

Spring Trout Fishery in the Cornwallis River, Nova Scotia, 2013.



John L. MacMillan

Inland Fisheries Division

Nova Scotia Department of Fisheries and Aquaculture

Introduction

Angler creel surveys are used to evaluate fisheries and collect biological data on fish populations. The Cornwallis River is located in Kings County Nova Scotia and supports a popular fishery for primarily brown trout, *Salmo trutta* and secondarily speckled trout, *Salvelinus fontinalis*. Brown trout were first introduced to Nova Scotia prior to 1925. Since that time, brown trout have established many self-sustaining populations and in some systems have replaced native speckled trout as the main sportfish. Angler catches of large brown trout exceeding 2kg have been reported from the Cornwallis River. As in other sea trout fisheries, much of the angling activity takes place in the spring of the year when the trout are in tidal waters and the lower reaches of river systems. Spring fisheries for sea run trout are typically characterized by small catch per effort and high rates of retention of large fish. In 2002, a 3.6 km section of the Cornwallis River was designated as a Special Trout Management Area and angling restrictions were in place to reduce harvest. Anglers have expressed interest as to understanding the status of the sport fishery on the Cornwallis River and if the trout populations were being overfished.

Methods

An angler creel survey on Cornwallis River was undertaken during 1 April to 19 May 2013. Ten of the most popular angling locations were sampled between the head of tide in Kentville and about 20km upstream to Berwick (Figure 1). Anglers were counted and interviewed to measure activity and their catch at each site. Survey sites were visited twice during a survey day by one creel survey clerk. One circuit required about 2 to 3 h to complete; therefore, a sampling day usually required approximately 4 to 6 h. The second circuit was started after completion of the first circuit. Creel clerks attempted to interview as many anglers as possible and budget time to complete circuits in about 2-3 h. Anglers were interviewed to obtain information on their hometown, gear type used, duration of angling, number and species caught. Mean catch per hour of angling was determined for each day when more than one angler was interviewed. The catch was measured for forklength in mm and weight in grams. A scale sample was taken from each fish to be aged. Water and air temperatures and weather conditions were recorded (Appendix A). The proportion of released trout was calculated. Data collected from the Hall site and Kentville site were combined because the sites were in close proximity. Data collected from the Lovett Road and a three km section downstream was presented as the Lovett Road site.

Effort, total angler hours spent on each system, was estimated from activity strata from the following equation; $E = TA$, where E = effort (number of hours angled), T = duration of the fishing day (hours), and A = mean activity. The total number of speckled trout caught was estimated using the following equation: $C = E * CPUE$, where C = total number of fish caught, E = effort, and $CPUE$ = mean catch per unit effort. Standard deviation, standard error, and coefficient of variance were determined for catch per unit effort and activity. Coefficient of variance was determined for effort and catch calculated using the following equation: $CV = SE(x) / x$, $CV(E) = CV^2(A)$, $CV(C) = CV^2(A) + CV^2(CPUE)$, where CV = coefficient of variance, SE = standard error, x = mean, E = effort, A = activity, $CPUE$ = catch per unit effort, and C = catch. Harvest (retained catch) was estimated based on the rates of retention for brown trout and for speckled trout from this survey.

Results and Discussion

A total of 127 anglers were counted and 116 anglers were interviewed. The majority (75%) of anglers were from Kings County and the angler who traveled the farthest was from Guysborough, Guysborough County (Figure 2). The angler population was comprised of 88% males, 7% females, and 5% children under sixteen years of age. The percentage of anglers that used the following gear was 36% for bait, 33% for lure, 16% for both lure and bait, 11% fly, and 3% fly and lure. The popularity of bait and participation by gender are similar to the provincial average (Nova Scotia Sportfishing survey 2013).

The three most popular angling locations were the Highway 101, Lovett Road and Kentville (Figure 3). Less angling pressure was observed in the upper reaches and that is consistent with other sea run fisheries in April and May. Over the sixteen days of the survey the mean daily activity (angler counts) were observed to decline and sampling was reduced to include only weekends after 16 April (Figure 4). Sampling was selective toward weekends since more anglers were expected to be present. As a result, the mean activity value of 4.1 (1.0, SD) anglers is probably greater than the actual activity for this system. Water temperatures remained less than 7°C during April and warmed to greater than 9°C during May (Figure 5). Feeding and movement of trout is influenced by water temperature and optimal temperatures for trout are in the range of 12-16°C. As water temperatures approach optimal temperatures during spring the catch per unit effort may increase.

During the survey, 116 anglers spent 244 hours to catch 25 brown trout and 2 brook trout. Eighty-eight percent of the catch of brown trout were released and all speckled trout were released. The mean size of the brown trout retained was 33cm. The large rate of release practiced by anglers on the Cornwallis River is an anomaly compared to other spring sea trout fisheries. In spring of 2013, release rates in the East River of Pictou were 27% for speckled trout and 11 % for brown trout. Other species caught by anglers on Cornwallis River include two white sucker that were released at the Lovett Bridge site. Mean catch per unit effort did not follow a pattern throughout the survey and was 0.23 (0.23,CV) for brown trout and was 0.02 (1.0,CV) for speckled trout. Small catch per hour were comparable to other sea trout systems like the East River of Pictou, Antigonish Rivers and other systems during spring fisheries in the Northumberland Strait (MacMillan and Madden 2008). Catch per unit effort also reflects abundance or population density. Clearly, these data indicate that brown trout are a dominant species in the main branch sites in the Cornwallis River. Electrofishing in the Cornwallis River indicated that speckled trout were more abundant in small cold water streams (MacMillan et al 2008). Taniguchi et al (1998) reported that speckled trout occupy upper reaches of systems because of thermal preference and competition. Characteristics that provide brown trout with a competitive advantage include an increased difficulty of capture, greater longevity and size compared to speckled trout. Additionally, brown trout are tolerant of warmer and more disturbed habitat conditions compared to speckled trout (Fausch and White 1981).

Estimated total angler effort spent on the Cornwallis River between 1 April and 29 May was 2867 hours and resulted the catch of 689 (0.64,CV) brown trout and 50 (1.25,CV) speckled trout. The harvest based on the proportion of the catch that was retained was 63 brown trout and zero speckled trout (Table 1). The bias associated with sampling only on weekends during the last half of the survey potentially overestimates activity, effort, and harvest. Although some angling effort and catch was missed during this survey, harvest estimates were small for trout and the high release rate practiced by anglers in the Cornwallis River suggest that the impact of angling on the sport fish resource is minimal. Environmental conditions that are impacted by agricultural activities and other development probably have a much larger impact on the fish populations and sportfishery. Habitat restoration and protection measures to address issues that relate to livestock access,

nutrient loading, irrigation, and improving buffer zones impacting the Cornwallis River system should be continued.

Acknowledgments

Thanks to Reginald Madden, Fisheries Technician, who participated in the data collection and data entry components of this project. Don MacLean, Director and Al McNeill, Manager, provided resources to undertake the study and a useful edit.

References

MacMillan, J.L., D. Caissie, T.J. Marshall, and L. Hinks. 2008. Population indices of brook trout (*Salvelinus fontinalis*), Atlantic salmon (*Salmo salar*), and salmonid competitors in relation to summer water temperature and habitat parameters in 100 streams in Nova Scotia. Canadian Technical Report of Fisheries and Aquatic Sciences. 2819:34p.

MacMillan, J.L. and R.J. Madden .1998. Angler effort and harvest of sea-run brook trout from a specially regulated estuary, Nova Scotia, Canada. pp 186-194 in Carline, R.F.; LoSpio C., eds. 2007. Sustaining wild trout in a changing world; proceedings of Wild Trout 1X symposium; 2007 October 9-12. West Yellowstone, Montana. 308p.

Fausch, K.D., and White, R.J. 1981. Competition between brook trout, *Salvelinus fontinalis*, and brown trout, in a Michigan Stream. Canadian Journal of Fisheries and Aquatic Sciences. 38:1220-1227.

Taniguchi, Y, Rahel, F.J., Novinger, D.C., and K.J. Gerow. 1998. Thermal mediation of competitive interactions among three fish species that replace each other along longitudinal stream gradients. Canadian Journal of Fisheries and Aquatic Sciences 55: 1894-1901.

NS Sportfishing survey. 2013. <http://novascotia.ca/fish/programs-and-services/industry-support-services/inland-fisheries/special-management-areas/reports-and-publications/>

Table 1. Angler catch per hour, angler counts per hour, angler effort, catch and harvest of brown trout and speckled trout on the Cornwallis River from 1 April to 19 May, 2013.

Species	Catch per hour					Activity				Effort in hours		Catch		Harvest
	Days	mn	SD	SE	CV	Days	mn	SE	CV	N	CV	N	CV	N
Brown	12	0.23	0.31	0.09	0.39	16	4.1	1.02	0.25	2984	0.25	689	0.64	83
Speckled	12	0.02	0.05	0.01	1.00	16	4.1	1.02	0.25	2984	0.25	50	1.25	0

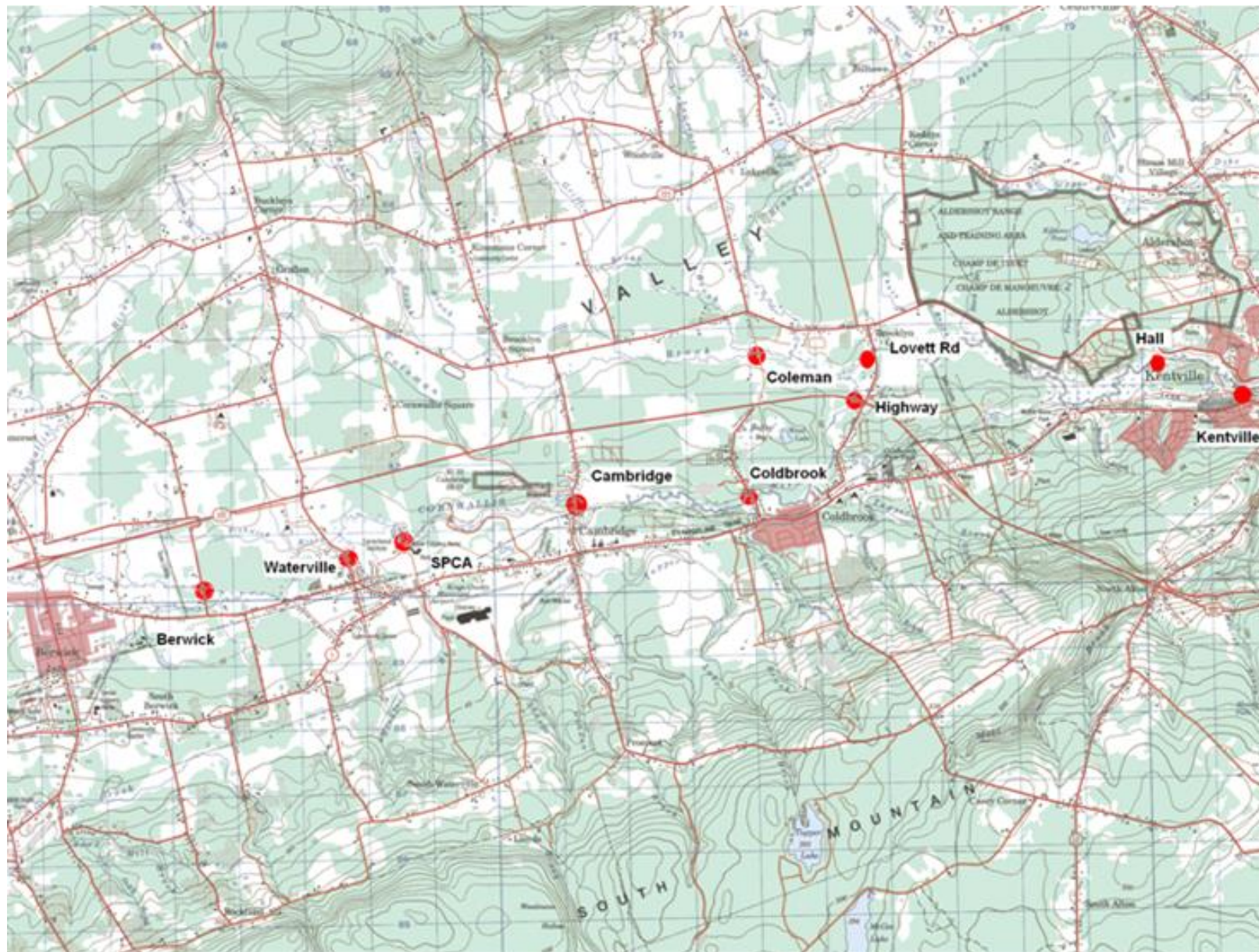


Figure 1. Location of angler creel survey sites in Cornwallis River, 1 April-19 May, 2013.

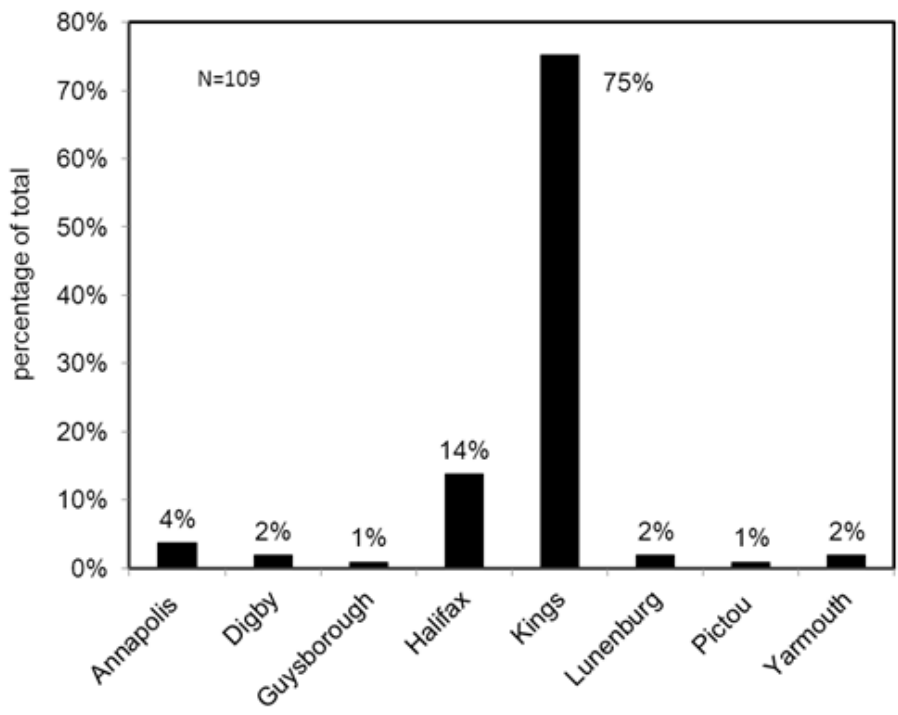


Figure 2. Origin of Anglers interviewed during the Cornwallis creel survey, 1 April -19 May, 2013.

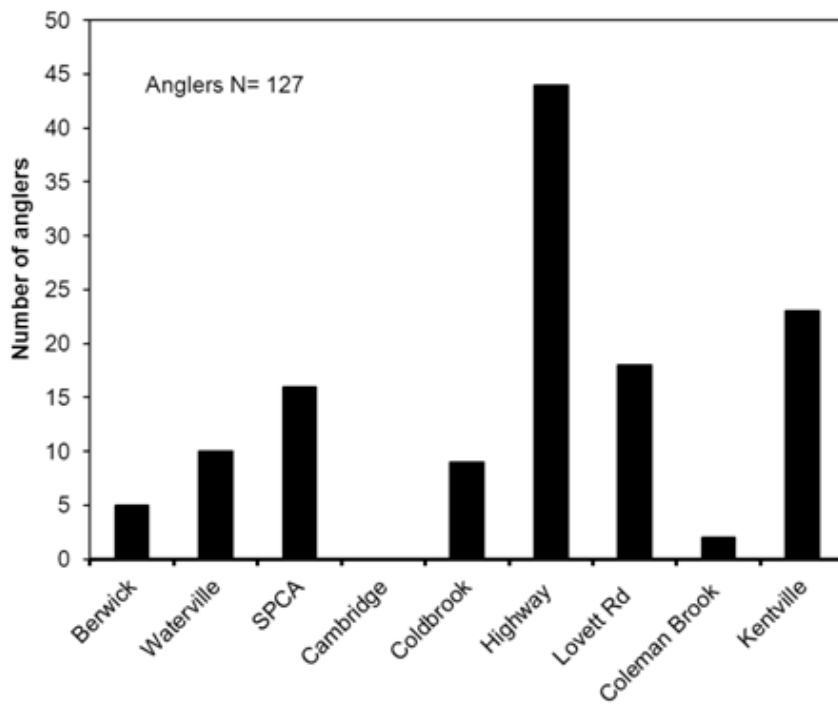


Figure 3. Total angler counts during the Cornwallis creel survey, 1 April-19 May, 2013.

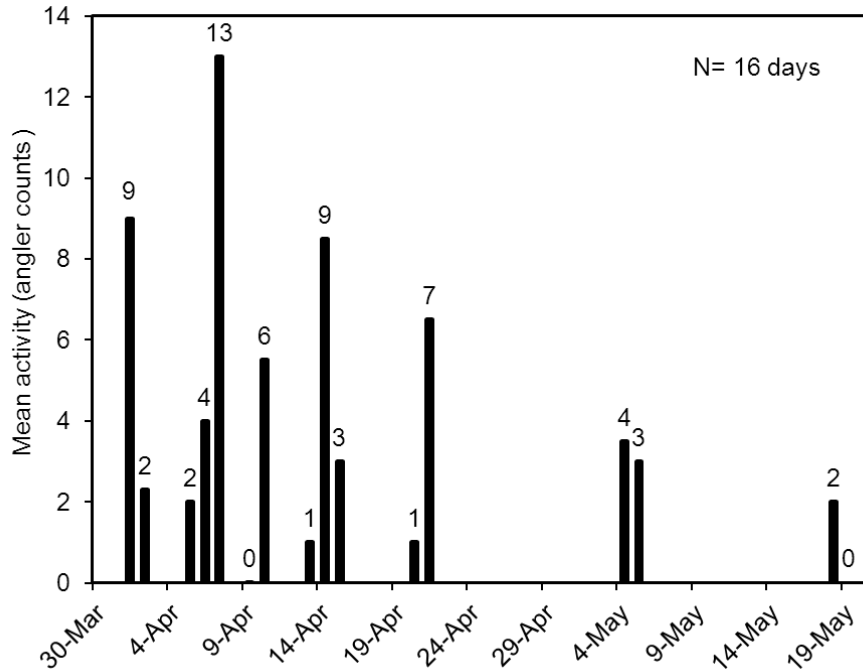


Figure 4. Mean daily angler counts during the Cornwallis creel survey, 1 April-19 May, 2013.

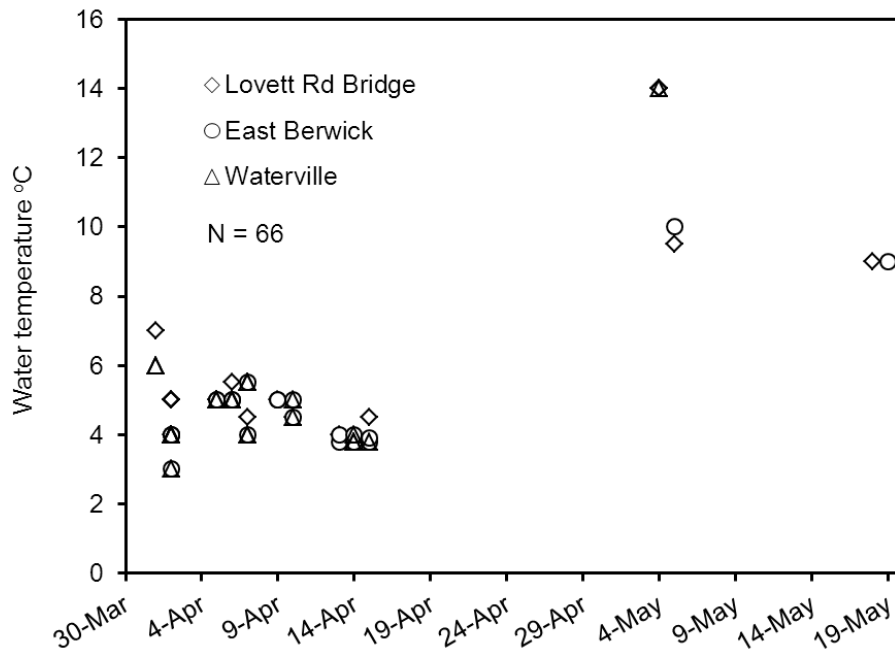


Figure 5. Water temperature recordings from three sites in the Cornwallis River, 1 April-19 May, 2013.

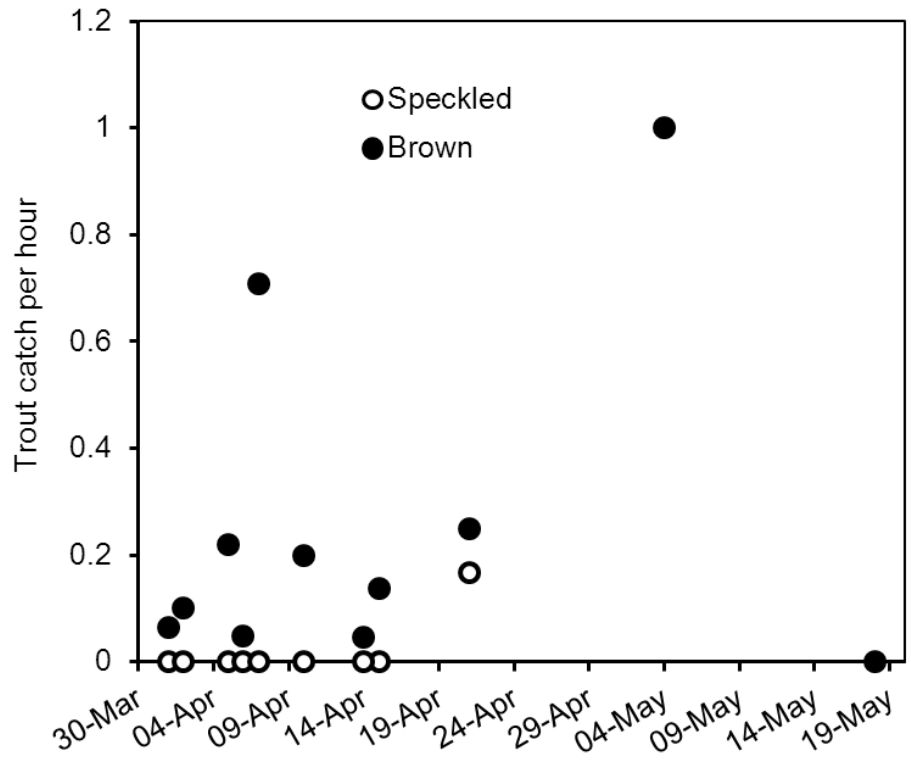


Figure 6. Mean daily trout catch per hour by anglers on the Cornwallis River, 1 April-19 May, 2013.

Appendix Angler creel survey sheet
SITES & ANGLER COUNTS - CORNWALLIS CREEL SURVEY 2013

NAME OF SAMPLER _____ DATE _____

WEATHER CONDITIONS (Fill out once at beginning of sample period)

Air Temp. _____ % Cloud _____ Snow/Rain _____ Windy/Calm

Tide time (low/high) _____ Other observations _____

<u>Site Name</u>	<u># cars</u>	<u># anglers</u>	<u>Time (am/pm)</u>	<u>H₂O Temp</u>
East Berwick (2012 trap site)	_____	_____	_____	_____
Waterville site	_____	_____	_____	_____
Waterville site 2 behind SPCA	_____	_____	_____	_____
Cambridge	_____	_____	_____	_____
Coldbrook	_____	_____	_____	_____
Colman Brook	_____	_____	_____	_____
Lovett Rd 101 Hwy Bridge	_____	_____	_____	_____
Lovett Rd Bridge	_____	_____	_____	_____
Road beside Chute brook	_____	_____	_____	_____
Meadowville Hall	_____	_____	_____	_____
Kentville	_____	_____	_____	_____

CATCH & SAMPLE FORM - CORNWALLIS CREEL SURVEY 2013

Name of Sampler _____ Date _____

Site (brook, lake, etc.) _____ Time _____

Name of Angler _____

Address (town) of angler _____

Gear: Bait _____ Lure _____ Fly _____

CATCH INFORMATION

Hours angler(s) has fished so far (today) _____ per angler.

Number (per angler) _____

<u>Species caught</u>	<u>Kept</u>	<u>Released</u>	<u>***Adipose Clipped</u>
A. Salmon	_____	_____	_____
Brook trout	_____	_____	_____
Brown trout	_____	_____	_____
_____	_____	_____	_____

SAMPLING INFORMATION (See kept fish above):

	<u>SPECIES</u>	<u>LENGTH (cm)</u>	<u>****ADIPOSE FIN CLIP</u>
<u>1</u>	_____	_____	_____
<u>2</u>	_____	_____	_____
<u>3</u>	_____	_____	_____
<u>4</u>	_____	_____	_____