WEST FORK PROJECT – FERC NO. 2686-NC

FISHERIES STUDY

INTRODUCTION

During the biological studies consultation process subsequent to the issuance of the First Stage Consultation Package for the West Fork Hydroelectric Project, the state and federal resource agencies identified the need for additional fisheries data in the vicinity of the project. Accordingly, a Technical Leadership Team (TLT) comprised of representatives from the North Carolina Wildlife Resources Commission (NCWRC), the United States Fish and Wildlife Service (USFWS), the United States Forest Service (USFS), the Land Trust for the Little Tennessee and the applicant was established to develop fisheries studies for the various Nantahala Area hydro projects. The study for the West Fork Project consisted of a fishery survey of the bypassed reach of the West Fork Tuckasegee River between the project dam and the powerhouse. The objectives of the study were to: (1) Describe the fishery resources in West Fork Tuckasegee River bypass, and (2) Determine any potential project-related impacts to the fishery resources present in the bypass.

METHODS

The fisheries study consisted of a review of historical data collected by the NCWRC during 1988 (unpublished data) and Fish and Wildlife Associates (FWA) during 1997, 1998 and 1999 (FWA 2000) at two locations in the West Fork Tuckasegee River bypass and additional sampling at the same locations during the Summer/Fall 2001. The historical NCWRC survey consisted of qualitative sampling, and no population data were calculated. However, for comparative purposes, total sample area (ha) and catch numbers and biomass by species were used to estimate fish density and standing crop. The historical FWA data and the current study consisted of population estimates derived utilizing the depletion sampling methodology. Field sampling and data analyses for the current study were conducted according to the protocols outlined in the NCWRC's *Trout Stream Management Standardized Sampling and Data Analysis Methods* (Borawa 1996).

Depletion population estimates were conducted at two locations in the West Fork Tuckasegee River bypass. Both locations were selected to generally coincide with locations sampled by the NCWRC during 1988. The most downstream site, WF-1, was located approximately 50 m upstream of a small bridge that crosses the bypass channel at it's confluence with the Tuckasegee Project reservoir. The sample reach was 100 m in length and averaged 8.9 m in width. Sampling at WF-1 was conducted on September 11, 2001. Prior to sampling, block nets were placed across the stream at the upstream and downstream ends of the study reach to ensure that fish did not move into or out of the study reach during sampling. Three backpack electrofishing units were used to conduct a standard three-pass depletion sample.

The second site, WF-2, was located upstream of WF-1 and immediately downstream of Rough Run Falls. This sample reach was 100 m in length and averaged 4.8 m in width. Sampling at WF-2 was conducted on August 8, 2001. At this location, the sample reach was bounded on the upstream end by Rough Run Falls and on the downstream end by a block net. As with Location WF-1, a standard three-pass depletion sample was conducted, however, due to the narrower channel width, only two backpack electrofishing units were required to sample Location WF-2.

Catch data were summarized in tabular format by sample station and species for total catch, catch per unit of effort (CPUE) for both number of fish per hour and number of fish per 100 m of stream, population estimate, density (fish/ha), and standing crop (kg/ha). Population estimates and associated statistics were generated with Microfish 3.0 software (Van Deventer and Platts 1989).

RESULTS AND DISCUSSION

Location WF-1

Depletion sampling at Location WF-1 yielded a total of 1,186 fish representing 13 species (Tables 1 and 2). The overall catch was representative of a relatively diverse assemblage of coolwater/coldwater species. In terms of abundance, minnows and mottled sculpin comprised the majority of the catch. Both rainbow and brown trout were also collected from this site. This diverse assemblage of species at Location WF-1 is likely related to its proximity to the Tuckasegee Reservoir and the movement of fishes from the reservoir to the lower reaches of the bypass channel.

The population estimate for this reach of stream yielded an overall density of 14,367 fish/ha and an overall standing crop of 89.9 kg/ha (Table 3). The rainbow trout population in this 100-m reach of stream was estimated to range from 27 to 29 fish, yielding density and standing crop estimates of 311 fish/ha and 4.6 kg/ha, respectively. The brown trout population was estimated to range from 13 to 15 fish, yielding density and standing crop estimates of 156 fish/ha and 6.5 kg/ha, respectively.

Fish species diversity, density and standing crop at Location WF-1 during 2001 were within the range of data collected during previous years (Tables 2 and 4). Species diversity ranged from a low of 10 species in 1988 to a high of 16 species in 1997. Density ranged from a low of 4,215 fish/ha in 1999 to a high of 23,370 fish/ha in 1988. Standing crop ranged from a low of 55.75 kg/ha in 1999 to a high of 277.68 kg/ha in 1997. Overall, minnows and mottled sculpin tended to dominate the catch during all years. Brown trout were collected during all years. Brown trout density ranged from a low of 12 fish/ha in 1988 to a high of 1,459 fish/ha in 1997. The extremely high catch during 1997 was attributable to the collection of large numbers of yearling trout. Rainbow trout were collected during all years, except 1988. Rainbow trout densities ranged from a low of 35 fish/ha in 1998 to a high of 311 fish/ha in 2001.

Location WF-2

Depletion sampling at Location WF-2 yielded an overall catch that was low in both total abundance and species diversity (Tables 1 and 2). Only 162 fish representing two species were collected in this 100 m reach of stream. The only species collected from this site were brown trout and blacknose dace.

The population estimate for this reach of stream yielded an overall density of 3,340 fish/ha and an overall standing crop of 20.5 kg/ha (Table 3). The brown trout population at this site was estimated to range from 52 to 54 fish, yielding density and standing crop estimates of 1,060 fish/ha and 15.5 kg/ha, respectively. Although the overall population of fishes at WF-2 was substantially lower than that at WF-1, the brown trout standing crop at WF-2 was 2.4 times higher than the brown trout standing crop at WF-1.

Fish species diversity and total standing crop at Location WF-2 during 2001 were lower than for any previous sample year (2 species and 20.50 kg/ha, respectively) (Tables 2 and 4). Total fish density (3,340 fish/ha) during 2001 was the second lowest recorded for this location. Species diversity ranged from a low of 2 species in 2001 to a high of 10 species in 1997 and 1999. Density ranged from a low of 1,371 fish/ha in 1988 to a high of 10,711 fish/ha in 1997. Standing crop ranged from a low of 20.50 kg/ha in 2001 to a high of 100.11 kg/ha in 1997.

In terms of overall catch, collections during 1997, 1998 and 1999 were similar and were dominated by minnows and mottled sculpin, while collections during 1988 and 2001 were similar and were dominated by blacknose dace and brown trout. Brown trout were collected during all years. Brown trout density ranged from a low of 61 fish/ha in 1998 to a high of 1,060 fish/ha in 2001. Rainbow trout were collected during all years except 2001. Rainbow trout density ranged from a low of 20 fish/ha in 1998 to a high of 201 fish/ha in 1988.

A notable observation about historical species diversity at Location WF-2 is the very low diversity during 1988 and 2001 (3 species and 2 species, respectively), as compared to diversity during 1997 through 1999 (Table 2). During 1988, blacknose dace, brown trout and rainbow trout were the only species collected, while 2001 sampling produced only blacknose dace and brown trout. Although total standing crop estimates during 1988 and 2001 were similar (24.58 kg/ha and 20.50 kg/ha, respectively), total fish density in 2001 was almost 2.5 times higher than density in 1988.

LITERATURE CITED

Borawa, J. C. 1996. Trout stream management standardized sampling and data analysis methods. North Carolina Wildlife Resources Commission, Division of Boating and Inland Fisheries. 8 pp.

FWA 2000. First Stage Consultation Package, West Fork Hydroelectric Project, FERC Project No. 2686-NC. 92 pp.

Van Deventer, J. S. and W. S. Platts. 1989. Microcomputer software system for generating population statistics from electrofishing data - users guide for Microfish 3.0. U. S. Forest Service General Technical Report INT-254. 29pp.

Table 1. Catch per unit of effort (number per hour and number per 100 m of stream) for Locations WF-1 and WF-2, West Fork Tuckasegee River bypass during August and September 2001.

Common Name	Scientific Name	WF-1		WF-2		WF-1	WF-2
		Total Catch	No./hr.	Total Catch	No./hr.	No./100 m	No./100 m
Rainbow trout (wild)	*Salmo trutta*	28	18	--	--	28	--
Brown trout (wild)	*Salmo trutta*	14	9	53	29	14	53
Central stoneroller	*Campostoma anomalum*	322	201	--	--	322	--
River chub	*Nocomis micropogon*	161	101	--	--	161	--
Warpaint shiner	*Luxilus coccogenis*	120	75	--	--	120	--
Tennessee shiner	*Notropis leuciodus*	53	33	--	--	53	--
Mirror shiner	*Notropis spectrunculus*	104	65	--	--	104	--
Blacknose dace	*Rhinichthys atratulus*	10	6	109	61	10	109
Longnose dace	*Rhinichthys cataractae*	10	6	--	--	10	--
Northern hog sucker	*Hypentelium nigricans*	33	21	--	--	33	--
Rock bass	*Ambloplites rupestris*	5	3	--	--	5	--
Greenside darter	*Etheostoma blennoiides*	5	3	--	--	5	--
Mottled sculpin	*Cottus bairdi*	321	201	--	--	321	--
Total		1,186	735	162	90	1,186	162

Table 2. Fish species occurrence by year for the West Fork Tuckasegee River bypass reaches during 1988, 1997 through 1999 and 2001.

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Table 3. Fish population estimates by location and species for West Fork Tuckasegee River bypass reaches during August and September 2001.

		Location	
Species		**WF - 1**	**WF - 2**
		100m x 8.90m = 0.09ha	**100m x 4.87m = 0.05ha**
Rainbow trout (wild)			
Oncorhynchus mykiss			
Total catch		**28**	
Catch by Run (1) (2) (3)		(20) (6) (2)	
Est. population		28	
+/- Confidence		1	
Number of fish/hectare		**311**	
Kg of fish/hectare		**4.6**	
Brown trout (wild)			
Salmo trutta			
Total catch		**14**	**53**
Catch by Run (1) (2) (3)		(8) (4) (2)	(40) (10) (3)
Est. population		14	53
+/- Confidence		1	1
Number of fish/hectare		**156**	**1,060**
Kg of fish/hectare		**6.5**	**15.5**
Central stoneroller			
Campostoma anomalum			
Total catch		**322**	
Catch by Run (1) (2) (3)		(205) (78) (39)	
Est. population		347	
+/- Confidence		8	
Number of fish/hectare		**3,856**	
Kg of fish/hectare		**21.9**	
River chub			
Nocomis micropogon			
Total catch		**161**	
Catch by Run (1) (2) (3)		(96) (54) (11)	
Est. population		172	
+/- Confidence		5	
Number of fish/hectare		**1,911**	
Kg of fish/hectare		**16.0**	

Table 3. Continued.

		Location	
Species		**WF - 1**	**WF - 2**
		100m x 8.90m = 0.09ha	**100m x 4.87m = 0.05ha**
Warpaint shiner			
Luxilus coccogenis			
Total catch		**120**	
Catch by Run (1) (2) (3)		(82) (25) (13)	
Est. population		125	
+/- Confidence		3	
Number of fish/hectare		**1,389**	
Kg of fish/hectare		**5.5**	
Tennessee shiner			
Notropis leuciodus			
Total catch		**53**	
Catch by Run (1) (2) (3)		(33) (16) (4)	
Est. population		55	
+/- Confidence		2	
Number of fish/hectare		**611**	
Kg of fish/hectare		**1.4**	
Mirror shiner			
Notropis spectrunculus			
Total catch		**104**	
Catch by Run (1) (2) (3)		(66) (29) (9)	
Est. population		109	
+/- Confidence		4	
Number of fish/hectare		**1,211**	
Kg of fish/hectare		**1.7**	
Blacknose dace			
Rhinichthys atratulus			
Total catch		**10**	**109**
Catch by Run (1) (2) (3)		(8) (2) (0)	(77) (17) (15)
Est. population		10	114
+/- Confidence		0	3
Number of fish/hectare		**111**	**2280**
Kg of fish/hectare		**0.3**	**5.0**

Table 3. Continued.

		Location	
Species		**WF - 1**	**WF - 2**
		100m x 8.90m = 0.09ha	**100m x 4.87m = 0.05ha**
Longnose dace			
Rhinichthys cataractae			
Total catch		**10**	
Catch by Run (1) (2) (3)		(6) (4) (0)	
Est. population		10	
+/- Confidence		1	
Number of fish/hectare		**111**	
Kg of fish/hectare		**0.4**	
Northern hog sucker			
Hypentelium nigricans			
Total catch		**33**	
Catch by Run (1) (2) (3)		(16) (12) (5)	
Est. population		39	
+/- Confidence		6	
Number of fish/hectare		**433**	
Kg of fish/hectare		**10.6**	
Rock bass			
Ambloplites rupestris			
Total catch		**5**	
Catch by Run (1) (2) (3)		(1) (2) (2)	
Est. population		13	
+/- Confidence		38	
Number of fish/hectare		**144**	
Kg of fish/hectare		**1.5**	
Greenside darter			
Etheostoma blennoiides			
Total catch		**5**	
Catch by Run (1) (2) (3)		(3) (2) (0)	
Est. population		5	
+/- Confidence		0	
Number of fish/hectare		**56**	
Kg of fish/hectare		**0.4**	

Table 3. Continued.

		Location	
Species		**WF - 1**	**WF - 2**
		100m x 8.90m = 0.09ha	**100m x 4.87m = 0.05ha**
Mottled sculpin			
Cottus bairdi			
Total catch		**321**	
Catch by Run (1) (2) (3)		(191) (76) (54)	
Est. population		366	
+/- Confidence		14	
Number of fish/hectare		**4,067**	
Kg of fish/hectare		**19.1**	
Total Fish			
Number of fish/hectare		**14,367**	**3,340**
Kg of fish/hectare		**89.9**	**20.5**

Table 4. Fish density (no/ha) and standing crop (kg/ha) estimates for the West Fork Tuckasegee River bypass reaches during 1988, 1997 through 1999 and 2001.

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