

PA FISH AND BOAT COMMISSION
COMMENTS AND RECOMMENDATIONS
February 16, 2012

WATER: Tributaries to the Tioga-Hammond Lake Complex (404A)

EXAMINED: July - August 2007

BY: Wnuk, Frey, and Koser

Bureau Director Action: _____ Date: _____

Division Chief Action: _____ Date: _____

WW Unit Leader Action: _____ Date: _____

CW Unit Leader Action: _____ Date: _____

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AREA COMMENTS:

The Area 4 Fisheries Management Office surveyed five named tributaries to the Tioga-Hammond Lake complex in July and August 2007 at the request of the United States Army Corps of Engineers (ACOE). The ACOE suspected that Chapter 93 classifications for these streams were incorrect. Wild trout were present in all five streams. Big Rift Creek, Section 01, supported a Class A wild brook trout population. Stephenhouse Run, Section 01, and Ives Run, Section 01, supported Class B wild brook trout populations. Chapter 93 classifications need to be upgraded for Phoenix Run, Ives Run, and Big Rift Creek.

AREA RECOMMENDATIONS:

1. The Pennsylvania Fish and Boat Commission should add Big Rift Creek Section 01 to the list of Class A wild trout waters.
2. The Pennsylvania Fish and Boat Commission should add the following sections to the list of streams that support trout reproduction: Big Rift Creek, Section 01; Phoenix Run, Section 01; and Ives Run, Section 01.
3. The Pennsylvania Department of Environmental Protection should upgrade the Chapter 93 water quality classification of Phoenix Run, Section 01, from trout stocking to cold water fishes.
4. The Pennsylvania Department of Environmental Protection should upgrade the Chapter 93 water quality classification of Ives Run, Section 01, from warm water fishes to cold water fishes.
5. The Pennsylvania Department of Environmental Protection should upgrade the Chapter 93 water quality classification of Big Rift Creek, Section 01, from cold water fishes to high quality-cold water fishes.

DEP Stream Code: 31316

Big Rift Creek

6. The Pennsylvania Fish and Boat Commission should continue to manage Stephenhouse Run, Brown Run, Ives Run, Big Rift Creek, and Phoenix Run with statewide angling regulations and no stocking.

DRAFT

This work made possible by funding from the Sport Fish Restoration Act Project F-57-R Fisheries Management.

**Pennsylvania Fish & Boat Commission
Bureau of Fisheries
Division of Fisheries Management**

Tributaries to the Tioga-Hammond Lake Complex (404A)
Fisheries Management Report

Prepared by:
Aaron Frey, Robert Wnuk, and Scott Koser

Date Sampled: July - August 2007

Date Prepared: January 2008

Introduction

The United States Army Corps of Engineers (ACOE) finished construction of the Tioga-Hammond Lake complex in 1979. This project formed two interconnected lakes with a total surface area of 449 ha. The lakes dammed the Tioga River and Crooked Creek within the North Branch Susquehanna River watershed to help prevent downstream flooding. A secondary outcome was water quality improvement by mixing water laden with acid mine drainage from the Tioga River with fertile water from Crooked Creek. There are several small tributaries feeding into the lakes that originate from heavily forested mountainous terrain. ACOE requested the Pennsylvania Fish and Boat Commission (PFBC) to inventory these tributaries because they believed the Pennsylvania Department of Environmental Protection (DEP) Chapter 93 classifications were incorrect.

Study Area

The Tioga-Hammond Lake complex consists of 259 ha Hammond Lake and 190 ha Tioga Reservoir. A portion of the land surrounding the complex is wooded mountainous terrain, most of which is located on State Game Lands (SGL) #37. Named tributaries to the complex include Stephenhouse and Ives Runs (tributaries to Hammond Lake), Brown Run (tributary to Stephenhouse Run), and Big Rift Creek and Phoenix Run (tributaries to Tioga Reservoir).

The underlying geology surrounding the Tioga-Hammond Lake complex is a complex mixture of Mississippian and Devonian Aged sandstones, siltstones, claystones, shales, and conglomerates. The Tioga, Crooked Creek, Jackson Summit, and Mansfield United

States Geologic Survey's 7.5 minute quadrangles provide topographic coverage of the region. Route 15 provides major road access (Figure 1).

Historic Perspective

The only named tributary to the Tioga-Hammond Lake Complex that the PFBC previously surveyed was Stephenhouse Run. Shoemaker (1931) stated that Stephenhouse Run was a warm water stream and recommended against trout stocking because the stream was too small. Snyder (1934), however, stated that brook trout *Salvelinus fontinalis* were present in Stephenhouse Run and recommended fingerling trout stocking. The PFBC stocked fingerling brook trout in Stephenhouse Run from 1934 through 1937 and once again in 1954. In 1956, the PFBC made a single planting of fingerling brown trout *Salmo trutta*.

Daniels et al. (1981) conducted the only biological survey of Stephenhouse Run. The objective of that work was to document the condition of the fishery prior to installation of habitat improvement devices. At the time, the Stephenhouse Run valley consisted of old farmlands that had grown over with shrubs. Stream shading was only partial and water temperatures were elevated. Daniels et al. (1981) planned to sample at two stations but found the upstream reaches were dry. Electrofishing for 312 m at a single site near the mouth produced nine fish species but the only sportfish present were two juvenile wild brook trout. They concluded that flows in Stephenhouse Run were probably inadequate to support a substantial fishery.

Current Management Strategies

DEP Chapter 93 Water Quality Standards classify Big Rift Creek and Stephenhouse Run including Brown Run as cold water fishes (CWF). Ives Run is classified as warm water fishes (WWF) and Phoenix Run as trout stocking (TSF). There are no exceptions to specific criteria. The PFBC manages all streams covered in this report as a single section extending from the headwaters downstream to the mouth. Statewide angling regulations apply to each of these streams.

Methods

We surveyed the tributaries to the Tioga-Hammond Lake Complex between July 30 and August 2, 2007. All procedures followed Marcinko et al. (1986). We surveyed all of the named streams feeding into the Tioga-Hammond Lakes excluding the Tioga River, Mill Creek, and Crooked Creek.

This survey assessed physical habitat, chemical parameters, and/or fish communities at six stations (Table 1). Physical habitat evaluations followed the United States Environmental

Protection Agency's Rapid Bioassessment Protocols (Barbour et al. 1999). All chemical parameters were measured in the field using a colorimetric method for pH, a mixed indicator for total alkalinity, and EDTA titration for total hardness. We used a Smith-Root unit (Model 12-A POW, 200 volts pulsed direct current) with a single anode and a rat-tail cathode to assess fish populations. We identified the fish captured at each site to species with the exception of sculpins *Cottus* sp. Sculpins were only identified to genus because it was difficult to accurately separate mottled sculpins *Cottus bairdi* from slimy sculpins *Cottus cognatus* in the field.

We classified all of the trout we captured as being of wild or hatchery origin based on species, coloration, size, and fin wear. We measured the wild trout to 25 mm length groups and gave them an upper caudal fin clip while we noted the hatchery trout but excluded them from further analyses. When we captured at least 30 wild trout at an individual site we made a second electrofishing pass to obtain a Chapman modified Petersen population estimate (Ricker 1975). We obtained wild trout population abundance and biomass estimates for stream sections by expanding the estimated number and weight of trout at a site to number and kilograms per hectare using state average weights calculated on January 3, 2008.

During this work, we conducted the second electrofishing pass on the same day as the marking run. We did this to maximize sampling efficiency and because of the difficulty in accessing some of these streams. The time between our marking and recapture runs varied from 2.75 to 5.5 hours. Temple and Pearsons (2006) demonstrated that a three hour recovery period was sufficient to produce unbiased estimates of rainbow trout *Oncorhynchus mykiss* in small streams. We calculated capture efficiencies for our estimates by dividing the number of recaptured fish by the number of marked fish. We calculated capture efficiencies to determine if our estimates were valid.

Results and Discussion

The Tioga-Hammond Lake tributaries examined during this survey drained primarily forested slopes with some areas of abandoned fields. These streams ranged from 2.15 to 6.30 km in length and their gradients ranged from 36.6 to 115.4 m/km (Table 2). Most of the streams were located on ACOE property surrounding the Tioga-Hammond Lake complex or on SGL #37. Human population density for all streams was rural and ranged from 10 to 15 persons/km² (Table 3).

We recorded physical habitat characteristics at four stations. Scores were in the sub-optimal range for each station (Table 4). Vegetative zone width scored well at each station because of the forested areas. Flows were at typical summer low flow conditions.

Each site had areas of low bank stability and sediment deposition.

We collected water chemistry data at six locations. Water chemistry values were similar across the streams. Total alkalinity ranged from 35 to 60 mg/l, total hardness ranged from 38 to 70 mg/l, pH ranged from 7.2 to 7.8, and specific conductance ranged from 93 to 167 umhos (Table 5).

We documented seven fish species from these streams (Table 6). Species richness ranged from one to six species per site. This low richness was typical for small, mountainous, coldwater streams. We found brook trout in each stream. Blacknose dace *Rhinichthys atratulus* were captured at all four electrofishing sites and sculpins at three of the four sites.

Stephenhouse Run

The PFBC manages Stephenhouse Run as one 6.3 km section from headwaters to mouth. Stephenhouse Run has one named tributary, Brown Run, which we will discuss separately.

Stephenhouse Run was generally well shaded except for a small portion near the mouth where it flowed through an ACOE picnic area. Habitat scores were similar between our two sites. Both sites had some sediment deposition in the pools. Channel alteration scores were low because of the placement of jack dams as habitat improvement structures in 1986. Eight out of ten at Station 0101 and several at Station 0102 were still functional.

Water chemistry values were similar between the two stations with parameters increasing in a downstream direction. Alkalinities were 35 and 44 mg/l, which were sufficient to buffer the stream against acid precipitation. Six fish species were present with wild brook trout dominating the gamefish community. The mean biomass of wild brook trout in Section 01 was 26.51 kg/ha (Table 7), sufficient to meet the criteria for Class B wild brook trout status. Wild brook trout ranged from 25 to 249 mm total length (Figure 2). We estimated there were 189 legal size and larger wild trout in the section. One hatchery rainbow trout was captured at Station 0102. The origin of this fish was unknown because there were no approved trout waters upstream from Hammond Lake.

Water chemistry values at Station 0102 were similar to those Daniels et al. (1981) documented. Our fisheries results, however, were much different. Daniels et al. (1981) only captured two wild brook trout in a 312 m long station that began at the ACOE bridge. Our site also began at the ACOE bridge but we captured 50 wild brook trout while electrofishing for 305 m. Changes in land use between the two surveys was one possible reason for this disparity in wild trout density. Old farmlands overgrown with shrubs dominated land use in the Stephenhouse Run valley during the Daniels et al. (1981) work. During our work, mature forests

dominated the valley and stream shading was good, possibly leading to lower average water temperatures. Changes in fish community composition between the Daniels et al. (1981) survey and our work supported the idea that average water temperatures in the lower portion of Stephenhouse Run have declined. Daniels et al. (1981) captured several species indicative of warmwater streams that were absent during the present survey. These species included central stonerollers *Campostoma anomalum*, bluntnose minnows *Pimephales notatus*, brown bullheads *Ameiurus nebulosus*, and green sunfish *Lepomis cyanellus*.

Brown Run

The PFBC manages Brown Run as one 2.15 km section from headwaters to mouth. The 2007 work was the first time the PFBC surveyed this stream. Brown Run possessed little flow, so we only collected water chemistry data at a single site. The stream was moderately fertile with a total alkalinity of 46 mg/l and a pH of 7.2. We did not electrofish but did observe several juvenile brook trout in a small pool.

Ives Run

The PFBC manages Ives Run as one 4.46 km section from headwaters to mouth. The 2007 work was the first time the PFBC surveyed this stream. Our single sampling station was located at the bridge near the entrance to the ACOE campground. Habitat was generally good although flows were low. Most of the stream was shallow riffles with few pools or woody debris. There was sediment in the pools and evidence of bank instability. The stream was moderately fertile. Total alkalinity and total hardness were both 45 mg/l and pH was 7.4. Electrofishing revealed three species with brook trout dominating the community. Brook trout biomass was 21.43 kg/ha, sufficient to meet the criteria for Class B wild brook trout status. Wild brook trout ranged from 25 to 249 mm total length (Figure 3). We estimated there were 165 legal size and larger wild brook trout in the section.

Big Rift Creek

The PFBC manages Big Rift Creek as one 3.46 km section from headwaters to mouth. The 2007 work was the first time the PFBC surveyed this stream. Access to Big Rift Creek was limited to either boating across Tioga Reservoir or hiking a long distance through wooded mountainous terrain. Our single sampling station was located at the first waterfall upstream from the mouth. Habitat was generally good although flows were low. Most of the stream was shallow riffles with few pools or woody debris. Sediment in the pools may have resulted from recent logging operations in the headwaters.

Big Rift Creek was moderately fertile. Total alkalinity and total hardness were both 48 mg/l and pH was 7.4. Brook trout were the only species captured in a 300 m long station. There was a waterfall 220 m into the station, above which we did not capture any fish. Although we observed only brook trout during electrofishing operations, a DEP biologist collected two sculpins in a kicknet downstream from the waterfall at our starting point. Brook trout biomass was 35.14 kg/ha, sufficient to meet the criteria for Class A wild brook trout status. Wild brook trout ranged from 50 to 299 mm total length (Figure 4). We did not capture any brook trout between 100 mm and 174 mm. High flows in November 2005 likely caused this missing year class. We estimated there were 170 legal size and larger wild brook trout in the section.

Phoenix Run

The PFBC manages Phoenix Run as one 2.43 km section from headwaters to mouth. The 2007 work was the first time the PFBC ever surveyed this stream. Our single sampling station was located at River Mile 0.10 near the end of SR 1004. A gate across this road about 1.3 km southeast of Phoenix Run limited access to walk-in only. The stream was moderately fertile. Phoenix Run had higher values for total alkalinity, total hardness, and specific conductance than the other tributaries. These values were 60 mg/l, 70 mg/l and 167 umhos, respectively. We did not evaluate habitat but flows were low and small shrubs and brush covered the stream banks. We did not establish a formal electrofishing site because stream flow was too low. Cursory electrofishing operations, however, captured three fish species including young-of-the-year brook trout.

Timing of Recapture Runs

We performed population estimates on these tributaries by conducting the marking and recapture runs on the same day. Capture efficiencies for our estimates ranged from 0.30 to 0.58 (mean = 0.47, n = 4). Our capture efficiencies were similar to those that Temple and Pearsons (2006) reported for rainbow trout after three hour (range 0.23 to 0.85, mean = 0.53, n = 16) and 24 hour (range 0.43 to 0.95, mean = 0.62, n = 13) recovery times. Our capture efficiencies were also similar to those generated from wild brook trout estimates in the Nescopeck Creek Basin (range 0.32 to 0.68, mean = 0.55, n = 13). Wnuk et al. (1999) conducted marking and recapture runs in the Nescopeck Creek basin on consecutive days. These results indicated that a three hour recovery time was adequate to produce unbiased estimates for brook trout in small streams.

Summary and Conclusions

Wild brook trout were present in all of the tributaries we sampled within the Tioga-Hammond Lake complex. Big Rift Creek,

Section 01, (Class A); Ives Run, Section 01, (Class B), and Stephenhouse Run, Section 01, (Class B) supported substantial wild trout populations and offered some opportunity for anglers to target legal size fish. DEP Chapter 93 classifications for some of these streams were inadequate and need to be upgraded (Table 8). DEP should upgrade Big Rift Creek from CWF to high-quality cold water fishes (HQ-CWF) because it supported a Class A wild brook trout population. Further, DEP should upgrade Ives Run (currently WWF) and Phoenix Run (currently TSF) to CWF because these streams supported reproducing brook trout populations.

Acknowledgements

We thank DEP biologist Steve Means for his assistance. Steve provided boat access to Big Rift Creek and assisted with carrying equipment through thick and hilly terrain.

DRAFT

MANAGEMENT RECOMMENDATIONS

1. The Pennsylvania Fish and Boat Commission should add Big Rift Creek Section 01 to the list of Class A wild trout waters.
2. The Pennsylvania Fish and Boat Commission should add the following sections to the list of streams that support trout reproduction: Big Rift Creek, Section 01; Phoenix Run, Section 01; and Ives Run, Section 01.
3. The Pennsylvania Department of Environmental Protection should upgrade the Chapter 93 water quality classification of Phoenix Run, Section 01, from trout stocking (TSF) to cold water fishes (CWF).
4. The Pennsylvania Department of Environmental Protection should upgrade the Chapter 93 water quality classification of Ives Run, Section 01, from warm water fishes (WWF) to cold water fishes (CWF).
5. The Pennsylvania Department of Environmental Protection should upgrade the Chapter 93 water quality classification of Big Rift Creek, Section 01, from cold water fishes (CWF) to high quality-cold water fishes (HQ-CWF).
6. The Pennsylvania Fish and Boat Commission should continue to manage Stephenhouse Run, Brown Run, Ives Run, Big Rift Creek, and Phoenix Run with statewide angling regulations and no stocking.

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DEP Stream Code: 31316

Big Rift Creek

Table 1. Station number, river mile, downstream limit, length electrofished, and voltage for tributaries to the Tioga-Hammond Lake Complex (404A).

Stream	Station Number	River Mile	Downstream Limit	Length (m)	Volts
Stephenhouse Run	0101	2.33	5 m dns SGL #37 bridge	305	200 DC
	0102	0.43	ACOE bridge	316	200 DC
Brown Run	0101	0.01	10 m upst mouth	NA	NA
Ives Run	0101	0.42	Upper campground bridge	300	200 DC
Big Rift Creek	0101	0.15	First waterfall upst mouth	300	200 DC
Phoenix Run	0101	0.10	SR 1004 Mill Creek Road	NA	NA

NA = Not Available.

Table 2. Physical data for tributaries to the Tioga-Hammond Lake Complex (404A).

Stream (Section)	Length (km)	Width (m)	Gradient (m/km)	USGS Quadrangle(s)
Stephenhouse Run (01)	6.30	3.30	36.6	C28, D28
Brown Run (01)	2.15	NA	74.3	D28
Ives Run (01)	4.46	2.60	54.2	C28, D28
Big Rift Creek (01)	3.46	2.10	82.1	D28, D29
Phoenix Run (01)	2.43	NA	115.4	C29

USGS Quadrangles: C28 = Tioga; C29 = Jackson Summit;
D28 = Crooked Creek; D29 = Mansfield

NA = Not Available.

Table 3. Social data for tributaries to the Tioga-Hammond Lake Complex (404A).

Stream (Section)	Road Access:			Ownership:		2000 Human Population Density
	% of Section Within 100 m	300 m	500 m	% Public Open	% Private Closed	
Stephenhouse Run (01)	26	69	82	97	3	13
Brown Run (01)	9	14	34	100	0	14
Ives Run (01)	32	63	67	100	0	10
Big Rift Creek (01)	0	0	4	100	0	15
Phoenix Run (01)	0	0	0	100	0	10

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DEP Stream Code: 31316

Big Rift Creek

Table 4. Physical habitat scores for tributaries to the Tioga-Hammond Lake Complex determined in July-August 2007 (404A).

Parameter	Stream and Station			
	Stephenhouse Run		Ives Run	Big Rift Creek
	0101	0102	0101	0101
Substrate/Cover	17	14	11	12
Embeddedness	16	16	16	10
Velocity/Depth	15	16	13	13
Sediment Deposition	11	10	11	11
Channel Flow Status	14	14	13	9
Channel Alteration	7	11	18	20
Riffle Frequency	18	18	18	17
Bank Stability:				
Left Bank:	6	8	6	8
Right Bank:	6	8	6	7
Vegetative Protection				
Left Bank:	5	5	9	5
Right Bank:	5	5	9	4
Riparian Zone Width:				
Left Bank:	8	7	10	10
Right Bank:	9	7	10	10
Total Score:	137	139	150	136

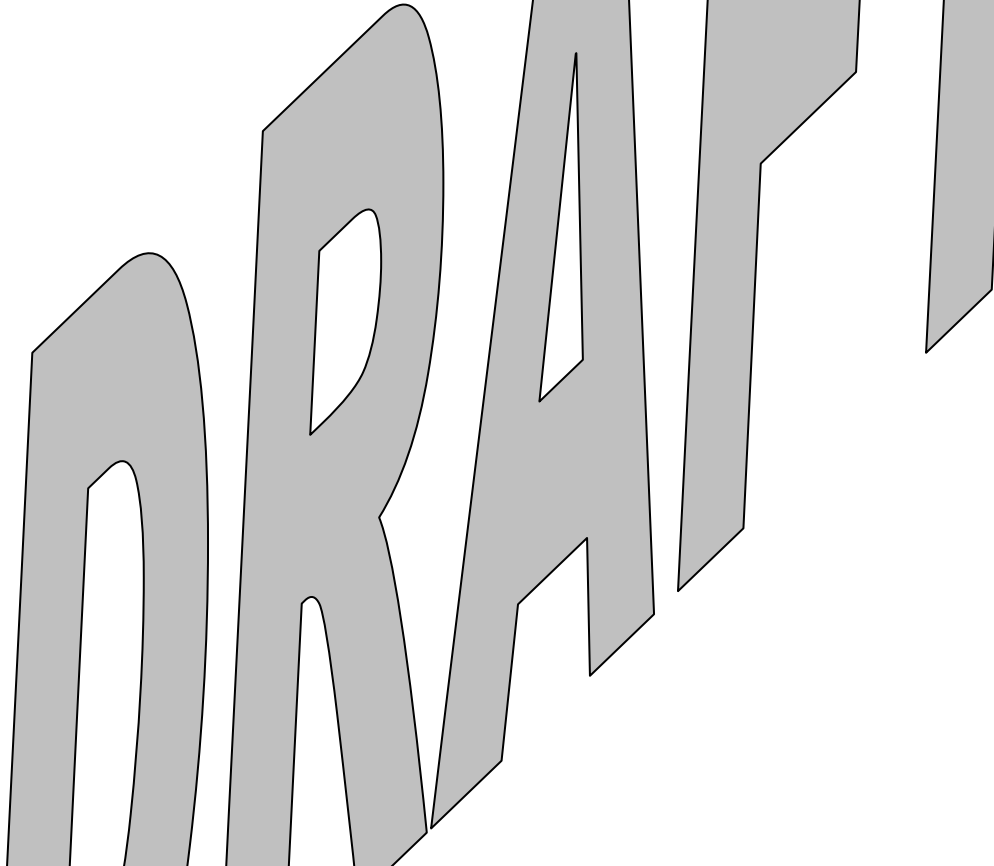
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DEP Stream Code: 31316

Big Rift Creek

Table 5. Physical and chemical data collected from tributaries to the Tioga-Hammond Lake Complex in July-August 2007 (404A).

Stream	River Mile	Date	Time	Air Temp. °C	Water Temp. °C	pH	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Specific Conductance (umhos)
Stephenhouse Run	2.33	8/01	1040	25.0	16.7	7.2	35	38	93
	0.43	8/01	1310	28.0	20.3	7.8	44	44	110
Brown Run	0.01	8/01	1300	25.0	16.1	7.2	46	46	119
Ives Run	0.42	8/01	0830	18.0	17.3	7.4	45	45	110
Big Rift Creek	0.15	7/30	1210	32.0	14.0	7.4	48	48	122
Phoenix Run	0.10	8/02	1335	31.0	21.0	7.4	60	70	167



DEP Stream Code: 31316

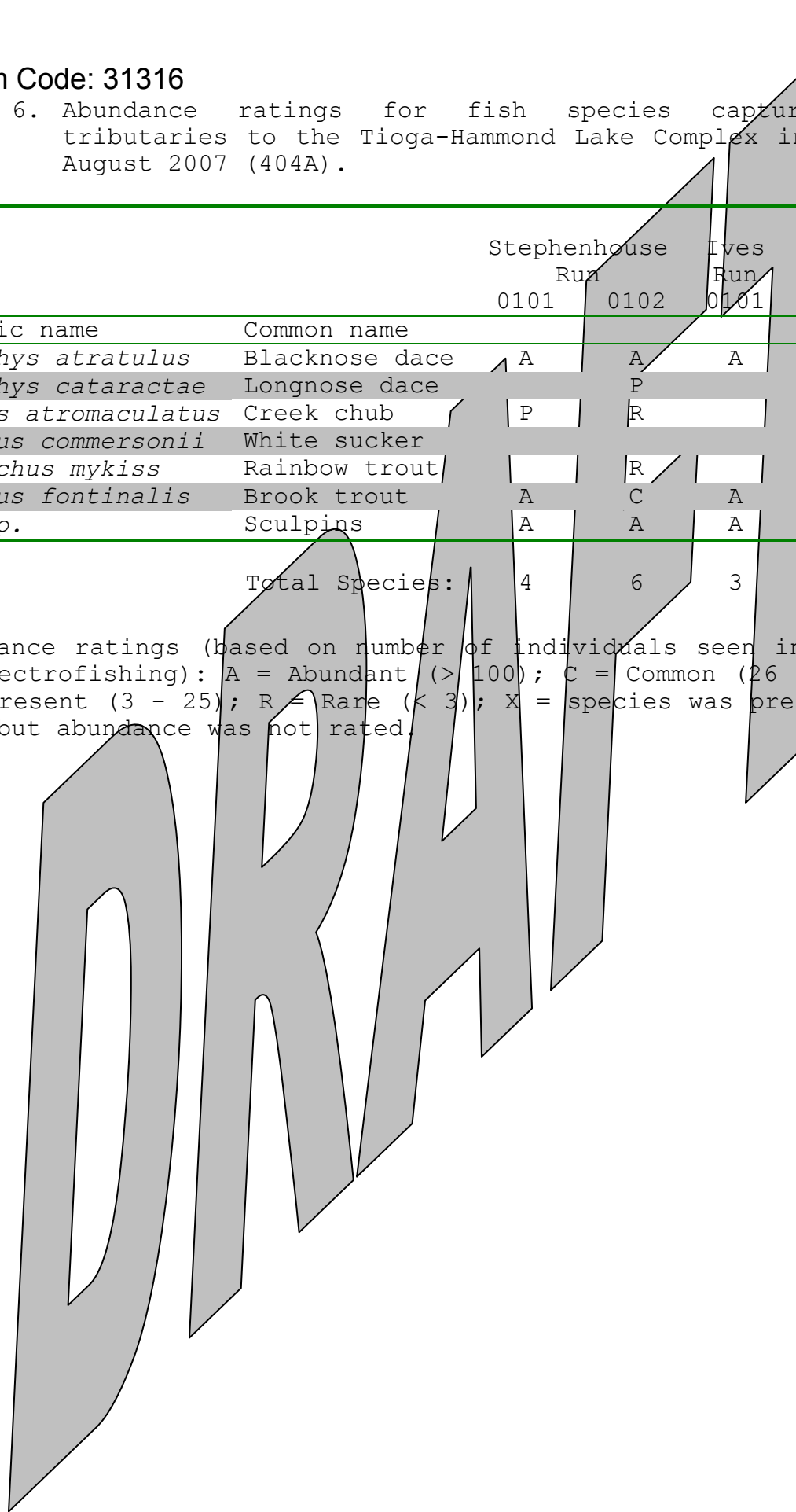
Big Rift Creek

Table 6. Abundance ratings for fish species captured in tributaries to the Tioga-Hammond Lake Complex in July-August 2007 (404A).

Scientific name	Common name	Stephenhouse Run		Ives Run	Big Rift Creek	Phoenix Run
		0101	0102	0101	0101	0101
<i>Rhinichthys atratulus</i>	Blacknose dace	A	A	A		X
<i>Rhinichthys cataractae</i>	Longnose dace		P			
<i>Semotilus atromaculatus</i>	Creek chub	P	R			
<i>Catostomus commersonii</i>	White sucker					X
<i>Oncorhynchus mykiss</i>	Rainbow trout		R			
<i>Salvelinus fontinalis</i>	Brook trout	A	C	A	C	X
<i>Cottus sp.</i>	Sculpins	A	A	A		

Total Species: 4 6 3 1 3

Abundance ratings (based on number of individuals seen in 300 m of electrofishing): A = Abundant (> 100); C = Common (26 - 100); P = Present (3 - 25); R = Rare (< 3); X = species was present at site but abundance was not rated.



DEP Stream Code: 31316

Big Rift Creek

Table 7. Wild brook trout abundance estimates for tributaries to the Tioga-Hammond Lake Complex determined in July-August 2007 (404A).

Water (Section)	Biomass (Kilograms per Hectare)	Number per Hectare	Number per Kilometer	Number of Legals per Kilometer	Number of Legals in Section
Stephenhouse Run (01)	26.51	1520	386	30	189
Ives Run (01)	21.43	2462	639	37	165
Big Rift Creek (01)	35.14	1778	372	49	170

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DEP Stream Code: 31316

Big Rift Creek

Table 8. Pennsylvania Fish and Boat Commission (PFBC) and Pennsylvania Department of Environmental Protection (DEP) classifications with recommended DEP upgrades and PFBC management programs for tributaries to the Tioga-Hammond Lake Complex (404A).

Stream (Section)	Classification		Recommended DEP Upgrade	Recommended PFBC Management Program
	PFBC	DEP		
Stephenhouse Run (01)	B R4	CWF	None	Natural Yield
Brown Run (01)	R4	CWF	None	Natural Yield
Ives Run (01)	B R4	WWF	CWF	Natural Yield
Big Rift Creek (01)	A R4	CWF	HQ-CWF	Wild Trout Waters
Phoenix Run (01)	R4	TSF	CWF	Natural Yield

CWF = Cold Water Fishes; HQ-CWF = High Quality Coldwater Fishes; WWF = Warm Water Fishes; TSF = Trout Stocking.

Figure 1: Tioga-Hammond Lake Complex, Tioga County

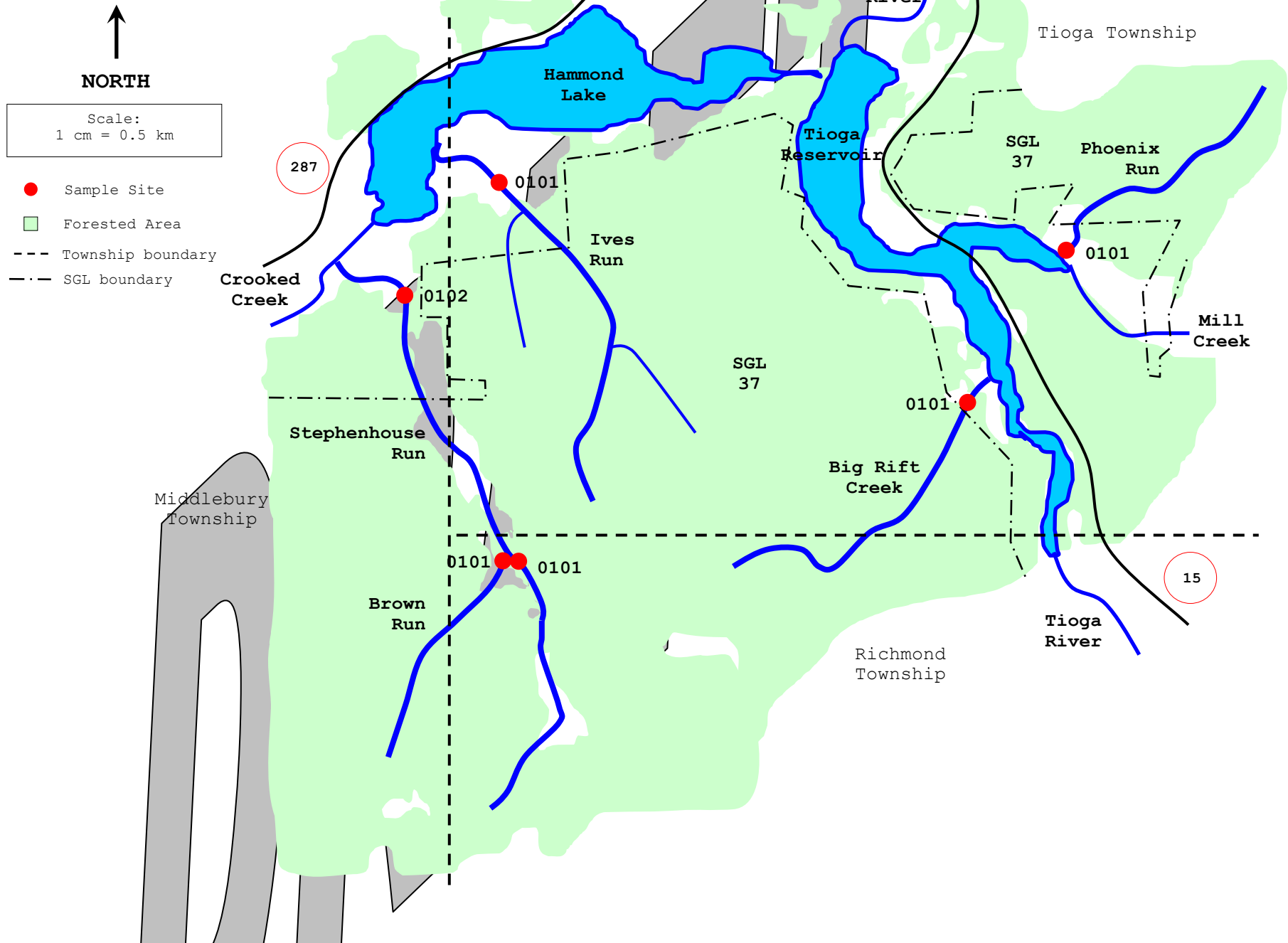


Figure 2. Length-frequency distribution (M+C-R) of wild brook trout captured in Section 01 of Stephenhouse Run (404A) during 2007.

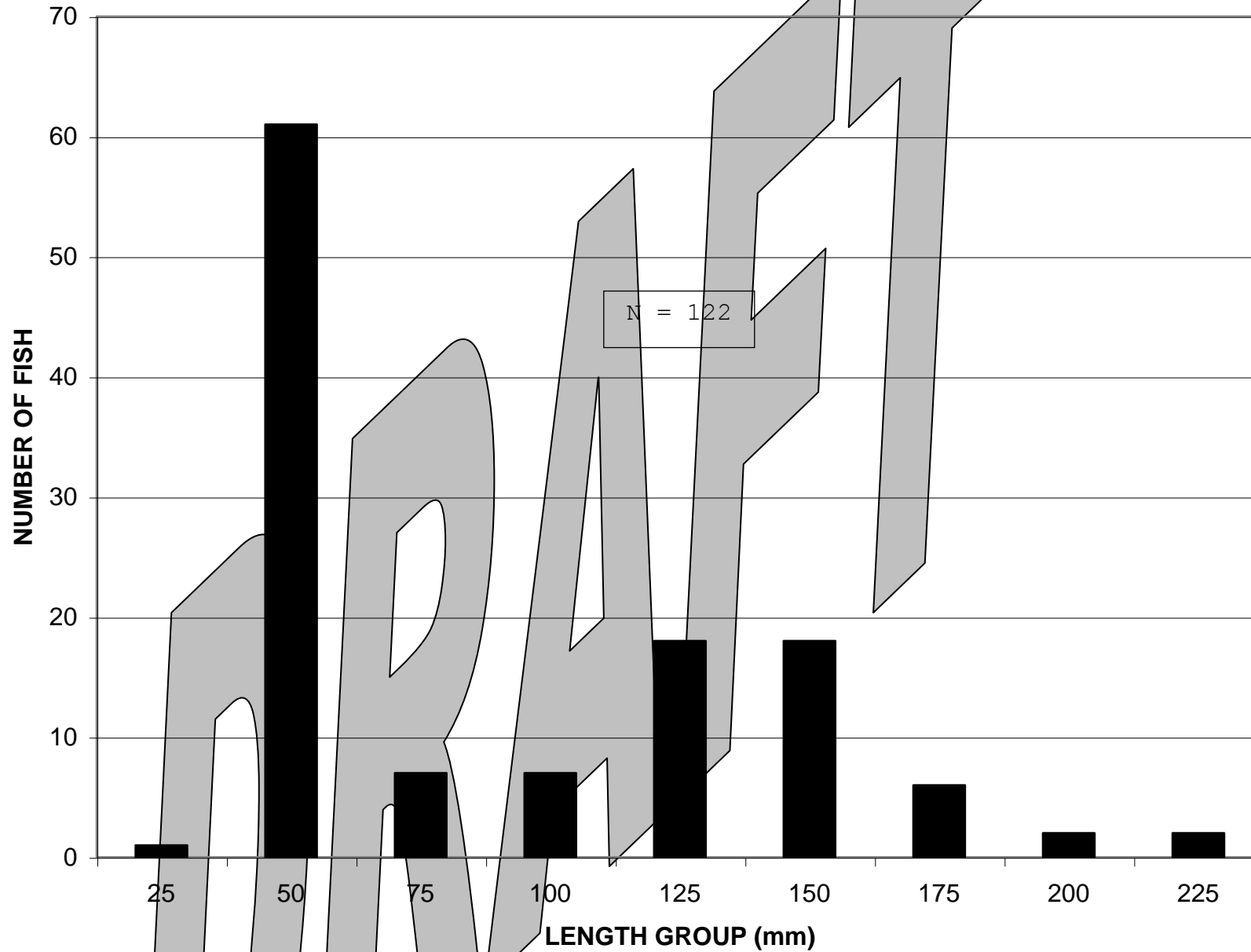


Figure 3. Length-frequency distribution (M+C-R) of wild brook trout captured in Section 01 of Ives Run (404A) during 2007.

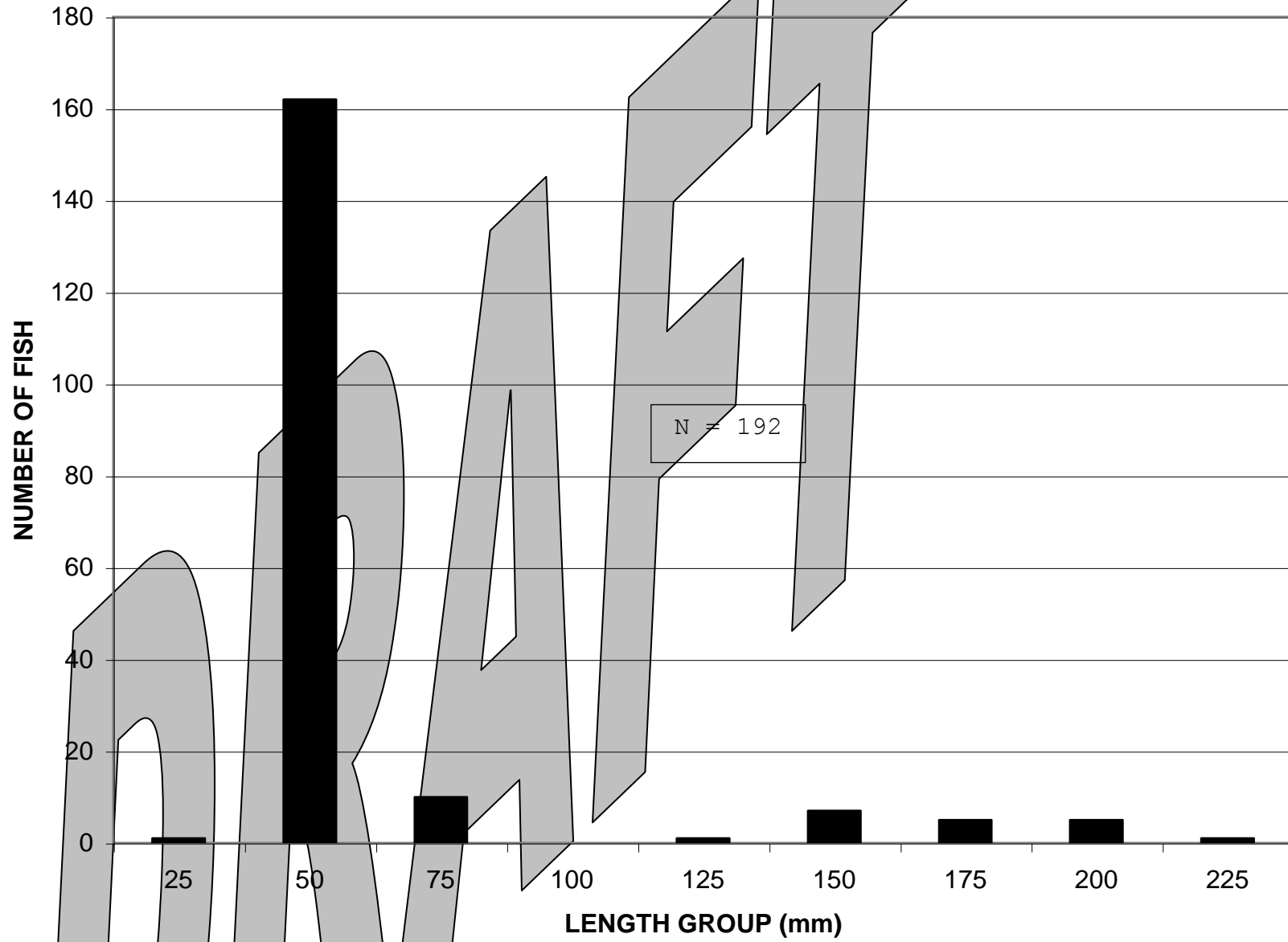
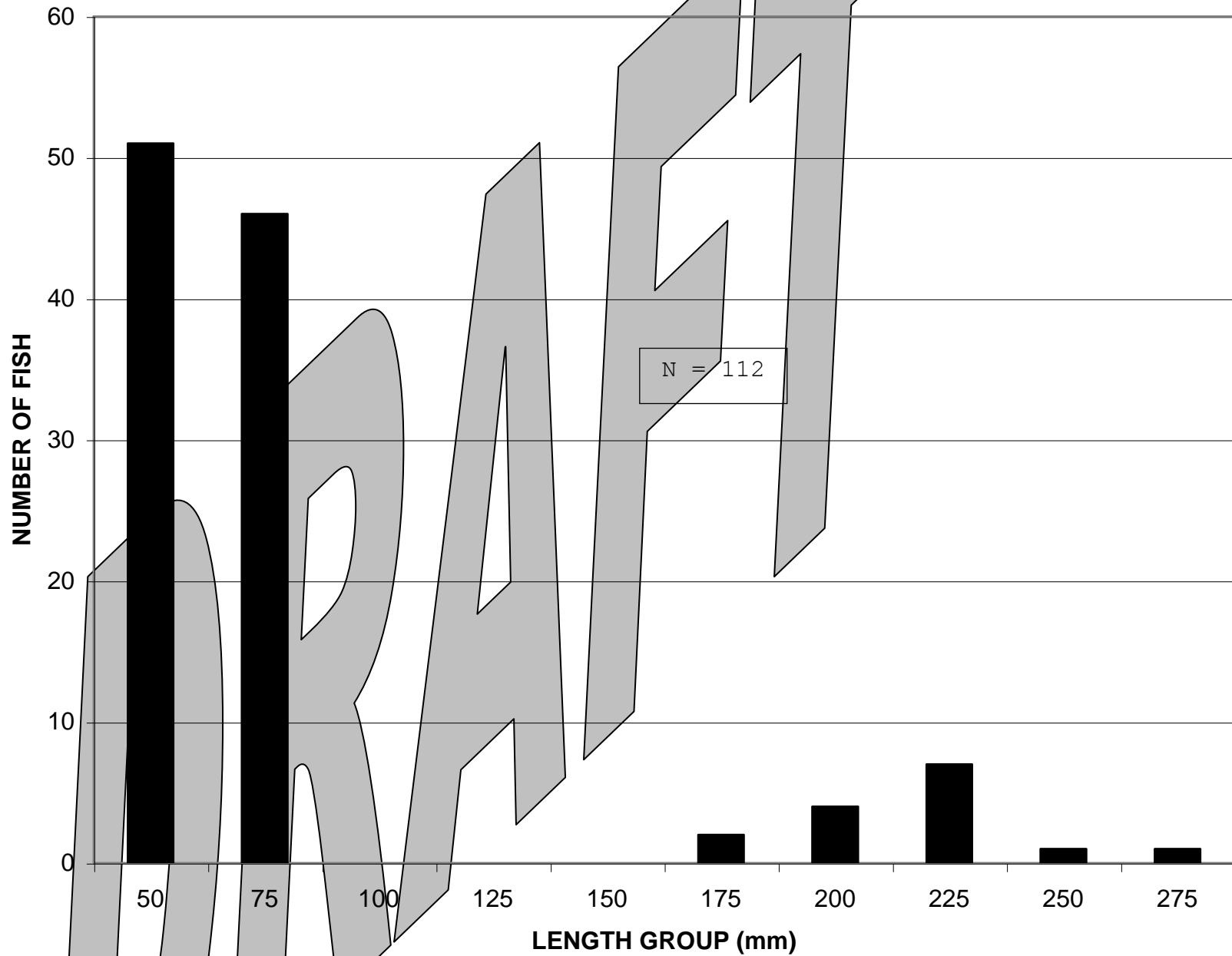


Figure 4. Length-frequency distribution (M+C-R) of wild brook trout captured in Section 01 of Big Rift Creek (404A) during 2007.



DISTRIBUTION

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Water	Lat/Long of the mouth
Stephenhouse Run	41-52-46 // 77-11-44
Brown Run	41-51-16 // 77-10-35
Ives Run	41-53-29 // 77-11-07
Big Rift Creek	41-52-08 // 77-07-16
Phoenix Run	41-52-50 // 77-06-52