

Housatonic River Basin Natural Resources Restoration Project  
Natural Resources Trustee SubCouncil for Connecticut  
Request for Supplemental Information (RSI)  
INSTRUCTIONS

RECEIVED  
JUN 19 2007  
INLAND FISHERIES

**PART A: SPONSOR AND PROJECT SUMMARY FORM**

Please read "Request for Supplemental Information (RFI) OVERVIEW" and this document,  
"Request for Supplemental Information (RSI) INSTRUCTIONS" before completing this form.

Part A must be completed using this "Sponsor and Project Summary Form"

**SPONSOR INFORMATION**

**Type of Entity** Check the box that best describes the sponsor.

- |  |  |
|--|--|
| <input type="checkbox"/> Private individual          | <input type="checkbox"/> Municipal government    |
| <input type="checkbox"/> Non-profit organization     | <input type="checkbox"/> Corporation or Business |
| <input checked="" type="checkbox"/> State government | <input type="checkbox"/> County government       |
| <input type="checkbox"/> Federal government          | <input type="checkbox"/> Academic Institution    |
| <input type="checkbox"/> Tribal government           | <input type="checkbox"/> Other (explain)         |

**Authorized Representative of Sponsor**

CT DEP Inland Fisheries Division

**Name**

Donald J. Mysling

**Title**

Senior Fisheries Biologist

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DEP Western Headquarters, 230 Plymouth Road

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06791

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**Contact Person (if different from Authorized Representative):**

**Name**

**Title**

**Address**

**City**

**State**

**Zip**

**Phone**

**Email**

00008

**Project Name** Provide a brief working name:

Blackberry River Fish Passage Restoration

**Project Location**

Attach an 8.5 x 11-inch map or copy of an aerial photograph showing project location and extent. Include pertinent topographic and geographic information, a scale, and north arrow.

State(s), Municipality/ies:

State: Connecticut, Municipality: Village of East Canaan within Town of North Canaan

Longitude for approximate center of project area:

73° 17' 34"

Latitude for approximate center of project area:

42° 00' 38"

**NOTE: If a specific location(s) has/have not been selected yet, include in Part C a narrative describing how project location(s) will be selected.**

**Restoration Priority Category** See Appendix C of these Instructions for Restoration Priority Category Descriptions

**Primary Category.** Check the restoration category that is the primary goal of the project.

Check one box.

- Aquatic Natural Resources Restoration/Enhancement
- Riparian & Floodplain Natural Resources Restoration/Enhancement
- Restoration/Enhancement of Recreational Uses of Natural Resources

**Secondary Categories.** Check all relevant boxes.

- Aquatic Natural Resources Restoration/Enhancement
- Riparian & Floodplain Natural Resources Restoration/Enhancement
- Restoration/Enhancement of Recreational Uses of Natural Resources

**List Specific Injured Natural Resources and/or Impaired Natural Resource Services to Benefit from Project**

Injured natural resources to benefit: Coldwater riverine fish species including brown trout and burbot, a State-listed Endangered Species.

Impaired natural resource services to benefit: Unobstructed fish movement, stream habitat continuity and streambank stability.

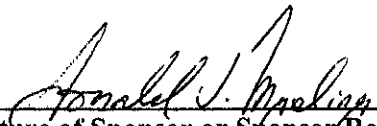
**Project Budget Summary**

Complete the table below to summarize the budget information that is detailed in Part D: Project Budget Narrative and Forms. Sponsors are advised to complete Part D (Project Budget Narrative and Forms) before filling in the table below.

Housatonic River NRD Funds – Requested	Other Contributions (Committed)	Other Contributions (Not Committed)	Total Project Cost (boxes 1+2+3)
1. From Part D, Table 2, Box 5 \$500,000	2. From Part D, Table 2, Box 6	3. From Part D, Table 2, Box 7 USDA NRCS WHIP Grant \$150,000	4. From Part D, Table 2, Box 8 \$650,000
<b>Amount of Other Contributions to Be Considered as Cost-Matching to NRD Fund Request</b>			
	5. CT DEP Inland Fisheries Division staff time (project design and permitting review, project oversight, fish population monitoring) \$60,000 (200 days @ \$300.00/day) Housatonic Valley Association staff time (coordinate volunteer labor, public outreach) \$15,000 (100 days @ \$150.00/day)		

**Authorizing Statement**

I hereby declare that the information included in this project submission and all attachments is true, complete, and accurate to the best of my knowledge, and that the proposed project complies with all applicable state, local, and federal laws and regulations.


June 18, 2007  
 \_\_\_\_\_  
 Signature of Sponsor or Sponsor Representative Date

Donald J. Mysling

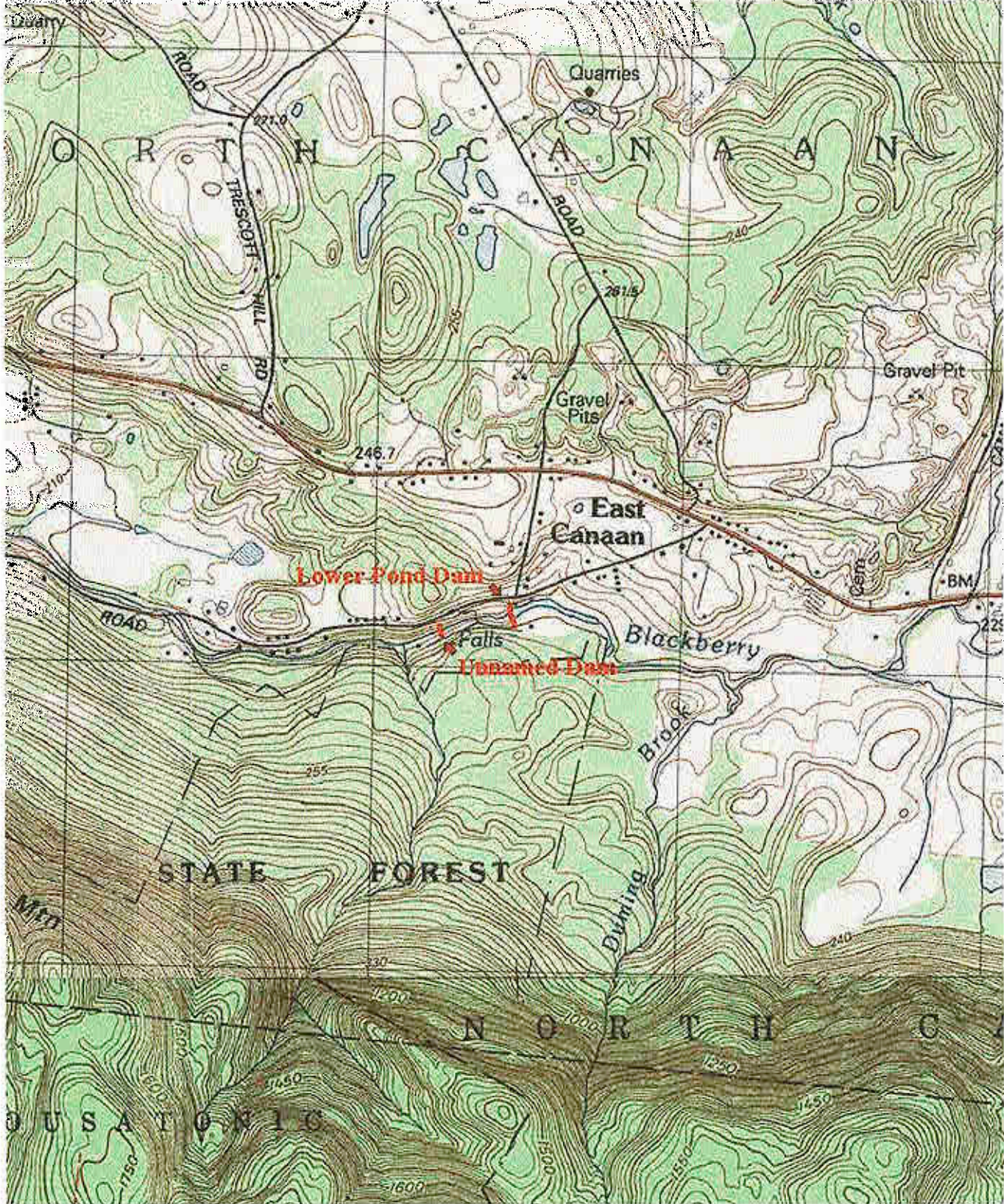
\_\_\_\_\_  
 Name of Sponsor or Sponsor Representative

CT Housatonic River Natural Resources Restoration Project



42°01'43" 73°18'40"

42°01'43" 73°16'19"



41°59'36" 73°18'40" NAD83

41°59'36" 73°16'19"



0 1000 2000 3000 4000 FEET  
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 Printed from TOPO! ©1998 Wildflower Productions (www.topo.com)

**Project location. USGS Ashley Falls, Mass. – Conn. Quadrangle.**



## PART B. PROJECT ABSTRACT

The project is intended to provide unobstructed fish passage and to reconnect segmented aquatic habitat by modifying an unnamed dam and the Lower Pond Dam that were constructed across the Blackberry River in East Canaan some 200 years ago to provide hydropower for two iron smelting furnaces. The restoration of contiguous habitat within the Blackberry River will allow the riverine fish community to more fully utilize areas for certain life functions (e.g. spawning and egg incubation, juvenile development) that are critical to support self-sustaining populations. The fish species of primary concern in the Blackberry River are brown trout (an important sportfish species) and burbot (a State-listed *Endangered Species*).

The proposed dam modifications will reconnect riverine habitat through the entire nine-mile length of the Blackberry River. Access to contiguous riverine habitat is a critical element that will allow for an increase in the brown trout and burbot population. The ability for anglers to fish and harvest naturally produced brown trout (along with brown trout stocked by the CT DEP Inland Fisheries Division) from the Blackberry River will off-set the brown trout harvest restrictions established for the Housatonic River mainstem due to PCB contamination.

Burbot have been nearly extirpated from north-west Connecticut streams largely due to human influenced habitat fragmentation. The reconnection of habitat in the Blackberry River will provide an opportunity for the burbot population to increase in size and range. This would ultimately remove it from the current State *Endangered Species* listing.

The tasks involved in this project are: 1). creating a bypass channel around the Lower Pond Dam and 2). breaching the unnamed that is located approximately 750 feet downstream (west) of the Lower Pond Dam. The project design contract and permitting (municipal, state, and federal regulatory agencies) will be undertaken in Fiscal Year 1 and Fiscal Year 2. Project bidding will be scheduled for Fiscal Year 3 and project implementation in Fiscal Year 4.

The CT DEP Inland Fisheries Division will serve as the project lead with the Housatonic Valley Association and USDA Natural Resources Conservation Service being project partners.

## PART C. PROJECT NARRATIVE

### 1.0 GENERAL DESCRIPTION

**1.1 Project Goals and Objectives.** The project is intended to provide unobstructed fish passage and to reconnect segmented aquatic habitat by modifying two dams that were constructed across the Blackberry River in East Canaan in the mid to late 1800's. The dams supplied waterpower to two iron smelting furnaces that were constructed along Lower Road.

The dam at the John Beckley Furnace (Canaan No. 2) site remains intact and is referred to as Lower Pond Dam. It is registered with the Department of Environmental Protection Dam Safety Unit as DS-100-4-6100. The dam at the Samuel F. Adam Furnace (Canaan No.1) is unnamed and is located approximately 750 feet downstream (west) of the Lower Pond Dam. The dam is not registered. It was partially removed by the U.S. Army Corps of Engineers in 1957 as it was considered a hazard following severe flood events produced by a hurricane in mid-August 1955.

The modifications proposed at the two dams to provide unobstructed fish passage and to reconnect segmented aquatic habitat involve: a). partially breaching the unnamed dam; and b). creating a bypass channel around Lower Pond Dam. The restoration of contiguous stream habitat will benefit a variety of coldwater riverine fish species including brown trout (an important recreational sport fish) and burbot (a State-listed *Endangered Species*).

The restoration of contiguous habitat within the Blackberry River will allow the riverine fish community to more fully utilize areas for certain life functions (e.g. spawning and egg incubation, juvenile development) that are critical to support self-sustaining populations. The fish species of primary concern in the Blackberry River are brown trout and burbot.

Although the State of Connecticut (the DEP Inland Fisheries Division and its predecessor the Connecticut Board of Fish and Game) has been stocking adult-aged, hatchery-reared brown trout into the Blackberry River for nearly a century, there has been a recent change in the fish stocking strategy in an attempt to promote a more "naturalized" population. Brown trout fry (1/2") and fingerlings (1"-2") are stocked yearly in suitable habitat throughout the river. The intent of this stocking strategy is to allow the fish to survive and grow to maturity in the natural environment. The success of this stocking (i.e. maturation of young fish to adult size) has prompted the DEP Inland Fisheries Division to establish special angler harvest regulations in 2002. The segment of the Blackberry River from the Whiting River confluence in East Canaan downstream to the Housatonic River became a *Class 3 Wild Trout Management Area*; it is one of fifteen watercourses so designated in Connecticut. Trout (all species including brown trout) must have a minimum length of 9 inches to be harvested and anglers may not possess more than 5 trout per day.

The adult-aged individuals produced from either fry or fingerling stocking are better adapted to reproduce in the river environment than are hatchery-reared adults. The naturally produced brown trout will provide a wild stock to the Blackberry River. Wild trout populations are important renewable resources that add quality and diversity to Connecticut's trout stream fisheries. Wild trout are esteemed due to their excellent physical appearance and to their superior taste and texture of flesh. They also have high intrinsic value, because anglers

recognize that wild trout are natural products of healthy stream ecosystems. The angling public has shown a growing interest in wild trout, and there has been an increasing demand for wild trout management, particularly from organized angler groups.

The ability for anglers to fish and harvest stocked and wild brown trout from the Blackberry River will off-set the brown trout harvest restrictions established for the Housatonic River mainstem due to PCB contamination.

In 2004, the DEP Inland Fisheries Division and the University of Connecticut College of Agriculture and Natural Resources (UCCANR) collaborated on a study entitled Habitat Use and Population Demographics of State-endangered Burbot *Lota lota* in Northwestern Connecticut. The burbot was first reported in Connecticut in 1844 within streams in the upper Housatonic River watershed. Fish surveys by the Connecticut Board of Fish and Game during the 1950's and 1960's showed a significant decline in the burbot distribution with the only viable population reported in the Hollenbeck River system. Fish surveys conducted by UCCANR in 2005 and 2006 verified the presence of burbot in the Hollenbeck River and documented several burbot in the Blackberry River immediately downstream of the unnamed dam in East Cannan. Burbot were not collected in the Blackberry River upstream of the unnamed dam or the Lower Pond Dam.

It is apparent that the unnamed dam and Lower Pond Dam have adversely affected the population structure of burbot in the Blackberry River by restricting access to additional habitat. Access to additional habitat (including habitat for spawning and juvenile development) should increase the burbot population in the river. Burbot produced in the Blackberry River may also migrate downstream and recolonize in the Housatonic River. The development of a large burbot population over a broad geographical range would ultimately remove the species from the current State-endangered listing.

The CT DEP Inland Fisheries Division will conduct electrofishing surveys of the Blackberry River as the primary means to assess the efficacy of creating unobstructed fish passage and reconnection of segmented aquatic habitat at the unnamed dam and Lower Pond Dam. The CT DEP Inland Fisheries Division had conducted a comprehensive fish and habitat survey of the Blackberry River in 1992 in conjunction with a multi-year survey of streams and rivers across Connecticut. Three sites within the river were surveyed that year; the initial surveys laid the groundwork for establishing permanent sampling locations for long-term monitoring of the fish population. Three permanent sites have had been established in 1998 with fish surveys being conducted annually. The sample locations are within the upper, mid, and lower reaches of the Blackberry River; the upper and mid river sample sites are upstream of the unnamed dam and Lower Pond dam while the lower river site is downstream. The electrofishing data collected to date will provide a "pre-construction" condition of the brown trout and burbot component of the fish population; future "post-construction" surveys of the permanent sites will provide an evaluation of project success.

In addition to the fish surveys, the CT DEP Inland Fisheries Division will design and install a fish trapping in the upstream end of the bypass channel to be constructed around Lower Pond Dam. The fish trap will monitor the effectiveness of the bypass channel in passing brown trout and burbot and will be a means to identify any physical changes that may be required to the bypass to increase its efficiency in providing the required fish passage.

## **1.2 Project Scope and Project Implementation Plan.**

**1.2 a).** The unnamed dam at the former Samuel F. Adam Furnace (Canaan No.1) site will be breached. The U.S. Army Corps of Engineers lowered the spillway elevation of the dam in 1957 from its original 12<sup>±</sup> height to roughly 5 feet. Despite the lowering, the remnants of the unnamed dam remain as a barrier to upstream fish passage at all flow stages of the Blackberry River.



**The unnamed dam at the former Samuel F. Adam Furnace (Canaan No.1) site.**

A portion of the remnant dam will be further lowered to an elevation not to exceed 1-foot above the riverbed elevation. The width of the dam to be lowered will be determined as per hydraulic modeling to achieve the most suitable velocities for the upstream passage of brown trout and burbot. The dam abutments and wingwalls will remain in place as they are functioning to stabilize the steeply sloped riverbanks.

**1.2 b).** A bypass channel will be created around the Lower Pond Dam at the John Beckley Furnace (Canaan No. 2) site. The John Beckley Furnace site, including the Lower Pond Dam, was purchased by the State of Connecticut in 1946 for a park. In 1978 the furnace site and dam were placed on the National Register of Historic Places. In 1996 the CT DEP provided funds to repair and restore the site that is now known as the Industrial Monument Historic Preserve. Alteration to the Lower Pond Dam (e.g. breaching, complete removal) has not been considered given the local and national historic importance.

A bypass channel landward of the southerly abutment of the dam is proposed. The bypass channel will be located within the course of an abandoned channel and will be constructed of natural materials to mimic the physical characteristics of the Blackberry River.





**Lower Pond Dam at the John Beckley Furnace (Canaan No. 2) site.**

1.2 c). The unnamed dam at the former Samuel F. Adam Furnace (Canaan No.1) site and the Lower Pond Dam at the John Beckley Furnace (Canaan No. 2) site have created barriers to fish passage and have segmented habitat within the Blackberry River following their construction in the mid to late 1800's. This has resulted in the near extirpation of burbot and has limited the recruitment of wild brown trout. The breaching of the unnamed dam and construction of a fish bypass channel around Lower Pond Dam have been identified as the most appropriate means to provide fish passage and to reconnect riverine habitat.

The project will require several years to complete. The tentative project schedule is as follows:

Fiscal Year 1 – project design and regulatory permit preparation; cost estimate \$100,000

Fiscal Year 2 – regulatory permit submission, property access agreements, easements;  
cost estimate \$10,000

Fiscal Year 3 – regulatory permit approval and submission of project bid, cost estimate \$0

Fiscal Year 4 – project implementation; cost estimate \$500,000;  
– construction inspection services; cost estimate \$40,000

The unnamed dam at the Samuel F. Adam Furnace (Canaan No.1) site is privately owned. Property access agreements, easements and other legal documents would need to be settled with the dam owner. The Lower Pond Dam at the John Beckley Furnace (Canaan No. 2) site is owned by the CT DEP. Property access and construction agreements would be settled “in-house” with the CT DEP Inland Fisheries Division.

The modifications to the unnamed dam at the Samuel F. Adam Furnace (Canaan No.1) site and the Lower Pond Dam at the John Beckley Furnace (Canaan No. 2) site would require a **Dam Safety Repair and Alteration** permit from the CT DEP Inland Water Resources Division.

## **2.0 EVALUATION CRITERIA NARRATIVE**

### **2.1 Relevance and Applicability of Project**

**2.1.1 Location of Project** The project is located on the Blackberry River is a major tributary to the Housatonic River. The Blackberry River watershed is in northwestern Connecticut near the Massachusetts state line. The river forms at the confluence of Spaulding Brook and Wood Creek in Norfolk and flows westerly through North Canaan then discharges into the Housatonic River in the village of Canaan. The project site on the Blackberry River at a point approximately 5 miles upstream of the Housatonic River confluence. The Housatonic River watershed in Canaan is above Derby Dam.

**2.1.2 Natural Recovery Period** The unnamed dam at the former Samuel F. Adam Furnace (Canaan No.1) site and the Lower Pond Dam at the John Beckley Furnace (Canaan No. 2) site have created barriers to fish passage and have segmented habitat within the Blackberry River following their construction in the mid to late 1800's. This has resulted in the near extirpation of burbot and has limited the recruitment of wild brown trout. The dams have withstood a number of large-scale precipitation events that have cause flooding of historic proportion. Without human intervention (i.e. physical modification to the dams) the natural recovery period may not be achieved for another century or more. With the proposed human intervention (breaching of the unnamed dam and bypass channel around Lower Pond Dam) the recovery period for brown trout and burbot could begin immediately.

**2.1.3 Sustainable Benefits** The modifications proposed at the two dams are to provide unobstructed fish passage and to reconnect segmented aquatic habitat. The restoration of contiguous stream habitat will benefit a variety of coldwater riverine fish species including brown trout (an important recreational sport fish) and burbot (a State-listed *Endangered Species*). The breaching of the unnamed dam and construction of a fish bypass channel around Lower Pond Dam have been identified as the most maintenance-free means to provide fish passage and to reconnect riverine habitat.

Although the unnamed dam is privately owned, it is located on a property that abuts CT DEP – owned land. The Lower Pond Dam is owned and is on land owned by the CT DEP. As such, future land management activities will not disrupt areas that will be restored and/or diminish the project's benefits.

The CT DEP Inland Fisheries Division will design and install a fish trapping in the upstream end of the bypass channel to be constructed around Lower Pond Dam. The fish trap will monitor the effectiveness of the bypass channel in passing brown trout and burbot and will be a means to identify any physical changes that may be required to the bypass to increase its efficiency in providing the required fish passage.

**2.1.4 Magnitude of Ecological Benefits** The unnamed dam and Lower Pond Dam have adversely affected the population structure of wild brown trout and burbot in the Blackberry River by restricting access to additional habitat. Access to additional habitat (including habitat for spawning and juvenile development) should increase the wild brown trout and burbot populations in the river. Wild trout populations are important renewable resources that add quality and diversity to Connecticut's trout stream fisheries. Burbot produced in the Blackberry River would colonize currently unavailable habitat. They may also migrate

downstream and recolonize in the Housatonic River. The development of a large burbot population over a broad geographical range would ultimately remove the species from the current State-endangered listing.

**2.1.5 Magnitude of Recreational Benefits** The naturally produced brown trout will provide a wild stock to the Blackberry River. Wild trout populations are important renewable resources that add quality and diversity to Connecticut's trout stream fisheries. Wild trout are esteemed due to their excellent physical appearance and to their superior taste and texture of flesh. They also have high intrinsic value, because anglers recognize that wild trout are natural products of healthy stream ecosystems. The angling public has shown a growing interest in wild trout, and there has been an increasing demand for wild trout management, particularly from organized angler groups.

The ability for anglers to fish and harvest stocked and wild brown trout from the Blackberry River will off-set the brown trout harvest restrictions established for the Housatonic River mainstem due to PCB contamination.

The CT DEP Inland Fisheries Division has a long-term commitment to conduct surveys monitoring the fish population in the Blackberry River. The surveys will assess the recruitment of wild brown trout to the fish population. Angler surveys could also be conducted to assess recreational (sportfishing) benefits.

## **2.2 Technical Merit**

### **2.2.1 Technical/Technological Feasibility**

**2.2.1 a).** The unnamed dam at the former Samuel F. Adam Furnace (Canaan No.1) site will be breached, that is a portion of the existing structure being removed. The dimension and location of the breach will be determined by hydraulic analysis that predicts the most suitable water velocities for the upstream passage of the fish species of concern (i.e brown trout and burbot). Dam breaching provides for fish passage while retaining a portion of the dam structure to retain impounded sediments by preventing channel head-cutting. Dam breaching is generally less expensive than a complete dam removal and can be done within a shorter timeframe.

Dam breaching has been successfully used to provide fish passage and to reconnect riverine habitat at a number of sites in Connecticut. The breaching of the Platt's Mill Dam on the Naugatuck River and the Century Dam (aka City Mills Dam) on the Mad River (both in Waterbury in the Naugatuck River drainage basin) were completed within the past decade.

**2.2.1 b).** A bypass channel at the Lower Pond Dam at the John Beckley Furnace (Canaan No. 2) site is proposed. The bypass channel will be located landward of the southerly dam abutment within the course of an abandoned channel. The bypass channel will be constructed of natural materials in accordance with the Natural Channel Design concept (NCD). The NCD concept focuses on creating a natural form and function to a created channel with the minimalization of traditional hard armoring practices. The NCD design of the channel will provide an appropriate morphology to handle a broad range of flows including flows necessary for fish passage. Attached is a design for a bypass channel based on the NCD concept.

While it has been used successfully in other states, the installation of bypass channels for fish passage around dams is a relatively new technique in Connecticut. The USDA Natural



Resources Conservation Service has designed and constructed a bypass channel around the Cannondale Dam on the Norwalk River, Wilton, in 2005. The bypass channel has been designed to provide passage for resident riverine fish species and anadromous fish species such as alewife, blueback herring and American shad.



**Cannondale Dam Bypass Channel, Norwalk River, Wilton**

**2.2.1 c).** The best available hydraulic engineering will be used to complete the design of the breaching of the unnamed dam at the former Samuel F. Adam Furnace (Canaan No.1) site and the bypass channel at the Lower Pond Dam at the John Beckley Furnace (Canaan No. 2) site. Once developed, the preliminary design of the breach and bypass channel will be submitted for review to engineering staff of the U.S. Fish and Wildlife Service Region 5 (USFWS Region 5) to assure the design will sufficiently provide fish passage for resident riverine species of the Blackberry River and in particular brown trout and burbot. Engineering staff of USFWS Region 5 have developed extensive experience in hydraulics and fishway design and work closely with state agencies.

**2.2.1 d).** Project review by engineering staff of USFWS Region 5 will identify any technical/technological complications and the affect on the project implementation schedule.

**2.2.2 Adverse Environmental Impact.** The bypass channel at the Lower Pond Dam at the John Beckley Furnace (Canaan No. 2) site will be created in a remnant side channel of the Blackberry River. The remnant channel is now colonized by a variety of trees and woody shrubs. The proposed bypass channel will require the clearing of this vegetation. The CT DEP Natural Diversity Data Base (NDDB) will be queried to determine the presence of Federal or State listed rare, threatened, or endangered plant and animal species known to reside within the course of the proposed bypass channel.

Should any listed species be found within the project bounds, a mitigation strategy will be developed following the guidance of the NDDB.

**2.2.3 Human Health and Safety.** Public access will be restricted during the breaching of the unnamed dam at the former Samuel F. Adam Furnace (Canaan No.1) site and construction of the bypass channel at the Lower Pond Dam at the John Beckley Furnace (Canaan No. 2) site. Construction fencing and/or other similar barriers will be installed to segregate the public from the work areas.

The areas will be cleared of all construction generated debris and slopes made stable as a means to eliminate the threat of long-term impacts to human health and safety.

**2.2.4 Measurable Results.** The unnamed dam at the former Samuel F. Adam Furnace (Canaan No.1) site and the Lower Pond Dam at the John Beckley Furnace (Canaan No. 2) site have adversely affected the population structure of wild brown trout and burbot in the Blackberry River by restricting access to additional habitat. Access to additional habitat (including habitat for spawning and juvenile development) should increase the wild brown trout and burbot populations.

Naturally produced brown trout will provide a wild stock to the Blackberry River. Wild trout populations are important renewable resources that add quality and diversity to Connecticut's trout stream fisheries. Wild trout are esteemed due to their excellent physical appearance and to their superior taste and texture of flesh. They also have high intrinsic value, because anglers recognize that wild trout are natural products of healthy stream ecosystems. The angling public has shown a growing interest in wild trout, and there has been an increasing demand for wild trout management, particularly from organized angler groups.

Burbot produced in the Blackberry River would colonize currently unavailable habitat. They may also migrate downstream and recolonize in the Housatonic River. The development of a large burbot population over a broad geographical range would ultimately remove the species from the current State-endangered listing.

The CT DEP Inland Fisheries Division has a long-term commitment to conduct surveys monitoring the fish population in the Blackberry River and other streams in the Housatonic River watershed. Specific to the Blackberry River, the surveys will assess the recruitment of wild brown trout and burbot to the fish population. Angler surveys could also be conducted to assess recreational (sportfishing) benefits.

The University of Connecticut College of Agriculture and Natural Resources (UCCANR) may desire assist with fish surveys to continue its studies of burbot population demographics and habitat use within streams in the upper Housatonic River watershed.

The best available hydraulic engineering will be used to complete the design of the breaching

of the unnamed dam at the former Samuel F. Adam Furnace (Canaan No.1) site and constructing the bypass channel at the Lower Pond Dam at the John Beckley Furnace (Canaan No. 2) site. Post-construction monitoring of the fish population structure (up- and downstream of the project site) and monitoring fish use of the bypass channel will form the basis to evaluate the project success. Similarly the monitoring can identify specific problems (e.g. structural inadequacies of the bypass channel, physical habitat limitations). Problems will be addressed with resources other than those provided by NRD-funds.

**2.3 Project Budget**

**2.3.1 Relationship of Expected Costs to Expected Benefits.** While the cost of the project is substantial, it is outweighed by the varied benefits including economic, environmental, and social benefits. The project is intended to increase brown trout reproduction with the naturally produced brown trout will provide a wild stock to the Blackberry River. Wild trout are esteemed due to their excellent physical appearance and to their superior taste and texture of flesh. The angling public has shown a growing interest in wild trout, and there has been an increasing demand for wild trout management, particularly from organized angler groups. Improvements to the wild brown trout fishery will likely increase recreational use and generate economic benefits to the local economy.

The environmental benefits include increasing the population size and range of the burbot. The development of a large burbot population over a broad geographical range would ultimately remove the species from the current State-endangered listing. Wild trout populations, including wild brown trout, are important renewable resources that add quality and diversity to Connecticut's trout stream fisheries.

Wild brown trout and burbot have high social intrinsic value. Anglers and the non-angling public recognize that wild trout and burbot are natural products of healthy stream ecosystems.

**2.3.2 Implementation - Oriented.** All of the NRD-funds will be used for project implementation. The costs associated with fish surveys and other monitoring will be borne by the CT DEP Inland Fisheries Division and funded through existing Federal Aid in Sportfish Restoration grants.

**2.3.3 Budget Justification and Understanding.** The breakdown of costs associated with the project are:

Project design and regulatory permit preparation	\$100,000
Regulatory permit submission, property access agreements, easements	\$10,000
Project implementation	\$500,000
<u>Construction inspection services</u>	<u>\$40,000</u>
Total Project Cost	\$650,000

**2.3.4 Leveraging of Additional Resources.** The breakdown of additional financial resources for the project are:

USDA Natural Resources Conservation Service WHIP Grant (WHIP Grant to cover project design, permit preparation, construction inspection services)	\$150,000
CT DEP Inland Fisheries Division staff time (cost match)	\$60,000
Housatonic Valley Association staff time (cost match)	\$15,000



**2.3.5 Comparative Cost Effectiveness.** The CT DEP Inland Fisheries Division is not cognizant of any similar project proposals brought before the CT SubCouncil to secure NRD-funds to modify the unnamed dam at the former Samuel F. Adam Furnace (Canaan No.1) site and the Lower Pond Dam at the John Beckley Furnace (Canaan No. 2) site.

## **2.4 Socioeconomic Merit**

**2.4.1 Community Involvement and Diversity.** The project offers the public to assist in the science-based monitoring of the fish population. The CT DEP Inland Fisheries Division has often involved volunteers in such monitoring programs such as anglers recording fish catch information in journals to assisting in fish surveys. The Housatonic Valley Association has offered to take the lead in securing volunteers for this project.

**2.4.2 Adverse Socioeconomic Benefits.** The project offers a number of benefits to the public all being favorable. The foreseeable benefits include: satisfying the demand of the angling public (particularly from organized angler groups) for wild trout management; providing anglers the opportunity to fish and harvest stocked and wild brown trout from the Blackberry River to off-set the brown trout harvest restrictions established for the Housatonic River mainstem due to PCB contamination; and increase the recreational use of the Blackberry River that in turn will and generate economic benefits to the local economy.

**2.4.3 Coordination and Implementation.** The project is consistent with CT DEP Inland Fisheries Division objectives to remove artificial barriers to fish migration and to reconnect segmented habitat. The goal is to restore populations of native aquatic fish species (e.g., burbot) and to enhance sportfish populations (i.e. augmenting hatchery reared trout with wild trout).

The project is intended increasing the population size and range of the burbot. The development of a large burbot population over a broad geographical range would ultimately remove the species from the current State-endangered listing. This is complimentary with the overall goal of the *Connecticut Endangered Species Act* "...to conserve, protect, restore, and enhance any endangered or threatened species and their essential habitat."

**2.4.4 Public Outreach.** The CT DEP Inland Fisheries Division will be the project lead with the Housatonic Valley Association (HVA) agreeing to be a project partner. The HVA is a non-profit organization dedicated to protecting the natural character and environmental health of the Housatonic River mainstem and watercourses within the 2,000 square mile watershed. The role of the HVA in the project is to 1) coordinate volunteers for to assist CT DEP Inland Fisheries Division staff in monitoring fish use of the proposed bypass channel and annual fish surveys of the Blackberry River and 2) aid in producing and disseminating educational materials pertaining to the project goals and major milestones.

## **2.5 Applicant Implementation Capacity**

**2.5.1 Technical Capacity of Applicant and Project Team.** The CT DEP Inland Fisheries Division will be the project lead with the Housatonic Valley Association (HVA) and USDA Natural Resources Conservation Service agreeing to be project partners. Donald J. Mysling, a Senior Fisheries Biologist with the Habitat Conservation and Enhancement Program, will be the authorized representative of the CT DEP Inland Fisheries Division. He is a graduate of the University of Connecticut with a Bachelor of Science Degree in Natural Resources

Conservation (Fisheries management studies) and is a 25-year employee of the CT DEP Inland Fisheries Division. For the past 20 years he has independently coordinated and supervised efforts of the Habitat Conservation and Enhancement Program to address issues related to aquatic habitat management, ranging from ensuring that habitats are not damaged through human manipulations, to restoring previously degraded waterways. He will oversee management and implementation of the project and will coordinate fish data collection, data analysis and report writing.

Residents of western Connecticut who were concerned with the future of the Housatonic River and its surrounding lands founded the Housatonic Valley Association (HVA) in 1941. The HVA is the nation's oldest non-profit, citizen watershed protection organization and is Connecticut's only non-profit organization dedicated solely to protecting the natural character and environmental health of the Housatonic River and its entire 2,000 square mile watershed. The HVA employs five full time and ten part time staff that work with community assistance, research, education, and advocacy. HVA staff will secure volunteer assistance and provide public educational/informational outreach to the project.

The Natural Resources Conservation Service (NRCS) is an agency of the United States Department of Agriculture (USDA). For nearly 70 years the USDA NRCS has worked cooperatively with landowners, conservation districts, federal, state, and local governments, and citizens from urban and rural communities to restore and enhance the landscape including the aquatic environment. The CT DEP Inland Fisheries Division and USDA NRCS have collaborated on a number of projects within and along streams in western Connecticut that focused on the enhancement and restoration of aquatic and riparian habitats. The USDA NRCS will assist by providing funding through the Wildlife Habitat Incentive Program (WHIP). The funds will be used for the project design, permit preparation, agreements/easements, and construction inspection services.

**2.5.2 Administrative Capacity of Applicant and Project Team.** The CT DEP Inland Fisheries Division, HVA, and USDA NRCS have long-standing, established procedures for receiving and administering grant monies. Additional assistance for the grant administration can be available from the CT DEP Financial Management Division.

**2.5.3 Project Commitments.** The CT DEP Inland Fisheries Division has a long-term commitment to: 1) conduct surveys monitoring the fish population in the Blackberry River, 2) assess instream and riparian habitat conditions, and 3) seek remedies to correct deficiencies in habitat that are limiting full support of the aquatic ecosystem including fish. Funds received by the CT DEP Inland Fisheries Division from the Federal Aid in Sportfish Restoration grant will provide the necessary personnel for the project. The HVA and USDA NRCS have verbally confirmed their commitment to the project.

**PART C. PROJECT NARRATIVE ATTACHMENT**

**Bypass Channel Design**



## MGWC 3.9: STEP POOLS

*Technique for grade control and  
improvement of aquatic habitat*

### DESCRIPTION

The work should consist of constructing step-pool sequences in steep headwater stream channels for grade control and the creation of aquatic habitat through flow diversification. Step-pool channels are characterized by a succession of channel-spanning steps formed by large grouped boulders called clasts that separate pools containing finer bed sediments. As supercritical flow tumbles over the step, energy is dissipated in roller eddies and becomes subcritical in the associated downstream plunge pool.

### EFFECTIVE USES & LIMITATIONS

Step-pool morphologies are typically associated with well confined, high-gradient channels with slopes greater than 3%, having small width-depth ratios and bed material dominated by cobbles and boulders. Step pools generally function as grade control structures and aquatic habitat features by reducing channel gradients and promoting flow diversity. At slopes greater than roughly 6.5%, similar morphologic units termed cascades spanning only a portion of the channel width are formed in these channel conditions. Step pools and cascades are generally found in the following Rosgen stream types: A1-A3 and B1-B3.

### MATERIAL SPECIFICATIONS

Natural steps in step-pool morphologies can be formed by large clasts, bedrock outcrops, and large woody debris aligned across the channel. Engineered steps can be made from boulders, logs, and large woody debris chosen according to the desired height of the step. Additionally, boulders should be sized to resist the design storm event using MGWC 2.1: Riprap as a guide.

### INSTALLATION GUIDELINES

All erosion and sediment control devices, including dewatering basins, should be implemented as the first order of business according to a plan approved by the WMA or local authority. The proposed construction sequence for step pools is as follows (refer to Detail 3.9):

1. The stream should be redirected by an approved temporary stream diversion (See *Section 1: Temporary Instream Construction Measures, Maryland's Guidelines to Waterway Construction*), the construction area should be dewatered, and any disturbed banks should be stabilized.
2. Step-pool units should be designed and constructed to have a characteristic step height, H, and step length, L, as shown in Detail 3.9, and all steps should be firmly anchored into the stream bank.
3. Step rocks shall be placed on footer rocks so that they rest on two halves of each footer rock below, and so that the step rock is offset in the upstream direction. Footer rocks should extend below the scour hole elevation.
4. As a general guideline, the ratio of the mean steepness, defined as the averaged value of step height over step length, to the channel slope, S, should lie in the range of 1 to 2 ( $1 < ((H/L)_{AVE}/S) < 2$ ). Typical spacings for step pools and cascades are provided in Detail 3.9(b) relating to alluvial channel morphologies.
5. Whenever practical, a reference reach with similar flow rates, bed and bank material characteristics, type and density of riparian vegetation, and channel gradient should be surveyed at low flows to determine appropriate values of H and L. At high discharges, step-pool characteristics may be obscured.

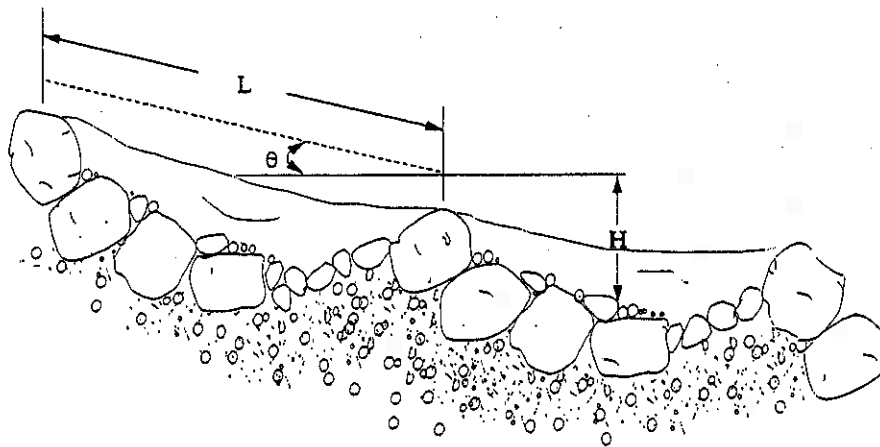
### MGWC 3.9: STEP POOLS

6. Once construction is completed, the diversion should be removed from upstream to downstream. Sediment control devices, including perimeter erosion controls, are to remain in place until all disturbed areas are stabilized in accordance with an approved sediment and erosion control plan and the inspection authority approves their removal.

Maryland's Guidelines To Waterway Construction  
DETAIL 3.9(a): STEP POOLS

Adapted From Abrahams et al.  
(1995)

DEFINITION SKETCH:  
STEP POOL



Note: L is measured parallel to the bed slope ( $\tan \theta$ )  
H is measured perpendicular to the horizontal

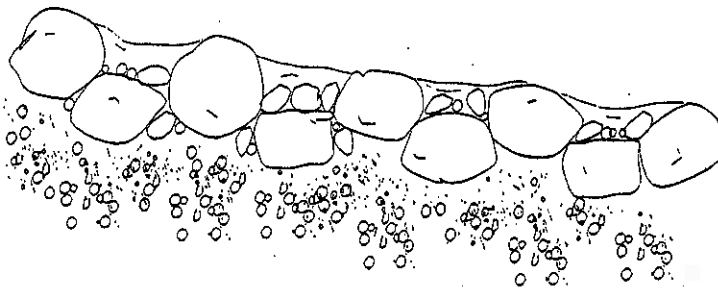


# Maryland's Guidelines To Waterway Construction

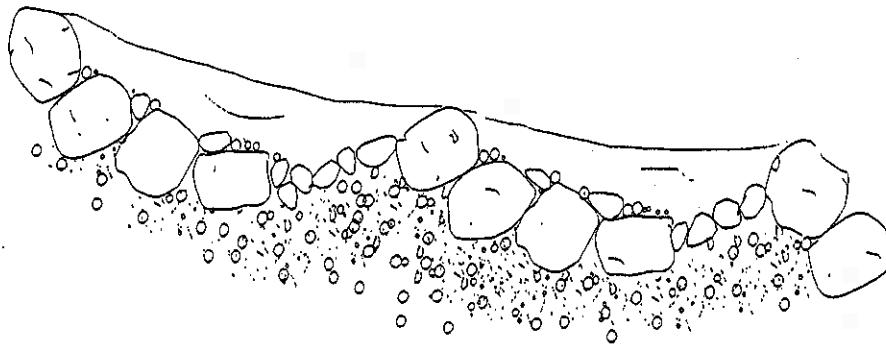
## DETAIL 3.9(b): STEP POOLS

Adapted From Montgomery  
and Buffington (1997)

### PROFILE VIEW: CASCADE & STEP POOL MORPHOLOGIES



Approximate channel slope: >0.065	Typical pool spacing: <1 channel width	Average step height (Abrahams et al., 1995) $1 \leq \{(HL)_{AVE}/S\} \leq 2$
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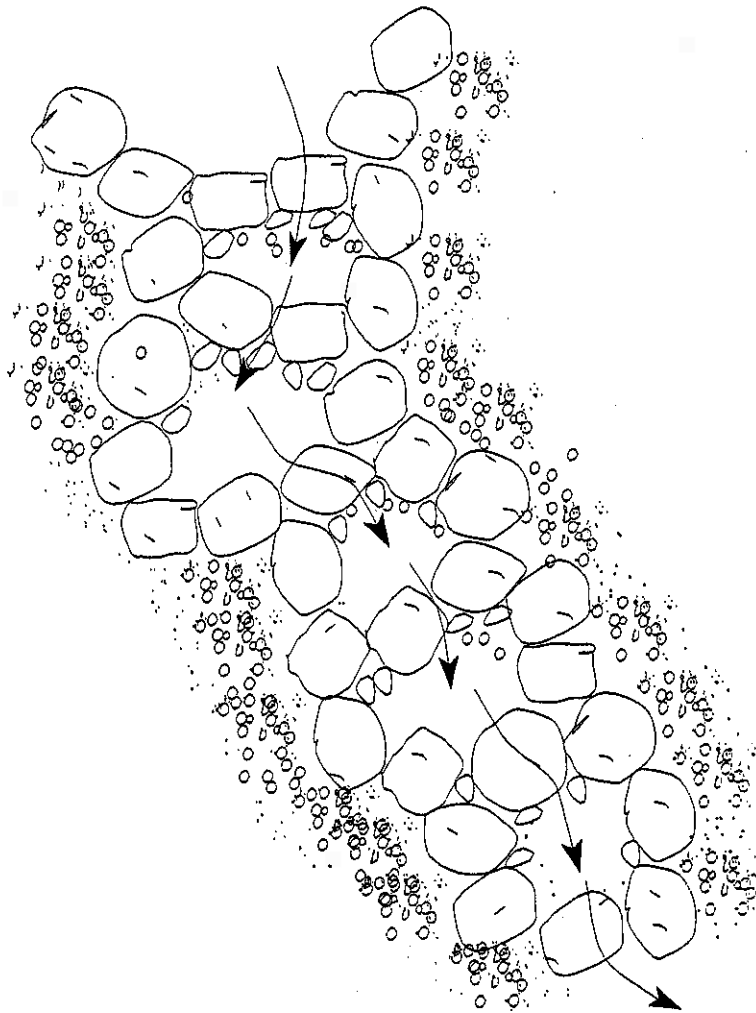


Approximate channel slope: 0.030-0.065	Typical pool spacing: 1-4 channel widths	Average step height (Abrahams et al., 1995) $1 \leq \{(HL)_{AVE}/S\} \leq 2$
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Maryland's Guidelines To Waterway Construction  
DETAIL 3.9(c): STEP POOLS

Section & Plan Views Adapted  
From Rosgen (1996)

PLAN VIEW: STEP POOL



CHANNEL STABILIZATION AND  
REHABILITATION TECHNIQUES

REVISED NOVEMBER 2000  
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MARYLAND DEPARTMENT OF THE ENVIRONMENT  
WATER MANAGEMENT ADMINISTRATION

## **PART D. PROJECT BUDGET NARRATIVE AND FORMS**

### **1.0 BUDGET NARRATIVE**

The proposed project for the breaching of the unnamed dam at the former Samuel F. Adam Furnace (Canaan No. 1) site and creating a bypass channel around the Lower Pond Dam at the John Beckley Furnace (Canaan No.2) site will require several years to complete. The tentative project schedule and budget is as follows:

Fiscal Year 1 – project design and regulatory permit preparation; cost estimate \$100,000

Fiscal Year 2 – regulatory permit submission, property access agreements, easements; cost estimate \$10,000

Fiscal Year 3 – regulatory permit approval and submission of project bid, cost estimate \$0

Fiscal Year 4 – project implementation; cost estimate \$500,000;  
– construction inspection services; cost estimate \$40,000

All of the NRD-funds requested will be used for project implementation (construction). The remainder of the costs (\$150,000) will be covered by a USDA Natural Resources Conservation Service (NRCS) Wildlife Habitat Incentive Program (WHIP) grant. The CT DEP Inland Fisheries Division will submit an application for the WHIP grant immediately after receiving confirmation from the CT SubCouncil that the project has been selected for NRD-funds. The NRCS has verbally committed to be a project partner and provide the WHIP funding.

The CT DEP Inland Fisheries Division has committed staff time for project oversight and pre- and post construction monitoring of the Blackberry River fish population as a cost match for the project grants. The cost match is estimated to be \$60,000 (200 days @ \$300/day).

The Housatonic Valley Association (HVA) has verbally committed to be a project partner and provide volunteer assistance and public outreach services. HVA staff time will be a cost match for the project grants. The cost match is estimated to be \$15,000 (100 days @ \$150/day).

The CT DEP Inland Fisheries Division will request that engineering staff of the U.S. Fish and Wildlife Service Region 5 Office review the preliminary designs for the project. Region 5 engineering staff have developed extensive experience in hydraulics and fishway design and work closely with state agencies. Their review time will also be used for a cost match for the project grants. There is currently no estimated cost match amount.



TABLE 1. HOUSATONIC RIVER NRD FUNDING ALLOCATION BY FISCAL YEARS 1

PROJECT TITLE:		Blackberry River Fish Passage Restoration			
SPONSOR NAME:		Donald J. Mysling CT DEP Inland Fisheries Division			
EXPENSE CATEGORY (See App. A)	FISCAL YEAR 1	FISCAL YEAR 2	FISCAL YEAR 3	FISCAL YEAR 4	
	Housatonic River NRD Funds	Housatonic River NRD Funds	Housatonic River NRD Funds	Housatonic River NRD Funds	
A. SALARIES					
B. OVERHEAD AND BENEFITS					
C. CONTRACTED SERVICES	Project Implementation \$500,000 (implementation scheduled for FY4)				
D. SUPPLIES, MATERIALS AND EQUIPMENT					
E. TRAVEL					
F. OTHER (LIST)					
G. OTHER (LIST)					
<b>TOTAL BY FISCAL YEAR</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	
	\$500,000	0	0	0	
<b>GRAND TOTAL (sum of boxes 1+2+3+4)</b>					
[This sum is the total NRD fund request and should match Part A, Budget Summary, Box 1]					
				\$500,000	

<sup>1</sup> The fiscal year is July 1 – June 30. If the proposed project will be completed in one year, fill in only the column titled "Fiscal Year 1."

TABLE 2. PROJECT BUDGET SUMMARY BY TASK AND FUNDING SOURCE

PROJECT TITLE:	Blackberry River Fish Passage Restoration			
	SPONSOR NAME: Donald J. Mysling CT DEP Inland Fisheries Division			
TASK <sup>2</sup>	HOUSATONIC RIVER NRD FUNDS	OTHER CONTRIBUTIONS		TOTAL COST BY TASK
		COMMITTED	NOT COMMITTED	
A. Project design, regulatory permit preparation			USDA NRCS WHIP GRANT	\$100,000
B. Regulatory permit submission, property access agreements, easements			USDA NRCS WHIP GRANT	\$10,000
C. Project Implementation	\$500,000			\$500,000
D. Construction inspection services			USDA NRCS WHIP GRANT	\$40,000
E.				
F.				
G.				
TOTAL BY FUNDING SOURCE	5	\$500,000	6	GRAND TOTAL \$650,000
			7	
			8	

NOTES: Box 5 should be the same as the Grand Total indicated in Part D Table 1. Box 6 above should match Part A, Budget Summary, Box 2. Box 7 above should match Part A, Budget Summary, Box 3. Box 8 should match Part A, Budget Summary, Box 4

<sup>2</sup> The listed tasks should correspond with information provided in the Project Implementation Plan.