

**Alberta Conservation Association  
2008/09 Project Summary Report**

**Project name:** *Cutthroat Trout Population Assessment in the Castle Drainage*

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**Partnerships**

Devon Canada Corporation

**Key findings**

- Westslope cutthroat trout and rainbow trout hybrids were common in the Castle drainage, with pure strain cutthroat trout restricted to the upper portion of the drainage and pure strain rainbow trout to the lower portions.
- Of the 1699 trout captured, we identified 63% as westslope cutthroat trout, 13% as rainbow trout, and 24% as hybrids.
- Approximately one third of the pure strain cutthroat trout were adults (> 149 mm fork length) and 7% of legal harvest size (> 300 mm total length).

**Abstract**

Westslope cutthroat trout populations in Alberta have been designated as “Threatened” by the Committee on the Status of Endangered Wildlife in Canada because populations have become severely isolated and depressed. Populations currently occupy no more than 20% of their historical distribution in Alberta. To generate data towards formulating conservation and management strategies, we initiated a drainage-scale population abundance assessment of the species in the Castle River. In 2008, we electrofished 50 stream reaches within the drainage; additional 42 sites will be surveyed in 2009. We captured a total of 1699 trout, consisting of 63% pure strain cutthroat, 13 % pure strain rainbow, and 24 % hybrids. The proportion of adults (> 149 mm fork length) in the pure strain cutthroat catch was 34%. Harvest sized individuals (> 300 mm total length) represented 7% of the total catch and 6% of the pure strain cutthroat catch. Cutthroat trout were more prevalent in upper sections of the drainage than in the lower sections. In contrast, rainbow trout tended to be more prevalent in the lower reaches than upper sections. Hybrids occurred in all reaches except for the headwaters. These trends suggest widespread of hybridization of cutthroat and rainbow trout in the Castle River drainage. However, because the

degree of error associated with using external morphological features to identify pure hybrids is unknown, further genetic research is required to accurately identify hybrids.

## **Introduction**

Westslope cutthroat trout (*Oncorhynchus clarkii lewisii*) currently occupy no more than 20% of their historical distribution in Alberta (Costello 2006). The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has designated the species as ‘Threatened’ because genetically pure populations are now severely isolated. In the Castle River drainage, upstream of the Oldman Reservoir, cutthroat and introduced rainbow trout (*Oncorhynchus mykiss*) (RNTR) are known to produce hybrid offspring (Costello 2006). To generate data towards formulating conservation and management strategies, we initiated a drainage-scale population assessment of the species in the Castle River. Our main objective was to determine the population density and abundance of cutthroat trout (and hybrids), and the proportion of harvestable sized fish. In addition, the proportions of pure strain cutthroat and rainbow trouts, and hybrids (cutthroat x rainbow) will be determined based on external morphological characteristics. Additional benefit to fishery managers will be identification of locations where pure cutthroats are most prevalent for future genetic sampling and management.

## **Methods**

We divided the Castle River drainage upstream of the Oldman Reservoir into five sampling strata. Strata were delineated by (1) bootstrapping GIS-derived stream-orders and (2) width data from previous sampling to determine approximate stream width ranges per stratum, and (3) sampling method to be used (Table 1). For Strata 1–4 streams, we used GIS software to randomly selected 85 sites of which 43 were sampled using backpack and tote-barge electrofishing; the remaining 42 sites will be sampled during the 2009 field season. For Stratum-5 streams, we sampled seven 2-km reaches systematically using a float (raft) electrofisher. We conducted three Peterson capture-mark-recapture population estimates to determine capture probability, which was used with abundance data to estimate fish densities using bootstrapping methods. We identified cutthroat and rainbow trout and their hybrid using external morphological characteristics as per Robinson (2007). Fish exhibiting both a prominent white-tipped anal fin and jaw slashes were considered hybrids, those with only jaw slashes as cutthroats, and those with only the white tip as rainbow trouts.

Table 1. Characteristics of sampling strata, including number of sites (n) sampled in 2008.

Stratum	Stream order and wetted width (m)	Mean ( $\pm$ SE) wetted-width (m)	Reach length (m)	n
1	All order 2	2.3 $\pm$ 0.3	150	6
2	Order 3; order 4 < 5 m	4.2 $\pm$ 0.7	300	13
3	Order 4 > 5 m; order 5 < 12 m	8.8 $\pm$ 1.0	500	13
4	Order 5 > 12 m; all order 6	16.9 $\pm$ 1.0	500	11
5	All order 7	30.1 $\pm$ 4.4	2000	7

### Preliminary Results

We captured a combined total of 1699 trout in 2008, consisting of 63% (n = 1072) pure strain cutthroat trout, 13 % (n = 216) pure strain rainbow trout, and 24 % (n = 411) hybrids. Of the combined catch, 6% (n = 98) were legal harvest size (> 300 mm TL). Of the pure strain cutthroat catch, 34% (n = 364) were mature adults (> 149 mm fork-length) and 7% (n = 75) were of legal harvest size. Cutthroat trout were more prevalent in upper sections of the drainage than in the lower sections decreasing with stream size (Figure 1). In contrast, rainbow trout abundance tended to increase with stream size i.e., they were more prevalent in the lower reaches than upper sections, Hybrids occurred in all reaches except for the headwaters.

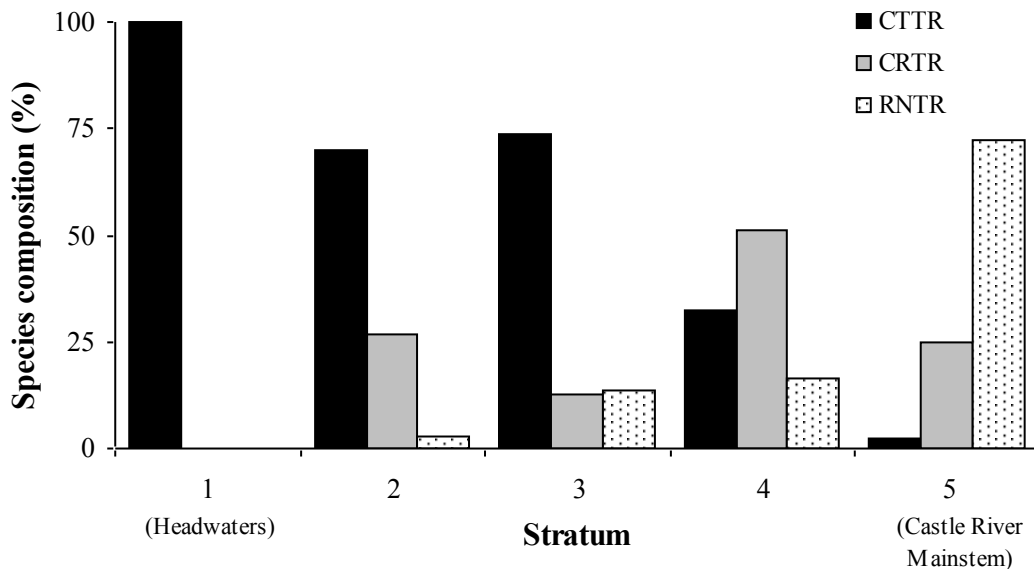


Figure 1. Percent species composition by stratum in the Castle River watershed study area.

### Conclusions

Trends in our preliminary data suggest widespread hybridization of cutthroat and rainbow trout in the Castle River drainage. The majority of fish sampled were cutthroat with hybrids and rainbow trout prevalent in the middle and lower portions of the drainage; cutthroats were more prevalent in upper sections of the drainage than in the lower sections. The degree of error associated with morphological features to identify pure cutthroat is unknown. Further genetic research is required to accurately identify low level hybrids and their impact, if any, on pure populations. We will conduct final estimates of population abundance once 2009 sampling is complete.

### Communications

- Alberta Conservation Association report series data report to be completed 2009-2010.

### Literature cited

Costello, A. 2006. The Status of Westslope Cutthroat Trout (*Onchorhynchus clarkii lewisii*) in Alberta. Prepared for Alberta Sustainable Resource Development and Alberta Conservation Association. Alberta Sustainable Resource Development Wildlife Status Report No. 61, Edmonton, AB. 34 pp.

Robinson, M. 2007. The Ecological consequences of hybridization between native westslope cutthroat trout (*Oncorhynchus clarkii lewisi*) and introduced rainbow trout (*Oncorhynchus mykiss*) in South Western Alberta. MSc thesis. University of Lethbridge. Lethbridge, AB. 152 pp.

### Photos





Comparison of a pure strain cutthroat trout from the upper South Castle River (top) and a suspected cutthroat/rainbow trout hybrid from the lower Carbondale River (bottom) identified using external characteristics (Photos: Jason Blackburn).



Alberta Conservation Association fisheries crew (Andrew Clough and Mike Marquardson) processing fish on South Castle River near Big Sagebrush Natural Area (Photo: Jason Blackburn).



Alberta Conservation Association fisheries crew totebarge-electrofishing on West Castle River near the ecological reserve. Top to bottom: Peter Aku, Brad Hurkett, Trevor Council and Jason Blackburn. (Photo: Andrew Clough)



Example of a Stratum 3 sample site, on the upper reaches of South Lost Creek. (Photo: Jason Blackburn)