ATTACHMENT E

Attachment E

Evaluation of Impacts to State-Listed Species from Proposed Remedy (SED 9/FP 4 MOD)

(Prepared by AECOM for General Electric Company)

This attachment presents an evaluation of whether EPA's proposed remedy for the Rest of River, designated SED 9/FP 4 MOD, would cause a "take," as defined in 321 CMR 10.02, of the state-listed endangered, threatened, or special concern species that have Priority Habitat, as mapped by the Massachusetts Natural Heritage and Endangered Species Program (NHESP), within areas that would be disturbed by EPA's proposed remedy. This evaluation includes an assessment of the extent of the local population(s) of each such species and an assessment of whether EPA's proposed remedy would adversely impact a significant portion of the local population(s) of each such species. This evaluation builds and relies upon the detailed assessment presented in Appendix L to the October 2010 Revised Corrective Measures Study Report (RCMS), entitled "Revised Assessment of MESA Issues for Rare Species Under Remedial Alternatives." References in this Attachment to RCMS Appendix L refer to that 2010 appendix.

The total acreage of the mapped Priority Habitats of these species and the acreage of those Priority Habitats that would be impacted by EPA's proposed remedy is provided in Table E-1 at the end of this Attachment. That table does not include impacts from vernal pool remediation, but such impacts are included in the impact estimates in the body of this Attachment. Higher impact values given in this Attachment reflect the upper-bound vernal pool remediation (remediation of all pools with average PCB concentrations greater than 3.3 mg/kg and located outside of Core Area 1). Lower impact values reflect the remediation of 16 vernal pools (based on assuming an initial remediation of 8 pools via excavation and 8 pools via activated carbon application).

Evaluation of Impacts to State-Listed Species from Proposed Remedy (SED 9/FP 4 MOD)

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
American bittern 501 acres in Reach 5 120 acres in Reach 7 Core Area 2 Species	Yes in Reach 5 due to impact on 57-62 acres of bittern Priority Habitat (see Table C-6 of RCMS Appendix L for specific impacts that would result in a take). The higher end of the impact range reflects the upper-bound vernal pool remediation, which would add over 5 acres of impact. No in Reach 7 due to no impacts on bittern Priority Habitat.	Priority Habitat for the American bittern occurs in and contiguous to the Primary Study Area (PSA) in Reaches 5A, 5B and 5C (see Figure C-1 of RCMS Appendix L), and also in Reaches 7D and 7F downstream of the PSA (see Figure C-2 of that appendix). Based on the Priority Habitat mapping and the life-cycle characteristics of the American bittern, two distinct local populations of American bitterns have been identified and evaluated in this assessment. One population of American bitterns was determined to be represented by the mapped Priority Habitat in Reach 5, while the mapped habitat in Reach 7 has been considered to represent a separate and distinct local population. The distance between the southernmost Priority Habitat area within Reach 5 and the northernmost mapped habitat area in Reach 7 is approximately seven miles, encompassing at least 1,500 acres of Housatonic River corridor and floodplain. There are both ecological (habitat) and cultural conditions (e.g., roadways/ bridges, developed areas) through this separation zone that likely function to separate these discrete Priority Habitat areas. Although this species is capable of flight, the home ranges reported in the literature are smaller than the distance between these discrete mapped Priority Habitat areas. Because of the distance between the two discrete areas of mapped Priority Habitats and the relatively high site fidelity of this species, two different local populations of American bittern have been identified for assessment in this section of the Housatonic River.	Yes in Reach 5. Proposed remedy would impact about 11-12% of the total mapped Priority Habitat of this species in Reach 5, much of it high quality bittern habitat. Approximately 6% of the core area for this species would be impacted. The impacts of the river and floodplain remediation would include direct loss of foraging habitat, along with indirect impacts from increased noise, truck traffic, and other construction activities, all resulting in disruption of the bittern's activities in Reach 5 over 10 years. Particularly given the sensitivity and high site fidelity of this species, this long-term disruption of bittern habitat would adversely impact a significant portion of the local bittern population. NA in Reach 7 due to no take. Even if both the Reach 5 and the Reach 7 Priority Habitats were considered to encompass a single local population of the American bittern in the Housatonic River corridor, approximately 9% of the Priority Habitat would be impacted, and 6% of the core area for this species would be impacted. Given the apparent value/size of the Reach 5 habitat, the widespread and long-term disruption to that Priority Habitat area would likely adversely affect the suitability of the overall combined area for that local population.

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
Bald eagle 187 acres in Reach 5	Yes in Reach 5 due to 45-48 acres of impact within the bald eagle Priority Habitat (see Table D-6 of RCMS Appendix L for specific impacts that would result in a take).	The total Priority Habitat of the bald eagle in Reach 5C comprises approximately 187 acres, with 136 acres of this Priority Habitat within the PSA (see Figure D-1 of RCMS Appendix L). Given this species' large home range and capacity for long-distance flight, it is likely that the individual bald eagles which utilize the habitat within the Reach 5C could interact with other bald eagles in the western and central portions of Massachusetts. The 187-acre mapped Priority Habitat in Reach 5C may provide a core habitat for the individual breeding eagles and foraging activities at this location, with the local population for this species extending to other areas of suitable habitat in western and central Massachusetts (i.e., those areas also having large water bodies with shallow waters and abundant fish and surrounded by mature forest).	Unlikely. Proposed remedy would impact approximately 24-26% of the mapped Priority Habitat, including work in multiple years. While these impacts could result in abandonment of breeding and foraging sites in Reach 5C, it is unlikely that this loss would affect a significant portion of the local bald eagle population because that population is expected to extend well beyond the Reach 5C Priority Habitat.
Bristly buttercup 30 acres in Reach 5 Core Area 1 Species	Yes, due to 1.5 acres of impact within the bristly buttercup Priority Habitat (see Table V-5 of RCMS Appendix L for specific impacts that would result in a take).	Priority Habitat of the bristly buttercup occurs in two locations in Reach 5 (see Figure V-1 of RCMS Appendix L), and these are considered to comprise the local population of this species. The first area is 29 acres in the central portion of Reach 5A to the west of the Housatonic River. The second location consists of two small areas (each less than 0.5 acre in size) outside of the river channel along the east and west banks of the Housatonic River in the lower portion of Reach 5C Although these two occurrences are at different ends of Reach 5, roughly seven miles apart, seed dispersal over this distance is possible via river water, given the lack of significant constrictions or disruptions in river flow over this stretch of the Housatonic. Therefore, these mapped Priority Habitat areas are considered to comprise the local population of this species. There is no bristly buttercup Priority Habitat mapped in Reaches 6, 7 or 8.	No. Proposed remedy would only impact approximately 5% of the total mapped Priority Habitat of this species, and only a portion of this (0.6 acre) would take place in the floodplain (preferred habitat for this species). Approximately 3% of the core area for this species would be impacted.

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
Brook snaketail 205 acres in Reach 5 173 acres in Reach 7	Yes in Reach 5 due to 53-55 acres of impact within the brook snaketail Priority Habitat (see Table I-5 of RCMS Appendix L for specific impacts that would cause a take). No in Reach 7 due to no impacts on Priority Habitat.	Priority Habitat of the brook snaketail comprises 205 acres within Reach 5A, with 158 acres located within the PSA. The habitat extends from the confluence of the East and West Branches downstream for approximately two miles (see Figure I-1 of RCMS Appendix L). Additional Priority Habitat for the brook snaketail occurs downstream of Woods Pond, in Reach 7 of the Housatonic River. The habitat area begins in the proximity of the Route 7 Bridge in Reach 7F and continues downstream for about 2 miles to approximately the Stockbridge Golf Course Bridge (see Figure I-2 of RCMS Appendix L). The total Priority Habitat mapped in Reach 7 covers 173 acres. The Priority Habitats in Reach 5 and Reach 7 are considered to encompass separate local populations due to the various extents of unsuitable habitat conditions between Reach 5 and the beginning of the Priority Habitat in Reach 7. While adults of the species can fly, they are considered a short-flight species and no habitat is mapped for approximately 19 river-miles downstream of the southernmost Priority Habitat in Reach 5.	Yes in Reach 5. Proposed remedy would impact approximately 26-27% of the total Priority Habitat in that reach, including the entire larval Priority Habitat within Reach 5 (~ 25 acres). The latter impacts would cause direct mortality of any larvae present and alteration of their feeding habitat. In addition, over 28 acres of the floodplain Priority Habitat in Reach 5A would be impacted through vegetative clearing, which would adversely affect adults using those areas. The cumulative impacts of the sediment and floodplain remediation would result in impacts to a significant portion of the local population. See also Table I-5 of RCMS Appendix L. NA in Reach 7 due to no take.
Bur oak 454 acres in Reaches 5/6 24 acres in Reach 7 Core Area 1 Species	Yes in Reaches 5 and 6 due to impacting 27-28 acres of bur oak Priority Habitat (see Table W-6 of RCMS Appendix L for specific impacts that would cause a take). No in Reach 7 due to no impacts on Priority Habitat.	Priority Habitat of the bur oak occurs throughout Reaches 5B, 5C, and 6. The habitat begins from the extreme downstream section of Reach 5B and runs throughout Reach 5C, and in Reach 6 near the north, south and east shores of Woods Pond (see Figure W-1 of RCMS Appendix L). Approximately 24 additional acres of mapped Priority Habitat occur in two locations within Reach 7 between the Willow Mill Dam and South Street in Stockbridge, Massachusetts (see Figure W-2 of RCMS Appendix L). The first area is located on the southern side of the Housatonic River within floodplain forest habitat and is approximately 23 acres in size. The second area is less than 1 acre in size and is located to the north of the river in forested habitat approximately 1,000 feet outside of the	No. Proposed remedy would impact approximately 6% of the total Priority Habitat in Reaches 5/6. Approximately 2% of the core area for this species would be impacted. No impacts would occur within the Reach 7 Priority Habitat.

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
		floodplain. Based on the Priority Habitat mapping, the characteristics of the bur oak, distances between mapped areas, and ecological factors in the intervening areas, three distinct local populations of bur oak have been identified and evaluated. In Reaches 5 and 6, the bur oaks (and any of its propagules) within the entire 454 acres of Priority Habitat in Reaches 5B, 5C and 6 constitute a single local population. Those within the 23-acre bur oak Priority Habitat to the south of the Housatonic River in Reach 7 constitute a distinct local population given that this area is over 8 miles downstream from the local population in Reaches 5 and 6, and there are several impoundments and other cultural features (e.g., developed areas, road crossings, etc.) that would limit the distribution of bur oak downstream over this 8-mile distance. The bur oaks within the Priority Habitat area in Reach 7 to the north of the river also constitute a separate local population given its location outside of the Housatonic River floodplain.	
Common moorhen 427 acres in Reaches 5/6 10 acres in Reach 7 Core Area 2 Species	Yes in Reaches 5 and 6 due to impacting 104-108 acres of the Priority Habitat (see Table E-6 of Appendix L in the RCMS for specific impacts that would cause a take). No in Reach 7 due to no impacts on Priority Habitat.	Priority Habitat of the common moorhen in the Housatonic River corridor upstream of Woods Pond Dam occurs in Reaches 5A, 5C, and 6 (see Figure E-1 of RCMS Appendix L). No mapped habitat occurs for the common moorhen in Reach 5B. Two small habitat areas exist in Reach 5A to the north of Utility Drive, on the east side of the Housatonic River. A third, larger habitat area begins in the upper portion of Reach 5C and continues downstream into Woods Pond. The area of Priority Habitat associated with the common moorhen in Reaches 5 and 6 is 427 acres, 297 acres of which are within the lateral boundaries of the PSA. An additional 10 acres of Priority Habitat for the common moorhen occurs downstream of Woods Pond within Reach 7 of the Housatonic River between South Street and Ice Glen Road in Reach 7F (see Figure E-2 of RCMS Appendix L). Based on the current Priority Habitat mapping and the life-cycle characteristics of the common moorhen, two	Yes in Reaches 5 and 6. Proposed remedy would impact approximately 24-25% of the total Priority Habitat in those reaches, with those impacts occurring primarily in the aquatic and backwater habitats used by this species in Reaches 5C and 6. Approximately 10% of the core area for this species would be impacted. Habitat impacts would include the loss of preferred habitat conditions that support foraging activity, along with breeding and nesting activity. Those impacts would be extensive enough to affect a significant portion of the local population. NA in Reach 7 due to no take.

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
		distinct local populations of this species have been identified in Reaches 5 and 6 and Reach 7, respectively. The local population in Reaches 5 and 6 consists of the birds present in the entire 427-acre Priority Habitat in those reaches, including 297 acres within the PSA. The distance along the river corridor between the southernmost Priority Habitat area within Reach 6 and the mapped habitat area in Reach 7 is approximately nine miles. There are both ecological (habitat) and cultural conditions (e.g., roadways/bridges, developed areas) through this separation zone that are likely to separate the local populations of common moorhen using these distinct habitat areas. The seven miles between the Reaches 5/6 and Reach 7 Priority Habitat areas include significant breaks in habitat such as downtown Lee and the Massachusetts Turnpike. Given the strong site fidelity of the common moorhen, its short, local flight pattern, the small home range sizes of this species, and this separation in habitat, it is not plausible that there would be any significant interaction of common moorhens between the Reach 5/6 area and the Reach 7 area. While winter migration patterns may result in some encounters between individuals of these areas, these would likely be short, random encounters and not material to the function of the local populations.	
Creeper 103 acres in Reach 7	Yes, due to 2.7 acres of riverine impacts within the Priority Habitat of the creeper in Reach 7E, causing a take through burial or removal of creepers within sediment removal or capping areas.	Priority Habitat of the creeper occurs in three segments of the Housatonic River in Reach 7 (Reaches 7D, 7E, and 7F), comprising a total of 103 acres (see Figure J-1 of RCMS Appendix L). Based on the current Priority Habitat mapping, the habitat conditions through the mapped stretches of the River, and the life-cycle characteristics of the creeper, the three mapped Priority Habitats in Reach 7 encompass one local population of this species. In their larval stage, creepers are reliant upon host fish species. The home ranges of some of the known host species are small, but the distances between mapped Priority Habitat areas are well within the home ranges of some fish host species.	No. Impacts would occur to less than 3% of the Priority Habitat of this species.

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
Crooked-stem aster 15 acres in Reach 5 Core Area 1 Species	Yes, due to impacting 0.3 acre of the Priority Habitat of this species (see Table X-5 of the RCMS Appendix L for specific impacts that would cause a take).	Two mapped areas of Priority Habitat for crooked-stem aster occur in the southern portion of Reach 5B, both just south of New Lenox Road (see Figure X-1 in RCMS Appendix L). The larger of the two occurs along the west side of the river; a small area occurs to the west of this location beyond the floodplain. Based on the Priority Habitat mapping and the characteristics of this species, the local population of the crooked stem aster consists of the plants (and seeds or other propagules) of this species present in all of the mapped Priority Habitat in the above-described locations identified within Reach 5. Although the smaller mapped area occurs outside of the Housatonic River 100-year floodplain, the two areas are in close enough proximity to each other (less than 1000 feet apart) that transport of seeds by air or wildlife between these two locations is likely.	No. Proposed remedy would impact 2% of the total Priority Habitat.
Foxtail sedge 137 acres in Reach 5	Yes, due to 12-13 acres of impact within the floodplain portion of the foxtail sedge Priority Habitat (see Table AA-6 of the RCMS Appendix L for specific impacts that would cause a take).	Priority Habitat of the foxtail sedge comprises 137 acres (66 acres within the PSA), extending contiguously from Reach 5B, 1,200 feet north of New Lenox Road, to the northern edge of Reach 5C (see Figure AA-1 of RCMS Appendix L). The local population of this species consists of the foxtail sedge plants and propagules within the entire 137 acres of mapped Priority Habitat	Possibly. The floodplain remediation and access/staging areas would impact approximately 12-13 acres of the floodplain portion of the mapped Priority Habitat of this species, which comprises 9% of the total Priority Habitat. Much of this affected floodplain habitat appears suitable for this species.
Gray's sedge 148 acres in Reach 5 Core Area 1 Species	Yes, due to 3.4 acres (0.2 acre in the floodplain) of impact within the Gray's sedge Priority Habitat (see Table CC-6 of the RCMS Appendix L for specific impacts that would cause a take).	Priority Habitat for Gray's sedge occurs within Reach 5C, consisting of two areas separated by the Housatonic River from approximately 1 mile south of New Lenox Road to the southern extent of Reach 5C near Woods Pond (see Figure CC-1 of RCMS Appendix L). The Priority Habitat for Gray's sedge comprises approximately 148 acres, of which 118 acres are located within the PSA. The local population of the Gray's sedge consists of the Gray's sedge plants (and seeds or other propagules) present on both sides of the river within the entire 148-acre area of Priority Habitat mapped within Reach 5C.	No. Only a small proportion (<3%) of the Gray's sedge Priority Habitat would be impacted under proposed remedy, and only 0.2 acre would be in the floodplain, where this species is most likely to occur.

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
Hairy wild rye 27 acres in Reach 5 Core Area 1 Species	Yes, due to 1.2 acres of impact with the Priority Habitat of this species (see Table DD-5 of RCMS Appendix L for specific impacts that would cause a take).	Priority Habitat of hairy wild rye comprises 27 acres (19 in the PSA) in the central portion of Reach 5A northeast of the Pittsfield Wastewater Treatment Facility on the west side of the Housatonic River (see Figure DD-1 of RCMS Appendix L). The local population of this species consists of the plants and seeds of this species in the 27 acres of mapped Priority Habitat in Reach 5A.	No. Proposed remedy would impact only approximately 4% of the total Priority Habitat of this species. There would be no impacts to the 15.2-acre core area for this species.
Intermediate spike-sedge 275 acres in Reach 5 33 acres in Reach 7 Core Area 1 Species	Yes in Reach 5, due to the impact on 119-128 acres of the Priority Habitat of this species in Reach 5 (see Table EE-5 of RCMS Appendix L for specific impacts that would cause a take). No in Reach 7 due to no impacts on Priority Habitat.	Priority Habitat of the intermediate spike-sedge comprises 275 acres (267 acres in the PSA) extending through all of Reaches 5A and 5B and into the central portion of Reach 5C (see Figure EE-1 of RCMS Appendix L). An additional 33 acres of mapped Priority Habitat are located within Reach 7, to the south of the Route 102 Bridge in Lee, Massachusetts (see Figure EE-2 of RCMS Appendix L). The two Priority Habitat areas are considered to comprise two distinct local populations of this species. Given the distance between the population in Reach 5 and that in Reach 7 (approximately 6 miles), as well as the ecological conditions in the intervening area (e.g., Woods Pond and its dam, other impoundments and roadway crossings), these are considered separate local populations.	Yes in Reach 5. Proposed remedy would impact approximately 43-46% of the Reach 5 Priority Habitat, and much of this impact area consists of riverine edge, backwater, and open floodplain habitats that are suitable habitats for this species. Although there would be no impacts to the core area for this species, the impacts to extensive lengths of river margins and open wetland habitats likely to support colonies of this species would result in an impact to a significant portion of the local population. NA in Reach 7 due to no take.

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
Jefferson salamander 105 acres in Reach 5 417 acres in Reach 7 Core Area 1 Species	Yes in Reach 5, due to impacts on 4-5 acres of the Priority Habitat in Reach 5 (see Table B-4 of the RCMS Appendix L for specific impacts that would cause a take). No in Reach 7 due to no impacts on Priority Habitat.	Priority Habitat of the Jefferson salamander comprises 105 acres in the southern section of Reach 5B and the northern portion of Reach 5C, just north of Yokun Brook (see Figure B-1 of RCMS Appendix L). This mapped habitat includes a cluster of five vernal pools referred to as 46-VP-1 through 46-VP-5. Priority Habitat for the Jefferson salamander also occurs in the downstream portion of Reach 7. There are four separate mapped Priority Habitat areas located on both sides of the River in this reach (see Figure B-2 of RCMS Appendix L), totaling approximately 417 acres, and these are associated with 11 NHESP-certified vernal pools. Based on the Priority Habitat mapping and the life-cycle characteristics of the Jefferson salamander, two local populations of Jefferson salamanders have been identified and evaluated in this assessment – one in Reach 5 and one in Reach 7. The Priority Habitat areas in Reach 7 were considered to encompass a separate population from that in Reach 5, because those areas are separated from the Reach 5 Priority Habitat by more than 15 river miles, which far exceeds the migration capability of this species, and this intervening area contains numerous roads and substantial development which would further restrict movements by this species.	Unlikely in Reach 5. Due to limitations on work in Core Area 1, proposed remedy would have no direct impacts on any vernal pools within the core area for this species or the associated 100-foot buffer zones. Proposed remedy would impact approximately 4-5% of the total Priority Habitat, including 2 vernal pools (1.4 acres) within the Priority Habitat but outside the core area, and about 10% of the 100-foot buffer zones around 5 vernal pools within the Priority Habitat but outside the core area. Assuming these vernal pools are not directly used by the Jefferson salamander, it is unlikely that the collective disturbance from river remediation, floodplain work, and access/staging areas would impact a significant portion of this local population of Jefferson salamanders. NA in Reach 7 due to no take.

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
Longnose sucker 109 acres in Reach 7	Yes in the upstream portion of Reach 7, due the impact on 6.4 acres of the Priority Habitat of this species in this area (see Table G-2 in RCMS Appendix L for specific impacts that would cause a take). No in downstream portion of Reach 7 due to no impacts on Priority Habitat.	Priority Habitat for the longnose sucker occurs along two distinct segments of Reach 7 (see Figure G-1 of RCMS Appendix L). One extends for approximately 5.5 miles from the Columbia Mill Dam to just downstream of the Hop Brook/Housatonic River confluence (Reaches 7C and 7D). A second segment extends approximately 2.5 miles from the Glendale Dam almost to the end of Reach 7 (i.e., just upstream of the Rising Pond Dam impoundment; Reach 7H). The overall mapped Priority Habitat within Reach 7 covers a total of 109 acres. Based on the Priority Habitat mapping and the life-cycle characteristics of the longnose sucker, two distinct populations of longnose suckers have been identified and evaluated in this assessment. The two local populations are separated by nearly eight miles of river and two dams (i.e., Willow Mill Dam and Glendale Dam). The upstream local population likely uses Goose Pond Brook as one of its primary spawning grounds. Goose Pond Brook is classified as a Class B coldwater fishery. The second, downstream local population in Reach 7 likely uses Mohawk Brook, another coldwater fishery, as its primary spawning grounds	No in upstream portion of Reach 7, given direct impacts to small percentage of the Priority Habitat in this portion of Reach 7, and none in likely spawning grounds. NA in downstream Priority Habitat.
Mustard white 1636 acres in Reaches 5/6 Core Area 2 Species 1400 acres consist of floodplain habitat	Yes, due to impacts occurring in 244-255 acres of the mustard white Priority Habitat (see Table L-6 of the RCMS Appendix L for specific impacts that would cause a take). Approximately 74-85 acres of floodplain habitat would be impacted within the mustard white Priority Habitat.	Priority Habitat of the mustard white butterfly extends south contiguously from Reach 5A below the Holmes Road bridge, through all of Reach 5B and Reach 5C, and into the northern and eastern portions of Reach 6 (see Figure L-1 of RCMS Appendix L). The total Priority Habitat area of the mustard white butterfly is 1,636 acres, of which 899 acres are within the PSA. Based on the Priority Habitat mapping and the life-cycle characteristics of this species, the entire 1,636 acres of mapped Priority Habitat encompass the local population of this species. Little information on documented home ranges or dispersal distances for this species is available. However, the flight distances of this species appear limited and the species does not migrate seasonally.	Unlikely. Although proposed remedy would impact approximately 15-16% of the total mapped Priority Habitat of this species, only approximately 5-6% of the floodplain habitat (74-85 of 1400 acres) would be impacted. Further, proposed remedy would impact only approximately 7% of the core area for this species (17 of 240 acres), which was designated by NHESP as the area where the "vast majority" of this population is located.

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
Narrow-leaved spring beauty 22 acres in Reach 5 Core Area 1 Species	Yes, due to the impact on 1.7 acres of the Priority Habitat for this species (see Table FF-5 of the RCMS Appendix L for specific impacts that would cause a take).	Priority Habitat of narrow-leaved spring beauty occurs at two locations within Reach 5; one just north of New Lenox Road comprises 20 acres on both the east and west sides of the Housatonic River, and a smaller (2-acre) area occurs in the central section of Reach 5C (see Figure FF-1 of RCMS Appendix L). The local population includes both Priority Habitat areas, which together total 22 acres, of which 18 acres are located within the PSA. These two areas are separated by only approximately 1.2 miles. Since there are no natural or man-made impoundments between the two mapped habitat areas, seed transport from the upstream to downstream sections of Priority Habitat is highly probable.	Unlikely. Proposed remedy would impact approximately 8% of the total Priority Habitat, and impacts would not occur in much of the preferred habitat for this species.

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
Ostrich fern borer moth 196 acres in Reach 5 169 acres in Reach 7 Core Area 1 Species	Yes in Reach 5, due to the impact on 30-31 acres of the Priority Habitat for this species (see Table M-5 of RCMS Appendix L for specific impacts that would cause a take of this species). No in Reach 7 due to no impacts in Priority Habitat.	Priority Habitat of the ostrich fern borer moth comprises 196 acres in the northern portion of Reach 5A (176 acres in the PSA), just downstream of the Holmes Road Bridge (see Figure M-1 of RCMS Appendix L). An additional ostrich fern borer moth Priority Habitat area of 169 acres occurs within Reach 7, at the confluence of Hop Brook and the Housatonic River (see Figure M-2 of RCMS Appendix L). The two distinct Priority Habitat areas of the ostrich fern borer moth comprise separate local populations based upon several factors. Information on documented home ranges or dispersal distances for this species is not available; however, the flight distances of moths are typically limited compared to those of birds or of certain other flying invertebrates known for longer flights (e.g., painted ladies, monarch butterflies), and this species is not documented to migrate seasonally. In addition, literature reviews for this species indicate that the larvae of this species are restricted to habitats with moderate to dense stands of ostrich fern, and the adults are usually in close proximity to these areas. Given these characteristics, the migration capability of this species is far exceeded by the nearly 10 miles of river corridor that separates the two mapped Priority Habitat areas and which is fragmented by agriculture, roads, and development. Accordingly, the moths in the Reach 7 Priority Habitat are considered to constitute a separate local population from those in the Reach 5A Priority Habitat.	No in Reach 5. Although proposed remedy would impact approximately 15-16% of the total Priority Habitat in Reach 5, only 14 acres of the floodplain Priority Habitat suitable for this species' host plants (approximately 7% of the total Priority Habitat) would be impacted. The remaining impacts would occur in more open and wetter wetland and deeper water habitats that would not support ostrich fern growth. NA in Reach 7 due to no take.

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
Rapids clubtail 208 acres in Reach 5	Yes, due to impacts on 51-54 acres of this species' Priority Habitat (see table N-6 of the RCMS Appendix L for specific impacts that would cause a take).	Priority Habitat of the rapids clubtail comprises 208 acres (166 acres in the PSA), extending from the southern portion of Reach 5A, through all of Reach 5B, and into the northern part of Reach 5C (see Figure N-1 of RCMS Appendix L). Based on the Priority Habitat mapping and the life-cycle characteristics of the rapids clubtail, the larvae and adults of this species within the Priority Habitat in Reach 5 constitute the local population.	Possibly. Proposed remedy would impact approximately 24-26% of the total Priority Habitat. In-river remedial activities would occur over 33 acres (16%) of the Priority Habitat, which is all of the riverine portion of the Priority Habitat. While most of this remediation would consist of activated carbon (AC) application, the cumulative impacts of that application along with sediment removal within riverine habitats may affect the larval forms; and impacts to adjacent floodplain habitats would occur over 19 acres of the Priority Habitat, affecting adults of the species.
Riffle snaketail 147 acres in Reach 5	Yes, due to 38-39 acres of impact within this species' Priority Habitat (see Table O-5 of the RCMS Appendix L for specific impacts that would cause a take).	Priority Habitat of the riffle snaketail comprises 147 acres in the upstream portion of Reach 5A, from the confluence of the East and West Branches to a point just upstream of the Joseph Road housing development off East New Lenox Road (see Figure O-1 of RCMS Appendix L). Based on the current Priority Habitat mapping and the life-cycle characteristics of the riffle snaketail, the larvae and adults of this species within the mapped Priority Habitat in Reach 5A constitute the local population	Yes. Proposed remedy would impact approximately 26-27% of the total mapped Priority Habitat, including sediment removal over the entire larval habitat. Approximately 18 acres of impact would occur within riverine habitats and affect the larval forms. This would cause direct mortality of all larvae in the Priority Habitat and alteration of their feeding habitat. In addition, approximately 20 acres of the floodplain Priority Habitat in Reach 5A would be impacted through vegetative clearing, which would adversely affect adults using those areas.
Skillet clubtail 265 acres in Reach 7	Yes, due to 10 acres of impact within this species' Priority Habitat (see Table P-5 of the RCMS Appendix L for specific impacts that would cause a take).	Priority Habitat for the skillet clubtail in the Housatonic River corridor occurs downstream of the PSA in Reach 7 (see Figure P-1 of RCMS Appendix L). This 265-acre area encompasses the local population of this species.	No. Proposed remedy would impact approximately 4% of the total mapped Priority Habitat.

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
Spine-crowned clubtail 351 acres in Reach 5	Yes, due to 85-87 acres of impact within this species' Priority Habitat (see Table Q-5 of RCMS Appendix L for specific impacts that would cause a take).	Priority Habitat for the spine-crowned clubtail comprises 351 acres from the confluence of the East and West Branches through Reach 5A to the upstream limit of Reach 5B (see Figure Q-1 of RCMS Appendix L). This area encompasses the local population of this species.	Yes. Proposed remedy would impact approximately 24-25% of the total mapped Priority Habitat, and involve removal of all larval habitats (~ 45 acres). The latter would cause direct mortality of any larvae present and alteration of their feeding habitat. In addition, over 40 acres of the floodplain Priority Habitat in Reach 5A would be impacted through vegetative clearing, which would adversely affect adults using those areas.
Stygian shadowdragon 650 acres in Reach 7	Yes, due to 17 acres of impact within this species' Priority Habitat (see Table R-5 of RCMS Appendix L for specific impacts that would cause a take).	The Priority Habitat for the stygian shadowdragon occurs in two areas within Reach 7 of the Housatonic River (see Figure R-1 of RCMS Appendix L). One mapped Priority Habitat extends from the former Eagle Mill Impoundment and extends downstream for about 4 miles to just north of the Hop Brook confluence in Lee. The second Priority Habitat area is about 5 miles downstream of Hop Brook, beginning to the east of the Stockbridge Golf Club in Stockbridge (below the Route 7 bridge) and continuing downstream for approximately 4 miles, ending to the north of the intersection of Dugway and Glendale Roads downstream of Glendale Dam. Based on the Priority Habitat mapping, the habitat conditions between the two mapped areas, and the life-cycle characteristics of the stygian shadowdragon, the two mapped Priority Habitat areas in Reach 7 encompass a single local population of this species. Although there are nearly 5 miles between the two mapped Priority Habitat areas, there are few cultural, hydrologic, or ecological barriers along this stretch to serve as a discontinuity for the stygian shadowdragon.	No. Proposed remedy would impact <3% of the total mapped Priority Habitat.

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
Wapato 390 acres in Reach 5 Core Area 1 Species	Yes, due to 186-196 acres of impact within the wapato Priority Habitat (see Table HH-6 of RCMS Appendix L for specific impacts that would cause a take).	Priority Habitat of wapato comprises 390 acres from the Confluence of the East and West Branches of the Housatonic River through Reach 5 to the northern section of Reach 6 (see Figure HH-1 of RCMS Appendix L). This Priority Habitat encompasses the entire local population of wapato.	Yes. Proposed remedy would impact approximately 48-50% of the total mapped Priority Habitat. This figure includes about 24 acres of riverine habitat impact in Reach 5B due to AC application. However, even if that work were not considered, the proposed remedy would still impact 42-44% of the Priority Habitat, causing direct and extensive alteration of suitable muddy substrates, riverbanks, and shallow water environments inhabited by wapato in various portions of the PSA. This is more than enough to impact a significant portion of the local population.
Water shrew 41 acres in Reach 5	Yes, due to 8.5-11 acres of impact within the water shrew Priority Habitat (see Table F-5 of RCMS Appendix L for specific impacts that would cause a take).	Priority Habitat of the water shrew occurs within a section of riverine and floodplain habitat in the middle of Reach 5C (see Figure F-1 of RCMS Appendix L). The total Priority Habitat for the water shrew covers approximately 41 acres, with nearly 39 acres located within the PSA. Based on the Priority Habitat mapping and the life-cycle characteristics of the water shrew, the local population is considered to encompass the 41 acres of mapped Priority Habitat within Reach 5.	Yes. Proposed remedy would impact approximately 21-27% of the total mapped Priority Habitat of the water shrew. The impacts would adversely affect the species in all aspects of its life, from foraging within the river and backwater areas to use of floodplain habitats near the river for overwintering, breeding, nesting, protective cover, and secondary foraging. These impacts would affect a significant portion of the local population using this Priority Habitat.

Species Acres in Priority Habitat	Would a Take Occur?	Local Population Assessment	Impact on Significant Portion of Local Population?
Wood turtle 1448 acres in and upstream of Reach 5 (including 1375 acres in Reach 5 and 73 acres upstream of confluence). 984 acres in Reaches 7/8 Core Area 2 Species	Yes in Reach 5, due to 203-215 acres of impact within the wood turtle Priority Habitat in that reach (see Table A-8 of RCMS Appendix L for specific impacts that would cause a take). Yes in Reaches 7 and 8, due to 36 acres of impact in that Priority Habitat (see Table A-8 of RCMS Appendix L for specific impacts that would cause a take).	Based on review of the Priority Habitat mapping, the distances between distinct mapped areas, ecological characteristics of the intervening landscape, and documented home ranges or dispersal distances for this species, two local populations of wood turtle have been identified and assessed in these sections of the Housatonic River corridor – one occurring in (and upstream of) Reach 5, and a separate local population in Reaches 7 and 8 (see Figures A-1 and A-2 of RCMS Appendix L) . These two areas of mapped habitats are separated by approximately 8 miles of riparian corridor, including Woods Pond Dam, Columbia Mill Dam, downtown Lee, and Interstate 90. In addition, significant portions of the landscapes directly adjacent to the river in Reaches 7 and 8 are well developed on both sides of the river north of Interstate 90, and along the northern/western side of the river south of Interstate 90. These features significantly reduce landscape connectivity and likely prevent movement or dispersal of wood turtles between the upper and lower mapped Priority Habitat areas. The local population of wood turtles in Reach 5 consists of those present within the 1375 acres of mapped Priority Habitat in Reaches 5A, 5B, and 5C, plus the 73 acres of contiguous wood turtle habitat above the Confluence (a total of 1448 acres). The local population of wood turtles in Reaches 7 and 8 consists of those present within the 984 acres of wood turtle Priority Habitat mapped in these reaches.	Yes in Reach 5. Proposed remedy would impact approximately 14-15% of the wood turtle Priority Habitat within (and upstream of) Reach 5. The excavation of river sediments, riverbank stabilization, and removal of adjacent floodplain habitat would substantially reduce wood turtle habitat suitability at various locations throughout the PSA. Approximately 10% of the core area for this species (46 of 458 acres) would be impacted. These habitat alterations would be extensive enough to impact a significant portion of the local population. Unlikely for Reaches 7 and 8. Proposed remedy would impact less than 4% of the wood turtle Priority Habitat in those reaches.

Table E-1. Impacts of EPA's Proposed Remedy on Priority Habitats of State-Listed Species

Species	Total Priority Habitat Area (acres)			Impacted Area (acres)											
				Sediment Remediation			Floodplain Remediation			Staging Areas/Access Roads			Total		
	R5/6	R7/8	Total	R5/6	R7/8	Total	R5/6	R7/8	Total	R5/6	R7/8	Total	R5/6	R7/8	Total
American Bittern	501	120	621	31.3	0	31.3	14.7	0	14.7	11.4	0	11.4	57.3	0	57.3
Bald Eagle	187	0	187	44.0	0	44.0	0.3	0	0.3	0.9	0	0.9	45.3	0	45.3
Bristly Buttercup	30	0	30	0.9	0	0.9	0.5	0	0.5	0.1	0	0.1	1.5	0	1.5
Brook Snaketail	205	173	378	24.6	0	24.6	19.0	0	19.0	9.4	0	9.4	53.0	0	53.0
Bur Oak	454	24	478	11.7	0	11.7	6.4	0	6.4	8.8	0	8.8	26.9	0	26.9
Common Moorhen	427	10	436	101.9	0	101.9	0.4	0	0.4	1.3	0	1.3	103.6	0	103.6
Creeper	0	103	103	0	2.7	2.7	0	0	0	0	0	0	0	2.7	2.7
Crooked-stem Aster	15	0	15	0.1	0	0.1	0	0	0	0.2	0	0.2	0.3	0	0.3
Foxtail Sedge	137	0	137	13.3	0	13.3	3.5	0	3.5	8.1	0	8.1	25.0	0	25.0
Gray's Sedge	148	0	148	3.2	0	3.2	0	0	0	0.2	0	0.2	3.4	0	3.4
Hairy Wild Rye	27	0	27	0.9	0	0.9	0	0	0	0.2	0	0.2	1.2	0	1.2
Intermediate Spike-sedge	275	33	308	103.9	0	103.9	11.6	0	11.6	3.1	0	3.1	118.6	0	118.6
Jefferson Salamander	105	417	523	0.4	0	0.4	0.9	0	0.9	2.6	0	2.6	3.9	0	3.9
Longnose Sucker	0	109	109	0	6.4	6.4	0	0.1	0.1	0	0	0	0	6.4	6.4
Mustard White	1636	0	1636	169.5	0	169.5	34.6	0	34.6	39.6	0	39.6	243.7	0	243.7
Narrow-leaved Spring Beauty	22	0	22	0.3	0	0.3	0.8	0	0.8	0.6	0	0.6	1.7	0	1.7
Ostrich Fern Borer Moth	196	169	364	15.8	0	15.8	10.2	0	10.2	3.8	0	3.8	29.9	0	29.9
Rapids Clubtail	208	0	208	32.7	0	32.7	8.6	0	8.6	10.0	0	10.0	51.3	0	51.3
Riffle Snaketail	147	0	147	17.7	0	17.7	12.2	0	12.2	8.0	0	8.0	37.8	0	37.8
Skillet Clubtail	0	265	265	0	7.1	7.1	0	2.3	2.3	0	0.8	0.8	0	10.2	10.2
Spine-crowned Clubtail	351	0	351	44.5	0	44.5	25.8	0	25.8	14.4	0	14.4	84.6	0	84.6
Stygian Shadowdragon	0	650	650	0	13.2	13.2	0.0	2.5	2.5	0	0.9	0.9	0	16.6	16.6
Wapato	390	0	390	169.2	0	169.2	11.5	0	11.5	5.1	0	5.1	185.9	0	185.9
Water Shrew	41	0	41	7.1	0	7.1	0.1	0	0.1	1.3	0	1.3	8.5	0	8.5
Wood Turtle	1375	984	2359	109.6	34.2	143.8	42.6	0	42.6	50.6	1.9	52.5	202.8	36.1	238.9

Note: Impacted areas do not include impacts from vernal pool remediation.

R5/6 = Reaches 5 and 6

R7/8 = Reaches 7 and 8