Alberta Conservation Association
2009/10 Project Summary Report

Project Name: *Cutthroat Trout Population Assessment in the Castle River Drainage*

Fisheries Program Manager: Peter Aku

Project Leader: Jason Blackburn and Trevor Council

Primary ACA staff on project:

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Partnerships

Alberta Sustainable Resource Development
Devon Canada Corporation

Key Findings

- Approximately 110,000 Cutthroat Trout ≥70 mm fork length are estimated to inhabit the Castle River drainage, of which nearly 4,000 are legal-harvest size.
- Hybridization between Westslope Cutthroat Trout and Rainbow Trout is widespread in the Castle River drainage.
- Pure Westslope Cutthroat Trout populations are restricted to upper headwater streams.
- We identified 61% of the *Oncorhynchus* catch as Westslope Cutthroat Trout, 26% as hybrids and 13% as Rainbow Trout.

Introduction

Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) is currently listed as *Threatened* in Alberta by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), because genetically pure populations have become severely isolated and depressed (Alberta Sustainable Resource Development 2006). In the Castle River drainage, the population status of Westslope Cutthroat Trout is uncertain. Pure populations remain in select watersheds; however, past introductions of Rainbow Trout **(***Oncorhynchus mykiss)* by fisheries managers have resulted in widespread interbreeding. To generate data towards formulating conservation and management strategies, we initiated a drainage-scale population assessment of the species in southeastern Alberta watersheds where they still occur. Our primary objective in this study was to determine population density, abundance and proportion of legal-harvest-sized Cutthroat Trout in the Castle River drainage using a stratified-random sampling design (Blackburn 2008). Additional conservation benefits include identification of regions where pure strains persist, and

identification of the ratio of Cutthroat Trout to hybrids and Rainbow Trout where the species co-exist.

Methods

During the summer of 2008 and 2009, we conducted fish surveys across the Castle River drainage in streams ranging in size from headwater tributaries to the main stem river channel. We sampled tributaries using backpack and tote-barge electrofishers at sites ranging 150 – 500 m in length at 86 locations, selected randomly from within four stream-size categories. We sampled the main stem Castle River systematically at seven 2-km reaches using a raft electrofisher. We conducted capture-mark-recapture (CMR) population estimates to estimate gear efficiency by stream size, and to correct for single-pass catch data. We used external features to differentiate Cutthroat Trout from their hybrids as outlined by Robinson (2007). We considered fish exhibiting both a prominent white-tipped anal fin and jaw slashes as hybrids, those with only jaw slashes as Cutthroat Trout, and those with only the white tip as Rainbow trout. Inability to detect low levels of hybridization using external features alone was addressed by calculating separate abundance estimates for field-identified Westslope Cutthroat Trout, Cutthroat Trout x Rainbow Trout hybrids, pure Rainbow Trout, and all black-spotted fish of the genus *Oncorhynchus* to describe the potential Cutthroat Trout population size range. Abundance and density estimates (90% confidence interval, CI) were calculated for fish ≥70 mm fork length (FL) (the minimum size cutoff for accurate CMR estimates), and for legal-harvest-sized fish (> 300 mm total length). In addition, we collected tissue samples from Westslope Cutthroat Trout and hybrids at the remaining sample sites in year two of the study for future genetic analysis and delineation of the pure strain distribution.

Results

At 93 sites across five stream-size strata, we captured 2,260 fish ≥ 70 mm FL belonging to the genus *Oncorhynchus* (Table 1).

Table 1. Fish abundance and density by size range for the Castle River Drainage study area.

Species	Size class	Estimated fish abundance (90% CI)	Estimated Density Fish/ km (90% CI)
Cutthroat Trout	≥70 FL	106,419 (63,892 – 170,771)	128.2 (80.6 - 200.3)
	>300 TL	3,729 .(2,012 – 6,360)	4.7 (2.5 - 8.0)
Cutthroat Trout x Rainbow Trout hybrids	≥70 FL	27,458 (9,698 – 54,811)	23.9 (9.6 - 45.5)
	>300 TL	704 (326 – 1,277)	0.9 (0.4 - 1.6)
Rainbow Trout	≥70 FL	7752 (3,574 – 14,099)	7.9 (3.8 - 13.6)
	>300 TL	366 (164 - 676)	0.4 (0.2 - 0.8)
All black spotted fish of the genus Oncorhynchus	≥70 FL	144,502 (90,530 – 228,431)	139.4 (91.4 - 212.4)
	>300 TL	4,798 (2,820 – 7,878)	5.9 (3.4 - 9.8)

We identified 61% as Cutthroat Trout (n = 1,375), 26% as hybrids (n = 595) and 13% as Rainbow Trout (n = 290). Of the total catch, 9% (n = 198) were legal-harvest-sized fish. Of the legal-sized catch, we identified 63% as Cutthroat Trout (n = 124), 33% as hybrids (n = 41) and 17% as Rainbow Trout (n = 33). Cutthroat Trout were more prevalent in streams in the upper part of the drainage than in mid and lower sections (Figure 1). In contrast, the abundance of Rainbow Trout and hybrids tended to increase lower in the drainage and occurred everywhere except for the headwaters. We estimated a total Oncorhynchus trout population of 144,502 (90% CI = 90,530 – 228,431) fish, of which 4,798 (90% CI = 2,820 – 7,878) were legal-harvest-size. The estimated Cutthroat Trout population was 106,419 (90% CI = 70,231 – 174,513) fish, of which 3,729 (90% CI = 2, 012 – 6,360) were legal-harvest-size (Table 1).

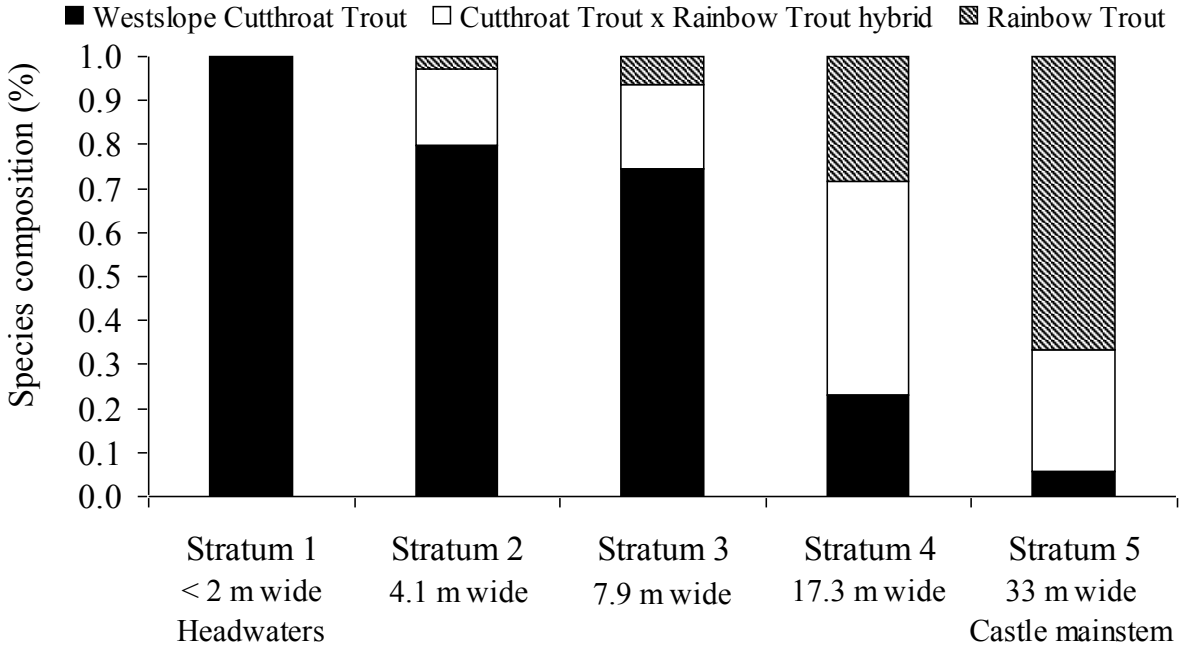

Figure 1. Species composition (%) by stratum as identified during 2008 – 2009 electrofishing, and average wetted width by stratum, in Castle River drainage.

Conclusions

Widespread hybridization across the drainage underscores the importance of incorporating full-scale tissue sampling and genetic analysis when conducting drainage-level estimates. Our results benefit fishery managers by providing a description of drainage population size and relative ratios of Cutthroat Trout to hybrids and Rainbow Trout throughout the watershed. Tissue samples collected during our study are available to delineate the geographic extent of hybridization between Westslope Cutthroat Trout and Rainbow Trout in the drainage, and the use of fish densities calculated in this study will facilitate future estimates of Cutthroat Trout density.

Communications

- Provision of information to ASRD upon project completion.
- Presentation of project results to the Oldman Chapter of Trout Unlimited Canada.
- ACA project report completed in March 2010.

Literature Cited

Alberta Sustainable Resource Development and Alberta Conservation Association. 2006. The status of Westslope Cutthroat Trout *(Oncorhynchus clarkii lewisi)* in Alberta. Alberta Sustainable Resource Development, Wildlife Status Report No. 61, Edmonton, Alberta. 34 pp.

Blackburn, J. 2008. Population abundance and stock assessment of Westslope Cutthroat Trout in the Upper Oldman River watershed. Data Report, D-2008-009, produced by Alberta Conservation Association, Lethbridge, Alberta, Canada. 38 pp + App.

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. M.Sc. Thesis, University of Lethbridge, Lethbridge, Alberta. 152 pp.

Castle Photo Captions

Name	S_Castle_efish_2
Title	Alberta Conservation Association crew tote-barge electrofishing on lower South Castle River. Left to right: Trevor Council, Jason Blackburn and Brad Hurkett. (Photo: Mike Marquardson)

Name	Wslp_CTTR_3
Title	Field-identified Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) from middle Carbondale River. (Photo: Brad Hurkett)

Name	RNTR_juvey_4
Title	Juvenile Rainbow Trout (*Oncorhynchus mykiss*) from middle South Castle River. (Photo: Brad Hurkett)

Name	S_Castle_Grizzly_Ck_5
Title	Example of stratum 4 site on South Castle River near the mouth of Grizzly Creek. (Photo: Jason Blackburn)