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TROUT POPULATIONS IN SELECTED STREAMS OF
GREAT SMOKY MOUNTAINS NATIONAL PARK IN 1954

by

Robert E. Lennon and Phillip S. Parker

Fishery Research Biologists

U.S. Fish and Wildlife Service

Leetown (P.O. Kearneysville), W. Va.

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Introduction

The improvement of trout populations in waters of the Great Smoky Mountains National Park has been rapid during the last two years. So obvious were the changes in the fishery by this fall that much favorable comment was made by anglers and sportswriters. We have good reasons to expect continued improvement with the result that the resource will be in sound condition and yield better fishing.

Extensive studies were made on some streams during the spring, summer and fall of 1954. Due to the size of the Park and the large number of streams, it has been possible to make adequate observations on less than half the watersheds. The necessary survey work will be extended to the remaining waters in 1955.

This preliminary report on conditions found in the Park during 1954 has been prepared to enable us to evaluate the existing fishing regulations (Fig. 1) and to aid us in formulating the 1955 regulations. It contains only a fraction of the data collected this year; a more complete report, with detailed analyses, will be submitted at a later date.

We are grateful for the assistance given us on many occasions by National Park Service personnel. We appreciate the efforts of Superintendent Edward Hummel and Chief Ranger Granville Liles in making equipment and facilities in the Park available for our use.

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
Great Smoky Mountains National Park
North Carolina--~~Tennessee~~

Fig. 1. -- FISHING REGULATIONS FOR 1954

OPEN SEASON: Fishing ~~is~~ permitted from May 16 to August 31, inclusive, from sunrise to sunset only.

OPEN AND CLOSED WATERS: All park waters are open to fishing except the following:
North Carolina: Lands Creek; Mingus Creek; Chestnut Branch; that part of Raven Fork and all tributaries thereof lying upstream from the Cherokee Indian Reservation boundary at Big Cove. Tennessee: All waters of the Middle Prong of Little Pigeon River above the mouth of Ramsey Prong except waters of Ramsey Prong.

FISHING RESTRICTIONS IN CERTAIN WATERS: No fish caught in the waters of Bradley Fork in North Carolina or in the waters of the West Prong of Little Pigeon River in Tennessee shall be retained but each fish caught in these waters shall be carefully handled with moist hands and returned at once to the water.

RESTRICTIONS AS TO USE OF BAIT: Fishing is permitted with artificial flies or lures with one hook.

SIZE LIMITS: No fish less than 7 inches long may be retained. All fish caught less than 7 inches in length shall be carefully handled with moist hands and returned at once to the water.

LIMIT OF CATCH AND IN POSSESSION: The maximum catch in any one day and the maximum number of trout in possession shall be 5. Maximum catch in any one day and maximum number of bass in possession shall be 5. Maximum creel of trout and bass together shall not exceed 5 fish in one day or 5 fish in possession at any time. There is no creel limit on other species.

FISHING LICENSE: The National Park Service makes no charge for fishing but persons fishing within the park must procure the resident or non-resident state license issued and required by Tennessee or the resident or non-resident or state or county license or permit issued and required by North Carolina. The possessor of a resident fishing license issued by the state of North Carolina shall not fish on the Tennessee side of the park without first having obtained a fishing license issued by the state of Tennessee, and the possessor of a resident fishing license issued by the state of Tennessee shall not fish on the North Carolina side of the park without first having obtained a fishing license issued by the state of North Carolina. The possessor of a non-resident license issued by the state of Tennessee or by the state of North Carolina may fish throughout the park during the open season.

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The changes in regulations from previous years were made as an effort to restore more fish to the streams and provide better fishing for all. If these experimental efforts are unsuccessful it may be necessary to temporarily close more of the streams.
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The cooperation of all fishermen will be necessary and will be appreciated.
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Procedures

A creel-checking station was operated from May 16 to September 1 on the Little Pigeon River watershed. Mr. John A. Fowler, Fishery Aid, collected the creel and angling data at the same site at Greenbrier as was used in 1953.

Spring and autumn checks were made on fish populations in selected streams using cresol compound. The technique of employing this chemical for making fish collections was greatly improved through experimentation. We hired Messrs. John Fowler, James Lich and McKinley Phillips, NPS fireguards, to assist us in the autumn survey.

An alternate-polarity, electric shocker apparatus was tested on several streams in November. The fish-collecting trials were successful on waters having very high resistivities to electricity. The device shows promise of being a very useful tool in sampling fish populations in areas and at times when other methods would be inapplicable.

Experiments were begun in the restoration of trout populations in barren or nearly-barren waters. Marked fingerling rainbow trout and Appalachian-strain brook trout were stocked in June in several streams which had been severely damaged in the 1951 flash flood. The survival of these fish through their first summer in the wild was checked with cresol and the electric shocker this fall.

The recovery of stocked, legal-size trout by anglers was determined for the Little Pigeon River in 1954. A total of 1,000 rainbow trout which averaged 8 inches long were marked and planted in the river on May 6. The specimens caught were identified and recorded at the Greenbrier checking station.

The Streams

Rangers and wardens in the Great Smoky Mountains National Park have estimated (in reports to the Chief Ranger) that the number of fishermen on Park waters during 1954 declined as much as 40 percent when compared with 1953. The reasons given for this slackening of fishing pressure included the new regulations adopted in May which abolished bait fishing and set a 5-fish daily creel limit on trout. Also, our interviews with anglers brought out the fact that the highly productive, warmwater fisheries of the nearby TVA impoundments are bearing an increasingly larger share of the fishing pressure once put on Park streams. Many local fishermen now divide their efforts between the trout waters and bass lakes.

Little Pigeon River Watershed

In spite of the reasons offered to explain the reduction of fishing pressure in the Park in 1954, the estimates of decline made by the rangers and wardens may be too high. A final tabulation of records obtained at the Greenbrier checking station discloses that there was a 20-percent increase in the number of anglers in this watershed this

year as compared with the count made in 1953 (Table 1). However, the season total of trout registered in 1954 was 14 percent below last year's total, due perhaps in large part to the fact that 43 percent less legal trout were stocked this year. We have estimated that the total numbers of fish caught and anglers recorded would be one-third greater in both years had it been possible to man the checking station each day and to check every fisherman and his creel.

Table 1.-The numbers of fishermen and trout counted at the Greenbrier checking station in 1953 and 1954.

Year	Number of fishermen	Number of legal trout		Total number of trout caught
		Stocked	Recovered	
1953	1,200	1,750	unknown	3,443
1954	1,436	1,000	743	2,948

It was to be expected that the number of fish creeled in the Little Pigeon watershed would be less than in 1953. As mentioned previously, considerably less legal trout were stocked, and the daily creel limit was reduced from 7 to 5 fish this year. The abolition of bait fishing and the restoration of the 7-inch minimum size restriction also served to restrict the number of wild trout available to the anglers.

Post-season population surveys on the Middle Prong of Little Pigeon River showed a greater number of trout per acre than in 1953. The adoption of the new fishing regulations has resulted in a better survival of wild fingerling and adult fish and has increased the possibility of adequate spawning and improved fishing in the near future.

Table 2.- The Densities of Trout Populations in Some Streams of Great Smoky Mountains National Park^{1/}

Stream	Average width	Sublegal fish per acre	Legal fish ^{2/} per acre	Total fish per acre
Alum Cave Prong (Tenn.)	11'	448	0	448 brooks
Anthony Creek (Tenn.)	12'	73	96	169 rainbows
Big Creek (N.C.)	24'	1,239	184	1,423 rainbows
Bradley Fork (N.C.)	28'	656 25	97 1	753 rainbows 26 brooks
Cosby Creek (Tenn.)	16'	2 82	4 0	6 rainbows 82 brooks
Kephart Prong (N.C.)	15'	145	87	232 rainbows
Little River (Tenn.)	27'	621	129	750 rainbows
Middle Prong, Little Pigeon River (Tenn.)	32'	323	63	386 rainbows
Wilderness Area	23'	846	145	991 rainbows
Palmer Creek (N.C.)	20'	432	52	484 rainbows
Porters Creek (Tenn.)	24'	350	30	380 rainbows
Ramsey Prong (Tenn.)	17'	193	80	273 rainbows
West Prong, Little Pigeon River (Tenn.)	20'	101 476	36 8	137 rainbows 484 brooks

^{1/} Fish collections made with cresol compound, and with electric shocker in September, October and November 1954.

^{2/} Trout 7 inches or more in length.

GREAT SMOKY MOUNTAINS NATIONAL PARK
Table 3.- Total Numbers of Trout Collected During the Fall (1954) Fishery Survey

Stream	Rainbow trout		Brook trout	
	Number	Size range (inches)	Number	Size range (inches)
Alum Cave Prong	-	-	183 ^{1/}	2.6-6.1
Anthony Creek ^{2/}	14	3.6-8.6	-	-
Big Creek	1,775	2.7-16.5	-	-
Bradley Fork	1,132	2.7-18.1	37	3.0-8.5
Cataloochee River ^{2/}	106	3.5-14.3	-	-
Cosby Creek	3	2.7-9.1	60	2.8-4.7
Kephart Prong	20	3.5-8.1	-	-
Little River	1,518	2.8-20.1	3 ^{1/}	11.5-14.5
Middle Prong, Little Pigeon River	1,200	2.0-11.8	1	3.3
Palmer Creek ^{2/}	65	3.1-10.6	-	-
Porters Creek	366	2.8-9.2	43 ^{1/}	3.8-5.3
Ramsey Prong	35	3.8-10.7	-	-
West Prong, Little Pigeon River	157	2.7-12.9	495 ^{1/}	2.8-11.7
Totals	6,391		822	

^{1/} Hatchery-reared fish, stocked in June 1954

^{2/} Survey not completed

^{3/} Includes some hatchery-reared fish, stocked in June 1954

The population estimates indicate that there were 386 rainbow

trout per acre of stream in October, of which 63 were over 7 inches long (Table 2). The size range of 1,200 specimens collected was 2.0 to 11.8 inches (Table 3). A length-frequency curve drawn from measurements taken on these specimens demonstrates that there is a large number of trout 5 to 7 inches long which will reach legal size before or during the 1955 season (Figure 2). A comparison of this curve with one drawn for 392 trout measured in 1953 (Figure 2) shows the improved survival of young-of-the-year and yearling fish.

The potentialities for improvement in the trout resource and in fishing are so good in the Little Pigeon watershed that we suggest the discontinuation of stocking legal-size hatchery trout. We recommend that the creel-checking station at Greenbrier be operated for another year to determine the amount of fishing pressure and the catch of wild fish.

Alum Cave Prong

This tributary of the West Prong Little Pigeon River has been barren of fish life since the 1951 flood. Following studies of the bottom fauna and streambed conditions, it was decided to plant fingerling brook trout, Appalachian strain, in an experiment in restoration. Park personnel packed in 1,000 marked trout, averaging 3 inches long, in June (Table 4). A check on these fish in September showed an average growth of 0.97 inches in 183 specimens measured. A 14 percent survey of the stocked area indicated a survival of 72.1 percent.

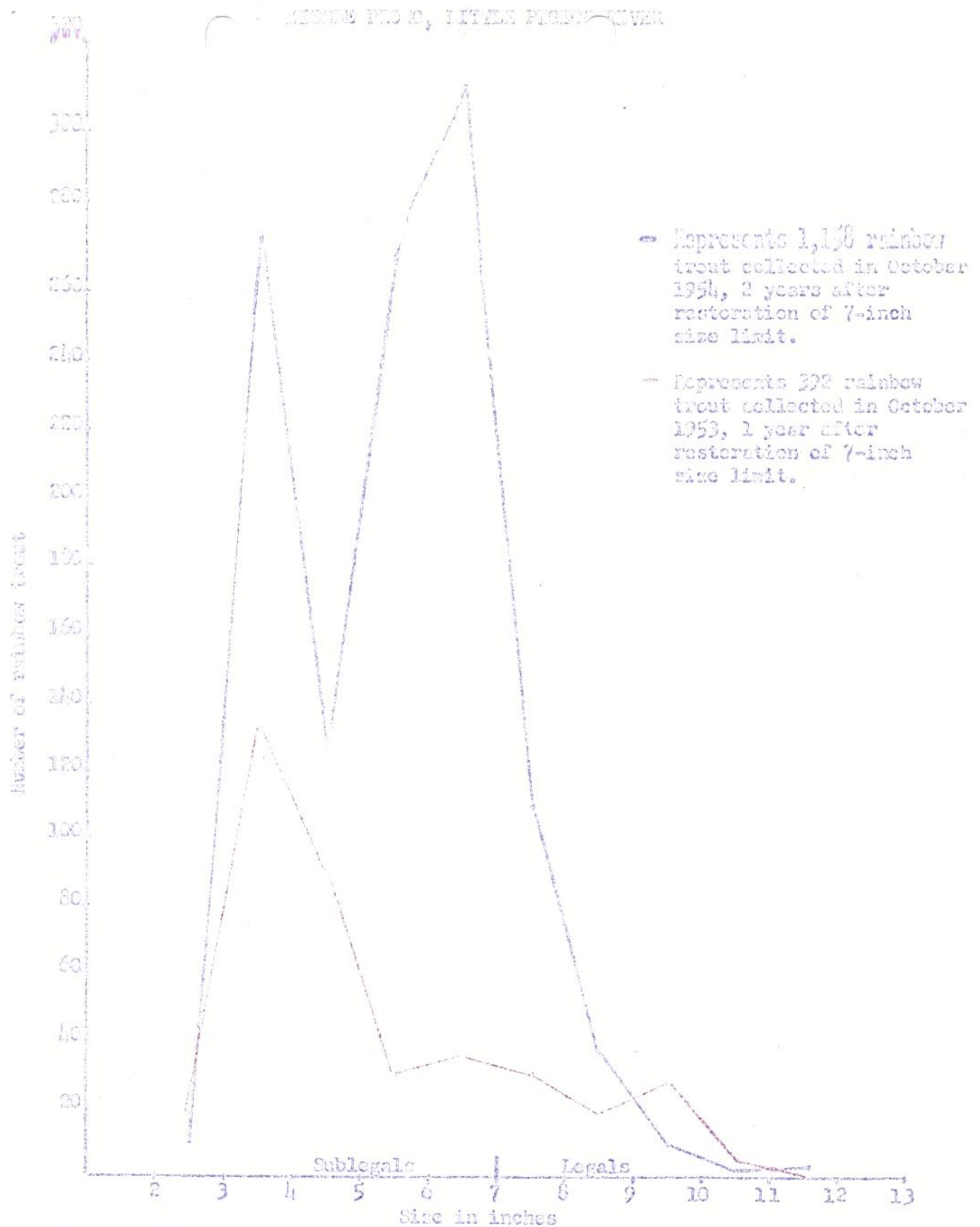


Fig. 2.- Size-distribution of Rainbow Trout collected in 1953 and 1954.
Specimens from Wilderness Area are included.

Table 4.- SUMMARY OF STOCKING, GREAT SMOKY MOUNTAINS NATIONAL PARK, 1954

(List furnished by C.M. Morefield, Supt. U.S. Fish Cultural Station, Erwin, Tenn.)

<u>STREAM</u>	<u>DATE</u>	<u>SPECIES</u>	<u>NUMBER</u>	<u>AV. SIZE (INCHES)</u>
Alum Cave Branch	6/4/54	Brook	1,000	3
Cataloochee River	5/12/54	Rainbow	350	8
	6/18/54	"	350	8
	7/21/54	"	300	12
Cosby Creek	6/4/54	Brook	2,000	3
Deep Creek	5/7/54	Rainbow	400	8
	6/14/54	"	300	9
	7/14/54	"	300	9
Indian Creek	6/14/54	Brook	500	10
	7/3/54	"	500	10
Kephart Prong	5/4/54	"	800	10
Little Cataloochee	5/12/54	"	200	10
	6/18/54	"	50	10
Little River (Elkmont)	5/5/54	"	250	10
	6/16/54	"	250	10
	5/6/54	Rainbow	400	8
	6/16/54	"	550	8
	7/19/54	"	550	9
Middle Prong Little Pigeon River	5/6/54	"	1,000	8
Middle Prong of Little River	6/15/54	Brook	500	10
	6/15/54	Rainbow	500	9
	7/19/54	"	500	9
Oconaluftee River	5/3/54	Brook	750	10
	5/7/54	Rainbow	1,000	8
	6/14/54	"	500	9
	7/14/54	"	500	9
Palmer Creek	5/12/54	Brook	300	10
	6/18/54	"	450	10
Porter's Creek	6/4/54	"	400	3
	6/4/54	Rainbow	2,000	3
Trout Branch	6/4/54	Brook	300	3
W. Prong Little Pigeon River	5/5/54	"	500	10
	6/4/54	"	6,100	3
		Total	24,350	

It is too early to judge if the attempt to restore the native brook trout in Alum Cave Prong will be successful. In view of the good showing made to date, we suggest that additional fingerlings be marked and planted next spring in the still-barren waters further upstream.

Big Creek

Big Creek has been called the best trout stream in the southern Appalachians. It is decidedly the finest trout water we have studied so far in the Park.

Seven survey stations were located on the lower 6 miles of the mainstream in October and 1,775 rainbow trout were collected, ranging in length from 2.7 to 16.5 inches (Table 3). An estimate of 1,423 trout (87.2 pounds) per acre was obtained (Table 5). This population can be considered excellent when compared with those reported for trout streams elsewhere in the country. A good proportion of the trout measured were of legal size; good fishing and adequate reproduction are apparent.

Big Creek has not been stocked in recent years. It is a popular stream with local anglers and a considerable number of them have approached us in the past 2 years to protest the discontinuation of stocking. We believe that our population estimates show that no stocking of hatchery fish is required to maintain good angling and uphold the resource.

Table 5.-- THE RAINBOW TROUT POPULATION IN BIG CREEK

Great Smoky Mountains National Park

Stream: Big Creek

Date: October 1954

Location: Mt. Sterling, North Carolina

Crew: FWS

NPS

J. Lich

J. Lich

R. Lennon

J. Stamey

Length group (inches): Wild rainbow trout (Salmo gairdneri)

M. Phillips

A. Whaley

P. Parker

J. Fowler

3.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	7.0-7.9	8.0-8.9	9.0-9.9	10.0-10.9	11.0-11.9	12.0-12.9	13.0-13.9	14.0-14.9
<u>Number of trout collected:</u>												
8	376	179	575	389	160	62	15	6	1	0	0	3
<u>Average length in inches:</u>												
2.7	3.6	4.3	5.5	6.4	7.4	8.4	9.4	10.3	11.4	0	0	14.4
<u>Average weight in grams:</u>												
3.0	7.0	12.0	23.0	36.0	59.0	91.0	123.0	168.0	250.0	0	0	540

Total number of rainbow trout collected: 1,775

Size range: Length, 2.7 to 16.5 inches; Weight, 2 to 540 grams

Number of rainbow trout per acre: 1,423

Weight of trout per acre: 87.2 pounds

Sublegals per acre: 1,239

Sublegals per acre: 57.1 pounds

Legals (over 7"): 184

Legals per acre: 30.1 pounds

Cosby Creek

The 4 miles of fishable water in Cosby Creek contain very few wild trout. A series of observations made in September showed a density of only 6 rainbow trout per acre; no native brook trout were seen or taken. These data were similar to those found in 1953.

Cosby Creek is a small stream and has been subjected to a very heavy angling pressure in past years. It is generally assumed by fishermen and Park personnel in that district that the native brook trout were literally wiped out during the years when no size limits were in force. Plantings of legal brook and rainbow trout in recent years had failed to improve the trout population. In June 1954, 2,000 3-inch brook trout were marked and stocked from the Park boundary upstream. Our September survey disclosed that the fingerlings planted in the lower stream, in the presence of exceedingly abundant dace, shiners, and stonerollers (Campostoma anomalum), had all but disappeared. Summer temperatures, competition with other species, and poaching are among the probable reasons for their poor survival.

The fingerlings placed in the upper waters did somewhat better; 59 were collected here which ranged from 2.8 to 4.7 inches. It is difficult however to be optimistic about the restoration of trout in Cosby Creek. For want of a better move, we suggest that another lot of fingerling brook trout be stocked in the upper portion of the mainstream and in the headwaters next spring. The possibility of closing the stream to all fishing should also be considered.

Bradley Fork

A good population of rainbow trout and a small one of native brook trout exist in this stream. The stocking of hatchery fish was discontinued in 1954 and the stream was placed under the Hazzard Plan of fishing. Anglers were permitted to fish with barbless artificial lures and all fish captured had to be returned to the water unharmed.

Bradley Fork is one of the two streams specially selected for testing the Hazzard plan. Observations are being collected on the amount of angler participation and the changes, if any, in the trout population under this type of protection. Park personnel report that very little fishing was done on the stream last summer. This was expected since the plan is new, but as fishermen become aware of the excellent fishing-for-fun-only available on Bradley, use of the stream should increase.

Seven survey stations were selected and tested in October. A collection of 1,132 rainbows and 37 brook trout was made (Table 3). The rainbows were well distributed throughout the stream and ranged from 2.7 to 18.1 inches long. The brook trout were found only in the upper waters.

The recent survey included two stations which had been sampled in November 1953 and May 1954. The length-frequency distribution of rainbow trout collected on the 3 occasions at these stations is shown in Figure 3. The November and May curves demonstrate that considerable growth of young-of-the-year fish took place between those dates. The

BRADLEY FORK

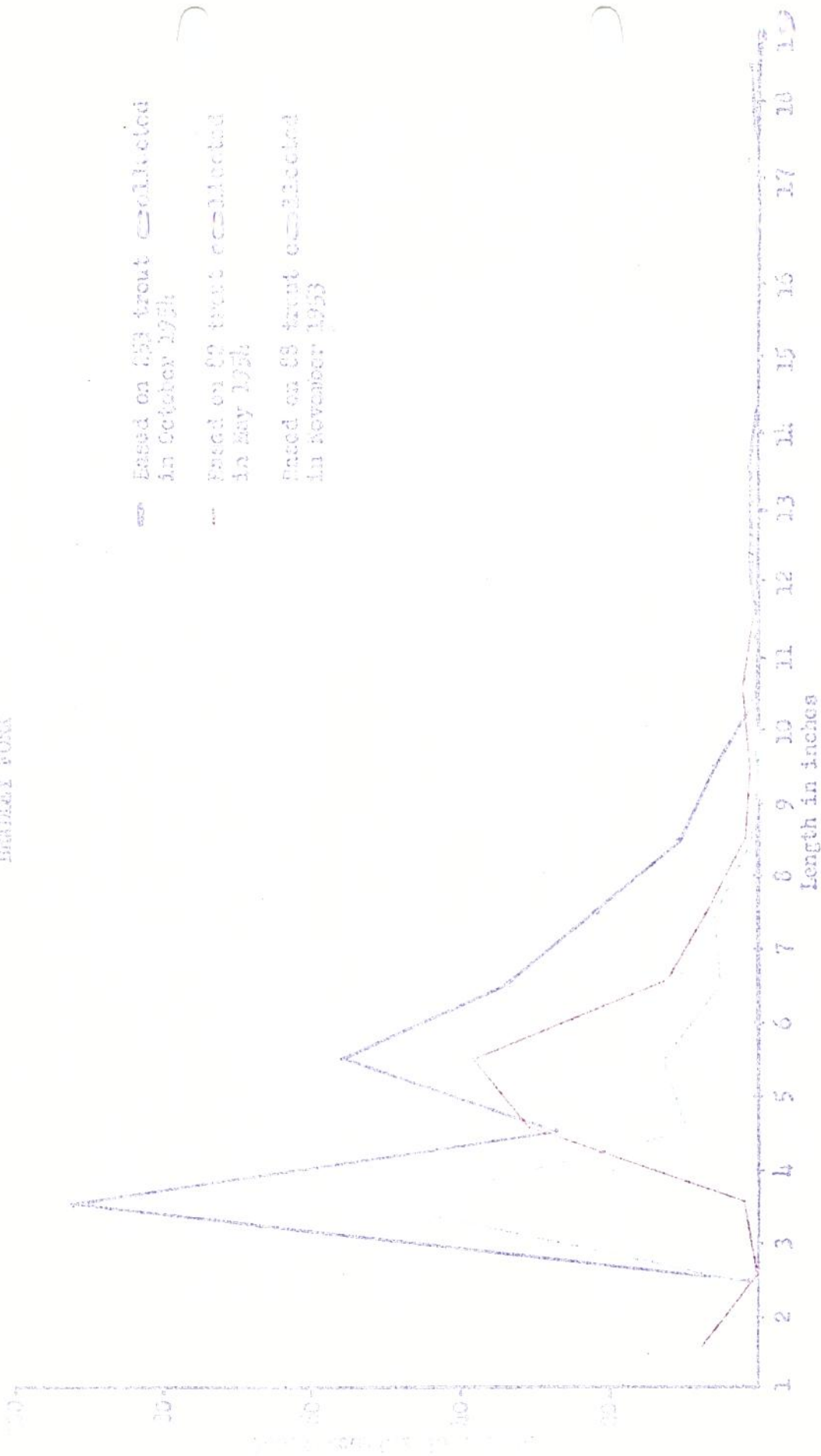


Fig. 3.- Length-frequency distribution of rainbow trout collected at 2 survey stations in 1953 and 1954.

bimodal curve for the October 1954 collection shows the increased survival of first- and second-summer fish (age groups 0 and I) under the restored 7-inch size limit. Subsequent checks on the same waters should yield additional information on changes in the size composition of the rainbow population.

Little River

A small number of observations were made on the density of trout in the headwaters of Little River in 1953 and in the spring of 1954. Assistance contributed by the Park staff enabled us to extend our survey in October. Ten stations were run with cresol from Elkmont upstream and one collection was made below Elkmont with an electric shocker. An estimate of 750 rainbow trout per acre was made, based on the 1,518 trout collected. The specimens ranged in length from 2.8 to 20.1 inches. The size distribution of the collected fish indicated that reproduction and survival of young has been good in the past 2 years. A relatively good proportion exceeded the minimum legal size and a large number of trout in the 5.0 to 6.9-inch range should enter the fishery in 1955.

On the basis of the present fishing regulations and the existing trout population upstream from Elkmont, there can be little or no justification for any stocking of legal trout in 1955. The rainbow trout is the dominant species in this river and the stocking of brook trout, as was done in 1954, appears to be especially useless.

If and when funds are available, a creel census station should be operated on Little River. The stream is productive, it bears a heavy fishing pressure, and the existence of creel, fisherman, and population data from other years would enable us to more fully evaluate the present fishery conditions.

Porters Creek

This stream is a major tributary of the Little Pigeon River at Greenbrier. It is in the process of recovering from the disastrous effects of the 1951 flood. Wild rainbow trout have increased in numbers and marked fingerlings planted in June have shown a good survival and growth. More details concerning this experimental stock will be reported at a later date.

The extreme headwaters of Porters Creek, upstream from the mouth of Boulevard Prong, have been reported as barren since fire and flood damaged the stream nearly 30 years ago. Its acid water may be the reason that rainbow trout avoid it, yet this species occurs in the mainstream and tributaries. In June, we marked and planted 400 brook trout of the Appalachian strain. These fish averaged 3 inches long, with a range of 2 to 4 inches. In September 43 specimens were collected which measured from 3.8 to 5.3 inches. All were in excellent condition. Some promising water remains barren above the newly-stocked area and an additional lot of marked fish should be packed in and planted next spring.

West Prong Little Pigeon River

Very few trout were found in the upper waters of this stream during population studies made in 1953. The area was very badly damaged in the 1951 flash flood and little recovery was noted for the fish, in spite of the fact that legal rainbow trout were stocked.

The nature of the stream and the lack of fish afforded an opportunity to attempt the restoration of the native brook trout. Accordingly, 6,100 fingerling brook trout were marked and stocked on June 4 in the upper 6 miles of the stream. A 5.5 percent survey was made with cresol in September and the estimated survival of the fingerlings to that date was computed to be 88.8 percent. The fish were in very good condition and the average increase in length in the 470 specimens measured was 1.1 inches. These results exceeded our expectations. The progress of this restoration attempt will be followed closely. It might be well to plant another lot of marked fingerlings this coming spring to fill the gap between the present fish and their eventual offspring.

The West Prong and its tributaries (Alum Cave, Trout Branch, Road Prong and Walker Prong) are included in the Hazzard plan. The waters were open to fishing with barbless artificial lures but all fish caught had to be returned to the water. In view of the small population of trout in the upper and lower waters, fishing pressure was light in 1954, as was to be expected. Reports were received, however, that some avid fly fishermen began to use the stream for its recreational fishing more and more as the season progressed. It appears likely that

the fishing will improve under this plan, and its attraction for tourist anglers should increase.

Recommendations

The foregoing discussions and data on certain streams represent only a small part of the material collected in 1954. The brief treatments are presented here to point out some of the highlights of the fishery situation. Full analyses of the observations and data will be made and reported at a later date.

We feel we are able to make some justifiable recommendations concerning the fishery resources in the Park. The following points should be considered in respect to the 1955 angling season:

1. The fishing regulations in effect during 1954 (Fig. 1) should be continued unchanged through 1955.
2. The stocking of legal-size, hatchery trout would be unnecessary and undesirable in these streams in 1955:
 - a. Big Creek
 - b. Bradley Fork
 - c. Little River, above Elkmont
 - d. Middle Prong Little Pigeon River
 - e. Porters Creek
 - f. Ramsey Prong
 - g. West Prong Little Pigeon River

3. Rainbow trout are dominant in these streams and we suggest that no legal brook trout be stocked in them:
 - a. Anthony Creek
 - b. Kephart Prong
 - c. Palmer Creek
4. All trout, legal or otherwise, planted anywhere in the Park in 1955 should be marked by fin-clipping so that specimens might be easily identified during creel checks and population surveys.
5. Experiments in the restoration of brook trout in barren or near-barren waters should be continued. We suggest that the following plantings of marked, fingerling brook trout of the Appalachian strain be made:
 - a. Alum Cave Prong; 1,500 in lower 2 miles
 - b. Cosby Creek; 1,000 in upper mile of mainstream and in headwaters
 - c. Porters Creek; 1,000 in Porters Flat area on headwaters
 - d. Walker Prong; presently barren; 500 in lower mile
 - e. West Prong Little Pigeon River; 3,000 in upper 5.5 miles above Chimneys Campground

Total number of fingerlings = 7,000

6. The creel census station at Greenbrier on the Little Pigeon River should be operated in 1955 to provide data on angling pressure and fish harvest for comparison with figures obtained there in 1953 and 1954.

It would be very worthwhile if creel census projects could be conducted on Big Creek and Little River. These streams are among

the best in the Park and are well-known throughout the southeast. It was determined this fall that good populations of wild trout are present and information should be obtained on the catch and fishing pressure.

7. We propose that a brief handout be prepared for distribution which would contain information on waters where good angling can be found. Too often, tourists who are interested in fishing get only a copy of current regulations and little else in the way of advice from temporary personnel who man the information desk at headquarters in summer. This is not always the case, but in general, advice on fishing sites is far less adequate than it is on trails, flowers, foliage, and the like.

The tourist's time is usually limited and he would like to spend as much of it as possible on good water. Many visitors have expressed a desire to fish for the wild brook and rainbow trout, since the less impressive hatchery varieties can be obtained in home waters. Consequently, information on the most productive Park streams should be made available to them.