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Housatonic River Basin Natural Resources Restoration Project  
Natural Resources Trustee SubCouncil for Connecticut

Request for Supplemental Information (RSI)

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INLAND FISHERIES

**“Restoration of Coarse Woody Habitat  
in Housatonic River  
Mainstem Impoundments”**

Submitted by the Connecticut B.A.S.S. Federation Nation

June 20, 2007

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

**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 checked="" type="checkbox"/> Non-profit organization | <input type="checkbox"/> Corporation or Business |
| <input 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**

Connecticut B.A.S.S. Federation Nation

**Name**

David A. Santos

**Title**

Environmental Director

**Address**

80 Center Street

**City**                      **State**                      **Zip**

Windsor Locks                      CT                      06096

**Phone**

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**Email**

das63@cox.net

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

CT DEP Inland Fisheries Division Habitat Conservation and Enhancement Program

**Name**

Peter Aarrestad

**Title**

Supervising Fisheries Biologist

**Address**

79 Elm Street

**City**                      **State**                      **Zip**

Hartford                      CT                      06106

**Phone**

(860) 424-3474 or (860) 424-4171 (personal line)

**Email**

peter.aarrestad@po.state.ct.us

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

Restoration of Coarse Woody Habitat in Housatonic River Mainstem Impoundments.

**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:

New Milford, Bridgewater, Brookfield,  
Southbury, and Newtown

Longitude for approximate center of project area:

-73 degrees 21' 2.8"

Latitude for approximate center of project area:

41 degrees 28' 46.7"

**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**

Impaired aquatic habitat and riverine biota as well as reduced recreational opportunities (recreational angling in particular) will all be enhanced by the proposed project.

**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.

<b>Housatonic River NRD Funds – Requested</b>	<b>Other Contributions (Committed)</b>	<b>Other Contributions (Not Committed)</b>	<b>Total Project Cost (boxes 1+2+3)</b>
1. From Part D, Table 2, Box 5 \$46,050.00	2. From Part D, Table 2, Box 6 \$119,200	3. From Part D, Table 2, Box 7 \$10,000	4. From Part D, Table 2, Box 8 \$175,250.00
<b>Amount of Other Contributions to Be Considered as Cost-Matching to NRD Fund Request</b>			
5. \$129,200.00			

**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.

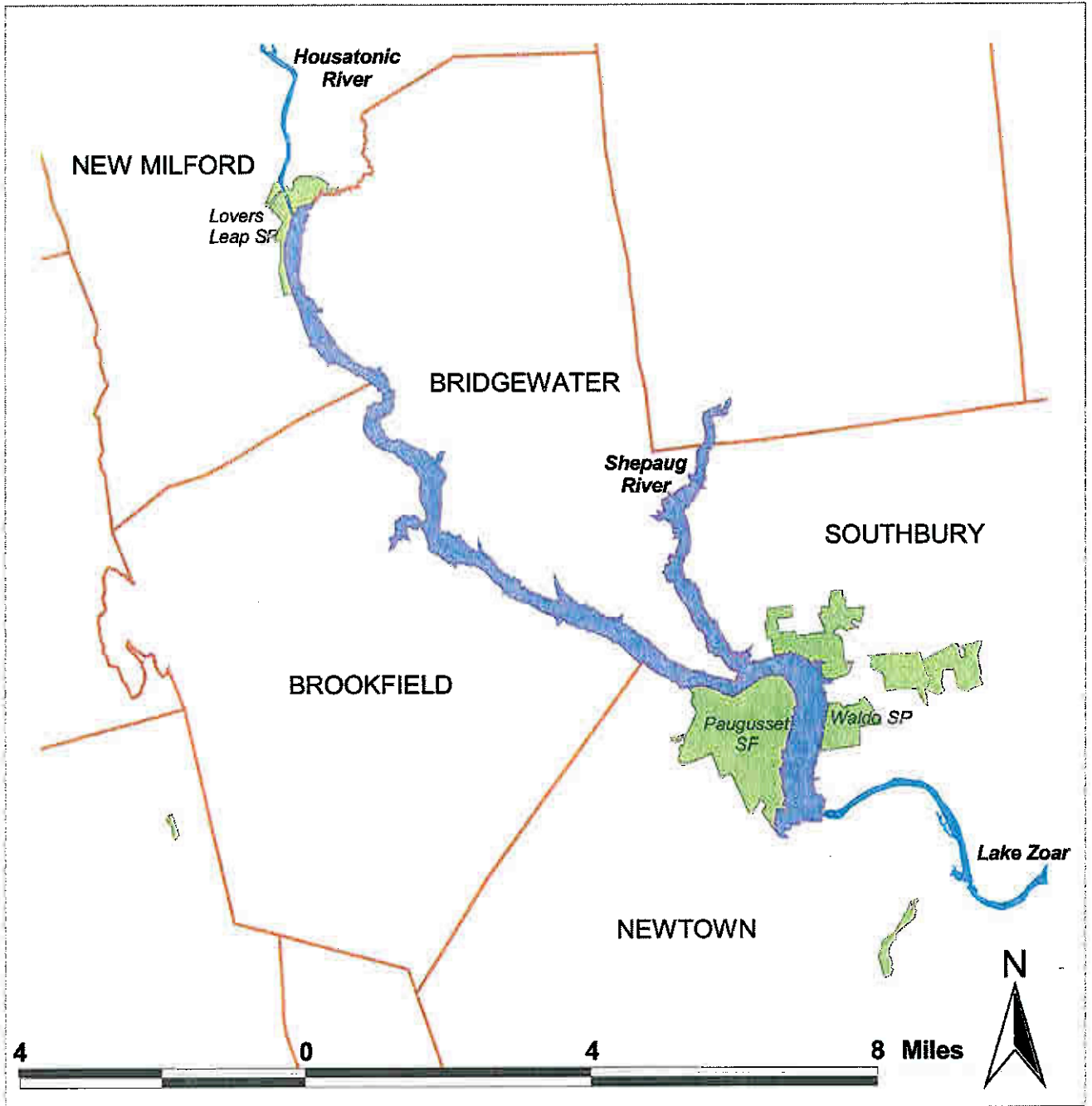
*David A Santos*

6/20/07

Signature of Sponsor or Sponsor Representative

Date

David A. Santos  
 Name of Sponsor or Sponsor Representative  
 (Type or print clearly)



Map of Lake Lillinonah.

## **PART B. PROJECT ABSTRACT**

Coarse Woody Habitat (CWH) will be restored in Lake Lillinonah, a major Housatonic River mainstem river impoundment in Connecticut. This proposal will actively restore natural resources and services through a physical restoration project that will integrate public involvement and avoid adverse environmental impact. Project partners include the Connecticut B.A.S.S. Federation Nation and the Connecticut Department of Environmental Protection (DEP).

The project is intended to (1) enhance near-shore fisheries habitat, and (2) mitigate the loss of CWH from Lake Lillinonah resulting from a skimming operation of floating logs and other debris that was recently implemented to reduce conflict with recreational boating. The project will restore CWH at appropriate submerged locations where it will be securely anchored at sufficient depth to avoid conflict with navigation or where it will be clearly visible above the water (shoreline locations). Ecosystem habitat value of CWH will be maintained, benefiting a variety of fishes and enhancing recreational angling opportunities in Lake Lillinonah.

The project will be implemented in four general phases with Phase 1 focusing on habitat mapping and assessment of locations pre-selected for CWH enhancement. Phase 2 involves planning and permit acquisition. Phase 3 consists of project implementation. Phase 4 consists of monitoring fish use, angler success, and the longevity of the CWHs. Phase 4 will also include provisions for replacing or augmenting the CWH as needed. Phases 1 through 3 will be completed within a three-year period whereas monitoring will continue for a period of 10 years subsequent to completion of Phase 3.

## **PART C. PROJECT NARRATIVE**

### **1.0 GENERAL DESCRIPTION**

#### **1.1 Project Goals and Objectives**

The proposed project is intended to restore Coarse Woody Habitat (CWH) in Lake Lillinonah, which at 1,547 acres, is the largest of the three major Housatonic River mainstem river impoundments in Connecticut. CWH (AKA large woody debris or LWD) serves a critical role in sustaining desirable fishes and communities in lakes, and changes in CWH can produce long-term effects at the ecosystem scale (Sass et al 2006). This proposal will actively restore natural resources and services through a physical restoration project that will integrate public involvement and avoid adverse environmental impact.

The primary goals of this project are to enhance impaired aquatic habitats, biotic resources and recreational angling opportunities in the mainstem Housatonic River and to partially replace impairments to natural resources and the societal services derived from those resources through the restoration of CWH in Lake Lillinonah.

The objectives of CWH restoration are to (1) enhance near-shore fisheries habitat and to improve recreational angling opportunities for shore based and boat based anglers in Lake Lillinonah. Lake Lillinonah was created in 1955 with the construction of the Shepaug Dam. The river valley was cleared of vegetation prior to being flooded. Based on historic photographs, land-clearing operations included the removal of tree stumps as opposed to simply cutting the trees and leaving the stumps in place (Bob Gates, Firstlight Power pers. comm.). As such, Lake Lillinonah would not be expected to have any CWH remaining from the construction of this impoundment, as would be the case if the stumps had not been removed. While some large woody debris floats into Lake Lillinonah from upstream sources, the extent to which this material has or continues to sink to the bottom to provide CWH is unclear. Large volumes of potential CWH in the form of floating large woody debris is now being removed from the Lake by annual skimming operations to reduce

conflict with recreational boating. This project is intended to critically and scientifically evaluate the relative amount and complexity of physical habitat in the lake and to restore habitat complexity in the form of CWH constructed from natural materials in areas where it is lacking.

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

Four areas within Lake Lillinonah, depicted within Figures 1 through 4, have been selected for detailed habitat mapping that will form the basis of a scientifically rigorous CWH restoration plan. The four areas for potential placement of submerged CWH are out of the historic river channel, thus avoiding the stronger riverine currents, they are of sufficient depth so as to ensure safe clearance over the top of the structures (even under the low pool elevation), the areas are relatively flat so as to ensure the structures can be properly installed, and most importantly, the areas are the least likely to currently provide any complex habitat features so there will be a direct and obvious benefit from habitat enhancement in these areas.

The proposed plan calls for installing Wisconsin style log cribs, a relatively long lasting constructed habitat that provides cover for various gamefish and other fish species (Fig. 5). Though the RFP for this project called for conducting this work in all three major Housatonic River impoundments (i.e., Lake Lillinonah, Lake Zoar and Lake Housatonic), the project has been scaled back to focus solely on Lake Lillinonah at this time. Consultation with other interested parties including but not limited to the DEP, various lake authorities, municipalities and Northeast Energy will be undertaken as appropriate during all project phases.

Each crib will be constructed out of 18 or so 6-inch diameter green hardwood poles (oak, maple, etc). The cribs will measure approximately 5ft by 5 ft by 4 ft (high). While a standard Wisconsin style log crib measures 8ft by 8ft by 4 ft (high), these are being reduced in size to facilitate transported on and launching from the debris skimmer that is being operated by Firstlight Power on Lake Lillinonah and Lake Zoar to skim floating debris. Brush is loosely stacked within the cribs to provide hiding cover for smaller fishes and rocks or other suitable ballast is added to or attached to the bottom to promote sinking.

The log cribs will be constructed at a secure lakeside location provided by Firstlight Power. These will be constructed by volunteers using power drills and chains saws. All of the material used in constructing the cribs is natural (wood or rock) with the exception of fasteners (steel re-bar or polyethylene rod or rope, nails, etc). The cribs will be towed to the predetermined and approved habitat enhancement sites and deployed from either a work barge or a debris skimmer, both of which can be supplied by Firstlight.

Project success will be determined by assessing various parameters such as fish utilization, anglers catch rates, and the longevity of CWH units. Project success will be measured through periodic monitoring of fish use of the submerged and shoreline CWH using remotely operated video and still photography, by volunteer angler reporting to compare catch rates from CWH-enhanced areas vs. non-enhanced areas within the lake, and through the inspection of CWH over time using direct observation and remotely operated video and still photography to determine when and if CWH units require replacement.

The project will be implemented in four general phases. Phase 1 is required to accurately assess the existing habitat conditions at pre-selected locations to determine the most appropriate location, number, and configuration of the log cribs. The following narrative incorporates information from Jeff Snyder, President of SeaVision Marine Services LLC and focuses on the technical services that will be provided by SeaVision. Mr. Snyder's professional resume and a support letter for this project dated June 17, 2007 are attached to this document.

### **Phase 1 – Assessment**

Task 1 – Hydrographic Survey

Task 2 – Sidescan Sonar Investigation

Task 3 – Water Quality Sampling and Bottom Sediment Characterization

## Task 4 – Underwater Video Ground Truthing

**Discussion:** Four (4) sites have been selected as potential areas for Coarse Woody Habitat (CWH) restoration in Lake Lillinonah. Each of these sites varies in size, but the general size of each is approximately 1100 feet by 2500 feet. In this phase, SeaVision Marine Services LLC (SeaVision) will first collect bathymetric data at each site using a singlebeam echosounder, sub-meter accurate Differential Global Positioning System, and assorted computer hardware and software. The geographically referenced bathymetric data will provide a baseline model of the lake bottom at each site. Following the hydrographic survey, SeaVision will perform a sidescan sonar investigation at each site, generating underwater imagery from which existing debris, rock outcrops, or hazards to navigation may be identified. This imagery, like the bathymetric data, shall be geographically referenced and prepared for overlay with the bathymetric model. The combination of the two survey techniques will provide a clear representation of the existing lake bottom and existing structure at each of the sites so that potential new CWH placement can be performed at areas where fish are likely to congregate but no suitable habitat exists currently. To further support the findings from the surveys, water quality sampling and sediment sampling shall be performed at each site. This will indicate any potential water quality issues and also determine if the bottom is suitably firm in the proposed areas to support the log cribs. Proposed installation locations, as well as any identified targets of interest at each site will be further investigated using a remotely operated vehicle (ROV) to collect video of the bottom conditions.

### **Phase 2 – Planning/Permitting**

#### Task 5 – Drawing Product Development

**Discussion:** After the data from Phase 1 is collected, SeaVision will generate a series of integrated hardcopy and digital deliverable products from the processed data. Hardcopy products will consist of large-format drawings (i.e., posters) that display each of the survey sites with digital aerial photographs, the bathymetric model, sidescan sonar imagery, targets of interest, water quality results, and bottom sediment sampling results.

Smaller, permit-sized drawings shall also be prepared for inclusion in any permit applications that may be needed to install the CWH habitat structures. These drawings shall consist of plan view and cross-section drawings that can be submitted in the final permit applications.

A digital deliverable product shall also be assembled so that the integrated digital data can be presented and distributed in a geographic information system (GIS) using the freely downloadable ESRI ArcExplorer Software. This product may prove to be a very valuable viewing tool so that the different data sets can be reviewed and compared while actual CWH site selection is performed.

Consultation with the DEP Inland Water Resources Division suggests that the installation of log cribs will require the approval of the local Inland Wetlands and Watercourses agencies (Bob Gilmore, pers. comm.). No DEP permits would be required with the possible exception that the DEP Boating Division might require the positing of signage or buoys to identify shoreline tree drops if deemed necessary. Given that the total bottom footprint of 50 log cribs (each 5 ft x 5 ft) would be substantially less than 5,000 sq. feet, no permits would be required from the U.S. Army Corps of Engineers. In fact, 199 log cribs of the dimension proposed would fall under the 5,000 sq ft regulatory threshold.

### **Phase 3 – Implementation**

The cribs will be constructed by volunteers from the CT B.A.S.S. Federation Nation at a secure lakeside site provided by Firstlight Power and located near the Shepaug dam. Work will be done on the weekends, primarily in early to mid-March. The cribs can be stockpiled for later installation. The completed cribs will be hoisted onto the debris skimmer or work barge using a small crane or pay loader. The cribs will then be transported to the previously selected and authorized locations for installation.



Lake Lillinonah offers an extensive shoreline that is currently forested, providing numerous opportunities for tree drops and similar enhancement opportunities for shoreline CWH. In addition to a significant shoreline fronted by Paugusset State Forest, Northeast Energy, municipalities, and land conservation organizations own other lands. As such, there would seemingly be numerous locations where shoreline anchoring would be suitable, provided the riparian landowners would consent to shoreline enhancements. Identifying suitable areas for shoreline enhancements would not require the same level of detailed assessment as would the submerged structures thus there is significantly less discussion and project cost information associated with the shoreline enhancements.

**Task 6 – Site Preparation**

**Discussion:** After the sites for CWH enhancement have been selected and permits obtained, SeaVision will assist with site preparation by deploying marker buoys (supplied by the CT B.A.S.S. Federation Nation) at each CWH installation site using SeaVision’s survey vessel and positioning equipment. After the CWH is installed, SeaVision will also collect ROV video of the bottom in the vicinity of each CWH structure to check for installation condition and orientation.

**Phase 4 - Monitoring**

**Task 7 - Periodic Underwater Video Monitoring**

**Discussion:** In order to gauge the effectiveness of the CWH habitat restoration, it will be necessary to return to each site periodically to check fish use at the installed log cribs. As part of this effort, SeaVision will provide ROV services, two times per year, for two years after installation of the CWH to collect underwater video in the vicinity of each CWH structure to document fish use. After the first two years, SeaVision will return each year, once per year, for eight additional years. This will provide a total of 10 years of video monitoring.

Phase 4 will consist of monitoring of all structures to assess longevity and success of the various CWHs, and will include provisions for replacing or augmenting the CWH. Phase 4 is considered critical to long-term success and it will thus continue well into the future and beyond the funding opportunities of this grant. As such, it will ensure that sufficient CWH remains within all three impoundments to support aquatic biota, ecosystem function, and enhanced fishing opportunities over the long term. It is expected that funds from other sources can be acquired in the future if any CWH needs to be augmented or replaced.

**Budget**

SeaVision has developed a discounted cost proposal for the services that have been described in Tasks 1 through 7 above. Both the discount cost and the standard pricing for these services are shown. The difference between the two prices represents in-kind contributions toward this project. If all of the tasks that are detailed below are implemented, the total in-kind contribution of donated services equates to \$99,200

<b><u>Task Description</u></b>	<b><u>Project Cost</u></b>	<b><u>Typical Cost</u></b>
<b>Phase 1 - Task 1 Hydrographic Survey</b> Lump Sum for Four (4) Sites, based on assumptions	<b>\$2,000.00</b>	<b>\$10,000.00</b>
<b>Phase 1 - Task 2 Sidescan Sonar Investigation</b> Lump Sum for Four (4) Sites, based on assumptions	<b>\$2,800.00</b>	<b>\$12,000.00</b>
<b>Phase 1 - Task 3 Water Quality and Bottom Characterization</b> Lump Sum for Four (4) Sites, based on assumptions	<b>\$1,500.00</b>	<b>\$6,000.00</b>
<b>Phase 1 - Task 4 Video Ground Truthing</b>	<b>\$1,000.00</b>	<b>\$7,500.00</b>

Lump Sum for Four (4) Sites, based on assumptions

**Phase 2 - Task 5 Drawing Product Development**

**\$2,000.00      \$10,000.00**

Lump Sum for Four (4) Sites, based on assumptions

**Phase 3 - Task 6 Site Preparation**

**\$1,000.00      \$4,000.00**

Lump Sum for Four (4) Sites, based on assumptions

**Phase 4 - Task 7 Periodic Underwater Video Monitoring**

**\$10,000.00      \$70,000.00**

Lump Sum for Sites, based on assumptions

**Total**

**\$20,300.00      \$119,500.00**

Figure 1. Submerged CWH Investigation Area #1. The black lines delineate the boundaries of the Investigation Area, whereas the anticipated area for potential installation of submerged CWH is approximated by the red oval. Submerged CWH Investigation Area #1 is the most downstream of the four CWH Investigation Areas, and is located approximately 1.5 miles upstream from the Shepaug Dam

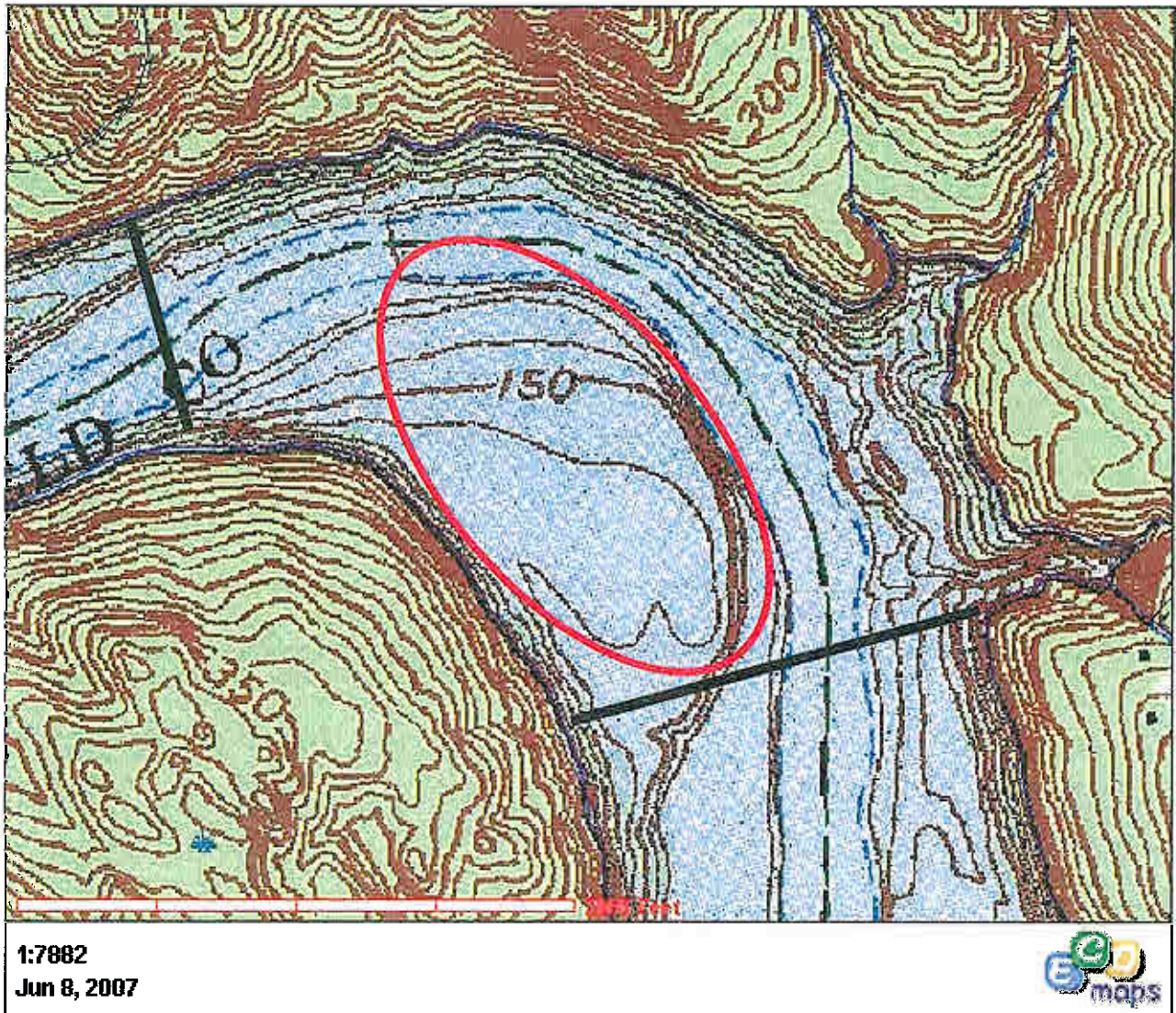


Figure 2. Submerged CWH Investigation Area #2. The black lines delineate the boundaries of the Investigation Area, whereas the anticipated area for potential installation of submerged CWH is approximated by the red oval. Submerged CWH Investigation Area #2 is near Hitchcock Brook just downstream of the S-curves. The site is located approximately seven miles upstream of the Shepaug Dam.

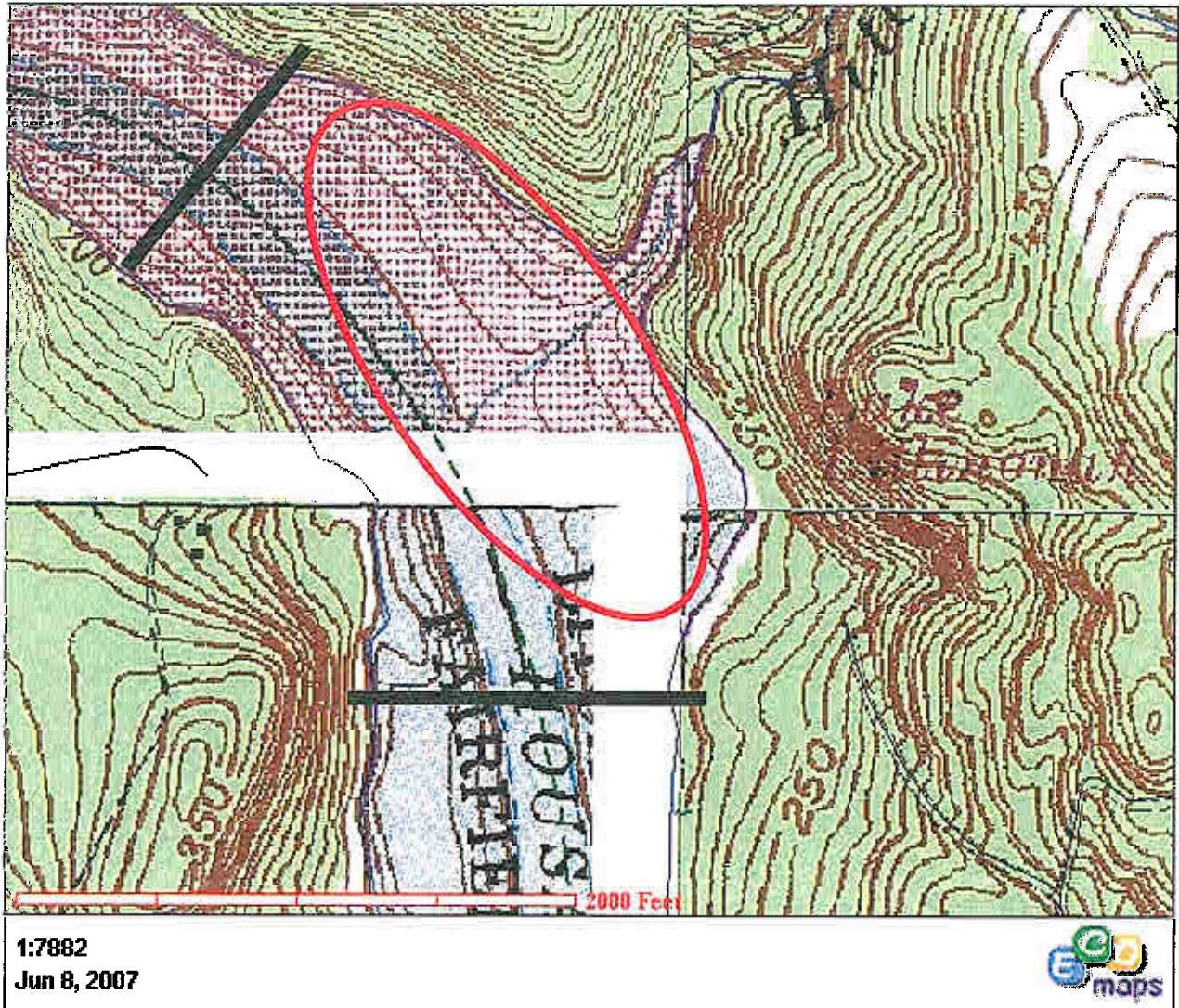


Figure 3. Submerged CWH Investigation Area #3. The black lines delineate the boundaries of the Investigation Area, whereas the anticipated area for potential installation of submerged CWH is approximated by the red oval. The site is near the upstream limits of the impoundment just below Lovers Leap, and it is approximately 10 miles upstream of the Shepaug Dam.

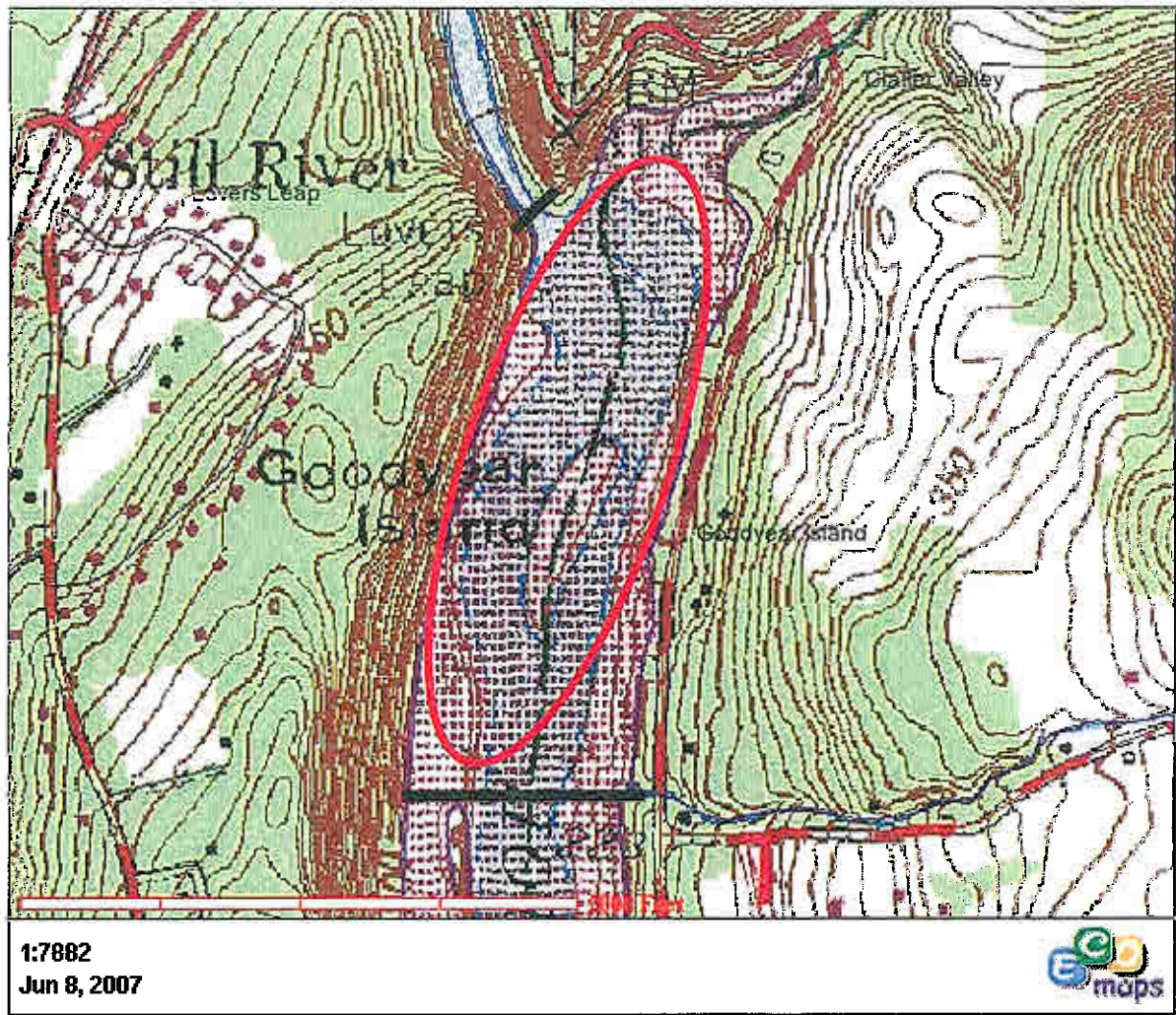


Figure 4. Submerged CWH Investigation Area #4. The black lines delineate the boundaries of the Investigation Area, whereas the anticipated area for potential installation of submerged CWH is approximated by the red oval. Submerged CWH Investigation Area #4 is located within the Shepaug Arm approximately 2 miles upstream from the main body of Lake Lillinonah and about four miles from the Shepaug Dam.

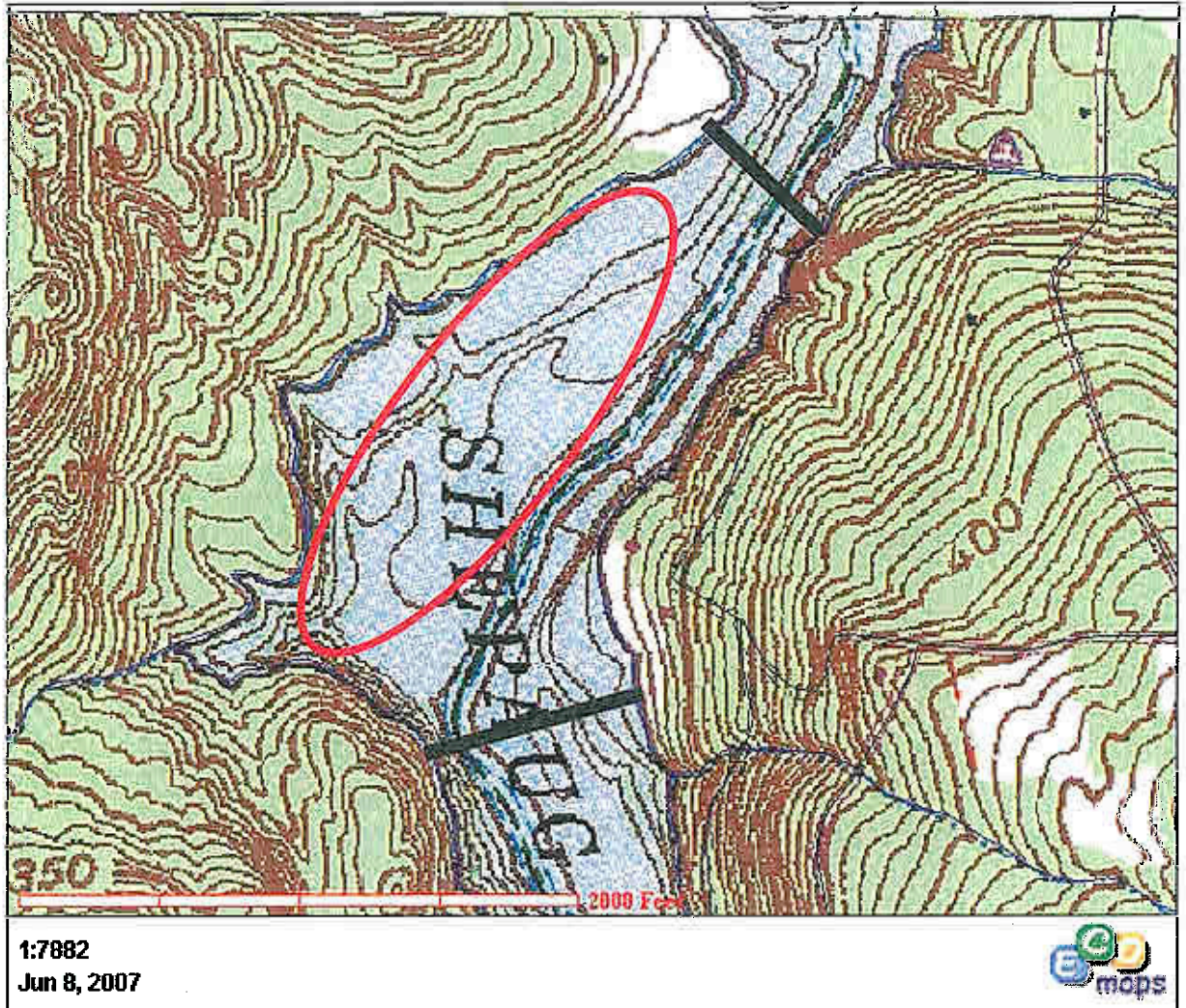




Figure 5. A Wisconsin Style log crib that was constructed on the ice in Wisconsin. <http://www.nden.k12.wi.us/grants/photocrib.htm>



Figure 6. Example of a natural tree drop. Photo taken on Lake Lillinonah on November 4, 2004.



Figure 7. Example of a large free-floating tree, which could be secured in place along an undeveloped shoreline. It would be visible, would not pose a navigation hazard, nor would it interfere with the riparian rights of lakefront residences. Photo taken on Lake Lillinonah on November 4, 2004.

#### **Literature Cited:**

Sass, G.C., J.F. Kitchell, S.R. Carpenter, T.R. Hrabik, A.E. Marburg, and M.G. Turner. 2006. Fish Community and Food Web Responses to a Whole-lake Removal of Coarse Woody Habitat. *Fisheries*. 31(7) 321-330.

## **2.0 EVALUATION CRITERIA NARRATIVE**

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

#### **2.1.1 Location of Project**

Lake Lillinonah is a 1,547 acre impoundment on the Housatonic River main stem in Connecticut that is located upstream of the Derby Dam. One of the four targeted enhancement sites within Lake Lillinonah is located in the Shepaug Arm of Lake Lillinonah. As such, this one targeted enhancement site is technically within the Shepaug River sub-regional drainage basin as per the DEP Drainage Basin Map.

#### **2.1.2 Natural Recovery Period**

Because of ongoing debris removal efforts, there will be a net loss of CWH in Lake Lillinonah over time in the absence of the proposed project. As such, the project will clearly accelerate the recovery of these habitat features as compared to the "natural" recovery period (i.e. in the absence of this project).

### **2.1.3 Sustainable Benefits**

The proposed project will provide long-term sustainable benefits, especially since monitoring and replacement of CWH will be undertaken. It is noted that the log cribs that are intended for submerged installation have an expected effective life span of 25 years. Tree drops also represent a relatively long-term form of CWH, as they would be expected to last up to 15 years or more. Boulders or other natural rock, if recommended by the Trustees as a preferred natural habitat enhancement material, would represent a material that has an essentially indefinite life span.

### **2.1.4 Magnitude of Ecological Benefits**

The project will provide a moderate level of ecological benefit insofar as CWH will be restored to the Housatonic River at Lake Lillinonah. CWH serves a critical role in sustaining desirable fishes and communities in lakes, and changes in CWH can produce long-term effects at the ecosystem scale (Sass et al 2006).

### **2.1.5 Magnitude of Recreational Benefits**

The project will provide improved recreational opportunities in the form of enhanced recreational fishing conditions within existing waters of Lake Lillinonah. This will be accomplished through the strategic placement of CWH that will attract gamefish and other species resulting in improved angling in the habitat enhanced areas.

## **2.2 Technical Merit**

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

The CWH types to be introduced in Lake Lillinonah have been widely used for well over 50 years in North American waters and were selected based on scientific/technical literature as well as from state and provincial fish and wildlife agency guidance documents.

### **2.2.2 Adverse Environmental Impact**

The proposed CWH types/structures are to be constructed from natural materials (wood and stone) to the greatest extent possible, thereby replicating natural habitat features that are already evident in the Housatonic River and impoundments thereto. There is no adverse environmental impact associated with this project.

### **2.2.3 Human Health and Safety**

The construction and installation of CWH into and along Lake Lillinonah does not present any health and safety concerns to those involved in project implementation. Proper safety equipment will be used and precautions taken during surveying, construction, installation and follow-up monitoring. There are no issues associated with the health and safety of the general public insofar as submerged CWH structures will be installed sufficiently below the low water elevation of the impoundment as determined by the DEP Boating Division and/or other authorities, whereas shoreline structures shall be clearly visible and or marked per the direction of the DEP Boating Division and/or other authorities. Unless otherwise required by permitting authorities, there shall be a minimum of 5 ft of clearance between the top of the submerged log cribs and the low water elevation of the impoundment, which is 193.8ft NGVD. As such, the 4 ft high structures will be placed where the lakebed elevation is at or below 184.8ft NGVD.

### **2.2.4 Measurable Results**

Project success will be determined by assessing various parameters such as fish utilization, angler catch rates, and the longevity of CWH units. Fish use of the submerged and shoreline CWH will be accomplished with remotely operated video photography. Angler catch rates will be determined through a volunteer angler reporting system administered by the B.A.S.S. Federation Nation to compare catch rates from CWH-enhanced areas vs. non-enhanced areas within the lake. Thus in the catch rate assessment the non-enhanced



areas will serve as the reference condition. The longevity of the structures will be determined over time through direct inspection with remotely operated video photography and CWH will be replaced if needed.

## **2.3 Project Budget**

### **2.3.1 Relationship of Expected Costs to Expected Benefits**

The donated volunteer services associated with this project greatly improve the cost/benefit ratio such that a significant environmental and recreational benefit will result from the allocation of limited Housatonic NRD funds.

### **2.3.2 Implementation-Oriented**

It is anticipated that this project will result in the installation of between 30 and 50 submerged CWH units (Wisconsin style log cribs) within three or four appropriate portions of the Lake Lillinonah impoundment. In addition, it is anticipated that between five and 15 shoreline CWH enhancements will be made along appropriate areas (i.e. only with the permission of the riparian landowners regardless of whether it is publicly or privately owned). These shoreline enhancements could be secured tree drops (refer to Figure 6.) or the repositioning and securing of large floating trees (refer to Figure 7). The implementation portion of this habitat enhancement plan cannot be finalized until the designated areas are assessed, though there is no reason to believe that implementation will not move forward.

### **2.3.3 Budget Justification and Understanding**

The project budget detailed below in Part D addresses all project phases from assessment, permitting, implementation and monitoring.

### **2.3.3 Leveraging of Additional Resources**

The project involves a significant contribution of various donated in-kind services including significant volunteer construction labor. The construction of each log crib requires approximately 8 hours, thus the total contributed man-hours for this phase, not including transportation to the centralized work locations ranges from 240 (n= 30 cribs) to 400 hours (n= 50 cribs). When transportation to the site for an average estimated one-way trip of one hour is factored in, the total estimated donated hours for this phase is increased to 300 (n= 30 cribs) to 500 hours (n= 50 cribs). The B.A.S.S. Federation Nation will also be donating the resources necessary to evaluate the catch rates in enhanced vs. non-enhanced areas as well as committing to public outreach efforts. The DEP Inland Fisheries Division is providing technical support services in terms of habitat plan development, logistical coordination, permit acquisition, and other technical phases as may be needed. Firstlight Power will be formally committing to providing construction space for the log cribs, and will be donating the use of the debris skimmer and its operator, and a work barge if needed. SeaVision will be donating substantial "in-kind" services in the form of discounted savings in contracted services.

### **2.3.5 Comparative Cost Effectiveness**

Not applicable as there are no other known projects that seek to restore damaged resources in the same manner and location as does this proposed project.

## **2.4 Socioeconomic Merit**

### **2.4.1 Community Involvement and Diversity**

The project will be implemented by the Connecticut B.A.S.S. Federation Nation, which has a current membership of 425 individuals. The mission of the Connecticut B.A.S.S. Federation Nation is as follows:

"Our mission is to promote the sport of bass fishing within the State of Connecticut in accordance with the goals and purpose of our parent organization B.A.S.S. We are dedicated to the preservation of our natural

resources, the conservation of fisheries, and promoting the continuation and enjoyment of our sport through youth and educational activities." Members of Connecticut B.A.S.S. Federation Nation will be directly responsible for the construction of the log cribs and will also implement the voluntary angler survey to evaluate the effectiveness of these structures in improving catch rates.

#### **2.4.2 Adverse Socioeconomic Impacts**

There are no known adverse socioeconomic impacts associated with this project.

#### **2.4.2 Coordination and Integration**

No conflicts between the proposed CWH restoration project and any existing state, regional, municipal or other agency plan has been identified. In addition, the activities associated with this project do not conflict with any plans or requirements of the Federal Energy Regulatory Commission's (FERC) relicensing of the Housatonic Hydroelectric Project. The Debris Management Plan developed by the Northeast Generation Company (NGC) (currently Firstlight Power) and approved by the FERC requires the licensee (per FERC order issued Sept. 15, 2005) to conduct skimming operations on Lake Lillinonah and Lake Zoar between May 1 and September 1 annually for the purpose of removing floating debris, including natural woody debris. This proposed project complements the Debris Management Plan insofar as the ecological and recreational benefits of large woody debris will be retained through the implementation of this plan, which will be done in a manner that does not create any navigation concerns or other potential conflicts.

#### **2.4.4 Public Outreach**

Anticipated public outreach components of this project include the following:

- Detailed project information will be featured on the websites of the CT B.A.S.S. Federation Nation and CT DEP, with a linkage from each site to the other.
- Writing and circulating press releases to major regional newspapers and other regional print media.
- Purchasing and installing two approximately 2 ft by 3 ft signs that describe the CWH restoration plan in Lake Lillinonah. These signs would be installed at the two public boat launches on Lake Lillinonah in accordance with any requirements of DEP (which owns and maintains the boat launches)
- Publishing articles in BASSTIMES and Bassmaster magazine, both of which have national circulation. .
- Applying for conservation awards through the BASS Federation Nation.
- Ensuring that all 425 members of the CT B.A.S.S. Federation Nation spread the word of the project.

### **2.5 Applicant Implementation Capacity**

#### **2.5.1 Technical Capacity of Applicant and Project Team**

Full implementation of the project will involve the combined efforts of the CT B.A.S.S. Federation Nation, fisheries biologists from the Connecticut Department of Environmental Protection, professional staff of Firstlight Power, and Jeff Snyder, President of SeaVision Marine Services LLC. Mr. Snyder's professional and educational credentials are attached to this document. The CT B.A.S.S. Federation Nation has at its disposal significant technical resource capacity from its national parent organization B.A.S.S.

#### **2.5.2 Administrative Capacity of Applicant and Project Team**

The project team is fully capable of implementing all phases of the proposed project. In addition to the merits of other partners, the CT B.A.S.S. Federation Nation has at its disposal significant technical resource

capacity from its national parent organization B.A.S.S.

### **2.5.3 Project Commitments**

Firstlight Power has indicated a willingness to provide various forms of support for this project. It is anticipated that confirmation of Firstlight's commitment to this project will be reached well before the selection of NRD grant recipients. Firstlight Power's involvement will include providing a secure lakeside location where construction materials can be delivered and the log cribs constructed. In addition, it is anticipated that Firstlight will agree to install all of the log cribs utilizing their custom skimmer craft. The skimmer craft has a 6 ft wide conveyor belt and a carrying capacity of 12,000 pounds, well in excess of the weight of the constructed log cribs. Although a standard log crib measures 8 ft by 8 ft by 4 ft (H), the cribs designed for this project will be scaled down to 5 ft by 5 ft by 4 ft (H) so they can be installed in the lake using Firstlight Power's skimmer vessel. If it is determined that there are any difficulties using the skimmer craft Firstlight Power will supply a work barge for transporting the log cribs to the habitat enhancement sites.

SeaVision has prepared a detailed Scope of Work for various phases of this project, some of the contents of which are embedded in this document. In addition, refer to the June 17, 2007 letter of Support from Jeffrey Z. Snyder, President of SeaVision.

### **3.0 LAND ACQUISITION PROJECTS**

Not applicable.

## PART D PROJECT BUDGET NARRATIVE AND FORMS

The budget for this project is detailed in Tables 1 (three separate sheets accounting for up to 10 fiscal years) and Table 2 below. A total of \$46,050 of Housatonic NRD funds is requested over the 10-year period, \$36,050 of which shall be requested for Fiscal Year 1.

A detailed explanation of contracted services is provided under section 1.2 (Project Scope and Implementation Plan) beginning on Page 3 and will not be repeated here. However, the allocation of contracted services for the four phases of this project over the 10 fiscal years in which Housatonic NRD funds are requested is shown below. As was noted earlier, and which is clearly stated in enclosed correspondence from SeaVision President Jeffrey Z. Snyder, SeaVision has agreed to greatly discount the cost of services. Thus the donated value of services is shown in Table 2 in the amount of \$99,200.00.

<u>Task Description</u>	<u>Project Cost</u>	<u>Fiscal Year</u>
<b>Phase 1 - Task 1 Hydrographic Survey</b> Lump Sum for Four (4) Sites, based on assumptions	\$2,000.00	1
<b>Phase 1 - Task 2 Sidescan Sonar Investigation</b> Lump Sum for Four (4) Sites, based on assumptions	\$2,800.00	1
<b>Phase 1 - Task 3 Water Quality and Bottom Characterization</b> Lump Sum for Four (4) Sites, based on assumptions	\$1,500.00	1
<b>Phase 1 - Task 4 Video Ground Truthing</b> Lump Sum for Four (4) Sites, based on assumptions	\$1,000.00	1
<b>Phase 2 - Task 5 Drawing Product Development</b> Lump Sum for Four (4) Sites, based on assumptions	\$2,000.00	1
<b>Phase 3 - Task 6 Site Preparation</b> Lump Sum for Four (4) Sites, based on assumptions	\$1,000.00	2
<b>Phase 4 - Task 7 Periodic Underwater Video Monitoring</b> Lump Sum for Sites, based on assumptions	\$10,000.00	1 through 10
<b>Total</b>	<b>\$20,300.00</b>	

The budget for materials includes the anticipated cost of hardwood poles and associated brush as per a quote from a licensed forest products professional whose business is located within the general vicinity of Lake Lillinonah. The quote is for 7200 LF of 6" DIA material/hardwood, which equates to 360 20ft poles for a price \$10,500.00, plus 200 LF of sapling poles and brush for \$3500.00. The material will be sufficient to build at least 50 log cribs with an allocation made for waste. The cost for all additional materials needed to construct and secure the log cribs and tree drops (ballast, stainless steel fasteners, re-bar or polyethylene rod or rope, etc.) was factored into the total estimated cost of \$19,500 (Table 2).

Costs for educational signage were estimated at \$365 per sign for two professionally made 2 by 3 ft signs.

The cost to secure local IWWCA permits was estimated, as was the cost for a crane rental.

Donated labor estimates were based on a volunteer work force supplied by the CT B.A.S.S. Federation Nation for a variety of services at a modest rate of \$10.00 per hour. It is anticipated that 10 volunteers will be constructing the log cribs over a period of 5 full days for a total effort of 500 hours. The construction of each log crib requires approximately 8 hours, plus an average estimated one-way trip of one hour to the work site for a total of 10 hours per log crib. In addition to this, the CT B.A.S.S. Federation Nation will also be donating the resources necessary to evaluate the catch rates in enhanced vs. non-enhanced areas, committing to and supporting public outreach efforts, and possibly assisting in the installation of the log cribs.

The value of services donated by Firstlight has only been estimated at this time. It is anticipated that a formal commitment of resources and services from Firstlight will be secured in the near future, including providing construction space for the log cribs, and will be donating the use of the debris skimmer and its operator, and a work barge if needed.

The DEP Inland Fisheries Division is providing technical support services in terms of habitat plan development, logistical coordination, permit acquisition, and other technical phases as may be needed.

TABLE 1 (SHEET 1). HOUSATONIC RIVER NRD FUNDING ALLOCATION BY FISCAL YEARS <sup>1</sup>

PROJECT TITLE:		Restoration of Coarse Woody Habitat in Housatonic River Mainstem Impoundments			
SPONSOR NAME:		Connecticut B.A.S.S. Federation Nation			
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	\$10,300.00	\$2,000.00	\$1,000.00	\$1,000.00	
D. SUPPLIES, MATERIALS AND EQUIPMENT	\$20,250.00				
E. TRAVEL					
F. OTHER (LIST) Crane Rental	\$5,000.00				
G. OTHER (permit acquisition)	\$500.00				
<b>TOTAL BY FISCAL YEAR</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	
	\$36,050.00	\$2,000.00	\$1,000.00	\$1,000.00	
<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]					
			\$46,050.00 (total through Fiscal Year 10		
			See additional sheets)		

<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 1 (SHEET 2). HOUSATONIC RIVER NRD FUNDING ALLOCATION BY FISCAL YEARS <sup>1</sup>

PROJECT TITLE:		Restoration of Coarse Woody Habitat in Housatonic River Mainstem Impoundments			
SPONSOR NAME:		Connecticut B.A.S.S. Federation Nation			
EXPENSE CATEGORY (See App. A)	FISCAL YEAR 5	FISCAL YEAR 6	FISCAL YEAR 7	FISCAL YEAR 8	
	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	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	
D. SUPPLIES, MATERIALS AND EQUIPMENT	\$				
E. TRAVEL					
F. OTHER (LIST) Crane Rental					
G. OTHER (LIST)					
<b>TOTAL BY FISCAL YEAR</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	
	1,000.00	1,000.00	1,000.00	1,000.00	
<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]					
			\$46,050.00 (total through Fiscal Year 10 See additional sheets)		

<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 1 (SHEET 3). HOUSATONIC RIVER NRD FUNDING ALLOCATION BY FISCAL YEARS<sup>1</sup>

PROJECT TITLE:		Restoration of Coarse Woody Habitat in Housatonic River Mainstem Impoundments			
SPONSOR NAME:		Connecticut B.A.S.S. Federation Nation			
EXPENSE CATEGORY (See App. A)	FISCAL YEAR 9	FISCAL YEAR 10	RESERVED	RESERVED	
	Housatonic River NRD Funds	Housatonic River NRD Funds			
A. SALARIES					
B. OVERHEAD AND BENEFITS					
C. CONTRACTED SERVICES	\$1,000.00	1,000.00			
D. SUPPLIES, MATERIALS AND EQUIPMENT					
E. TRAVEL					
F. OTHER (LIST) Crane Rental					
G. OTHER (LIST)					
<b>TOTAL BY FISCAL YEAR</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	
	1,000.00	1,000.00			
<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.]					
\$46,050.00 (total through Fiscal Year 10 See additional sheets)					

<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**

<b>PROJECT TITLE:</b>		<b>Restoration of Coarse Woody Habitat in Housatonic River Mainstem Impoundments</b>			
<b>SPONSOR NAME:</b>		<b>Connecticut B.A.S.S. Federation Nation</b>			
<b>TASK<sup>2</sup></b>	<b>HOUSATONIC RIVER NRD FUNDS</b>	<b>OTHER CONTRIBUTIONS</b>		<b>TOTAL COST BY TASK</b>	
		<b>COMMITTED</b>	<b>NOT COMMITTED</b>		
A. Contracted Services of SeaVision	\$20,300.00			\$20,300.00	
B. Donated Services of SeaVision		\$99,200.00		99,200.00	
C. Materials to build and secure log cribs and to secure tree drops	\$19,500.00			\$19,500.00	
D. Purchase educational signage	\$750.00			\$750.00	
E. Acquire local permits	\$500.00			\$500.00	
F. Crane Rental for 10 days at \$500.00/day	\$5000.00			\$5000.00	
G. Donated labor at an estimated equivalent rate of \$10.00/hour per individual (2,000 hour total)		\$20,000.00		\$20,000.00	
H. Estimated equivalent value of FirstLight services to deploy log cribs.			\$10,000.00	\$10,000.00	
<b>TOTAL BY FUNDING SOURCE</b>	<b>5</b> \$46,050.00	<b>6</b> \$119,200.00	<b>7</b> \$10,000.00	<b>8</b> <b>GRAND TOTAL</b> \$175,250.00	

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

**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

SeaVision Marine Services LLC  
502 Maple Hill Road  
Naugatuck, CT 06770  
203-605-8959 (phone)  
203-723-7996 (fax)  
jsnyder@seavisionmarine.com

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**VIA ELECTRONIC TRANSMITTAL**

June 17, 2007

Connecticut B.A.S.S. Federation Nation  
80 Center Street  
Windsor Locks, CT 06096

Attention: David Santos, Environmental Director

**Subject: Housatonic River Restoration Grant Proposal  
Restoration of Coarse Woody Habitat in Mainstem Impoundments**

Dear Mr. Santos,

On behalf of SeaVision Marine Services LLC (SeaVision), it is my pleasure to offer the Connecticut BASS Federation Nation our proposed contract services to support their efforts as part of the Restoration of Coarse Woody Habitat in the Housatonic River Mainstem Impoundments, under the Housatonic River Restoration Grant Program.

We wanted to take this opportunity to express our commitment to this project and briefly discuss our motivation for the cost proposal we have tendered. As you will notice, we are offering a wide scope of services for a total of \$20,300.00. In our opinion, an equivalent amount of services could be provided at market rates on other projects (such as private sector, industrial, or public sector) for roughly \$119,500.00. We base this opinion on our professional experience and knowledge of commercial rates that the market in the northeastern United States can support for similar projects of similar scope, or for a combination of individual projects that carry scopes of work consistent with the individual tasks that have been proposed for this project.

As you can see, we have developed a scope of work and cost proposal that is very ambitious, at a rate that marks a significant discount. However, we want to assure you and the Grant review committee of our willingness and ability to perform this work for the budget proposed:

- (1) The proposed services can be completed in-house by SeaVision.
- (2) The proposed techniques draw upon hardware and software capabilities that SeaVision owns.
- (3) SeaVision owns and operates vessels that can perform this work.

Ultimately, our willingness to provide such discounted budget rates is driven by the fact that we are fishermen. As fishermen, we recognize and embrace the value that a project like this can have for the inland fisheries in the Housatonic River impoundments. We hope that the grant review committee recognizes our commitment to this project and understands our ability to support this project properly with our suite of services. We look forward to beginning work on this project for the CT Bass Federation Nation when the grant is awarded for this ambitious and necessary project.

Best Regards,



Jeffrey Z. Snyder, President  
SeaVision Marine Services LLC

Copy to: Peter Aarrestad, CT DEP Inland Fisheries



## Biography

Mr. Jeff Snyder is the President of SeaVision Marine Services LLC. He carries over 10 years of experience conducting marine operations to support diving and salvage operations, underwater survey operations, and engineering design and construction projects.

His background includes extensive training and experience in a variety of diving systems and deck operations, the use of sonars for conducting underwater searches and surveys, and the application of geophysical techniques for performing subsurface investigations into the design and monitoring of proposed and ongoing marine dredging projects. Mr. Snyder has also developed significant experience with Geographic Information Systems (GIS). He has integrated these diverse skill sets with excellent analytical, verbal, and written communication skills to provide valued service to clients throughout the Northeast United States.

Highlights of Mr. Snyder's experience and accomplishments are as follows:

- Conducted several hydrographic surveys throughout the Port of New York and New Jersey for private and commercial property owners with waterfront rehabilitation projects.
- Conducted a hydrographic conditions survey and sidescan sonar investigation of a 500 ft by 2500 ft area directly adjacent to the Cross Bay Bridge in Jamaica Bay for the Triborough Bridge and Tunnel Authority. The purpose of the investigation was the determine water depths in the survey area and find any remnants of a previously demolished bridge and/or other hazards to navigation that may exist in the survey area. Mr. Snyder also utilized a remotely-operated vehicle to investigate targets of concern in the survey area.
- Conducted a hydrographic condition survey of two berths at Naval Station Newport, RI where two moored aircraft carriers, which could not be removed from the berths, remained in place during the surveys. Mr. Snyder managed this project, which he accomplished by first performing a traditional hydrographic condition survey using a differential global position system and a single-beam echosounder. The area of the berths under each of the moored vessels was then surveyed utilizing a remote-operating vehicle with an inertial positioning system. Deliverables included large-format drawings of the hydrographic survey data (contours and soundings), drawings that describe the distance between the hulls of the moored vessels and the bottoms, and a three-dimensional rendering of the hulls and the bottom.
- Supervised the acquisition, and performed the processing and interpretation, of sidescan sonar data at Naval Weapons Station Earle, NJ in Fall 2005 and Summer 2006 in order to determine the separation of upland dredge material from offshore-suitable dredge material during the recent deepening of Pier 3. As part of this effort, Mr. Snyder also developed and supervised a sampling effort to support the sidescan sonar survey and provided guidance for further dredging activities and regulatory interface efforts.
- Managed a team of hydrographic survey subconsultants to perform several harbor bottom surveys in the aftermath of a catastrophic barge explosion. Over the course of five months, Mr. Snyder coordinated between the terminal operator, the salvage contractor, and the survey consultants to verify the removal of all explosion debris, focus the efforts of continued salvage operations, and confirm safe navigation depths so that the terminal operator could minimize down-time at the undamaged berths.
- Managed the design and permitting of several waterfront development and dredging projects. All of the dredging projects required the management of dredged material that was both suitable and/or unsuitable for offshore disposal. Mr. Snyder holds the distinction of preparing the first approved permit application for a private deepening project in the Port of New York and New Jersey that saw placement of over 70,000 cubic yards of Pleistocene glacial till at the Historic Area Remediation Site (HARS) offshore without undergoing expensive biological testing. Mr. Snyder's efforts saved the client over \$100,000 in lab testing fees. Mr. Snyder coordinated the only offshore dredge material placement project by a non-Federal party during the maintenance dredging of the Providence River in 2004, saving the client over \$100,000 in lab testing and \$230,000 in disposal fees.

## Education and Certifications

M.S. Geosystems  
Massachusetts Institute of Technology

B.S. Geology  
Duke University

Graduate Certificate in GIS  
University of New Haven

USCG Merchant Mariner License  
Master 100 Ton (Inland)/Mate 200 Ton (Near Coastal).

American Congress of Surveying and Mapping  
Certified Hydrographer (pending, late-June 2007)