

## **Alberta Conservation Association (ACA)**

**Date:** 2014-2015

**Project Name:** Stocked Trout Survival

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### **Partnerships**

- Alberta Environment and Sustainable Resource Development

### **Key Findings**

- Proportion of stocked fish captured throughout the summer ranged from a low of 0.7% at Mirror Reservoir to a high of 74.5% at Irma Pond.
- Estimated angler effort varied widely between our 12 study waterbodies, ranging from a low of 7 h/ha at Mirror Reservoir to a high of 5,268 h/ha at Cipperley's Reservoir.
- Harvest of stocked trout ranged from 3.3% at Mound Red Reservoir to 72.7% at Cipperley's Reservoir.
- Fish survival varied widely between our 12 study waterbodies, with estimates ranging from 7.5% at Beaumont Pond to 99.7% at Nugent Pond.

### **Introduction**

Stocking trout to create put-and-take fisheries is a popular management tool for providing recreational fisheries. In Alberta, both Alberta Environment and Sustainable Resource Development and Alberta Conservation Association (ACA) annually stock over two million harvestable-sized rainbow trout (*Oncorhynchus mykiss*) into approximately 250 waterbodies. In 2014, ACA stocked 61 waterbodies with approximately 115,150 rainbow trout. Most Enhanced Fish Stocking (EFS) waterbodies are situated close to small municipalities, making them popular family destinations. However, recent evidence suggests some of these waterbodies may not be capable of supporting trout survival beyond mid-summer. Results from our study of seven stocked waterbodies (including four EFS waterbodies) indicated that only 4% of trout mortality was attributable to anglers and that over 90% of stocked trout died of natural causes over the fishing season (Patterson and Sullivan 2013). A variety of factors likely contribute to the high mortality of stocked trout in EFS waterbodies. However, recent water quality data collected by ACA suggest poor water quality, particularly high temperature and low oxygen, may be key among these factors. The objectives of this study were to estimate survival of rainbow trout at 12

representative ACA stocked waterbodies; correlate fish survival with water temperature, dissolved oxygen (DO) and other water quality parameters; and estimate angler effort and angler harvest at these waterbodies.

## **Methods**

We estimated fish survival at two-week intervals from stocking date in mid-May to mid-September 2014. We captured fish with a gang of multi-panel gill nets of varying mesh sizes set just after sunrise to noon. To limit fish mortality, nets were inspected every 10 to 15 minutes, and smaller mesh panels were replaced with larger ones over the summer period as fish grew larger. Each captured fish was uniquely marked with a passive integrated transponder (PIT) tag and released. During the week of September 22, we used overnight net sets to maximize capture of remaining stocked fish. Estimates of trout survival were derived using the Cormack Jolly-Seber live recaptures open population models in the software program MARK.

During gill netting sessions, we opportunistically conducted angler surveys to estimate trip and fish harvest/release at each waterbody. In addition, we collected supplementary information on angler effort at each waterbody using trail cameras, programmed to take a photograph hourly from 0600 to 2300 hours daily.

During each netting session, we measured temperature and DO profiles. Grab water samples were collected and sent to Maxxam Analytics to be analyzed for total phosphorus, chlorophyll-*a* and ammonia. In addition, water temperature and DO were measured at one-hour intervals throughout the summer with data loggers suspended in mid-water column. Analysis of water quality data is underway and not presented in this report.

## **Results**

The proportion of stocked fish captured throughout the summer ranged from a low of 0.7% at Mirror Reservoir to a high of 74.5% at Irma Pond, with an overall mean of 23.2% (Table 1). We had only occasional catches in Mirror Reservoir throughout the summer and no catches at Parlby Pond by mid-July. Fish survival into late September ranged from a low of 7.5% at Beaumont Pond to a high of 99.7% at Nuggett Pond (Table 1). Overall, average fish survival at all ponds was 36.9% but varied substantially among ponds between May and September (Figure 1). Survival was not estimated at Lamont, Mirror and Parlby reservoirs due to low fish captures. At Mirror Reservoir, direct evidence of significant avian predation was observed, and this is suspected to be a very large source of fish mortality.

Table 1. Number of fish stocked, percent of initial stocking captured and fish surviving until mid-September from 12 Alberta Conservation Association stocked waterbodies, 2014.

Waterbody	Number of trout stocked	No. fish captured	% fish captured	Fish surviving until mid-September		
				No.	%	95% CI
Beaumont Pond	2,500	392	15.7	188	7.5	3.5 – 10.1
Cipperley’s Reservoir	1,500	298	19.9	783	52.2	32.5 – 56.1
Daysland Pond	400	286	71.5	256	64.1	10.3 – 84.5
Innisfree Pond	1,600	268	16.8	310	19.4	17.1 – 21.1
Irma Pond	400	298	74.5	177	44.2	29.1 – 46.2
Lamont Reservoir	2,000	117	5.9	NA <sup>1</sup>	NA <sup>1</sup>	–
Mirror Reservoir	3,000	21	0.7	NA <sup>1</sup>	NA <sup>1</sup>	–
Mound Red Reservoir	3,000	114	3.8	228	7.6	2.4 – 8.4
Nuggent Pond	1,000	377	37.7	997	99.7	NA
Parlby Reservoir	1,000	18	1.8	NA <sup>1</sup>	NA <sup>1</sup>	–
Radway Pond	1,000	209	20.9	242	24.2	5.1 – 33.4
Westlock Pond	2,000	175	8.8	262	13.1	7.0 – 17.6

<sup>1</sup> Estimates not available as fish captures were too low

We obtained adequate data from direct counts to derive creel estimates at four waterbodies only (Table 2). Estimated total number of trips made by anglers to these ponds ranged from 537 to 3,212 trips, and total harvest ranged from 100 to 1,091 fish (Table 2). Total catch rates ranged from 0.39 fish/h at Cipperley’s Reservoir to 1.22 fish/h at Westlock Pond, while angler harvest ranged from a low of 3.3% at Mound Red Reservoir to a high of 72.7% at Cipperley’s Reservoir. From camera data, estimated angler hours and angler effort ranged from 31 to 4,862 h and 7 to 5,268 h/ha, respectively (Table 3). Hours and effort were lowest at Mirror Reservoir and highest at Cipperley’s Reservoir (Table 3).

Table 2. Results of angler interviews from four Alberta Conservation Association stocked waterbodies, 2014. Means and associated 95% confidence intervals were estimated using bootstrap techniques.

Waterbody	Number of trips		Total harvest (fish/h)			Catch rate (fish/h)
	Mean	95% CI	Mean	95% CI	%	
Beaumont Pond	1,066	824 – 1,389	795	721 – 869	31.8	0.50
Cipperley's Reservoir	3,212	2,526 – 4,035	1,091	982 – 1,207	72.7	0.39
Mound Red Reservoir	1,116	856 – 1487	100	90 – 110	3.3	0.56
Westlock Pond	537	367 – 821	444	385 – 504	44.4	1.22

Table 3. Trail camera data from 12 Alberta Conservation Association stocked waterbodies, 2014. Means and associated 95% confidence intervals were estimated using bootstrap techniques.

Waterbody	Total number of hours		Angler effort (h/ha)	
	Mean	95% CI	Mean	95% CI
Beaumont Pond	2,176	1,974 – 2,380	888	805 – 971
Cipperley's Reservoir	4,862	4,371 – 5,368	5,268	4,727 – 5,804
Mound Red Reservoir	2,480	2,232 – 2,732	596	536 – 657
Westlock Pond	1,091	947 – 1,242	799	694 – 910
Daysland Pond	439	315 – 581	273	196 – 362
Innisfree Pond	1,271	1,122 – 1,428	878	775 – 986
Irma Pond	612	517 – 717	1,390	1,172 – 1,627
Lamont Reservoir	472	386 – 560	85	70 – 100
Mirror Reservoir	31	13 – 56	7	3 – 13
Nuggent Pond	505	415 – 600	856	703 – 1016
Parlby Reservoir	1,148	937 – 1,364	1,559	1,273 – 1,853
Radway Pond	520	431 – 615	308	255 – 364

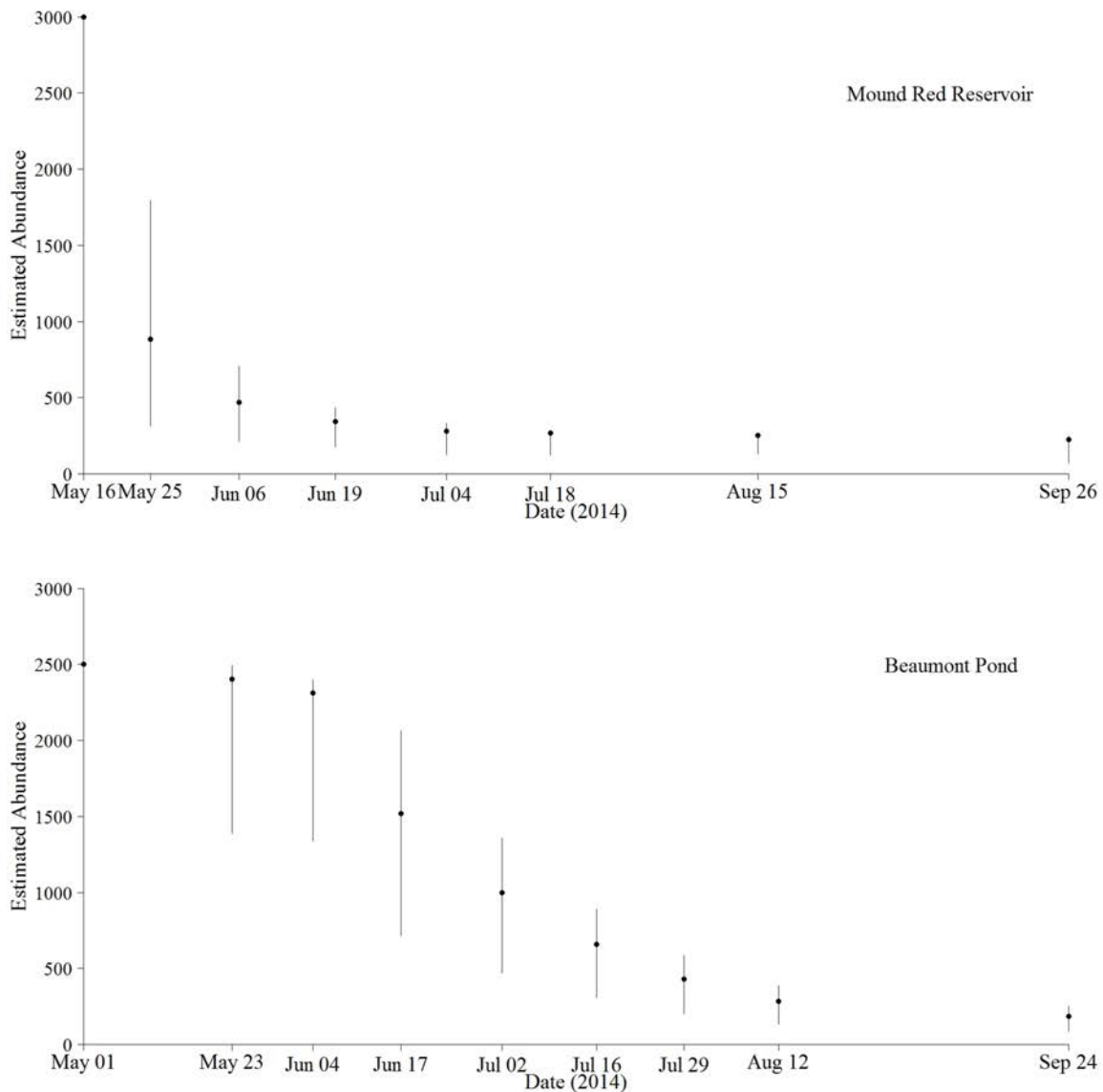


Figure 1. Examples of temporal trend in fish abundance (mean  $\pm$  95% confidence intervals) in two Alberta Conservation Association stocked waterbodies, May to September 2014.

## Conclusions

Estimates of stocked trout survival and angler effort varied considerably across our 12 study waterbodies. In some instances, low survival was attributed to high angler harvest, indicating direct benefit to anglers. At other ponds, low survival appears to be related to avian predators. Where the source of non-angler mortality is known, we will try to implement measures to increase fish survival, providing greater benefit to anglers. Where the source of mortality is unknown, further investigations are needed. Identifying trends in survival of stocked fish at individual waterbodies is helpful to assess our current stocking practices.

## **Communications**

N/A

## **Literature Cited**

Patterson, W.F., and G.M. Sullivan. 2013. Testing and refining the assumptions of put-and-take rainbow trout fisheries in Alberta. *Human Dimensions of Wildlife* 18: 340–354.

## **Photos**



Alberta Conservation Association staff member Zach Spence holding a rainbow trout captured at Innisfree Trout Pond. Photo: Dave Jackson



A family fishing at an Alberta Conservation Association stocked pond in Radway, Alberta.  
Photo: Kevin Fitzsimmons