Volume 066
Article
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IDAHO DEPARTMENT OF FISH AND GAME
Salmon, Idaho

FIVEMILE CREEK ISOLATED RAINBOW
- Electrophoretic analyses -
- 1985 Field Survey -

by:
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April, 1986

ABSTRACT

Fivemile Creek Isolated Rainbow Trout:

A genetically unique rainbow trout population was found above impassable barriers in Fivemile Creek, a minor tributary of the Salmon giver in the Frank Church River of No Return Wilderness. A field survey in 1985 disclosed the population extended approximately 2.6 km (4 no above the lowermost barrier in this high gradient stream, (104 546 ft./mi). Sexually mature individuals as small as 150 mm total length (2+ years) were found. Scale analyses disclosed 4 annuli present on the oldest and largest (240 mm) individuals collected.

Forty-eight fish were screened for electrophoretically detectable variation at 47 loci. Genetic variation was detected for 9 loci for the common allele in rainbow trout. Two variant alleles are unique to this population and are most likely a result of a very long period of reproductive isolation.

Four of five bilateral meristic characteristics examined showed significant differences from other isolated rainbow stocks examined (mandibular pores, pectoral fin rays, upper and lower gill raker counts).

A high average heterozygosity (0.068) is presently unexplained. It may be related to the presence of sub-isolated groups above upper barriers. Further investigation of these fish is recamended.

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INTRODUCTION

In 1982, a stream survey disclosed the presence of rainbow trout move a series of impassable barriers in Fivemile Creek, a minor tribu-.ary of the Salmon River in central Idaho. Electrophoretic analyses of :bese fish showed them to be genetically distinct from all other rainbow populations in the upper Columbia River drainage that have been examined (both anadromous and nonanadranous). This difference also exists between the rainbow population below the barriers in this same stream.

Physical characteristics examined showed significant differences in numbers of pectoral fin rays, upper and lower gillrakers and mandibular pores from other rainbow populations.

In 1985, a field survey was conducted to determine the extent of this isolated population in Fivemile Creek, its general biological structure and the general characteristics of the stream environment. These are described in this report.

The distinctiveness of the Fivemile Creek rainbow population appears to be the result of a very long period of reproductive isolation. As such, these fish are a unique and valuable genetic resource that deserves further study.

A definitive study of the Fivemile Creek rainbow should be initiated to provide an in-depth evaluation of the fish population. This could include, but not be limited to:

Intensive sampling to ensure other species are not present, including nongame species such as sculpin.

Population density estimates over representative stream reaches to produce an estimate of the total population size.

Electrophoretic analyses of upper segments of the population that appear to be above other impassable barriers.

Further comparison of meristic characteristics between Fivemile Creek rainbow and other anadromous and nonanadromous rainbow strains.

Possible geological inspection of the barrier materials to assist in estimating the length of time they have been in place.

Detailed mapping and photographic documentation of all barriers, slide areas and the determination of the absolute upper limit of the fish population.

Investigation of the potential value of these fish to researchers in allied scientific fields such as taxonomy, genetics, etc.

Aerial stocking of fish into Little Sheepeater Lake should be discontinued.

In addition, management possibilities could include recommendations to consider :

Extending the upper limits of the population by moving fish above the final barrier.

Establishing an additional population of Fivemile rainbow in other suitable isolated streams.

Evaluating the performance of Fivemile rainbow in other environments, such as an isolated alpine lake.

Development of a captive broodstock of Fivemile rainbow to be available for experimental outplants or other purposes.

Emphasizing the uniqueness of this resource to the area land management agency (USFS) to assist in formulating their land use plans for the area, including such factors as fire-fighting policy.

Protection of the population from any increase in exploitation due to the inevitable dissemination of knowledge about its existence.

DESCRIPTION OF THE AREA

Fivemile Creek enters the Salmon River from the south, approximately 221 km (138 mi.) upstream from its mouth and approximately 6.4 km (4 mi.) above the confluence of the South Fork Salmon River. Its headwaters lie on the western perimeter of Chamberlain Basin in the Frank Church River of No Return Wilderness in central Idaho in T. 23 R. 9 E. An alpine lake (Little Sheepeater) heads the drainage at 1,327 m above sea level (7,636 ft.). From this point, Fivemile Creek flows 15.7 km (9.8 mi.) to the Salmon River at elevation 697 km above sea level (2,286 ft.) for an average gradient of 104 m/km (546 ft./Mi.) Figures 1, 2).

Access is difficult. Trails from the Chamberlain Basin landing field lead to the headwaters 19 km (12 mi.) west over passes nearly 1,438 m (8,000 ft.) above sea level. There is no trail down Fivemile Creek from the headwater areas.

On the north side of the Salmon River, a low grade road descends from the settlement of Dixie, Idaho to the river at Mackay Bar. A primitive 4-wheel drive road then proceeds upriver for approximately

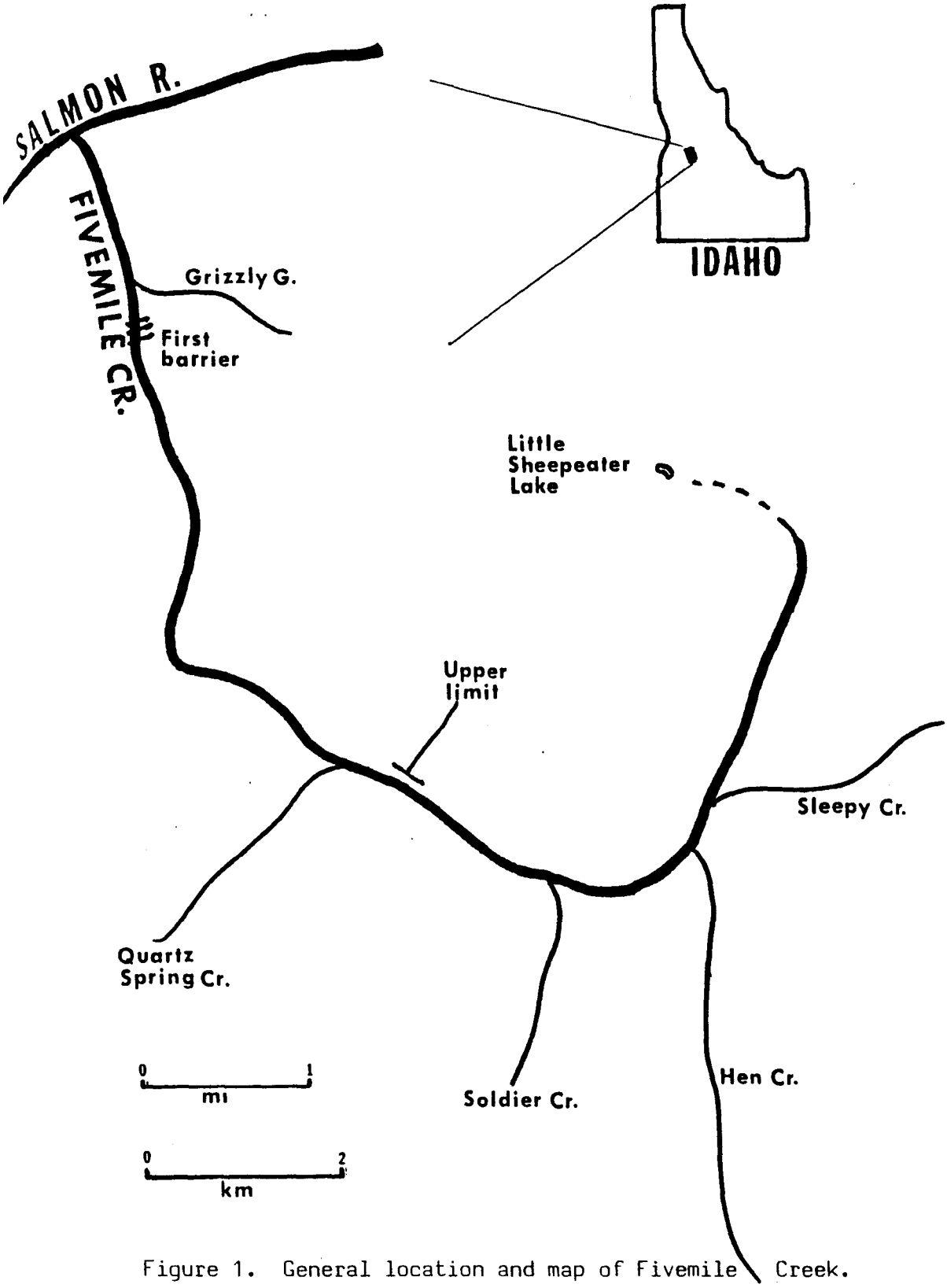

Figure 1. General location and map of Fivemile Creek.

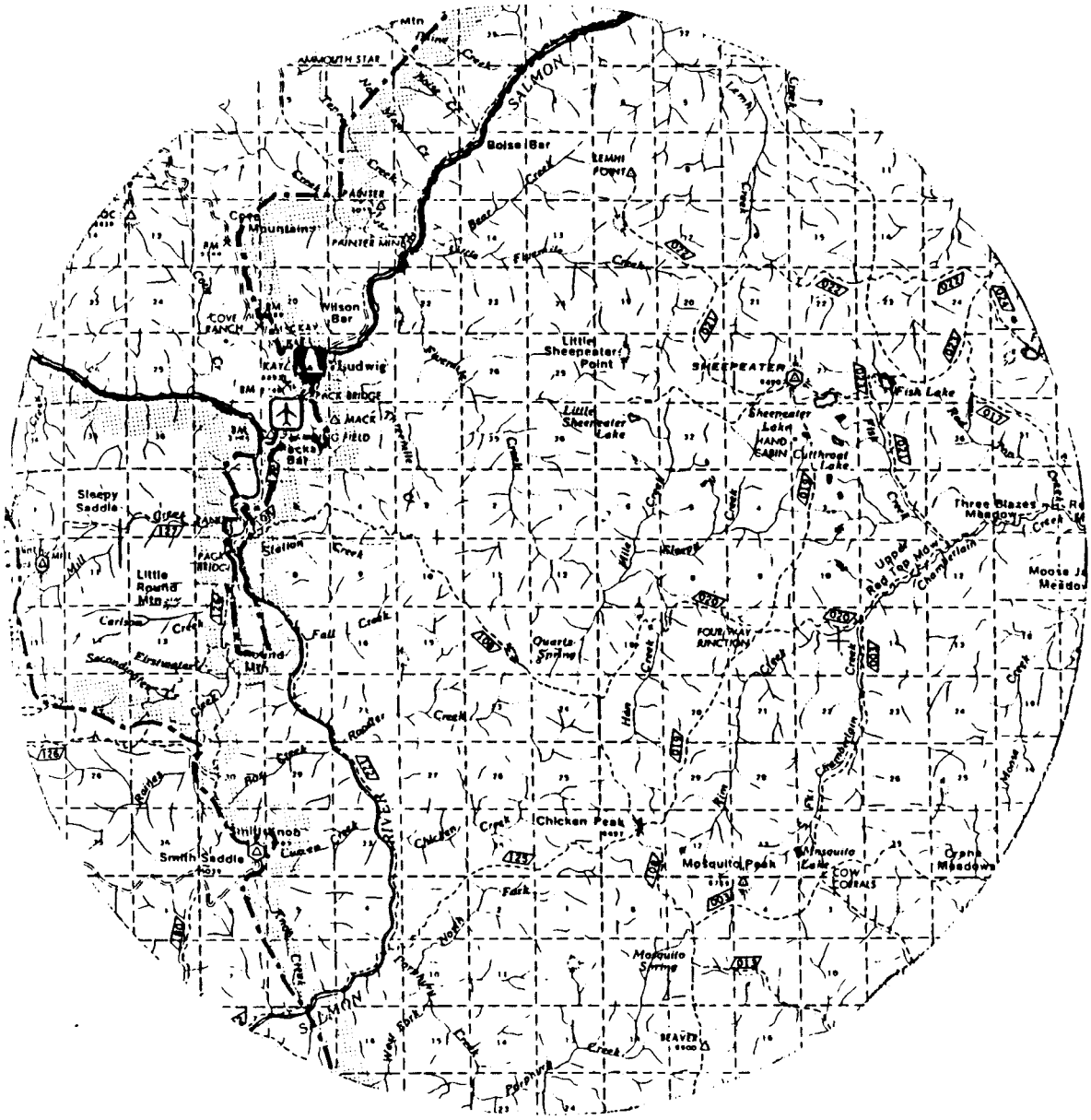

Figure 2. USFS map of Fivemile Creek area, Frank Church River of No Return Wilderness.

5 km (3 mi.) to Painter Bar. A boat can then be used to cross the Salmon River to the mouth of Fivemile Creek. At the mouth, on the east side of the creek, the historical site of the homestead of Sylvan “Bucksin Bill" Hart is maintained by private caretakers. A trail procedes up the east side of Fivemile Creek for approximately 1.6 km (1 mile, crosses the creek, proceeds for another .4 km (.25 mi.) up the west side, then turns west and leaves the drainage. At that point, travel directly up the stream bed is the most practical route. The first barriers lie approximately 450 m (500 yds.) above this point and a short distance upstream from Grizzly Gulch.

During the survey, we traveled to the lower end of Fivemile Creek coming down the Salmon River by whitewater jet boat from the road end at Corn Creek, approximately 85 km (53 mi.). This same means of access can be used to reach the stream from the end of the Salmon River head at Vinegar Creek, sane 48 km (30 mi.) downstream.

Fivemile Creek is one of the smaller tributaries of the Salmon River. I estimated the minimum flow level in mid-summer 1985 at 40-50 cfs. It is contained in a very steep, rugged canyon, covered with thick forest and vegetation, making overland travel difficult. The high gradient of 104 m/km (546 ft./mi.) creates high velocity areas and the stream consists largely of rapids, cascades, drops, falls and plunge pools. The bottom materials are primarily large boulders and heavy rubble. Downed trees, log jams and other woody material are

scattered the length of the creek. Spawning gravels are found primarily above log jams, in side eddys and at the tail-out of pools.

Along the lower 6.5 km (4 mi.) of the stream there is a number of minor and major slide areas contributing boulders, rubble, sediments and trees to the creek. These areas are presently active and are affecting and changing some of the existing barriers in the creek.

The remote location of Fivemile Creek, its small size and difficult access are undoubtedly the reasons this isolated rainbow population was not recognized until the 1980's. Most all other streams in the Chamberlain Basin area have received introductions of nonindigenous fish stocks either by direct stocking or infiltration from alpine lakes that are accessible by fish from the Salmon River. No records, either written or oral, indicate outside stocks were ever planted in Fivemile Creek.

Little Sheepeater Lake at its headwaters had received aerial plants of cutthroat intermittently in past years. The lake, however, is too shallow to support fish over winter and no fish were found in the lake in 1985. Stocking records are unclear, but it appears it was last stocked in the late 1960's by pilot Bill Dorris of McCall, flying for the defunct Johnson Flying Service. The lake has no over-surface outlet and fish could not escape from the lake.

TECHNIQUES

The field survey conducted in 1985 was the initial investigation made to determine the general situation concerning the Fivemile Creek rainbow population and the drainage itself. The difficulty of access to the area is demonstrated by the logistics involved to conduct this survey.

On 23 July, I took the Fish and Game Department whitewater jet boat from Corn Creek to Lemhi Bar on the Salmon River and remained overnight with outfitter and guide, Bob Smith at his camp. The morning of July 24th, I continued downstream to Fivemile Bar. The boat was then left there in care of the caretakers of "Buckskin Bill's" homestead and I returned upriver with Bob Smith.

On 29 July, I and one other man flew into Chamberlain Basin landing field from Salmon, Idaho and met the third member of the investigative party who had flown in from Boise. Outfitter and guide Ed McCallum Chamberlain Basin Outfitters) met us at the airstrip as pre-arranged - lead pack mules and riding horses were used to transport ourselves and our equipment to the head of the Fivemile Creek drainage. The trip took six hours.

We then embarked cross country on foot, carrying our supplies and Equipment on our backs, to Little Sheepeater Lake. From this point it took 27 hours over a 3 1/2 day period to traverse the length of the

Stream. Average forward speed was .36 mph. When we emerged at the mouth of the creek on August 1, we used the jet boat moored there to turn upriver to Corn Creek where a vehicle had been parked.

During the traverse of Fivemile Creek, we used angling gear to collect fish from the creek (Figure 3). We measured all fish caught to the nearest 10 mm increment and collected scales from representative length groups. Fish were cut open and inspected for gonad development to determine age at maturity. These fish also supplemented our diet of freeze-dried food.

A wet suit, snorkel and mask were used to make underwater counts and observations of fish on 22 August, 1985, in five pools above the lower barriers.

On 4 November, we collected 52 rainbow-steelhead trout near the mouth of Fivemile Creek with a Cofelt backpack shocker for additional electrophoretic analyses. Seven fish had been collected on 20 September by angling gear, also.

The electrophoretic analyses of samples of rainbow collected from Fivemile Creek was conducted by Dr. Fred W. Allendorf and Robb F. Leary of the Department of Zoology, University of Montana, Missoula, Montana. Two groups of fish were analyzed; one sample of 48 individuals col- •collected by angling gear above the lower barriers on September 21, 1984, and a group of 59 fish collected near the mouth of Fivemile Creek on

September 20 and November 4, 1985. The protein extraction procedures electrophoretic methods followed those described by May et al.

1979), Data were compared to that compiled on other Salmon River and

southwest stocks by prior research work (Milner, G.B. and D.J. Teel 1979; Milner, G.B., D.J. Teel and F.M. Utter 1980; Wishard, L. and J. ,) 1983; Milner, G.B. and D.J. Teel 1985).

Mr. Robb Leary also performed the comparisons of five bilateral ,:istic physical characteristics of the upper rainbow sample to fish Macks and Sinker Creek (redband trout) from two tributaries of the Snake River in Owyhee County, Idaho.

RESULTS AND DISCUSSION _

Little Sheepeater Lake

Little Sheepeater Lake is approximately five surface acres in size with an average estimated depth of less than 2.4 m (8 ft.). The bottom is thick mud and sediments with few rocks or boulders showing and little vegetation. This lake does not appear capable of supporting fish over winter and no fish were present in the lake on 29 July, 1985. The lake has no inlet stream. Several small springs, seeps and snow melt provide inflow. The outlet of the lake flows only a few meters then goes underground into a large boulder patch. There appears to be no route for fish to escape from the lake. Salamanders were present.

although aerial stocking of cutthroat trout occurred in the 1950's 1960's ▸ they obviously did not establish themselves in the lake. cutthroat trout were observed or caught in Fivemile Creek during our stay.

Fivemile Creek

As we proceeded down Fivemile Creek above Quartz Spring Creek, we made visual observations and fished on a periodic basis. We were unable however, to remain continually in the stream due to its small gradient and obstructions, such as trees. On the afternoon of 30 (the second day) we noted the presence of a waterfall-cascade at the confluence of Hen Creek. A large pool at the base of these (..swas devoid of fish. Because of the gradient and impassable con-:ons in-stream at that point, we proceeded along the canyon sides. '.:K vegetation forced us higher into a large rockslide in order to :inue our descent of the drainage. We could hear what sounded like :;h gradient-falls area near the mouth of Soldier Creek but could :see the stream at that point. The next place we approached the °k was approximately 450 m (500 yds.) below Soldier Creek. We could

the stream from the hillside but could not readily enter it. We ;inued along the east hillside and eventually were able to re-enter `Creek approximately .5 km (1/3 mi.) above Quartz Spring Creek. At "Point, we saw the first fish. The lateness of the day, threat-i+-:,g weather and the lack of a suitable camping site persuaded us ''nst returning upstream to locate the absolute upper limit of the

„opulation. We believe, however, we were within a few hundred
.,of the upper barrier and its location lies approximately .8 km
_i.) above Quartz Spring Creek or approximately 6.5 km (4 mi.) up-:I
from the lowermost barrier in Fivemile Creek.

::0m the Quartz Spring Creek area downstream, we traveled in the
;;,bed. We noted the presence of several boulder falls that ap-

to be impassable barriers (Figures 4 and 5). There were no ob-
high water routes around these, and it appeared that higher flows
,increase velocities and make passage even less likely. Fish were
,e these barriers, however.

A possible explanation for the presence of fish above upper bar-
:s may be related to the presence of landslides. We noted a number
:yeas along the drainage where massive amounts of boulders, rocks,
:s, rubble, gravels and sand had slid, and were actively sliding
:,Fivemile Creek. This material can inundate, fill and modify a
..s-cascade area and allow fish passage and then be moved out by high
vs. An observable demonstration of this occurred in 1983.

Oral history related **by Sylvan "Buckskin Bill" Hart** through care-
Mark Haney in 1982, described the presence of a waterfall and
?Plunge pool approximately 2.6 km (1.5 mi.) upstream from the
-zof Fivemile Creek. Buckskin **Bill** noted this falls from his
=lest trips up Fivemile Creek in the 1930's, and named the location
Pothole". In late October, 1983, a few days before the major

o earthquake near Mackay, caretaker Mark Haney noted a deep -cling and felt earth movement at the homestead site. Two days

:er, he traveled up Fivemile Creek to go fishing in "The Pothole". ,:n he arrived there, he did not recognize the area and was unable to :j "The Pothole". Climbing on some large angular boulders, he :imed he was nearly crushed as some shifted and moved under him. ;pection of the area in 1984 disclosed that a massive slide had :iterated and filled the area, the falls no longer existed and the :ono longer appeared to be impassable to fish. Photographs of the :ea before and after the slide are shown in Figures 6 and 7. Undoubt- :1y, this material will shift and move downstream for many years. It ;possible a barrier may re-establish itself in time. Also, the pri- -ay barrier area lies a few hundred meters belaw this deposition and :could possibly be affected by materials moving downstream.

In some of the upper barriers in the creek, we noted the presence :large angular boulders that appeared different in color and smooth- :ss from the primary boulders forming the barriers. I believe these .:e either recent depositional materials or heavy boulders left behind :;n previously washed-out slide materials (Figures 4 and 5). Geolog- .=a1 examination of the stream bed materials could possibly delineate age of barrier materials.

The initial barrier occurs approximately 2.4 km (1.5 mi.) above the C:th of Fivemile Creek. It is comprised of a waterfall, approximately - 8m (6 ft.) high, with a high velocity chute above (Figure 8). Above

,:ea we found only rainbow trout. Below this point, Fivemile :cntains steelhead trout, chinook salmon, whitefish, bull trout, ,,mot trout, sculpins and suckers. Squawfish may also be present.

Rainbow **Population**

september, 1984, we collected 48 rainbow above the lowermost ::ers. These fish were taken to the University of Montana at Mis-

Montana for electrophoretic analyses. All **48** fish were screened <lectrophoretically detectable variation at 47 loci (Table 1). ′;y-eight loci were nonvariable for the common allele in rainbow Genetic variation was detected for nine loci. The rainbow from -.i1e Creek are electrophoretically very different from other rain- %trout populations in the upper Columbia River drainage that have examined, including those from other nearby Salmon River tribu- s (Bargamin, Chamberlain, Sheep) (Table 2). This difference is u::by the dendogram (Figure 9) based upon genetic similarities be-- n these samples using the variable loci that were analyzed (Gpi2; •4; Mdh3, 4; Sodl) (Allendorf and Leary 1985). The variant alleles i2 and Aatl in Fivemile Creek fish are unique to this population. distinctiveness is most likely the result of a very long period of oductive isolation.

-n the fall of 1985, 59 steelhead-rainbow trout were collected from ''-'Ile Creek below the barriers, near its mouth. Electrophoretic '·ses of the protein products of 48 loci was conducted (Table 3).

Enzymes and loci examined in rainbow trout from Fivemile Creek, 1984, 85.

The protein products of the pairs of loci in parentheses are electrophoretically indistinguishable so they are considered to be single tetrasomic loci all analyses. E = eye, L = liver, M = muscle.

	Loci	Tissue
Lase	Acol,2	L
.late kinase	**Adkl,2**	M
of dehydrogenase	Adh	L
state aminotransferase	Aatl,2	L
	Aat(3,4)	M
,tine kinase	Ckl,2•	M
	Ck3, CkC1,2	E
-ose phosphate isomerase	Gpil,2,3	M
oraldehyde-3-phosphate dehydrogenase	Gap3,4	E
erol-3-phosphate dehydrogenase	G3p1,2	L
•yl-leucine peptidase	G11,2	E
,citrate dehydrogenase	Idhl,2	M
	Idh(3,4)	L
rate dehydrogenase	Ldhl,2	M
	Ldh3,4,5	E
^yl-glycyl-glycine peptidase	Lgg	E
:ate dehydrogenase	Mdh (1, 2)	L
	Mdh(3,4)	M
.is enzyme	Me(1,2)	M
	Me(3,4)	L
)sphoglucomutase	Pgml,2	M
	Pgml-t	L
,Iiosphogluconate dehydrogenase	**6Pg**	M
rbitol dehydrogenase	Sdh	L
:eroxide dismutase	Sodl	L
thine dehydrogenase	Xdh	L

Locus	Allele	Frequency in the Population			
		Five Mile	Bargamin	Chamberlain	Sheep
Aatl	100	0.065	NA	NA	NA
	null	0.935			
Aco2	100	0.604	0.790	0.690	0.75
	90	0.396	0.210	0.060	0.25
	82	--	--	0.250	--
Gpi2	100	0.396	1.000	1.000	1.00
	null	0.604	--	--	--
Idh3,4	100	0.818	NA	0.670	NA
	114	--		0.010	
	71	0.089		0.180	
	40	0.094		0.150	
Ldh4	100	0.646	0.320	0.240	0.29
	120	--	--	0.030	--
	76	0.354	0.680	0.730	0.71
Mdh3,4	100	0.792	0.990	0.980	0.93
	125	0.198	--	0.010	0.01
	83	0.010	0.010	--	0.06
	74	--	--	0.010	--
Sod.	100	0.885	0.850	0.960	0.88
	152	--	0.010	0.010	--
	57	0.115	0.140	0.030	0.12

NA = not analyzed

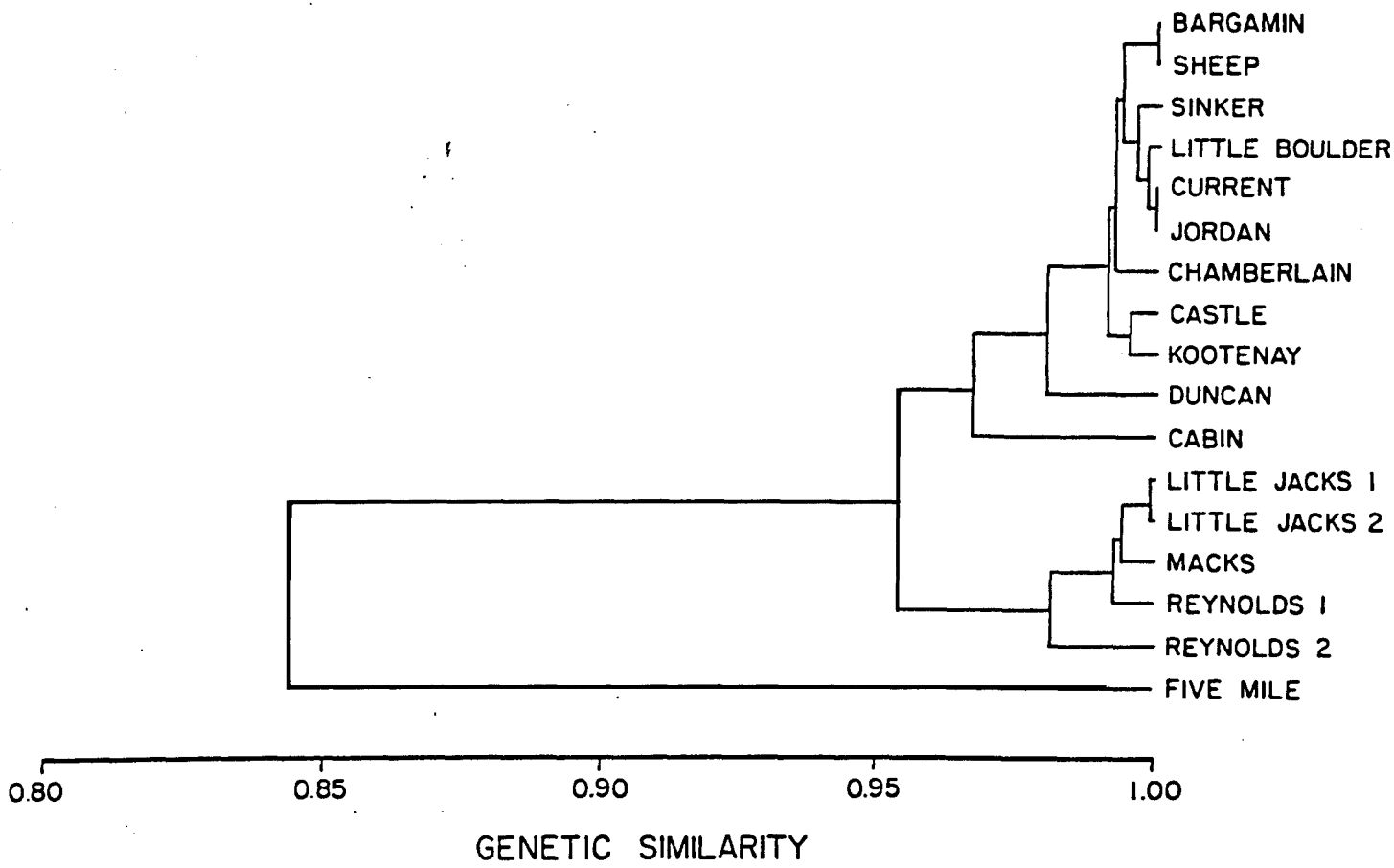

Figure 9. Dendogram of genetic similarity between Fivemile Creek rainbow and 16 other anadromous and nonanadromous rainbow stocks.

e 59 fish analyzed, four harbored the null alleles Aatl and Gpi2 are not known to occur in other rainbow populations except upper dle• The remaining 55 fish did not show the presence of these

:ies. This lead to the conclusion that the four fish that possessed alleles most likely originated from above the barriers. Due :Ile lack of these alleles in the lower samples, the rainbow popula-

;,s above and below the barriers differ and interbreeding between the ;la and lower populations is not occurring. Adult steelhead are ,3:n to enter and spawn in lower Fivemile Creek and the 55 rainbow in - lower sample were most likely juvenile steelhead. Further evidence substantiate this is shown on Table 4. Based on the loci analyzed -rimer Fivemile Creek rainbow-steelhead and rainbow-steelhead from ,::by Salmon River tributaries (Bargamin, Chamberlain, Sheep) it is ,,cent there is a closer similarity between these populations than i ': en the fish above the barriers (Figure 10) (Allendorf and Leary

)f the fish collected above the barriers in 1984, total counts of ··bilateral meristic traits were compared to similar traits in rain-'u :rout from two tributaries of the Snake River in Owyhee County, —:'c• These trout, commonly referred to as redband trout, have also nced a long period of reproductive isolation. Four of the five ~- ,'actcristics examined (mandibular pores, pectoral fin rays, upper `'·:- Ner gill raker counts) showed significant differences between =fish and the Fivemile rainbow (Table 5) (Allendorf and Leary

Allele frequencies at the genetically variable loci in samples of rainbow trout collected above (upper) and below (lower) the first barrier in Fivemile Creek and three other Salmon River tributaries.

	Allele frequencies				
Allele	Five Mile (Upper)	Five Mile (Lower)	Bargamin	Chamberlain	Sheep
100	0.065	0.907	NA	NA	NA
165	**--**	0.093			
null	0.935	--			
100	1.000	**0.995**	NA	NA	NA
110	--	0.005			
100	0.604	0.787	0.790	0.690	0.750
9C	0.396	0.148	0.210	0.060	0.250
82	--	0.065	--	0.250	--
100	1.000	0.982	NA	NA	NA
400	--	0.018			
100	1.000	0.973	0.958	0.950	0.975
115	--	0.027	0.042	0.050	0.025
100	. 0.396	1.000	1.000	1.000	1.000
null	0.604	--	--	--	--
100	0.818	0.591	NA	0.670	NA
114	--	--		0.010	
71	0.089	0.291		0.180	
40	0.094	0.118		0.150	
100	0.646	0.409	0.320	0.240	0.290
120	--	--	--	0.030	--
76	0.354	0.591	0.680	0.730	0.710
100	1.000	0.991	1.000	1.000	1.000
95	--	0.009	--	--	--
100	1.000	0.991	1.000	1.000	0.991
135	--	0.009	--	--	0.009
100	0.792	0.991	0.990	0.980	0.930
125	0.198	0.005	--	0.010	0.010
95	--	0.005	--	--	--
83	0.010	--	0.010	--	0.060
74	--	--	--	0.010	--

(continued).

Allele	Allele frequencies				
	Five Mile (Upper)	Five Mile (Lower)	Bargamin	Chamberlain	Sheep
100	1.000	0.973	NA	NA	NA
90	--	0.027			
100	0.885	0.870	0.850	0.960	0.880
152	--	--	0.010	0.010	--
57	0.115	0.130	0.140	0.030	0.120

NA = not analyzed.

4 Genetic similarities between five populations of rainbow trout from Salmon River tributaries based on loci that were analyzed in all the populations.

	Five Mile (Upper)	Five Mile (Lower)	**Bargamin**	Chamberlain
t•tile (Lower)	0.922			
• ;1min	0.917	**0.988**		
•-uerlain	0.901	0.991	0.992	
·,t,	0.918	0.995	0.999	0.990

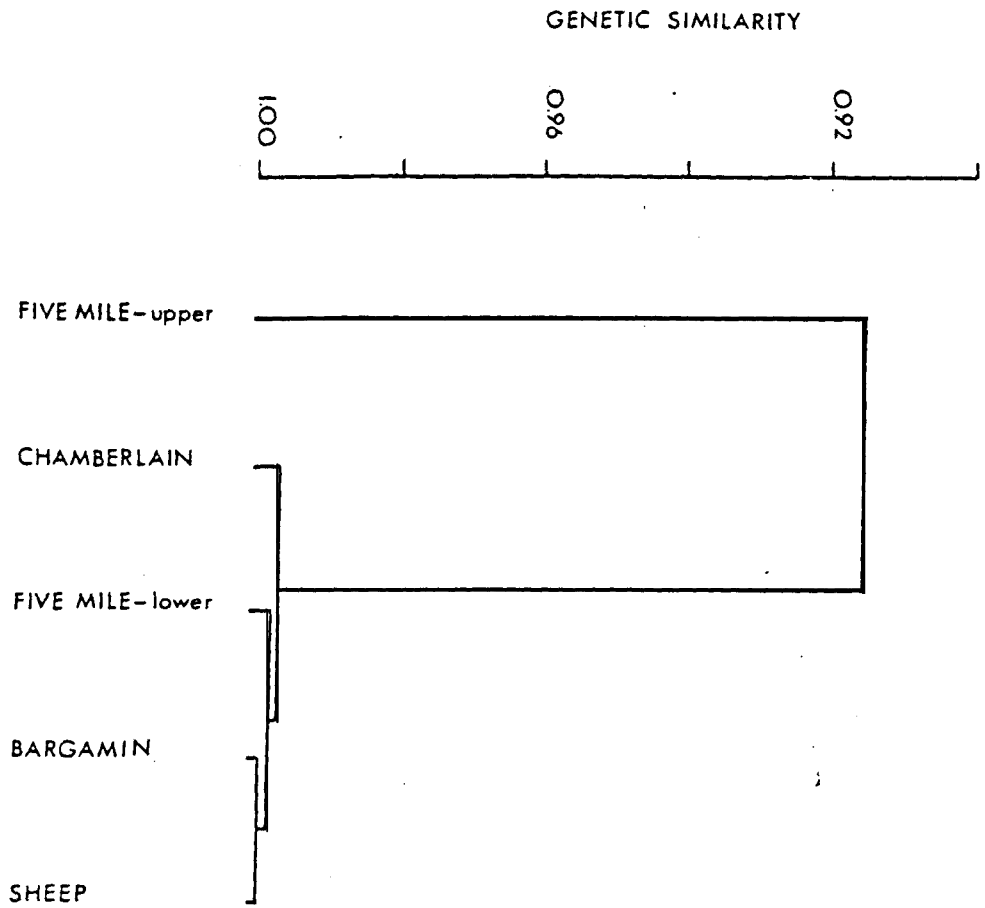

Figure 10. Dendogram of genetic similarity between upper Fivemile rainbow trout and lower Fivemile, Chamberlain, Bargamin and Sheep creeks.

Menple of fish from above the barriers that was electrophoreti-
a,aiyzed showed a relatively high amount of genetic variation. of
the 47 loci (18%) were variable. Average heterozygosity of sanple is
0.068. This is high, relative to the other populations
.3inbow trout examined from upper Columbia River areas (Allendorf

;Leary 1985). This high heterozygosity was unexpected in the iso-
d Fivemile rainbow. A genetically distinct fish population re-..
•;acted to one small stream would be expected to lose genetic varian
due to a restricted population size. An explanation of this is
;readily apparent. One possibility could be that a series of

risolated genetically distinct groups exist above the several upper
.criers. Fish could migrate downstream over these barriers but no
:stream movement could occur. Our sample for electrophoretic analyses :s
collected at the lower end of the population. Collection and anal-:es
of fish above upper barriers would reveal if that situation exts.

During the 29 July-1 August survey, we measured 112 fish caught by -
:ling. Total length ranged fran 100-240 mm (Figure 11). We also -
sFcted the gonads of 20 trout. Mature ovaries and sperm sacks were Ind
in fish as small as 150 **mu.**

Scales taken from 52 rainbow above the barrier were read for number l
annuli present. The number of annuli found versus sizes of fish 1 .ire:
100-120 mn/I, 120-160 nm/II, 160-220 nm/III, 200-240 mm/IV.

-;:D1e 5. Mean and standard deviation (SD) of the total counts of five bilateral meristic traits for rainbow trout from Five-mile Creek and from two tributaries of the Snake River in Owyhee County, Idaho.

CHARACTER	WAN (SD)		
	HUE MILE	MACKS	SINKER
'','41D I BULAR PORES	15.0(1.3)	'16.6(1.6)*''-*	16.1(1.3) ***
`'LCTORAL FIN RAYS	28.1(0.7)	27.5(1.2)**	28.2(0.9)
·LLVIC FIN RAYS	19.7(1.4)	19.3(0.9)	19.6(1.6)
ITER GILLRAKERS (FIRST ARCH)	16.6(1.0)	15.3(1.2)***	16.5(1.0)
UtR GILLRAKERS (FIRST ARCH)	22.0(1,2)	21.3(1.1)*	21.4(1.5)*

'WE ASTERISKS INDICATE MEANS THAT ARE SIGNIFICANTLY DIFFERENT FROM FIVE MILE CREEK: * P<0.05, ** P<0.01, *** P<0.001.

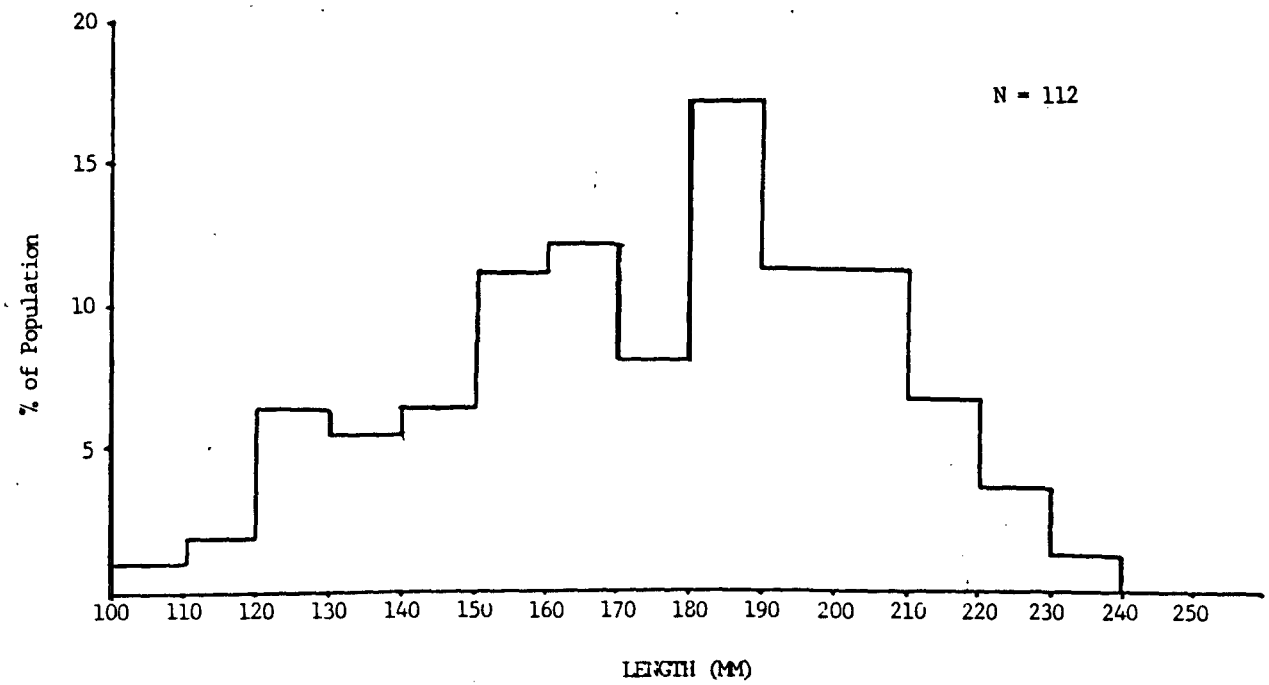

Figure 11. Length frequencies of 112 rainbow trout caught from Fivemile Creek during the 29 July-1 August, 1985 survey.

th relationships are shown in Figure 12. Based on this data, 511 in Fivemile Creek are sexually mature in their third year of ld capable of reproducing.

-•.e percent of the sample caught and measured on the 29 July-1 • survey, by age, is shown in Figure 13. No fish older than 4+ were caught during the survey.

%; has been discussed, the only species that appears to be present ..F the barriers is rainbow trout, although other species are carillon v. This situation leads me to believe that the origin of these r. were steelhead. The size and jumping ability of adult steelhead ...7e fact that their spawning migration timing coincides with spring - would give them an advantage to ascend the stream that chinook =A4 and bull trout would not have at low flows in late summer and :., when they normally spawn.

:do not believe the present state of the lowermost velocity bar- -!shas allowed passage in recent times and the wide electrophoretic - rarity between the upper and lower populations support this.

:t appears that the upper Fivemile Creek rainbow are a unique and a:%le genetic resource that deserves recognition and further study.

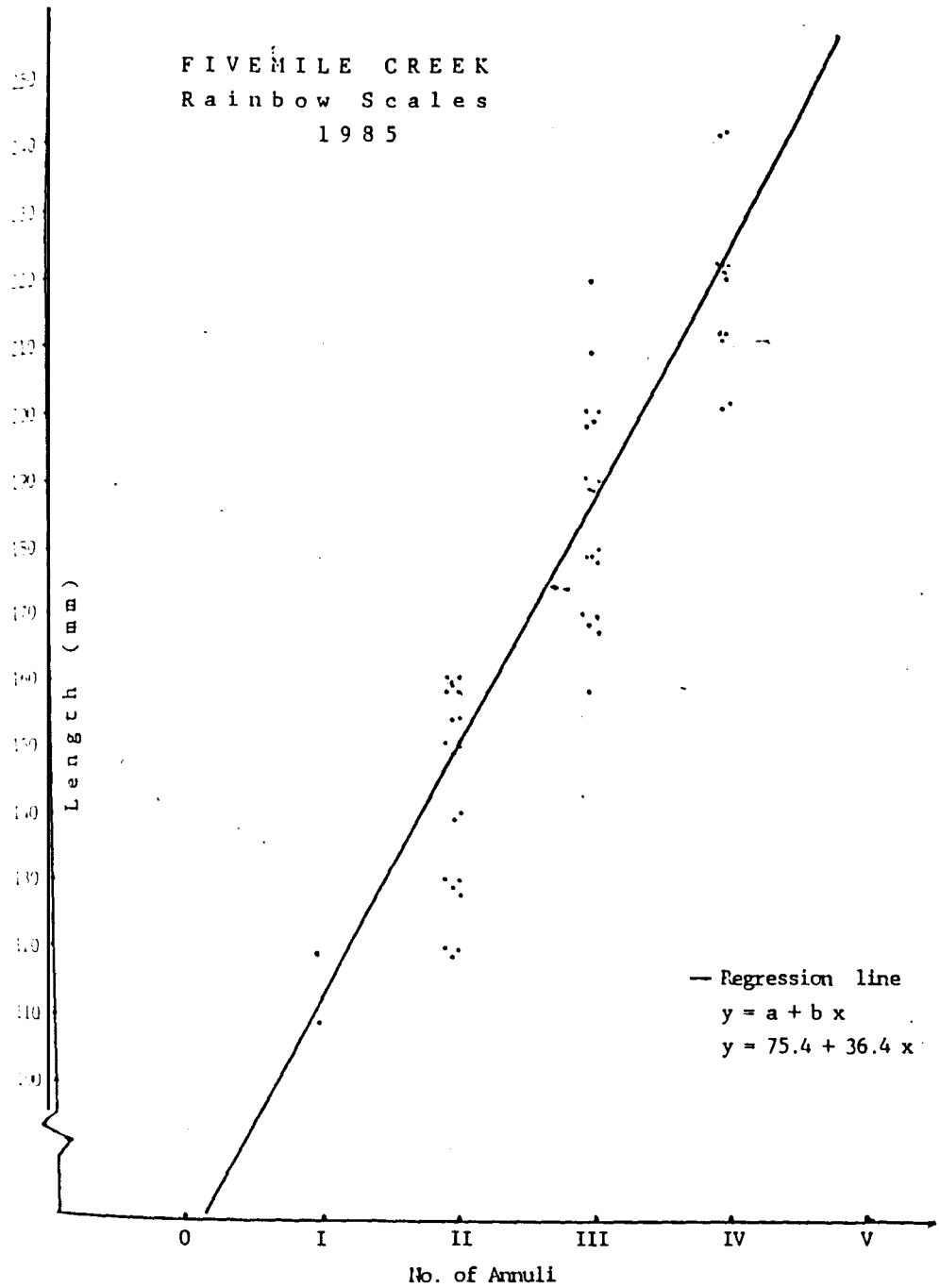

Figure 12. Number of annuli versus length of fish for 52 rainbow trout from upper Fivemile Creek. Sexually mature fish as small as 150 mm total length were found.

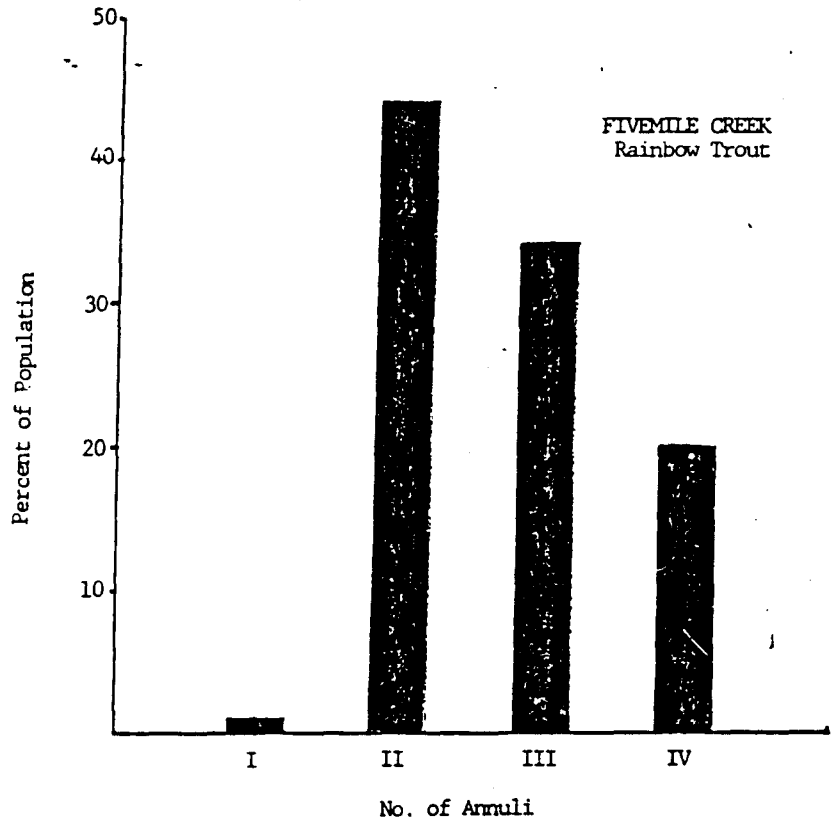

Figure 13. Percent of population caught and measured by age during the 29 July-1 August, 1985 survey. Angling gear selected out age I fish.