DRYWOOD AND YARROW CREEKS -
FISHERIES ASSESSMENTS, 2009
Trout Unlimited Canada Technical Report
No. AB-017

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Trout Unlimited Canada
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Acknowledgements

Trout Unlimited Canada (TUC) would like to thank the Drywood-Yarrow Conservation Partnership for inviting us to work with them in their watershed. In particular, thank you to Tony Bruder for coordinating volunteers and helping to plan events, and to Dick and Stephanie Hardy for hosting an electrofishing workday at their farm.

Thank you to the Alberta Conservation Association (ACA) for providing funding for this project through their Grant Eligible Conservation Fund.

TUC would also like to thank Jeff Porter from the Southwestern Alberta Conservation Partnership (SACP) for coordinating the fencing and off-stream watering projects at Dick Hardy’s and Walter Bonertz’s operations. TUC is also grateful to Michael Gerrand (Cows and Fish), Mike Uchikura (ACA), and Jeff Porter for their assistance with the Drywood Creek workday in August.

Thank you to Matthew Coombs and Daryl Wig of Alberta Sustainable Resource Development for issuing the proper Fish Research Licenses, and for providing TUC with data from previous fisheries sampling within this drainage.

Thanks to Barb Johnston of Waterton Lakes National Park for assisting with the electrofishing assessment in upper Yarrow Creek. We would also like to thank Will Warnock, and his assistant, Clint from the University of Lethbridge for bringing a second electrofisher and helping with the population estimate at Yarrow Creek.

Finally, thank you to all the other volunteers and their families for graciously giving their time to participate in the events and for showing enthusiasm and willingness to learn about fisheries and aquatic communities.
Executive Summary

Trout Unlimited Canada (TUC) began working with the Drywood-Yarrow Conservation Partnership (DYCP), a group of landowners and residents within the Drywood Creek watershed, in 2008. An impoundment on Drywood Creek 6.5 kilometres from the mouth is one issue TUC is concerned about within this watershed. This impoundment prevents fish, including bull trout, from migrating upstream to reach spawning habitat. TUC is interested in exploring options to address this problem, and in the meantime we are working with local landowners, and other conservation organizations to inventory fish within the system, hold educational events for schools and families, and complete projects that will protect and improve the health of the watershed such as installing riparian fencing and off-stream stock watering systems.

In 2009, TUC completed two electrofishing population estimates: one on Drywood Creek in August and one on Yarrow Creek in October. On Drywood Creek, the crew completed a two-pass depletion of a 250 m reach below the confluence with South Drywood Creek. Six species were observed: longnose dace (n=699), mountain sucker (n=95), brook trout (n=29), rainbow trout (n=8), mountain whitefish (n=5), and bull trout (n=1). We calculated an estimated population of 46 brook trout within the reach sampled. Two rainbow trout were the only individuals with fork lengths (FL) ≥200 mm. The brook trout appeared to have multiple length class groupings.

Yarrow Creek was sampled in the upper reach of the system, above a Shell Canada compressor station. A four-pass removal of a 300 m reach was electrofished and 35 bull trout were captured. We estimated a bull trout population of 36 within this reach. Most (82.9%) of these bull trout had fork lengths ≥200 mm and they likely represent multiple age classes. These results differed from our population estimate completed at Spread Eagle Road in 2008, in which six species were observed and all bull trout were <200 mm FL.

In 2009, as part of the Drywood Creek Watershed Renewal Program, TUC funded approximately four miles of riparian fencing, two off-stream stock watering systems, and three portable calf shelters for two cattle producers within the watershed.

TUC plans to continue working in this drainage with additional fisheries assessments, educational activities, and working with landowners to help protect and restore riparian areas, while exploring options for increasing connectivity within the system.
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1.0 INTRODUCTION

1.1 Background
The Drywood Creek watershed is located in the southwest corner of Alberta. The system includes three main tributaries: Yarrow Creek, Spionkop Creek, and South Drywood Creek, which drain an area of 280 km² before emptying into the Waterton Reservoir (Fitch 1980) (Figure 1). The Drywood Creek basin includes the Front Range and foothills of the east slopes.

Two impoundments are located on Drywood Creek: one is approximately 6.5 kilometres above the Waterton Reservoir, and the other is approximately 2.6 kilometres above the mouth of South Drywood Creek. The upstream reservoir serves the Shell Waterton Complex; the lower dam, locally known as the BA Dam, (SE14-29-4-W4) was built in 1956 by Gulf Oil to provide water to a processing facility relating to oil and gas activity in the area. Land use within the watershed includes oil and gas exploration and development, grazing, and some cultivation.

One of the goals of Trout Unlimited Canada’s Drywood Creek Watershed Renewal Program is to increase connectivity within the watershed, allowing native bull trout (BLTR) to migrate upstream to spawning grounds. We already know BLTR are likely spawning in the headwaters (Meagher 2008). Allowing BLTR to travel upstream past the BA Dam on lower Drywood Creek would help to improve the genetic diversity of this population. Before any modifications to the dam and spillway are proposed and to add value to the program, TUC’s goal is to collect fisheries data, engage the community and local schools with educational field days, and work with landowners to protect and improve the health and functionality of riparian areas within the watershed.

In October, 2008, a population estimate was completed within Yarrow Creek at Spread Eagle Road (Meagher 2008). Three events were planned for 2009 but one educational field day was cancelled due to inclement weather. Population estimates were completed at Drywood Creek on August 12, 2009 and at Yarrow Creek on October 20, 2009. In addition, TUC funded approximately four miles of fencing, two off-stream stock watering system, and three portable calf shelters for two landowners belonging to the Drywood-Yarrow Conservation Partnership.

1.2 Study Area
Two sites were sampled in 2009: Drywood Creek (below the mouth of South Drywood Creek), and upper Yarrow Creek (Figure 1). These sites were chosen based on previous sampling efforts, and ease of access.
1.2.1 Drywood Creek
Drywood Creek, from below its confluence with South Drywood Creek, is approximately 24 kilometres long and has an average gradient of about 10.8 metres per kilometre (Miller and Paetz 1952). The 2009 sampling effort on Drywood Creek took place on August 12 at Dick and Stephanie Hardy’s farm (N1/2 15-4-30-W4) (Figure 2). This site is downstream of the reservoir at the Shell Waterton Complex on Drywood Creek and downstream of the mouth of South Drywood Creek. The Hardy family granted TUC and volunteers permission to access their private land where the processing station was situated.

Fisheries Management completed a fisheries assessment at Drywood Creek in September, 2000, approximately 1.5 kilometres upstream of the 2009 sampling site. The species observed within the 200 metre reach sampled in 2000 include BKTR and RNTR (Fisheries Management, unpublished data). Spawning and rearing habitat potential for these species was rated moderate and overwintering habitat potential rated low.

1.2.2 Yarrow Creek
Yarrow Creek is approximately 26 kilometres long, has an average width of about 9 metres and an average gradient of 10.6 metres per kilometre (Miller and Paetz 1952). The Yarrow Creek sampling site was located in the upper reach of the creek, upstream of the Shell Canada compressor station (Figure 3). A private service road runs along Yarrow Creek providing access to the north end of Waterton Lakes National Park and to the Shell Canada compressor station. Shell Canada and Parks Canada permitted access through the locked gate at entrance to this service road at Range Road 303.

In September, 2000, Fisheries Management completed a fisheries investigation at same site TUC sampled in 2009. This effort resulted in the capture of 34 BLTR within a 200 metre reach (Fisheries Management, unpublished data). The habitat within this site was described as having high BLTR rearing potential, moderate overwintering habitat, and low spawning habitat potential.
Figure 1. Overview of Drywood Creek watershed and 2009 sampling sites.
Figure 2. Reach sampled in Drywood Creek on August 12, 2009 (red bars indicate the upper and lower limits of the sampling area).

Figure 3. Reach sampled in Yarrow Creek on October 20, 2009 (red bars indicate the upper and lower limits of the sampling area).
2.0 METHODS

2.1 Sampling Sites
Sampling sites were chosen based on ease of access and representativeness, with consideration of previous sampling efforts.

2.2 Sampling Methods
Electrofishing was used during both sampling events. All sampling was completed with Smith-Root backpack type 12B and type LR24 electrofishers and followed the guidelines described in the Alberta Fisheries Management Division Electrofishing Policy Respecting Injuries to Fish (2004). Each electrofishing crew was comprised of one electrofisher operator, three or four dip-netters and one to two bucket carriers. All crew members wore the following safety equipment: non-leaking chest waders, wading boots, and rubber gloves. Polarized sunglasses and a brimmed hat were also recommended for crew members.

Block nets were set up to isolate the reaches sampled. Block nets were secured to t-posts that were pounded into the substrate with a post pounder. Cable ties secured the blocking net onto the t-posts. To anchor the net in place, rocks were piled on the ends of the net on the banks, as well as along the bottom of the net. At Yarrow Creek, ropes were also used to hold the lower block net in place. Block nets were 1.5 to 2.0 metres tall, varied in width between 5 and 22 metres, and made of 1.5 millimetre stretch diagonal netting.

All fish were carried in buckets to a central processing area where they were measured and weighed. Once processed, fish were held in recovery tubs until the entire electrofishing survey was completed. Fish were released throughout the sampling area when sampling was completed.

Standard scientific abbreviations were used throughout the fieldwork and data analysis and throughout this report to name fish species (Table 1).

2.2.1 Drywood Creek
One electrofishing crew completed two passes to carry out the Drywood Creek population estimate. A 250 metre reach was cordoned off with block nets on either end. Recovery tubs were placed above the upper blocking net and secured to the river bed with t-posts.

2.2.2 Yarrow Creek
A 300 metre reach was sampled at Yarrow Creek. Two electrofishing crews each carried out two passes for a total of four electrofishing passes. After the first crew began, the second crew allowed a minimum of thirty minutes to elapse to allow fish remaining in the creek to recover. Block nets were set up at both ends of the sampling area. The upper block net was compromised part-way
through the survey as leaf litter combined with high water flows pushed the net over. However, this was not thought to have skewed results as various individuals replaced the netting and held it in place as required. In the future we would ideally utilize more t-posts and clean the net more frequently.

Will Warnock, a PhD candidate from the University of Lethbridge, was on hand to assist with sampling, take stream habitat measurements (Appendix A), and to clip adipose fins of BLTR for genetic analysis.

Table 1. Abbreviations, common names, and scientific names of all fish species mentioned in this report.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Common Name</th>
<th>Scientific Name</th>
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<tr>
<td>Sportfish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RNTR</td>
<td>rainbow trout</td>
<td>Oncorhynchus mykiss</td>
</tr>
<tr>
<td>BLTR</td>
<td>bull trout</td>
<td>Salvelinus confluentus</td>
</tr>
<tr>
<td>BKTR</td>
<td>brook trout</td>
<td>Salvelinus fontinalis</td>
</tr>
<tr>
<td>MNWH</td>
<td>mountain whitefish</td>
<td>Prosopium williamsoni</td>
</tr>
<tr>
<td>Non-Sportfish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MNSC</td>
<td>mountain sucker</td>
<td>Catostomus platyrhynchus</td>
</tr>
<tr>
<td>LNDC</td>
<td>longnose dace</td>
<td>Rhinichthys cataractae</td>
</tr>
</tbody>
</table>

2.3 Data Analysis

2.3.1 Population Estimates
Data was entered into and analyzed using Microsoft Excel. The population estimates for Drywood Creek and Yarrow Creek were calculated using the two-pass and multiple-pass depletion methods, respectively, as described by Lockwood and Schneider (2000). These formulas provide a population estimate, the probability of capture (p), and approximate 95% confidence limits. Population estimate lower confidence intervals are equal to the actual catch unless otherwise reported.

The two-pass depletion estimates are considered unbiased when \( p \geq 0.80 \) and quite unreliable when \( p \leq 0.20 \) (i.e., when less than 20% of the population is captured per pass (Lockwood and Schneider 2000).

2.3.2 Length Distribution
No fish were aged during the project. Instead, the fork length frequency distribution has been displayed in histograms to illustrate length classes (Figures 4 and 5). Fork lengths of BKTR at Drywood Creek and BLTR at Yarrow Creek
were grouped in 10 mm intervals and the frequency of occurrence displayed as percentages in the histograms.

3.0 RESULTS AND DISCUSSION

3.1 Drywood Creek

3.1.1 Species Composition
Six species were captured from Drywood Creek during the 2009 sampling event. These included four sport species: BKTR (n=29), RNTR (n=8), MNWH (n=5), and BLTR (n=1). Non-sport species included LNDC (n=604) and MNSC (n=95). Overall, sportfish made up 5.8% of the total catch during the two-pass removal (Table 2).

3.1.2 Population Estimates
The two-pass depletion population estimate method described by Lockwood and Schneider (2000) was used to estimate the BKTR population within the 250 m reach sampled. Twenty-nine BKTR were captured, and the estimated population was calculated to be 46 individuals within the reach sampled (95% confidence upper limit: 90 individuals) (Table 3). No population estimate was completed for other sport species due to small sample size.

3.1.3 Length Distribution
Two RNTR were the only individuals with fork lengths ≥200 mm; one measured 205 mm FL and the other measured 222 mm FL (Appendix B). There appears to be three unique length classes present in the sample of BKTR: the first ranges in length from the 21-30 mm FL interval to the 41-50 mm FL interval; the second overlaps with the first and ranges from the 41-50 mm FL interval to the 61-70 mm FL interval; the third length class ranges from the 121-130 mm FL to the 141-150 mm FL interval (Figure 4). We could hypothesize that these three length classes may represent three age cohorts: young-of-the-year (YOY), age-1, and age-2 individuals, but we did not take any ageing data so we cannot confirm this.

3.2 Yarrow Creek

3.2.1 Species Composition
BLTR (n=35) was the only species observed during the 2009 sampling effort at Yarrow Creek (Table 4). Similarly, an electrofishing assessment at the same site in September, 2000 resulted in the capture of only BLTR (n=34) (Fisheries Management, unpublished data). In contrast, the 2008 effort further downstream at Spread Eagle Road resulted in the capture of 64 BLTR (42.5% of total catch) 39 BKTR (25.5% of total catch), plus 49 other fish of four other species (Table
4). It is possible that the habitat in the upper reach sampled in 2009 was not as suitable for BKTR and non-sport species. Temperature likely may also play a role as a limiting factor in the upper reaches of Yarrow Creek. Temperatures in the upper reaches were lower and this may be the limiting factor benefitting BLTR. Local landowners indicate the creek flows become subterranean between these sampling sites for a portion of the year which could also isolate fish in the upper reaches of the creek. This could benefit localized populations of BLTR and limit the influence of non-native BKTR.

3.2.2 Population Estimate
The four-pass removal electrofishing effort resulted in the capture of 19, seven, six, and three BLTR, respectively, for a total of 35 individuals. From these findings, we estimate the 300 m reach held a total of 36 BLTR (95% confidence upper limit: 38 individuals) (Table 3).

3.2.3 Length Distribution
A wide distribution of fork lengths were observed among the BLTR captured in 2009; individual fork lengths varied between 58 mm and 320 mm (Appendix C). In contrast, during the 2008 sampling effort two presumed age classes were captured (age-1 and age-2), with the predominant length class made up of the presumed age-1 cohort (Figure 5). No BLTR captured in 2008 measured ≥200 mm FL, while 82.9% of BLTR measured ≥200 mm FL in 2009 (Table 4). There are several possible explanations for the differences in length distribution between the 2008 and 2009 sampling sites: electrofishing and dip netting efficiency may have been reduced in 2009 as a result of high water; fewer small fish may have been present within the 2009 sampling area because of the high water; or the habitat in the 2009 sampling area is less suitable for small fish. Although length is not a great predictor of age for older fish because the overlap between the length-at-age distribution is large (Morton and Bravington 2008), we still suspect there were more age classes present in 2009.
Table 2. Size class and density comparisons of fish captured at Drywood Creek on August 12, 2009.

| Species | (n=) | Density (Fish / meter) | % Composition | ≥ 200mm (%)
|---------|------|------------------------|---------------|--------------
| BLTR    | 1    | <0.1                   | 0.1%          | 0.0%         |
| BKTR    | 29   | 0.1                    | 5.3%          | 0.0%         |
| MNWH    | 5    | <0.1                   | 0.7%          | 0.0%         |
| RNTR    | 8    | <0.1                   | 1.1%          | 25.0%        |
| LNDC    | 604  | 2.4                    | 81.4%         | 0.0%         |
| MNSC    | 95   | 0.4                    | 12.8%         | 0.0%         |

| Total Sportfish | 43 | 0.2 | 5.8% | 4.7% |
| Total Non-sportfish | 699 | 2.8 | 94.2% | 0.0% |
| Total All Fish | 742 | 3.0 | —   | 0.3% |
| Percent Sportfish | 5.8% | —   | —   | —   |

Note: ≥ 200mm (%) derived from # of individuals ≥ 200mm FL divided by total number of fish within that class (i.e. sport or non-

Table 3. Population estimates for BNTR and/or BKTR captured in Drywood Creek and Yarrow Creek in 2008 and 2009. Population estimates calculated using methods described in Lockwood and Schneider (2000).

<table>
<thead>
<tr>
<th>YARROW CREEK</th>
<th>DRYWOOD CREEK</th>
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<tr>
<td></td>
<td>2008 - Spread Eagle Road</td>
</tr>
<tr>
<td>Distance Fished (m)</td>
<td>300</td>
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<tr>
<td>Species</td>
<td>BKTR</td>
</tr>
<tr>
<td>Pass 1</td>
<td>21</td>
</tr>
<tr>
<td>Pass 2</td>
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<td>Pass 3</td>
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<td>Pass 4</td>
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<tr>
<td>Total</td>
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<td>Population Estimate</td>
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Table 4. Fish size class and density comparisons at Yarrow Creek in 2008 (at Spread Eagle Road) and 2009 (above Shell Canada compressor station)

<table>
<thead>
<tr>
<th>Species</th>
<th>2008 - Spread Eagle Road</th>
<th>2009 - Shell Canada Compressor Station</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=) Density (Fish / meter)</td>
<td>% Composition ≥ 200mm (%)</td>
</tr>
<tr>
<td>BLTR</td>
<td>65 0.2 42.5% 0.0%</td>
<td>N/A N/A N/A N/A</td>
</tr>
<tr>
<td>BKTR</td>
<td>39* 0.1 25.5% 0.0%</td>
<td>N/A N/A N/A N/A</td>
</tr>
<tr>
<td>MNWH</td>
<td>1 &lt;0.1 0.7% 100.0%</td>
<td>N/A N/A N/A N/A</td>
</tr>
<tr>
<td>RNTR</td>
<td>19 &lt;0.1 12.4% 0.0%</td>
<td>N/A N/A N/A N/A</td>
</tr>
<tr>
<td>LNDIC</td>
<td>26 &lt;0.1 17.0% 0.0%</td>
<td>N/A N/A N/A N/A</td>
</tr>
<tr>
<td>MNSC</td>
<td>3 &lt;0.1 2.0% 0.0%</td>
<td>N/A N/A N/A N/A</td>
</tr>
<tr>
<td>Total Sportfish</td>
<td>124 0.4 81.0% 0.8%</td>
<td>35 0.1 N/A 82.9%</td>
</tr>
<tr>
<td>Total Non-sportfish</td>
<td>29 0.1 19.0% 0.0%</td>
<td>N/A N/A N/A N/A</td>
</tr>
<tr>
<td>Total All Fish</td>
<td>153 0.5 – 0.7%</td>
<td>35 0.1 – 82.9%</td>
</tr>
<tr>
<td>Percent Sportfish</td>
<td>81.0% – – –</td>
<td>100.0% – – –</td>
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Note: ≥ 200mm (%) derived from # of individuals ≥ 200mm FL divided by total number of fish within that class (i.e. sport or non-sport)
* Includes one BKBL hybrid
1 Sampling immediately upstream of Spread Eagle Road, from Meagher 2008
2 Sampling above Shell Canada Compressor Station in upper Yarrow Creek

Figure 4. Fork length frequency distribution of brook trout captured at Drywood Creek in 2009.
Figure 5. Fork length frequency distribution of bull trout captured at two different sites within Yarrow Creek in 2008 and 2009.

3.3 Overview and Recommendations

The two sites sampled in 2009 had very different species composition and length distribution. At Drywood Creek crews observed six species and the catch was dominated by non-sportfish. BKTR was the dominant sport species, and no BKTR individuals measured ≥200 mm FL. In contrast, the Yarrow Creek site contained only BLTR, and 82.9% of fish were ≥200 mm FL. Temperature is likely the major factor influencing species distribution within these creeks. The population of BLTR captured above the Shell compressor station may be isolated from BKTR genetics and competition, which may benefit this population. Many of the BLTR captured at Yarrow Creek were likely fluvial resident individuals (W. Yarrow Creek - October 2009 (immediately upstream of Shell compressor station), NES-3-30-W4 - Bull Trout Length Class Distribution

Yarrow Creek - October 2008 (immediately upstream of Spread Eagle Road), NW22-3-30-W4 - Bull Trout Length Class Distribution

Warnock, pers. comm.). The largest BLTR captured at the upper Yarrow site appeared to be post-spawn (they displayed battle scars and kypes). The fact that they still resided in this reach well after spawning suggests they were residents.

Recommendations for future sampling efforts within the Drywood/Yarrow watershed:

- Properly assess the desired reach prior to sampling – During the sampling effort at Drywood Creek, flow rates were high and the creek was wider than anticipated. Two electrofishers working simultaneously in the creek would have increased the electrofishing efficiency and optimized on time;
- Having a second electrofisher and enough qualified people to run two crews gives the option to either run two electrofishing crews simultaneously or to complete more electrofishing passes in less time. Having a second crew during sampling at Yarrow Creek in October worked very well. This allowed us to do four passes in the time it would take one crew to do two passes. A second crew to assist with sampling at Drywood Creek likely would have improved electrofishing efficiency.
- Continue to work the Drywood-Yarrow Conservation Partnership – Members are excellent volunteers, they help with access to sampling sites, provide local knowledge and advice, can help coordinate school groups, and are intimately concerned with the health of their watershed;
- Continue to work with Will Warnock as he collects data within the watershed for his PhD;
- Re-visit the 2009 Yarrow Creek sampling site in 2010 to compare findings with the 2009 data;
- Sample other areas of the watershed –
  - Drywood Creek above the Shell Waterton Complex – where locals suspect there may be isolated populations of pure cutthroat trout, a species we have not yet observed during sampling in this watershed;
  - Spionkop Creek – this tributary has a different appearance and different habitat than Yarrow Creek (Miller and Paetz 1953) and has not yet been sampled by TUC;
  - Drywood Creek below the confluence with Yarrow Creek, possibly below the BA dam.

4.0 OTHER CONSERVATION INITIATIVES, 2009

In 2009, TUC partnered with Jeff Porter, the Conservation Coordinator for the Southwest Alberta Conservation Partnership (Municipal Districts of Pincher Creek, Willow Creek, and Ranchlands) to help two cattle producers with conservation initiatives. Funding from the Alberta Conservation Association’s Grant Eligible Conservation Fund and TUC’s Coldwater Conservation Fund paid
for the materials required for approximately four miles of riparian fencing, two off-stream stock watering systems, and three portable calf shelters. Dick and Stephanie Hardy, and Walter Bonertz, were recipients of the funds. The fencing and stock watering systems will allow these producers to better manage and protect riparian areas on their land (Figures 6 and 7).

Figure 6. Riparian fencing completed at Dick and Stephanie Hardy’s farm

Figure 7. Off-stream watering system set up at Dick and Stephanie Hardy’s farm
Literature Cited


# APPENDIX A

Table A1 Stream habitat measurements completed October 20, 2009 at Yarrow Creek: riffle and pool characteristics

**Stream:** Yarrow Creek  
**Total distance:** 187 m  
**Date:** October 20, 2009  
**Water temp:** 4 degrees C  
**Time:** 10:00 AM  
**Water Clarity:** Turbid  
**Elevation:** 1546 m  
**UTM:** 12u 0282020 5453480

**Sampling Crew:** Team Scorpion and Trout Unlimited dream team

## Riffle Characteristics

<table>
<thead>
<tr>
<th>Number</th>
<th>Length (m)</th>
<th>Boulder-1</th>
<th>Boulder-2</th>
<th>Boulder-3</th>
<th>Bedrock (m)</th>
<th>Large Woody Debris (#)</th>
<th>Riparian Cover (m)</th>
<th>Undercut Banks (m)</th>
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<th>Percent riffle (%)</th>
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<th>Total area, m²</th>
<th>% Bedrock</th>
<th>% Fines (&lt;2mm)</th>
<th>% Small Gravel (&lt;2mm)</th>
<th>% Large Gravel (2&lt;16mm)</th>
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<th>% Cobble (65-256mm)</th>
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## APPENDIX B

### Appendix B Table B1

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Life history data collected during sampling at Drywood Creek on August 12, 2009, PASS 1.

### Appendix B Table B2

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Life history data collected during sampling at Drywood Creek on August 12, 2009, PASS 1.
### Appendix B Table B3

**Life history data collected during sampling at Drywood Creek on August 12, 2009, PASS 2.**

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Total: 1, 382
### APPENDIX C

**Appendix C Table C1**

Life history data collected during sampling at Yarrow Creek on October 20, 2009, PASS 1.

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**Appendix C Table C2**

Life history data collected during sampling at Yarrow Creek on October 20, 2009, PASS 2.

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**Appendix C Table C3**

Life history data collected during sampling at Yarrow Creek on October 20, 2009, PASS 3.

<table>
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<th>Species</th>
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<th>Weight (g)</th>
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**Appendix C Table C4**

Life history data collected during sampling at Yarrow Creek on October 20, 2009, PASS 4.

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