

**Final Summary Report of**  
**A SURVEY TO ASSESS THE CURRENT CONDITION OF**  
**SIGNIFICANT NATURAL**  
**COMMUNITIES, CRITICAL HABITATS, AND RARE PLANT**  
**OCCURRENCES OF THE**  
**EIGHTMILE RIVER WATERSHED,**  
**23 Jun 2019 – 14 Oct 2020**

by William H. Moorhead III, 23 December 2022

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**Introduction.**

In 2019, I was commissioned by the Eightmile River Wild & Scenic Coordinating Committee to conduct over 2 years a resurvey of critical habitats, significant natural communities, and rare plant occurrences in the Eightmile River watershed that I had documented in 2003. The primary purpose was to assess their current condition and whether there had been positive or negative changes to these entities over the 17-18 years since my 2003 surveys. In addition to resurvey of the entities documented in 2003, I also conducted a certain amount of *de novo* survey for previously undocumented entities.

## **Materials and Methods**

I resurveyed 34% of the rare plant sites in the Eightmile River watershed that have documented as far back as 2003 or more recently (at least 8 new rare plant sites have been documented in 2003 and later by me and mostly others in the watershed since my 2003 survey). I biased my selection of rare plant sites to survey toward those sites with habitats I judged to be most likely to have potentially changed, as opposed to those in situations, such as the 31 rare plant sites in the intertidal habitats in Hamburg Cove and the 36 rare plant sites in waterbodies and wetlands, where the habitat appeared, upon inspection, to be substantially unchanged since 2003.

Of the 130 previously documented Critical Habitats and other significant natural community sites (123 documented by me in 2003, plus 7 others mapped in the 2009 CTDEEP Critical Habitat GIS layer that I did not visit in 2003), I was able in 2019-2020 to revisit 91 sites. However, only 75 of these sites were traversed and re-explored, while 16 were inspected and assessed only from their margins (roadsides, pond and wetland edges, and mostly photographed. I was unable to visit 39 sites in the field. These sites I attempted to assess changes since by comparing 2004 and 2019 digital aerial imagery. By this method, I was able with reasonable confidence to hypothesize that there had not been significant changes in habitat at 23 of these sites, and was unable to assess to make a confident assessment at the remaining 16 sites. All 39 sites that I did not revisit in 2019-2020 should be a priority for field visits in any future work similar to this project.

## **Results.**

### **Critical Habitats and Other Significant Natural Communities**

Of the original 123 sites I documented in 2003, 7 sites have been “lost”, i.e., I consider them to have lost their biodiversity significance, for reasons explained below. However, I discovered, documented, and mapped 10 new Critical Habitat sites and 8 new significant natural communities to the mapping in the Eightmile watershed. The footprints of a number of Critical Habitats and significant natural communities were remapped to reflect changes over the last 17-18 years, such as closing in of open habitats due to succession and lack of management, as well as destruction of habitat in the Eversource power transmission ROW due to road improvements and the creation of large crane/work pads around structures. Also, a number of Critical Habitats and significant natural community footprints were changed based on my using GPS technology to help map them in 2019-2020, which I did not have available in 2003.

In summary, strictly comparing 2003 sites to 2019-2020 sites, there is a net increase of 20 acres of Critical Habitat and significant natural community sites due to the discovery of 18 new sites (totaling 28 acres) as compared to the loss of 7 sites. But due to some of the processes discussed below, there has been a net loss of 20 acres of Critical Habitat and significant natural communities.

### ***Trends.***

With respect to changes in Critical Habitats and significant natural communities in the Eightmile River watershed since 2003, the following are the most significant.

1. Destruction and degradation of habitat in the Eversource Transmission ROW caused by service road improvement and the building of permanent work pads for cranes that are now used for servicing and replacing wire support structures. Approximately 4 acres of Subacidic Rocky Summit/Outcrop, 3.5 acres of Sand Barren Grassland, and small occurrences of Acidic Spring Fen have been destroyed. Habitat that was not destroyed has been degraded by the cutting of nearly all the Eastern Red Cedar (*Juniperus virginiana*) and Flowering Dogwood (*Benthamidia florida*), both formerly abundant in the transmission ROW.
2. Loss or reduction in the area of Sand Barrens and some other open herbaceous habitats due to succession to forest and/or shrub thicket, in the absence of management or disturbance. Both native and invasive woody plants (especially Autumn Olive [*Elaeagnus umbellata*]) involved in the succession. In some cases, this has resulted in the loss or reduction of associated rare plant populations.
3. At least in parts of the watershed, there appears to have been a reduction in deer densities since 2003, judging by the relative lack of evidence of browse, deer trails and scat, and the well-developed forest understory in many areas.
4. There has been a significant decline in the acreage of the Cedar Lake Cedar Swamp that is dominated by Atlantic White Cedar (AWC), as opposed to hardwoods. It is unclear to what to attribute this decline. Beaver have been active there for many years and may be a factor, but the gradual decline of AWC prominence in AWC swamps is a phenomenon that has been occurring state-wide for a long time. Some kind of management or natural disturbance to control competition from hardwoods is evidently necessary.

The list of the types of Critical Habitats and Significant Natural Communities I and others have identified in the Eightmile River watershed is presented below in Table 1. Data is presented for each individual occurrence in the attribute table that accompanies the ESRI shapefile entitled “Crit\_habs\_signif\_comms\_2021\_v\_2022-12-15.shp”, delivered under a separate cover.

Table 1. Critical Habitats and Other Significant Natural Communities Identified and Mapped in 2003 and 2019-2020

Critical Habitat Commtyp	Critical Habitat Commsubtyp	Significant Natural Community	Cumulative acreage	Number of Occurrences	Min size (ac)	Max size (ac)	Comments
Acidic Atlantic White Cedar Swamp	Cedar Swamp	Same as Critical Habitat	3.04	1	3.04	3.04	Not assessed in field in 2019-2020, but 2019 aerial photo indicates <i>Chamaecyparis</i> is still a dominant sp.
Acidic Atlantic White Cedar Swamp	Cedar/Hardwood	Same as Critical Habitat	2.95	1	2.95	2.95	Based on aerial photo analysis, the abundance of AWC appears to have declined substantially since 2003 (see discussion above)
Acidic Rocky Summit/Outcrop	Grassy Glade/Bald	Same as Critical Habitat	6.25	4	0.19	2.40	Occurrence mapped in 2003 unchanged, plus several new occurrences identified in 2019-2020
Acidic Rocky Summit/Outcrop	Scrub Oak, Grassy Glade/Bald	Same as Critical Habitat	2.63	1	2.63	2.63	Unchanged since 2003
Alluvial Grassland/Outcrop	Grassland	Same as Critical Habitat	6.23	3	0.33	5.00	Unable to assess two 2003 occurrences, one new occurrence identified in 2020
Dry Subacidic Forest	Ash/Hickory Glade	Same as Critical Habitat	35.87	10	0.35	11.78	Several new occurrences identified in 2019-2020, 2003 occurrences unchanged or possibly shadier, one occurrence reduced in area due to more accurate mapping
Freshwater Aquatic	Coastal Plain Pond	Same as Critical Habitat	74.83	1	74.83	74.83	Unchanged
Intertidal Marsh	Freshwater Marsh	Same as Critical Habitat	18.82	5	0.05	10.01	Not visited in 2019-2020, not able to assess condition using aerial photos
Medium Fen	Other/Unique	Same as Critical Habitat	7.97	2	0.56	8.53	Assessed based on appearance, appearing unchanged
Medium Fen	Other/Unique	Sandy, acidic, seasonally saturated low heathland	0.31	1	0.31	0.31	Largely unchanged, some invasion of taller shrubs
Medium Fen	Other/Unique	Acidic Spring Fen	1.18	3	0.05	0.99	Two occurrences in Eversource ROW destroyed by service road construction and beaver flooding, a 3 <sup>rd</sup> occurrence appears unchanged based on aerial photo review
Medium Fen	Other/Unique	Medium Fen	5.44	1	5.44	5.44	Unchanged, reclassified from Poor to Medium Fen
Medium Fen	Other/Unique	Floating peatland community	0.20	1	0.20	0.20	New Critical Habitat identified in 2019-2020
Medium Fen	Sedge	Medium Fen	10.68	4	2.11	5.44	Unchanged

Critical Habitat Commtyp	Critical Habitat Commsubtyp	Significant Natural Community	Cumulative acreage	Number of Occurrences	Min size (ac)	Max size (ac)	Comments
Medium Fen	Other/Unique	Scirpus expansus fen	0.65	1	0.65	0.65	Appears unchanged on aerial photos
Medium Fen	Shrub Thicket	Medium Fen	10.46	1	10.46	10.46	Appears unchanged on aerial photos
Poor Fen	Shrub Thicket	Poor Fen	0.45	1	0.45	0.45	Unchanged
Sand Barren	Sandplain Grassland	Same as Critical Habitat	19.95	9	0.03	6.27	Acreage losses due to succession, Eversource infrastructure changes in ROW, DOT infrastructure construction in Rte. 11 meridian
Sand Barren (cemetery)	Sandplain Grassland	Same as Critical Habitat	3.36	3	0.34	2.39	Unchanged, except one cemetery being mowed too often
Sand Barren	Sparsely Vegetated Sand, Sandplain Grassland	Same as Critical Habitat	10.31	2	0.26	9.32	Some acreage reduction due to succession, two new occurrences identified
Sand Barren	Sparsely vegetated sand	Same as Critical Habitat	2.68	3	0.20	1.23	Acreage reduction due to succession, one new occurrence identified
Subacidic Cold Talus Forest/Woodland	No subtypes defined	Ice talus forest	4.76	1	4.76	4.76	Largely unchanged, some increase in invasives and some hemlock mortality
Subacidic Rocky Summit/Outcrop	Cedar Woodland	Subacidic Rocky Summit/Outcrop Community	0.98	1	0.98	0.98	Small increase in area due to some tree removal to allow a vista from summit
Subacidic Rocky Summit/Outcrop	Other/Unique (Utility ROW)	Dry rich cedar-dogwood forb/Carex pensylvanica savanna	12.54	2	1.74	10.80	Greatly reduced in size due to Eversource infrastructure changes, and all of the red cedar and dogwoods have been removed
		<b>Total Acreage Critical Habitats</b>	<b>242.56</b>				
		Acer rubrum woodland - tall shrub draw-down swamp	1.00	2	0.86	0.14	Appears little changed on 2019 aerial photos
		Acidic cliffs	15.22	7	0.43	7.63	Unchanged in part, in part cliff habitat is sunnier due to adjacent tree mortality, which appears to have caused some decrease in the state listed Mountain spleenwort

Critical Habitat Commtype	Critical Habitat Commsubtyp	Significant Natural Community	Cumulative acreage	Number of Occurrences	Min size (ac)	Max size (ac)	Comments
		Acidic draw-down swamp	0.34	1	0.34	0.34	Appears unchanged, viewed from road
		Acidic oak woodland	9.21	2	0.81	8.40	Some reduction on open habitat due to succession
		Acidic Seepage Forest	8.26	2	2.65	5.62	One occurrence unchanged, at the 2 <sup>nd</sup> , which was not visited, there has been some development, based on aerial photos
		Acidic Seepage Swamp	4.39	2	0.52	2.01	Two occurrences appear unchanged on aerial photos, a 3 <sup>rd</sup> occurrence is new in 2020
		Basin Marsh	8.35	2	2.41	5.94	One appears unchanged on aerial photos, unable to assess the 2 <sup>nd</sup> from aerial photos
		Big bluestem prairie	2.33	2	8.35	0.02	Some reduction in proportion of Big bluestem due to invasives and competition from Sensitive fern
		Cephalanthus kettle swamp	0.90	1	0.90	0.90	Appears unchanged viewed from edge
		Drawdown graminoid marsh	1.45	1	1.45	1.45	Appears unchanged viewed from edge
		Dry acid cedar savanna and/or woodland	18.38	7	0.22	4.95	Some reduction in open habitat due to succession by trees and shrubs
		Dry Acidic Forest on Glacial Till	4.35	1	4.35	4.35	Some mortality of large wolf oaks evident on aerial photos
		Dry grassland	9.32	6	0.40	3.52	Some loss of open habitat due to succession, service road building, some occurrences have been maintained by yearly mowing, one occurrence declassified as Significant Community
		Dry grassland (cemetery)	0.71	1	0.71	0.71	Reduced its biodiversity significance to "Arguable", because it appears to be more intensively managed than in 2003
		Dry oak woodland	0.44	1	0.44	0.44	Not visited in 2019-2020 and unable to assess change or no change from aerial photos
		Dryish warm-season grassland/meadow	0.65	1	0.65	0.65	New significant community in 2020
		Dry-mesic to submesic cedar woodland	2.10	1	2.10	2.10	Red cedars have closed in to form closed-canopy forest patches in places, but still some open habitat

Critical Habitat Commtyp	Critical Habitat Commsubtyp	Significant Natural Community	Cumulative acreage	Number of Occurrences	Min size (ac)	Max size (ac)	Comments
		Floating seasonally flooded peat flat community	0.59	1	0.59	0.59	Unchanged
		Fresh-spring-tidal wet meadow/acidic, sandy seasonally saturated meadow	0.12	1	0.12	0.12	Some reduction in meadow area due to encroaching tall shrubs and vines, with reduction in 2 listed plants numbers
		Freshwater Intertidal Flats	0.64	2	0.21	0.43	Unchanged
		Mesic Acidic Forest on Glacial Till	5.58	2	2.66	2.92	No apparent change at one occurrence, at the other oak mortality has created some canopy openings
		Old-age Tsuga ravine forest	11.30	1	11.30	11.30	Some hemlock mortality, most still alive
		Quercus bicolor drawdown swamp	3.99	1	3.99	3.99	Appears unchanged on aerial photos
		Riverside Seep/Riverbank Beach/Shore Community	1.52	1	1.52	1.52	Unchanged
		Sandy floodplain meadow	2.10	1	2.10	2.10	Unchanged except for invasion of a portion by Mugwort
		Sandy, acidic, seasonally inundated meadow	5.63	5	0.11	2.52	Mowed occurrences unchanged, meadow habitat area has been reduced at others by succession of trees and shrubs
		Sandy, acidic, seasonally saturated woodland	2.23	1	2.23	2.23	Unchanged
		Scrubby seasonally wet meadow	1.28	2	0.26	1.03	Shrubs denser and taller than in 2003, with apparent loss of some of the listed plant subpopulations
		Submesic meadow	2.69	2	0.24	2.45	Unchanged
		Tall shrub swamp - wet meadow mosaic	2.29	1	2.29	2.29	Not visited and unable to assess from aerial photos – there has been development less than 100 ft away since 2003

Critical Habitat Commtype	Critical Habitat Commsubtyp	Significant Natural Community	Cumulative acreage	Number of Occurrences	Min size (ac)	Max size (ac)	Comments
		Vernal pool	2.94	7	0.18	0.80	Some appearing unchanged on aerial photos, while unable to assess others from aerial photos
		Wet meadow	10.26	3	0.60	5.33	One occurrence is now mowed frequently mowed than it was ca. 2003, and I was unable to assess its current diversity, but the 2 listed plants are still extant. A 2 <sup>nd</sup> occurrence appears unchanged on aerial photos, and a 3 <sup>rd</sup> appears to go through cyclic periods of being flooded by beaver and then being abandoned by them and turning back into wet meadow
		<b>Total Acreage Significant Natural communities</b>	<b>140.56</b>				



## State Listed Plant Occurrences

Of 187 state listed rare plant sites where the rare plant was documented as extant by myself and others as far back as 2003 or later, I resurveyed 63 sites in 2019 and 2020. During this survey, I was unable to find any plants extant at 16 sites, I found rare plants still extant at 46 sites, and I documented 13 new sites for state-listed plants, so there was an apparent net loss of 6 rare plant sites. A “rare plant site” is the equivalent of a “Source Feature” in the CTDEEP-NDDDB’s GIS listed species tracking system. It is a discrete polygon separated by some distance from other polygons occupied by the same rare species. If multiple polygons for the same rare plant are close enough to each other, and some other conditions are met regarding the habitat between the polygons, the polygons are considered to be one rare plant occurrence (or more formally, a rare plant Element Occurrence, or rare plant EO). Thus, the 187 rare plant sites (= Source Features in NDDDB system) represent only 57 rare plant occurrences. In terms of rare plant occurrences in the watershed, I resurveyed 25 occurrences, and I failed to find plants at 8 occurrences. I found plants still extant at 17 occurrences, and discovered 6 new rare plant occurrences. Because some rare plant occurrences are a complex of multiple rare plant sites (or source features) which are not necessarily all in the same habitat and all subject to the same ecological processes, I will use the term “rare plant site”, to refer to discrete colonies of rare plants.

As of 2003, there were 53 extant occurrences of state-listed plants in the Eightmile River watershed, and there are now approximately 57 known or presumed extant occurrences of state-listed plants. This apparent net gain in rare plant occurrences is due to the discovery of new occurrences by myself and others since 2003, and in spite of the apparent loss of 8 occurrences and the loss of 4 occurrences due to the removal of 3 plants from the Endangered/Threatened/Special Concern list.

### *Trends*

In addition to the 8 occurrences of rare plants that appear to have “blinked out”, there are a number of occurrences at which the population numbers have fallen. The reasons for the loss or decline of a rare plant population range are sometimes obvious, sometimes obscure, and often somewhere in between. Examples of some of the obvious and suspected reasons are:

1. Destruction of portions of a rare plant occurrence by foliar herbicide application to control incompatible woody plants in the power transmission ROW. The rare plants were not the target of control, but were killed by herbicide dripping from the target species foliage and/or by over-spraying of the target plants. This happened once that we know of, on 2005, when a large portion of one *Endodeca serpentaria* (Virginia snakeroot) occurrence of 200-1000 plants was destroyed, and plants have never recolonized the portion of the population area that was herbicided. It is unknown if this has happened more than this one time. I failed, in 2019 and 2020, to find any *Endodeca* at all at only one site in the transmission

- ROW. This might be related to vegetation management or due to my inability to relocate the precise spot where the plants occurred (See also para. following this numbered list).
2. Destruction of portions of rare plant occurrences by Eversource's infrastructure changes (service road construction and improvement, construction of permanent crane work pads) and vegetation management in the power transmission ROW. Portions of rare plant populations has been buried under roads and crane work pads, and slash from cut Red Cedars has been piled over rare plants. Eversource has corrected some of these impacts where we knew of them and they were reversible, by removing a sections of road and removing Red Cedar slash.
  3. Discontinued disturbance or management of rare plant sites, followed by succession to forest, shrub thicket, and/or tall dense herbaceous meadow or grassland. An example of this is a small population of the Endangered sedge *Scleria triglomerata* (Whip nutrush) that grew in a sandy trail that in 2003 was used and perhaps periodically mowed. Sometimes after 2003, the trail use and maintenance was discontinued, and the trail became densely vegetated at ground level and also a dense canopy of Black Huckleberry developed over the trail. The *Scleria* is shade-intolerant and cannot tolerate competition at ground level, and could not be found at the site in 2019 or 2020. This plant may be a seed banker, and viable seeds may be in the soil at this site, waiting for some disturbance to create conditions under which the seed can germinate and produce living plants again.
  4. Changing the disturbance or management regime from what it had been in 2003 or not long before. An example of this is site for the Special concern sedge, *Carex bushii* (Bush's sedge), where former agricultural land that was acquired by The Nature Conservancy in 2000 (it appears on aerial photos that it was managed as hayfields in the 1990s). In 2003, not long after the agricultural management regime was discontinued, I found hundreds of *Carex bushii* plants in multiple locations over much of the former agricultural field area. In 2019 and 2020, I found less than 50 *Carex bushii* plants. I understand that the management regime since the land become a preserve in the areas with *Carex bushii* has been mowing less than once per year, which has allowed some areas to develop into shrubland and others to become tall meadow. Based on robust occurrences of *Carex bushii* at other Connecticut sites which are mowed once per year, usually late, I suspect that this *Carex bushii* has declined due to competition by other taller herbaceous vegetation and shading by shrubs, which is in turn due a lack of yearly mowing.
  5. Invasion of open-canopy wet, mesic, and dry meadows, grasslands, and Sand Barrens by invasive shrubs and vines and herbaceous invasives, such as Mugwort (*Artemisia vulgaris*), Common Reed (*Phragmites australis*), and Reed Canary Grass (*Phalaris arundinacea*), and Japanese Stiltgrass (*Microstegium vimineum*). This has impacted some rare plant occurrences in the watershed, reducing population size or possibly causing the disappearance of one occurrence.
  6. Too much anthropogenic disturbance, such as too frequent mowing (i.e., several to many times per year) and/or mowing at times of the growing season that is not favorable for the rare plant. I appears that this may have impacted rare plant occurrences at 3 rare plant locations, two roadsides and one wet meadow that in

2003 was mowed once per year. At one of the roadside sites, population size of Special Concern *Desmodium glabellum* (Dillenius' tick-trefoil) and vigor of the plants has been reduced. At the second roadside site the rare plant (*Carex bushii*) appears to have disappeared. At the wet meadow site, I was unable to assess the magnitude of the decline, if there has been a decline, because much of the site had recently been mowed when I conducted survey for *Carex bushii* (mowed plants are not identifiable).

As noted above, the reason or reasons for the decline in population numbers or disappearance of some rare plant occurrences is/are obscure. At these sites the habitat appears unchanged since the rare plant was previously documented. Some of these are roadside sites which had small populations, and one cannot know exactly what disturbances the site may have been subjected to over the years, except that some amount of vegetation management is assumed to have occurred. This may include mowing at some frequency, cutting back of woody vegetation and leaving brush or chip piles, and at some sites herbicide application. Deer predation may be a factor at some sites which had very small population sizes, such as two Endangered orchid occurrences. The apparent disappearance of the Special Concern annual *Aristida longespica* var. *geniculata* (Needlegrass) from several sites in Sand Barren habitat in the unfinished section of Rte. 11 is difficult to explain. Though much of the Sand Barren habitat has grown up into Red Cedar and Autumn Olive thicket there is still abundant suitable habitat. One hypothesis is that there has been less disturbance by ATVs in recent years than there was in 2005, when I first documented some of the sites, and in 2011, when plants were found by others in the vicinity of my 2005 sites and elsewhere. In 2020, it did not appear that there was much ATV activity at the site, and a certain amount of soil disturbance may be required by this species (I recently discovered a new site in the meridian of the completed part of Rte. 11 a little north of the Rte. 82 interchange, in a Sand Barren with wheel ruts).

Also, there are important things to keep in mind, regarding rare plant sites and occurrences at which the rare plants appear to have disappeared. At some rare plant sites, the habitat is such that the rare plants can be very hard to spot, and it is difficult to confidently determine that the rare plants are actually absent. This is especially true if the rare plant population size is small. An example is the Special Concern *Endodeca serpentaria* (Virginia Snakeroot), which sometimes grows in dense and diverse herbaceous vegetation that is as tall or taller than it is, which effectively camouflages the *Endodeca* plants. For this reason, one should resurvey a known site multiple times before concluding the rare plant is no longer present, and I have not deleted any of the rare plant sites from the GIS coverage that accompanies this summary report. I surveyed several *Endodeca* sites several times in 2019 and 2020, before finally rediscovering plants at each site.

Also, some rare plants may “come and go”; i.e., the rare plants may not be present as above ground plants in a given growing season, but show up in a subsequent growing season. Some perennial orchid species are known for this, and some annuals behave this way. An example of this is the tiny Endangered annual *Crassula aquatica* (Pygmyweed) which occurs in the upper part of the intertidal zone in fresh and brackish systems. I first

documented this species in Hamburg Cove in 2005, but could not find it at the site in either 2019 or 2020. There was no evident change to the habitat since 2005, so I was puzzled at its apparent disappearance. Then, in 2022, I revisited the site, and there it was. The explanation may be that it is a seed banker which occurs in a relatively dynamic environment, subject to both tides and high-energy periodic floods.