PROJECT TITLE

Leadmine Brook Fish Passage and Habitat Restoration Project

NFHAP funding requested: $50,000

Project Location: (Connecticut, Windham, Ashford)

Congressional District: 2nd

APPLICANT: Town of Ashford
Organization: Town of Ashford
Officer: Joe Theroux, Inland Wetlands Agent
Street: 5 Town Hall Road
City, State, Zip: Ashford, CT 06278
Telephone Number: 860-487-4414
Facsimile Number: 860-487-4435
Electronic Mail Address:
joetheroux426@comcast.net

Sponsoring Fish and Wildlife Service Fisheries Office: Connecticut River Coordinator
Project Officer: Jan Rowan
Street: 103 East Plumtree Road
City, State, Zip: Sunderland, MA 01375
Telephone Number: (413) 548-9138
Facsimile Number: (413)-548-9622
Electronic Mail Address:
Jan_Rowan@fws.gov

Grant Application Technical Guidance Provided By:
Brian D. Murphy, Senior Fisheries Habitat Biologist
Connecticut Department of Environmental Protection
Inland Fisheries Division
Habitat Conservation and Enhancement Program
209 Hebron Road
Marlborough, CT 06447
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Date Submitted: September 29, 2008

II. PROJECT DESCRIPTION, SCOPE OF WORK, AND PARTNER INFORMATION (3 pages maximum)

A. Project Description and Scope of Work

Project Need: Twin concrete culverts that convey Leadmine Brook underneath Axe Factory Road within the Yale–Meyers Forest were undermined and damaged during an October 2005, 100 year frequency storm event. Town public works staff repaired this road crossing by inserting twin 4 ft. round corrugated culverts into remaining sections of the concrete culverts. This emergency repair installation created perched culvert conditions at the outlet and also resulted in a skewed culvert alignment, which redirected flows into the southern streambank. Unfortunately, repair work blocked upstream fish passage for the native brook trout population resulting in lost access to over 2.94 miles (1.05 mainstem length, 1.89 tributary length) of viable brook trout habitats. In addition, more than 125 feet of downstream stream channel was straightened and channelized resulting in the alteration of instream fish habitats used by all life stages of wild brook trout.

Goals

Restore upstream fish passage and instream habitats for the wild brook trout population at the Axe Factory Road Crossing and provide access to over 2.94 miles of upstream brook trout habitats.

Objectives

1. Remove and replace existing twin culverts with an engineering clear span timber bridge.
2. Restore and stabilize 60 feet of instream and streambank habitat at the road crossing location formerly occupied by culvert infrastructure.
3. Enhance 125 feet of brook trout habitat in the channelized section downstream of the road crossing through the installation of instream habitat structures, such as deflectors, rootwads and lunkers (Hunter 1991, Murphy 2003).
4. Monitor brook trout population response through pre and post project annual fish surveys.

Project Benefits

Not only will the installation of a timber bridge provide multiple fisheries resource benefits to the Leadmine Brook wild brook trout population as delineated in the aforementioned project objectives, the bridge will incorporate an increased hydraulic opening as compared to the existing twin culverts. This design will minimize debris accumulation at the crossing, which has created localized flooding and overtopping of the roadway and led to past culvert failure. Roadway overtopping has also caused gully erosion along the unimproved forest road leading to sedimentation within Leadmine Brook riparian wetlands. Bridge installation will also eliminate the need for future periodic maintenance. Glulaminated timber bridge life span is projected to be up to 50 years; thus the installation of a timber span bridge will ensure that the native brook trout population has unimpeded access to over 2.94 miles of upstream stream habitat during the concurrent life span of the bridge. Finally, the use of a timber bridge "fits in" more with the aesthetic environment of the Yale-Meyers Forest.

B. Partner Information

While the 7,800 acre Yale-Meyers Forest is owned by Yale University and managed by the Yale School of Forestry, the road system is maintained with the cooperative assistance from local municipalities, in this case the Town of Ashford. The Town of Ashford will administer EBTJV grants funds, secure engineering and design services, purchase bridge materials and be responsible for bridge installation. The DEP Inland Fisheries Division, Habitat Conservation and Enhancement program will provide technical guidance relative to the design and engineering of stream channel restoration and enhancement treatments, provide construction assistance, provide streambank stabilization materials, monitor brook trout population response for five years through pre and post project annual fish electrofishing surveys and provide public outreach. Yale University staff will provide critical fluvial geomorphic and hydrologic assessment of the Leadmine Brook channel and watershed, information which will be used to assist with bridge design and stream restoration and enhancement activities. The Thames Valley Chapter of Trout Unlimited will assist with the construction and installation of instream fish habitat treatments.

Partner Name	Contribution In-Kind	Contribution Cash	Federal or Non-Federal	Partner Category	Role of Partner
Town of Ashford	$27,500		Non-Federal	Local Government	Project Management & Construction
CTDEP Inland Fisheries	$21,000		Federal	State Agency	Technical Guidance & Monitoring
Yale School of Forestry	$5,000		Non-Federal	Landowner	Technical Guidance & Assessment
Thames Valley Trout Unlimited	$2,500		Non-Federal	Local Conservation Group	Construction Assistance

C. Milestones and Timeline

I. Pre-Construction

Fall 2008

- Conduct fluvial geomorphic, watershed and hydrology assessment

Winter 2009

- Contract bridge engineering and design services

Spring 2009

- Develop preliminary construction drawings

Summer 2009

- Fish population monitoring

Fall 2009

- Completion of construction drawings
- Apply for local and State regulatory permits

Spring 2010

- Obtain local and State regulatory permits

Summer 2010

- Pre-construction public outreach field trip
- Fish population monitoring

II. Construction

Summer 2010

- Remove culverts and construct bridge abutments
- Delivery and installation of pre-fabricated glulaminated timber bridge
- Restore streambanks and instream habitats
- Installation of instream fish habitat structures

III. Post-Construction

Summer 2011

- Fish population monitoring
- Post construction public outreach field trip

Summer 2012

- Fish population monitoring

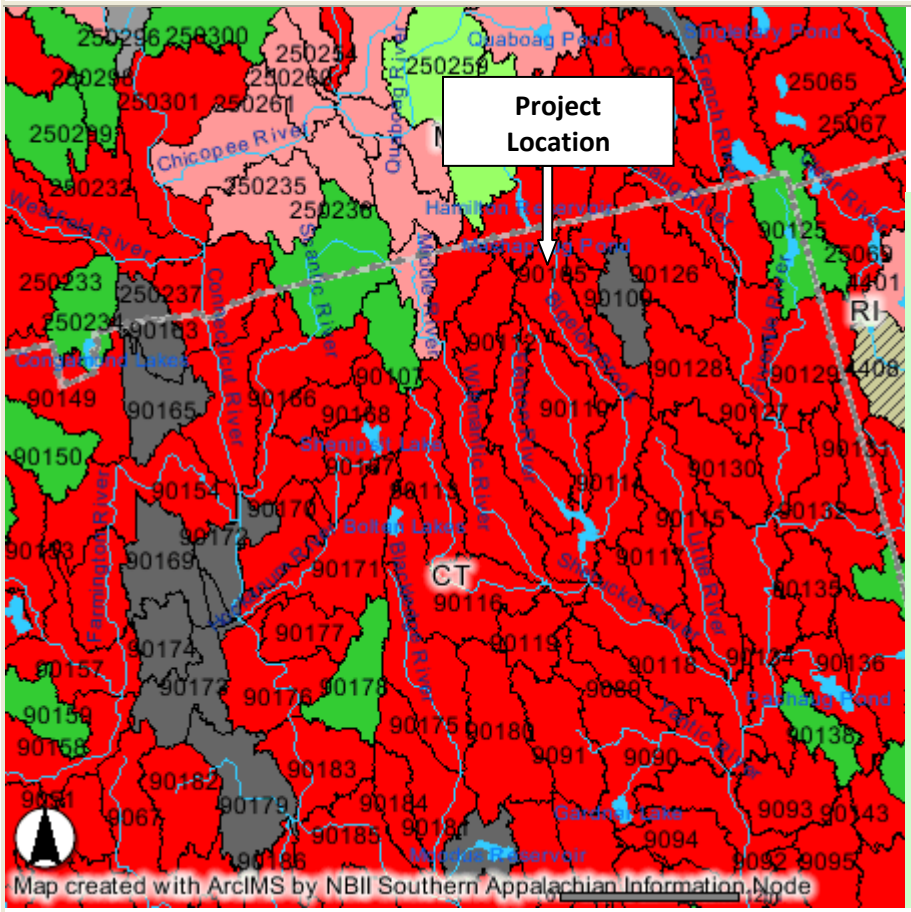
Summer 2013

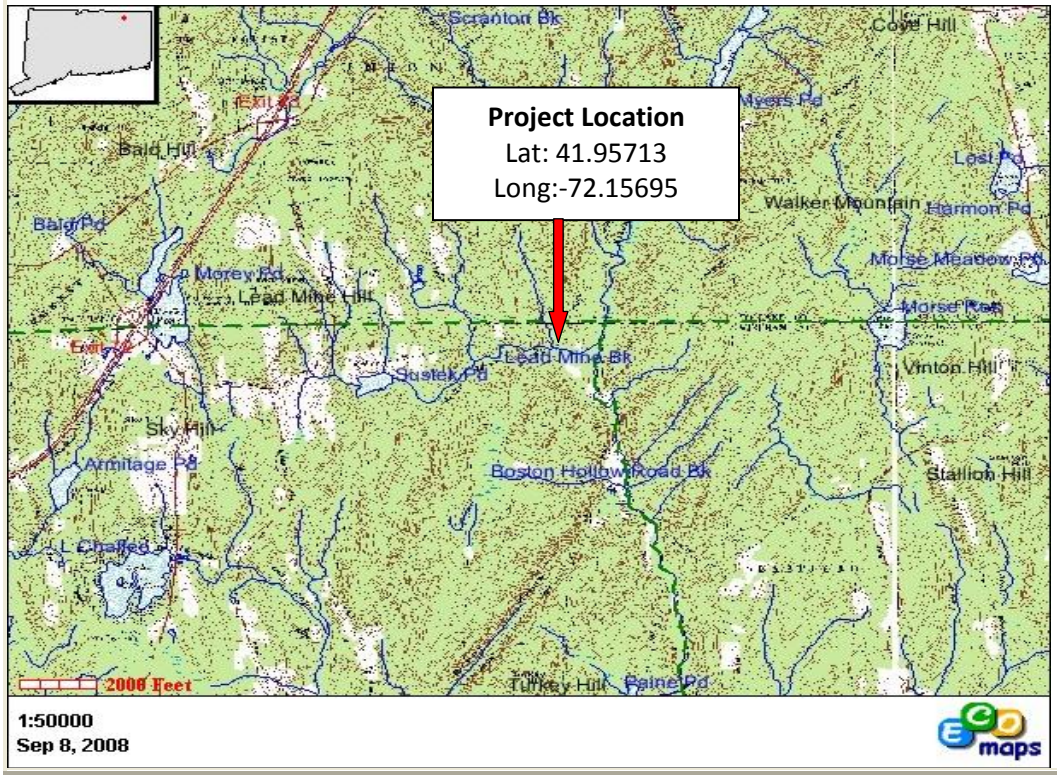
- Fish population monitoring

Fish Population Monitoring Protocol

Brook trout population monitoring in Leadmine Brook will involve a backpack electrofishing survey utilizing the three pass Zippin removal method (Zippin 1958) that includes at the minimum, two years of baseline pre-restoration data and three years of post-restoration data. Historic fish population data collected at this location in 1994 will be also used as a reference point. For each annual survey, separate samples will be collected above and below the road crossing to assess the fish population response relative to proposed fish passage and habitat restoration treatments.

III. MAP OF PROJECT AREA





IV. PHOTOGRAPHS OF PROJECT AREA

Leadmine Brook Fish Passage and Channel Restoration Project, Ashford, CT

Figure 1. Photograph depicting outlet of twin culverts perched above streambed. Improper culvert installation blocks and prevents upstream passage for the wild brook trout population.

Figure 2. Photograph illustrating skewed alignment of culvert outlet directing high stream flow regimes into streambank and downstream area of past channelization.

U.S. Fish & Wildlife Service

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Name: Brian D. Murphy

Address: CTDEP 209 Hebron Road Marlborough, CT 06447

Phone: 860-295-9523

Signature: Brian D. Murphy Date: 9/19/08

FWS Form 3-2259 10/03

V. PROJECT BUDGET

Partner Name	Activity	NFHAP Request	Non-Federal Contribution	Federal Contribution	Total	Acres/ miles Affected
Town of Ashford	Contract engineering & design services	$10,000			$10,000	
Town of Ashford	Bridge materials	$33,000			$33,000	
Town of Ashford	Contract administration project oversite & purchasing		$2,500 (inkind)		$2,500	
Town of Ashford	Bridge abutment materials	$7,000			$7,000	
Town of Ashford	Construction services: equipment & personnel		$25,000 (inkind)		$25,000	2.94 miles
CTDEP Inland Fisheries	Construction assistance			$2,800 (inkind)	$2,800	
Yale University	Geomorphic & watershed assessment		$5,000 (inkind)		$5,000	2.01 mi^2
CTDEP Inland Fisheries	Streambank Stabilization materials			$2,000 (inkind)	$2,000	0.03 acres
CTDEP Inland Fisheries	Fish population monitoring & data management			$15,000 (inkind)	$15,000	2.94 miles
Trout Unlimited Thames Valley	Construction & installation habitat structures		$2,500 (inkind)		$2,500	0.12 acres
CTDEP Inland Fisheries	Public outreach			$1,200 (inkind)	$1,200	
Total		$50,000	$35,000	$21,000	$106,000	

VI. EVALUATION QUESTIONS

A. Conservation of Sustainable Brook Trout Populations

The Leadmine Brook Fish Passage and Habitat Restoration Project will address specific threats and conservation actions as outlined in Connecticut's Comprehensive Wildlife Conservation Strategy which was approved by the U.S. Fish and Wildlife Service in 2006. This publication can be reviewed at ftp://ftp.state.ct.us/pub/dep/wildlife/cwcs/CWCSIntro.pdf

Wild brook trout are listed as a **"**most important species**"** of Greatest Conservation Need (GCN) in Connecticut Habitat 9b (unrestricted, free-flowing streams) and Habitat 9c (coldwater streams). Among the greatest threats to wild brook trout in these habitats are:

(1) Fragmentation of populations and loss of access to upstream and spawning habitat due to impediments to fish movements, such as dams, barriers, and culverts.

(2) Loss of habitat value due to hydrologic impacts from development, new roads, impervious surfaces, and culverts.

One "priority conservation action" is to "remove dams and barriers where appropriate". The Leadmine Brook Fish Passage and Habitat Restoration Project will definitively address this priority conservation action by removing culverts that block upstream fish passage for a wild brook trout population.

The Leadmine Brook project also addresses EBTJV document, "Conserving the Eastern Brook Trout: Action Strategies" State-level specific objectives as listed below:

Objective (7). Mitigate factors that degrade water quality.

d. Use indirect stream enhancement activities, such as riparian plantings, to stabilize stream banks and reduce inputs of sediment over a broad area.

Objective (8). Maintain or restore natural hydrologic regimes.

c. Re-establish fish passage and brook trout population re-connectivity through barrier removal.

Objective (12). Partner with organizations on projects that involve nongame species, migratory birds, and brook trout.

B. Threatened and Endangered Species and Species or Management Concern

Brook trout is listed by the U.S. Fish and Wildlife Service Region 5 Fisheries Program as a "Fish Species of Conservation and Management Concern".

As outlined in Connecticut's Comprehensive Wildlife Conservation Strategy, wild brook trout is listed as a **"most important species"** of Greatest Conservation Need (GCN) in Connecticut Habitat 9b (unrestricted, free-flowing streams) and Habitat 9c (coldwater streams).

C. Other Species of Economic Importance Not Included Above

While there are no other fish or terrestrial species of "economic importance" that will benefit from this project, it must be stated that Connecticut citizens view and associate "environmental health and well-being" of small streams with the presence of wild, non-hatchery reared, brook trout (Humphreys et al. 2007). Thus, this proposed restoration project incorporates a very high intrinsic environmental health value that does not readily translate into economic importance.

D. Special Considerations

This project will provide a unique opportunity to promote and foster cooperation between government agencies, academia, local conservation groups and the local community. As such, this proposal is consistent with a fundamental concept of the Eastern Brook Trout Joint Venture (EBTJV) program, which is to direct locally-driven efforts that build private and public partnerships to improve fish habitat.

In addition, the project is consistent with a "priority conservation action" as outlined in the Connecticut's Comprehensive Wildlife Conservation Strategy Plan, which is to "encourage cooperation among agencies (DEP divisions, local governments, etc.) and other stakeholders.

The Leadmine Brook fish community also supports fluvial dependent and fluvial specialist fish species that include: fallfish, common shiner, blacknose dace, and white sucker, consequently, the completion of this project will also meet the upstream fish passage needs for the entire fish community.

E. EBTJV Targeted Watershed

Leadmine Brook is a tributary of Bigelow Brook, within the Thames River Basin. Leadmine Brook has been identified as being located within EBTJV subbasin designation #90105, a subbasin targeted with a **"high priority level-0.91"** for brook trout population enhancement due to population levels reduced more than 50%. The Leadmine Brook Watershed is not stocked with hatchery-reared trout.

F. Habitat Connectivity and Enhancing Population Mobility

As previously mentioned, Leadmine Brook is located within subbasin designation #90105, a watershed in which brook trout population levels are reduced more than 50%. Twin concrete culverts that convey Leadmine Brook underneath Axe Factory Road within the Yale–Meyers Forest were undermined and damaged during an October 2005, 100 year frequency storm event. Town public works staff repaired this road crossing and unknowingly created perched culvert conditions that subsequently blocked upstream fish passage for the native brook trout population. This barrier fragments and segments the existing brook trout population, for example, juvenile brook trout that seasonal disperse downstream cannot move back upstream to habitats within the Leadmine Brook headwaters. Leadmine Brook is also known to provide critical thermal refuge habitats for the Bigelow Brook native brook trout population; thus, seasonal thermal refuge habitats are unavailable for this mainstem population. The replacement of culverts with a clear span timber bridge will restore stream connectivity to over 2.94 miles of upstream brook trout habitats. Given the projected lifespan of a timber bridge is 50 years, the replacement of culverts with a timber bridge will ensure wild brook trout population connectivity and mobility throughout the Leadmine Brook watershed during that time period.

Metapopulation theory predicts that the movement of individuals between subpopulations with different population vital rates is necessary for metapopulation persistence (Letcher et al. 2007). Under these conditions, habitat fragmentation and dispersal barriers such as currently exist at the Leadmine Brook Axe Factory Road crossing can reduce abundance and population growth rates, increasing the risks of extinction. These local extinctions in turn increased the likelihood of system-wide extinction, as tributaries no longer function as a population source. Thus, the implementation of the Leadmine Brook project is critical for the long term persistence of the wild brook trout metapopulation.

This restoration project is consistent with CTDEP Inland Fisheries Division stream crossing best management guidelines and policies that stress the need to provide "fish friendly" stream crossings to ensure fish population connectivity. This document can be obtained at: http://www.ct.gov/dep/lib/dep/fishing/restoration/streamcrossingguidelines.pdf.

G. Management Assets

The project will incorporate brook trout population monitoring. This will involve a backpack electrofishing survey utilizing the three pass Zippin removal method (Zippin 1958) that includes at the minimum, two years of baseline pre-restoration data and three years of post-restoration data. Sampling design used for this project is similar to that of the Inland Fisheries Division, Stream Survey Team as described by Hagstrom et al. (1989). For standardization purposes, yearly samples will be collected during a similar time period (late July-early August). In addition, separate samples will be collected above and below the road crossing to assess fish population response relative to proposed fish passage and habitat restoration treatments. CTDEP Inland Fisheries Division, Habitat Conservation and Enhancement (HCE) program staff have extensive expertise in monitoring fish population response relative to stream restoration efforts. Please refer to summary of HCE stream restoration projects at: http://www.ct.gov/dep/cwp/view.asp?a=2696&q=322734.

Most of the Leadmine Brook mainstem and tributaries are open to the public with access being located with the Yale-Meyers Forest. While open to public fishing, small, second order headwater streams such as Leadmine Brook typically do not receive significant fishing pressure. In addition, "niche-anglers" that target native brook trout populations usually practice catch and release.

This project will promote and foster cooperation between government agencies, academia, local conservation groups and the local community. Relative to education and public outreach, CTDEP staff will be responsible for conducting pre and post restoration field days to demonstrate the multiple and diverse fisheries resource benefits of this project.

H. Supporting Documentation

A. Letter of support from local state fishery management agency

Letter from Connecticut Department of Environmental Protection, Bureau of Natural Resources, is included.

B. Literature Cited

Letcher B.H., Nislow K.H., Coombs J.A., O'Donnell M.J., Dubreuil T.L. 2007. Population response to habitat fragmentation in a stream-dwelling brook trout population. PLoS ONE. 2007 Nov 7;2(11):e1139.PMID: 18188404 [PubMed - indexed for MEDLINE]

Hagstrom, N.T., W.B. Gerrish, E.A. Machowski, and W.A. Hyatt. 1989. A Survey of Connecticut Streams and Rivers - Farmington River, Park River and Stony Brook Drainages. Connecticut Department of Environmental Protection, Project Progress Report, F-66-R-1. 157pp.

Hunter, C.J. 1991. Better trout habitat. A guide to stream restoration and management. Montana Land Reliance. Island Press, Covelo, CA. 320pp.

Murphy, B. D. 2003. Stony Brook Fish Habitat Enhancement Project. Connecticut Department of Environmental Protection, Final Project Report. 13 pp.

Zippin, C. 1958. The Removal Method of Population Estimation. Journal of Wildlife Management. 22(1):82-90.

C. Resource Management Plans Cited

Humphreys, M., T. J. Barry and N. T. Hagstrom. 2007. Inland Fisheries Research and Management/Study 1 Coldwater Fisheries Management/Job 6 Wild Trout Management. Federal Aid to Sportfish Restoration. Progress Report F-57-R-26. Connecticut Department of Environmental Protection. Hartford, CT.

Connecticut's Comprehensive Wildlife Conservation Strategy. 2005. Connecticut Department of Environmental Protection. Bureau of Natural Resources. Hartford, CT.
ftp://ftp.state.ct.us/pub/dep/wildlife/cwcs/CWCSIntro.pdf

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

September 26, 2008

Callie McMunigal
Appalachian Partnership Coordinator
U.S. Fish and Wildlife Service
400 East Main Street
White Sulphur Springs, WV 24986

Dear Ms. McMunigal:

This letter is in support of an Eastern Brook Trout Joint Venture grant application proposal, entitled "The Leadmine Brook Fish Passage and Habitat Restoration Project" that was submitted by the Town of Ashford. Main goals of this project are to restore upstream fish passage and instream habitats for the wild brook trout population at the Axe Factory Road Crossing in Ashford, CT. The project aims to reconnect upstream access to over 2.94 miles of wild brook trout habitat. This will be accomplished by the removal and replacement of existing undersized twin culverts with an engineered clear span timber bridge and through restoration and enhancement of instream fish habitats.

The Leadmine Brook Fish Passage and Habitat Restoration Project will address specific threats and conservation actions as outlined in Connecticut's Comprehensive Wildlife Conservation Strategy, which was approved by the U.S. Fish and Wildlife Service in 2006.

The project also provides an excellent opportunity to promote and foster cooperation between government agencies, academia, local conservation groups and the local community.

Our Inland Fisheries Division, Habitat Conservation and Enhancement staff will be providing technical guidance and oversight assistance for this project. They have extensive experience in reviewing engineering and design of stream crossing rehabilitation projects, as well as implementing and evaluating stream restoration efforts.

In summary, as a grant proposal partner and as Chief of the Department of Environmental Protection Bureau of Natural Resources I strongly support the Leadmine Brook Fish Passage and Habitat Restoration Project grant proposal. Any questions can be referred to Senior Fisheries Habitat Biologist, Brian D. Murphy who can be contacted at 860.295.9523.

Sincerely,

Edward C. Parker, Chief
Bureau of Natural Resources
CT Department of Environmental Protection
79 Elm Street
Hartford, CT 06106-5127