non-breeding seasons. This requirement is taken into consideration for the 750-foot buffer mapped around the pools in Figure 9.

We mapped 116 intermittent woodland pools in the Town of Stanford (Figure 9). Pools were distributed widely with an average size of 0.17 acres and ranged in size from 0.01 to 0.72 acres. One notable concentration of pools occurred north of Homan Road, extending to north of Shelly Hill Road. Because these pools are small and often difficult to identify from aerial photographs, we expect there are other intermittent woodland pools that we missed.

We consider intermittent woodland pools to be one of the most imperiled habitats in the region. Although they are widely distributed, the pools are small (often < 0.1 acre), and their ecological importance is often undervalued. They are frequently drained or filled by landowners and developers and overlooked in environmental reviews of proposed developments. Some have been converted to open ornamental ponds. Even when the pools themselves are spared in a development plan, the surrounding forest so essential to the ecological functions of the pools is frequently destroyed. Intermittent woodland pools are often excluded from federal and state wetland protection due to their small size, their temporary surface water, and their isolation from other wetland habitats. It is these very characteristics of size, isolation, and intermittency, however, that make woodland pools uniquely suited to species that do not reproduce or compete successfully in most larger wetland systems.

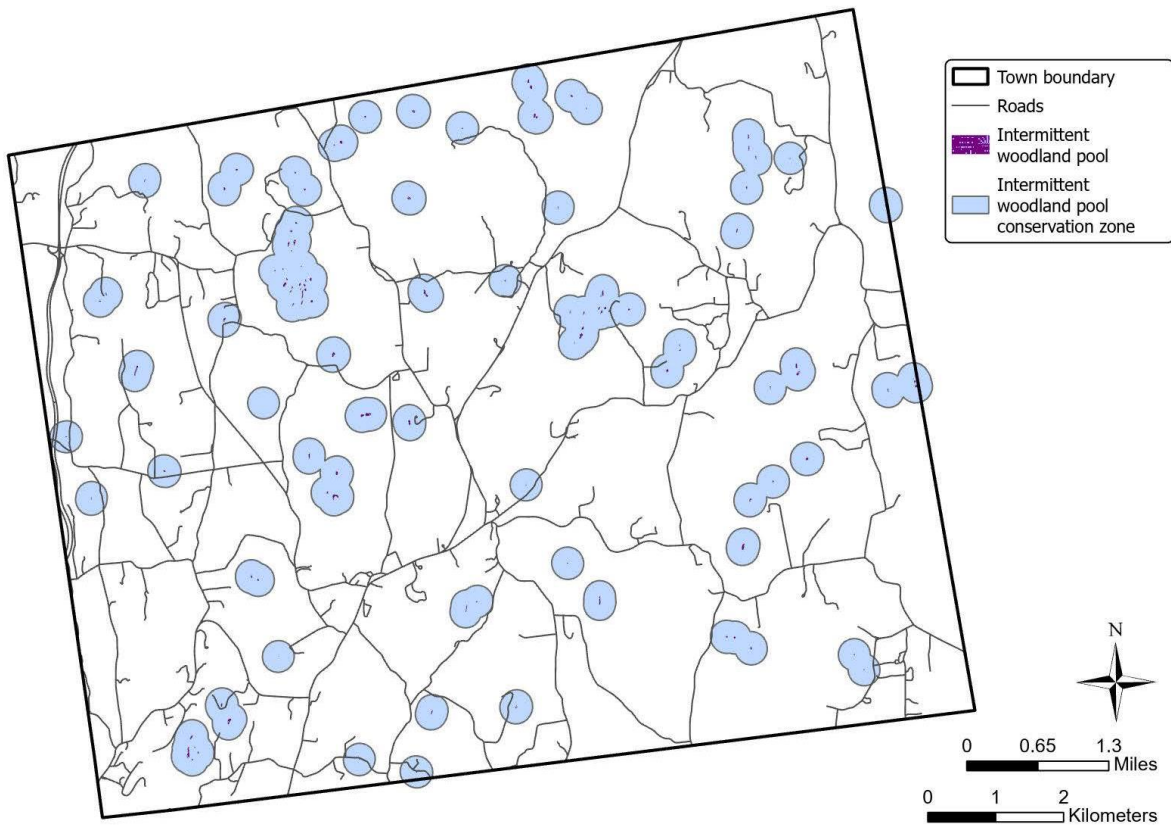


Figure 9. Intermittent Woodland Pool and Associated Conservation Zones in the Town of Stanford, 2024.

Buttonbush Pools and Associated Conservation Zones

A buttonbush pool is a seasonally or permanently flooded, shrub-dominated pool, with buttonbush normally the dominant plant. Other shrubs such as highbush blueberry, swamp azalea, and willows may also be abundant and buttonbush may be absent (buttonbush seems to appear and disappear over the years in a given location). In some cases, a shrub thicket in the middle of the pool is entirely or partly surrounded by an open water moat. The buttonbush pool may have some small trees such as red maple or green ash in the pool interior, but usually lacks a forest canopy. Buttonbush pools typically have no stream inlet or outlet, although some may have a small or intermittent inlet or outlet. Standing water is normally present in winter and spring but often disappears by late summer or remains only in isolated puddles.

The kettle shrub pool, a specific type of buttonbush pool, has all the previous characteristics but is located in a glacial kettle (a depression formed by the melting of a stranded block of glacial ice). Glacial outwash soils (e.g., Hoosic gravelly loam) are located adjacent to the pools. Buttonbush pools and kettle shrub pools have the potential to support many rare species, and kettle shrub pools are the primary core habitat of the Blanding's turtle (a Threatened species in New York). Buttonbush pools also have many of the habitat attributes of intermittent woodland pools and are used by many intermittent woodland pool species.

We documented 16 buttonbush-dominated pools and swamps in the Town of Stanford. One pool (73°43'5"W, 41°54'17"N), described in the 2004-2005 report as a "low sink and unusual deep calcareous pool", is now designated as "open water" in the updated report and habitat map. Field verification could identify whether this indeed is no longer buttonbush-dominated and should be only considered as open water. Because all pools were more than 492 ft away from mapped glacial outwash soils, we classified none as kettle shrub pools. Buttonbush pools were defined by having the following structural and vegetation characteristics: a semi-round or oblong basin containing open, fairly deep water either surrounding (moat) or surrounded by shrubs (pool), including a large percentage of buttonbush. Buttonbush pools were widely distributed in Stanford (Figure 10), with two notable concentrations: in the Homan-Bowen Road area and east of Cold Spring Road in the Stissing Mountain area.

Buttonbush pools may be particularly sensitive to changes in hydrology. Groundwater extraction in the vicinity could alter the pool's hydroperiod and water depth; and altering surface water entering or leaving the pool can drastically change its character. These pools are also sensitive to changes in water chemistry; inputs from roads, agricultural fields, lawns, and construction sites all negatively affect water quality. To provide high-quality winter and spring habitat for Blanding's turtle, a pool must retain an undisturbed bottom of deep organic muck. Development and habitat fragmentation threaten the habitat connections between buttonbush pools and other wetland and upland habitats. Like intermittent woodland pools, buttonbush pools are frequently excavated for ornamental ponds and overlooked in environmental reviews of proposed developments. Therefore, we mapped an "area of concern" around buttonbush pools using a 6,500 ft buffer which encompasses a conservation zone of 3,300 feet around the pools in Figure 10.

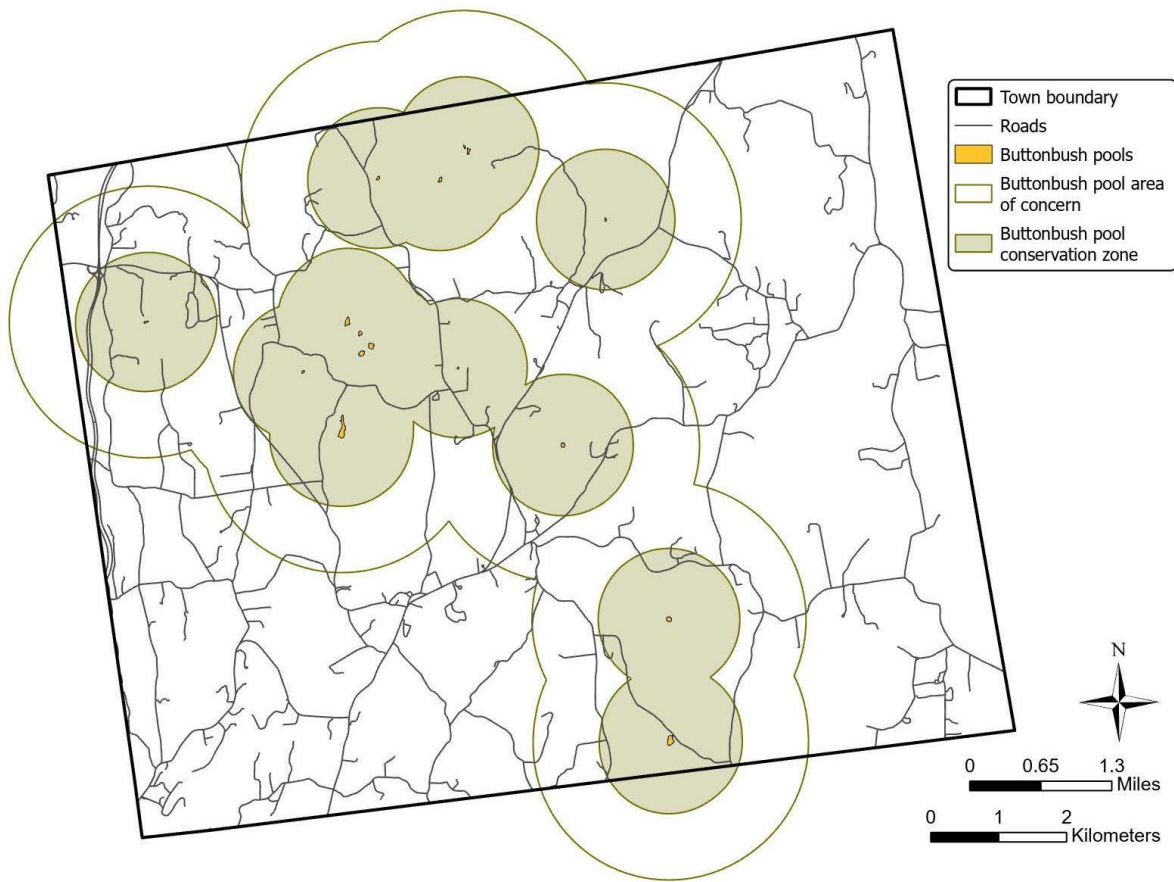


Figure 10. Buttonbush Pools and Associated Conservation Zones in the Town of Stanford, 2024.

Streams and Associated Conservation Zones

Perennial streams flow continuously throughout years with normal precipitation, but some may dry up during droughts. Perennial streams provide essential water sources for wildlife throughout the year and are critical habitat for many vertebrate and invertebrate species. We loosely define “riparian corridor” as the zone along a perennial stream that includes the stream banks, the floodplain, and adjacent steep slopes. Although we did not delineate riparian zones on the Town of Stanford habitat map, it is such an important part of the ecological landscape that we are including it in this report in the hope that town officials and residents will consider it as a critical factor when undertaking land-use planning or reviewing development proposals. We did map buffers of a set width on either side of streams (Figure 11), as a conservation zone to protect the water quality and wildlife of streams. These do not necessarily cover the whole riparian corridor

for any stream, however, which varies in width depending on local topography and the size of the stream's catchment area.

Intermittent streams flow only during certain times of year or after rain. They are the headwaters of many perennial streams, and are significant water sources for lakes, ponds, and wetlands of all kinds. The condition of these streams therefore influences the water quantity and quality of those larger water bodies and wetlands. Intermittent streams can be important local water sources for wildlife, and their disappearance in a portion of the landscape can affect the presence and behavior of wildlife populations over a large area (Lowe and Likens 2005).

Perennial streams and their riparian corridors are distributed widely throughout the Town of Stanford. The largest is Wappinger Creek, with its major tributaries Cold Spring Creek, Willow Brook, and Hunns Lake Creek. Intermittent streams are most common in the more hilly terrain on the eastern and western edges of the town and the buffer zones around them are designed as "non-perennial" in Figure 11.

In a study examining relationships between land use and water quality in 15 Hudson River tributaries, Parsons and Lovett (1993) found a marked correlation between urbanization (e.g. roads and residential and commercial development) and water quality deterioration. In a 1988-1989 study (Stevens et al. 1994) of Hudson River tributaries, Hudsonia found that water quality in many streams had significantly deteriorated since previous studies in 1966 (Ayer and Pauszek 1968) and 1985 (Schmidt and Kiviat 1986). The report states:

"It is not premature to warn planners, regulators, and other decision makers that there is a lot of stream pollution and habitat degradation occurring in Hudson River tributaries, and...the overall picture is one of streams under considerable stress from both point and non-point pollution sources. Environmental planners and managers should worry less about what is happening at particular point sources and more about the cumulative impacts of pollutants from sources such as sewage discharges, septic leachate, and runoff from construction sites, agricultural lands, and highways. Planners and regulators should not wait to act; it is more difficult to restore streams than to protect them....Although a pristine ideal may not be achievable given the intensity of land development in this region of the Hudson

Valley, restoration and maintenance of viable functioning communities of native stream organisms is a realistic objective.”

The habitat quality of a stream is affected not only by direct disturbance to the stream or its floodplain, but also by land uses throughout the watershed. Activities in the watershed that cause soil erosion, increased surface water runoff, reduced groundwater infiltration, or contamination of surface water or groundwater are likely to affect stream habitats adversely. For example, an increase in impervious surfaces (roads, parking lots, roofs) may elevate runoff volumes, leading to erosion of stream banks and siltation of stream bottoms, and degrading the habitat for invertebrates, fish, and other animals. Road runoff often carries contaminants such as petroleum hydrocarbons, heavy metals, road salt, sand, and silt into streams.

Along the stream, removal of trees or other shade-producing vegetation can lead to elevated stream temperatures that can adversely affect aquatic invertebrate and fish communities. Clearing of floodplain vegetation can reduce the important exchange of nutrients and organic materials between the stream and the floodplain, and can diminish the floodplain’s capacity for floodwater attenuation, leading to increased flooding downstream, scouring and bank erosion, and sedimentation of downstream reaches. Any alteration of flooding regimes, stream water volumes, timing of runoff, and water quality can profoundly affect the habitats and species of streams and riparian zones. Hardening of the streambanks with concrete, riprap, gabions, or other materials reduces the biological and physical interactions between the stream and floodplain and tends to be harmful both to stream and floodplain habitats. Removal of snags from the streambed degrades habitat for fishes, turtles, snakes, birds, muskrats, and their food organisms. Stream corridors with road crossings or other soil disturbance are especially prone to invasion by Japanese knotweed, an introduced plant that is spreading in the Hudson Valley (Talmage and Kiviat 2004).

Effective protection of stream habitats, therefore, requires attention not only to the stream channel, but to land uses in the riparian corridor and throughout the watershed. Applications of fertilizers and pesticides to agricultural fields, golf courses, lawns, and gardens in or near the riparian zone can degrade the water quality and alter the biological communities of streams. Construction, paving, logging, soil mining, clearing of vistas, creating lawns, and other

disruptive activities in and near riparian zones can eliminate riparian functions and adversely affect the species that depend on streams, riparian zones, and nearby upland habitats. Because one of the most important means of protecting stream quality is to protect the riparian zones from disturbance, we recommend maintaining (or restoring, if necessary) natural riparian habitats wherever possible. We included a buffer of 660 ft around perennial streams to encompass the minimum area that should be protected and a buffer of 160 feet around all other streams in Figure 11.

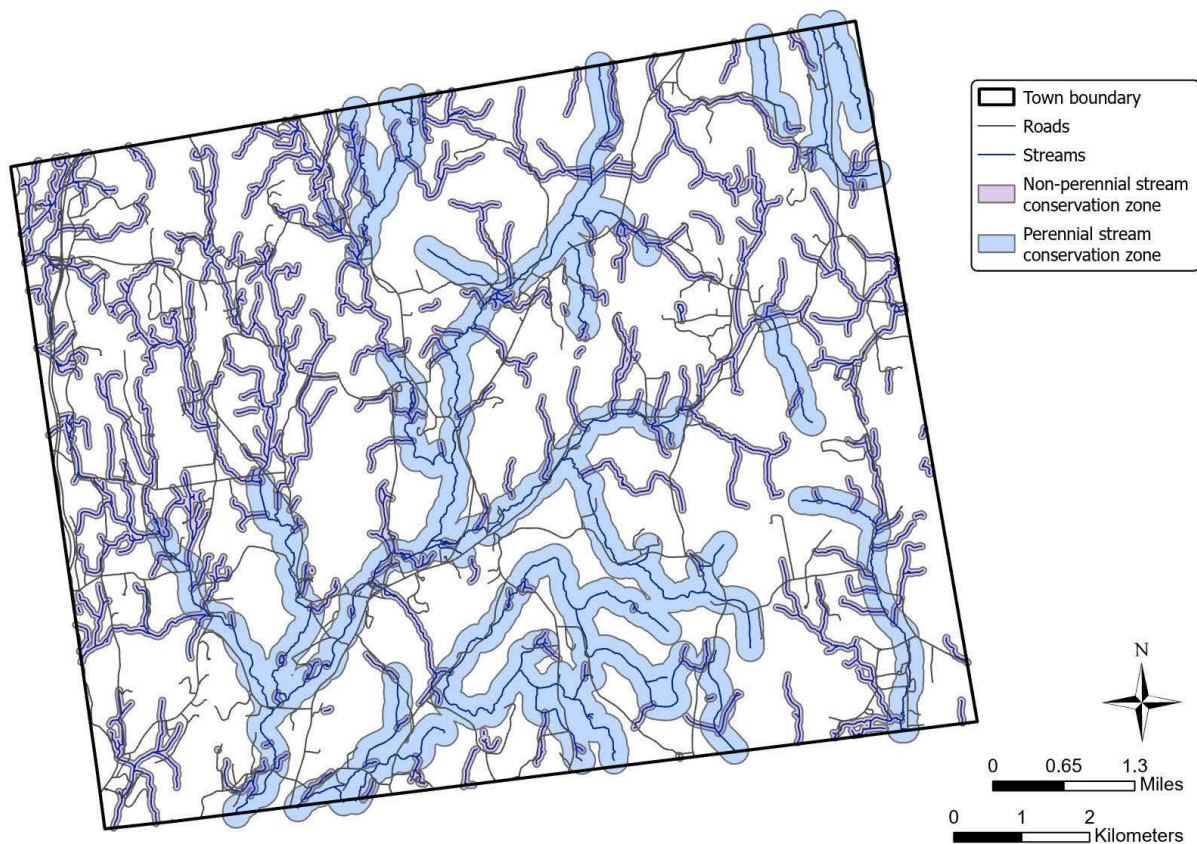


Figure 11. Streams and Associated Conservation Zones in the Town of Stanford, 2024.

Priority Conservation Areas in Stanford

In addition to the priority habitats discussed above, there are locations in Stanford that deserve special attention because they each contain several priority habitats. This is not meant to be a comprehensive list of such areas in the Town of Stanford and is unchanged from the 2004-2005 report (Figure 12). For a discussion of the features of each area that make it especially valuable to biodiversity and for detailed discussion on conservation issues and recommendations for each habitat type, refer to the 2004-2005 report.

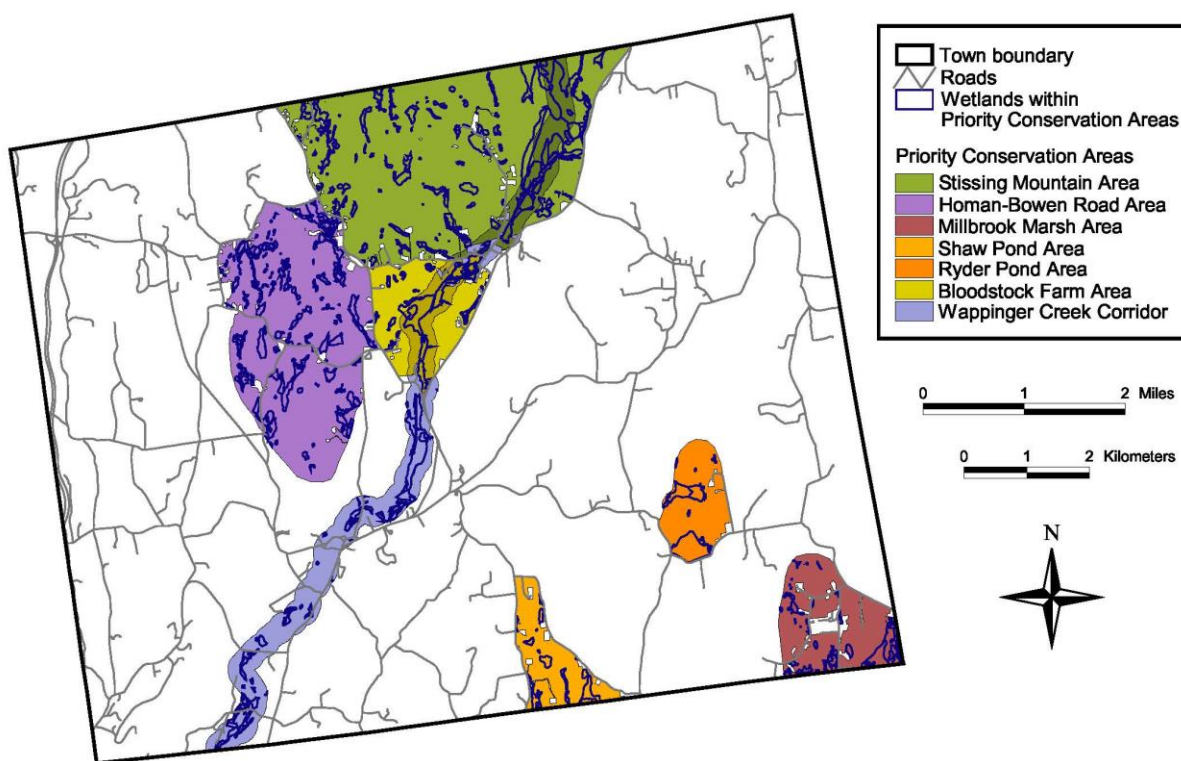


Figure 12. Priority Conservation Areas in the Town of Stanford, Dutchess County, New York. These are examples of areas with high biodiversity value but not a complete list. This map was generated for the 2004-2005 report by Hudsonia Ltd.

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