Dirt & gravel road, streambank stabilization projects, Cross Fork Subwatershed, Cross Fork, PA EBTJV

Project Location (State, County, Town, Congressional District) Pennsylvania; Potter; Cross Fork; 5th Congressional District Glenn Thompson (R)

Congressional District of Project: Congressional District Glenn Thompson (R)

Congressional District of Applicant: Congressional District Glenn Thompson (R)

NFHAP / EBTJV Funding Requested: $45,000

Total Project Cost: $311,562

Total Federal Matching: $191,730

Total Non-Federal Matching: $74,832

Applicant:
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USFWS FONS Database Project Number: 52230-2012-367

Coordination Completed with Sponsoring U.S. Fish and Wildlife Service Office (Check One):

X **Yes** 8/22/2013 **Date Coordination Began**

_____ **No**

I. PROJECT DESCRIPTION, SCOPE OF WORK, AND PARTNER INFORMATION

A. Project Description

The Cross Fork subwatershed (HUC 420247), part of the larger Kettle Creek drainage in Pennsylvania, is by many standards considered one of the "best of the best" brook trout habitat areas in Pennsylvania. This subwatershed is home to more than 103 miles of streams designated as "exceptional value" in water quality, 74 miles of wild trout water, and contains more than 21 miles of Class A brook trout waters. This subwatershed, almost entirely contained within the Susquehannock State Forest and thus protected in perpetuity, is widely renowned as a brook trout destination fishery. Additionally, the Cross Fork subwatershed neighbors the Hammersley Fork subwatershed (HUC 420293) home to the only "intact" brook trout population in the larger 244-square mile Kettle Creek drainage and only one of nine "intact" brook trout populations present throughout the rest of the 7,000-square mile West Branch Susquehanna watershed. Despite these high-quality attributes, the Upper Kettle Creek Fish Habitat Conservation Plan (2002) and the Upper Kettle Creek Fish Habitat Conservation Plan Tributaries Addendum (2005) identify the Cross Fork subwatershed as one of the few areas in the Kettle Creek watershed that contains multiple sites with high, unstable streambanks. Additionally, the Cross Fork subwatershed is also home to a network of dirt and gravel roads where improper road profiles, inadequate drainage, and multiple stream crossings have accelerated erosion and transport of sediment to the streams and has limited brook trout habitat availability.

To address these issues, Trout Unlimited (TU) will work in partnership with the local municipalities, Kettle Creek Watershed Association (KCWA), Potter County Conservation District, PA Department of Conservation and Natural Resources (DCNR) Bureau of Forestry, PA Department of Environmental Protection (DEP), PA Fish and Boat Commission (PFBC), Penn State University Center for Dirt and Gravel Road Studies, and private landowners over the next two years to select and implement high priority projects that focus on dirt and gravel road improvements, streambank stabilization, riparian buffer restoration, and brook trout habitat extension in support of the overall goal to improve the long-term brook trout population viability in the Cross Fork subwatershed and the larger Kettle Creek drainage. Specific project outputs will include: [1] Improve sediment drainage at two high priority sites on dirt and gravel roads; [2] Complete design and permitting for a high priority pilot fish passage project; [3] Improve stability on 2,000 ft of actively eroding streambank; [4] Restore 10,560 ft of riparian buffers; and [5] Increase the involvement and capacity of KCWA to work with partners to plan and implement watershed restoration projects.

TU is seeking funding in the amount of $45,000 from the EBTJV toward the total project cost of $311,562 and will provide $266,562 (85.5%) in matching funds. Funding toward this project has already been secured from the National Fish and Wildlife Foundation ($191,730), Richard King Mellon Foundation ($18,232), and the Chesapeake Bay Trust ($6,600). TU also plans to submit a grant application to the upcoming round of PA's DEP Growing Greener Grant Program in the amount of $50,000.

B. Proposed Methods (Max Characters: 350)

TU will utilize proven best management practices for dirt and gravel road projects, biostabilization methods and native vegetation for streambank stabilization projects, and appropriate native trees and shrubs planted at a minimum 35-ft width for the riparian buffer projects. EBTJV funds will cover costs for engineering/design work, supplies, and construction.

C. Project Timeline

The timeline for proposed projects spans from October 2012 until September 2014. The funds being requested from the EBTJV are expected to be utilized in year two.

		Year 1												Year 2											
Project #	Task	Oct 12	Nov 12	Dec 12	Jan 13	Feb 13	Mar 13	Apr 13	May 13	June 13	July 13	Aug 13	Sept 13	Oct 13	Nov 13	Dec 13	Jan 14	Feb 14	Mar 14	Apr 14	May 14	June 14	July 14	Aug 14	Sept 14
1	Meet with project partners to evaluate and select two priority dirt & gravel road projects	■	■																						
1	Conduct pre-construction monitoring			■	■	■	■	■	■	■	■														
1	Assist municipalities with applying for construction funds for dirt & gravel road projects			■	■	■	■	■	■	■	■														
1	Assist municipalities with coordination and oversight of dirt & gravel road projects								■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
1	Conduct post-construction monitoring																		■	■	■	■	■	■	■
2	Conduct assessment of bridges/culverts	■	■	■	■	■	■	■	■	■	■	■	■	■											
2	Complete design and permitting for priority pilot fish passage project														■	■	■	■	■	■	■	■	■	■	■
3	Meet with project partners to evaluate and select streambank stabilization project sites	■	■																						
3	Coordinate and implement streambank stabilization projects			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
3	Conduct periodic post-construction inspections of streambank stabilization projects					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
4	Meet with project partners to evaluate and select riparian buffer project sites	■	■																						
4	Coordinate and implement riparian buffer projects			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
4	Conduct post-planting inspections of riparian buffer project sites					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
5	Work to increase involvement and capacity of the KCWA to plan and implement projects with other partners	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Project #

[1] Improve sediment drainage at two high priority sites on dirt and gravel roads

[2] Complete design and permitting for a high priority pilot fish passage project

[3] Improve stability on 2,000 ft of actively eroding streambank

[4] Restore 10,560 ft of riparian buffers

[5] Increase the involvement and capacity of the local Kettle Creek Watershed Association to work with partners to plan and implement projects

D. Proposed Accomplishment Summary (Max Characters: 500)

The proposed projects will remediate brook trout habitat degradation and address habitat fragmentation throughout the Cross Fork subwatershed resulting from historical logging practices and existing dirt and gravel road networks. These projects are in support of several of the EBTJV regional habitat objectives as they will allow for more habitat and

facilitate development of multiple life histories which will ultimately increase the likelihood of persistence of brook trout populations.

E. State the Importance of the project to the Resource (Max Characters: 350)

The proposed projects will result in the restoration and expansion of brook trout habitat in the Cross Fork subwatershed which contains a “reduced” population of brook trout and is neighbor to the Hammersley Fork subwatershed that contains the only “intact” brook trout population in the Kettle Creek drainage and is one of only nine “intact” populations in the West Branch Susquehanna watershed.

F. Problem and Specific Cause of the Problem (Max Characters: 350)

Assessments conducted by a private consulting firm and the Penn State University Center for Watershed Stewardship cite that historic logging practices, combined with the present-day dirt and gravel road network, have resulted in excess sediment loads to Cross Fork and its tributaries, caused streambank stability problems, and fragmented the brook trout habitat within Cross Fork subwatershed.

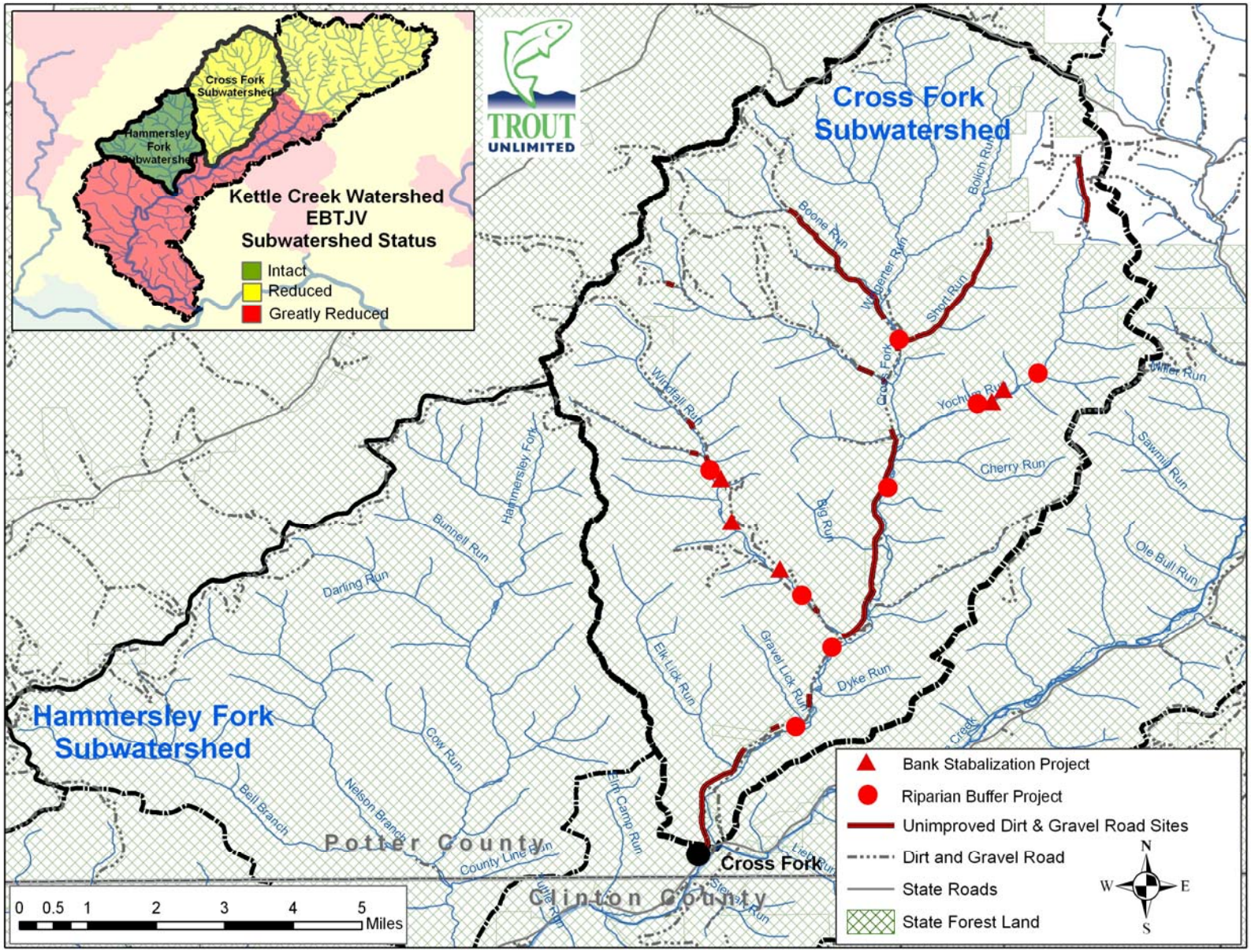
G. Objective of the Project with Reference to the Problem (Max Characters: 350)

The primary objectives of the projects are to reduce the sediment load currently being delivered to the streams and to improve and extend brook trout habitat within the Cross Fork subwatershed and larger Kettle Creek drainage.

H. Partner Information

Partner Name	Contribution In-Kind	Contribution *Cash*	Federal or Non-Federal	Partner Category	Role of Partner
National Fish & Wildlife Foundation		191,730	Federal	Conservation group (national)	Cash provided through the Chesapeake Bay Stewardship Fund/Small Watersheds Grant Program
Richard King Mellon Foundation		18,232	Non-Federal	Private foundation	Cash provided through a grant for West Branch Susquehanna River basin restoration work
Chesapeake Bay Trust		6,600	Federal	Local conservation group	Cash provided through the Chesapeake Bay Funders Network Chesapeake Capacity Building Initiative
PA DEP Growing Greener Grant Program		50,000	Non-Federal	State agency	Cash to be provided through a Growing Greener grant

II. MAP OF PROJECT AREA



III. PHOTOGRAPH(S) OF PROJECT AREA

Riparian target area in the Cross Fork subwatershed. Photo by Amy G. Wolfe, Trout Unlimited

Improper drainage from unimproved dirt and gravel road adjacent to Class A native brook trout stream. Photo by Amy G. Wolfe, Trout Unlimited

IV. PROJECT BUDGET

Partner Name	Partner Category *	Activity of Partner **	Budget Category***	EBTJV NFHAP Request	Non-Federal Contribution		Federal Contribution		Total Contribution	Acres/Miles Affected
					In-Kind	Cash	In-Kind	Cash		
Nat'l Fish & Wildlife Foundation	Conservation Group (national)	Monitoring	Personnel	0				93,600	93,600	
		Streambank stabilization	Contractual	5,000				10,000	10,000	
		Streambank stabilization	Construction	20,000				20,000	20,000	0.38 mi
		Fish passage design/permit	Contractual	0				18,000	18,000	
		Streambank stabilization	Supplies	2,500				11,110	11,110	
		Riparian reforestation	Supplies	0				18,500	18,500	
		Monitoring	Supplies	0				11,000	11,000	
		Monitoring, Dirt/gravel road projects, Streambank stabilization projects, Riparian projects	Travel	0				9,520	9,520	
Richard King Mellon Foundation	Private Foundation	Monitoring, Dirt/gravel road projects, Streambank stabilization projects, Riparian projects	Personnel	0		18232			18,232	
PA DEP Growing Greener Program	State Agency	Dirt/gravel road projects	Contractual	0		4000			4,000	
		Dirt/gravel road projects	Construction	17,500		28000			28,000	
		Riparian reforestation	Supplies	0		15000			15,000	
		Riparian reforestation	Contractual	0		3000			3,000	2 mi
Chesapeake Bay Trust	Conservation Group (local)	Capacity building	Personnel	0				5,400	5,400	
		Capacity building	Travel	0				1,200	1,200	

Total Contribution				45,000		68,232		198,330	266,562	

V. EVALUATION QUESTIONS

1. **Please provide the GPS Coordinates for the project using UTM NAD 83.**
   Mouth of watershed: -77° 49' 12.29" 41° 29' 6.36"

2. **Please list the type of project.**
   In-stream habitat, riparian planting, fish passage, assessment

3. **Are brook trout currently present at the project site or in the project stream? If not, were brook trout historically present? Is the habitat known to be suitable for restoration / reintroduction of brook trout?**

   Brook trout are common throughout the Cross Fork subwatershed and are present in Cross Fork as well as in its tributaries. In fact, data published in 2012 by the PFBC indicate that approximately 74 miles of streams within the subwatershed support wild populations of brook trout. Of those 74 miles of water, more than 21 miles are classified as Class A brook trout fisheries which are considered the "best of the best" trout water in Pennsylvania and are by definition supporting of a population of naturally reproducing trout of sufficient size and abundance to support a long-term and rewarding sport fishery.

   Moreover, the habitat within the Cross Fork subwatershed has been identified as key for restoration efforts by TU's Conservation Success Index (CSI). The CSI, created to rank subwatershed management priorities for protection, restoration, and reintroduction of trout and salmon species, integrates fishery population data with spatial habitat and threat related data. This tool identifies watershed connectivity and water quality as areas of concern in the Cross Fork subwatershed owing to the large number of dirt and gravel roads within close proximity to stream channels and the number of roads crossing first and second order streams (TU, 2007).

4. **Please describe how the project will provide for the expansion or improvement of existing habitat?**

   Despite the many outstanding aquatic attributes found within the Cross Fork subwatershed, this area has been prioritized for sediment load reduction among other large Kettle Creek tributaries because Cross Fork problem areas were also determined to be affecting the mainstem of Kettle Creek. In fact, assessments conducted by a private consulting firm and the Penn State University Center for Watershed Stewardship identified 11.5 miles of dirt and gravel road problem areas and more than 40 sites with moderate to severe bank erosion and poor riparian buffers throughout the Cross Fork subwatershed.

   To date, 1.7 miles of dirt and gravel road projects and six habitat improvement projects have successfully been completed within the Cross Fork subwatershed. Within the next two years, TU intends to further the habitat restoration efforts in this subwatershed by 1) improving sediment drainage at two high priority sites on dirt and gravel roads,

2) improving the stability on 2,000 feet of actively eroding streambank, and 3) restoring 10,560 feet of riparian buffers.

Additionally, based on the understanding that the existence of the extensive road network in the Cross Fork subwatershed not only increases the sediment load being delivered to Cross Fork and its tributaries but that it is also more than likely inhibiting trout dispersal, TU also intends to complete a fish passage barrier inventory as well as design and permitting for a high priority fish passage project during the same time period.

The spatial extent of the benefits expected from the proposed projects varies. The proposed dirt and gravel road, streambank stability, and riparian buffer projects will have direct and immediate beneficial impacts to their receiving streams by reducing sediment loading and stream temperatures. The fish passage barrier inventory and ultimately the implementation of the high priority fish passage project will yield additional habitat availability within and beyond the Cross Fork subwatershed.

While TU recognizes it is advantageous if specific project locations were already determined and the projects were "shovel ready" so that construction could begin immediately, these projects are intentionally not "shovel ready" so that local participation through project selection and planning is increased. Concurrent to these habitat restoration efforts, TU is working through a grant from the Chesapeake Bay Trust to increase the organizational capacity of the Kettle Creek Watershed Association. As such, TU will work closely with the KCWA and will engage KCWA board members and/or volunteers during all stages of the project, including project development, so as to improve their long-term capacity and sustainability for working with partners to plan, implement, and maintain watershed restoration projects.

5. Does the project include a protection component? Is the project footprint located on private or public land? Is the land currently protected? Does the project include land purchase or easements as match?

Fortunately, 95% of the Cross Fork subwatershed is contained within the Susquehannock State Forest and is managed by the PA Department of Natural Resources and Conservation. Only 5% of the subwatershed and less than 3 miles of stream in the north eastern section of the subwatershed is privately owned. While it is not expected that conservation easements or land purchase will be included as part of the project deliverables, TU intends to work closely with the Western Pennsylvania Conservancy over the next two years to educate local landowners on land conservation tools, and to preserve brook trout habitat on private lands in the Kettle Creek watershed, including the Cross Fork subwatershed, through conservation easements or acquisitions.

6. What percentage of the watershed above the proposed project is protected in perpetuity?

95% of the Cross Fork subwatershed is contained within the Susquehannock State Forest and is protected in perpetuity.

7. List the specific regional EBTJV habitat objectives addressed by the project and describe how the project will contribute towards them.

According to the range-wide assessment of brook trout populations throughout their native eastern United States range by Hudy et al. (2005), the Cross Fork subwatershed contains a reduced population of brook trout meaning that 50-90% of the original habitat is currently occupied. The proposed projects will certainly support the EBTJV's regional objective to *strengthen brook trout populations in 63 subwatersheds classified as reduced*. Furthermore, considering that partnerships are already well-established, six projects have been completed to date on the mainstem of Cross Fork to stabilize streambanks and improve fish habitat, 1.7 miles of dirt and gravel road problem areas have been addressed, and the remaining unaddressed sites are identified through previous assessments and conservation plan development, the planned activities very well could be part of a larger long-term effort to increase the EBTJV status of the subwatershed thereby supporting the objective to *improve 7 reduced subwatersheds to healthy classification*.

Finally, the intended efforts to identify, prioritize, and eventually remove potential fish passage problem areas in the Cross Fork subwatershed are an indirect, but important component to the regional objective to *maintain the status, or no net less, of 617 subwatersheds classified as healthy* in that the Hammersley Fork subwatershed (HUC 420293), located just downstream of the Cross Fork subwatershed, contains the only "intact" brook trout population in the larger 244-square mile Kettle Creek drainage. It stands to reason that by increasing the habitat extent and subsequently the long-term viability of the brook trout population in the Cross Fork subwatershed that the intact patch of brook trout currently occupying the Hammersley Fork drainage could be extended so as to encompass both subwatersheds. In the long-term, increase of this patch size so that it includes both the Cross Fork and Hammersley Fork subwatersheds would be supportive of the EBTJV regional objective to *strengthen brook trout populations in 31 subwatersheds classified as healthy*.

8. State which, if any, EBTJV priority the project addresses:

The proposed projects address all three of the EBTJV priorities. The water quality and habitat within the Cross Fork subwatershed is considered the "best of the best" by many standards. In fact, the Cross Fork subwatershed is 99% forested, 95% is contained within the Susquehannock State Forest and it is home to 103 miles of streams designated exceptional value for water quality. In addition, the PFBC has determined that 74 of the exceptional value stream miles are naturally reproducing trout waters and that just over 21 miles of stream are Class A brook trout fisheries or the "best of the best". While exact project locations will not be determined until 2013, nearly all of the remaining 9.8 miles of unimproved dirt and gravel road problem sites are within 100 ft of a Class A trout stream.

Burroughs and King (1989) report that when ditches and culverts are located within 200 ft of a stream, the sediment delivery to streams can reach 100%. Clearly, reduction in sediment load being delivered to these Class A brook trout streams by dirt and gravel roads will lend to a more viable and healthy brook tout population and support the EBTJV's priority to *protect the "best of the best" habitats that already support healthy, stable brook trout populations.*

Additionally, the benefits that will result from the ultimate removal of fish passage barriers as well as the completion of design and permitting for a high priority pilot project, will assist in the connection of the brook trout within the Cross Fork subwatershed to those within the "intact" Hammersley Fork subwatershed which is located just downstream thus addressing priority (2) *The project improves and reconnects habitats adjacent to the best of the best that also have a high likelihood of supporting stable brook trout populations.*

Finally, improving habitat in the Cross Fork subwatershed by way of reducing the sediment load delivered to the streams through the proposed dirt and gravel road, streambank stabilization and riparian buffer improvement projects will have direct enhancement impacts to the "reduced" population of brook trout in this subwatershed thus addressing goal (3) *The project enhances impacted or unstable brook trout populations by first targeting brook trout habitats that have the capacity of being enhanced to intact streams.*

9. What is the EBTJV subwatershed number and associated priority ranking for the proposed project?

Watershed # = 420247
Priority Score = 1.35
Map = PA Best for Protection Map

10. Will the completed project benefit any federally listed threatened or endangered species?

No federally listed threatened or endangered aquatic species are known to exist in Cross Fork or its tributaries.

11. Will the completed project benefit any state listed threatened or endangered species?

No state listed threatened or endangered aquatic species are known to exist in Cross Fork or its tributaries.

12. Will the project provide or enhance connectivity to or within an intact subwatershed?

The long-term goal to increase the viability of the brook trout population in the Cross Fork subwatershed is expected to indirectly enhance and strengthen the brook trout population in the neighboring "intact" Hammersley Fork subwatershed. The relationship between habitat connectivity, habitat availability, and population status is evidenced by comparing habitat conditions in the Cross Fork subwatershed with its

"reduced" brook trout population to habitat conditions in the Hammersley Fork subwatershed that has an "intact" population status for brook trout.

Similar to conditions in the Cross Fork subwatershed, all streams within the Hammersley Fork subwatershed are designated as exceptional value and approximately 70% of those waters are considered natural reproduction trout waters. Additionally, this watershed is also 99% forested and almost 94% is within the Susquehannock State Forest. However, there is a distinct difference in watershed connectivity and road density between these watersheds in that the Hammersley Fork subwatershed contains markedly less barriers and unpaved roads compared to the Cross Fork subwatershed. In consideration of the anticipated benefits from the ongoing habitat enhancement projects on the mainstem of Kettle Creek, it is expected that habitat connectivity between the tributaries of Cross Fork and Hammersley Fork will improve and ultimately increase the size and scope of the "intact" patch of brook trout currently occupying the Hammersley Fork drainage so that it also occupies the Cross Fork drainage.

13. What are the root causes of the watershed degradation and which of these are addressed by the project?

The root causes of the habitat degradation in the Cross Fork subwatershed spans back to the late 1800s to early 1900s when the drainage was logged and large influxes of sediment and extreme high flows created wide, shallow channels. The fact that these widened channels still exist with good flooplain access, but with limited habitat and shading indicates that the detrimental effects of the logging era persist today. One of the main sources of non-point sediment pollution that contribute to habitat impairment and unstable stream channels is the network of dirt and gravel roads in the subwatershed where improper road profiles, inadequate drainage, and multiple stream crossings create accelerated erosion and transport of sediment to the stream. Large sediment inputs from dirt and gravel road and streambank erosion impact stream channel stability and reduce the habitat available for fish and macroinvertebrates. Additionally, thin riparian buffers not only influence the sediment load a stream receives but also can increase stream temperature by increasing exposure of the stream to solar radiation. As the water warms, oxygen is driven into the atmosphere making respiration more difficult for aquatic life.

Finally, the existence of the extensive road network in the Cross Fork subwatershed not only increases the sediment load being delivered to Cross Fork and its tributaries, but is also likely inhibiting trout dispersal throughout the subwatershed. In fact, the CSI indentifies that the connectivity of habitat in the Cross Fork subwatershed is highly fragmented, which indicates that the long-term persistence ability of the brook trout fishery contained within the subwatershed is at risk. An increase in hydrologic connectivity provides more habitat area and facilitates development of multiple life histories which will ultimately increase the likelihood of persistence of brook trout populations.

The proposed dirt and gravel road, streambank stabilization, riparian buffer restoration, and fish passage projects address all of these problem areas. In fact, these projects are the next logical step in the overall restoration and extension of the habitat in the Cross Fork subwatershed.

14. Describe the plans for project monitoring and evaluation.

Dirt and gravel road improvement projects – To monitor the effectiveness of the projects in terms of fine sediment contribution to the adjacent stream, TU will conduct brook trout spawning habitat surveys upstream and downstream of the selected project sites. TU will monitor the effectiveness of the BMPs by measuring instream sediment loading before, during, and following rain events at strategically located sites upstream and downstream from project sites to establish baseline pre-construction sediment load conditions and post-construction sediment loads. TU intends to use ISCO portable samplers to automatically collect water samples at designated times such as during and after rain events, as well as when rain events occur during times of high volume road traffic such as during trout fishing or hunting seasons when sediment drainage is often greatly accelerated. TU will also install a sensor logger/pressure transducer either in the stream or in a stilling well several months before project implementation. The transducer will be calibrated to a permanent staff gage and baseline water level measurements will be collected at 30-minute intervals. Periodic stream flow measurements will be made at varying flows during all stages of the project so as to create a reliable rating curve of stream discharge. A LaMotte turbidity meter will be used to measure total suspended solids from ISCO water samples. The total suspended solids will be correlated with the storm hydrograph and pollutographs of sediment load will be generated for comparison of pre- and post-construction rain events.

Streambank stabilization projects – TU will periodically inspect the streambank stabilization projects to ensure the natural fiber erosion control blankets are intact and to monitor and document growth of the native trees and shrubs planted on the regraded streambank. TU will consider the projects successful if by the end of the grant period there are no new or continued signs of streambank erosion and at there is successful growth on at least 75% of the newly planted vegetation.

Riparian buffer restoration – TU will periodically inspect the riparian buffer projects to clear away any non-native, invasive vegetation that may inhibit the growth of the newly planted native trees and shrubs. The native plants will also be inspected for evidence of deer browse, disease, or otherwise unsuccessful growth at the project sites. TU will consider the projects successful if by the end of the grant period there is successful growth on at least 75% of the newly planted trees and shrubs.

Design and permitting for a high priority pilot fish passage project – While it is not necessarily anticipated that construction of the fish passage project will be completed by the end of the grant period, TU will conduct fish surveys to document the population status of brook trout prior to fish passage improvement at sites located strategically upstream and downstream. TU also anticipates conducting a fish movement study to document the movement and migration of brook trout relative to potential fish passage barriers, and once the construction of this fish passage project is completed, the impact of

the pilot project.

TU will monitor the aforementioned projects for the first five years after the projects are completed. Additionally, TU will provide training to the KCWA as part of its capacity building program so that the KCWA can monitor the projects thereafter. Finally, in addition to the monitoring projects and performance measurements described above, TU will use data obtained from monitoring to update its science and GIS-based CSI to track progress made on improving habitat and population status for the brook trout throughout the Cross Fork subwatershed.

15. Describe the expected effect on the brook trout population. To what degree will the project strengthen the brook trout population status?

Large sediment from dirt and gravel road and eroding streambank problem areas can impact stream channel stability while fine sediments can reduce the habitat available for fish and macroinvertebrates. Additionally, thin riparian buffers not only influence the sediment load a stream receives but also can increase stream temperature by increasing exposure of the stream to solar radiation. As the water warms, oxygen is driven into the atmosphere making respiration more difficult for aquatic life. By lessening the sediment load being received to the Cross Fork subwatershed and removing the aforementioned brook trout stressors, the proposed projects will benefit the health, abundance, and natural productivity of the brook trout populations within the subwatershed.

Additionally, considering that the habitat in the Cross Fork subwatershed is highly fragmented by the existence of the extensive road network present, the proposed evaluation, prioritization, and eventual removal of barriers will ultimately provide more habitat and facilitate development of multiple life histories which will ultimately increase the likelihood of persistence of trout populations.

16. Please describe the long term benefit of the project and provide an estimate of the length of time the project is expected to be effective. If a plan for long term maintenance is necessary to maintain project benefits, please describe it.

The long-term benefits associated with the proposed projects are numerous. Reduction of the sediment inputs from dirt and gravel road and streambank erosion problem areas will improve stream channel stability and the available habitat for native brook trout and macroinvertebrates. Additionally, increased riparian buffers will aid to decrease the sediment load entering into Cross Fork and its tributaries, while at the same time help to reduce water temperatures. Finally, considering that the habitat in the Cross Fork subwatershed is highly fragmented by the existence of the extensive road network present, the proposed evaluation, prioritization, and eventual removal of barriers will ultimately provide more habitat and facilitate development of multiple life histories which will ultimately increase the likelihood of persistence of brook trout populations.

The longevity of the proposed projects and their benefits is unlimited pending appropriate maintenance. TU will work with its partners to periodically monitor the dirt and gravel road

improvement project areas and inspect for maintenance needs. Additionally, TU will periodically inspect the streambank stabilization project areas to ensure the natural fiber erosion control blankets are intact and to monitor and document growth of the native trees and shrubs planted on the regraded streambank. TU will also periodically inspect the riparian buffer projects to clear away any non-native, invasive vegetation that may inhibit the growth of the newly planted native trees and shrubs. The native plants will also be inspected for evidence of deer browse, disease, or otherwise unsuccessful growth at the project sites.

17. Are other strains of brook trout, salmonids, or exotics present in the proposed watershed? Do stockings of other strains of brook trout, salmonids, or other exotics occur, and if so, where does the stocking take place with respect to the project site (in HUC, in HUC but below barrier, or in adjacent HUCs)?

The PFBC currently stocks the lower 3 miles of Cross Fork with rainbow trout to enhance seasonal recreational opportunities and brown trout have been documented in many areas of the subwatershed. However, it should be noted that brown trout have been naturalized in many Pennsylvania trout waters since the late 1800s so the presence of this species in the Cross Fork subwatershed is not unexpected.

18. Please describe the current status of the project. Is it planned, permitted and ready to begin?

Currently there are 9.8 miles of dirt and gravel road problem areas and more than 40 sites with moderate to severe bank erosion and poor riparian buffers have already been identified throughout the Cross Fork subwatershed. Within the next year, site selection will be finalized and appropriate pre-project data will be characterized for the dirt and gravel road, stream bank stabilization, and riparian buffer restoration projects. Concurrently, a complete inventory and ranking of fish movement barriers will be completed. The design and permits required for the fish passage project are expected to be completed in 2014. As mentioned previously, the proposed projects are intentionally not “shovel ready” so that local participation through project selection and planning is increased.

19. Will public access be allowed at the project site? If so, what kinds of recreational activities are allowed – public fishing, nature trails, etc?

Approximately 95% of the Cross Fork subwatershed which equates to more than 30,000 acres is contained within the Susquehannock State Forest. Subsequently, public recreation activities including fishing, hiking, and camping are permitted and encouraged. In fact, according to trail data compiled by the DCNR and Rails-to-Trails Conservancy (2012) there are approximately 13 miles of marked hiking trails in this watershed, 10 miles of which are included as a portion of the Susquehannock Trail System an 85-mile loop that meanders through the remote and unspoiled woodlands of Pennsylvania’s Susquehannock State Forest (DCNR & Rails-to-Trails Conservancy, 2012). Lastly, according to the PFBC, 100% of the designated Class A brook trout

streams, whether on public or private lands, have public access to fishing. In fact, the Kettle Creek watershed is widely known for its unrestricted public access to fishing on all of its wild trout streams.

20. What is the recreational quality of the potential fishery?

The Cross Fork subwatershed and the larger Kettle Creek drainage are well-known destination fisheries. Despite the rather sparse human population, angling pressure is comparatively heavy because many anglers travel to the area from other parts of Pennsylvania and surrounding states. In fact, the Kettle Creek watershed has been featured on television programs such as "TU TV" and "On the Rise", showcased in documentaries including WVIA's "Water: An Endangered Resource" and "Hope for Polluted Waters", written about in TROUT magazine and Fly Fisherman Magazine, and has been featured in countless other local, regional, and nationwide newspaper and magazine articles.

21. Describe the outreach or educational components of the project and how many individuals / students will be served.

TU has found that webinars made available to partner organizations and agencies, as well as targeted to county conservation districts and county USDA-NRCS offices is very useful for the dissemination of project results. TU will seek to coordinate at least one webinar with the Penn State University Cooperative Extension Office, or if not feasible TU has the ability to host its own webinar. TU also anticipates multiple speaking engagements at a variety of public meetings (i.e. watershed organization, local municipalities) and professional conferences at which case studies on the projects completed through this grant will be provided to meeting and conference participants. Additionally, TU will provide project information and results through written and electronic media sources such as the KCWA newsletter and website (www.kettlecreek.org), TU website (www.tu.org), and project fact sheets. TU will also share sediment loading data from the dirt and gravel road projects with the Penn State Center for Dirt and Gravel Road Studies, as well as all fish and fish passage assessment data with the PFBC and any other interested entity. Based on similar outreach activities and events, TU expects to serve at least 500 individuals and/or students.

The various components of each project completed through this grant that will be discussed through the outlets described above will include: [1] Successes and lessons learned for how to build organizational capacity and work in partnership with other groups toward common goals and objectives; [2] How to evaluate, select, and plan the most environmentally beneficial and cost-effective dirt and gravel road improvement, streambank stabilization (using biostabilization methods), riparian buffer, and fish passage projects; and [3] How to develop and implement short-term and long-term monitoring plans for these types of projects. There is widespread applicability of these project results to far-reaching corners of the eastern brook trout extent because dirt and gravel roads are common sources of non-point sediment pollution, streambank stabilization and riparian buffer restoration projects are relatively easy projects for watershed organizations to undertake, and the understanding and awareness is

increasing for how important adequate fish passage is to reconnecting and improving the integrity of eastern brook trout populations and their available habitat.

22. If applicable, please briefly describe how this project will promote adaptation to climate change.

Recognizing that there are inherent difficulties associated with attempts to slow the immediate impacts of a changing climate and that healthy watersheds are better able to withstand the stress of climate impacts TU will adhere to its "Protect-Reconnect-Restore" prioritization and model of fishery sustainability throughout the steps of implementing the proposed projects. This process emphasizes protection of the best remaining habitats and populations, reconnecting stream systems by removing instream barriers and reestablishing flows, and restoring vital lower-elevation rivers. These strategies are consistent with the best available science, have been proven to be effective in on-the-ground application, and are intended to increase the resistance to climate change impacts.

Furthermore, TU's Conservation Success Index has a component specific to climate change in Pennsylvania that utilizes current trout distribution, historical climate data, forecasted temperatures and groundwater influence combined with a 21.5° C threshold and a 23.5°C absolute threshold for trout distribution. The CSI identifies that both the Cross Fork and Hammersley Fork subwatersheds have a predicted 2050 mean August air temperature of between 21.5 and 23.5°C which highlights the importance of these areas as refugia for brook trout in the coming years. These predicted cool temperatures combined with the more than 103 miles of exceptional value streams, and the 74 miles of natural reproduction trout waters (of which more than 21 miles are Class A brook trout streams) in the Cross Fork subwatershed support the reasoning that habitat availability should be enhanced as this area is one of the best opportunities to ensure a safeguard for future brook trout populations amid the impacts of climate change.

23. Please explain how this project is a good investment of funds, using a quantitative approach where possible and the recreational and / or economic value of the project.

Since 1998, TU has secured more than $180,000 in grants from the PA Growing Greener Grant Program, National Fish and Wildlife Foundation, Richard King Mellon Foundation, and PA Department of Environmental Protection 104(b)(3) Program for the assessment, prioritization, and implementation of habitat projects in the Cross Fork subwatershed. Of this funding, a $20,000 grant from the Eastern Brook Trout Venture (2006) helped to fund the construction of six streambank stabilization and native brook trout habitat enhancement projects on Cross Fork. Concurrently, countless in-kind services and assessments have been completed by the PA Fish and Boat Commission, Penn State University Center for Watershed Stewardship, Penn State University Center for Dirt and Gravel Road Studies, Potter County Conservation District, PA Department of Conservation and Natural Resources Bureau of Forestry, PA Department of Environmental Protection, Quehanna Boot Camp, Kettle Creek Watershed Association, and TU chapters.

To date, 1.7 miles of dirt and gravel road problem areas have been addressed and six habitat improvement projects have been completed. The proposed projects are simply the next logical step needed for the restoration and expansion of native brook tout habitat within the Cross Fork subwatershed. Furthermore, the projects are instrumental to achieving the ultimate goal of increasing the long-term viability of brook trout within the Cross Fork subwatershed, as well as the rest of the Kettle Creek drainage.

TU is seeking funding in the amount of $45,000 from the EBTJV toward the total project cost of $311,562 and will provide $266,562 (85.5%) in matching funds. Funding toward this project has already been secured from the National Fish and Wildlife Foundation ($191,730), Richard King Mellon Foundation ($18,232), and the Chesapeake Bay Trust ($6,600). TU also plans to submit a grant application to the upcoming round of PA's DEP Growing Greener Grant Program in the amount of $50,000.

VI. SUPPORTING DOCUMENTATION:

1. Literature Cited

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2. References to published interagency fishery or aquatic resource management plans.