

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 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 Division of Inland Fisheries and Division. of
Environmental Conservation Police

Name

Michael Humphreys

Title

Fisheries Biologist.

Address

54 Harris Rd.

City **State** **Zip**

Litchfield CT
06759

Phone

860 567-8998

Email

Michael.Humphreys@PO.State.CT.US

Contact Person (if different from Authorized Representative):

Name

Title

Address

City **State** **Zip**

Phone

Email

RECEIVED

JUN 20 2007

INLAND FISHERIES

Project Name Provide a brief working name:

Increased Law Enforcement Patrols at Bull's Bridge Trout and Bass Management Area, and Other Problem Areas.

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: CONNECTICUT: New Milford, Sherman, Kent, Sharon, Cornwall, Salisbury, Canaan, North Canaan

Longitude for approximate center of project area: 73o 25.484' W

Latitude for approximate center of project area: 41o46.388' N

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

1) Trout and bass populations, as well as other aquatic species, 2) Quality of recreational angling, 3) Riparian zone flora and fauna.

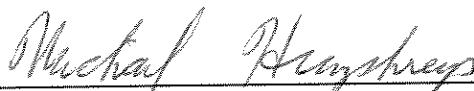
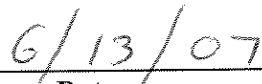
Project Budget Summary

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 \$75,000	2. From Part D, Table 2, Box 6 \$204,400	3. From Part D, Table 2, Box 7 \$93,929	4. From Part D, Table 2, Box 8 \$373,329
Amount of Other Contributions to Be Considered as Cost-Matching to NRD Fund Request			
5. \$298,329			

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.

Signature of Sponsor or Sponsor Representative

Date

Michael Humphreys
 Name of Sponsor or Sponsor Representative
 (Type or print clearly)

PART B. PROJECT ABSTRACT

This project will provide direct, significant, and measurable, improvements to aquatic and riparian natural resources and recreational angling quality within and along the riverine portions of the upper Housatonic River mainstem in Connecticut. Fish population assessments and a recent angler survey have shown that new fisheries management goals are not being fully realized due to illegal harvest of bass and trout. Additionally, over-use and abuse of the riparian zone at some locations are degrading rare riparian habitat and aesthetic qualities. Improvements in size and age structure of game fish populations, ecological balance of other non-game species, angling quality, integrity of riparian habitat, and aesthetic qualities will be accomplished by increasing compliance with existing laws and regulations. Law enforcement patrolling will be increased by 250 man-hours per year for three years at problem areas and special management areas from New Milford northward to the state line. The Bull's Bridge Management Area has been managed and studied intensively in recent years and will serve as a focus point for project assessment. Organized angling groups, as well as unaffiliated anglers and other recreational users of the river corridor have volunteered to be partners in this initiative, and to report suspicious and illegal activity. Funds for this project, \$25,000/year for three years, will enable Conservation Police Officers to respond to more reports, and conduct additional patrolling. The Inland Fisheries Division will conduct annual fish population assessments, a follow-up angler survey, and annual reporting of results at no cost to the project.

PART C. PROJECT NARRATIVE

1.0 GENERAL DESCRIPTION

This project will provide direct, significant, measurable, and potentially long-term improvements to aquatic natural resources and recreational angling quality within the riverine portions of the upper Housatonic River mainstem in Connecticut. Improvements will be accomplished by altering human behavior to comply with existing laws and regulations. Law enforcement patrolling will be increased at problem areas and special management areas from the upper end of Lake Lillinonah (Bleachery Dam) in New Milford northward to the Mass/Conn state line. The section of the Housatonic River between Bull's Bridge Dam and the rte 7 bridge in Gaylordsville (Bull's Bridge Management Area) has been managed and studied intensively in recent years and will serve as a focus point for project assessment.

The Bull's Bridge Management Area has been stocked by the DEP and managed with catch-and-release regulations for trout (since 2002) and bass (since 2003) in an effort to restore natural balance to the fish populations by eliminating the negative effects of over-harvest. This active management is also intended to provide higher angler catch rates of larger bass and trout which would likely result in increased angler use and angler satisfaction. Both angler use and angler satisfaction have suffered as a direct result of PCB contamination.

During a recent angler survey of this management area conducted by DEP Inland Fisheries (March-October 2006), creel agents documented extensive illegal activity, including significant harvest of bass and trout, use of gillnets to harvest fish, harvest and depletion of trout from an important thermal refuge, and extensive littering. The DEP Division of Environmental Conservation Police (DECP) has been kept abreast of this situation for several years, but acknowledges that they are unable to adequately address this overwhelming problem due to manpower limitations and other important commitments and duties.

Annual electrofishing surveys to assess fish populations show that illegal harvest is having substantial negative effects on trout and bass populations preventing full realization of benefits of catch-and-release management. For example, smallmouth bass, which have very low natural mortality rates in

this river, have the potential to reach at least 17 years of age and 18+ inches in length. However smallmouths over age 4 (10 inches) are severely depleted by harvest, and fish over age 9 (16 inches) are rarely encountered. Restoration of more natural population structures of top-level predators in this ecosystem would have cascading effects on populations of other species, generating a more natural balance and trophic structure. Ecosystem benefits provided in this way constitute direct and measurable restoration and enhancement of natural resources that were injured by PCB contamination.

This project will also help restore critical riparian habitat and aesthetic qualities. It is well known that unmonitored and unrestricted use of the gorge at Bull's Bridge, as well as other areas downstream and upstream, is having significant negative impacts on the integrity of riparian habitat, including rare habitat types essential for the support of several State-listed plant species. During the summertime these areas attract large numbers of picnickers, and bathers, many of whom appear to have little regard for cleaning up their litter before they leave. During the 2006 angler survey at Bull's Bridge, creel agents who conducted angler interviews approximately three times a week were instructed to bring garbage bags and remove trash as time permitted. Agents regularly encountered more new trash than they could carry out.

The proposed remedial action is likely to have long-term and far-reaching effects. cursory and qualitative observations, as well as anecdotal reports from anglers indicate that these enforcement issues are not restricted to the Bull's Bridge Management Area. Providing funding for an increased level of law enforcement for three years will allow officers to become more familiar with all sections of the upper River (especially less accessible sections), and the volume, nature, location, and timing of illegal activities. Increased involvement will foster a vested interest in protecting and enhancing these resources that is likely to carry over beyond the three-year period. In addition, three years of increased patrols may be enough to catch and discourage habitual offenders. Increased enforcement support of the new and promising fisheries management initiative at Bull's Bridge will help to demonstrate significant benefits that will have broad applications for the rest of the upper Housatonic River in Connecticut. Increased patrolling and responsiveness in other sections of the upper River will identify and address less well-documented problems.

The tasks necessary to implement the project are clear and simple. Once funding is established, DECP supervisory staff will develop protocols and adjust scheduling. Increased patrolling and enforcement actions will be accomplished with existing staff who will take on this additional work and will be paid overtime as necessary. Conservation Police Officers (CPOs) will record detailed information on patrolling and enforcement actions in each section of the upper River. The DECP has expressed a willingness to take this on, and has provided an outline of their preferred approach. The requested funds (\$25,000/year for three years) will provide approximately 250 additional hours of dedicated patrol time per year. The Inland Fisheries Division (IFD) will provide background information and guidance at no cost to the project. The IFD also intends to analyze and summarize enforcement records, and conduct annual assessments of fish populations by electrofishing to assess potential changes resulting from this project. The IFD will conduct an angler survey, at no cost to this project, during the last year of the project to assess direct benefits to anglers.

Both organized and unaffiliated anglers, as well as passive recreational users have expressed concern over the need for additional enforcement and strong and unsolicited support for this proposal. Many have offered their help (e.g. calling the "TIP Hotline"), especially if there is a greater likelihood of initiating a law enforcement response. It is anticipated that major owners of adjacent lands (CT DEP, National Park Service, Northeast Generation Services or their successor, River Oaks Golf Course Association) will be fully supportive of this initiative as well. The relationship between proposed costs and likely benefits of this project is very favorable.

1.1 Project Goals and Objectives

Goal 1: Improve the size structure and abundance of trout and bass populations in the upper Housatonic River by improving compliance with existing angling regulations. By so doing,

restore a more natural trophic structure to fish, aquatic invertebrates, and other elements of this ecosystem.

Objective 1: Effect a detectable improvement in the abundance and size structure of trout and bass populations as measured in annual electrofishing samples from the Bull's Bridge Management Area.

Goal 2: Improve the quality of recreational angling in the upper Housatonic River by improving compliance with existing laws. By so doing, increase the abundance and catch of larger and older bass and trout.

Objective 1: Improve the angler catch rate of older bass and trout as measured in an angler survey.

Objective 2: Improve angler satisfaction, as measured by angler ratings of personal angling success.

Objective 3: Increase the abundance of trout and large bass in annual electrofishing samples from the Bull's Bridge Management Area.

Goal 3: Improve aesthetics and safety in the riparian zone for all active and passive recreational users, by increased patrolling and enforcement of litter laws.

Objective 1: Based on subjective assessment, effect a noticeable reduction in the accumulation rate of trash, broken glass, human waste, etc., particularly in heavy-use areas in the riparian zone.

Goal 4: Improve the integrity of the riparian zone, and the flora and fauna that live there, by increased patrolling and enforcement of existing laws.

Objective 1: Based on subjective assessment, effect a noticeable reduction in riparian habitat degradation due to littering, illegal dumping, campfires, and the use of dirt bikes, ATVs, and 4-wheel drive vehicles.

1.2 Project Scope and Project Implementation Plan

Funding obtained through the Natural Resources Restoration Project will be used exclusively for scheduled overtime patrolling by permanent DEP Law Enforcement personnel, and unscheduled field responses to tips and complaints. Officers will be available to work on this project at the overtime rate (1.5 times their normal pay rate) on their days off, on "extended days" (up to two extra hours per day), and in response to complaints and tips. No funding will be used to cover time spent filling out or processing infraction-related paperwork (i.e. case reports), or time spent in court resulting from project related enforcement actions. Also, no time spent driving to or from the Housatonic River will be charged to this project; only the time spent at the site will be charged. Ten man-hours per week of regularly scheduled ongoing patrolling in this area will be maintained and not be charged to this project. Although DEP Inland Fisheries Division personnel will spend considerable time providing guidance to law enforcement officers, summarizing data from enforcement activities, and assessing and reporting the biological effects of this project, no NRD Project funding will be used by the Inland Fisheries Division. Costs to Inland Fisheries will be covered by on-going Federal Aid Projects to assess and enhance trout and bass fisheries in the upper Housatonic River.

Funding will be spent in three 6-month blocks, April through September, in three consecutive years. A previous angler survey indicated that most of the law enforcement-related problems occurred during this high-use period. Actual weekly scheduling of extra patrols will be flexible, so that patrol time can be increased or decreased in response to the perceived need.

The section of the river that will receive increased patrolling will be from the Bleachery Dam in New Milford, upstream to the Connecticut-Massachusetts state line, with increased emphasis in heavy-use areas (e.g. Bulls Bridge TMA, Housatonic River TMA, Stanley Tract, etc) and known or newly identified problem areas.

The DEP Law Enforcement Division will use its "Computer-Aided Dispatch" (CAD) software and hardware to record all project-related enforcement activities and enter all records into an electronic database. Records will be entered for all "TIP" (Turn In Poachers) calls from the public, all enforcement responses and outcomes, and all observed violations. In addition, all contacts with the public while on patrol will also be recorded. For example the number of anglers contacted that were fishing legally will be available in the Law Enforcement database. There will be no Project costs for use of the CAD System.

Results of this Project will be reported in annual reports required as part of the on-going Inland Fisheries Federal Aid Projects.

2.0 EVALUATION CRITERIA NARRATIVE

2.1 Relevance and Applicability of Project

2.1.1 Location of Project

This project will be located in the area of highest priority, the upper mainstem of the Housatonic River in Connecticut.

2.1.2 Natural Recovery Period

Bass and trout populations in the Bull's Bridge Management Area are over-harvested despite catch-and-release regulations. Littering and heavy use of the riparian zone have degraded riparian habitat and recreational opportunities for all users. There is no natural recovery period, as use is likely to increase over time, and non-compliance with angling regulations is not likely to abate without intervention.

2.1.3 Sustainable Benefits

Funding is requested for only three years of increased patrolling. However, this will result in several long-term benefits that will remain effective after the three-year period: **1)** Providing funding for an increased level of law enforcement for three years will allow officers to become more familiar with all sections of the upper River (especially less accessible sections), and the volume, nature, location, and timing of illegal activities. Increased involvement will foster a vested interest in protecting and enhancing these resources that will carry over beyond the three-year period. In future years, regular patrolling will be more efficient, as officers will be more familiar with the river, and its many users. **2)** Three years of increased patrols may be enough to catch and permanently discourage habitual offenders. **3)** Increased enforcement support of the new and promising fisheries management initiative at Bull's Bridge will help to demonstrate significant benefits which will have broad applications for the rest of the upper Housatonic River in Connecticut in the future. **4)** Increased contact with the law-abiding users of the river will help to satisfy the current perception that more should be done to address this growing problem. Increased contact and positive interaction between CPOs and Housatonic River users will improve the respect and cooperation of the public well beyond the three years of funded patrols.

2.1.4 Magnitude of Ecological Benefits

Significant illegal harvest of top-level predatory fish species (trout and bass) has cascading effects on prey species of fish and invertebrates, as well as other elements of the food web and ecosystem. Indirect benefits to this complex ecosystem from restoration of large predators are difficult to measure and quantify, but may be reasonably assumed. Benefits are likely to include improved species diversity, increased growth

rates of fish including non-game species, and a more natural distribution of biomass among trophic levels.

Degradation of riparian habitat, including habitat for several State-listed plant species, takes many forms, most of which are related to unregulated human use and abuse. An increased presence of law enforcement will discourage some of this activity.

2.1.5 Magnitude of Recreational Benefits

Anglers will experience noticeable improvements in catch rates of larger bass and trout. All river users will have safer and more satisfying experiences when the current trend of increasing riparian corridor over-use and degradation is reversed.

2.2 Technical Merit

2.2.1 Technical/Technological Feasibility

This project will be accomplished using state-of-the-art methods and equipment and highly trained professional staff familiar with all aspects of law enforcement patrolling and fishery assessment. Enforcement of fishing regulations, litter laws, and other applicable laws and regulations are well-worn techniques that need no further justification. Likewise, angler surveys and fish population assessment techniques will be conducted and reviewed by professional DEP Fisheries Biologists in accordance with time-tested state-of-the-art methods already in use on site.

2.2.2 Adverse Environmental Impact

There are no negative environmental impacts resulting from increased patrolling or fishery assessment.

2.2.3 Human Health and Safety

There are no negative impacts to human health and safety resulting from increased patrolling, fishery assessment, improved ecosystem balance, or riparian zone restoration. In fact, health and safety may be significantly improved by increased presence of law enforcement officers and a resultant reduction in harvest and consumption of PCB contaminated fish for which DPH has issued a fish consumption advisory. Additional safety benefits may include a reduction in dangerous behavior, and a reduction in the accumulation of hazardous materials such as broken glass and human waste.

2.2.4 Measurable Results

Multiple parameters will be monitored quantitatively or qualitatively during the course of this project, as well as in subsequent years:

- 1) All patrolling activities, including all contacts with the public, illegal and legal activities, TIP calls, etc. will be recorded with the DECP's CAD System, and summarized and reported in Inland Fisheries Division annual Federal Aid Reports.
- 2) During the third year of the project the Inland Fisheries Division will conduct a follow-up angler survey at the Bull's Bridge Management Area. Data will be compared to that collected during the 2006 angler survey to assess changes in angler catch, usage, and satisfaction.
- 3) Fish populations will continue to be surveyed annually by electrofishing at standard sites within the Bull's Bridge Management Area. Standard fishery assessment methods, including length/frequency analysis, catch/effort, and fish age determination, will be used to track changes in bass and trout populations during this project and in subsequent years.
- 4) Qualitative notes will be kept during the course of the project, including assessment of the condition of the riparian zone habitat, abundance of litter, and evidence of illegal activity such as dumping and illegal recreational vehicle use.

A summary of the 2006 angler survey results and a summary of current trout and smallmouth bass population information outlining existing conditions in the Bull's Bridge Management Area, are included.

2.3 Project Budget

2.3.1 Relationship of Expected Costs to Expected Benefits

The cost of this project is small compared to the expected benefit, and consists exclusively of the economic cost of increasing Law Enforcement man-hours spent on site. Benefits are substantial and varied, including environmental, social, and economic benefits.

Environmental benefits will include restoration of fish populations and other aquatic biota to a more natural and balanced condition, and restoration of riparian habitat. Social benefits will include improved quality of recreational angling opportunities, restoration of aesthetic qualities for all recreational activities, and increased public safety and public outreach opportunities. Improvements in fishing and aesthetic qualities may increase recreational use and generate additional economic benefits to local economies.

2.3.2 Implementation-Oriented

As explained above, 100% of NRD funds obtained for this project will be used for project implementation. Only time spent on site by CPOs will be billed to this Project.

2.3.3 Budget Justification and Understanding

The Assistant Director of the DECP has calculated that the average total cost of overtime for field personnel involved in this project is \$100.00/hour (including fringe benefits and 1.5 overtime rate), and that approximately 250 additional man-hours of patrolling and enforcement per year would be needed to effect the desired changes. It was also estimated that three years of increased law enforcement activity in the area would turn the tide on the current situation, and have long-term beneficial effects on efficiency of patrolling and reduction in the rate of illegal activity. More specific details are provided in Section D.

2.3.4 Leveraging of Additional Resources

Many sources of additional resources will be used in the completion of this project.

DECP resources that will be used and not billed to NRD funds include:

- 1) 10% administration costs associated with the project totaling \$2,500/year.
- 2) 10 man-hours of regular patrol each week for 5 months/year, totaling \$51,836.
- 3) Travel time and vehicle usage to and from the Housatonic River.
- 4) Use of the CAD tracking system.
- 5) Time spent on paperwork, case reports, and court time.

DEP Inland Fisheries Division participation in this project will be supported by USFWS Federal Aid in Sport Fish Restoration Projects to assess and enhance trout and bass fisheries in the Housatonic River. Resources that will be used on this project and not billed to NRD funds include:

- 1) Manpower and equipment necessary to sample and assess fish populations.
- 2) Manpower and equipment necessary to conduct and analyze results from an angler survey during the third year of the project.
- 3) Incorporation of law enforcement data into analysis and Federal Aid report preparation.

Trout Unlimited representatives and Housatonic Fly Fishermen's Assoc., as well as unaffiliated anglers have offered to be additional "eyes and ears" on the river and will report suspicious and illegal activity.

2.3.5 Comparative Cost Effectiveness

We are unaware of any similar project proposals that are eligible for funding.

2.4 Socioeconomic Merit

2.4.1 Community Involvement and Diversity

Involvement of anglers and other recreational users will be essential for the success of this project. The DEP Law Enforcement "TIP Hotline" number is posted on angling regulation signs at many locations along the river, and in the annual CT Angler's Guide. Cell phone service has recently improved at some locations in the river valley. Many anglers and other recreational users have expressed a willingness to help with this project by being additional "eyes and ears," and calling the TIP number when they see illegal or suspicious activity. This cooperative effort is likely to continue long after the three-year period, and will markedly increase the efficiency of law enforcement.

2.4.2 Adverse Socioeconomic Impacts

Anticipated socioeconomic impacts are many, all of which are anticipated to be positive:

- 1) Public Health and Safety will be improved by reduction in dangerous behavior, reduction in hazardous materials such as broken glass and human waste, and reduction in the number of people who eat unsafe quantities of illegally-harvested PCB contaminated fish.
- 2) The quality of angling and other recreational activities will be improved.
- 3) Improved aesthetics will enhance all visitors' enjoyment of the river and riparian zone.
- 4) Improved recreational opportunities may increase revenues at a broad range of local businesses.

2.4.3 Coordination and Integration

Clearly this project would synergistically complement other management plans for the Housatonic River:

- 1) Inland Fisheries management goals of enhancement of trout and bass fisheries will not reach their maximum potential without implementation of this project.
- 2) Some of the goals of the recently completed FERC hydropower re-licensing process, namely enhancement of ecological conditions and recreation, will not reach their full potential without implementation of this project.
- 3) Protection of habitat for State-listed plant species, especially in the Bull's Bridge Gorge Area, will not be possible without implementation of this project or some similar initiative.

2.4.4 Public Outreach

Conservation Officers and angler survey agents will have frequent and positive interaction with all elements of the public that use the river corridor for recreation. This will provide many proactive opportunities for public outreach and education relative to the careful and responsible use, protection, and management of natural resources and the environment. There will be additional off-site opportunities as well, to explain and promote this initiative.

2.5 Applicant Implementation Capacity

2.5.1 Technical Capacity of Applicant and Project Team

This project will be managed and implemented by the DEP's DECP and Inland Fisheries Division. Each division's involvement falls right in line with routine on-going activities. Data analysis and reporting, and oversight of fishery assessment will be conducted by DEP Fisheries Biologist Michael Humphreys, who has a Master's Degree in Fisheries and 27 years of professional experience in fisheries studies, over 17 years of which have been with the CT DEP. Captain Richard Lewis will oversee and coordinate the scheduling, billing, and implementation of the Law Enforcement Aspects of this study. Randy Michaelson, Grants and Contract Manager for the DEP's Financial Management Division, will be responsible for receiving and administering funding.

2.5.2 Administrative Capacity of Applicant and Project Team

Grants and Contract Management personnel within the DEP's Financial Management Division have routine and well-worn procedures for receiving and administering grant monies. Likewise, the DECP receives and spends various grant monies on a frequent basis. The Fisheries Division has personnel and procedures in place that guarantee regular project technical and financial review, and peer review of analyses and reports.

2.5.3 Project Commitments

Fisheries data pertaining to the assessment of this project are already required to be collected, analyzed and reported under Federal Aid in Sportfish Restoration grant F57R. Excerpts from approved USFWS Federal Aid in Sport Fish Restoration grants are attached. These project funds and personnel are necessary and adequate to support the Inland Fisheries Division's commitment to this project. Angler commitments are in the form of verbal confirmation and demonstrated willingness to report violations, as well as willingness by representatives of Trout Unlimited and the Housatonic Fly Fishermen's Association to have their groups listed as project participants.

3.0 LAND ACQUISITION PROJECTS

PART D PROJECT BUDGET NARRATIVE AND FORMS

1.0 BUDGET NARATIVE

The budget for this project is clear and simple. All \$75,000 of the requested NRD funds will be used to support three seasons of increased patrolling and responsiveness to complaints along the upper mainstem of the Housatonic River. Officers will take on this work as an additional responsibility beyond their normal workload, and will bill all time spent on this project at the overtime rate, 1.5 times the normal rate. All field officers are not paid at the same rate. Captain Lewis has calculated that the average total cost of each hour of patrolling at the overtime rate will approximate \$100 per hour. If this project is funded at \$25,000 per 6-month season, then officers will be able to spend 250 additional man-hours on site along the upper Housatonic River each season. Total man-hour costs are broken down into straight-time salary + 50% overtime pay + 60% of the straight-time rate for benefits and contributions + 23% of the straight-time rate for indirect costs. Other committed DECP resources that will not be billed to the project include 10% administrative costs, 10 hours/week of normal ongoing patrol time, travel time and vehicle use spent traveling to and from the River, use of the CAD system for recording and organizing law enforcement records, and time spent on subsequent paperwork, case report preparation, and in court.

The intent is to run this project for three consecutive spring/summer seasons, April 1-September 30. Because the fiscal year runs July 1-June 30, the three seasons of patrolling will occur during four different fiscal years.

The CT DEP's Inland Fisheries Division is committed to providing resources to support, assess, and report on this project at no cost to the NRD Fund. Funding from two currently funded USFWS Federal Aid in Sport Fish Restoration Projects (Study 1, Job 3: Monitoring Trout Management Areas; and Study 2, Job 6: Assessment of Riverine Smallmouth Bass) will be used to cover IFD fisheries assessments. Excerpts from the approved Federal Aid grant proposal are attached, outlining the projects and available funding. The current Federal Aid grant ends March 31, 2010. It is highly likely that both of these projects will be funded at a similar level for at least an additional 5-year segment after the current segment expires. Nevertheless, funding for the final year is listed as "Not Committed," and the funding level is estimated as a 3% increase over the previous year.

For the purposes of this proposal, it was estimated that 20% of the annual TMA Monitoring grant would serve to support this project during each of the first two years, and 33% of the annual TMA Monitoring grant money would be applied during the final year when the angler survey is being conducted. Additionally, it was estimated that 50% of the Riverine Smallmouth Bass Project expenditures each year would be related to assessment of this project.

Contributions by volunteer angler groups and others are expected to be substantial, primarily in the form of reporting of illegal, suspicious, or dangerous activity. These TIP calls will be essential to the efficiency and success of this project, however this contribution is difficult to quantify and express monetarily.

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

PROJECT TITLE:	Increased Law Enforcement at Bull's Bridge TMA and Other Problem Areas			
SPONSOR NAME:	CT DEP Inland Fisheries Division and Law Enforcement 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	\$8,050	\$16,100	\$16,000	\$8,050
B. OVERHEAD AND BENEFITS	\$4,450	\$8,900	\$8,900	\$4,450
C. CONTRACTED SERVICES				
D. SUPPLIES, MATERIALS AND EQUIPMENT				
E. TRAVEL				
F. OTHER (LIST)				
G. OTHER (LIST)				
TOTAL BY FISCAL YEAR	1	2	3	4
	\$12,500	\$25,000	\$25,000	\$12,500
GRAND TOTAL (sum of boxes 1+2+3+4)				
[This sum is the total NRD fund request and should match Part A, Budget Summary, Box I]				
				\$75,000

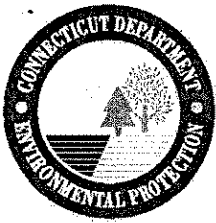
¹ The fiscal year is July 1 – June 30. If the proposed project will be completed in one year, fill in only the column titled "Fiscal Year 1."

TABLE 2. PROJECT BUDGET SUMMARY BY TASK AND FUNDING SOURCE

PROJECT TITLE:		Increased Law Enforcement at Bull's Bridge TMA and Other Problem Areas			
SPONSOR NAME:		CT DEP Inland Fisheries Division and Law Enforcement Division			
TASK²	HOUSATONIC RIVER NRD FUNDS	OTHER CONTRIBUTIONS		TOTAL COST BY TASK	
		COMMITTED	NOT COMMITTED		
A. Over Time law enforcement patrolling and associated enforcement actions.	\$75,000			\$75,000	
B. Law Enforcement administration costs (10% of total)		\$7,500		\$7,500	
C. Ten hours/week of regular patrol for 5 months (ave. \$78.54/hr)		\$51,836		\$51,836	
D. Law Enforcement travel time, vehicle usage, time spent on court cases and paperwork, use of CAD system		(Not quantified)		(Not quantified)	
E. Inland Fisheries Division fish population sampling and assessment, angler survey, and annual summary report including summary of Law Enforcement's CAD data		\$145,064	93,929	238,993	
F. TU, HFFA, and unaffiliated recreational users volunteer reporting of suspicious and illegal activity.			(no clear estimate of dollar value available)	(no clear estimate of dollar value available)	
TOTAL BY FUNDING SOURCE	5 \$75,000	6 \$204,400	7 93,929	8 GRAND TOTAL \$373,329	

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

² The listed tasks should correspond with information provided in the Project Implementation Plan.



STATE OF CONNECTICUT
DEPARTMENT OF
ENVIRONMENTAL PROTECTION

Federal Aid in Sport Fish Restoration
F-57-R Application for Federal Assistance
April 1, 2005 – March 31, 2010

Inland Fisheries Research and Management



Bureau of Natural Resources
Inland Fisheries Division
79 Elm Street, Hartford, CT 06106-5127



A Proposal to the U.S. Fish and Wildlife Service for Federal Aid under the Sport Fish Restoration Act

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Grant Title: Inland Fisheries Research and Management

Study 1: Coldwater Fisheries Management

STUDY STATEMENT

NEED:

Trout are a highly sought-after gamefish in Connecticut, attracting approximately 1.5 million fishing trips per year (USFWS 2001). Trout fisheries can be further improved by ongoing implementation and thorough evaluation of recommendations made in A Trout Management Plan for Connecticut's Rivers and Streams (final report for Job 5 of F66R, Hyatt et al 1999) and in Trout Research and Management in Connecticut Lakes and Ponds (Final report for F57R-16, Schluntz et al 1999).

Many Connecticut streams require periodic monitoring when changes occur to water quality, physical habitat, flow volume, or aquatic fauna. Intentional and unintentional alterations to the physical stream habitat need to be evaluated so that impacts can be quantified and understood. Water quality has improved in many Connecticut streams following upgrades of sewage treatment plants, reductions in harmful industrial discharge, and enhancement of summertime flows or water temperatures. The Inland Fisheries Division needs to assess the potential of upgraded streams to support trout and to provide recreational fishing opportunities.

Wild trout add quality and diversity to Connecticut's trout fisheries. Wild trout are esteemed because of their excellent physical appearance and intrinsic value, since 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.

In 1994, the Inland Fisheries Division successfully initiated wild trout management on a high quality stream using special regulations that provided good angler catch rates while protecting the wild trout population. Based on this success and ongoing work to identify other important wild trout streams, an additional 33 Wild Trout Management Areas (WTMAs) were created throughout Connecticut in 2002 (Hyatt et al.

1999). During the previous AFA, studies were performed on Connecticut's 12 Natural and 22 Enhanced WTMA's. Studies showed that special regulations were capable of conserving wild trout populations in Natural WTMA's, and that special regulations in concert with juvenile stockings were capable of sustaining harvest of wild trout and semi-wild trout (derived from juvenile stocking) in Enhanced WTMA's. Regular sampling is required during the 2005-2010 AFA to ensure that wild trout populations are being conserved in Natural WTMA's, and that semi-wild trout continue to substantially augment wild trout in Enhanced WTMA's. There is also a need to continue fry and fingerling stocking, and to assess the relative performance of different strains of brown trout.

Connecticut currently has 14 Trout Management Areas (TMAs) with an additional two proposed for 2005-06. TMAs are managed with catch-and-release regulations on a seasonal or year-round basis. These areas attract greater angler effort, sustain higher catch rates throughout the year, and are more cost effective (more angler-hours per trout stocked) than areas managed under statewide regulations. Periodic monitoring provides the information necessary to respond to angler inquiries and to ensure that fishing quality is maintained. In addition, the timing of stockings, size of fish, and species and strains selected for stocking can all affect angler catch rates and in turn angler satisfaction. Experimenting with these factors and monitoring changes in angler catch rates and satisfaction will provide the information needed to optimize angling quality in Connecticut's TMAs.

Connecticut's trout and salmon fisheries are sustained by the annual production and distribution of approximately 800,000 yearling, catchable-sized, and larger sized trout; 1,000-2,000 broodstock Atlantic salmon and 50,000-150,000 kokanee salmon fry. These fish are stocked into approximately 220 rivers and streams, and 90 lakes and ponds.

Stocking of trout and salmon requires timely scheduling, logistical planning, proper allocation, and accountability. Field personnel of the Connecticut Inland Fisheries Division are required to schedule all stockings, and to take lead responsibility for actively distributing the fish. They must also determine stocking locations, and make recommendations for needed modifications. Although procedures for scheduling and distribution have been improved and automated, questions remain concerning proper

allocation rates of trout. To date, stocking rates for Connecticut's lakes and streams have been based largely on the professional judgment of biologists and conservation officers. The Connecticut Inland Fisheries Division needs to develop a quantitative approach for determining allocation rates. It is also necessary to assess the performance of fish that are stocked into selected areas.

OBJECTIVES:

1. Document changes in fish populations in streams where water quality and physical stream habitat have been altered and identify appropriate fisheries management options for such waters (see Job 1).
2. Maintain wild trout populations and fisheries in 34 Wild Trout Management Areas (WTMAs) and evaluate options for expanding and improving these fisheries (see Job 2).
3. Maintain trout fishing opportunities in 16 Trout Management Areas and evaluate options for improving these fisheries (see Job 3).
4. Maintain and enhance trout fisheries in 220 rivers and streams and 90 lakes and ponds via ongoing stocking of trout and salmon, determination of proper stocking rates, and evaluation of options for improving trout fisheries (see Job 4).

EXPECTED RESULTS AND BENEFITS:

Trout fishing accounts for approximately 1.5 million fishing trips per year in Connecticut (USFWS 2001). These trips amount to six million hours of angling and are estimated to generate over 30 million dollars in direct expenditures. Collectively, work performed in this study will increase the overall quality, quantity and diversity of coldwater fishing opportunities in Connecticut.

Most of Connecticut's trout fishing activity is directly attributable to the production and distribution of stocked trout. Efficient distribution of hatchery trout will maximize the socioeconomic benefits of this program. Monitoring will enable the DEP to develop new trout fisheries and increase sportfishing opportunities in streams where water and/or habitat quality have been upgraded.

Wild trout management (WTMAs) will conserve populations of wild trout and provide quality trout fishing opportunities. This will increase the cost effectiveness of Connecticut's trout program by increasing the quantity and quality of stream fisheries without incurring additional hatchery costs. Connecticut's Trout Management Areas (TMAs) attract greater angler effort and provide higher sustained catch rates than areas managed for put-and-take trout fishing. Anglers fishing these areas also tend to catch greater numbers of large trout and experience more consistent trout fishing throughout the year. Angling quality in TMAs will be maintained and, where possible, enhanced. In addition, WTMAs and TMAs will provide anglers with opportunities to catch wild trout or wild-looking trout that have grown to catchable size.

APPROACH:

Objectives for Coldwater Fisheries Management will be achieved by the completion of four jobs. Details on the approach, procedures, and schedules are provided separately for each job. Jobs included in this study are as follows.

- Job 1. Monitoring Fish Populations in Streams
- Job 2. Wild Trout Management
- Job 3. Monitoring Trout Management Areas
- Job 4. Trout Stocking

LOCATION:

Work on this study will be done at Inland Fisheries Division offices and on rivers, streams, and coldwater lakes throughout Connecticut.

ESTIMATED COST:

Fiscal Year	Total Cost
05	\$525,904
06	\$541,681
07	\$557,932
08	\$574,670
09	\$591,910

Grant Title: Inland Fisheries Research and Management

Study 1: Coldwater Fisheries Management

Job 3: Monitoring Trout Management Areas

NEED:

Connecticut has expanded the number of Trout Management Areas (TMAs) in the State from seven in 1993 to 14 by 2004, with two more proposed in the Saugatuck River Basin for 2005-06. TMAs are managed with catch-and-release regulations on a seasonal or year-round basis. They typically support more angler days, sustain higher catch rates throughout the year and are more cost effective (more angler-hours per trout stocked) than areas managed under statewide trout regulations. Collectively, TMAs attract more than 100,000 angler-hours per year. In addition, the TMAs expand recreation opportunities for Connecticut anglers by allowing anglers to fish for trout during the early spring when other waters are closed to trout fishing. Catch-and-release angling has become very popular in Connecticut. Angler effort in the West Branch Farmington River TMA has more than tripled since 1988 and this stretch of river is now our State's most heavily fished trout water. Periodic monitoring provides the information necessary to respond to angler inquiries and to ensure that fishing quality is maintained.

The timing of stockings, size of fish, and species and strains selected for stocking can all affect angler catch rates and in turn their satisfaction. Experimenting with these factors and monitoring changes in angler catch rates and satisfaction will give us the information needed to optimize angling quality in Connecticut's TMAs.

Connecticut's stocked trout have been selectively bred to grow well in hatcheries rather than to survive well in the wild. These characteristics are desirable for put-and-take fisheries. However, a trout strain that can survive in rivers and streams for an extended period is needed to get the most from catch-and-release management. Developing a "Survivor" trout strain requires the selection of broodstock from wild or stocked trout that have lived for an extended period in the wild. This selective breeding will produce

fish that have the superior traits needed to best survive and over-winter in our year-round TMAs.

OBJECTIVES:

1. Maintain high quality fishing (≥ 1.0 trout/angler-hour) on Connecticut's Trout Management Areas during the catch-and-release period.
2. In year-round catch-and-release TMAs, maintain trout abundance, growth rates, and size distributions at levels that provide quality fishing over the entire year.
3. Attract greater angler effort per area than in comparably stocked waters managed under the default 5-fish/day creel limit.
4. Maximize angler catch rates and satisfaction by determining the ideal species, size composition, strain and timing for trout stocking.
5. Continue selective breeding for "Survivor" strain brown trout and evaluate their growth and survival in the wild.

EXPECTED RESULTS AND BENEFITS:

Connecticut's Trout Management Areas attract greater angler effort and provide higher sustained catch rates than areas managed for put-and-take trout fishing. Anglers also have the opportunity to catch greater numbers of trout and experience more consistent trout fishing throughout the year. In several of the TMAs there is also a higher probability of catching larger holdover trout. Through all this, TMAs increase the diversity of Connecticut trout fishing opportunities. Diversity and high angling quality reduces out-of-state travel by Connecticut anglers, while attracting greater numbers of anglers from other states.

TMAs are an efficient means of increasing the cost effectiveness of Connecticut's trout program. Under put-and-take management, fisheries provide an average of less than two hours of fishing per trout stocked, whereas TMAs typically provide three to twelve hours per trout stocked.

APPROACH:

Trout stocking (numbers, species, strains and sizes of trout) and harvest recommendations will be adjusted to achieve objectives specific to each TMA. Objectives for each TMA will be determined based on the biological capabilities of the

stream and angler desires. Abundance, size distribution and growth rates of trout populations will be monitored. Angler effort, catch rates and preferences will be monitored periodically by angler surveys.

PROCEDURES:

Trout population sampling will be conducted annually in the West Branch Farmington River TMA. In other year-round catch-and-release TMAs, trout populations will be sampled as needed depending on special concerns or experiments underway. Where sufficient summer water temperature data exists, predictive models will be used to evaluate the need for fall trout stockings in year-round catch-and-release TMAs. Seasonal TMAs will be sampled as resources permit. Sampling frequency will be determined by the need for specific information, as in the case of trout strain comparisons.

Population sampling will be conducted in the late summer or early fall by electrofishing with either a Coffelt BP-4 dual electrode backpack unit (in small streams) or a canoe-mounted Coffelt VVP-2 stream shocker with three meter probes (in larger streams). Indices of abundance and size distribution will be determined based on the number of trout per size group collected on a single pass through a standard sampling area.

The catch-and-release regulations used in the year-round TMAs protect trout from fishing mortality; therefore, the TMAs are ideal places to do performance comparisons between trout strains. Selected cohorts will be marked by fin clips or with fluorescent elastomer tags prior to stocking in the spring. Comparisons of relative abundance estimates and growth rates among strains/cohorts will be made from fish recaptured during fall electrofishing. Estimates of trout density will be made for those locations where expansion values can be generated based on prior sampling data.

The size and species of trout and the timing of stockings will be adjusted in each TMA to optimize angler catch rates, provide a more varied angling experience and increase angler satisfaction.

To document angler catch rates and satisfaction, roving angler surveys will be conducted every three years on the West Branch Farmington and as resources permit on

other TMAs. Information collected may include angler effort, catch, catch rates, angler attitude and socioeconomic data. All angler surveys will be a random stratified design with a combination of uniform and non-uniform probabilities.

During annual population sampling, brown trout that have over-wintered one or more years will be collected from the West Branch Farmington River TMA to serve as broodstock for the development of a "Survivor" strain brown trout. These fish will be spawned in the hatchery and later returned to their place or origin. The offspring of "Survivor" strain trout will be grown to yearling size (6-9 inch) and stocked into the West Branch Farmington River TMA and other selected streams.

DURATION:

April 1, 2005 – March 31, 2010

SCHEDULE:

Elastomer tagging will be conducted during the spring in selected waters to assess the performance of certain trout cohorts. Water temperature data loggers will be deployed annually in selected waters during late spring and retrieved in early fall. Trout populations in the year-round TMAs will be sampled as needed in late summer or early fall. Seasonal TMAs will be sampled as resources permit. Angler surveys will be conducted throughout the year as needed and as resource permit. Broodstock for "Survivor" strain brown trout will be collected from the West Branch Farmington River TMA annually during late summer sampling.

PROJECT PERSONNEL:

Neal Hagstrom, Job Leader
Mike Humphreys, Primary Staff
Ed Machowski, Primary Staff
Eric Schluntz, Primary Staff
Tim Barry
James Bender
Bill Gerrish
William Hyatt
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Gerald Leonard
Christopher McDowell
Eileen O'Donnell
Robert Orciari
Richard Van Nostrand
Kevin Vensel
Seasonal Research Assistants

ESTIMATED COST:

Fiscal Year	Total Cost
2005-06	\$120,213
2006-07	\$123,819
2007-08	\$127,534
2008-09	\$131,360
2009-10	\$135,301

Grant Title: Inland Fisheries Research and Management

Study 2: Warmwater Fisheries Management

STUDY STATEMENT

NEED:

Connecticut anglers spend approximately 2.3 million trips per year fishing for largemouth and smallmouth bass (1.5 million trips/yr) and other warmwater species (0.8 million trips/yr) such as northern pike, panfish, walleye, and catfish (USFWS 2001). Warmwater fisheries can be further improved by ongoing implementation and evaluation of recommendations made in A Management Plan for Bass in Connecticut Waters (final report F57R-16, Jacobs et al 1999) and other final job reports (Schluntz et al 1998, Barry and Machowski 1996, Orciari et al. 2002).

Connecticut's warmwater fisheries are an important component of the State's overall angling activity. Current information on fish populations is needed in order to make informed management decisions. Since the status of warmwater fisheries changes over time, it is important to monitor fish populations on a regular basis.

Northern pike are Connecticut's largest freshwater gamefish. Pike fisheries are created and maintained to increase fishing opportunities for trophy-size fish. Currently, there are seven waters managed for northern pike in Connecticut. Maintaining existing fisheries through marsh management and fingerling stocking, along with development of additional pike fisheries where appropriate will ensure angler access to a unique and popular sport fishery.

Walleye are one of the most popular gamefish in North America. Successful fisheries have been established in four Connecticut lakes and there are developing fisheries in seven additional waters. Ongoing fingerling stocking, evaluation of stocking success, a comparison of stocking approaches (fall fingerling vs. summer fingerling), and an evaluation of harvest regulations are needed to maintain and efficiently manage these fisheries.

Largemouth and smallmouth bass are Connecticut's most popular lake and pond gamefish. Alternative length limits have the potential to improve bass fishing quality for Connecticut anglers. Alternative regulations implemented in 2002 need to be evaluated to ensure that reductions in harvest are compensated by improvements in angling quality.

Channel catfish are a popular gamefish species across much of the United States. The Connecticut River supports a large channel catfish population and an extremely popular fishery. In addition, catfish are frequently caught in many Connecticut lakes and ponds where fish have been stocked by private individuals. Elsewhere in the U.S., catfish have been used to develop fisheries in urban ponds and to provide trophy fisheries in lakes. There is potential for similar use of channel catfish in Connecticut waters.

Walleye, northern pike, largemouth bass, smallmouth bass and channel catfish, are all large predators capable of converting abundant forage fish to gamefish. Moreover, thinning overabundant panfish populations can lead to improved growth rates and angling quality for panfish. The overall effects of enhanced gamefish/predator populations on other fish species needs to be monitored.

Riverine smallmouth bass are an important, but often overlooked resource that can diversify Connecticut's fisheries and provide exciting fishing opportunities. Bass populations have been assessed throughout Connecticut as part of many separate and often unrelated studies. Data collected on riverine smallmouth bass in Connecticut currently is held in many separate databases or hard copy files. Further, much of this data has not been fully compiled and analyzed. Most data have shown that smallmouth bass grow slowly in Connecticut's rivers. Slow growth, combined with aggressive tendencies and variable year-to-year spawning success, may cause riverine smallmouth bass to be vulnerable to angler overharvest or habitat disturbances. Current statewide management may not be adequate to maintain healthy bass populations that can provide quality angling in Connecticut's streams. A Fisheries Management Plan needs to be completed for riverine smallmouth bass. To do so will require complete analysis of all pertinent data, collection of additional information, and review of the scientific literature.

OBJECTIVES:

1. Maintain a database on fish population status in Connecticut lakes and ponds having public access (Job 3).
2. Maintain pike fisheries on seven water bodies and evaluate potential for expansion to additional waters (Job 1).
3. Maintain walleye fisheries in 11 lakes and evaluate harvest regulations. Determine effectiveness of current stocking practices and the success in establishing fisheries in the seven most recently stocked waters (Job 2).
4. Evaluate special harvest regulations for largemouth bass and smallmouth bass in 29 lakes that were implemented in 2002 as per A Management Plan for Bass in Connecticut Waters and Recommendations for Other Warmwater Species (final report F57R-16) and develop recommendations for ongoing bass management (Job 4).
5. Develop and implement a program to improve fishing opportunities in urban ponds and larger lakes by stocking channel catfish (Job 5).
6. Develop a Fisheries Management Plan for riverine smallmouth bass (Job 6).

EXPECTED RESULTS AND BENEFITS:

Connecticut anglers spend approximately 2.3 million trips per year fishing for warmwater species. Collectively, work performed in this study will increase the overall quality and diversity of warmwater fishing opportunities in Connecticut. Greater angler satisfaction may lead to increased participation and license sales.

Continued monitoring and assessment of warmwater fish populations will expand the Fisheries Division's knowledge of Connecticut's lakes and ponds, especially for lakes where data is lacking. This information will enable the DEP to identify lakes that may be in need of alternate management or subject to environmental stress. Improved fishing quality resulting from informed and timely management decisions will lead to greater interest and participation in warmwater fishing.

Maintenance and enhancement of northern pike and walleye fisheries, and establishment of channel catfish, increase diversity and provide Connecticut anglers with the opportunity to catch large gamefish. In addition, predation by pike, walleye and catfish

can reduce densities of overabundant forage and panfish populations and thereby lead to improved growth rates and angling quality for panfish.

Alternative bass regulations should improve the growth rates, size structure and angling quality for bass and panfish in affected lakes. They will also increase the diversity of fishing opportunities for Connecticut anglers. The result will be a renewed interest and greater participation in Connecticut lake and pond fishing.

Assessment of existing data and development of a Management Plan for Connecticut's riverine smallmouth bass will ensure appropriate conservation and management of bass populations and fisheries.

APPROACH:

Objectives for Warmwater Fisheries Management will be achieved by the completion of six jobs. Details on the approach, procedures, and schedules are provided separately for each job. Jobs included in this study are as follows.

- Job 1. Northern Pike Management
- Job 2. Walleye Management
- Job 3. Monitor Warmwater Fish Populations in Lakes, Ponds and Large Rivers
- Job 4. Bass Management in Lakes, Ponds and the Connecticut River
- Job 5. Channel Catfish Management
- Job 6. Assessment of Riverine Smallmouth Bass

LOCATION:

Work on this study will be done at Inland Fisheries Division offices and on rivers, lakes and ponds throughout Connecticut.

ESTIMATED COST:

Fiscal Year	Total Cost
05	\$717,910
06	\$739,448
07	\$761,631
08	\$784,480
09	\$808,015

State: Connecticut

Project Number: F57R

Grant Title: Inland Fisheries Research and Management

Study 2: Warmwater Fisheries Management

Job 6: Assessment of Riverine Smallmouth Bass

NEED:

Riverine smallmouth bass are an important, but often overlooked resource that can diversify Connecticut's fisheries and provide exciting fishing opportunities to many anglers throughout the State. Stream anglers seek smallmouth bass because of their aggressiveness and superior fighting ability. Anglers can also catch smallmouth bass during the summer, when trout are usually at low abundance or become unavailable to stream fishermen.

Riverine smallmouth bass have been assessed throughout Connecticut as part of many separate, and often unrelated studies. During a statewide stream survey conducted from 1988 to 1995 (Hagstrom et al. 1996), over 30 populations of riverine smallmouth bass were found in state rivers, with some populations being sufficiently abundant to support recreational fishing.

One of the most abundant populations supporting relatively large-size bass (>25 cm) was found in the free-flowing section of the Housatonic River (Salisbury to New Milford). The Inland Fisheries Division has collected considerable data on this population and, in 1989, created a Bass Management Area encompassing a 6-mile stretch of the River (The Stanley Tract). Despite high angler catch rates of smallmouth bass, it was recommended that statewide stream regulations (6 bass/day with no length limit) be maintained due to low harvest in this relatively remote section of PCB-contaminated river (Barry et al. 1989). In 2002, another special Bass Management Area (Bulls Bridge Trout and Bass Management Area) was established on the Housatonic River (Hagstrom et al. 2004). This area is being managed with catch-and-release regulations for bass and trout, and will be assessed during the current AFA to determine the success of the new regulations. Relative abundance of smallmouth bass and other species is also being assessed in several sections of the Housatonic River to determine the effects of different

flow regimes (pond-and-release: 2000-2004 vs. run-of-river: 2005-2009) upon the river's fish population (Machowski et al. 2004). Standardized sampling within all sections of the Housatonic River will continue under different jobs within the current AFA.

The Connecticut River also supports a strong population of smallmouth bass, particularly north of Hartford. The river is large and supports fishing from shore and boat. Assessment of smallmouth bass throughout the Connecticut River and its coves has been conducted using standardized boat electrofishing methods with data on relative abundance and growth reported in Jacobs and O'Donnell (1996, 2003, and 2004).

Several rivers in eastern Connecticut also support smallmouth bass. The Quinebaug and Shetucket rivers are too large to be sampled by stream electrofishing, yet too shallow to be sampled with an electrofishing boat. A preliminary assessment has recently been conducted on these rivers by angling (2002-2004); however, these data have not yet been evaluated.

Data collected on riverine smallmouth bass in Connecticut currently is held in many separate databases or hard copy files. Further, much of this data has not been fully compiled and analyzed. Although the Inland Fisheries Division has collected a wealth of information on riverine smallmouth bass, the data is often unavailable or cannot be properly analyzed due to the disparate means of storage. There is a need to consolidate all of these separate sources of information into one database to facilitate analysis and identification of information gaps.

Most data have shown that smallmouth bass grow slowly in Connecticut's rivers. Slow growth, combined with their aggressive tendencies and variable year-to-year spawning success, may cause riverine smallmouth bass to be vulnerable to angler overharvest or habitat disturbances. Current statewide management may not be adequate to maintain healthy smallmouth bass populations that can provide quality angling in Connecticut's streams. Assessment of catch-and-release fishing for bass in the Bulls Bridge Trout and Bass Management Area (BBA) of the Housatonic River may have applicability to other areas of this river, but those findings may not be appropriate for other rivers in Connecticut. A comprehensive Fisheries Management Plan needs to be completed for riverine smallmouth bass throughout the State. To do so will require

complete analysis of all pertinent data, collection of additional information as needed, and review of scientific literature.

OBJECTIVES:

1. Complete assessment of catch-and-release bass regulations on the Bulls Bridge Trout and Bass Management Area.
2. Combine data from various sources into a database specifically dedicated to riverine smallmouth bass.
3. Conduct age/growth analysis and determine total mortality rates and relative abundance for riverine smallmouth bass populations. Determine information gaps and future sampling needs.
4. Identify stream and river sections in Connecticut that have the potential to provide recreational fishing opportunities for smallmouth bass.
5. Conduct literature review of smallmouth bass management strategies.
6. Formulate a comprehensive Fisheries Management Plan for Connecticut's riverine smallmouth bass.

EXPECTED RESULTS AND BENEFITS:

Work will result in all data on riverine smallmouth bass being consolidated, compiled, and fully analyzed. This will provide a better understanding of riverine smallmouth bass populations throughout Connecticut, and will lead to their proper management. Naturalized populations of smallmouth bass require no stocking, and can be managed to maximize utilization while maintaining healthy populations. Proper management of smallmouth bass will not only diversify Connecticut's stream resources, but could increase angler utilization. Connecticut's stream anglers will benefit from such management by being able to have quality fishing experiences for an aggressive, hard-fighting fish during the summer when trout fishing typically wanes.

APPROACH:

Data will be gathered from all the different sources, and entered into a database dedicated to riverine smallmouth bass. Fish sampling and angler surveys will continue to be performed on the BBA and other sections of the Housatonic River. Data will be analyzed, and additional data will be obtained to fill gaps in information. Special

regulations currently in place for bass on the Housatonic River BBA will be evaluated. A review of scientific literature will also be completed to help determine potential management strategies. Rivers having high potential for quality smallmouth bass fisheries will be identified, and appropriate management will be recommended in a Fisheries Management Plan for Riverine Smallmouth Bass in Connecticut.

PROCEDURES

All existing biological data on smallmouth bass in Connecticut streams and rivers (relative abundance, population structure and growth) will be consolidated into one database or electronic filing system. When available, supplementary data on recreational fishing, habitat characteristics, hydrology, and socioeconomic factors (such as public access) will be added to the electronic file.

Data will be compiled and gaps in information will be identified. Additional biological information will be collected by electrofishing or angling. Data on angler effort, catch and attitudes may be collected via creel survey. Additional scales and/or otoliths may be collected from smallmouth bass residing in streams where growth information has not been determined.

Consolidated information will be analyzed with careful consideration given to population dynamics of smallmouth bass, characteristics of the existing fishery, and to potential socioeconomic benefits from fisheries management. Data loggers may be deployed to collect water temperature data on selected streams. Streams will be rated for suitability of smallmouth bass and their potential to provide quality angling.

Insight into special management of riverine smallmouth bass will be obtained through an assessment of the new catch-and-release fishery for bass on the Housatonic River BBA. A review of riverine smallmouth bass management in the scientific literature will also be conducted. By having knowledge of our stream resources and insight into proper management techniques, we will formulate a comprehensive Fisheries Management Plan for Riverine Smallmouth Bass in Connecticut.

DURATION:

April 1, 2005 – March 31, 2010

SCHEDULE:

Sections of the Housatonic River will be sampled by electrofishing during each summer (2005-2009), and by angler survey, as needed. Progress specific to the Housatonic River BBA will be reported annually.

Beginning in 2005, all available data on riverine smallmouth bass will be compiled within a dedicated database. Streams that lack information will be identified and sampled by electrofishing or angling during summers, 2006-2008. During this period, angler surveys may be conducted and stream temperature loggers may be deployed. Data will be analyzed along with a literature review beginning in 2006. Progress will be reported in 2007 and 2008, and a Final Report of data analyses will be completed in 2009. A comprehensive Fisheries Management Plan will be developed during 2009 and completed in March 2010.

PROJECT PERSONNEL:

Edward Machowski, Job Leader
Mike Humphreys, Primary Staff
Eileen O'Donnell, Primary Staff
Tim Barry
Jim Bender
Neal Hagstrom
Bob Jacobs
Jerry Leonard
Chris McDowell
Bob Orciari
Eric Schluntz
Kevin Vensel

ESTIMATED COST:

Fiscal Year	Total Cost
05-06	\$82,707
06-07	\$85,188
07-08	\$87,744
08-09	\$90,376
09-10	\$93,087

Grant Title: Inland Fisheries Research and Management

Study 3: Inland Fisheries Coordination and Administration

STUDY STATEMENT

NEED:

Inland Fisheries Division staff must provide services to the angling public to ensure proper protection and management of Connecticut's fishery resources. These activities are necessary so that current knowledge and the results of research and management projects can be broadly applied. Included in these activities are public outreach, access development, planning, and permit review.

Connecticut is a densely populated state (680/square mile) with many of its residents living in an urban environment. Historically, the Inland Fisheries Division has focused nearly all of its fisheries management efforts on high quality streams and lakes within the more rural/suburban areas of the State. Although this approach created good fisheries in many areas of Connecticut, those fisheries are not have readily available to the State's urban residents. A program that enhances fishing opportunities in Connecticut's major population centers is needed to increase public use of these waters and provide recreational benefits to urban residents.

The Connecticut Inland Fisheries Division often relies upon angler survey data to manage the State's fisheries resources. Surveys are routinely used to address specific questions on angler utilization and catch, and have been instrumental in determining the success of trout stocking, new regulations, conservation actions, and species introductions. Candlewood Lake (5,064 acres) and the Connecticut River (~70 miles and 12,000 acres) are the two largest freshwater fisheries resources in Connecticut, but have yet to be adequately assessed by angler survey. Important fisheries issues have developed on both waters including large harvest of catfish and declining catch rates for smallmouth bass on the River, and increased use by bass anglers and reports of declining effort and catch of trout on Candlewood. The Inland Fisheries Division needs to

complete comprehensive angler surveys to guide future management decisions on these waters.

OBJECTIVES:

1. Provide general fisheries information to the public.
2. Plan and coordinate Inland Fisheries operations.
3. Design, implement and evaluate a pilot program to enhance freshwater fishing opportunities in urban locations.
4. Determine angler effort, catch, harvest and timing of recreational fisheries on Candlewood Lake and the Connecticut River.

EXPECTED RESULTS AND BENEFITS:

Effective communication with the public will result in a more informed constituency. Prompt and efficient technical assistance will ensure that scientific collections, fishing tournaments, and fish stockings are conducted in a manner that does not harm fisheries, fish populations, or fish habitat. Time allocated to planning and coordination will enable the Fisheries Division to respond promptly when information is needed and when opportunities arise.

Urban fisheries will increase public use and the value of aquatic resources located in urban areas, help achieve environmental equity, and broaden, diversify, and perhaps increase Connecticut's clientele base of licensed anglers.

The Inland Fisheries Division will obtain information on angler utilization, catch and harvest on the Connecticut River and Candlewood Lake. Angler survey data will be meshed with species-specific biological information and will allow the Inland Fisheries Division to set long-term management objectives for Connecticut's largest freshwater fisheries resources.

APPROACH AND PROCEDURES:

Objectives for Inland Fisheries Coordination and Administration will be achieved by the completion of three jobs. Details on the approach, procedures, and schedules are provided separately for each job. Jobs included in this study are as follows.

Job 1. Inland Fisheries Operations

Job 2. Urban Fishing Initiative

Job 3. Angler Survey of the Connecticut River and Candlewood Lake

LOCATION:

Work on this study will be done in the Hartford Inland Fisheries Division Office, field offices located in the towns of Harwinton, Litchfield and Marlborough and on rivers, streams, and lakes throughout Connecticut.

ESTIMATED COST:

Fiscal Year	Total Cost
05	\$399,041
06	\$411,012
07	\$423,343
08	\$436,043
09	\$449,124

Grant Title: Inland Fisheries Research and Management

Study 3: Inland Fisheries Coordination and Administration

Job 1: Inland Fisheries Operations

NEED:

Fisheries Division staff must provide services to the angling public to ensure the proper protection and management of Connecticut's fishery resources. These activities are necessary so that current knowledge and the results of research and management projects can be broadly applied. Included in these activities are public outreach, access development, planning, and permit review.

The Fisheries Division is frequently required to collect information due to unforeseen circumstances (ex. Fish needed for contaminant analysis, investigation of fish kills). In addition, opportunities to collect valuable information often arise (ex. new waters open to fishing, fish become available for stocking). It is important that the Fisheries Division be able to meet these demands and take advantage of opportunities.

OBJECTIVES:

1. Provide general fisheries information to the public.
2. Ensure that data can be collected where needed to evaluate programs and to take advantage of opportunities.

EXPECTED RESULTS AND BENEFITS:

Improved communication will result in a more informed constituency. Anglers and the general public will become more aware of fisheries issues, projects, and programs. This will increase the effectiveness of the Bureau of Natural Resources/Fisheries Division by building partnerships and trust. Prompt and efficient review of Inland Fisheries permits by qualified personnel will ensure that scientific collections, fishing tournaments, and fish

stockings are conducted in a manner that does not harm fisheries, fish populations, or fish habitat. Time allocated to planning and coordination will enable the Fisheries Division to respond promptly when information is needed. Ongoing attention to planning and coordination will provide the flexibility needed to take advantage of unforeseen opportunities.

APPROACH AND PROCEDURES:

All staff will be involved in providing information to the public. Fisheries personnel will communicate information as part of each research and management job. Efforts to distribute additional fisheries information will be developed as needed. Fisheries staff will produce approximately 10-20 press releases, 30 weekly fishing advisory reports, six circulars or articles, and do 20 – 30 presentations annually.

Staff will attempt to provide information as it is requested; however, if need be, requests will be coordinated to minimize impacts on research and management projects. Periodically, we will identify issues on which the public needs to be better informed. In these instances we will attempt to develop an effective method to deliver the information, consult with the DEP Communications Office, and proceed accordingly.

Permits for (1) the importation and liberation of fish, (2) the collection of fish for scientific purposes, and (3) conduct of competitive fishing tournaments will be reviewed promptly to ensure protection of fish populations and recreational fisheries. Information on each permit will be stored in a relational database (RBASE) that will allow easy access to the data. Guidelines will be established and maintained to ensure that all permits are reviewed in a fair and consistent manner.

Ongoing attention will be paid to operations to ensure continued efficiency. Supervisory staff in all field offices and the central office will communicate regularly.

DURATION:

April 1, 2005 – March 31, 2010

SCHEDULE:

Fisheries personnel will communicate information as part of each research and management project. Efforts to distribute additional fisheries information will be developed as needed. Fisheries staff will produce approximately 10-20 press releases, 30 weekly fishing advisory reports, six circulars or articles, and do 20 – 30 presentations annually.

PROJECT PERSONNEL:

- William Hyatt, Job Leader
- Bob Jacobs
- Bill Gerrish
- Eileen O'Donnell
- Chuck Phillips
- Tim Barry
- James Bender
- Neal Hagstrom
- Mike Humphreys
- Gerald Leonard
- Ed Machowski
- Bob Orciari
- Eric Schluntz
- Seasonal Research Assistants

ESTIMATED COST:

Fiscal Year	Total Cost
05	\$129,986
06	\$133,886
07	\$137,903
08	\$142,040
09	\$146,301

Study 2: Warmwater Fisheries Management

Job 6: Assessment of Riverine Smallmouth Bass

Federal Aid Project: F57R (Federal Aid to Sport Fish Restoration)

Segment Date: April 1, 2005-March 31, 2006

Total Job Expenditures: \$XX,XXX (\$XX Federal, \$XX State)

Part A: Statewide assessment of riverine smallmouth bass populations.

(in progress)

Part B: Evaluation of catch-and-release regulations for smallmouth bass in the Bull's Bridge Trout and Bass Management Area (TBMA).

Purposes of the Job:

In the late 1970s, PCBs originating from a transformer factory in Massachusetts were detected in high levels in fish from the Connecticut portion of the Housatonic River. A health advisory was issued, and signs were posted along the river recommending against consumption of any fish caught from the river. More recent testing of fish has shown that concentrations of PCBs in smallmouth bass have dropped to a level where consumption of bass in moderation no longer represents a significant health risk for most people. Consequently, in 2001, the health advisory was relaxed, and the Connecticut DEP Angler's Guide was edited to inform anglers that it was once again safe to harvest bass for consumption. Even prior to the recent easing of the PCB health advisory, electrofishing data and complaints from anglers indicated increasing evidence of over-harvest of bass from portions of the Housatonic, and it was recognized that it might be necessary to restrict harvest in order to restore bass angling quality and prevent additional over-harvest. An experimental catch-and-release regulation for smallmouth bass (all bass must be released without avoidable injury) went into effect on a test section of the Housatonic River, Bull's Bridge TBMA, in 2003. This area includes the portion of the Housatonic River from Bull's Bridge Dam in Kent, downstream approximately 3 miles to the Route 7 bridge in Gaylordsville, and the entire portion of the Tenmile River in Connecticut running from its confluence with the Housatonic in Kent and Sherman, upstream approximately 0.6 miles to the New York State line. The purpose of Job 6, Part B is to assess the effectiveness of this new regulation for restoring the quality of this unique fishery. In addition, results from this study may prove useful for restoration of other over-harvested sections of this river and possibly other rivers in Connecticut.

From 2001 through 2005, smallmouth bass population assessment work was conducted in conjunction with assessment of trout populations in the Bull's Bridge TBMA. This progress report presents a summary of results of annual sampling and assessment work conducted since 2001, as well as comparisons with smallmouth data collected from this site during a Stream Survey sample in 1992. Additional progress reports will be completed each year, and comprehensive data analysis and final report preparation with recommendations will be completed by March, 2010.

Objectives:

- ◆ Assess changes to the smallmouth bass population resulting from catch-and-release regulations.
- ◆ Assess angler catch, effort, and satisfaction under the new catch-and-release management.
- ◆ Identify issues and provide recommendations for future management of this section of the Housatonic River. Assess possible implications for management of other sections of the Housatonic River as well as other riverine bass populations statewide.

Methods:

- ◆ Beginning January 2003, new catch-and-release regulations went into effect for smallmouth bass on the portions of the Housatonic River and Ten Mile River within the Bull's Bridge TBMA. Signs which reflect the new regulations were posted in early spring of 2003, and are maintained. The 2003 Connecticut Angler's Guide was edited to reflect the regulation and management change.
- ◆ Standard sample sites have been electrofished for smallmouth bass with standardized equipment and methods in the Housatonic River (640 m), and Ten Mile River (800 m) portions of the management area annually since 2001 (except in 2004 the Housatonic River standard site could not be sampled due to high water).
- ◆ Length-frequency and age-and-growth data are tabulated, graphed, and compared to data collected in previous years, in order to track year classes and assess possible changes in population structure.
- ◆ In 2003 and 2005, scale samples from two or three bass in each centimeter group were collected when fish were available. Scale samples were prepared and used to determine fish ages and back-calculated lengths-at-age by standard methods. Age and growth data from 2003 and 2005 were compared to data from smallmouth bass collected at this site in 1992, and data from 927 riverine smallmouth bass (aged by scale and otolith analysis) collected from 34 riverine smallmouth bass populations statewide. Scale samples will continue to be collected each year, and age and growth will be determined to help assess effects of catch-and-release regulations.
- ◆ Water temperatures are continuously monitored from spring to fall with electronic data loggers set each year at several locations within the Housatonic River and Ten Mile River.
- ◆ Flow data obtained from USGS gauging station records are assessed.

Findings:

- ◆ Since annual sampling for this project began in 2001, 2,841 smallmouth bass were netted and measured (1,046 in 2005). Of these, only 67 from the Housatonic River, and 47 from the Ten Mile River were over 30 cm. Sampling was not possible in the Housatonic River portion of the TBMA in 2004 due to high water.
- ◆ Age determinations from scale samples from 50 bass collected in 2003 and 101 bass collected in 2005 (Table 1) corroborated lengths-at-age determined from peaks in length-frequency plots from five different years (Figure 1), and provided validation of the use of scales for determining age through age 6+.
- ◆ Scale aging data (Table 1) and length-frequency data (Figure 1) from 2005 samples show continued dominance of the strong 2001 year class at age 4+ (306 mm), continued absence of the 2000 year class at age 5+, and nearly total depletion of the previously-strong 1999 year class at age 6+ (353 mm).
- ◆ Aging and length-frequency data also show nearly complete year class failures in 2003 and 2004, followed by the strongest year class documented to date in 2005.
- ◆ Only three of 151 scale samples collected at this management area (including both the Housatonic River and Tenmile River portions) in 2003 and 2005 were from fish over age 6+. Of these, one was aged at 7+ and two were aged at 8+. Length-frequency data also indicate that very few, if any, additional fish netted in samples were over age 6+. Because nearly all scale samples were from relatively young fish, ages were determined with a high degree of confidence, and confirmation of scale age estimates by examination of otoliths does not appear necessary at this time. Nevertheless, for smallmouth bass collected at this site in 1992, accuracy of scale ages was confirmed with otoliths for the oldest ages present at that time (up to age 7+).
- ◆ Data from previous studies of Housatonic River smallmouth bass (Barry et al. 1993) have shown that bass over 10 years of age (up to age 17) can be fairly abundant in areas where harvest is not high. In age and growth studies of these populations with older fish, it was

determined, by examination of scales and otoliths, that the potential exists to under-age the oldest fish if scales alone are used for age determination.

- ◆ On average, smallmouth bass in the Bull's Bridge population reach 12 inches (305 mm) by age 5.5. This growth rate is faster than Barry (1993) reported for smallmouth bass from an upstream portion of the Housatonic River (246 mm at age 5, 304 mm at age 9), and is considerably faster than growth rates reported for most other Connecticut streams (Table 2; 1994 Stream Survey report, and unpublished data from files).
- ◆ Maximum attainable length (L_{max}) based on Von Bertalanffy Analysis was 459 mm (18.1 inches) for 2003 and 2005 data combined. However individual fish may be expected to have the potential to attain greater lengths.
- ◆ Variation in mean length-at-age calculated from scales collected in 1992, 2003, and 2005 (Table 1) was likely due to considerable variation in summer conditions and suitability for growth during the years prior to each sample.
- ◆ Temperature loggers set in the TBMA showed that water temperatures were generally cooler during the summers of 2000, 2003 and 2004, and warmer during the summers of 2001 and 2005. USGS records showed that cooler temperatures generally coincided with frequent rain events and high flows (Figure 1, bottom).
- ◆ Comparison of length-frequency data from 2005 with that from four prior years (1992, 2001, 2002, and 2003; Figure 1) showed considerable annual variation in year class strength, with strong year classes being generated when spring and summer flows were low, and spring-summer water temperatures were warm (1999, 2001, and 2005). Conversely, very little successful smallmouth bass reproduction occurred in 2000, 2003, and 2004 when spring and summer flows were high and temperatures were cool. Similarly, data collected previously at this site and at other streams in Connecticut showed almost complete year class failure in 1992, another cool wet year (caused in part by the volcanic eruption of Mt. Pinatubo). The observed dependence of riverine smallmouth bass year class strength on spring flow conditions is consistent with findings reported in the literature. Loss of year classes occurs when repeated high flow events in late spring cause nest failure.
- ◆ Comparison of length-at-age among strong and weak year classes shows no indication that growth rate is inversely related to density. Data from this site, as well as earlier age and growth data from 34 other riverine smallmouth bass populations throughout Connecticut (Stream Survey, unpublished data), indicate that annual growth (in addition to year class strength) is best when flows are stable and low to moderate, and summer temperatures are warm, as in 1999, 2001, and 2005. Annual growth (and year class strength) is poor in cool summers with frequent rain events such as 1992, 2000, 2003, and 2004.
- ◆ Length-frequency data from 2003 and 2005 show some indication of improvement in the abundance of larger fish subsequent to implementation of catch-and-release regulations in January 2003 (Figure 1). However this increase may be mostly due to strong 1999 and 2001 year classes with higher than usual abundance of individuals still present at age 4+.
- ◆ Refuse left by fishermen, and heavily worn streamside trails indicate fairly heavy fishing activity in the Bull's Bridge TBMA. Illegal harvest of smallmouth bass was documented by four conservation officers, as well as Inland Fisheries Division workers. Additionally, an illegal gill net was found on the stream bank during sampling in 2005. Conservation Officers have informed project biologists that, due to manpower limitations and other higher priorities, they are unable to patrol this management area or consistently respond to TIP (Turn In Poachers) reports from compliant anglers and Inland Fisheries Division personnel.

Conclusions:

- ◆ Truncated fish population data with very few older fish, documented illegal harvest, and physical streamside evidence of heavy fishing activity indicate high illegal harvest rates of smallmouth bass over age 3 (approx. 10 inches).

- ◆ With relatively good growth rates at this site, and typically low natural mortality rates for this species in the Housatonic River, strong potential exists for improving the abundance of larger smallmouth bass (over 12 inches) in this new bass management area if compliance with new catch-and-release regulations can be improved.
- ◆ High variability of riverine environmental conditions, both within a particular growing season, and among growing seasons, contributes to a higher level of variation in annual recruitment and annual growth than is usually seen in more stable lacustrine environments. This variability diminishes the usefulness of standard methods of calculating survival based on constant recruitment, and renders standard PSD/RSD stock assessment methods less useful as well. Survival calculations based on tracking of individual cohorts may prove to be the best method for assessing improvements resulting from reduction of harvest.

Recommendations:

- ◆ Continue annual sampling of standard sites in the Housatonic River and Ten Mile River to evaluate the effects of recently enacted regulations.
- ◆ Compile and graph data from the Ten Mile River standard site for comparisons with data from previous years and data from the Housatonic River standard site.
- ◆ Collect and age additional smallmouth bass scale samples in 2006 to monitor potential changes resulting from new regulations.
- ◆ Continue to encourage Conservation Officers to respond to reports of poaching, and to enforce the new regulations.
- ◆ Continue to check on posted regulation signs and re-post as necessary.
- ◆ Conduct a roving-type angler survey from spring through fall in 2006 to assess catch, effort, attitudes, and compliance with new regulations for both bass and trout. This effort should be coordinated with trout management needs.
- ◆ Assess methods of calculating survival/mortality rates, with particular emphasis on cohort tracking methods. With the most appropriate methods, calculate survival annually for this population to help assess anticipated population structure shifts brought on by catch-and-release management.
- ◆ Continue to assess stream temperatures with data loggers.

Expenditures:

Total expenditures for this segment amounted to \$xxx,xxx, of which \$xx,xxx was Federally funded and \$xx,xxx was State funded.

<u>Category</u>	<u>Federal Funds</u>	<u>State Funds</u>
Personnel	\$xx,xxx	\$xx,xxx
Operations & Equipment	\$xx,xxx	

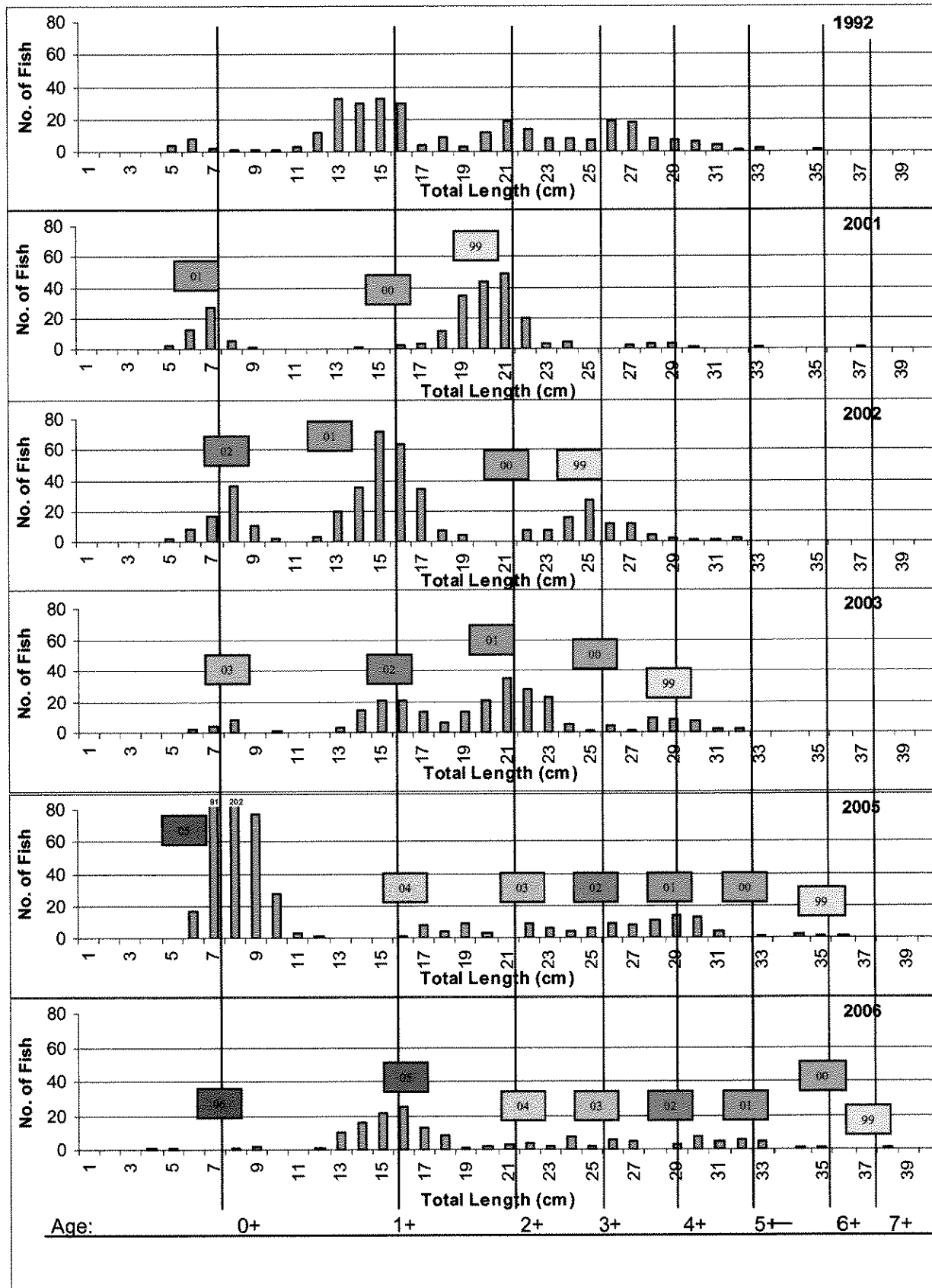
Table 1. Mean lengths at age (determined by scale analysis) for smallmouth bass (year classes combined) collected from the Bull's Bridge Trout and Bass Management Area, September 12, 2003, August 16, 2005, August 24, 2006, and August 5, 1992. For 2003 data, an annulus was assumed at the edge of each scale, as little growth occurs past mid-September. No annulus was added at the edge of scales from fish sampled in 1992, 2005, or 2006).

	Age							
	1	2	3	4	5	6	7	8
2006								
TL AT AGE	93	163	218	266	303	319	354	374
SD	14	23	20	23	21	15	14	0
N	58	41	29	24	14	7	7	1
2005								
TL AT AGE	94	157	208	255	289	323	340	366
SD	14	17	16	16	9	8	0	0
N	57	43	33	23	8	8	2	1
2003								
TL AT AGE	96	160	218	266	304	307	320	
SD	15	17	15	20	20	0	0	
N	50	49	34	16	16	1	1	
1992								
TL AT AGE	98	170	210	243	277	318	346	
SD	14	16	14	19	20	15	11	
N	44	33	23	22	13	2	2	

Table 2. Mean length-at-age (and range) of smallmouth bass from 34 stream sites in Connecticut with resident riverine smallmouth bass populations. Data were derived from approximately 900 scale samples collected during the statewide Stream Survey (1988-1995).

	Age										
	1	2	3	4	5	6	7	8	9	10	11
Mean Length (mm)	84	141	187	229	257	284	318	323	327	337	346
Range	71-100	120-171	157-215	182-314	218-286	228-309	304-337	311-337	325-328	337	346
Number of populations	34	33	33	26	18	16	8	3	2	1	1

Figure 1. Smallmouth bass length frequency data from a standard sample site (Gunn's Eddy to Sphinx Rock, 256 m) within the Bull's Bridge Trout and Bass Management Area. Samples were collected in August in 1992, 2001, 2002, 2005, and 2006, and on September 12, 2003. Catch-and-release regulations went into effect for trout in January 2002, and for bass in January 2003. Year classes are indicated in colored boxes.



Annual weather conditions summarized from USGS gauging station records:

1999- dry spring, severe summer drought	2003- cool wet spring/summer, frequent rains
2000- cool wet spring/summer, frequent rains	2004- cool wet spring/summer, frequent rains
2001- average/hot spring/summer	2005- dry spring, severe summer drought
2002- early spring rains, hot dry summer	2006- cool wet spring, very frequent rains

State of Connecticut
Department of Environmental Protection
Bureau of Natural Resources
Inland Fisheries Division

Federal Aid to Sport Fish Restoration

F-57-R-25

Progress Report

Grant Title: Inland Fisheries Research and Management

Study 1: Coldwater Fisheries Management

Job 3: Trout Management Areas

Period Covered: April 1, 2006 to March 31, 2007.

Prepared by: Neal T. Hagstrom, Senior Fisheries Biologist
Robert D. Orciari, Supervisory Biologist
Tim J. Barry, Senior Fisheries Biologist
Michael Humphreys, Fisheries Biologist

Date Submitted: _____

Approved by: _____

William A. Hyatt
Director, Inland Fisheries Division

Edward C. Parker
Chief, Bureau of Natural Resources

Executive Summary

Study 1: Coldwater Fisheries Management

Job 3: Trout Management Areas

Federal Aid Project: F57R (Federal Aid to Sport Fish Restoration)

Segment Date: April 1, 2006-March 31, 2007

Total Job Expenditures: \$##,### (\$##,### Federal, \$##,### State)

Purposes of the Job

There are currently 14 Trout Management Areas (TMAs) in Connecticut. In each of these areas, catch-and-release regulations were applied to improve the quality of trout fishing. Studies demonstrated the popularity and success of this approach, with increases in angler trips, total catch, catch rates, and numbers of large trout (Orciari and Phillips 1985; Hagstrom et al. 1996). The first catch-and-release area in Connecticut was created on the Willimantic River in 1976. These areas were officially designated Trout Management Areas in 1981 when the Housatonic River was added. Other early TMAs added were on the Mianus River in 1987 (the first seasonal TMA) and on the West Branch Farmington River in 1988. Subsequently, five new TMAs were created in the 1990s with five more added in 2002.

TMAs are managed in one of two ways, as either Year-Round TMAs, with catch and release regulations in effect all year, or as Seasonal TMAs, which have catch-and-release fishing from September until the start of the trout fishing season (third Saturday in April) and a reduced two-fish/day creel limit during the remainder of the year. All of Connecticut's TMAs are located on streams having good trout habitat. Year-Round TMAs are located on streams where trout are expected to survive through the summer; whereas, summer water conditions are generally marginal for trout survival in Seasonal TMAs. Seasonal TMAs expand the recreational fishing opportunities available to anglers in early spring and during the fall. This management method allows harvest of fish that would otherwise have died due to warm summer water temperatures.

TMAs are extremely cost-effective, generating an average of more than two hours of fishing per stocked trout among all areas and ≥ 7 hours per stocked trout in the larger TMAs. Percent return-to-the-angler (number caught divided by the number stocked) averages over 200% among all TMAs and exceeds 600% in the larger areas (by comparison, returns average 80% in put-and-take streams, Hagstrom et al. 1996).

This progress report presents a summary of management and research conducted in the TMAs during the period April 1, 2006 to March 31, 2007.

Objectives of Trout Management Areas

- ◆ Provide quality catch-and-release fishing by maintaining population numbers, growth rates and size distributions of trout.
- ◆ Attract greater angler effort than in comparable waters managed under statewide regulations.
- ◆ In Seasonal TMAs, expand fishing opportunities for anglers in early spring and during the fall.
- ◆ Produce the same level of angler effort that was measured prior to TMA regulations, but with reduced stocking and sustained catch rates.

Methods

- ◆ Water temperature data are collected using on-site automatic temperature recorders (data loggers) to determine limitations to trout growth and survival.
- ◆ Standard trout stockings (numbers, species, sizes) specific to each TMA are carried out each spring and in the fall if needed.
- ◆ Fin clipping and/or elastomer tagging are used to mark and later identify specific groups of trout.
- ◆ Angler surveys are conducted using a stratified roving creel design to assess angler usage, catch and regulation compliance, and to collect angler opinion data.

Key Findings

- ◆ **WEATHER CONDITIONS** during 2006 were not favorable to summer trout survival during parts of July and August.
 - Summer water temperatures were cool during early summer, but spiked in mid-July and again in early August. There were consistent rains throughout much of the spring and summer with several heavy storms from mid-October through early-November. This resulted in many periods of higher than normal flows during the year. While air temperatures were warm, flows in most streams would not have been a limiting factor for trout survival this summer. The heavy fall rains, which occurred late in the spawning season, may have scoured the trout redds reducing survival of trout eggs. While not as severe as the flooding in fall 2005, the net effect on trout reproduction may be similar.
- ◆ **YEAR-ROUND TMAs:**
 - **Hockanum River TMA:** Created in 2002, this urban TMA in Manchester/Vernon has a tailwater hypolimnetic release from Shempsit Lake, which keeps water temperatures in the upper third of the TMA cool enough to support trout during all but the hottest summers. At Union Pond there is a split release, with part of the flow coming from a fixed volume bottom valve on the south side of the dam and the balance of the flow is surface water over pouring at the north end of the dam.
 - Trout densities were low in the TMA below Union Pond 11/mile and closer to normal levels (125/mile) above Union Pond during summer 2006, the result of spiking summer temperatures and higher than normal flows. The higher flows caused a larger proportion of the water passing Union Pond Dam to be warm. This large volume of surface water over pouring the dam negated the effect of the cooler bottom release water.
 - None of the rainbow trout or brook trout stocked in the spring were sampled during late summer below Union Pond and only eleven of the 1,000 rainbows stocked were sampled above Union Pond.
 - Brown trout density in the Hockanum River TMA above Union Pond was 56/mile and only 11/mile below the dam. All brown trout sampled originated from fall fingerling stockings. No catchable-size brown trout had been stocked in this TMA.
 - Trout were not evenly distributed in the sample areas. The low numbers of trout in areas shielded from general view by trees raised questions about potential illegal harvest problems.
 - **Housatonic River Cornwall TMA:** This TMA is the longest in Connecticut and has a long and complex history spanning almost 25 years. The TMA was created in 1981 to prevent the loss of a very popular fishery threatened by PCB contamination. Thermal refuges were found to be critical to trout survival in this TMA. Protecting these refuges against warm water intrusions from hydro-releases is considered critical for maintaining healthy trout populations. Currently, population sampling is focused on evaluating the effects of the recently required (2005) run-of-river flows on

fish populations in the TMA.

- There were no fish kills reported in the TMA and no deviations reported in run-of-river flows during 2006.
- During mid-August an electrofishing sample was conducted in this TMA. Only two areas were sampled due to time constraints and higher than normal flows (350 cfs). A standard sample was done in the Turnip Island section and the Furnace Brook Thermal Refuge. Sampling yielded 27 trout at Turnip Island and 19 trout at Furnace Brook. This expands to an estimated 336 trout/mile. The 2006 trout density is lower than those sampled in 2000-2002 (average density = 1,163 trout/mile). The growth of recently stocked fish was 33 mm from stocking to sampling. Growth rates of recently stocked trout in prior samples average 34mm (1997-2002).
- Few fish were seen utilizing the thermal refuges during summer 2006.
- **Housatonic River Bulls Bridge TMA:** This TMA was created in 2002 and has catch-and-release regulations for both trout and black bass. This section of river is also subject to a PCB health advisory. The TMA includes a 3.1-mile section of the Housatonic River and a 0.63-mile section of the Ten Mile River.
 - Water temperatures (as measured by data loggers) exceeded the short-term lethal limit for brown trout in the Housatonic River during 9 days (with a high spike of 30° C) and during 2 days in the Ten Mile River during 2006. In contrast, water temperatures exceeded the short-term lethal limit in either area during four days in 2004 and 29 days in 2005.
 - As in past years, water temperatures were generally cooler than upstream in the Housatonic River- Cornwall TMA.
 - Moderate numbers of trout were sampled in both the Housatonic River and the Ten Mile River (121 fish).
 - The trout sample consisted of 8 wild brown trout; 43 Survivor strain brown trout stocked spring 2005 at yearling size (avg. 200 mm); 35 Cortland strain brown trout stocked spring 2005 at adult size (avg. 298 mm); and 35 Rome strain brown trout stocked fall 2005 at yearling size (avg. 191 mm).
 - No older holdover trout from prior to summer 2005 were collected during sampling.
 - Relative survival was similar for all three cohorts of trout sampled given the differences in their time of stocking and sizes at stocking.
 - Anglers fished for 4,316 angler-hours in the Bull Bridge Area during a March to October 2006 angler survey. A total of 4,331 trout were caught during the survey.
 - Atypical weather with frequent rains and the resulting high flows made the area unfishable for 27% of the creel period. This was a particular problem during the peak trout fishing period in the late spring when 60% of the days were unfishable due to heavy rains and high flows.
 - Fishing effort was widely distributed among a variety of angler groups both by tackle and target species: 43% bait, 29% fly, and 28% lure; and 37% targeted trout, 16% smallmouth bass and 40% any species.
 - Anglers fishing in the BBTMA traveled an average of 33.9 miles to fish in this TMA, compared to an average travel distance of 15.6 miles for the WBFRTMA as determined during a concurrent survey on that TMA.
 - Directed effort for trout peaked in the spring (38% of anglers) and fall (50% of anglers), while smallmouth bass effort was highest in the summer (38% of anglers).
 - Angler catch rates of trout were very high (2.47 trout/hr) during the peak trout fishing period in spring, and were good (1.00 trout/hr) when averaged over the entire season. The target catch rates for trout in TMAs is 1.0 trout/hr.
 - Over the course of the summer, the creel clerks felt that some groups of anglers became less than truthful about their catch. These groups often indicated no fish were being

caught even though they had been very successful when interviewed earlier in the summer.

- Of anglers who provided an opinion, 97% were in favor of catch-and-release regulations.
 - Forty-four anglers were encountered who had no license, ran away or refused to answer questions. Sixteen anglers were observed with illegally harvested fish and once again in 2006, a gillnet was recovered in the TMA.
 - Expansion of observed illegal harvest events to the entire surveyed time period (16 events/0.048 percent survey coverage of possible sample blocks) produces a minimum estimate of 333 anglers harvesting fish illegally between March and October of 2006. This estimate is based on observed harvest. It is believed that illegal harvest was more extensive, because many fish harvested illegally were likely hidden from view and were not seen by creel agents.
- **Naugatuck River TMA:** This was the second year of TMA designation for this area. This area is stocked with broodstock size Atlantic salmon in the fall.
 - The TMA was sampled by electrofishing on July 18, 2006. This was before this summer's two heat waves in mid-July and early August.
 - The trout catch rate was 72/mile for the 0.69 miles of stream sampled. The sample consisted of 10% wild brown and brook trout and 90% stocked brown and rainbow trout.
 - The number of large (>12 inches) brown and rainbow trout sampled in 2006 (60/mile) was higher than in pre-regulation change samples (32/mile, 2004). None of these fish were holdover trout.
 - The density of wild trout sampled (7/mile, 2006) in the TMA had declined significantly from densities found in pre-regulation change samples (15/mile, 2004).
 - Trout densities of less than 100/mile have typically been used as an action level for requiring a fall trout stocking in the TMAs to maintain quality fishing.
 - **Moosup River TMA and Willimantic River TMA:** The Willimantic River TMA was started in 1976 and is the oldest catch-and release area in Connecticut. It is a popular fly-fishing-only area, which regularly draws anglers to its banks as soon as the ice is off the river in March. The Moosup River TMA was created in 1993 and has both an all-legal-techniques section as well as a fly-fishing-only area.
 - In 2006, water temperature models rather than electrofishing samples were used to estimate fall trout population densities for these two TMAs.
 - Water temperatures exceeded 24.7°C on 20 days for the Moosup River TMA and for 22 days for the Willimantic River TMA.
 - Fall stockings were conducted in both TMAs based on model output. Stockings are required whenever there are more than 17 days with water temperatures above 24.7 °C.
 - **Pequabuck River TMA:** Created in 2002, this TMA offers year-round trout fishing in a heavily developed urban area.
 - Trout densities were slightly higher than those found during the last several samples (154/mi in 2006 vs. 108/mi average density 2002 & 2004-2005).
 - The majority of trout sampled in 2006 appeared to be of wild origin or from fingerling stockings. While only two holdover wild trout were encountered in 2005, 23 wild trout were sampled in the same area in 2006.
 - **West Branch Farmington River TMA:** Created in 1988, this TMA is located within a portion of the river designated as a "National Wild and Scenic River". This is the largest tailwater release fishery in Connecticut. The TMA is the focus of a program for developing a "Survivor" strain of brown trout. This program should create a strain of fish better suited for the TMAs than the domestic strains typically produced at the hatcheries.
 - An angler survey was conducted on the TMA from March through October and in adjacent sections of the river from Opening Day to October 31, 2006. Angling groups had

expressed interest in having the TMA expanded and suggested several options to consider. In addition to collecting standard catch and effort information, during the creel survey anglers, both inside and outside the TMA, were queried for their opinions on the suggested expansion options for areas adjacent to the TMA.

- This TMA was stocked with 1,000 large Survivor strain brown trout in April 2006. This year's cohort averaged 16 inches at the time of stocking while past cohorts (2004 & 2005) had averaged 14 inches. In addition, it was possible to stock all 1,000 fish in the spring this year while in the past logistics had required a fall stocking of 300 fish with the remaining 700 fish being stocked in the spring.
- Water levels were slightly higher than normal during sampling, 110 cfs vs. typical levels of 85-100 cfs.
- The estimated number of trout in the TMA during fall 2006 was slightly below the average for the last eleven years (920/mile - 2006 vs. 953/mile - average 1995-2005).
- Wild fish made up 35.6% of the trout sampled in 2006. The 2006 density of wild trout (329/mile) was within the range observed during the previous six years (112-342/mile).
- The density of large brown trout (>16 inches) in the TMA was greater in 2006 (158/mile) than during the previous six years (14-128/mile). The composition of these brown trout >16 inches captured in 2006 was 17% wild trout, 5.3% unmarked stocked trout, and 77.7% Survivor strain trout. Of the Survivor strain fish, 17% were from prior stockings of yearling size trout, 13% were from the 2004 stocking of large trout, 16% were from the 2005 stocking of large trout and 54% were from the 2006 stocking of large trout.
- Most of the large Survivor brown trout from the 2004 and 2005 cohorts were in very poor condition. Individuals from these cohorts that were taken back to the hatchery for spawning produced lower than expected numbers of eggs for their size.
- A relatively high percentage (14%) of the 2005 cohort of large (>14 inches) Survivor strain brown trout, survived through fall 2006 (39/mile). The 2004 cohort of large survivor trout had the same survival rate for a comparable period the prior year. The survival rate observed previously for similar stockings in 2002 and 2003 was 6%.
- Forty-four percent of the 2006 cohort of large Survivor strain brown trout stocked in the spring survived to the fall. The 2005 cohort of large Survivor trout had a 55% survival rate during the same period in 2005.
- Three logjam structures were repaired due to damage in November 2005 by flooding and two new structures were constructed in the "Boneyard" pool within the TMA during July.
- During snorkel surveys in August 2006 it was noted that the structures continue to attract large numbers of trout (10-40 fish/structure). Similar snorkel surveys conducted prior to logjam construction found only low densities of trout (5-10 trout per 100 m) in this pool.
- Angler effort in the TMA during 2006 (41,830 angler-hrs, 7,470 angler-hrs/km) was 34% lower than from the same survey period in 2002 (62,972 angler-hr). During the same time period, there was 49,399 angler-hrs (3,686 angler-hrs/km) of fishing effort in the 8-mile section of the Trophy Trout Area located upstream of the TMA and 5,261 angler-hours (1,180 angler-hrs/km) in the 1.4-mile section of the Trophy Trout Area located downstream of the TMA.
- The proportion of fishing trips by out-of-state anglers was similar to the 2002 survey (18.7% 2006 vs. 17% 2002). The estimated total number of out-of-state fishing trips in the TMA was 1,840 trips in 2006. In the adjacent Trophy Trout Areas, 10.1% of trips were by out-of-state anglers for a total of 1,247 trips.
- Angler responses to the survey conducted in the TMA (310 interviews) and in adjacent river sections (451 interviews) found only a partial overlap in usage of river areas between angler groups. Anglers outside the TMA indicated that on average they spent only about 20% of their Farmington River fishing time in the WBFTMA, while anglers inside the TMA indicated that about 90% of their Farmington River fishing time on

average was spent fishing in the WBFTMA.

- In the TMA, trout catch rates during 2006 were similar to the rates in the 2002 survey (1.09 fish/hr 2006 vs. 0.9 fish/hr). Catch rates of large trout were also similar (0.1 fish/hr 2006 vs. 0.09 fish/hr 2002). It was estimated that there were 4,450 catch events of trout >16 inches in the TMA during 2006.
- The majority of anglers outside the TMA did not indicate an interest in seeing the TMA expanded. When asked about expanding the TMA to any of four possible new areas, between 31-40% of the 446 interviewed anglers currently using those areas were opposed to any change and another 26-40% of the anglers had no opinion. Of anglers fishing in the TMA 65-80% of anglers favored expanding the TMA depending on the size and locations of the additional area.
- A comparison of median distance traveled to fish the West Branch Farmington River both for the Trophy Areas and the TMA found only a slight difference in the distance traveled (Trophy Trout Area-13.8 miles vs. TMA-15.6 miles).
- The median variable cost reported by anglers was the same for both areas (Trophy Trout Area \$25.9 vs. TMA \$25.9).

◆ **SEASONAL TMAs:** No fish kills were reported in the seasonal TMAs during 2006.

- **Mianus River TMA:** Created in 1993, The Connecticut-American Water Company uses a cold water bottom release from Bargh Reservoir to move water to a filtration plant downstream of the TMA. The cold water release keeps water temperatures cool in this TMA throughout the summer.
 - The density of trout sampled was higher than in recent samples (283/mile 2006 vs. 99/mile 2002).
 - A small population of wild brown trout persists in the TMA with an age structure similar to the last sample in 2002, but at a higher density (109/mile 2006) than in the 2002 sample (46/mile).
- **Mill River Hamden:** A section of the Mill River, Hamden has been under two-fish-daily regulations for several years as part of the Trout Park Program.
 - It was determined that by converting the area to a Seasonal TMA all anglers would gain additional fishing opportunities (about 7 extra weeks of fishing) without negatively affecting the put-and-take anglers who normally fish the area in the spring.
- **Salmon River TMA:** Created in 1993, trout survival in this TMA is usually limited by high summer water temperatures.
 - Trout catch rates were above average during fall population sampling (104/mile) compared to recent samples (18-133/mile during 2000, 2002-2005).
- **Saugatuck River TMA:** Created in 2002, this seasonal TMA expanded early spring recreational fishing opportunities in southeastern Connecticut.
 - A fish population sample was conducted in the TMA in August 2006 as part of a general population (Water Bureau, Ambient Monitoring) sample. The sample was not representative of the entire TMA, because only a short (150 m) section of shallow riffle was sampled.
 - Three age-0 wild brown trout were handled during the August sample, a density of 32/mile. No other wild or stocked trout of any species were encountered during the sampling.

Conclusions

- ◆ **YEAR-ROUND TMAs:** In year-round TMAs where water temperatures are limiting, trout

populations can be more cost-effectively managed using water temperature models rather than by electrofishing, based on the relative cost of collecting water temperature data versus electrofishing population sampling.

- **Weather Conditions** in 2006 (consistent rainfall and short periods of spiking air temperatures) only moderately impacted most of the TMAs, but overall water temperatures were warmer than average. This caused fall stockings to be necessary to generate good fall fishing opportunities in most of the TMAs
- Illegal fishing activity (gill netting/ poaching) continues to be a problem in several of the TMAs: Hockanum River and Housatonic River Bulls Bridge TMA.
- **Housatonic River-Cornwall:**
 - Even though densities of recently stocked trout were similar to average, trout densities were lower than average, necessitating a fall stocking to generate good fall fishing.
- **Housatonic River Bulls Bridge TMA:**
 - The trout population had improved from 2005.
 - Generally weather conditions were not detrimental to trout survival during 2006.
 - The lack of holdover trout from 2005 or earlier was due to the adverse effects of weather and flow conditions during 2005 and probably illegal harvest from thermal refuges as well.
 - Contrary to past years, there was no clear benefit apparent in 2006 data to using Survivor strain brown trout in the TMA.
 - The stocking of fall fingerlings contributed substantially to the trout population's improvement.
 - The angler survey result under-represented typical usage of the Bulls Bridge TMA due to the unusually large proportion of unfishable days during the survey. Despite this, there was significant angling activity and catch in the TMA, and anglers traveled a considerable distance to fish this TMA.
 - Anglers using the TMA (who provided opinions) strongly support the current management of the TMA.
 - Poaching is still a significant problem for this TMA and is preventing this TMA from reaching its full potential. The continued use of illegal gears, such as gillnets in thermal refuges, can be devastating to the TMA's trout population.
- **Naugatuck River TMA:**
 - The decline in wild trout sampled was due to dry, warm conditions in the summer and severe flooding (a 100 year event) in the fall 2005, not an effect of the regulation change.
 - Initially population sampling was done in early to mid-July. Periods of potentially lethal high water temperatures occur during late July and early August. Population evaluations done in mid-to-late August would be more representative of overall trout population health and the potential of the TMA to produce holdover trout.
 - While the sampled trout density was below the 100 trout/mile action level for requiring a fall trout stocking, the fall stocking of Atlantic salmon broodstock made stocking additional trout unnecessary.
- **Pequabuck River TMA:**
 - The wild brown trout population is starting to recover from the sharp population decline caused by the severe drought conditions of 2001. Favorable water temperatures and flows in 2003 and 2004 and no adverse water quality events contributed to the presence of a significant 2006 year-class of age 0 wild trout.
- **West Branch Farmington River TMA:**
 - The density of the trout in the West Branch Farmington River TMA was within the normal range of densities, allowing for minor year-to-year differences in sampling efficiencies.

- The most important reasons for the increased number of trout >16 inches sampled in the TMA in fall 2006 was the good survival of the large Survivor strain trout that were stocked in 2006 and the two cohorts of large Survivor strain trout that held over from 2005 to 2006.
 - The poor condition of the 2004 and 2005 cohorts of large Survivor strain brown trout is a cause for concern. Their condition could be attributed to several causes. 1) Disruption of normal behavior due to aggressive, belligerent behavior by large, recently stocked, hatchery fish (2006-cohort) 2) A reduced food supply during the winter of 2005-06 due to scouring of the river bottom after flooding in fall 2005 and/or 3) Inter-cohort competition with the 2006 cohort for space and food.
 - The larger average size at stocking for the 2006 fish may have given them a competitive edge that adversely affected the two earlier cohorts. It is possible that too many large fish have been stocked and that the production capabilities of the area can not support the 600 trout >16 inches that are estimated to be present.
 - Those anglers fishing the Trophy Trout Areas are generally a discrete subset of anglers from those who predominately use the TMA with only about a 20% overlap in resource usage between the two groups.
 - Expansion of the TMA does not seem to be a viable alternative at this time, because such an expansion would displace most of the current anglers, the majority of whom are not in favor of such a change. There is no additional evidence of any over-riding socio-economic advantage to the TMA that would make expanding the TMA beneficial to the local economy. It appears that the engine drawing people to the region is the Farmington River itself and not the TMA.
 - A possible alternative to creating more year-round catch and release water in the Farmington System would be to change the Seasonal Farmington River TMA in Burlington/Avon to a year-round TMA.
 - Construction of artificial logjams in the Boneyard pool supplied much-needed large woody debris habitat, which trout actively seek out.
- ◆ **SEASONAL TMAs:** Catch rate and size composition of trout populations in the seasonal TMAs that were sampled were similar to past samples, with low densities of trout remaining after the harvest period. Population samples in these TMAs are generally unnecessary and fall stockings are done as a standard practice.
- **Mill River Hamden:** Anglers would gain a net benefit by changing this area from a Trout Park to a Seasonal TMA.

Recommendations

- ◆ Continue to stock all TMAs with standard numbers and sizes of trout used in 2006.
- ◆ Continue to mark trout as needed to allow identification of specific stockings, strains or age-classes.
- ◆ Assess the effects of "run-of-river" flows on trout survival in the Housatonic-Cornwall TMA.
- ◆ Assess the potential for additional fall fingerling stockings for the Housatonic-Bulls Bridge TMA.
- ◆ Investigate options for improving enforcement effort in the Housatonic-Bulls Bridge TMA.
- ◆ Change Naugatuck River TMA sample dates to later in August.
- ◆ Continue the development of Survivor-strain brown trout using broodstock from the West Branch Farmington River TMA.
- ◆ Investigate user opinions about year-round catch and release in the Farmington River TMA in Burlington/Avon.
- ◆ Continue to deploy automatic data loggers to monitor summer water temperatures in selected TMAs.
- ◆ Continue to use water temperature-based models to determine the need for fall stocking in some of

the Year-Round TMAs.

- ◆ Change the regulations for the Mill River Hamden from a Trout Park to a Seasonal TMA.

Expenditures

A total of \$##,### was expended on Project 1, Job 3 during Segment 25.

<u>Category</u>	<u>Federal Funds</u>	<u>State Funds</u>
Personnel	\$##,###	\$##,###
Operations & Equipment	\$##,###	