# ENVIRONMENTAL ASSESSMENT
# WESTSLOPE CUTTHROAT TROUT RESTORATION:
# TRANSFER OF LIVE FISH FROM
# CARPENTER, O'BRIEN, OR GRAVEYARD CREEKS (BELT CREEK DRAINAGE) TO CRAWFORD CREEK (BELT CREEK DRAINAGE)

## I. Description of proposed action

### A. Description of water body and action.

**Receiving Water:**

| | | | |
|---|---|---|---|
| Name: | Crawford Creek; | Location: | T14N R7E Sec 12 |
| | Water Code: 17-1840 | | |
| County: | Cascade County | | |

**Donating Waters:**

| | | | |
|---|---|---|---|
| Name: | O'Brien Creek | Location: | T13N R8E Sec 17 |
| | Water Code: 17-5584 | | |
| | Carpenter Creek | Location: | T14N R8E Sec 14 |
| | Water Code: 17-1248 | | |
| | Graveyard Gulch | Location: | T14N R7E Sec 36 |
| | Water Code: 17-3152 | | |
| County: | Cascade County | | |

Non-hybridized westslope cutthroat trout (WCT) *(Oncorhynchus clarki lewisii)* will be transferred to Crawford Creek (Belt Creek Drainage) from one to two donor populations (O'Brien, Carpenter, or Graveyard creeks). The potential donor streams are tributaries to Belt Creek and support non-hybridized WCT populations protected by fish barriers. The lower 1.5 miles of Crawford Creek (above a concrete barrier) to be stocked was chemically treated twice in 2006 with rotenone to remove non-native brook trout (*Salvelinus fontinalis*), rainbow trout (*O. mykiss*), and WCT x rainbow trout hybrids (Figure 1).

The uppermost reaches of Crawford Creek support a small (less than 0.5 miles of stream) remnant population of non-hybridized WCT above a natural falls barrier (Figure 1). In 2005, a concrete barrier was constructed on Crawford Creek approximately 0.2 miles upstream of its confluence with Belt Creek (1.5 miles downstream of natural falls barrier). Surveys of the small non-hybridized headwater population in late 2006 revealed that four out of about 50 WCT above the

natural barrier had deformities (extended lower jaw, short upper caudal lobe). We are not certain if these deformities are of genetic or environmental origin. If genetic, then this could indicate the presence of inbreeding depression in the population and it would not represent a wise source of fish to transfer to the lower portion of Crawford Creek. Because of the uncertainty about the origin of the deformities, we prefer to be conservative by assuming they are of genetic origin and increase the chances of a successful transfer by using WCT from one to two of the aforementioned donor streams.

We will continue to monitor the frequency of deformities in the headwater population of Crawford Creek. If the frequency appears to increase over time, we will probably propose to introduce a small number of WCT from another population into it. This will represent an attempt to break down what appears to be inbreeding depression in the Crawford Creek population.

## B. Need for Action:

WCT are ranked as S2 (imperiled because of rarity or because of other factors demonstrably making it very vulnerable to extinction throughout its range) by the Natural Heritage Network and the State of Montana. Non-hybridized WCT are thought to occupy about 8% of their historical range in the western United States (Shepard et al. 2003) and less than 3% of their historical range in northcentral Montana within the Missouri River Drainage (Moser 2003). Major threats to WCT include competition and hybridization with non-native rainbow trout (Leary et al. 1995; Hitt et al. 2003), competition with brook trout (Dunham 2003; Peterson et al 2004), and isolation of remaining non-hybridized populations above barriers in short headwater sections of stream. These small isolated populations are at risk of extinction from catastrophic events (e.g. fire, drought) and may eventually suffer negative consequences of inbreeding (Wang et al. 2002). Translocations/transfers have been commonly used to augment established populations, create refuge populations, and re-establish historic populations (Stockwell and Leberg 2002). One of the restoration actions referenced in the WCT Conservation Agreement (MFWP 1999) is translocation of non-hybridized populations into new habitats.

Historically, all of these populations had some level of connectivity. However, substantial genetic differences can exist among WCT populations even between adjacent drainages (Leary 1998). If enough fish can be obtained from O'Brien Creek to stock Crawford Creek (225 adult fish over three years), then only O'Brien Creek fish will be transferred. If removing approximately 75 adult fish exceeds 10% of O'Brien's total population size in any one year, then Carpenter Creek or Graveyard Creek will be used as an additional donor. These numbers should be sufficient to prevent a genetic founder effect, which requires a minimum successful transfer of 25 males and 25 females (Leary et al. 1998). Mixing of two populations, rather than three or more, is a compromise aimed at minimizing outbreeding effects (Gilk et al. 2004) while also reducing the negative impacts of inbreeding (Wang et al. 2002). The final proportion of stocked individuals from each donor stream may not be equal. Moreover, survival and reproductive rates of donor fish may differ because of variability in the environment during and after planting and potential genetic adaptations to the new environment. Population surveys will be completed at the donor sites prior to transfers to determine the number of fish to be moved. No more than 10% of the estimated population's fish >= 6 inches and no more than 20% of the population's fish <6 inches will be moved.

Fin clips will be taken from all fish transferred. DNA will be extracted from these and the genetic characteristics of the fish will be determined at a number of microsatellite loci. DNA is already

available from fin clips taken from the headwater population of WCT in Crawford Creek which can be used for microsatellite analysis. If the transfers successfully establish a reproducing population in lower Crawford Creek, the microsatellite data will allow a determination of what source or sources of fish established the population and whether or not the headwater population contributed to the lower one via migration.

## II. Impacts of the proposed action

Please review the attached checklist on pages 7 and 8. The impacts of this action are included in the Environmental Assessment checklist. The following text addresses the impacts.

### A. Impacts to the Physical Environment

#### 1) Terrestrial and Aquatic Habitat

The proposed project will involve transfer of WCT from one to two Belt Creek tributaries to 1.5 miles of Crawford Creek. Live fish transfers have successfully established WCT cutthroat populations in the past (Tews et al. 2000). Several measures have been taken to reduce potential impacts to the aquatic habitat. These include, disease testing of fish in the donor streams where appropriate and amphibian surveys of the recipient stream. The MFWP wild fish transfer policy will be followed and WCT will not be transferred until approved by the MFWP Fish Health Committee.

**Disease testing:** Thirty-one WCT collected from Carpenter Creek on August 26, 2003 were negative for all tested pathogens. Thirty WCT collected on July 28, 1999 from Carpenter Creek were ELISA positive and PCR positive (one fish) for *Renibacterium salmoninarum* (bacterial kidney disease). The Carpenter Creek WCT population is isolated by a waterfall barrier at the confluence of Snow Creek and mining pollution which renders the creek barren in the lowermost four miles. Thirty-five fish collected from O'Brien Creek on March 23, 2005 were ELISA positive and PCR negative for *R. salmoninarum*. The O'Brien Creek WCT population is isolated by a waterfall barrier about three miles above its mouth. Forty-three cutthroat trout collected from Graveyard Creek on August 26, 2003 were negative for all tested pathogens. Nineteen brook trout collected on the same date were ELISA positive and PCR negative for *R. salmoninarum*. Positive tests for bacterial kidney disease are common in wild fish throughout central Montana and may not preclude transfer of these fish. Crawford Creek has not been tested for disease.

Table 1. Fish disease history – Carpenter, O'Brien, and Graveyard creeks.

| Location | Date | Species | # Fish | Results |
|---|---|---|---|---|
| **Carpenter Creek** | 7/28/1999 | WCT | 30 | Elisa positive for *Renibacterium salmoninarum*. One fish confirmed positive with PCR |
| | 8/26/2003 | WCT | 31 | Negative for all pathogens |
| | | | | |
| **O'Brien Creek** | 3/23/2005 | WCT | 35 | Elisa positive for *Renibacterium salmoninarum*. No fish confirmed positive with PCR |
| | | | | |
| **Graveyard Creek** | 8/26/2003 | WCT | 43 | Negative for all pathogens |
| | 8/26/2003 | EB | 19 | Elisa positive for *Renibacterium salmoninarum*. No fish confirmed positive with PCR |

**Genetic Analyses:** Fifty fish collected from Carpenter Creek (four occasions from 1997 to 2000) were analyzed for evidence of hybridization using allozymes. Alleles characteristic of only westslope cutthroat trout were detected in these fish. Eighteen fish collected from O'Brien Creek on July 30, 1999 displayed alleles characteristic of only WCT (allozymes). An additional 25 PCR (fin clips) samples were collected from O'Brien Creek on June 25, 2002 and alleles characteristic of only WCT were detected in these samples. Twenty-five fish collected from Graveyard Gulch (two occasions in 1999) were analyzed for evidence of hybridization using allozymes. Alleles characteristic of only WCT were detected in Graveyard Gulch fish. Fifty fin clips collected from Graveyard Creek fish in 2005 (July 21, 2005) displayed alleles characteristic of only WCT. Fifty-one fish collected from Crawford Creek above the upper barrier had alleles characteristic of only WCT (June 29, 2006, N=25; August 25, 2003, N=15; June 28, 2001, N=10).

**Aquatic Invertebrates and Amphibians:** Invertebrate and amphibian communities in Crawford Creek developed in the presence of fish. Impacts on invertebrate and amphibian species from introduced non-hybidized WCT will be similar to those recently experienced (prior to piscicide treatment) in this watershed.

**2) Unique, endangered, fragile or limited environmental resources.**

This proposed action will protect and expand non-hybridized WCT in Crawford Creek from less than 1/2 mile to over 2 miles of inhabited stream. The resulting increase in population size should reduce risks of extinction by reducing negative impacts from inbreeding depression (loss of fitness) and the potential impacts of catastrophic events (e.g. fire, drought) . It is unlikely that this short reach of stream could support the 2,500 minimum WCT population size recommended by Hilderbrand and Kershner (2000) for long term persistence and it drains less than the 5.6 square miles (minimum watershed size) area recommended as a coarse filter for translocations by Harig and Fausch (2002). However, the habitat is better than that found in many WCT streams in northcentral Montana that have held WCT populations for greater than 50 years (Tews et al. 2000).

## B. Impacts to the Human Environment

### 1) Agricultural or Industrial production

The water (Crawford Creek) that WCT will be introduced into is entirely within Lewis and Clark National Forest (Figure 1). Two grazing allotments are within the area where WCT will be introduced. No additional requirements of grazing allotees will be required because Crawford Creek was considered a WCT stream prior to piscicide treatment (slightly hybridized). Moreover, prior to piscicide treatment Crawford Creek supported sympatric populations of WCT and brook trout. On the Lewis and Clark National Forest streams which hold sympatric populations of WCT and brook trout are held to a higher standard of bank trampling than streams which hold only WCT.

### 2) Access to and Quality of Recreational Activities

There is ample access to this fishery at the Crawford Creek trailhead directly behind the Belt Creek Ranger Station. The new fishery will provide an opportunity to fish for non-hybridized WCT.

### 3) Demands on Government Services

This action will be undertaken by fisheries staff as part of normal field operations. Other WCT fisheries projects may be postponed due to the fish transfer. Much of the work for this transfer has already been completed. It is anticipated that it will take two, three person fisheries crews about 3 to 4 days each to complete additional surveys and to transfer the WCT.

# III. Discussion of Reasonable Alternatives

### 1) No Action

Crawford Creek may re-colonize naturally from the non-hybridized upstream population. If the upstream population is suffering from a genetic bottleneck, the new downstream population may eventually fail (i.e. crash because of genetic defects). In addition, if any hybrid fish survived the piscicide treatments they may re-colonize the currently fishless portion of stream faster than downstream movement from the headwater population can occur (transfer of fish should “swamp” out the genetic contribution of a few survivors). A portion of the genetic diversity represented by the donor WCT populations would not be replicated. MFWP has agreed to take actions to benefit WCT (MFWP 1999) and if this project is not completed it will be a setback to WCT conservation in Montana.

# IV. Environmental Assessment Conclusion Section

**1) Is an EIS required?** No, the action is expected to be minor and beneficial.

## References


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## Environmental Assessment Checklist

**Project:** Transfer of live fish from Carpenter Creek and O'Brien Creek (Belt Creek drainage) to Crawford Creek (Belt Creek drainage) **Division:** Fisheries Division
**Description of Project:** 150 to 600 genetically pure westslope cutthroat trout *(Oncorhynchus clarki lewisi)* will be transferred over three years from O'Brien Creek and Carpenter Creek to Crawford Creek (all in Belt Creek drainage).

### Potential Impact on the Physical Environment

| | MAJOR | MODERATE | MINOR | NONE | UNKNOWN | COMMENTS ON ATTACHED PAGES |
|---|---|---|---|---|---|---|
| 1. Terrestrial & aquatic life and habitats | | | X | | | P. 2 |
| 2. Water quality, quantity & distribution | | | | X | | |
| 3. Geology & soil quality, stability and moisture | | | | X | | |
| 4. Vegetative cover, quantity & quality | | | | X | | |
| 5. Aesthetics | | | | X | | |
| 6. Air quality | | | | X | | |
| 7. Unique, endangered, fragile or limited environmental resources | | X Benefit | | | | P. 3 |
| 8. Demands on environmental resources of land, water, air & energy | | | | X | | |
| 9. Historical & archaeological sites | | | | X | | |

**Potential Impacts on the Human Environment**

| | MAJOR | MODERATE | MINOR | NONE | UNKNOWN | COMMENTS ON ATTACHED PAGES |
|---|---|---|---|---|---|---|
| 1. Social structures & mores | | | | X | | |
| 2. Cultural uniqueness & diversity | | | | X | | |
| 3. Local & sate tax base & tax revenue | | | | X | | |
| 4. Agricultural or industrial production | | | | X | | P. 4 |
| 5. Human health | | | | X | | |
| 6. Quantity & distribution of community & personal income | | | | X | | |
| 7. Access to & quality of recreation and wilderness activities | | | X benefit | | | P. 4 |
| 8. Quantity & distribution of employment | | | | X | | |
| 9. Distribution and density of population & housing | | | | X | | |
| 10. Demands for government services | | | | X | | P. 4 |
| 11. Industrial and commercial activity | | | | X | | |
| 12. Demands for energy | | | | X | | |
| 13. Locally adopted environmental plans & goals | | | | X | | |
| 14. Transportation networks & traffic flow | | | | X | | |

**Other groups or agencies contacted or which may have overlapping jurisdiction:** United States Forest Service.

**List of Individuals or groups contributing to this EA:** Travis Horton, Fisheries Biologist, MFWP, Great Falls, MT; Anne Tews, Fisheries Biologist, MFWP, Lewistown, MT; Michael Enk, Fisheries Biologist, Lewis and Clark National Forest, Great Falls, MT; Robb Leary, University of Montana, Missoula, MT.

**List of all agencies and individuals who have been notified of this proposed transfer:** Public notification via the MFWP Web Site (http://fwp.state.mt.us/publicnotices/). The USFS has been involved in drafting the EA.

**Recommendation concerning preparation of EIS:** No EIS Required. Action expected to be minor.

**EA prepared by**: David Moser, Fisheries Biologist, MFWP, Great Falls, MT. **Date:** November 9, 2006

**Comments will be accepted until:** December 31, 2006

**Comments should be sent to:** David Moser, MFWP, c/o USFS, P.O. Box 869, Great Falls, MT 59403; dmoser@fs.fed.us

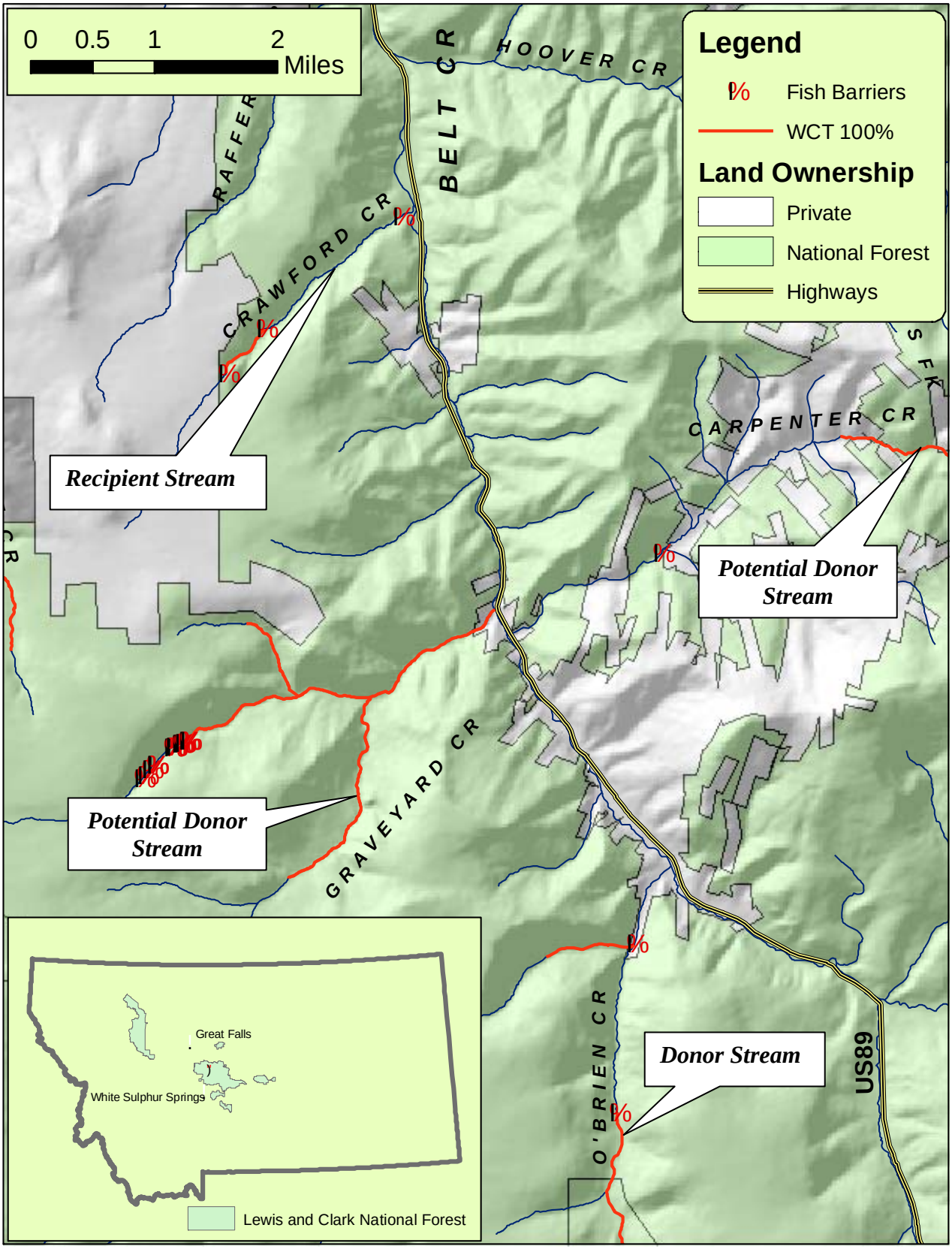


Figure 1. O'Brien Creek, Carpenter Creek, and Crawford Creek.