

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

WATER: Wapwallopen Creek Basin (405B) Luzerne County

EXAMINED: Summer 2005

BY: Moase, Wnuk, and McGrady

Bureau Director Action: _____ Date: _____

Division Chief Action: _____ Date: _____

WW Unit Leader Action: _____ Date: _____

CW Unit Leader Action: _____ Date: _____

=====
CWU COMMENTS:

The Wapwallopen Creek (405B) Basin was examined during July 2005 to update inventory information on Wapwallopen Creek, Sections 02-04, and Big Wapwallopen Creek, Sections 01-03, and to collect baseline inventory information on Wapwallopen Creek, Section 01, Balliet Run, Section 01, Bow Creek, Section 01, and Watering Run, Section 01.

Wapwallopen Creek

Section 01

Section 01 can be characterized as a small, coldwater stream. The 2005 examination (conducted at two sample sites) recorded the presence of 12 fish species, including a Class A wild brown trout population estimated at 49.18 kg/ha.

Section 02

This segment can be characterized as a moderate size, coldwater stream. The 2005 examination recorded the presence of nine fish species, including a Class A wild brown trout population estimated at 41.28 kg/ha.

Section 03

Section 03 can be characterized as a moderate size, coldwater stream. Adult trout stocking was added to the management of this section of stream in 2004. The 2005 examination recorded the presence of eight fish species, including a biomass Class B wild brown trout population estimated at 38.17 kg/ha.

Section 04

This segment of stream can be characterized as a moderate size, coldwater stream. The 2005 examination recorded the presence of 13 fish species, including a modest population of wild brown trout estimated at 5.96 kg/ha.

Big Wapwallopen Creek

Section 01

Section 01 can be characterized as a small, infertile, coldwater stream. The 2005 examination recorded the presence of six fish species, including a Class A mixed wild brook (46.07 kg/ha) and wild brown trout (51.83 kg/ha) population estimated at 97.90 kg/ha.

Section 02

This segment can be characterized as a small, coldwater stream. Historically, Section 02 has been managed with the planting of PFBC adult trout. A total of 11 fish species were captured at two sample sites in 2005, including a biomass Class B wild brown trout population estimated at 23.17 kg/ha.

Section 03

Section 03 can be characterized as a moderate size, coldwater stream. The 2005 examination (conducted at four sample sites) recorded the presence of 16 fish species, including a biomass Class B wild brown trout population estimated at 37.69 kg/ha.

Balliet Run

Section 01 can be characterized as a small, coldwater stream. A total of five fish species were captured in 2005, including a Class A wild brown trout population estimated at 59.71 kg/ha.

Bow Creek

Section 01 can be characterized as a small, infertile, coldwater stream. The 2005 examination recorded the presence of eight fish species, including a Class A mixed wild brook (15.90 kg/ha) and wild brown trout (41.12 kg/ha) population estimated at 57.02 kg/ha.

Watering Run

Section 01 can be characterized as a small, infertile, coldwater stream. The 2005 examination recorded the presence of 10 fish species, including a biomass Class B wild brown trout population estimated at 25.86 kg/ha.

CWU RECOMMENDATIONS :

1. Wapwallopen Creek (405B), Section 03, and Big Wapwallopen Creek (405B), Section 02, should continue to be managed with the planting of PFBC adult trout. Stocking rate and frequency should be determined by classification according to program guidelines.
2. Wapwallopen Creek, Sections 01 and 02, Big Wapwallopen Creek, Section 01, Balliet Run, Section 01, and Bow Creek, Section 01, should be managed as Class A wild trout waters. Statewide regulations should apply with no stocking.
3. Big Wapwallopen Creek, Section 03, and Watering Run, Section 01, should be managed as biomass Class B wild trout waters. Statewide regulations should apply with no stocking.
4. Wapwallopen Creek, Section 04, should be managed as a biomass Class D water. Statewide regulations should apply with no stocking.
5. Balliet Run, Section 01, should be added to the list of Pennsylvania stream sections that support wild trout production.
6. Based on the presence of Class A wild trout populations within five stream sections in the Wapwallopen Creek drainage, I concur with the Area 4 recommendations stating that the DEP Chapter 93 Water Quality Standards should be upgraded to HQ-CWF for the entire Wapwallopen Creek Basin.

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**

Wapwallopen Creek Basin (405B)
Fisheries Management Report

Prepared by:
Robert Wnuk, Robert Moase, and Ryan McGrady

Fisheries Management Database Name: Wapwallopen Ck
Lat/Lon: 410421760808

Date Sampled: Summer 2005

Date Prepared: December 2005

Introduction

There is a substantial fishery resource in the 40,000+ miles of flowing water throughout Pennsylvania. To realize the potential of this resource the Pennsylvania Fish and Boat Commission (PFBC) has established a policy of resource examination and classification. The primary objectives of the examination are to document a stream's fish populations and to collect social, physical, and chemical data that influence the way we manage its fishery. Establishing relationships among these parameters allows us to place each individual stream section into a resource category. Once we've assigned a section to a resource category, we can implement a management program that is consistent with statewide goals and objectives.

The Area 4 fisheries management office has been conducting stream examinations on a drainage basin level to facilitate management by resource classification. We selected the Wapwallopen Creek basin for investigation in 2005 because we had never surveyed most of its named tributaries and because the information we had on previously surveyed waters was old. Thus, the objectives of our examination were: 1) to collect baseline data on the fisheries in unsurveyed waters so that we could assign them to resource categories and 2) to evaluate past management practices in the watershed and implement new management strategies where appropriate.

Wapwallopen Creek Basin (405B)**Page 2****Study Area**

Wapwallopen Creek is a 14.34 km long tributary to the North Branch Susquehanna River at River Mile (R.M.) 40.79. Its 138 km² drainage contains five named streams (Table 1) and is located entirely within Luzerne County. Land use in the drainage is a mixture of agriculture, woodlots, and single family rural residential development. Concentrated residential and industrial development exists near Mountain Top. Many of the National Pollution Discharge Eliminate System (NPDES) permits in the basin originate from this area, and all named streams receive NPDES discharges. The Mountain Top Area Joint Sanitary Authority (MTAJSA) is the largest discharger in the watershed. This sewage treatment plant has a design flow of 4.16 mgd and discharges to Big Wapwallopen Creek. The other discharges are much smaller. They originate from industrial plants or private sewage systems.

The main geological components of the Wapwallopen Creek watershed are Devonian Aged members of the Catskill Formation. These members are composed of various sandstones, siltstones, claystones, and shales. Small amounts of the Trimmers Rock Formation (Devonian Age) and Spechty Kopf Formation (Mississippian and Devonian Ages) are also present. There are no significant public land holdings. Major road access is via Interstate 81, SR 239, SR 437, and SR 309 (Figure 1). Topographic coverage is provided by the Berwick, Freeland, Sybertsville, Wilkes-Barre East, and Wilkes-Barre West USGS 7.5 minute quadrangles.

Historic Perspective

USGS 7.5 minute topographic maps have caused some confusion in historic PFBC files. The Sybertsville map shows Wapwallopen Creek splitting near Moyers Grove. The eastward split is labeled as Wapwallopen Creek but the northern split is unnamed. On the next map to the east (Freeland), the eastern split is labeled as Balliet Run and the northern split is labeled as Big Wapwallopen Creek. The PFBC historically considered the northern split to be Wapwallopen Creek and the eastern split to be Balliet Run. This was changed in 2003. The PFBC now considers the eastern split to be Wapwallopen Creek, with the headwaters at the junction of Balliet Run and an unnamed tributary. The northern split is considered a separate stream named Big Wapwallopen Creek. Big Wapwallopen Creek originates from Crystal Lake and ends at its junction with Wapwallopen Creek.

Daniels (1965) conducted the first PFBC biological investigations of Wapwallopen and Big Wapwallopen Creeks. He described good conditions in the upper end of the system with increasing siltation downstream. Daniels and Jackson (1973) also

Wapwallopen Creek Basin (405B)**Page 3**

surveyed both streams. They found that the heaviest siltation had washed away and documented some brown trout *Salmo trutta* reproduction in Wapwallopen Creek. Additionally, they noted rapid development, littering, landowner posting, and pollution from various sources. Daniels et al. (1978) documented a Class B mixed wild brown and brook *Salvelinus fontinalis* trout population in Section 01 of Big Wapwallopen Creek. The investigators noted that sewer line construction had adversely impacted wild trout populations in the area. The sewer line crossed Big Wapwallopen Creek 87 different times. Wild trout biomass generally declined as this survey progressed downstream on Big Wapwallopen Creek and into Sections 02 and 04 of Wapwallopen Creek. The Daniels et al. (1978) survey also reported a fish kill in Watering Run due to phenol pollution. Newspaper accounts from the time claimed that 55 brown trout and a number of other fish were killed in this incident.

Copeland (1989) conducted the most recent PFBC survey in the Wapwallopen Creek basin. He examined five stations in Section 03 of Big Wapwallopen Creek to measure the impacts of the MTAJSA discharge. A Class C wild brown trout population along with a few wild brook trout was present. Intermittent sublethal discharges of chlorine and ammonia confounded efforts to measure the impacts of the discharge. Further, Watering Run enters Big Wapwallopen Creek upstream from the sewage outfall.

The Pennsylvania Department of Environmental Protection (DEP) has also surveyed Big Wapwallopen Creek to measure the impacts of the MTAJSA discharge. Kupsky (1979) collected baseline data prior to the operation of the plant. He documented excellent biological and chemical conditions in both July and September. Following startup, Kupsky (1981) noted a slight depression in the aquatic macroinvertebrate community downstream from the discharge but found that all measured biological and chemical parameters were within permitted limits. Shertzer (1986), however, found that trout were absent downstream from the outfall and that the effluent plume remained stratified in the stream flow as far as 325 m. Kupsky (1989a) found severely depressed macroinvertebrate and fish communities downstream from the outfall. He suspected ammonia and chlorine toxicity originating from the sewage plant. Kupsky (1989b) found that the plant had improved the precision of its dechlorination process and that ammonia treatment was to be achieved within permit limits.

Current Management Strategies

DEP classifies the entire Wapwallopen Creek basin as a coldwater fishery (CWF) in its Chapter 93 Water Quality Standards. The PFBC

Wapwallopen Creek Basin (405B)**Page 4**

manages Wapwallopen Creek as four separate sections and Big Wapwallopen Creek as three. The remainder of the streams in the basin are managed as single sections extending from the headwaters downstream to the mouth. All sections are managed with statewide angling regulations. Wapwallopen Creek, Section 03, and Big Wapwallopen Creek, Section 02, are stocked with adult hatchery trout. Wapwallopen Creek, Section 03, receives a preseason only stocking. Big Wapwallopen Creek, Section 02, receives a preseason and two inseason stockings. There are no special stocking instructions and no known Cooperative Nursery stockings.

Methods

We examined the Wapwallopen Creek basin between July 13 and July 26, 2005. All procedures of the survey followed Marcinko et al. (1986). We surveyed all of the named streams in the basin and collected physical and some social data for all stream sections. We did not evaluate parking characteristics.

This survey assessed physical, chemical, and biological characteristics at 18 sampling stations (Figure 1; Table 2). We evaluated total alkalinity with a mixed indicator, pH with a colorimetric method, and total hardness with EDTA titration. We used backpack electrofishing gear to assess fish populations. Backpack setups included a Coffelt unit (Model BP 1C, alternating current) and a Smith-Root unit (Model 12-A POW, pulsed direct current) with a single anode and a rat-tail cathode. The choice of backpack electrofishing gear generally depended on station width. In this work we used the Coffelt unit at 12 sites and the Smith-Root unit at three sites. Electrofishing was not conducted at three sites because of low flows. We identified the fish we captured at each site to species. The scientific and common names of the fish species we captured followed Robins et al. (1991).

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). At all other sites, we considered the number of wild trout captured to be the total population present. 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 December 22, 2005.

Results and Discussion

Wapwallopen Creek and its tributaries possessed low to moderate gradients. The highest gradient for any section in the basin was 29.1 m/km at Bow Creek (Table 3). Human population density varied from rural to urban (Table 4). Urban stream sections were those located near Mountain Top. Stream ownership in the basin was completely private. All sections were considered closed to public fishing without permission except for the trout stocked areas (Table 4).

Chemically, the upper portions of streams in the Wapwallopen Creek basin were infertile but fertility increased in downstream areas. Total alkalinity values ranged from 4 to 64 mg/l and pH values ranged from 6.2 to 8.6 (Table 5). Total alkalinity was < 10 mg/l at two of the 18 sites, and was between 10 and 20 mg/l at another eight sites. As such, the headwater areas of many streams in the watershed were vulnerable to acid precipitation. Increases in fertility in the downstream portions of streams were associated with suburban and agricultural runoff in combination with the many NPDES discharges. The influence of the discharges on stream chemistries was particularly evident in specific conductance values. Specific conductance in the basin generally exceeded 150 umhos and was as high as 446 umhos downstream from the MTAJSA outfall. Water temperatures during the latter half of the survey were quite warm for a coldwater system. Water temperature at River Mile 1.21 of Big Wapwallopen Creek was 24.9°C (Table 5). Nevertheless, wild brown trout were present at this site. The warm stream temperatures were associated with the warm, dry summer we experienced in 2005. Trout at most of the sites appeared to be thin, most likely because they were not feeding well in the warm temperatures.

We documented 27 fish species in the Wapwallopen Creek basin (Table 6). Coldwater and transitional species dominated fish communities at most of our sites (Tables 7 through 9). Wild brown trout and white suckers *Catostomus commersoni* were present at every site we electrofished. Warmwater species were generally limited to Wapwallopen Creek near its confluence with the river and small populations that had originated from area ponds. Fallfish *Semotilus corporalis* were collected at seven of the 15 electrofishing sites. This was significant given that fallfish have declined throughout the Area 4 Fisheries Management Region in recent years (Wnuk et al. 2000). Also of interest was the absence of sculpins *Cottus* sp. in the drainage. Sculpins are ubiquitous in Area 4. Historically, Daniels et al. (1978) collected sculpins at a single site on Wapwallopen Creek, but no other PFBC surveys found them. Sculpins are present in drainages adjacent to Wapwallopen Creek.

Wapwallopen Creek Basin (405B)**Page 6**

Basin-wide fish species diversity in 2005 compared favorably to historic work. The PFBC found 31 fish species in all historic surveys combined. Those species present historically but absent during the current work were shorthead redhorse *Moxostoma macrolepidotum*, brown bullhead *Ameiurus nebulosus*, American eel *Anguilla rostrata*, rock bass *Ambloplites rupestris*, redbreast sunfish *Lepomis auritus*, green sunfish *Lepomis cyanellus*, black crappie *Pomoxis nigromaculatus*, shield darters *Percina peltata*, and sculpins. Historically, brown bullheads were collected at six sites but the other species were collected at no more than two sites. Conversely, we documented tiger trout, comely shiner *Notropis amoenus*, swallowtail shiner *Notropis procne*, river chub *Nocomis micropogon*, and banded darters *Etheostoma zonale* in the basin for the first time during this work. These species were also rare.

The gamefish species we documented in the Wapwallopen Creek basin were hatchery rainbow trout *Oncorhynchus mykiss*, wild and hatchery brown trout, wild and hatchery brook trout, tiger trout, chain pickerel *Esox niger*, smallmouth bass *Micropterus dolomieu*, and largemouth bass *Micropterus salmoides*. Wild brown trout populations were substantial. All sections supported at least a Class B wild brown trout density except Section 04 of Wapwallopen Creek (Table 10). Wild brook trout were not as abundant as wild browns but reached Class A density in Section 01 of Big Wapwallopen Creek. Hatchery trout were common at Station 0201 of Big Wapwallopen Creek but rare elsewhere. Tiger trout, chain pickerel, smallmouth bass, and largemouth bass were uncommon during the 2005 work.

Water quality, fish species occurrence, and wild trout abundance varied among the Wapwallopen Creek basin streams. We will next discuss specific findings for each stream and section individually, as the PFBC currently manages on a stream/section basis. This approach will facilitate presenting the resource classifications (Table 11) needed to generate management plans (PFBC 1997).

Balliet Run

The PFBC manages Balliet Run as a single section extending from the headwaters downstream to the mouth. The mouth of Balliet Run is at its confluence with an unnamed tributary between Springtown and Moyers Grove. This confluence forms the headwaters of Wapwallopen Creek. Balliet Run, Section 01, is 6.0 km long and is located in an area of rural human population density. It is closed to public angling without landowner permission.

Wapwallopen Creek Basin (405B)**Page 7**

We sampled two stations on Balliet Run. The upstream station possessed very little flow so we did not electrofish. Electrofishing at the downstream station produced five fish species. Total wild brown trout biomass was 59.71 kg/ha and the biomass of wild brown trout < 150 mm was 18.6 kg/ha. This was sufficient to qualify the section for Class A wild brown trout status. Wild brown trout ranged from 25 to 324 mm total length (Figure 2), and we estimated that 480 legal size and larger wild brown trout were present in the stream. Wild brook trout biomass was 11.94 kg/ha, which accounted for only 17% of the total trout biomass at the station.

*Wapwallopen Creek**Section 01*

Section 01 of Wapwallopen Creek extends 5.8 km from the headwaters downstream to the confluence with Big Wapwallopen Creek. The headwaters of Wapwallopen Creek are formed by the confluence of Balliet Run with an unnamed tributary. Human population density for Section 01 is rural. The section is closed to public angling without landowner permission.

We sampled two stations in Section 01. Total alkalinity, total hardness, and specific conductance values were much higher at the upstream station than at the downstream one. The United States Environmental Protection Agency does not list any NPDES discharges to Wapwallopen Creek between our two stations (http://www.epa.gov/enviro/html/pcs/pcs_query_java.html December 2005), so we were unable to explain this chemical anomaly. Wild brown trout were present at both stations. They were much more abundant at the downstream station but overall section biomass was still sufficient to qualify for Class A status. Total wild brown trout biomass in Section 01 was 49.08 kg/ha and the biomass of wild brown trout < 150 mm was 4.36 kg/ha. Wild brown trout in Section 01 ranged from 25 to 449 mm total length (Figure 3). We estimated there were 644 legal size and larger wild browns in the section. Wild brook trout were only present at the upstream station. Mean wild brook trout biomass in Section 01 was 0.10 kg/ha.

Section 02

Section 02 of Wapwallopen Creek extends 2.9 km from the confluence with Big Wapwallopen Creek downstream to a point located 380 m downstream from SR 3012. Human population density for the section is rural and it is closed to public angling without landowner permission.

Wapwallopen Creek Basin (405B)**Page 8**

We sampled a single station in Section 02. The fish community consisted of 9 species and was dominated by wild brown trout. Total wild brown trout biomass was 41.28 kg/ha and the biomass of wild brown trout < 150 mm was 1.80 kg/ha. This was sufficient to qualify the section for Class A status. Wild brown trout in Section 02 ranged from 50 to 474 mm total length (Figure 4). We estimated there were 644 legal size and larger wild browns in the section. We only captured one wild brook trout at the station.

Wild brown trout biomass in Section 02 increased substantially from historic work. Daniels et al. (1978) only captured one rainbow, seven brown, and three brook trout in a 370 m long station. Further, most of these trout were stocked fish that had held over from a PFBC stocking. The PFBC formerly stocked portions of Section 02 with hatchery trout.

Section 03

Section 03 of Wapwallopen Creek extends 1.4 km from a point located 380 m downstream from SR 3012 downstream to a point located 500 m downstream from SR 3013. The strange section limits encompass the property of a single landowner who requested trout stocking and was willing to grant public access. The PFBC began stocking this section in 2004. It is stocked pre-season only with 400 fish. Human population density for the section is rural and it is completely open to public angling.

We sampled a single station in Section 03. The station was only 240 m long because water depth in all other areas of the section was too deep to sample. Nevertheless, the station included 17% of the total section length. Eight fish species were present including wild brown trout. Wild brown trout biomass was 38.17 kg/ha (Class B) with fish ranging from 50 to 399 mm total length (Figure 5). There were an estimated 321 legal size and larger wild browns in the section. We also captured three hatchery brown trout at the station. Given the low density pre-season only stocking program, it was unlikely that trout stocking impacted the wild brown trout population in Section 03.

Section 04

Section 04 of Wapwallopen Creek extends 4.2 km from a point located 500 m downstream from SR 3013 downstream to the mouth. Human population density for the section is rural and it is closed to public angling without landowner permission. This section flows through an attractive gorge area. A landowner at the lower end of the section formerly allowed access but closed his property due to poor public behavior.

Wapwallopen Creek Basin (405B)**Page 9**

We sampled a single station in Section 04. Thirteen fish species were present including hatchery rainbow trout, wild brown trout, and smallmouth bass. Trout were not abundant but very high flows from an overnight thunderstorm affected our catch rates. We did not enumerate smallmouth bass at this site but juveniles were very abundant. We were able to capture these fish easily in near-shore areas with slower flows.

Wild brown trout and smallmouth bass were the only gamefish Daniels et al. (1978) captured in Section 04. Wild brown trout density in 1978 was similar to that in 2005. The 1978 survey found 20 fish species in the section while we only found 13. This may have been the result of the high flows in 2005.

*Big Wapwallopen Creek**Section 01*

Section 01 of Big Wapwallopen Creek extends 7.5 km from the headwaters at Crystal Lake downstream to the power line crossing upstream from Nuangola Road. Human population density for the section is suburban and it is closed to public angling without landowner permission.

We sampled two sites in Section 01. Flows were very low at the upstream site so we did not electrofish. Electrofishing at the downstream site produced six fish species. Wild brown and brook trout dominated the fish community. Total wild brown trout biomass was 51.83 kg/ha and total wild brook trout biomass was 46.07 kg/ha. The biomass of wild brown trout < 150 mm was 11.42 kg/ha and the biomass of wild brook trout < 150 mm was 13.42 kg/ha. This was sufficient to qualify the section for Class A mixed wild brown and brook trout status. Wild brown trout ranged from 25 to 424 mm total length and wild brook trout ranged from 25 to 274 mm total length (Figure 6). We estimated there were 375 and 555 legal size and larger wild brown and brook trout, respectively, in the section. In addition to the wild trout, we captured three large (300 to 349 mm total length) hatchery brook trout at this station. These fish had originated from a Lions Club stocking for a children's fishing derby in an upstream pond.

Wild trout biomass in Section 01 increased substantially from the historic survey. Daniels et al. (1978) documented 13.21 kg/ha of wild brown trout and 21.78 kg/ha of wild brook trout. These investigators noted that wild trout and aquatic macroinvertebrate populations at the time of their survey were depressed by sewer line construction activities.

Wapwallopen Creek Basin (405B)**Page 10***Section 02*

Section 02 of Big Wapwallopen Creek extends 7.2 km from the power line crossing upstream from Nuangola Road downstream to the County Road bridge. Human population density for the section is urban and it is 100% open to public angling. The PFBC stocks this section with adult hatchery trout. It annually receives one preseason and two inseason plants.

We sampled two stations in Section 02. The fish community consisted of 11 species and included both hatchery and wild trout. Wild brown trout were present at both stations and had a section biomass of 23.17 kg/ha. Wild brook trout were only present at the upstream station and had a section biomass of 1.24 kg/ha. Wild brown trout in Section 02 ranged from 50 to 349 mm total length (Figure 7). We estimated there were 554 legal size and larger wild brown trout in the section. In addition to the wild trout, we estimated that 7 hatchery rainbow trout, 20 hatchery brown trout, and 2 hatchery brook trout were present in Section 02. This amounted to 0.8% of the 3,400 trout stocked in the section in 2005.

Wild trout biomass in Section 02 increased substantially from historic work. Daniels et al. (1978) found 8.25 kg/ha of wild brown trout and 0.34 kg/ha of brook trout. Further, some of these trout were likely hatchery fish. As in Section 01, wild trout populations in Section 02 were impacted by sewer line construction during the 1978 survey.

Wild trout biomass in Section 02 during the 2005 work was lower than in Sections 01 or 03. This may have been related to the high intensity stocking program in Section 02 (Bachman 1984; Vincent 1987; Moring 1993), but many factors can affect the relationship between stocking and wild trout populations (see Carline et al. 1991). Petrosky and Bjornn (1988) and Weiss and Schmutz (1999) found that stocking hatchery fish did not impact wild trout density. Further, differences in physical habitat confounded comparisons of wild trout densities among the three sections of Big Wapwallopen Creek. Section 02 was generally wide and shallow, while Sections 01 and 03 possessed numerous deep pools.

Section 03

Section 03 of Big Wapwallopen Creek extends 14.0 km from the County Road bridge downstream to the confluence with Wapwallopen Creek. Human population density for the section is suburban and it is closed to public angling without landowner permission.

Wapwallopen Creek Basin (405B)**Page 11**

We sampled four stations in Section 03. Water chemistry values at the most upstream station were elevated when compared to all other stations on the stream. This was the result of the MTAJSA sewage discharge. Wild brown trout were numerous enough at the upstream three stations to conduct a Petersen population estimate. At the most downstream station we captured 29 wild brown trout in a 300 m site. We did not extend the site to attempt a Petersen estimate because the water temperature was quite warm (24.9°C) and we did not wish to further stress the fish by conducting a recapture run.

We documented 16 fish species in Section 03. Wild brown trout were dominant and had a mean section biomass of 37.69 kg/ha (Class B). Wild brown trout ranged from 50 to 449 mm total length (Figure 8) and we estimated there were 2,520 legal size and larger wild brown trout in the section. Wild brook trout and hatchery brook and rainbow trout were scarce. Wild brook trout section biomass was 0.62 kg/ha.

Wild brown trout biomass in Section 03 increased substantially from historic work. Daniels et al. (1978) documented 15.18 kg/ha and Copeland (1989) documented 14.01 kg/ha of brown trout in the section. This increase may have been related to improvements in ammonia treatment at the MTAJSA plant (Kupsky 1989b). DEP has not recorded an ammonia violation from this discharge since March 2002. Nevertheless, the plant violated BOD standards in March 2004 and remains in violation of dichlorobromomethane standards (http://www.epa.gov/enviro/html/pcs/pcs_query_java.html December 2005). Dichlorobromomethane is inadvertently formed during the chlorination process. It is a recognized carcinogen in the state of California (http://www.oehha.ca.gov/prop65/prop65_list/Newlist.html December 2005).

Bow Creek

The PFBC manages Bow Creek as a single section extending from the headwaters downstream to the confluence with Big Wapwallopen Creek. This section is 7.3 km long and is located in an area of urban human population density. It is closed to public angling without landowner permission.

We sampled at two stations on Bow Creek. The upstream station possessed very little flow so we did not electrofish. Total alkalinity at this station was 4 mg/l, the lowest we documented in the entire basin. All water chemistry values increased at the downstream site as Bow Creek received NPDES discharges from the Crestwood Industrial Park. Electrofishing at the downstream station produced eight fish species. Wild brown trout biomass was 41.12 kg/ha and wild brook trout biomass was 15.90 kg/ha.

Wapwallopen Creek Basin (405B)**Page 12**

The biomass of wild brown trout < 150 mm was 11.78 kg/ha and the biomass of wild brook trout < 150 mm was 8.51 kg/ha. This was sufficient to qualify the section for Class A mixed wild brown and brook trout status, as brook trout made up 28% of the total wild trout biomass. Wild brown trout ranged from 25 to 349 mm total length and wild brook trout ranged from 50 to 249 mm total length (Figure 9). We estimated that 701 wild brown and 190 wild brook trout of legal size and larger were present in the stream.

Watering Run

The PFBC manages Watering Run as a single section extending from the headwaters downstream to the confluence with Big Wapwallopen Creek. This section is 3.8 km long and is located in an area of urban human population density. It is closed to public angling without landowner permission.

We sampled a single station on Watering Run. The station was located downstream from the outlet of a large pond on a horse farm. Warm water from the pond discharge may have impacted the trout population at our site. Wild brown trout biomass was 25.86 kg/ha and wild brook trout biomass was 0.75 kg/ha. Nevertheless, our site was probably representative of the section, as this stream has numerous farm ponds in its drainage. Wild brown trout at the station ranged from 25 to 274 mm total length, and wild brook trout ranged from 50 to 149 mm total length (Figure 10). We estimated 190 legal size and larger wild brown trout in the entire stream.

Chapter 93 Classifications

DEP currently classifies the entire Wapwallopen Creek basin as a CWF in its Chapter 93 Water Quality Standards. This classification is inadequate to protect the substantial wild trout populations present. Of the 10 sections in the basin, five supported Class A wild trout densities, two supported very high Class B densities, and two supported lower Class B densities. The only section that lacked a large wild trout population was the lower 4.2 km of Wapwallopen Creek, and sampling in this section was impeded by very high stream flows. Because of its significant wild trout populations, DEP should upgrade the entire Wapwallopen Creek basin to high-quality coldwater fishery.

MANAGEMENT RECOMMENDATIONS

1. The Pennsylvania Fish and Boat Commission should continue to manage Wapwallopen Creek, Section 03, and Big Wapwallopen Creek, Section 02, with adult hatchery trout under statewide angling regulations. Stocking rates should be determined according to program guidelines.
2. The Pennsylvania Fish and Boat Commission should manage the remaining stream sections in the Wapwallopen Creek basin for their natural fish populations under statewide angling regulations.
3. The Pennsylvania Fish and Boat Commission should add the following stream sections to the list of Class A wild trout waters: Balliet Run, Section 01; Wapwallopen Creek, Section 01; Wapwallopen Creek, Section 02; Big Wapwallopen Creek, Section 01; and Bow Creek, Section 01.
4. The Pennsylvania Fish and Boat Commission should add Balliet Run, Section 01, to the list of wild trout waters.
5. The Pennsylvania Department of Environmental Protection should upgrade the Chapter 93 water quality classification of the entire Wapwallopen Creek Basin from coldwater fishery to High-Quality Coldwater Fishes.

LITERATURE CITED

- Bachman, R.A. 1984. Foraging behavior of free-ranging wild and hatchery brown trout in a stream. Transactions of the American Fisheries Society 113:1-32.
- Carline, R.F., T. Beard Jr., and B.A. Hollender. 1991. Response of wild brown trout to elimination of stocking and to no-harvest regulations. North American Journal of Fisheries Management 11:253-266.
- Copeland, T. 1989. Wapwallopen Creek (405B) Management Report Section 03. Pennsylvania Fish and Boat Commission, Bellefonte, PA.
- Daniels, D.W. 1965. Wapwallopen Creek stream survey work sheet. Pennsylvania Fish and Boat Commission, Bellefonte, PA.
- Daniels, D.W., and L.L. Jackson. 1973. Wapwallopen Creek stream survey report. Pennsylvania Fish and Boat Commission, Bellefonte, PA.
- Daniels, D.W., R.E. Moase, and Westgate. 1978. Wapwallopen Creek stream examination report. Pennsylvania Fish and Boat Commission, Bellefonte, PA.
- Kupsky, E.P. 1979. Aquatic biology investigation Wapwallopen Creek Luzerne County. Pennsylvania Department of Environmental Protection, Wilkes-Barre, PA.
- Kupsky, E.P. 1981. Aquatic biology investigation Wapwallopen Creek Luzerne County. Pennsylvania Department of Environmental Protection, Wilkes-Barre, PA.
- Kupsky, E.P. 1989a. Aquatic chemical and biological investigation Wapwallopen Creek Luzerne County Mountaintop Sewage Treatment Plant. Pennsylvania Department of Environmental Protection, Wilkes-Barre, PA.
- Kupsky, E.P. 1989b. Aquatic chemical and biological investigation, Wapwallopen Creek, Luzerne County. Pennsylvania Department of Environmental Protection, Wilkes-Barre, PA.
- Marcinko, M., R. Lorson, and R. Hoopes. 1986. Procedures for stream and river inventory information input. Pennsylvania Fish and Boat Commission, Bellefonte, PA.
- Moring, J.R. 1993. Effect of angling effort on catch rate of wild salmonids in streams stocked with catchable-size trout. North American Journal of Fisheries Management 13:234-237.

- Pennsylvania Fish and Boat Commission. 1997. Management of trout fisheries in Pennsylvania waters, 3rd edition. Pennsylvania Fish and Boat Commission, Bellefonte, PA.
- Petrosky, C.E., and T.C. Bjornn. 1988. Response of wild rainbow (*Salmo gairdneri*) and cutthroat trout (*S. clarki*) to stocked rainbow trout in fertile and infertile streams. Canadian Journal of Fisheries and Aquatic Sciences 45:2087-2105.
- Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board of Canada Bulletin 191.
- Robins, C.R., R.M. Bailey, C.E. Bond, J.R. Brooker, E.A. Lachner, R.W. Lea, and W.B. Scott. 1991. A list of common and scientific names of fishes from the United States and Canada, 5th edition. American Fisheries Society Special Publication # 20. Bethesda, MD.
- Shertzer, R. 1986. Appendix D. Pennsylvania Department of Environmental Protection, Wilkes-Barre, PA.
- Vincent, E.R. 1987. Effects of stocking catchable-size hatchery rainbow trout on two wild trout species in the Madison River and O'Dell Creek, Montana. North American Journal of Fisheries Management 7:91-105.
- Weiss, S., and S. Schmutz. 1999. Performance of hatchery-reared brown trout and their effects on wild fish in two small Austrian streams. Transactions of the American Fisheries Society 128:302-316.
- Wnuk, R.T., R.E. Moase, and K. Hauck. 2000. Sugar Creek basin (404C) fisheries management report. Pennsylvania Fish and Boat Commission, Bellefonte, PA.

Table 1. Named streams of the Wapwallopen Creek Basin (405B) listed in hierarchical order.

Balliet Run Section 01
Wapwallopen Creek Section 01
Wapwallopen Creek Section 02
Big Wapwallopen Creek Section 01
Big Wapwallopen Creek Section 02
Bow Creek Section 01
Watering Run Section 01
Big Wapwallopen Creek Section 03
Wapwallopen Creek Section 03
Wapwallopen Creek Section 04

Table 2. Station number, river mile, downstream limit, length electrofished, and voltage for stations sampled during 2005 in the Wapwallopen Creek Basin (405B).

Stream	Station Number	River Mile	Downstream Limit	Length (m)	Volts
Balliet Run	0101	3.37	Small Mountain Road (T 395)	NA	NA
	0102	0.65	150m dnst Archer Rd (T 398)	300	200 DC
Wapwallopen Creek	0101	7.72	300m dnst St John's Rd (CO 029)	300	200 DC
	0102	5.43	180m dnst Moyers Grove Rd (SR 3011)	300	150 AC
	0201	4.45	150m dnst Bridge Rd	315	100 AC
	0301	2.62	500m dnst Valley Rd (SR 3013)	240	125 AC
	0401	0.15	45m dnst SR 239	300	100 AC
Big Wapwallopen Creek	0101	16.51	SR 437	NA	NA
	0102	15.50	South Main St	300	150 AC
	0201	12.17	150m dnst end of Glendale Dr	300	150 AC
	0202	9.63	150m dnst SR 2047	300	150 AC
	0301	7.27	150m dnst Alberdeen Rd	300	100 AC
	0302	4.68	250m dnst St John's Rd (CO 029)	300	100 AC
	0303	2.72	120m dnst roadside pulloff	309	75 AC
	0304	1.21	210m dnst Faux Rd (T 393)	300	100 AC
Bow Creek	0101	3.38	SR 437	NA	NA
	0102	1.04	270m dnst SR 309	300	100 AC
Watering Run	0101	1.11	210m dnst pond outlet on horse farm	300	200 DC

Table 3. Physical data for stream sections in the Wapwallopen Creek Basin (405B).

Stream (Section)	Length (km)	Width (m)	Gradient (m/km)	USGS Quadrangle (s)
Balliet Run (01)	6.0	2.6	18.8	J37, J38
Wapwallopen Creek (01)	5.8	4.0	10.7	J37
Wapwallopen Creek (02)	2.9	12.5	8.7	J37
Wapwallopen Creek (03)	1.4	12.8	4.4	J37
Wapwallopen Creek (04)	4.2	13.2	16.2	J36, J37
Big Wapwallopen Creek (01)	7.5	4.0	28.1	I38, I39
Big Wapwallopen Creek (02)	7.2	5.5	6.9	I38, J38
Big Wapwallopen Creek (03)	14.0	8.9	6.7	J37, J38
Bow Creek (01)	7.3	4.4	29.1	I38, I39
Watering Run (01)	3.8	3.8	16.7	J38

USGS Quadrangles: I38 = Wilkes-Barre West;
 I39 = Wilkes-Barre East; J36 = Berwick;
 J37 = Sybertsville; J38 = Freeland.

Table 4. Social data for stream sections in the Wapwallopen Creek Basin (405B).

Stream (Section)	Road Access:			Ownership:		2000 Human Population Density
	% of Section			%	%	
	Within:			Private	Private	
	100 m	300 m	500 m	Open	Closed	
Balliet Run (01)	35	95	100	0	100	34
Wapwallopen Creek (01)	34	57	67	0	100	33
Wapwallopen Creek (02)	52	89	100	0	100	33
Wapwallopen Creek (03)	17	100	100	100	0	33
Wapwallopen Creek (04)	16	86	100	0	100	28
Big Wapwallopen Creek (01)	16	58	75	0	100	56
Big Wapwallopen Creek (02)	24	83	97	100	0	126
Big Wapwallopen Creek (03)	39	90	100	0	100	69
Bow Creek (01)	56	96	100	0	100	160
Watering Run (01)	29	59	100	0	100	160

Table 5. Physical-chemical data collected at sampling stations in the Wapwallopen Creek Basin (405B) during 2005.

Stream	River Mile	Date	Time	Air Temp. °C	Water Temp. °C	pH	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Specific Conductance (umhos)
Balliet Run	3.37	7/25	1145	22.0	18.7	7.0	10	30	232
	0.65	7/25	1030	24.0	18.8	7.0	12	60	244
Wapwallopen Creek	7.72	7/13	1245	30.0	23.6	8.6	25	40	223
	5.43	7/14	1040	27.0	20.3	8.6	14	28	138
	4.45	7/14	1225	28.0	21.9	7.4	26	56	250
	2.62	7/18	1120	30.0	24.0	7.4	35	63	288
	0.15	7/13	1110	28.0	21.5	7.4	36	64	318
Big Wapwallopen Creek	16.51	7/22	1400	25.0	18.9	6.2	10	NA	29
	15.50	7/22	1242	26.5	19.6	6.6	6	16	70
	12.17	7/20	1100	NA	19.6	7.0	18	36	169
	9.63	7/20	1335	NA	23.2	7.2	18	39	169
	7.27	7/20	1216	27.0	23.0	7.4	64	118	446
	4.68	7/19	1240	30.0	24.1	8.0	44	94	367
	2.72	7/19	1041	28.0	23.4	7.4	46	94	355
1.21	7/18	1345	30.0	24.9	8.4	40	68	327	
Bow Creek	3.38	7/22	1410	24.0	18.4	6.2	4	22	105
	1.04	7/26	0920	21.5	17.8	6.8	16	30	155
Watering Run	1.11	7/26	1050	31.0	20.6	6.8	16	34	148

NA = Not Available.

Table 6. Scientific and common names of fish species captured in the Wapwallopen Creek Basin (405B) during current and historic work.

Scientific name	Common name	Current	Historic
<i>Oncorhynchus mykiss</i>	Rainbow trout	(4)	X
<i>Salmo trutta</i>	Brown trout	(15)	X
<i>Salvelinus fontinalis</i>	Brook trout	(9)	X
Tiger trout	Tiger trout	(1)	
<i>Esox niger</i>	Chain pickerel	(2)	X
<i>Exoglossum maxilllingua</i>	Cutlips minnow	(12)	X
<i>Notemigonus crysoleucas</i>	Golden shiner	(1)	X
<i>Luxilus cornutus</i>	Common shiner	(1)	X
<i>Notropis amoenus</i>	Comely shiner	(1)	
<i>Notropis hudsonius</i>	Spottail shiner	(1)	X
<i>Notropis procne</i>	Swallowtail shiner	(1)	
<i>Notropis rubellus</i>	Rosyface shiner	(1)	X
<i>Cyprinella spiloptera</i>	Spotfin shiner	(1)	X
<i>Pimephales notatus</i>	Bluntnose minnow	(1)	X
<i>Rhinichthys atratulus</i>	Blacknose dace	(13)	X
<i>Rhinichthys cataractae</i>	Longnose dace	(12)	X
<i>Semotilus atromaculatus</i>	Creek chub	(10)	X
<i>Semotilus corporalis</i>	Fallfish	(7)	X
<i>Nocomis micropogon</i>	River chub	(1)	
<i>Catostomus commersoni</i>	White sucker	(15)	X
<i>Moxostoma macrolepidotum</i>	Shorthead redhorse		X
<i>Ameiurus nebulosus</i>	Brown bullhead		X
<i>Noturus insignis</i>	Margined madtom	(3)	X
<i>Anguilla rostrata</i>	American eel		X
<i>Ambloplites rupestris</i>	Rock bass		X
<i>Lepomis auritus</i>	Redbreast sunfish		X
<i>Lepomis cyanellus</i>	Green sunfish		X
<i>Lepomis gibbosus</i>	Pumpkinseed	(5)	X
<i>Lepomis macrochirus</i>	Bluegill	(4)	X
<i>Micropterus dolomieu</i>	Smallmouth bass	(1)	X
<i>Micropterus salmoides</i>	Largemouth bass	(5)	X
<i>Pomoxis nigromaculatus</i>	Black crappie		X
<i>Etheostoma olmstedii</i>	Tessellated darter	(14)	X
<i>Etheostoma zonale</i>	Banded darter	(1)	
<i>Percina peltata</i>	Shield darter		X
<i>Cottus spp.</i>	Sculpins		X

Total Species: 27 31

(##) = Number of sites within the basin where each species was captured during the 2005 survey.

Table 7. Fish species captured at electrofishing sites on Wapwallopen Creek (405B) during 2005.

Species	Section 01		Section 02	Section 03	Section 04
	RM 7.72	RM 5.43	RM 4.45	RM 2.62	RM 0.15
Rainbow trout					X
Brown trout	X	X	X	X	X
Brook trout	X		X		
Chain pickerel		X			
Cutlips minnow	X	X	X	X	X
Comely shiner					X
Spottail shiner				X	
Swallowtail shiner					X
Spotfin shiner					X
Bluntnose minnow					X
Blacknose dace	X	X	X	X	
Longnose dace	X	X	X	X	
Creek chub	X	X		X	
Fallfish	X	X	X		
River chub					X
White sucker	X	X	X	X	X
Pumpkinseed			X		X
Bluegill		X			
Smallmouth bass					X
Largemouth bass	X	X			
Tessellated darter	X	X	X	X	X
Banded darter					X
Total Species:	10	11	9	8	13

RM = River Mile.

Table 8. Fish species captured at electrofishing sites on Big Wapwallopen Creek (405B) during 2005.

Species	Section 01	Section 02		Section 03			
	RM 15.50	RM 12.17	RM 9.63	RM 7.27	RM 4.68	RM 2.72	RM 1.21
Rainbow trout		X			X	X	
Brown trout	X	X	X	X	X	X	X
Brook trout	X	X		X	X		
Chain pickerel							X
Cutlips minnow		X	X	X	X	X	X
Common shiner							X
Rosyface shiner							X
Blacknose dace	X	X	X		X	X	X
Longnose dace	X	X	X	X	X	X	X
Creek chub	X	X	X	X	X		X
Fallfish				X	X	X	X
Margined madtom					X	X	X
White sucker	X	X	X	X	X	X	X
Pumpkinseed				X			X
Bluegill		X	X				
Largemouth bass		X			X		
Tessellated darter		X	X	X	X	X	X
Total Species:	6	11	8	9	12	9	13

RM = River Mile.

Table 9. Fish species captured at electrofishing sites on Balliet Run, Bow Creek, and Watering Run (405B) during 2005.

Species	Balliet Run RM 0.65	Bow Creek RM 1.04	Watering Run RM 1.11
Brown trout	X	X	X
Brook trout	X	X	X
Tiger trout		X	
Cutlips minnow			X
Golden shiner		X	
Blacknose dace	X	X	X
Longnose dace			X
Creek chub		X	
White sucker	X	X	X
Pumpkinseed			X
Bluegill			X
Largemouth bass			X
Tessellated darter	X	X	X
Total Species:	5	8	10

RM = River Mile.

Table 10. Wild trout abundance estimates determined in the Wapwallopen Creek Basin (405B) in 2005.

Water (Section)	Species	Biomass (Kilograms per Hectare)	Number per Hectare	Number per Kilometer	Number of Legals per Kilometer	Number of Legals in Section
Balliet Run (01)	Brown	59.71	4,616	1,200	80	480
	Brook	11.94	1,898	493	10	60
	Totals:	71.62	6,514	1,693	90	540
Wapwallopen Creek (01)	Brown	49.08	1,776	728	111	644
	Brook	0.10	4	2	0	0
	Totals:	49.18	1,780	730	111	644
Wapwallopen Creek (02)	Brown	41.28	873	917	222	644
	Brook	0.28	3	3	3	9
	Totals:	41.56	876	920	225	653
Wapwallopen Creek (03)	Brown	38.17	588	651	229	321
Wapwallopen Creek (04)	Brown	5.96	12	18	15	63
Big Wapwallopen Creek (01)	Brown	51.83	968	321	50	375
	Brook	46.07	2,052	676	74	555
	Totals:	97.90	3,020	997	124	930
Big Wapwallopen Creek (02)	Brown	23.17	558	333	77	554
	Brook	1.24	49	27	4	29
	Totals:	24.41	607	360	81	583
Big Wapwallopen Creek (03)	Brown	37.69	473	404	180	2,520
	Brook	0.62	9	9	5	70
	Totals:	38.31	482	413	185	2,590

Continued on next page.

Table 10. Continued.

Water (Section)	Species	Biomass (Kilograms per Hectare)	Number per Hectare	Number per Kilometer	Number of Legals per Kilometer	Number of Legals in Section
Bow Creek (01)	Brown	41.12	2,297	1,010	96	701
	Brook	15.90	1,326	583	26	190
	Totals:	57.02	3,623	1,593	122	891
Watering Run (01)	Brown	25.86	1,308	496	50	190
	Brook	0.75	141	53	0	0
	Totals:	26.61	1,449	549	50	190

Table 11. Pennsylvania Fish and Boat Commission (PFBC) and Pennsylvania Department of Environmental Protection (DEP) classifications with recommended DEP upgrades and PFBC management programs for stream sections in the Wapwallopen Creek Basin (405B).

Stream (Section)	Classification		Recommended DEP Upgrade	Recommended PFBC Management Program
	PFBC	DEP		
Balliet Run (01)	ACR4	CWF	HQ-CWF	Wild Trout/Statewide Regulations
Wapwallopen Creek (01)	ACR3	CWF	HQ-CWF	Wild Trout/Statewide Regulations
Wapwallopen Creek (02)	ACR2	CWF	HQ-CWF	Wild Trout/Statewide Regulations
Wapwallopen Creek (03)	BGR2	CWF	HQ-CWF	Preseason Stocking Only
Wapwallopen Creek (04)	DCR2	CWF	HQ-CWF	Natural Yield
Big Wapwallopen Creek (01)	ACS3	CWF	HQ-CWF	Wild Trout/Statewide Regulations
Big Wapwallopen Creek (02)	BGU3	CWF	HQ-CWF	Preseason and Inseason Stocking
Big Wapwallopen Creek (03)	BCS3	CWF	HQ-CWF	Natural Yield
Bow Creek (01)	ACU3	CWF	HQ-CWF	Wild Trout/Statewide Regulations
Watering Run (01)	BCU4	CWF	HQ-CWF	Natural Yield

CWF = Coldwater Fishery; HQ-CWF = High Quality Coldwater Fishery.

Figure 1. The Wapwallopen Creek Basin (405B).

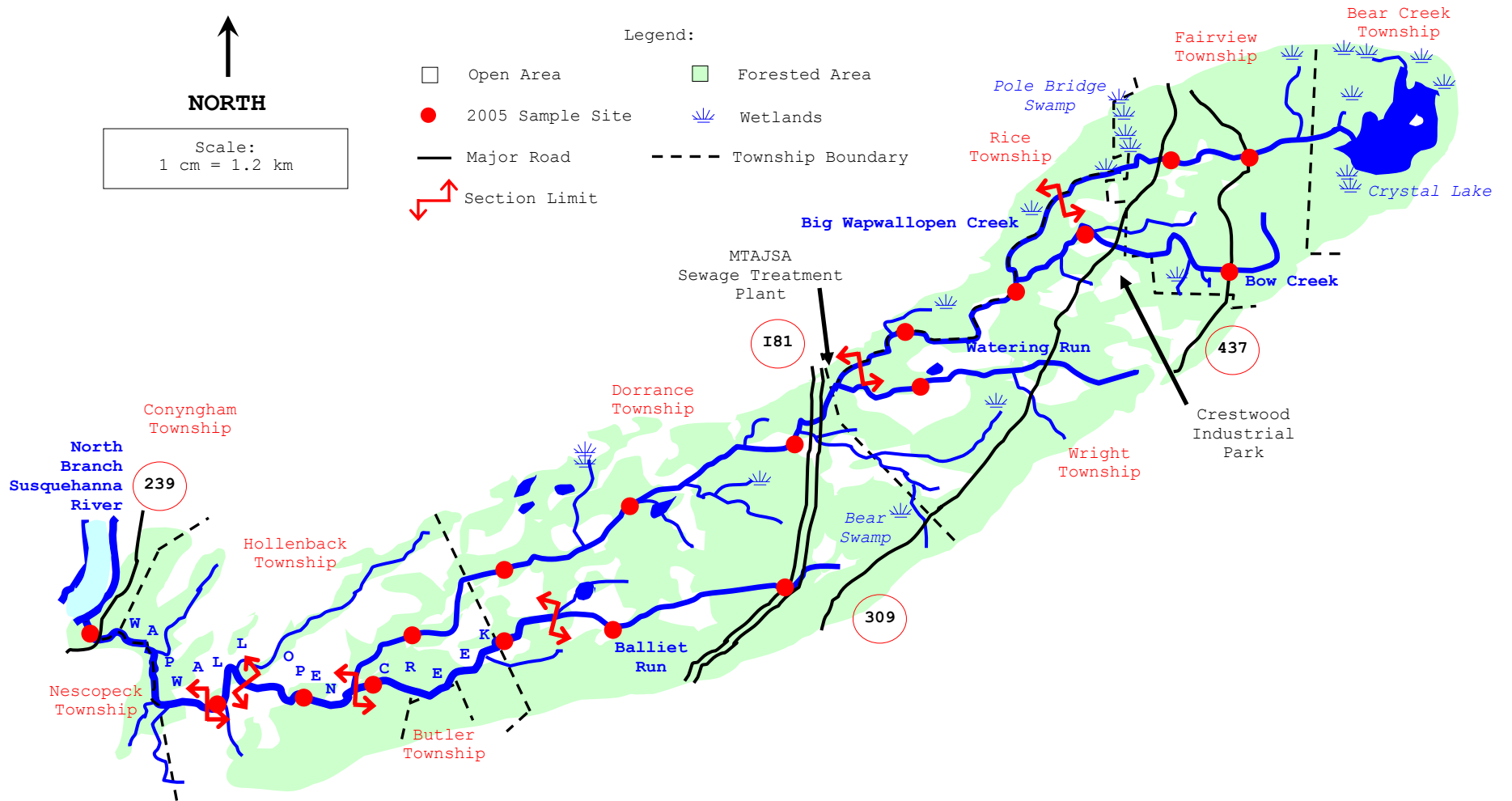


Figure 2. Length-frequency distributions (M+C-R) of wild brown and brook trout captured at one site in Section 01 of Balliet Run (405B) during 2005.

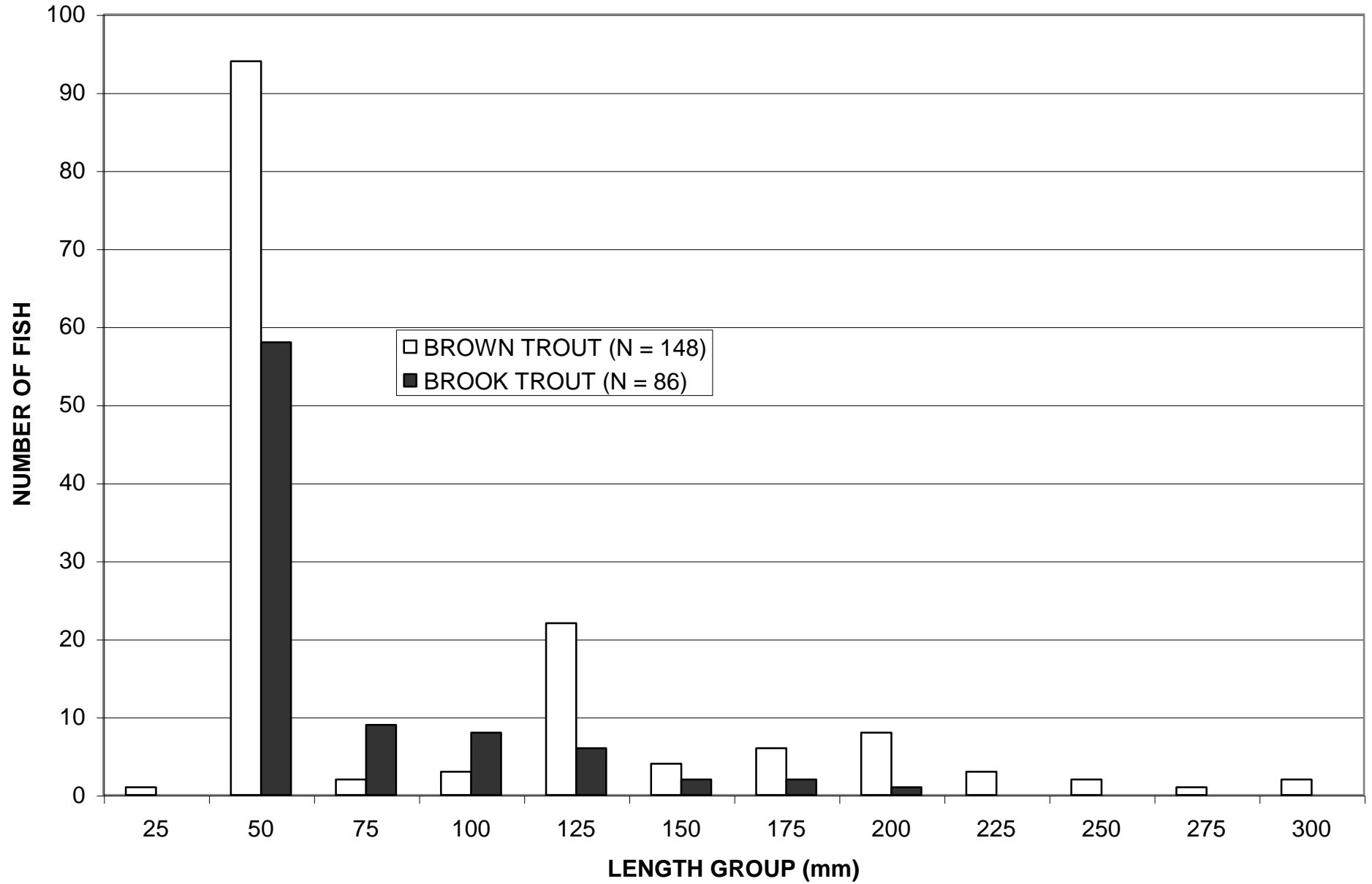


Figure 3. Length-frequency distributions (M+C-R) of wild brown and brook trout captured at two sites in Section 01 of Wapwallopen Creek (405B) during 2005.

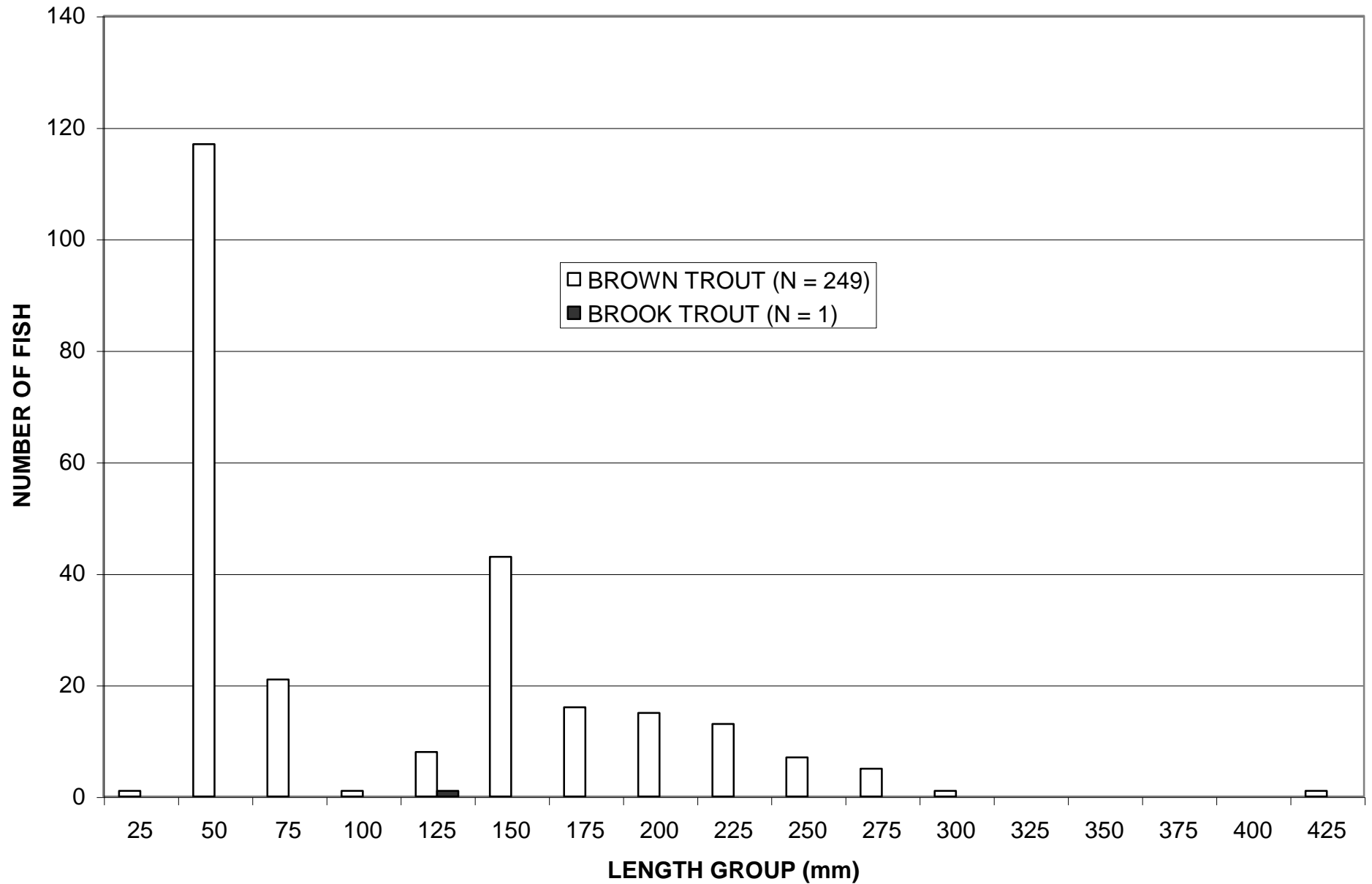


Figure 4. Length-frequency distributions (M+C-R) of wild brown and brook trout captured at one site in Section 02 of Wapwallopen Creek (405B) during 2005.

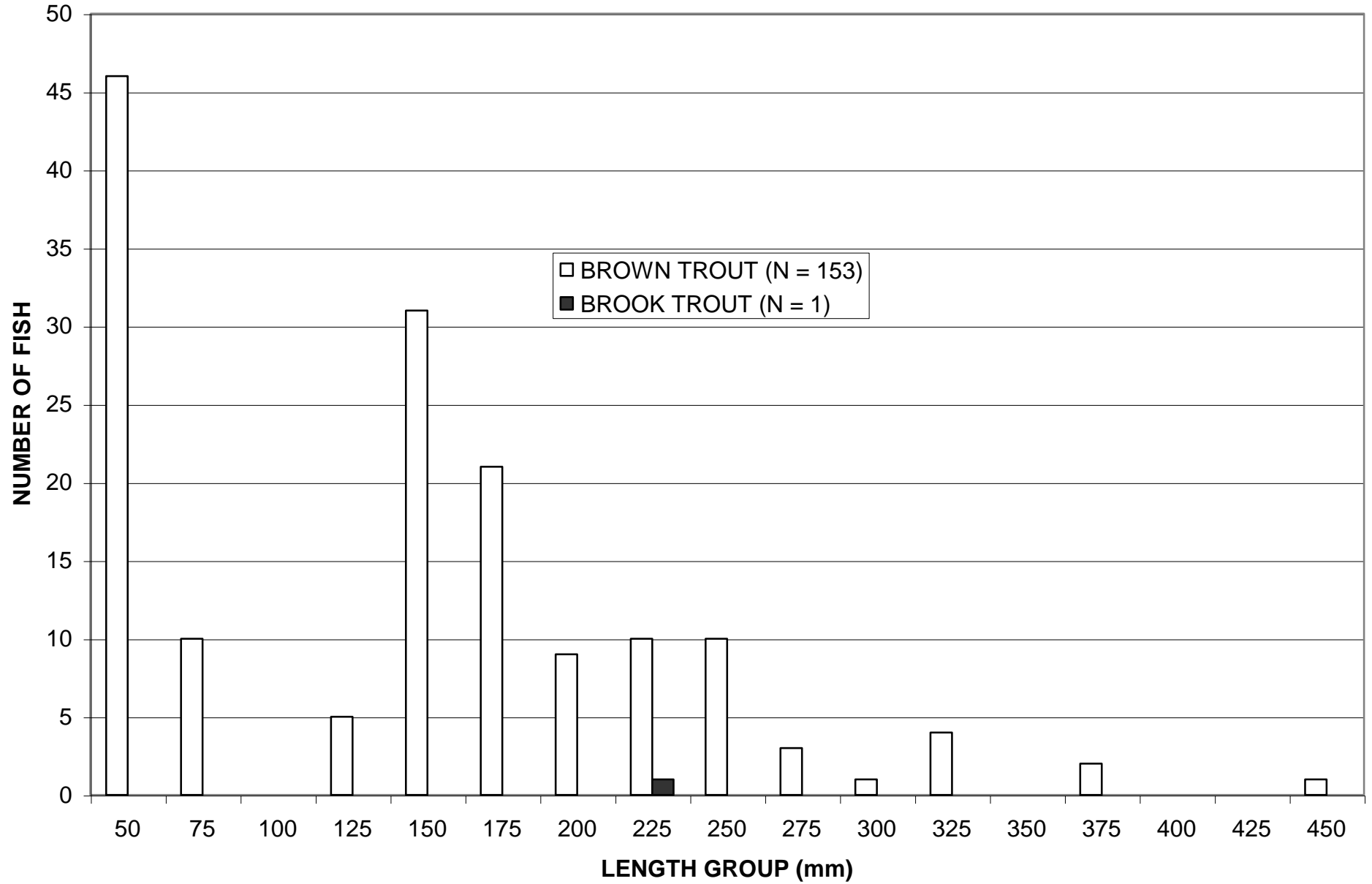


Figure 5. Length-frequency distributions (M+C-R) of wild brown trout captured at one site in Section 03 and one site in Section 04 of Wapwallopen Creek (405B) during 2005.

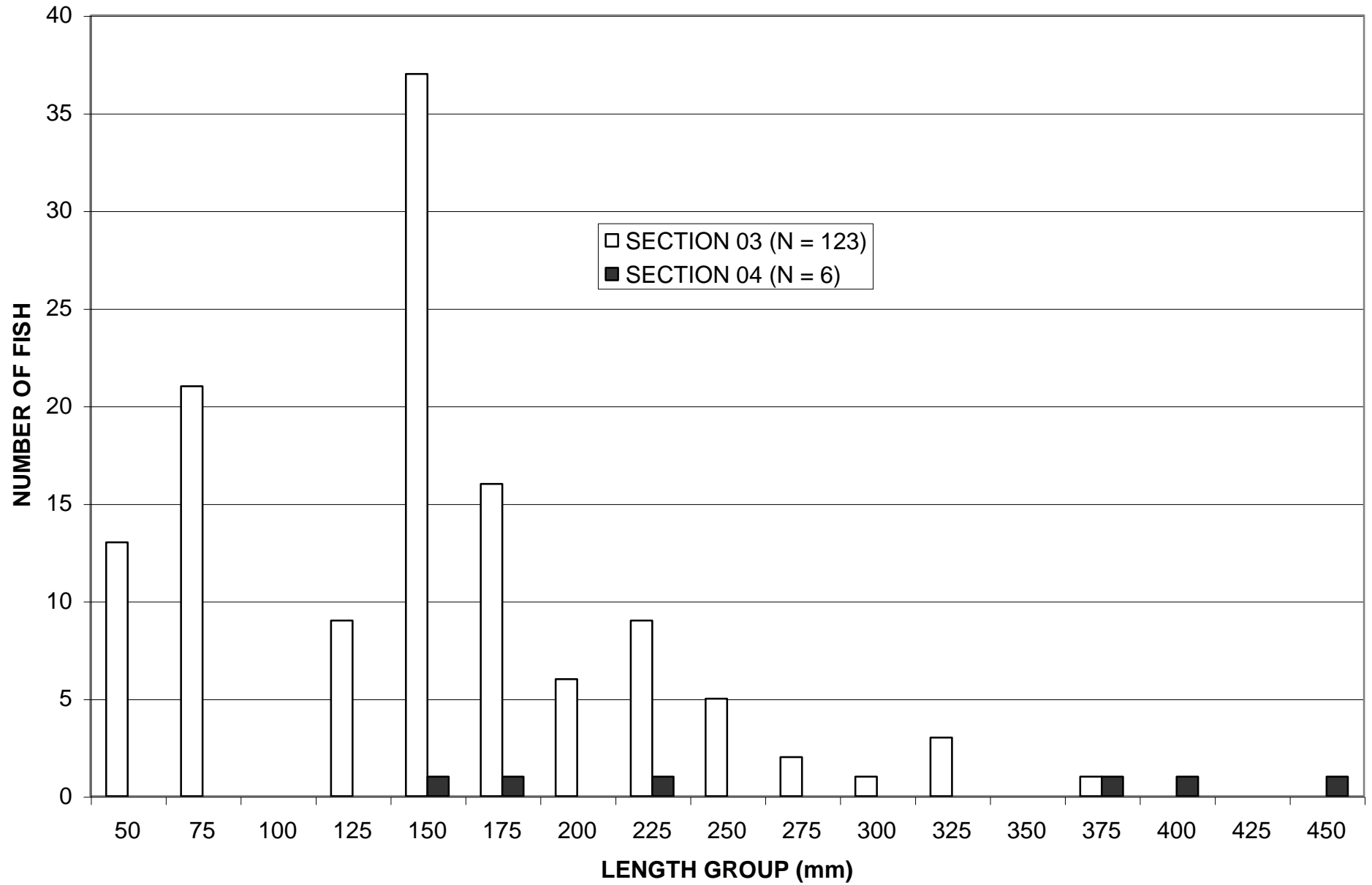


Figure 6. Length-frequency distributions (M+C-R) of wild brown and brook trout captured at one site in Section 01 of Big Wapwallopen Creek (405B) during 2005.

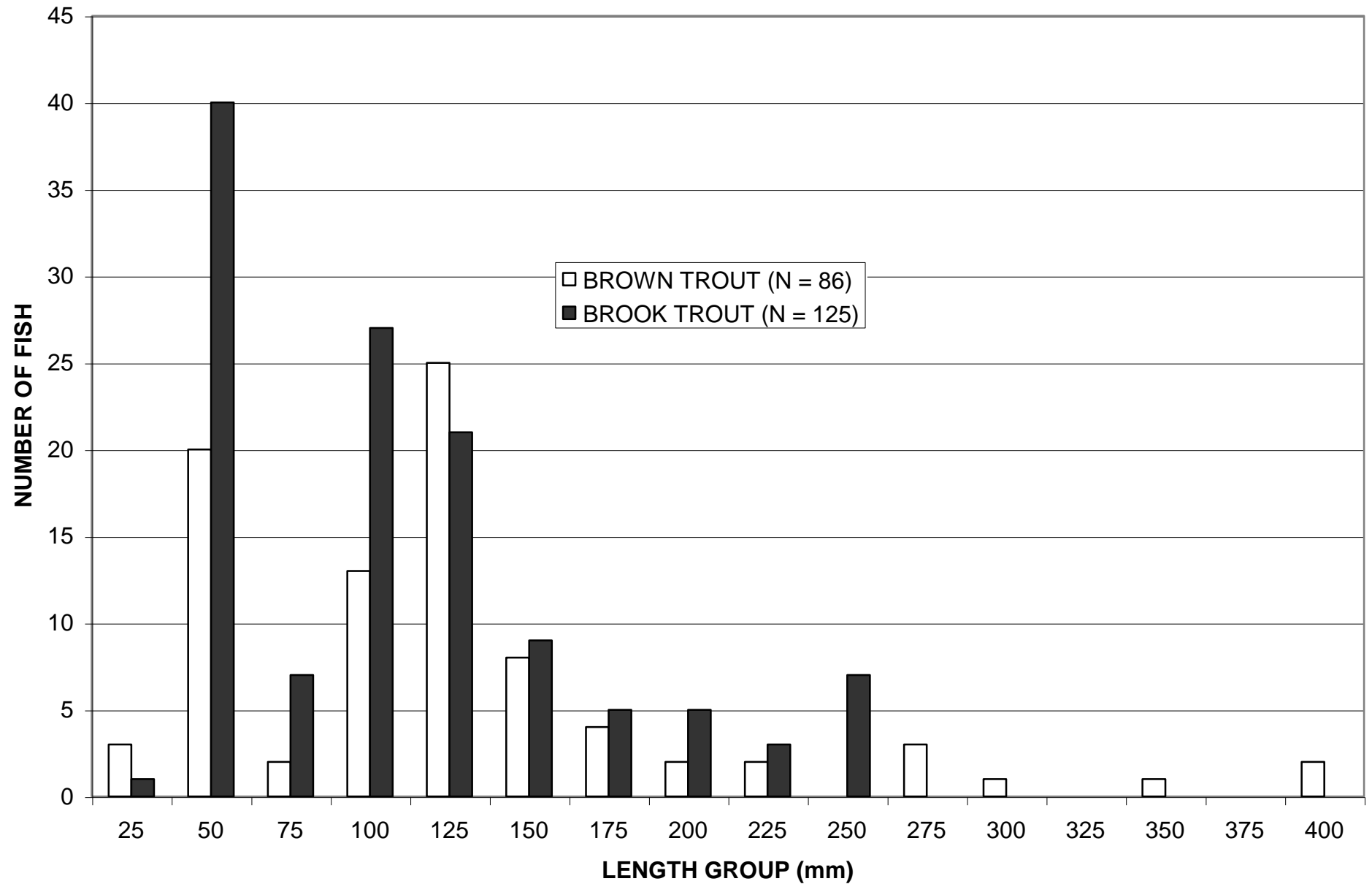


Figure 7. Length-frequency distributions (M+C-R) of wild brown and brook trout captured at two sites in Section 02 of Big Wapwallopen Creek (405B) during 2005.

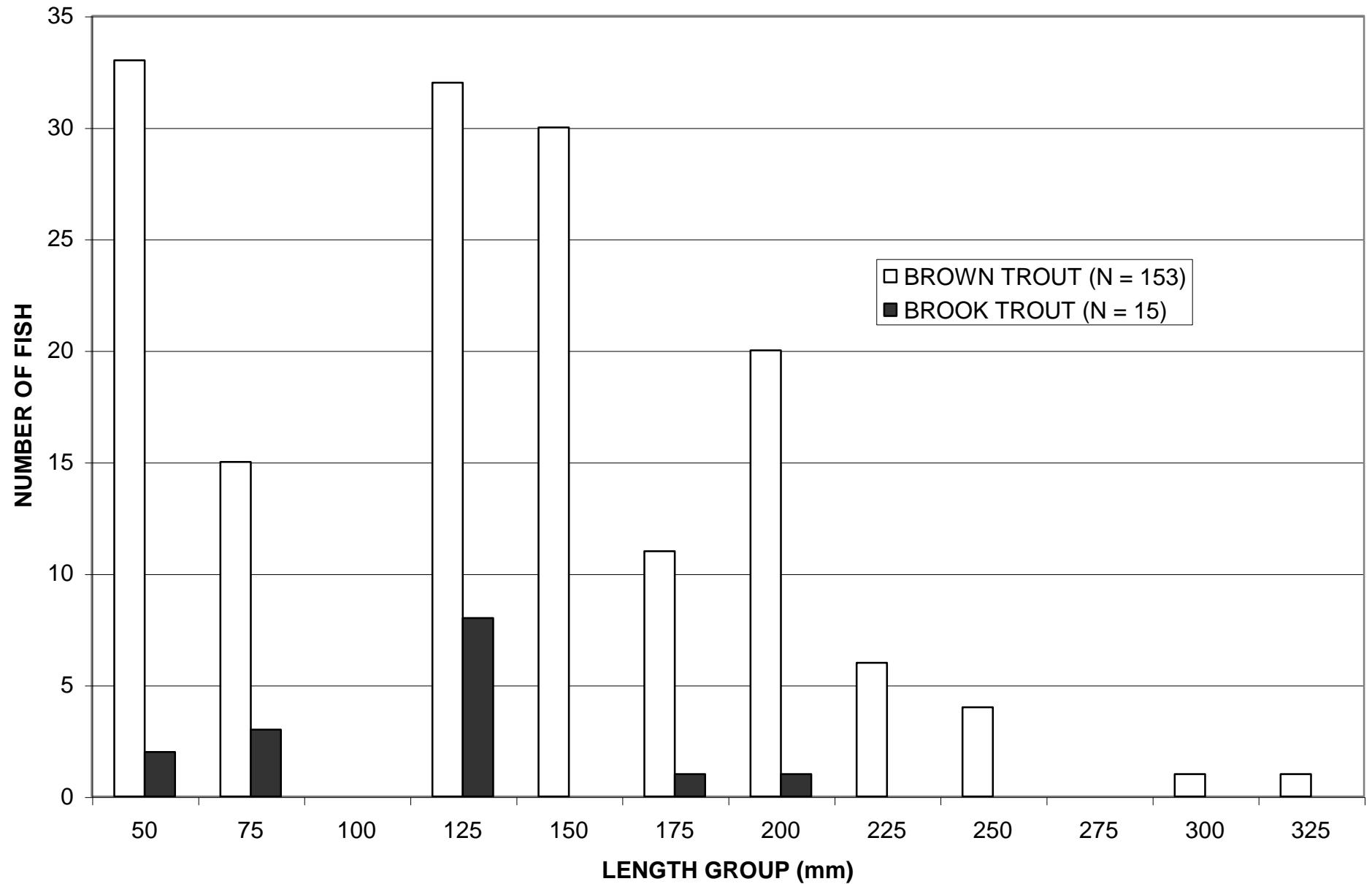


Figure 8. Length-frequency distributions (M+C-R) of wild brown and brook trout captured at four sites in Section 03 of Big Wapwallopen Creek (405B) during 2005.

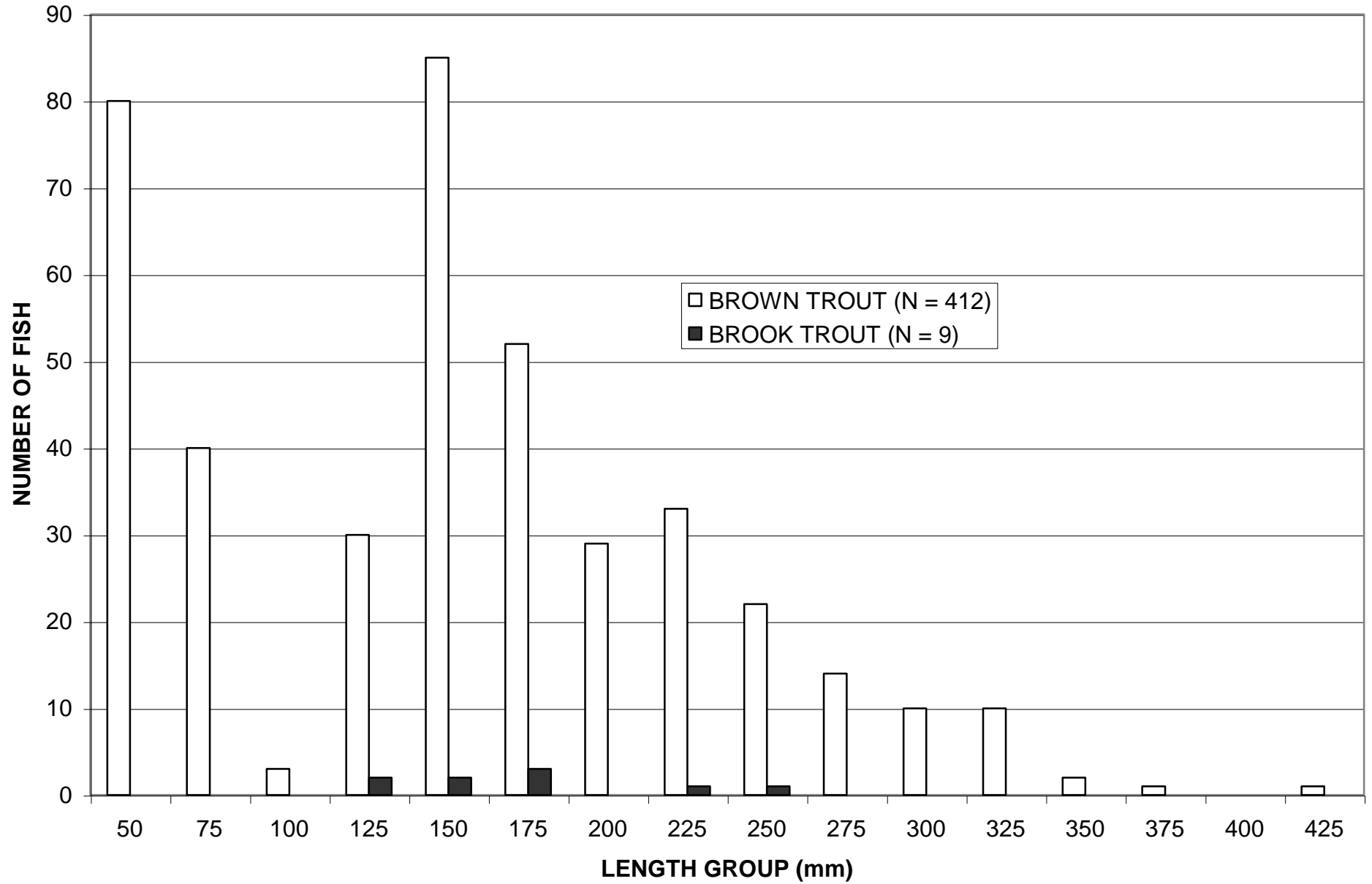


Figure 9. Length-frequency distributions (M+C-R) of wild brown and brook trout captured at one site in Section 01 of Bow Creek (405B) during 2005.

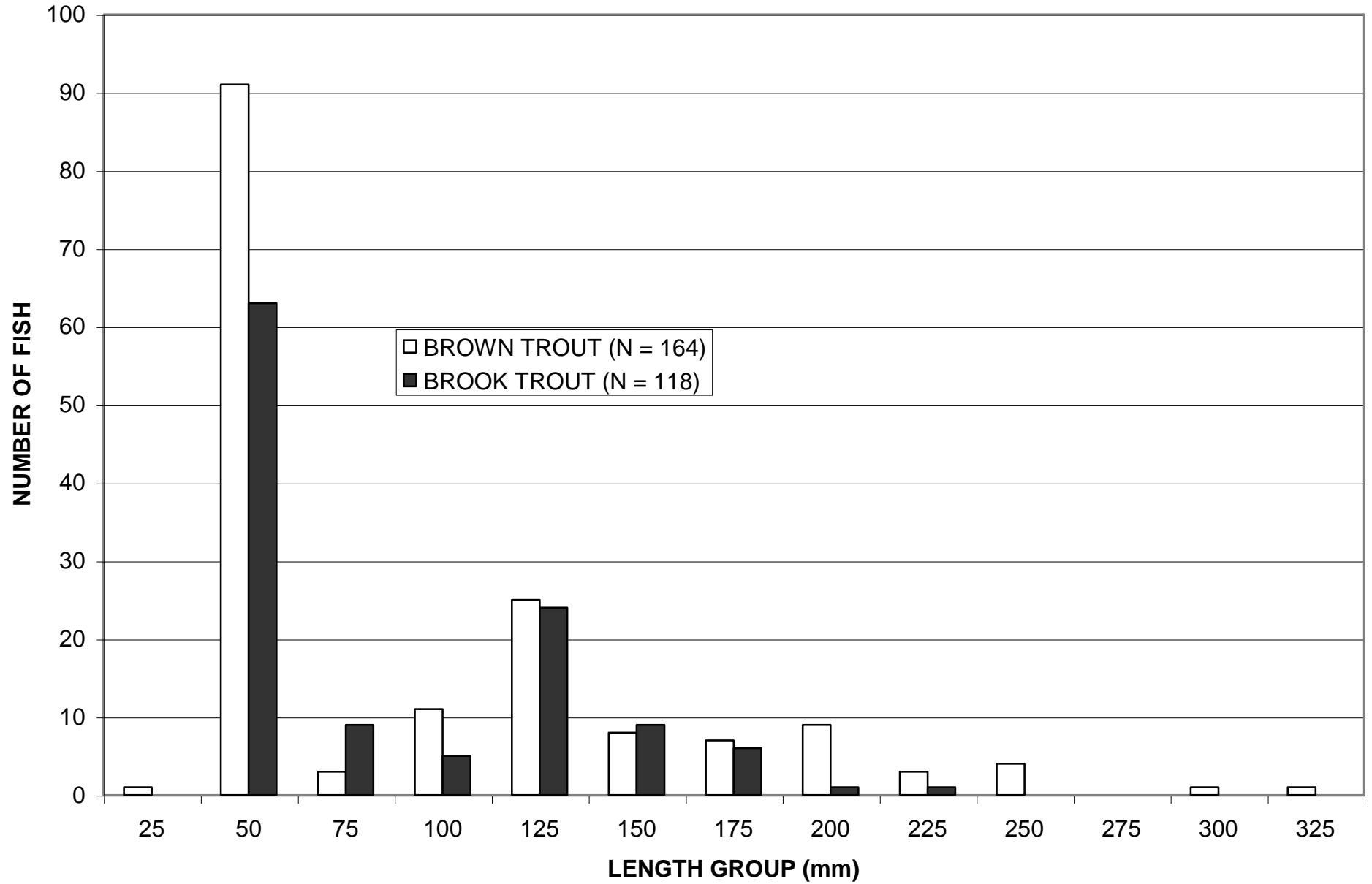
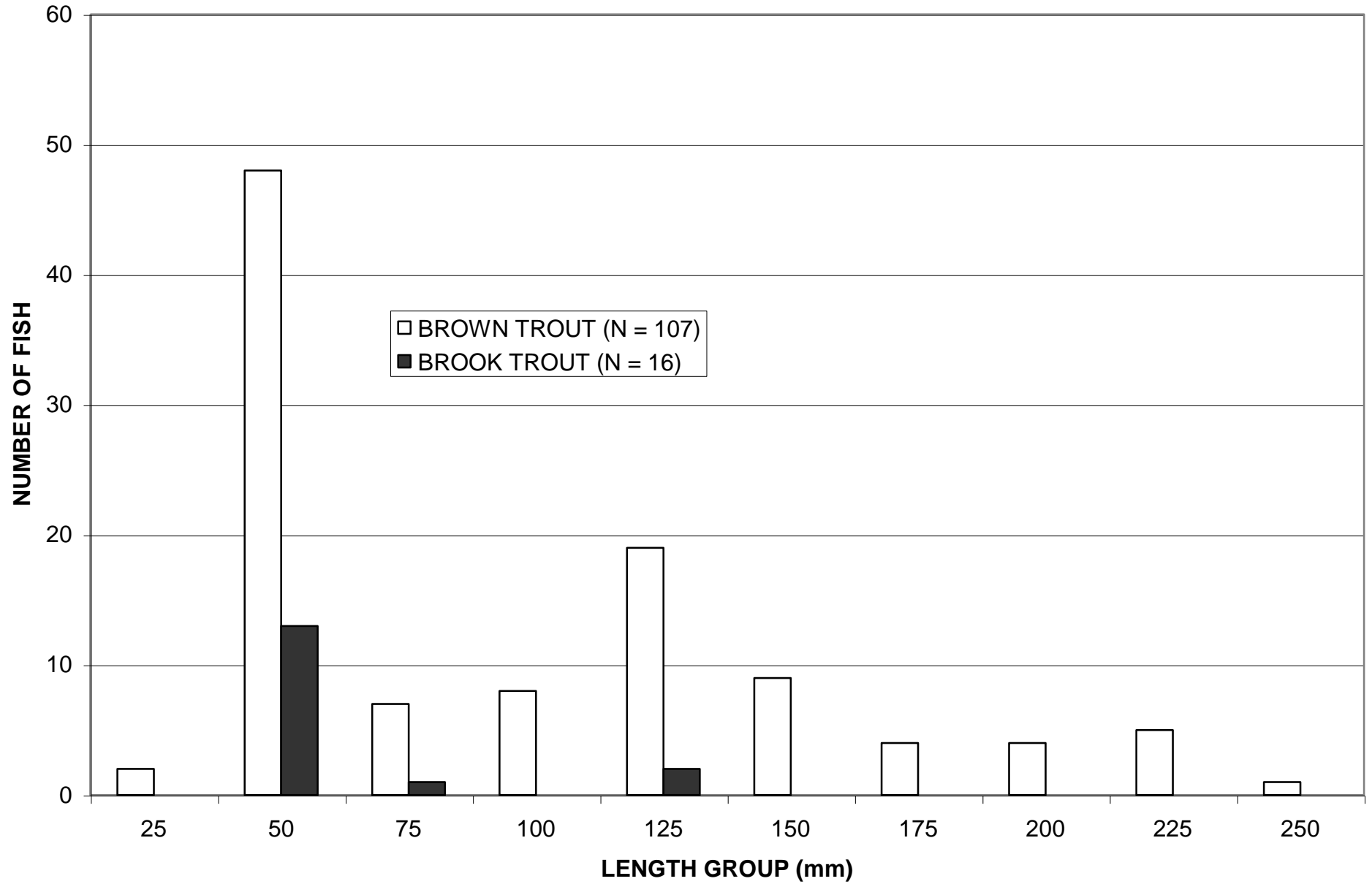


Figure 10. Length-frequency distributions (M+C-R) of wild brown and brook trout captured at one site in Section 01 of Watering Run (405B) during 2005.



DISTRIBUTION

S. Corl, Northeast Region Law Enforcement Manager

District 3077 WCO

J. Arway, PFBC (Chapter 93 upgrades)

Water	Database Name	Lat/Long of the mouth
Balliet Run	Balliet Rn	41-04-27 // 76-01-11
Wapwallopen Creek	Wapwallopen Ck	41-04-21 // 76-08-08
Big Wapwallopen Creek	Wapwallopen Ck Bg	41-03-29 // 76-04-11
Bow Creek	Bow Ck	41-08-28 // 75-54-46
Watering Run	Watering Rn	41-06-56 // 75-57-29