

**FLUVIAL WESTSLOPE CUTTHROAT TROUT MOVEMENTS AND RESTORATION OF THERMAL HABITATS**  
Climate Change Studies scholarship

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### **PROBLEM DESCRIPTION**

Across the intermontane west, climate change is predicted to affect the distribution and abundance of salmonids by elevating water temperatures, leading to habitat loss and fragmentation (Rieman et al. 2007). Westslope cutthroat trout (*Oncorhynchus clarkia lewisi*), which are native to Montana's Blackfoot River and its tributaries, have already suffered habitat loss and fragmentation due to anthropogenic influences, competition with non-native fishes, and genetic introgression (Pierce et al. 2007). However WSCT are particularly vulnerable to changes in water temperature, and cannot tolerate water temperatures above 13-15°C (Bear et al. 2007). WSCT necessarily avoid prolonged exposure to warmer water temperatures (Bear et al. 2007) – a factor which is aggravating their current population decline.

Locally, Montana Fish, Wildlife and Parks (FWP) have been investigating restoration techniques specifically intended to mediate changes in thermal habitats including active channel habitat structures, grazing management improvements, instream flow enhancements, and riparian vegetation plantings. These projects – over a larger scale – have the potential to buffer these sensitive populations from a key driver of their declines. Over the past 20 years, FWP have been involved in the restoration and monitoring of WSCT populations across >600 sites on the Blackfoot River and its tributaries (Pierce and Podner 2011). These studies have included the use of telemetry of individual fish to document the effects that thermal restoration efforts have had on WSCT home ranges, movement patterns and spawning habitat (Pierce et al. 2007). Although these historic monitoring data are available, the ability of the current array of restoration techniques to restore thermal habitat for WSCT has remained unevaluated across the larger landscape. Assessing the influence of current restoration practices on WSCT thermal habitat is necessary to adjust the effectiveness of these practices so that moderation of future climate change can be achieved.

The intent of this project is to evaluate the utility of these restoration techniques in mitigating some of the known or anticipated effects of a changing climate on both the physical habitat (water temperature, discharge, riparian habitat vegetation, channel characteristics) and subsequent population characteristics (migratory behavior, dispersal, home range) of this species of concern. The specific objective of this study is to determine whether or not restoration efforts on Nevada and Grantier Creeks have had an effect on the use of different thermal habitats by monitoring movement and habitat usage of native WSCT. Telemetry relocations of WSCT, water temperature, and riparian habitat and community typing data will be collected and compared to pre-restoration data to evaluate the effects of restoration induced water cooling on WSCT migratory life history and size of home range.

### **METHODS**

Sampling protocol in this study will follow those of previous monitoring work on these creeks as documented by Pierce et al. (2007) and Schmetterling (2003). Ten individual WSCT will be captured in wintering habitat in each creek and implanted with continuous radio Lotek™ transmitters before spring spawning begins. These fish will be tracked on a daily basis throughout the 2012 spawning cycle and their locations recorded using GPS. Post-spawn, relocations of these individuals will be recorded on a weekly basis. Water temperature and discharge will be collected from gauges already in place and currently monitored by FWP. Riparian vegetation community and habitat type data will be recorded in accordance with FWP standard protocol. Visual observations about habitat, such as large woody debris, cattle influence, vegetation, and substrate will also be recorded. This data will be added to FWP's existing 20-year database which can then be used as the basis for a before-after-control-impact statistical evaluation of the effects of thermal restoration on WSCT habitat use.

## CLIMATE CHANGE RELEVANCE

Warmer water temperatures induced by climate change are expected to have a profound effect on salmonid habitat (Reiman et al. 2001). Thermally sensitive species, such as WSCT, are likely to suffer habitat loss and fragmentation as a direct consequence, leading to increased competition with non-native fishes, genetic introgression, and loss of spawning habitat (Reiman et al. 2007, Pierce et al. 2007). Native fish habitat restoration that focuses on water temperature and streamflow could be the key to maintaining adequate thermal habitat for sensitive native species (Dunham et al. 2003). Restoration activities employed on Nevada and Grantier Creeks, such as active channel work, grazing management improvements, instream flow enhancements, and riparian vegetation plantings (Pierce and Podner 2011), may reduce water temperatures, mitigate for climate change, and restore habitat for thermally sensitive species.

## BUDGET

Monitoring equipment including Lotek® tags, receiver, and antenna are being provided by Montana FWP. Stream gauges are already in place for continuous collection of water temperature and discharge. FWP is providing support for field costs through the end of June, however fieldwork is anticipated to continue through the end of August. Estimates for mileage, meals, and lodging in the second half of the summer field season (currently unfunded) are based on FWP standard allowances. Some incidentals and field equipment will be supplied by the Marczak lab. The following additional expenses are anticipated:

Item	Currently unfunded	Marczak Lab (UM)	FWP
<b>Equipment.</b> Office Supplies		300	
Hip-waders		60	
Polarized glasses		150	
Field incidentals (bug spray, sunscreen, etc)		100	
<b>Transportation.</b> Mileage (\$.55/mile, 175 miles round trip to sites)	480		867
ATV rental and fuel, 32 days at \$177/day + \$30 trailer/day + fuel			10500
<b>Meals and Lodging.</b> camp fees (\$12/day)	288		288
per diem (\$23/day)	552		552
<b>Salaries.</b> Student stipend	5000		
fringe/benefit costs associated with stipend (13%)	650		

*Total project needs remaining to be funded*

6970

### Current request

**3000**

If funded, I would apply this fellowship directly to my stipend support; I am currently pursuing additional funding opportunities to cover the remaining travel and material costs necessary to support this project.

## TIMELINE

2012	April	Capture and tagging of individual WSCT
	May-June	WSCT spawn movements and relocations recorded daily; water temperature and discharge recorded weekly or daily.
	July-August	WSCT relocations recorded weekly; vegetation community types surveyed; water temperature and discharge recorded weekly.
2013	September- December	Ongoing analysis of data and preparation of a manuscript for publication.
	Spring	Anticipate at least one presentation at a scientific conference (e.g. Society for Freshwater Science in May, 2013).

**REFERENCES**

- Bear, Elizabeth A., Thomas E. McMahon, Alexander V. Zale. 2007. Comparative thermal requirements of westslope cutthroat trout and rainbow trout: Implications for species interactions and development of thermal protection standards. *Transactions of the American Fisheries Society*, 136:4, 1113-1121.
- Dunham, Jason, Robert Schroeter, Bruce Rieman. 2003. Influence of maximum water temperature on occurrence of Lahontan cutthroat trout within streams. *North American Journal of Fisheries Management*. 23:3, 1042-1049.
- Magee, James P., Thomas E. McMahon, Russell F. Thurow. 1996. Spatial variation in spawning habitat of cutthroat trout in a sediment-rich stream basin. *Transactions of the American Fisheries Society* 125:768-779. Accessed March 5, 2012.
- Montana Fish, Wildlife and Parks (FWP). Native Fish. Mt.gov.  
<http://fwp.mt.gov/fishAndWildlife/management/nativeFish.html> (accessed March 21, 2012).
- Pierce, Ronald W., Ryan B. Aasheim, Craig S. Podner. 2007. Fluvial Westslope cutthroat trout movements and restoration relationships in the upper Blackfoot basin, Montana. *Intermountain Journal of Sciences*. Vol. 13, No. 2-3: 72-85. September 2007.
- Pierce, Ronald W., Craig Podner. 2011. Fisheries Investigations in the Big Blackfoot River Basin 2008 – 2010. Montana Fish, Wildlife and Parks. Missoula, Montana.
- Rieman, Bruce E., Daniel Isaak, Susan Adams, Dona Horan, David Nagel, Charles Luce, Deborah Myers. 2007. Anticipated climate warming effects on bull trout habitats and populations across the Interior Columbia River Basin. *Transactions of the American Fisheries Society*, 136:6, 1552-1565.
- Schmetterling, D. A. 2003. Reconnecting a fragmented river: movements of Westslope cutthroat trout and bull trout after transport upstream of Milltown dam, Montana. *North American Journal of Fisheries Management*. 23:721-731.

**TRACY WENDT**  
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**EDUCATION + TRAINING**

**Bachelors of Science – Resource Conservation/Restoration Ecology** **2012 (Anticipated)**  
University of Montana; Davidson Honors College

**Associates of Applied Science - Wildlife Biology** **2010**  
Spokane Community College

**FIELD AND RESEARCH SKILLS**

- \* Dendrology
- \* Field Sampling
- \* Forest Ecology
- \* Forest Measurements
- \* Forest Protection
- \* Global Information Systems (GIS)
- \* Global Positioning Systems (GPS)
- \* GreenBuild
  - LEED® Retail Technical Review
  - LEED® Volume Build Case Study Presentation
  - LEED® Contracts and Documentation
- \* GreenSeattle Partnership
  - Forest Steward Orientation
- \* Mapping + Aerial Photos
- \* Microsoft Excel Training 1 + 2
- \* Microsoft Project Basics Training
- \* Orienteering | Surveying
- \* ReGeneration
  - Adaptive Planning
  - The Value of Design Workshop
- \* Restoration Ecology
- \* Silviculture
- \* Sustainability Development + Training
- \* Water Policy
- \* Water Quality
- \* Watershed Hydrology
- \* Wildlife + Fish Biology

**ECOLOGICAL FIELD/RESEARCH EXPERIENCE**

**Montana Fish, Wildlife and Parks** **2012 – Present**  
Fish Technician (seasonal) - Radio telemetry relocations of tagged fish, electrofishing, tagging fish, record relocations, collect water and vegetative data, data entry and processing

**Columbia Basin Fish and Wildlife Authority** **2011**  
Habitat Evaluation Procedures (HEP) Technician (seasonal) – Establish transects and collect vegetative data (measurements and identification) according to HEP protocol; data collection, analysis and reporting

**Montana State University** **2010**  
Fish Technician (seasonal) – Radio telemetry via truck, raft, and on foot; electrofishing; record and enter data; insert PIT tags; collect water samples and prepare for lab; collect water data using YSI meter

**Conservation Northwest** **2008 – 2009**  
Paid Intern – Canadian lynx study assistance: set up lures, cameras, hair snares, record data about each site (vegetation, location, condition upon retrieval); various other duties as assigned

## **VOLUNTEER ECOLOGICAL EXPERIENCE**

- \* EarthCorps
- \* Five Valleys Land Trust
- \* Futurewise
- \* GreenSeattle Partnership
- \* Inland Northwest Land Trust
- \* The Lands Council
- \* Little Pend Oreille Wildlife Refuge
- \* Montana Natural History Center
- \* Nature Consortium
- \* Rattlesnake Creek Watershed Group
- \* Reverb
- \* Seattle GreenFestival
- \* Seattle Parks and Recreation
- \* Spokane Greendrinks
- \* Spokane Riverkeeper

## **OTHER WORK EXPERIENCE**

**Montana Museum of Art & Culture** **2010 - Present**  
Office Assistant - Reception, correspondence, dictation, errands, communications; Gallery attendant

**Spacesaver Northwest** **2008 - 2010**  
Administrative Assistant - Business development, order supplies; schedule travel; issue correspondence; organize office; update contact database; track sales leads

**Whitehouse | Black Market** **2008**  
Retail Sales - Customer service and sales assistance; stock merchandise; set up sales floors and displays

**Callison Architecture** **2006 – 2008**  
Client Services Representative | Studio Sustainability Lead  
Monitor budgets; write and execute client contract and consultant letters of agreement; track accounts receivable and resolve invoices over 60 days outstanding; facilitate monthly financial meeting; various project management assistance; assist with LEED® OnLine for individual

## **AFFILIATIONS + CERTIFICATIONS**

- \* American Fisheries Society University of Montana Sub-Chapter - Secretary
- \* CPR + First Aid Certificate
- \* GreenSeattle Forest Steward
- \* LEED® Accredited Professional
- \* Missoula Water Quality Advisory Council - Member