

CONNECTICUT RIVER WATERSHED HABITAT ACCESS RESTORATION PLAN FOR ANADROMOUS FISHES



Connecticut River Migratory Fish Restoration Cooperative

103 East Plumtree Road

Sunderland, Massachusetts 01375

Approved by the CRMFRC on December 16, 2025

1. BACKGROUND

Prior to pervasive dam construction in the late 18th and early 19th century, anadromous fishes were abundant in the Connecticut River watershed including American Shad (*Alosa sapidissima*), Alewife (*Alosa pseudoharengus*) and Blueback Herring (*Alosa aestivalis*) {collectively referred to as river herring}, Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*), Shortnose Sturgeon (*Acipenser brevirostrum*), Rainbow Smelt (*Osmerus mordax*), Striped Bass (*Morone saxatilis*), Atlantic Salmon (*Salmo salar*), and Sea Lamprey (*Petromyzon marinus*) (Gephard & McMenemy, 2004). These fishes migrated inland to spawn and inhabit nursery habitat, with Atlantic Salmon historically migrating the farthest upstream, to Beechers Falls, Vermont (550 river kilometer, rkm), and more abundant species including American Shad and Blueback Herring migrating to Bellows Falls, Vermont (280 rkm). These fishes provided spring seasonal fisheries for Native Americans and later the early Colonial settlers in the region, and were considered valuable food and commercial resources (Gephard & McMenemy, 2004)

Dam construction began throughout the watershed shortly after the arrival of European settlers. The industrial revolution and the construction of dams to harness the power of the river reduced habitat connectivity that in turn altered fish populations. Many populations were further harmed by no or limited harvest restrictions of anadromous fishes. These factors resulted in a severe reduction in anadromous fishes range and abundance. Anadromous fish populations upstream of Holyoke, the first dam on the Connecticut River, plummeted prior to early/primitive fish passage being implemented at this site in the 1950s (primitive fish ladders had been built in the late 1800s at the dam that were ineffective before failing) (Gephard & McMenemy, 2004).

The present-day abundance of anadromous species remains a small percentage of historical levels and varies by species and location in the watershed. The watershed has lost several anadromous species over time including Rainbow Smelt, Atlantic Sturgeon, and Atlantic Salmon (following the 2012 cessation of a 45-year effort started in 1967 to restore the species). Restoration efforts during the past 40 years have improved anadromous fishes habitat and connectivity primarily by fish passage and in smaller scale barrier removals, resulting in a modest increase in some anadromous fishes abundance and some of their ranges in the watershed. Regulated water quality standards, installation of fish passage facilities, stocking of adult fish above barriers, and dam removals on the tributaries contribute to these successes. The passage of the Clean Water Act led to improved water quality conditions since the 1970s, although non-point sources, development, reduced riparian habitat and combined sewer overflow systems remain items of concern. Even with these positive advances in the Connecticut River, aquatic connectivity remains one of the largest obstacles to restoring these anadromous fish populations, their fisheries, and their ecological roles and functions.

2. PURPOSE STATEMENT

The purpose of the *Connecticut River Watershed Habitat Access Restoration Plan for Anadromous Fishes* (Plan) is to provide information on barriers to historic habitat to inform anadromous fishes restoration efforts. The Plan includes a companion Geographic Information System (GIS) that was developed to provide the most current information on these species' ranges, the locations and details of dams, details on existing fish passage measures, recommended measures, and related information. The goals, objectives, and recommendations of this Plan support the restoration of Connecticut River anadromous fishes access to historic habitat to inform state and federal management plan goals and objectives for these species developed for the Connecticut River by the Connecticut River Migratory Fish Restoration Cooperative (CRMFR) and its predecessor Connecticut River Atlantic Salmon

Commission (CRASC) as well as the Atlantic States Marine Fisheries Commission (ASMFC). Appendix A provides brief target species summary information. This Plan supports the mission of the Connecticut River Migratory Fish Restoration Cooperative, as well as the fisheries management efforts of the National Marine Fisheries Service (NOAA Fisheries), the United States Fish and Wildlife Service (USFWS), the Connecticut Department of Energy & Environmental Protection (CTDEEP), the Massachusetts Division of Fish and Wildlife (MassWildlife), the Massachusetts Division of Marine Fisheries (MADMF), the New Hampshire Fish and Game Department (NHFGD), and the Atlantic States Marine Fisheries Commission (ASMFC).

The GIS mapper tool is publicly accessible at the following hyperlink: [Connecticut River: Available Habitat for Migratory Fish](https://fws.maps.arcgis.com/apps/instant/exhibit/index.html?appid=a429753165834e7685173a67a426ca20). It may also be copy and pasted in a web browser: <https://fws.maps.arcgis.com/apps/instant/exhibit/index.html?appid=a429753165834e7685173a67a426ca20>. This Plan includes figures taken from the GIS and tabular data that describes relevant details on the defined species, barriers, fish passage status, habitat area and related details.

3. GOALS AND OBJECTIVES

Watershed-Level Goals and Objectives

Anadromous Species Goal: Coordinate the restoration, protection, and enhancement of anadromous fish populations and their historic habitats throughout the Connecticut River watershed. These habitats include spawning habitats, nursery habitats, and migratory routes for all life history events and life stages.

Objective 1. Improve habitat accessibility for anadromous fishes via dam or other barrier removal, or installation or improvement of safe, timely, and effective fish passage facilities at obstacles that prevent or delay fishes from accessing habitats.¹ Fish passage performance metrics for up and downstream passage have been developed for American Shad and American Eel in Federal Energy Regulatory Commission approved Comprehensive Plans (CRASC, Connecticut River American Shad Management Plan, 2020; CRASC, Connecticut River American Eel Management Plan, 2023). Passage performance metrics should be applied to all fish passage facilities for both up and downstream movement for all life stages.

Objective 2. Improve habitat access, quantity and quality to support successful reproduction, survival of life stages, juvenile development of anadromous fishes, and subsequent outmigration to the marine environment.

Objective 3. Identify habitats associated with barriers that are degraded or altered through study or monitoring, develop appropriate recommendations and measures for improvement, and seek to implement those recommendations and measures through regulatory and non-regulatory mechanisms to support anadromous fish restoration.

Strategies to help achieve the goal and objectives include:

1. Identify, prioritize and remove barriers or improve fish passage as discussed in this plan.

¹ Dam removal is the preferred option in nearly all cases where restoring fish passage is the goal. We recognize this is not always a feasible option. We recommend alternative strategies (e.g., installing or retrofitting fish passage structures, or rebuilding them based on current data and designs) where dam removal is infeasible.

2. Stocking of target anadromous fishes to facilitate habitat colonization or supplement the populations. This approach may include capture and transfer of pre-spawn fishes from lower in the basin into targeted habitat and/or hatchery-based life stages.
3. Population monitoring to assess progress toward goals and to determine effectiveness of any strategies to inform adaptive management.
 - Identify gaps in available data.
 - Propose and conduct surveys to update information and fill in data gaps.
 - Provide up-to-date data to inform decision making and adaptive management.
4. Research studies to answer management-based questions (e.g., movement and habitat use).
5. Build partnerships with watershed stakeholders to increase awareness and support.
6. Collaborate among local, state, and federal agencies to align management approaches and avoid duplication of effort.

At a high level, these needs demonstrate the broad scope of potential management strategies the Connecticut River Cooperative will consider meeting anadromous fish restoration goals. The recommendations in this plan not related to fish passage are synergistic with improved habitat access and beneficial to the watershed overall.

Species-Specific Goals

American Shad Goal: To restore and maintain a naturally-reproducing American Shad population to its historic range in the Connecticut River watershed at targeted management levels of both abundance and stock structure that will provide and maintain; (1) recreational fisheries in the four basin states, (2) traditional in-river commercial fisheries in Connecticut River, and (3) diverse ecological benefits derived from all life stages of American Shad in freshwater, estuarine and marine habitats (ASMFC 2022; CRASC 2020).

Blueback Herring and Alewife Goal: To restore and maintain a naturally reproducing Blueback Herring and Alewife population to their historic ranges in the Connecticut River watershed at targeted management levels of both abundance and stock structure, that will provide and maintain; (1) recreational fisheries in each species historic range, and (2) fully provide for the diverse ecological benefits derived from all life stages of river herring in freshwater, estuarine and marine habitats (CRASC 2004).

Sea Lamprey Goal: To restore and maintain runs of Sea Lamprey in the Connecticut River watershed for ecological benefits in historically accessible habitats (CRASC 2018).

Shortnose Sturgeon Goal: To support the Federal Recovery Plan of this endangered species population with the goal of de-listing this species from both the Federal (NOAA Fisheries) and State Endangered Species Acts (Commonwealth of Massachusetts and State of Connecticut).

Atlantic Sturgeon Goal: To support the Federal Recovery Plan of this endangered species population with the goal of de-listing this species from both the Federal (NOAA Fisheries) and State Endangered Species Acts (Commonwealth of Massachusetts and State of Connecticut).

4. BIOLOGICAL AND GEOGRAPHIC SCOPE OF THIS PLAN

Biological Scope

The biological scope of the Plan focuses on five target anadromous fish species (American Shad, Alewife, Blueback Herring, Sea Lamprey, and Shortnose Sturgeon) that have been negatively impacted by human made habitat barriers in the Connecticut River and will benefit from the goals, objectives, strategies and recommendations outlined in this Plan. We considered several other anadromous species including Atlantic Sturgeon, Atlantic Salmon (extirpated), Striped Bass (not a spawning stock), Rainbow Smelt (extirpated) and Atlantic Tomcod (extirpated). These species were designated non-targets in the Plan based on their present-day distribution, status, management and whether or not they were likely to benefit from the management recommendations in this Plan. American Eel are also not included in this Plan but are a species (catadromous life history) of active restoration and management interest to the Cooperative. An effort to describe the current and historic range extent of this species and barriers is in development by the CRMFRC (CRASC 2023).

Geographic Scope

The Connecticut River watershed is the largest in New England, draining an area greater than 2,848,987 hectares as it flows into Long Island Sound. The mainstem of the Connecticut River flows 653 kilometers through Vermont, New Hampshire, Massachusetts and Connecticut. The tidal portion of Connecticut River extends to approximately river kilometer 77 at Windsor Locks, Connecticut (Figure 1). The six largest tributaries, by size of the drainage area, to the mainstem Connecticut River are:

1. Chicopee River (MA) 186,738 hectares
2. White River (VT) 183,889 ha
3. Deerfield River (MA and VT) 172,234 ha
4. Farmington River (CT and MA) 157,730 ha
5. Passumpsic River (VT) 112,923 ha
6. Ashuelot River (NH) 108,780 ha

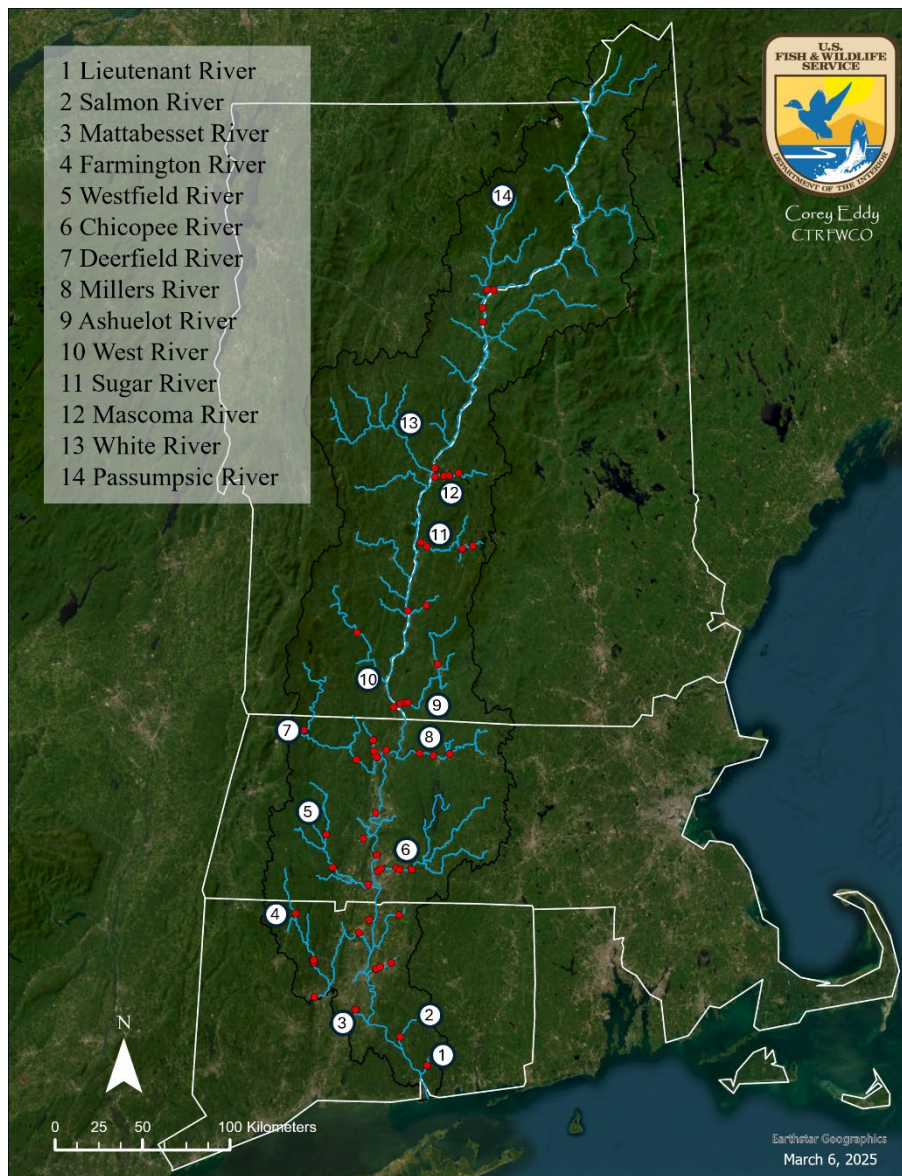


Figure 1. The Connecticut River Basin with select major tributary systems shown without any priority. Red dots indicate dam presence and also are for illustration purposes, with not all dams shown, rather select dams most relevant to this Plan.

The five dams on the mainstem of the Connecticut River, that span the ranges of the target anadromous species, each operates hydroelectric facilities. These dams and their federal project numbers are Holyoke (P-2004), Turners Falls (P-1889), Vernon (P-1904), Bellows Falls (P-1855) and Wilder (P-1892). All these dams and their associated hydropower facilities will provide some new or improved upstream and downstream fish passage and/or passage protections through the current Federal Energy Regulatory Commission’s relicensing process for the listed project (sole exception Holyoke).

5. METHODOLOGY

The restoration potential for target species was assessed using several analyses including: target species life history, current and historical anadromous fishes’ distributions, watershed barrier

inventory², and existing fish passage, including noted concerns. The Connecticut River Atlantic Salmon Commission developed several species-specific plans that define accessible and blocked historical habitat as well as an Atlantic States Marine Fisheries Commission required American Shad Habitat Plan:

- Connecticut River American Eel Management Plan (CRASC, Connecticut River American Eel Management Plan, 2023)
- Connecticut River American Shad Management Plan and Fish Passage Performance Addendum (CRASC, Connecticut River American Shad Management Plan, 2020)
- Connecticut River American Shad Habitat Plan (ASMFC, 2022)
- Connecticut River Sea Lamprey Management Plan (CRASC, Connecticut River Anadromous Sea Lamprey Management Plan, 2018)
- Management Plan for River Herring in the Connecticut River Basin 2004
- Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River, 1998

In addition to these, tributary specific diadromous fish restoration plans have been or are in development:

- Migratory Fish Restoration Plan for the Ashuelot River Basin, New Hampshire (New Hampshire Fish and Game, 2021)³
- The Plan to Restore Diadromous Fishes to the Farmington River Watershed (CTDEEP, in draft)

These documents each provided their own unique list of barriers in the watershed. These barriers were compiled into a list by the Coop Habitat Subcommittee that led to additional barriers being added to the list and geolocated. The compiled list of barriers affecting access to anadromous fish habitat is in the Appendix B that are products of the GIS mapper tool and its attributes table. Access to the GIS mapper is limited to USFWS with plans to complete additional steps to make this GIS fully public accessible before 2026 (process underway at time of this draft).

Historical distribution data include a variety of sources of information and/or historical publications with varied levels of details as well as early fisheries agency documents (Gephard & McMenemy, 2004; Noon, 2003; NHFG, 1939; Moffitt, Kynard, & Rideout, 1983) provide a useful summary on these species ranges in the basin. Recent CRASC target species abundance estimates has used passage data at the Holyoke Project because few quantitative fisheries surveys exist for anadromous fishes in the watershed. This Plan and its associated GIS represents the most current habitat mapping for anadromous species in the Connecticut River watershed.

6. KEY FINDINGS AND DISCUSSION

Access to the historic range of the five target species is highly variable, as shown in the GIS mapper tool and is further complicated by unknown passage effectiveness and delay in most cases at existing fishways. On the main stem river, measures to improve up and downstream passage measures have been developed and implemented at Holyoke Dam and its Hadley Falls Project (e.g., improvements to safely pass Shortnose Sturgeon with other target species). At the next upstream dam and hydropower projects at Turners Falls, the FERC relicensing process is nearing final stages and includes a signed Settlement Agreement on Fish Passage and Flows between the power company and the Massachusetts Department

² The barrier analysis was limited to FERC licensed project and non-hydropower dams within the historic range of anadromous fishes habitat.

³ FERC Accession # [20210318-5157](#)

of Fish and Game, NOAA Fisheries, the USFWS and The Nature Conservancy. Similarly, at the next upstream dams and hydropower projects Vernon, Bellows Falls and Wilder, an unsigned agreement regarding fish passage and operational flows were developed by the State of Vermont and New Hampshire and the USFWS. At the time of his Plan’s completion, FERC had released its draft NEPA document for the two company’s projects, which is a significant action in the process.

Table 1. Summary of high priority barriers in the Connecticut River watershed where upstream passage, via improvements to an existing fishway, installation of a new fishway, or through dam removal, will assist in the restoration of anadromous fishes. Refer to Appendix B, Table B-1 to see the complete list of barriers and more related information. Note, that barriers not identified as a priority in this Plan do not diminish the potential conservation benefits and value from either their removal or passage improvement.

Name	River	State	FERC P#	Upstream fishway	Anadromous Fish passage type	Alewife	Shad	Blueback	Sea Lamprey
Lower Millpond Dam	Mill Brook	CT		Yes	Alaskan Steeppass	Improve		Improve	
Moulson Pond Dam	EightMile	CT		Yes	Pool-and-Weir into Steeppass	Improve		Improve	Improve
Leesville Dam	Salmon	CT		Yes	Denil ladder	Remove		Remove	Remove
Rainbow* Dam	Farmington	CT		Yes	Vertical slot	Remove	Remove	Remove	Remove
Lower Collinsville Dam	Farmington	CT		No	None	Remove	Remove	Remove	Remove
Swartz Dam	Stonybrook	CT		No	None	Remove		Remove	Remove
D.F. Riley Grist Mill Dam	Mill, Hatfield	MA		No	None			Remove	Remove
Turners Falls Dam	Main stem	MA	1889	Yes	Ladders		Improve	Improve	Improve
Erving Paper Dam	Millers	MA		No	None		Remove	Remove	Remove
New Home Dam	Millers	MA	6096	No	None		Remove/ Install	Remove/ Install	Remove/ Install
Fiske Mill Dam**	Ashuelot	NH	8615	Yes	Fish lift		Remove	Remove	Remove
Ashuelot Paper Dam	Ashuelot	NH	7791	No	None		Install	Install	Install
Lower Robertson Dam	Ashuelot	NH	8235	No	None		Install	Install	Install
Keene/West Street Dam	Ashuelot	NH		No	None		Remove/ Install		Remove/ Install
Vernon Dam	Main stem	NH VT	1904	Yes	Vertical Slot		Improve	Improve	Improve
Vilas Pool Dam	Cold River	NH		No	None				Remove/ Install
River Rd culvert	East Putney Brook	VT		No	None				Improve
Currently has passage									

* Upstream passage is not being operated due to its ineffectiveness and untested and possibly insufficient downstream passage

**This dam/project is owned by TNC, seeking to surrender the FERC license and remove

Based on the review of the assembled information, including location, degree of negative impact to target species and stated goals, the highest priority barriers that are not part of an active relicensing

process are in two major tributaries that are over 90% devoid of native anadromous target species:

- 1) **Rainbow Dam**, its associated hydropower facility and its fish passage/protection measures, on the Farmington River in Windsor, Connecticut.
- 2) **Fiske Mill Dam** its associated hydropower facility and its fish passage/protection measures, on the Ashuelot River in Hinsdale, New Hampshire.

Based on factors such as number of dams downstream, drainage area, and potential available habitat, fishway status, other hydropower fish protections, two tributaries in the watershed were identified as highest priorities for providing improved and new access to habitat for American Shad, Blueback Herring, Alewife (Farmington River), and Sea Lamprey in the Farmington River in Connecticut and the Ashuelot River in New Hampshire.

Rainbow Dam is the first dam on the Farmington River in Windsor, Connecticut. While this dam generates electricity, the dam does not hold a license from FERC. The dam does have a fish ladder and separate downstream passage that had been operated by the State of Connecticut since 1976, but the fishway and was deemed ineffective by the State and ceased operations in 2023. Consequently, several non-profit organizations have engaged in discussions with the dam owner, Stanley Black and Decker on improvements to fish passage that had included removal. Those discussions are ongoing. The next upstream barrier is Lower Collinsville Dam, owned by the State of Connecticut and planned for removal. Upstream of this barrier is the Upper Collinsville Dam where the licensee installed upstream and downstream passage for anadromous and catadromous species in 2022.

Fiske Mill Dam is the first dam on the Ashuelot River in Hinsdale, New Hampshire. It is owned by The Nature Conservancy whose goal is to remove the dam for ecological benefits. The FERC license for the project has expired under FERC's procedures. Funding for this dam's removal is in development and planning stages.

7. CONCLUSION

Fish passage provisions and water quality improvements over the past several decades have improved conditions for anadromous fishes in the Connecticut River watershed. Much work remains to achieve management goals and objectives for anadromous fishes and their habitats. Ongoing and upcoming FERC licensing at hydropower projects, as well as license compliance actions, provide an opportunity to increase the amount of accessible habitat and improve habitat quantity and quality for anadromous fishes with diverse benefits noted earlier. This Plan is designed to inform the activities of the Connecticut River Migratory Fish Restoration Cooperative and other stakeholders in support of the restoration of anadromous fishes in the Connecticut River watershed over the next ten or more years. Recommended management and restoration strategies will facilitate this process and are designed to serve the goals of this Plan. This Plan, its identified barriers and recommendations should not preclude or diminish the value, consideration, or work on other barriers not identified in this Plan, for either removal or passage improvements.

The member agencies of the CRMFRC and their staff are limited to implementing actions in this Plan to the extent permitted by law and subject to the availability of staff and resources, in accordance with their respective missions, policies, and regulations. While this Plan does not commit staffing or funding resources of the state and federal agencies, where appropriate and as resources allow, the CRMFRC will strive to support implementing recommended strategies. The implementation of this Plan will likely be a broader collaborative effort comprising local, state, and federal resource agencies,

hydropower developers, and non-government organizations. Through a collaborative process, these stakeholders will guide the implementation of the proposed restoration activities. The collaborative process and the management framework that this Plan establishes will be progress toward the restoration, protection, and enhancement of anadromous fish stocks and their habitats in the Connecticut River watershed.

8. REFERENCES

- ASMFC. (2022). *American Shad Habitat Plan for the Connecticut River*. Atlantic States Marine Fisheries Commission. Retrieved from https://www.asmfc.org/files/ShadHabitatPlans/CRASC_CT_RiverAmShadHabitatPlan_May2022.pdf
- CRASC. (2004). *Management Plan for River Herring in the Connecticut River Basin*. USFWS, Sunderland, Massachusetts.
- CRASC. (2018). *Connecticut River Anadromous Sea Lamprey Management Plan*. Connecticut River Atlantic Salmon Commission. Retrieved from https://elibrary.ferc.gov/eLibrary/idmws/file_list.asp?accession_num=20200707-5132
- CRASC. (2020). *Connecticut River American Shad Management Plan*. Connecticut River Atlantic Salmon Commission. Retrieved from http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20200302-5300
- CRASC. (2023). *Connecticut River American Eel Management Plan*. Connecticut River Atlantic Salmon Commission. Retrieved from https://elibrary.ferc.gov/eLibrary/idmws/file_list.asp?accession_num=20230630-5046
- Gephard, S., & McMenemy, J. (2004). An Overview of the Program to Restore Atlantic Salmon and Other Diadromous Fishes to the Connecticut River with Notes on the Current Status of these Species in the River. In *The Connecticut River Ecological Study (1965-1973) Revisited: Ecology of the Lower Connecticut River 1973-2003* (pp. 287-314). American Fisheries Society Monograph 9.
- Moffitt, C. M., Kynard, B., & Rideout, S. G. (1983). Fish passage facilities and anadromous fish restoration in the Connecticut River basin. *Fisheries. A Bulletin of the American Fisheries Society*, 7(6), 2-11. doi:10.1577/1548-8446-7-6
- NHFG. (1939). *Biological Survey of the Connecticut Watershed*. Nashua, NH: New Hampshire Fish and Game Commission.
- Noon. (2003). *Fishing in New Hampshire, A History*. Warner, NH: Moose County Press.

Appendix A

Restoration summaries by species

The following is a brief background covering some species-specific background information for Alewife, Blueback Herring, American Shad, Sea Lamprey and Shortnose Sturgeon. For more detailed information refer to earlier cited management plans and other references cited.

Alewife

Alewife production occurs almost exclusively in Connecticut with very limited sampling of Alewife in annual river herring assessment work (2013-2025) by the USFWS in the Chicopee River, MA. The current 2004 CRASC Management Plan for River Herring is outdated and is planned for an update in 2026 by the Cooperative's Technical Committee. Many tributaries in Connecticut have had technical fishways installed to open access to river herring habitat, often with unknown levels of passage efficiency (Appendix B, Table B-1; Figure 2) with small dam removals also completed. A high proportion of the first fishways in each tributary have video counting systems operated by the CTDEEP.

The top three tributary watersheds listed in the 2004 River Herring Plan, by acres of potential river herring habitat are the Moodus River-lakes (157 ha), Lieutenant River-Rogers Lake (118 ha) and the Hockanum River (105 ha). Subcommittee members agree that the amount of available habitat for the Moodus (Gephard & McMenemy, 2004) River is erroneous and needs to be lowered substantially due to existing barriers and portions of this river being too steep for river herring to ascend as an example of information to update in that Plan. The subcommittee members also agree that the Farmington River needs to be included on this priority list as it provides a substantial amount of habitat for Alewife. The CTDEEP Plan to Restore Diadromous Fishes to the Farmington River Watershed, though not final at this time, provided data and other information to inform this Plan.

The Lieutenant River (Old Lyme, CT) is the tidal portion of Mill Brook, and therefore the three dams with fishways in this watershed are located above the head-of-tide on Mill Brook. Fish passage is provided into the headwater habitat of Rogers Lake. Downstream passage improvements are needed at the lowermost dam (Lower Millpond Dam). The other noted higher quantity habitat tributary, Hockanum River (East Hartford, CT) has a high density of dams. In 2022, Burnside Hydro provided a draft application for exemption for 10-megawatt (MW) hydroelectric project at the first dam on the Hockanum River to resource agencies. The Federal Energy Regulatory Commission has neither noticed this application nor has it assigned a project number to this application. The dam does not provide upstream passage. If this application does not proceed, the resource agencies agree that it is unlikely that fish passage will be provided here. In addition, two more dams are immediately upstream of this first dam and here too, fish passage is not provided. The Hockanum River is not stocked with any anadromous fishes.

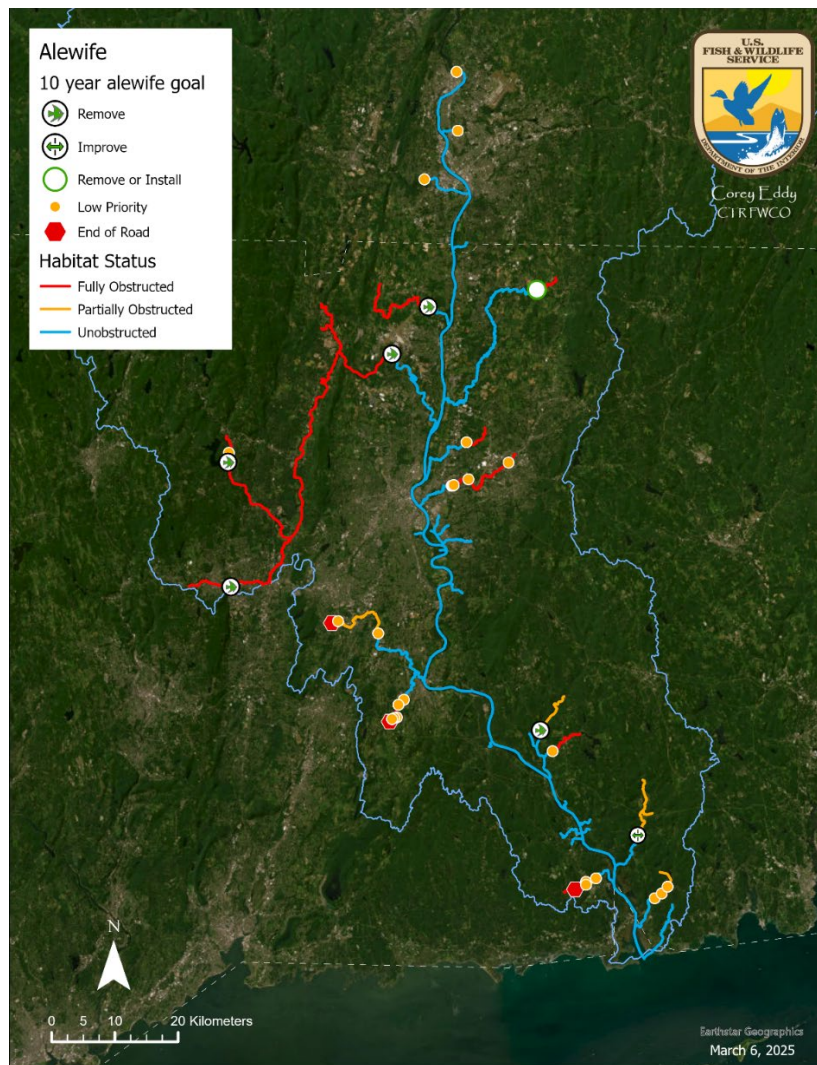


Figure A-1. The current management range (unobstructed, partially and fully obstructed) for Alewife in the Connecticut River basin. Barriers are shown as needing improved passage, recommended for removal or passage installation, and if a low priority passage concern. More tabular information on barriers and locations is in Appendix B, Table B1.

Blueback Herring

Blueback Herring historically ranged to Bellows Falls, Vermont on the mainstem as well as in numerous large to small tributaries. In Connecticut both Wethersfield Cove and White Oak Cove have been determined to be of important spawner use by acoustic tagging studies conducted in 2021 and 2024. Technical fishways at mainstem and tributary barriers provide varying degrees of access due to passage efficiencies that are not well studied (Appendix B-1; Figure 3). Since the late 1990s with what is characterized as a stock collapse, the State of Connecticut closed their waters to the taking of river herring in 2003, followed soon after by the Commonwealth of Massachusetts. Since the declines in annual numbers passed at Holyoke Fish Lift from the hundreds of thousands (1980s to early 1990s) to only hundreds or rarely a few thousand fish (2000 to current) the species is functionally extirpated from habitat upstream of Holyoke Dam with acoustic tagging study results supporting the hypothesis the fish are not reaching that far upstream in anything more than sparse abundance levels. There is no indication this decline is a function of a fish's passage issue at Holyoke. Since the collapse, the adult run utilizes

habitat below Holyoke, primarily in Connecticut and preferentially in tributaries and most notably coves (Sprankle, unpublished acoustic tagging study 2021 and 2024).

On the Farmington River, at Rainbow Dam in Windsor Connecticut, the Connecticut Department of Energy and Environment (CTDEEP) and other non-government organizations (NGO) continue to have discussions with Stanley Black & Decker about ways to improve fish passage at their dam. Improved fish passage at this project has been and will continue to be a priority for CTDEEP at this barrier. The Winchell-Smith Dam, was fully removed in 2025. The next upstream dam is the Lower Collinsville dam. This formerly FERC licensed project has not generated power for over 15 years. Federal funding has been awarded for the removal of this project and construction might begin in 2027. Finally, the Upper Collinsville dam is a FERC licensed project. The licensee of this project has installed upstream and downstream fish passage.

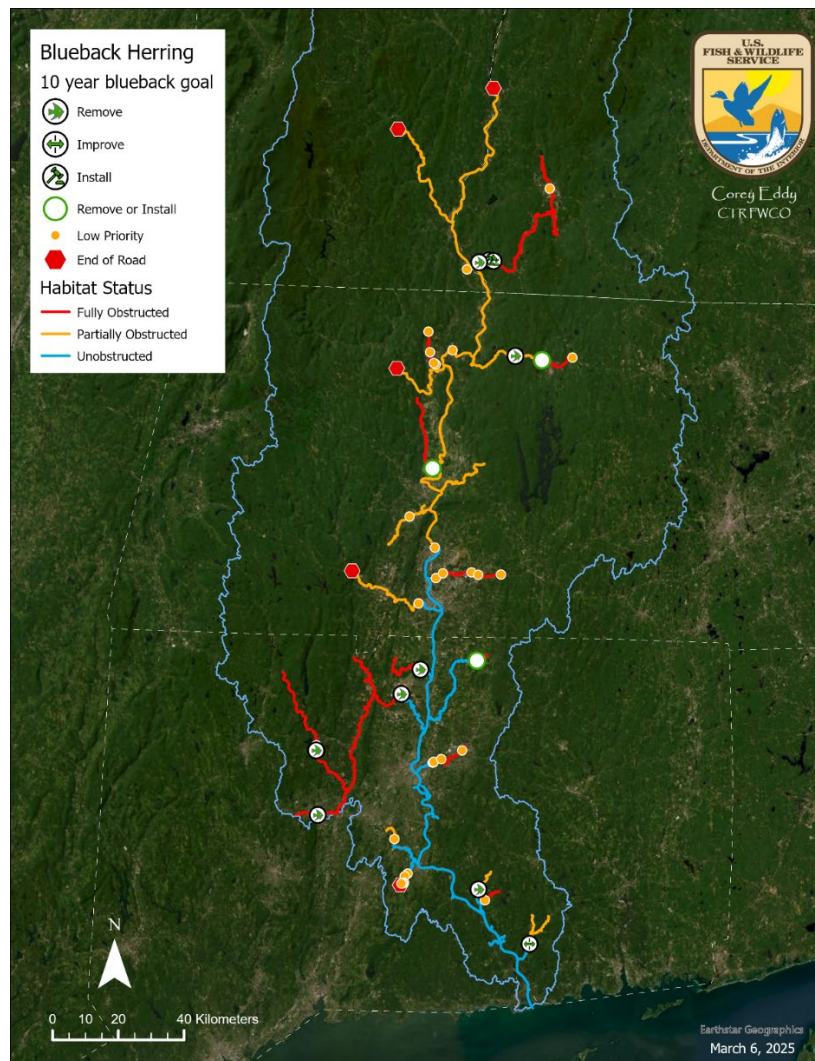


Figure A-2. The current management range (unobstructed, partially and fully obstructed) for Blueback Herring in the Connecticut River basin. Barriers are shown as needing improved passage, recommended for removal or passage installation, and if a low priority passage concern. More tabular information on barriers and locations is in Appendix B, Table B1.

Sea Lamprey

The historic range of Sea Lamprey in the Connecticut River basin is not known but is believed to

have been at least to the Fifteen Mile Falls area of the mainstem river where the “high dams” are located (Comerford Dam, rkm 452). Sea Lamprey may penetrate far into accessible tributaries such as the White River, Vermont for those able to pass at the lower main stem fishways (Figure 4). This species is known to use pheromone cues for adults (either from juveniles in nursery habitat or from other adults) to provide guidance to migrating pre-spawn fish moving upstream.

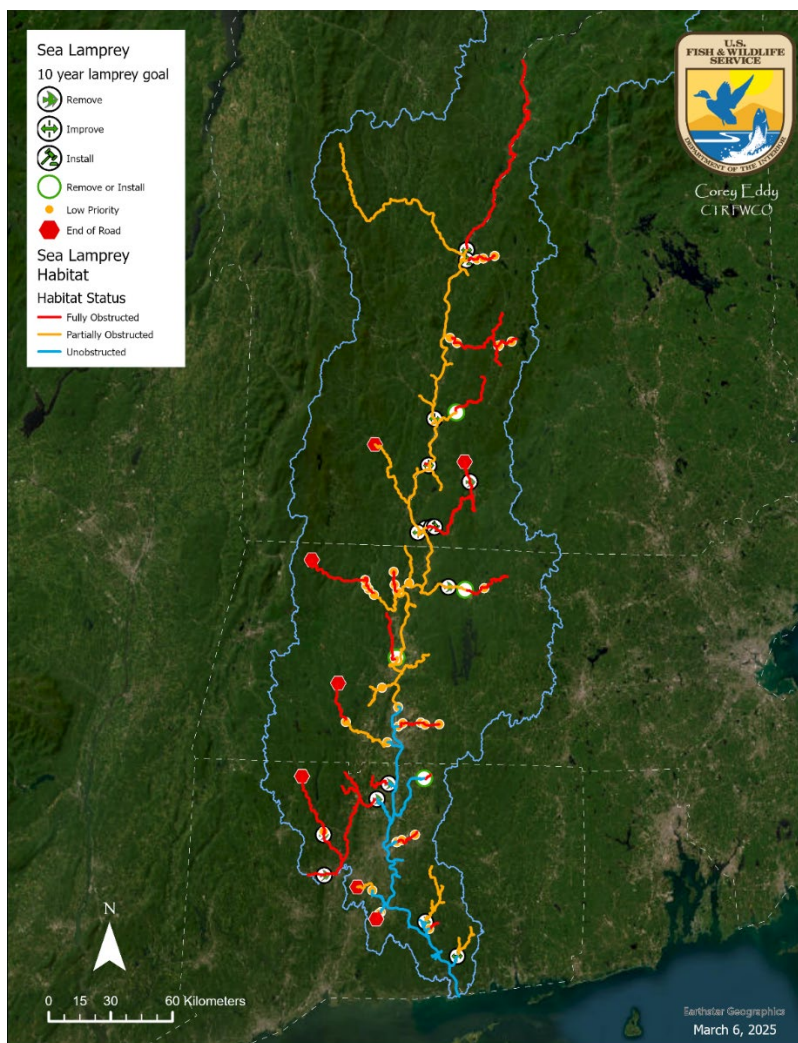


Figure A-3. The current management range (unobstructed, partially and fully obstructed) for Sea Lamprey in the Connecticut River basin. Barriers are shown as needing improved passage, recommended for removal or passage installation, and if a low priority passage concern. More tabular information on barriers and locations is in Appendix B, Table B1.

American Shad

The Connecticut River Atlantic Salmon Commission developed two plans to benefit American Shad within the Connecticut River watershed. The American Shad Habitat Plan for the Connecticut River, submitted to the ASMFC, discusses barriers that affect shad passage, and it provides habitat summaries for ten tributaries that contribute flow and provide habitat to the mainstem Connecticut River⁴. CRASC also developed the Connecticut River American Shad Management Plan (revised 2022) that provides management objectives and passage performance standards for fishways within the watershed⁵. FERC has approved both of these plans as Comprehensive Plans⁶. Both of these plans provide biological and management information on this species.

In 2023, FirstLight reached an agreement with the resource agencies (MADFW, NOAA, and USFWS) and the Nature Conservancy that covered fish passage and flows at its Turners Falls and Northfield Mountain Pumped Storage projects⁷. Given the available information, the focus of fish passage improvements was on American Shad. The U.S. Fish and Wildlife Service (USFWS) as well as the National Marine Fisheries Service (NMFS) submitted to the FERC fishway prescriptions and conservation recommendations (May 2023) that were consistent with the agreed upon measures in the settlement agreement. Similarly, Great River Hydro also reached an informal agreement with Vermont and New Hampshire agencies and the USFWS for their Vernon, Bellows Falls and Wilder dam/projects. The USFWS submitted to FERC its preliminary fishway prescription and conservation recommendations also in May of 2023.

Given the fish passage that has been implemented, the dam removals that have occurred or are anticipated to occur, and the relevant management plans for shad, the Farmington River in Connecticut and the Ashuelot River in New Hampshire are two tributaries to the Connecticut River that have been identified as priorities for American shad restoration.

4 The plan is available for download from the ASMFC website [here](#): (Accessed Jan 23, 2025)

5 Available from the FERC e-library here: FERC Accession # [20200302-5300](#)

6 FERC's approval of the management plan: FERC Accession # [20200706-3007](#)

FERC's approval of the habitat plan: FERC Accession # [20230914-3027](#)

7 FERC's received agreement: FERC Accession # 20230331-5600

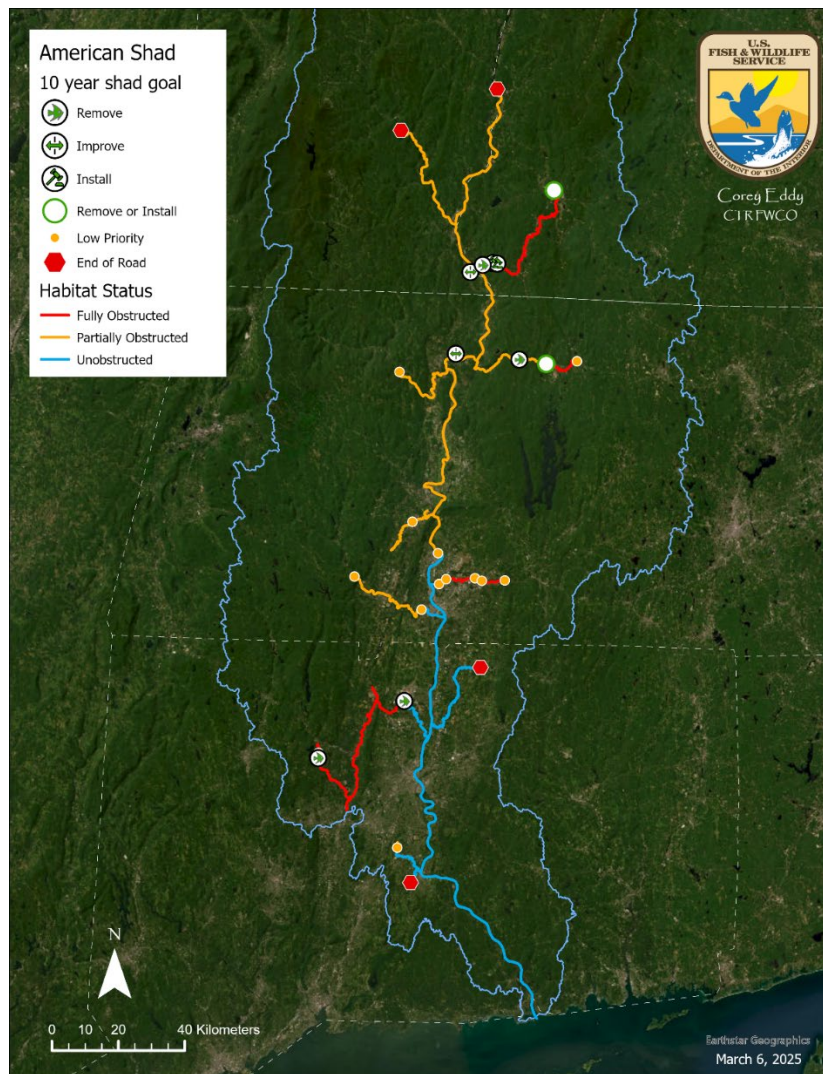


Figure A-4. The current management range (unobstructed, partially and fully obstructed) for American Shad in the Connecticut River basin. Barriers are shown as needing improved passage, recommended for removal or passage installation, and if a low priority passage concern. More tabular information on barriers and locations is in Appendix B, Table B1.

Shortnose Sturgeon

The Shortnose Sturgeon is a federally listed Endangered Species that NOAA Fisheries has lead authority on. The Commonwealth of Massachusetts and the State of Connecticut also both list this species in the Connecticut River as endangered under their state statutes. Research has confirmed two spawning locations 1) rock dam and immediate downstream shoals Turners Falls, MA and 2) Holyoke main stem habitat, Holyoke, MA. In 2017, NOAA Fisheries approved the passage of Shortnose Sturgeon at the modified spillway lift entrance at Holyoke Gas and Electric’s Hadley Falls Station. In immediate prior years, new downstream passage and protection measures were completed and evaluated to NOAA’s approval to allow the new upstream passage measures. From 2017 to 2024 over 400 Shortnose Sturgeon have been passed upstream.

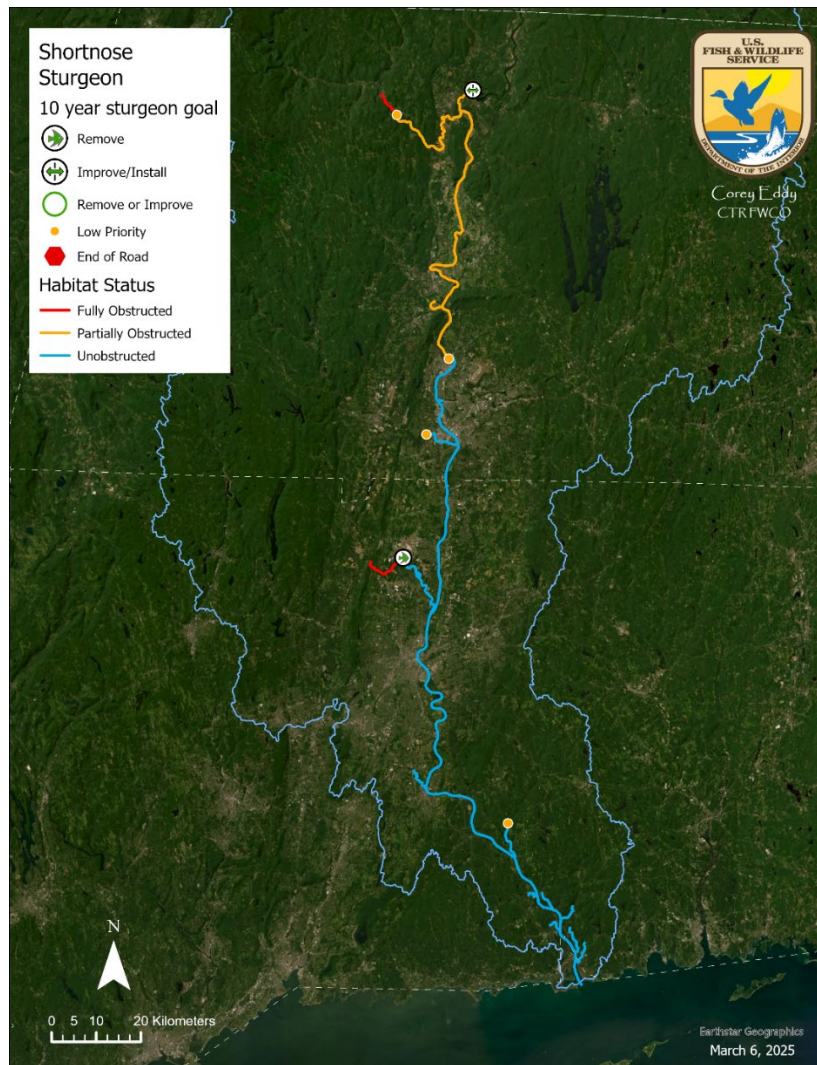


Figure A-5. The current management range (unobstructed, partially and fully obstructed) for Shortnose Sturgeon in the Connecticut River basin. Barriers are shown as needing improved passage, recommended for removal or passage installation, and if a low priority passage concern. More tabular information on barriers and locations is in Appendix B, Table B1

Appendix B

Identified Barriers in the Connecticut River Watershed

Table B-1. Barriers that effect American Shad, Alewife, Blueback Herring, and Sea Lamprey. Habitat is based on length and not area estimates that may vary based on watershed impoundment of natural waterbody features. Priority passage need may include preferred removal (e.g., Fiske Mill) or technical fishway improvements in either up and/or downstream measures (FERC licensed projects and new license conditions).

State	River	Dam Name	Fish passage type	Latitude	Longitude	Alewife Priority Passage Need or Improvement*	Total Habitat Above ALE (rkm)	American Shad Priority Passage Need or Improvement*	Total Habitat Above SHAD	Blueback Priority Passage Need	Total Habitat Above BBH (rkm)	Sea Lamprey Priority Passage Need	Total Habitat Above SL (rkm)
CT	Mill Brook	Lower Millpond Dam	Alaskan Steeppass	41.337949	-72.320419	High*	5.1	Not Applicable		Not Applicable	5.1	Low	TBD
CT	Mill Brook	Upper Millpond Dam	Alaskan Steeppass	41.343272	-72.310634	Low	3.8	Not Applicable		Mod	3.8	Low	TBD
CT	Mill Brook	Rogers Lake Dam	Alaskan Steeppass	41.350435	-72.302326	Low	2.6	Not Applicable		Mod	2.6	Not Applicable	
CT	Falls River	Tiley-Pratt Dam	Stone Pool and Weir	41.352296	-72.418125	Low	3.4	Not Applicable		Low	3.4	Low	TBD
CT	Falls River	Dolan Pond Dam	Alaskan Steeppass	41.355294	-72.418130	Low	3.8	Not Applicable		Low	3.8	Low	TBD
CT	Falls River	Mill Pond Dam	Alaskan Steeppass	41.359086	-72.404039	Low	5.7	Not Applicable		Low	5.7	Low	TBD
CT	Falls River	Ivoryton Pond Dam	None	41.347499	-72.433698	Low	1.7	Not Applicable		Low	1.7	Low	TBD
CT	EightMile River	Moulson Pond Dam	Denil ladder	41.404943	-72.344489	Mod	9.9	Not Applicable		Mod	16.1	High	23.6
CT	Salmon River	Leesville Dam	Denil ladder	41.516682	-72.483085	Mod	6.0	Not Applicable		Mod	6.0	High	42.3
CT	Moodus River	Johnson Mill Pond Dam	End of Road	41.494458	-72.465653	Not Applicable		Not Applicable		Not Applicable		Not Applicable	
CT	Mattabasset River	Mattabasset River Dam	Denil ladder	41.619453	-72.713287	Low	11.8	Low	1.4	Low	4.8	Low	11.8
CT	Mattabasset River	Kensington Dam	Alaskan Steeppass	41.632389	-72.770319	Mod	1.3	Low	TBD	Mod	1.3	Low	1.3
CT	Mattabasset River	Sherwood Falls Dam	End of Road	41.630320	-72.779173	Not Applicable		Not Applicable		Not Applicable		Not Applicable	
CT	Coginchaug River	Starr Mill Pond Dam	None	41.548904	-72.677023	Low	4.7	Not Applicable		Low	4.7	Low	4.7
CT	Coginchaug River	Spring Street Dam	None	41.543427	-72.684572	Low	3.5	Not Applicable		Low	3.5	Low	3.5
CT	Coginchaug River	Coginchaug River Dam #2	None	41.530389	-72.686816	Low	1.4	Not Applicable		Low	1.4	Low	1.4
CT	Coginchaug River	Wadsworth Falls Dam #2	None	41.529447	-72.690468	Low	1.0	Not Applicable		Low	1.0	Low	1.0
CT	Coginchaug River	Coginchaug River Dam #1	None	41.528640	-72.693920	Low	0.6	Not Applicable		Low	0.6	Low	0.6
CT	Coginchaug River	Wadsworth Falls Dam	End of Road	41.525742	-72.697043	Not Applicable		Not Applicable		Not Applicable		Not Applicable	
CT	Hockanum River	Burnside Co Dam #2	None	41.775593	-72.608778	Mod	12.8	Not Applicable		Mod	12.8	Mod	12.8
CT	Hockanum River	Burnside Co Dam #1	None	41.775606	-72.607575	Mod	12.7	Not Applicable		Mod	12.7	Mod	12.7
CT	Hockanum River	Cellu Co Dam	None	41.776503	-72.606308	Mod	12.6	Not Applicable		Mod	12.6	Mod	12.6
CT	Hockanum River	Laurel Lake Dam	None	41.782710	-72.585026	Mod	9.8	Not Applicable		Mod	9.8	Mod	9.8
CT	Hockanum River	Union Pond Dam	None	41.800206	-72.528268	Mod	1.4	Not Applicable		Mod	1.4	Mod	1.4
CT	Podunk River	Podunk Pond Dam	None	41.821525	-72.588118	Low	4.8	Not Applicable		Low	4.8	Not Applicable	
CT	Farmington River	Rainbow Dam	Vertical slot	41.914920	-72.693895	High	86.1	High	63.5	High	105.2	High	120.3
CT	Farmington River	Lower Collinsville Dam	Slated for removal	41.800468	-72.926789	High	4.2	High	4.2	High	24.0	High	27.7
CT	Farmington River	Upper Collinsville Dam	Denil ladder	41.810403	-72.925731	Mod	2.4	Mod	2.4	Mod	22.3	Mod	26.0
CT	Farmington River	Goodwin (Hogsback) Dam	End of Road	41.989191	-73.020099	Not Applicable		Not Applicable		Not Applicable		Not Applicable	
CT	Pequabuck River	Bristol Brass Dam	Slated for removal	41.668702	-72.922814	Mod	5.6	Not Applicable		Mod	5.6	Mod	6.8
CT	Pequabuck River	Middle Pond Dam and dike	End of Road	41.682027	-73.020560	Not Applicable		Not Applicable		Not Applicable		Not Applicable	
CT	Scantic River	Somersville Pond Dam	None	41.982618	-72.487832	Mod	4.8	Not Applicable		Mod	4.8	Mod	4.8
CT	Stonybrook River	Swartz Dam	None	41.964707	-72.642177	High	15.7	Not Applicable		High	15.7	High	15.7
MA	Westfield River	West Springfield (DSI)	Denil ladder	42.099005	-72.647682	Low	23.9	Low	23.9	Mod	23.9	Low	42.4
MA	Westfield River	Woronoco Dam	None	42.164756	-72.828743	Not Applicable		Not Applicable		Not Applicable		Low	18.2
MA	Westfield River	Knightville Dam	None	42.289496	-72.862325	Not Applicable		Not Applicable		Not Applicable		Low	TBD
MA	Chicopee River	Dwight Street Dam	None	42.149882	-72.600213	Low	TBD	Low	18.3	Low	18.3	Low	18.3
MA	Chicopee River	Chicopee Dam	None	42.159929	-72.581007	Low	TBD	Low	15.4	Low	15.4	Low	15.4
MA	Chicopee River	Indian Orchard Dam	None	42.161958	-72.502467	Low	TBD	Low	7.7	Low	7.7	Low	7.7

MA	Chicopee River	Putts Bridge Dam	None	42.156363	-72.484440	Low	TBD	Low	5.5	Low	5.5	Low	5.5
MA	Chicopee River	Collins Dam	None	42.157072	-72.422538	Low	TBD	Low	TBD	Low	TBD	Low	TBD
MA	Connecticut River	Holyoke Dam	Fish lift	42.211895	-72.602309	Low	TBD	Mod	142.8	Mod	142.8	Mod	307.9
MA	Manhan River	Manhan Dam	Denil ladder	42.274442	-72.671854	Low	TBD	Mod	4.4	Low	12.1	Low	15.2
MA	Mill River	D.F. Riley Grist Mill (Advocate) Dam	None	42.371531	-72.608419	Low	TBD	Not Applicable		High	24.3	High	24.3
MA	Deerfield River	Great River Hydro	None	42.573254	-72.706730	Not Applicable		Not Applicable		Not Applicable		Low	38.7
MA	Deerfield River	Gardners Falls Dam	None	42.591533	-72.730121	Not Applicable		Not Applicable		Not Applicable		Low	35.6
MA	Deerfield River	Deerfield No. 3 Dam	None	42.602608	-72.739616	Not Applicable		Not Applicable		Not Applicable		Low	33.9
MA	Deerfield River	Deerfield No. 4 Dam	None	42.619946	-72.745230	Not Applicable		Not Applicable		Not Applicable		Low	29.5
MA	Deerfield River	Fife Dam	End of Road	42.684746	-72.977264	Not Applicable		Not Applicable		Not Applicable		Not Applicable	
MA	Green River	Wiley Russell Dam	None	42.580902	-72.599720	Low	TBD	Not Applicable		Mod	11.7	Mod	11.7
MA	Green River	Greenfield EL&P Dam	None	42.583471	-72.604916	Low	TBD	Not Applicable		Mod	11.2	Mod	11.2
MA	Green River	Swimming Pool Dam	None	42.605417	-72.616172	Low	TBD	Not Applicable		Low	7.6	Low	7.6
MA	Green River	Pumping Station Dam	None	42.646830	-72.620564	Low	TBD	Not Applicable		Not Applicable		Low	TBD
MA	Connecticut River	Turners Falls Dam	3 fish ladders (Vert, Slot and Ice Harbor)	42.609791	-72.554059	Low	TBD	High*	83.2	High*	83.2	High*	248.3
MA	Millers River	Erving Paper Dam	None	42.598213	-72.382332	Low	TBD	Low	17.4	High	17.4	High	31.8
MA	Millers River	New Home Dam	None	42.589339	-72.310215	Low	TBD	Low	10.3	High	10.3	High	24.7
MA	Millers River	Crescent Street Dam	None	42.594446	-72.226776	Low	TBD	Low	TBD	Low	TBD	Mod	14.4
NH	Ashuelot River	Fiske Mill Dam	Fish Lift (defunct)	42.785715	-72.481388	Not Applicable		High	41.5	High	65.0	High	65.0
NH	Ashuelot River	Ashuelot Paper Dam	None	42.789703	-72.454804	Not Applicable		High	38.8	High	62.2	High	62.2
NH	Ashuelot River	Lower Robertson Dam	None	42.788877	-72.442267	Not Applicable		High	37.7	High	61.2	High	61.2
NH	Ashuelot River	Keene/West Street Dam	None	42.933504	-72.289060	Not Applicable		Low	11.1	High	11.1	High	11.1
NH	Ashuelot	Surry Dam	End of Road	42.997372	-72.312126	Not Applicable		Not Applicable		Not Applicable		Not Applicable	
VT/NH	Connecticut River	Vernon Dam	Ice Harbor & Vertical Slot	42.771855	-72.514836	Low	TBD	High*	50.8	High*	50.8	High*	215.8
VT	West River	Townsend ACOE Dam	None	43.052411	-72.702868	Not Applicable		Not Applicable		Not Applicable		Mod	TBD
NH	Cold River	Vilas Pool Dam	None	43.153869	-72.348389	Not Applicable		Not Applicable		Not Applicable		Mod*	26.2
VT/NH	Connecticut River	Bellows Falls Dam	Vertical Slot	43.133843	-72.442641	Not Applicable		Not Applicable	TBD	Not Applicable		High*	165.1
NH	Sugar River	Sweetwater Dam	None	43.390649	-72.375965	Not Applicable		Not Applicable		Not Applicable		Low	65.8
NH	Sugar River	Lower Valley Dam	None	43.374505	-72.346264	Not Applicable		Not Applicable		Not Applicable		Low	60.4
NH	Sugar River	Gordon Woolen Mill Pond Dam	None	43.364497	-72.165498	Not Applicable		Not Applicable		Not Applicable		Low	10.9
NH	Sugar River	Sugar River Dam	None	43.366550	-72.162548	Not Applicable		Not Applicable		Not Applicable		Low	10.6
NH	Sugar River	Wendall Marsh Dam	None	43.377936	-72.107560	Not Applicable		Not Applicable		Not Applicable		Low	2.8
VT/NH	Connecticut River	Wilder Dam	Pool and Weir	43.666702	-72.303348	Not Applicable		Not Applicable		Not Applicable		High*	95.8
NH	Mascoma River	Glen Road Hydro Dam	None	43.635221	-72.303771	Not Applicable		Not Applicable		Not Applicable		Low	15.0
NH	Mascoma River	Rivermill Hydro Dam	None	43.637814	-72.257900	Not Applicable		Not Applicable		Not Applicable		Low	9.5
NH	Mascoma River	Lebanon Water Treatment	End of Road	43.639993	-72.230081	Not Applicable		Not Applicable		Not Applicable		Low	5.7
NH	Mascoma River	Mascoma Lake Dam	None	43.648636	-72.181801	Not Applicable		Not Applicable		Not Applicable		Not Applicable	
VT	East Putney Brook	River Rd culvert	None	42.985707	-72.468616	Not Applicable		Not Applicable		Not Applicable		High	1.8