I. Cover Page

A. General Information

- Project Title: Brook Trout Restoration, Lynn Camp Prong, Great Smoky Mountains National Park, a Partnership with NFHAP and EBTJV
- Amount of NFHAP funding requested: $50,000.00
- Project Location: Blount and Sevier County, TN
- Congressional District: TN-1 and TN-2
- Applicant Organization: USDI, National Park Service
- Street: 107 Park Headquarters Road
- City, State, Zip: Gatlinburg, TN 37738
- Project Officer: Stephen E. Moore
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- Electronic Mail Address: steve_e_moore@nps.gov
- Date Submitted: September 7, 2006

B: Sponsoring Fish and Wildlife Service Fisheries Office

- Fish and Wildlife Service Office: Warm Springs Regional Fisheries Center
- Street: 1875 Century Boulevard, Suite 250
- City, State, Zip: Atlanta, GA 30345
- Project Officer: Tom Sinclair
- Telephone Number: (404) 679-7324
- Facsimile Number: (404) 679 – 4141
- Electronic Mail Address: thomas_sinclair@fws.gov

II. Executive Summary

Brook trout (*Salvelinus fontinalis*) are the only trout native to the southern Appalachian Mountains and the Great Smoky Mountains National Park (GRSM or Park). Since 1900, this native salmonid has lost approximately 75 percent of its range inside the Park boundary. Initial range loss (about 50 percent) has been attributed to substantial logging and resultant water quality degradation. This virtually eliminated brook trout in streams below approximately 984 m (3,000 ft) in elevation (King 1937). During the logging era, non-native rainbow trout were stocked and this activity continued until 1975. Distribution surveys taken in the 1970's revealed that approximately half of the range exclusively occupied by brook trout had been lost since the mid-1930's (Kelly et. al. 1980). The decline was the direct result of rainbow trout encroachment into previously un-stocked native brook trout streams. Native brook trout had become restricted to marginal headwater streams above 1,067 meters (m) elevation (3,500 ft), characterized by steep gradients and naturally acidic water. It also appeared that the only places brook trout would not be displaced would be in streams above waterfalls that rainbow trout could not ascend. In the mid-1990's, brook trout distribution data provided evidence that some headwater populations had been lost since the 1970's. Water chemistry data indicated that three of the streams were too acidic to support fish life. This information increased the urgency of restoring brook trout to lower elevations streams that are not as susceptible to the impacts of acidic deposition.

The Park's Fishery Management Plan identifies brook trout restoration as one of its highest priorities. To date, brook trout have been successfully restored to 27.2 km (17.0 miles) of historic range in eleven streams. Lynn Camp Prong is the next stream on the list identified for restoration using Fintrol® (antimycin) in the Environmental Assessment for the restoration of native brook trout. In 2007, pre-treatment aquatic insect surveys will be conducted, brook and rainbow trout distribution defined, stream gradient data collected and time of travel data for stream flow collected each tributary and the main stem. The pre-treatment data collected during the first year is essential to the successful completion task for year two and three of the project.

Approximately 12.8 km (8 miles) of stream will be treated with Fintrol® in 2008 to remove non-native rainbow trout (Figure 1). In 2009, brook trout will be reintroduced into the stream and recovery carefully monitored, thus restoring brook trout to a segment of stream within historic range.

The Park's Fishery Management Plan and the Tennessee Brook Trout Conservation Strategy identify restoration as a high priority for the protection and conservation of native brook trout in the state. The successful completion of this project will help ensure that the management objectives for both agencies are moving forward. Additionally, the project will help meet a goal of the National Fish Habitat Action Plan (NFHAP) and the Eastern Brook Trout Joint Venture (EBTJV) by restoring brook trout to a watershed in which they have been reduced by over 90% and will reconnect populations.

PROJECT SUMMARY

Field Priority

Title of the Project: Brook Trout Restoration, Lynn Camp Prong, Great Smoky Mountains National Park, a Partnership with NFHAP and EBTJV

Proposed Accomplishment: The restoration of Lynn Camp Prong, Great Smoky Mountains National Park (GRSM), will return native brook trout to 12.8 km of historic range upstream of a natural barrier. In 2007, trout distribution data will be validated, physical stream data collected and pre-treatment aquatic insect data collected. In 2008, rainbow trout will be removed from the stream and in 2009 native brook trout will be reintroduced. This project will be possible by a cost share program with NFHAP and EBTJV.

Description:
The successful restoration of Lynn Camp Prong will return brook trout to 12.8 km of historic range in GRSM. This action will ensure that GRSM's management goals for the protection and restoration of native brook trout are met and meet the restoration goals described in the Tennessee Brook Trout Conservation Strategy, NFHAP and EBTJV.

Logging activities prior to the establishment of GRSM and the stocking of non-native rainbow trout eliminated native brook trout from about 75% of their native range. Within the Lynn Camp Prong watershed, brook trout are currently restricted to marginal headwater streams and cannot expand due to competition from non-native rainbow trout.

The objective of this project is to remove rainbow trout from 12.8 km of historic brook trout range. The completion of this action will reconnect brook trout populations in three tributary streams. When the population recovers, recreational fishing will be allowed in this watershed.

Fintrol® (antimycin) will be used to eliminate rainbow trout from 12.8 km of Lynn Camp Prong upstream of the natural barrier at 622 m (2040 ft.). Treatment will follow standard operating procedures for the use of Fintrol®. Biologist involved in the EBTJV will be invited to participate and receive training in the proper use of the chemical.

The feasibility of this project is very high, as a natural barrier exists at 622m (2040 ft.) that will prevent the upstream movement of non-native rainbow and brown trout. GRSM staff has successfully completed three restoration projects using antimycin in the Park since 2000 and have supervised successful projects in Great Basin National Park and Andrew – Pickens National Forest. The Standard Operating Procedures for Fintrol® will be refined where necessary and strictly followed.

Outreach/educational products that focus on the use of antimycin for Brook Trout restoration will be created to publicize and support this project and partnership. These include:
- A full-color, multi-panel poster display to be used at GRSM Visitor Centers and special events.
- Timely news releases throughout this project to
- Articles in *The Smokies Guide*, which is free to the 9 million visitors who visit GRSM each year.
- Power point talks will be given to the visiting public, community, civic groups, and students of all ages.

During the 75th Anniversary Celebration of GRSM in 2009, native brook trout from GRSM will be put back into the waters of Lynn Camp Prong. A representative from each participating partner will be invited to participate in this event.

Fish passage barriers to be removed by this project: (If none, so state)

Barrier name: NONE

Decimal degree longitude: (NAD-1983)

Decimal degree latitude: (NAD-1983)

Funding Information

Estimate FWS funding for up to five years (in 2007 dollars):

Fund	Year					Total
	1	2	3	4	5	
NFHAP	$50,000	$50,000	$50,000			

What is the estimated duration of the project? (1 to 5+ years)
3 years

Record anticipated first year partner contributions:

Partner	Cash Matching	In Kind
Eastern Brook Trout Joint Venture	$50,000	
Trout Unlimited	$10,000 (requested)	$20,600 (pledged)
University graduate student stipend and office/computer time		$17,250 (requested)
Trout and Salmon Foundation	$5,000 (requested)	
Federation of Fly Fishermen	$3,600 (requested)	
National Park Service		$95,300
Bass Pro Shops	$10,000 (requested)	
Wal Mart	$10,000 (requested)	
Total:	$88,600	$133,150

Record anticipated new FTEs (information provided by Fish and Wildlife Service sponsoring office): ** No new FTE created as a result of this proposal

	Manager		Administrative Office / Assistant
	Biologist		Outreach Specialist
	Other Specialist / Scientist		Maintenance Worker
	Technician / Fish Culturist		

Record Congressional District(s): TN 1 and 2

III. PROJECT DESCRIPTION, SCOPE OF WORK, AND PARTNER INFORMATION (2 pages maximum)

A. Project Description and Scope of Work

The Lynn Camp Prong watershed is located within the boundaries of the Great Smoky Mountains National Park in Sevier and Blount Counties, TN. The proposed three year project will remove rainbow trout from 12.8 km (8.5 miles) of historic brook trout range. Task for the first year of this project are: (1) conduct pre-treatment aquatic insect surveys; (2) define brook and rainbow trout distribution; (3) collect stream gradient data and produce a stream profile graph and (4) determine stream flow times for each tributary and the main stem. The

pre-treatment data collected during the first year is essential to the successful completion task for year two and three of the project. This project will provide a biologist from each state participating in the EBJTV with the opportunity to receive training in the application of antimycin for native fish restoration.

The collection of pre-treatment aquatic insect data is essential for determining short and long term impacts of the antimycin to aquatic insect populations. This work will be conducted and supervised by staff from a local university with expertise in the collection and identification of aquatic macroinvertebrate taxa. Rapid bio-assessment protocols and appropriate quantitative methods will be utilized to collect baseline data prior to treatment.

GRSM fisheries staff will use backpack electrofishing techniques to collect brook and rainbow trout distribution data. These data will be transferred to topographic maps and will aid in determining where treatment is to be initiated in the upper reaches of all streams.

Staff will then divide the stream into 100 m sections and collect gradient data for each stream section. These data will be used to construct a gradient profile for the stream. Stream gradient profile data is vital to the success of treatment when implemented in 2008. These data help identify steep areas (i.e. >8%) which affect the horizontal and vertical distance the antimycin will be effective.

Fisheries staff will also collect time of travel data for each tributary and the main stem of Lynn Camp Prong. This task is accomplished by adding 100 ml of a non-toxic fluorescence dye to the stream at the upstream end of the section to be treated and following the dye downstream. Normally, the time the dye arrives at each 100 m station is recorded as are times of arrival at stream confluences. These data will be used to coordinate treatment times for each tributary and to calculate the time of flow to the potassium permanganate station. All of this information will be critical to the success of the restoration project in 2008.

Approximately 25% of the remaining habitat designated for conservation on public lands in TN occurs in GRSM; therefore, it is critically important that the Park expand the range where feasible. This project when completed will help fulfill the goals of the Tennessee Brook Trout Conservation Strategy and those of the EBTJV by restoring brook trout to a watershed when they have been reduced by over 90% for over 70 years. If successful, fish from the Park could be used as a source of brood stock for other restoration projects in the region. Additionally, once the reintroduced brook trout population becomes stabilized, it will provide recreational fishing opportunities for that can be easily accessed because of its location.

Table 1. Project activities for 2007 showing approximate months of sampling and data collection.

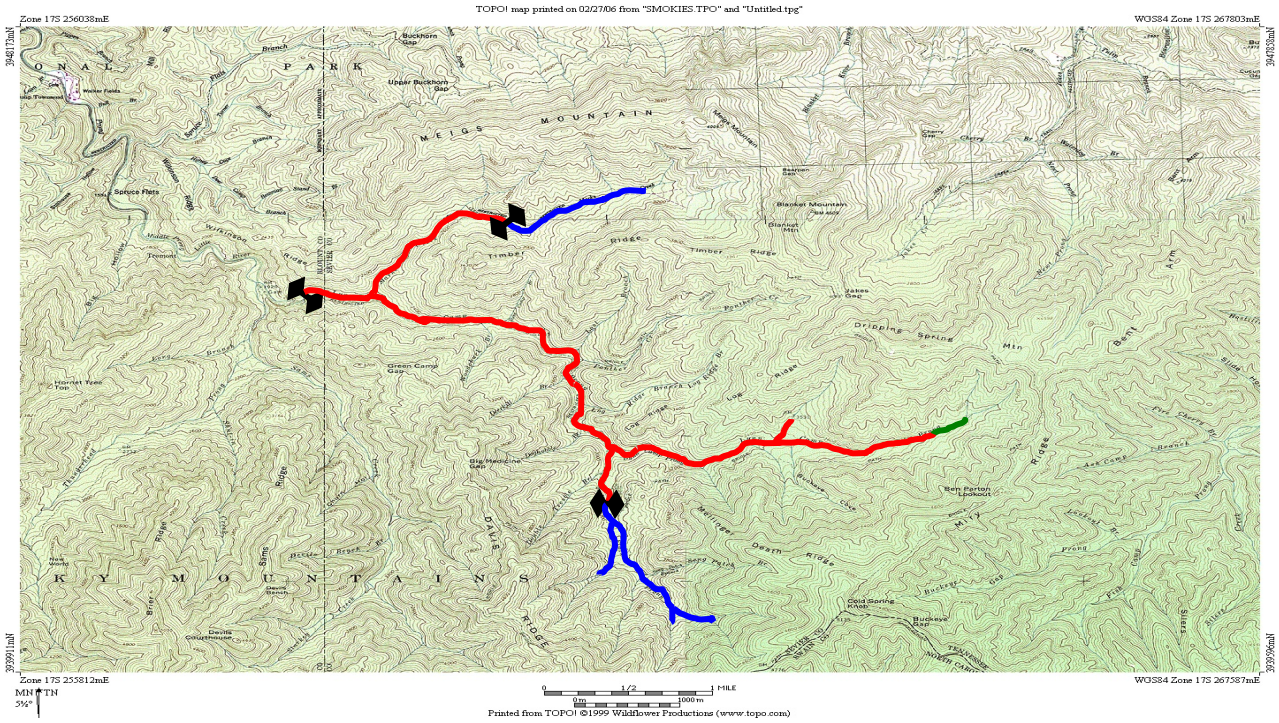
Month	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Aquatic Insect Survey	X			X			X			X		
Fish distribution							X	X	X			
Stream gradient							X	X	X			
Travel time							X	X	X			

B. Partner Information

Conservation Group (National): Federation of Fly Fishermen, cash donation $3,600: **1.6 % of total**
Conservation Group (National): Trout Unlimited, $10,000 Embrace a Stream Grant: **4.5 %of total**
Conservation Group (National): Trout and Salmon Foundation, $5,000 cash donation (requested), **2.2 % of total**
Local Conservation Group: Little River Chapter of TU, $16,100 cash, volunteer labor ($4,500) to assist with the collection of field data, , TN Council of TU $1,000: **9.7 % of total Local Business:** Little River Outfitters $1,000: **0.5 % of total**
Corporation: Bass Pro Shops, $10,000 cash donation, Wal Mart, $10,000 cash donation: **5.2 % of total**
Local University: Graduate student stipend, computer and office space, $17,250 donated by the university: **8.9 % of total**
Federal Agency: National Park Service, In-kind labor of permanent and seasonal fishery staff, $95,300: **42.3 % of total**
Eastern Brook Trout Joint Venture: Cash contribution, $50,000: **22.4 % of total**

IV. MAP OF PROJECT AREA (one, minimum)

Figure 1. – Map of Lynn Camp Prong watershed, Great Smoky Mountains National Park, including barrier falls and current brook trout distribution within the watershed. Red lines indicate pure rainbow trout, blue pure brook trout, and green mixed rainbow and brook trout. Natural barriers are noted by dumbbell bars at lower Lynn Camp Prong, Marks Creek, and lower Indian Flats Prong.



V. PHOTOGRAPH(S) OF PROJECT AREA (1-2 page(s), optional)

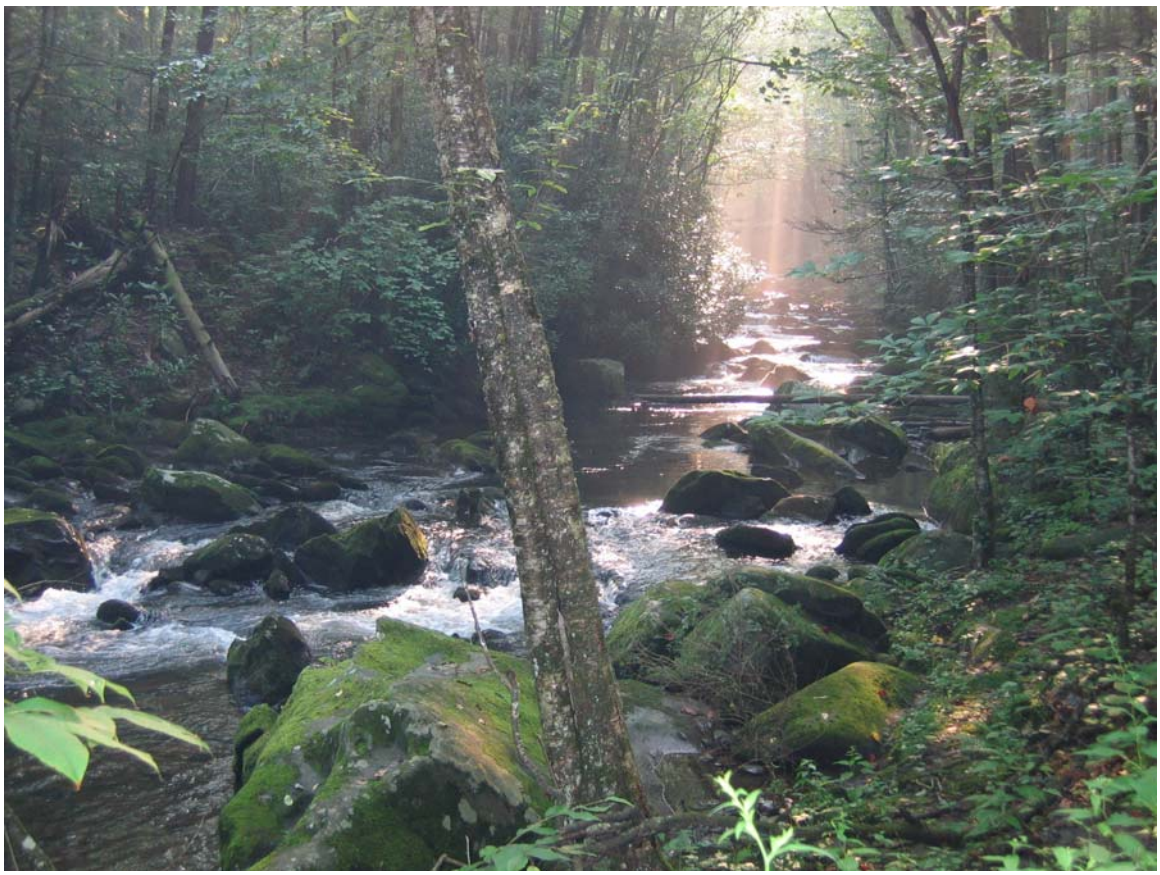


Figure 2. View of lower Lynn Camp Prong, Great Smoky Mountains National Park.

VI. PROJECT BUDGET (1 – 2 pages)

Partner	Activity	NFHAP Request	Non-Fed. Contribution	Federal Contribution	Total
GRSM Staff	Field and data work			$95,300	$95,300
Trout Unlimited (National)	Salary for seasonal staff		$10,000 (cash)		$10,000
TU Little River Chapter	Field work and aquatic insect studies		$21,600		$21,600
Trout and Salmon Foundation	Salary for seasonal staff		$5,000 (cash)		$5,000
Federation of Fly Fishermen	Salary for GS-2 seasonal		$3,600 (cash)		$3,600
Bass Pro Shops	Aquatic insect studies		$10,000 (cash)		$10,000
Wal Mart	Filed Equipment and Supplies		$10,000 (cash)		$10,000
University graduate student stipend	Aquatic insect studies		$17,250		$17,250
EBJTV	Salary for seasonal staff and equipment	$50,000			$50,000
Little River Outfitters	equipment		$1,000		$1,000
		Total $50,000	Total $78,450	Total $95,300	Grand Total $223,750

VII. EVALUATION QUESTIONS

A. Conservation of Sustainable Brook Trout Populations:

This proposal is a proactive approach to reestablishing native brook trout in a segment of their historic range in GRSM. The successful completion of this project will reconnect populations that have been isolated for over 75 years and increase the number of kilometers of stream that have been restored for native brook trout by approximately 50%. Additionally, the completion of this project will help GRSM meet restoration goals for native brook trout identified in the Park's fishery management plan. The successful restoration of Lynn Camp Prong will also restore brook trout to approximately 11.2 km (7 miles) of stream below 1,067m, which is less susceptible to acidic deposition and pH effects on trout. Approximately 25% of the remaining habitat designated for conservation on public lands occurs in GRSM; therefore, it is critically important that the Park expand the range where feasible. If successful, fish from the Park could be used as a source of brood stock for other restoration projects in the region.

One of the goals of the Eastern Brook Trout Joint Venture (EBTJV) is the restoration and protection of brook trout in its native range. This group has identified acidic deposition as one of several threats to the long term survival of the species. If approved, this project will provide training for state and federal biologists interested in learning how to conduct native fish restoration projects using antimycin. The successful completion of this project will help meet the goals of the EBTJV for the range wide protection and preservation of brook trout in its native range.

Successful completion of this will help meet the strategy identified in Priority 4: Brook Trout Protection, Restoration and Enhancement of the Tennessee Brook Trout Conservation Strategy. Additionally, the successful completion of the project will meet the goals for brook trout restoration identified in the Parks Fishery Management Plan.

B. Endangered Species:

There are no known federally or state listed species within the project area.

D. Economically important species not also listed as threatened and endangered species:

Recreational fishing for brook trout will have a positive impact on local economy.

E. Special Considerations:

If approved this project will provide training for state and federal biologists interested in learning how to conduct native fish restoration projects using antimycin.

F. EBTJV Habitat Restoration Priority:

These priorities are currently being developed and were not available at the time this proposal was developed.

G. Habitat Connectivity and Enhancing Population Mobility:
Non-native rainbow trout will be removed from the main stem of Lynn Camp Prong and its tributaries in 2008. Brook trout populations in headwater tributaries will remain and be allowed to expand and moved downstream. Brook trout will be collected from other streams across the park and released into the main stem of Lynn Camp Prong to speed the recovery process. Reintroductions of brook trout will most likely be necessary in succeeding years to complete the process.

The presence of multiple barriers to the upstream migration of non-native salmonids insures the success of the long term success of the project. Once the brook trout population has reached carrying capacity, the stream will be opened to recreational fishing. Based on the success of other brook trout restoration projects, this stream is expected an excellent sustainable fishery is expected.

H. MANAGEMENT ASSETS:
Two research projects will be tied to the brook trout restoration project in Lynn Camp Prong. The first will focus the sensitivity of different aquatic macroinvertebrate species to antimycin and to their recovery. Past projects have indicated that some species of mayflies, caddis flies and stoneflies are more sensitive to Fintrol® than others. Rapid Bio Assessment Protocols and appropriate quantitative techniques will be used to evaluate short-term impacts and the recovery rates for these species.

Restoration projects in GRSM and in western parks indicate that the effective travel distance of Fintrol® is affected by stream gradient, habitat and substrate. During the Lynn Camp Prong restoration project, we will examine the factors associated with stream gradient and habitat that impact the effective travel distance of Fintrol®. These data will be useful to biologist planning antimycin projects in the future and will have application for projects nation wide.

Recreational angling will be allowed in Lynn Camp Prong once the population has recovered. Based on previous projects, a five recovery time is anticipated but it could take longer and will be evaluated annually for status. The stream will be accessible by hiking or horse back.

Educational components associated with this project will include: 1) A full-color, multi-panel poster display to be used at GRSM Visitor Centers and special events; 2) timely news releases throughout this project; 3) articles in *The Smokies Guide*, which is free to the 9 million visitors who visit GRSM each year and 4) power point talks will be given to the visiting public, community, civic groups, and students of all ages.

Additionally, during the 75th Anniversary Celebration of GRSM in 2009, native brook trout from GRSM will be put back into the waters of Lynn Camp Prong. A representative from each participating partner groups will be invited to participate in this event and newspaper and TV reporters will be invited to participate in the event.