

STATE OF ALASKA

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Annual Progress Report for

Steelhead and Sea-Run Cutthroat
Life History in Southeast Alaska*

by

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in S. E. Alaska.

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ABSTRACT

This report covers the second years' operation of the project on the Petersburg Creek system designed to study the life history of the sea-run cutthroat trout, Salmo clarki (Richardson), and the steelhead trout, Salmo gairdneri (Richardson), in a typical southeastern Alaska lake-stream system. A total of 536 adult immigrant steelhead were enumerated at the Petersburg Creek weir between April 24, 1972 and June 27, 1972. Ages of adult steelhead were determined from a total of 389 scale samples. The steelhead run was comprised of fish in twenty-nine age classes with 43.7% of the total adult immigrants entering Petersburg Creek on their second, third, fourth, or fifth spawning run. The outmigration of steelhead smolts from Petersburg Creek began in late April and a total of 1,251 were enumerated through the weir by late August 1972. The outmigration of sea-run cutthroat began in May, and a total of 560 were tagged with numbered anchor tags by mid-August. The immigration of sea-run cutthroat to the Petersburg Creek system began in mid-July and was complete by late October, 1972. A total of 1,103 sea-run cutthroat entered Petersburg Creek, of which 179 were marked on the outmigration. Sea-run cutthroat tagged at the weir were recovered or observed in 11 streams in the Petersburg area. Tagged cutthroat were recovered as far as 44 miles from Petersburg Creek and spent as much as 149 days at sea.

RECOMMENDATIONS

To investigate the spawning grounds and spawning requirements of both steelhead and sea-run cutthroat in the Petersburg Creek system.

To mark selected immigrant adult steelhead in an effort to determine the amount of time spent on the spawning grounds in Petersburg Creek.

To investigate that portion of the cutthroat population in the Petersburg Creek system that is non-migratory.

To investigate the migratory habits and areas frequented by sea-run cutthroat after they leave the Petersburg Creek system .

To gather data from other populations of steelhead and sea-run cutthroat in southeast Alaska .

OBJECTIVES

1. To determine the numbers of in- and outmigrant anadromous cutthroat and steelhead in the Petersburg Creek system .
2. To determine the length, sex and age of anadromous cutthroat and steelhead in the Petersburg Creek system .
3. To determine the maturity composition of the anadromous in and outmigrant cutthroat in the Petersburg Creek system .
4. To determine the age of steelhead smolt and outmigrant cutthroat smolt in the Petersburg Creek system .
5. * To determine the spawning grounds and distribution of anadromous cutthroat and steelhead in the Petersburg Creek system .

6. *To determine the distribution and food habits of rearing cutthroat and steelhead in the Petersburg Creek system .
7. To determine the migration patterns of anadromous cutthroat after they leave the Petersburg Creek system .
8. *To gather population data on steelhead populations in additional selected streams in southeast Alaska .
9. To compile an annotated bibliography of selected references on cutthroat and steelhead .

* Some work was done on objectives 5, 6 and 8 but were not completed during this report period. Those objectives will be reported on in the final report of this project.

TECHNIQUES USED

Background information from prior studies conducted by the Alaska Department of Fish and Game and other agencies was reviewed .

A horse and deck weir incorporating in- and outmigration fish traps was completed in the upper intertidal area of Petersburg Creek on April 23, 1972. The completed weir was 165 feet long and three feet high. An additional three feet of height was added to compensate for the higher high tides by the addition of screens mounted above the weir deck. The weir was of an inclined screen panel type using 1.60 cm hardware cloth screens for normal operation and 2.54 cm screens during high water levels. Three traps, 12 feet by 9 feet, were placed at points determined to be most attractive to migrating fish. Traps were designed to be used as either in- or outmigrant traps depending upon the direction of the bulk of the migrating fish. A nine-foot section, located in midstream, was modified to allow boat traffic to pass through the weir .

All in-and outmigrant adult steelhead captured at the weir were anesthetized with Tricaine Methanesulfonate (MS 222), sexed, measured, weighed and marked by removal of the adipose fin. Scale samples were also collected for age determinations. Sampled steelhead were then placed in a freshwater tank to recover before releasing them in the direction of original migration.

All outmigrant steelhead smolt captured at the weir were anesthetized with MS 222, enumerated and measured. Every 10th smolt was killed, measured and sexed. Otoliths were collected from these smolts for age determinations. Stomach contents were examined and classified.

As the outmigrant cutthroat entered the traps, they were placed in tubs and anesthetized. They were measured, those over 200 mm were tagged with a numbered "Floy" internal anchor type tag and the right ventral fin was removed. Cutthroat under 200 mm were only given a right ventral fin clip. All cutthroat were then placed in a freshwater recovery tub and were observed until all were active before release below the weir.

As the inmigrant cutthroat entered the traps they were handled using the same procedure as were the outmigrants. All cutthroat were measured and examined for fin clips and tags.

Every 10th cutthroat captured at the weir was killed, measured, weighed and sexed. Otoliths were collected from these fish for age determinations. The sexual maturity of the gonads was noted and the cutthroat were classed as mature or immature. The stomach contents were examined and classified.

The in-and outmigration of Dolly Varden (S. malma) and the enumeration of the various salmon species were counted past the weir by removing them from the traps by dip net or removing a weir screen and tally counting as they crossed a flash board.

FINDINGS

Adult Steelhead - Numbers and Timing

An estimated 536 adult steelhead (S. gairdneri) entered Petersburg Creek in 1972. Of these, 77 were harvested from Petersburg Creek by 279 sport anglers.

Periodic flooding during the spring of 1972 required removal of the weir screens to save the structure. During these high water periods, an undetermined number of adult steelhead passed upstream. To estimate the total immigration of adult steelhead in 1972, a marked to unmarked ratio of the outmigrants (Bailey's modification of Peterson's formula; Ricker, 1958) was used. The estimated immigration was computed as follows:

$$\hat{N} = \frac{M (C+1)}{R+1} = \frac{227 (273)}{135} = 459$$

Where M = 227 Marked Fish
 C = 273 Fish Sampled
 R = 135 Marked Fish Recaptured

An additional 77 steelhead were removed from the total run by anglers. The addition of these sport caught fish brings the estimated total 1972 run to 536 adult steelhead.

The immigration of adult steelhead began in March, peaked in late May, and was complete by late June. The most important single factor influencing immigrating steelhead was water levels in Petersburg Creek. Steelhead entered the traps most readily on rising stream levels. On stable or dropping stream levels the immigrants preferred to move during the hours of darkness. On rising levels, immigrant steelhead moved equally well at all hours of the day. Water temperature did not effect migration as water temperatures in Petersburg Creek were uniformly cold (0° to 4° C) during the period steelhead were moving past the weir.

The outmigration of spent steelhead started in late May, peaked in June, and was complete by early August. Outmigrant steelhead were not eager to enter the outmigrant traps and did so only during the hours of darkness on moderate water levels. Presented in Table 1 are the monthly migration totals for Petersburg Creek weir in 1972.

TABLE 1 Adult Steelhead Trapped by Month, Petersburg Creek Weir 1972.

Month	Direction of Migration	
	Immigration	Outmigration
April	9	--
May	195	24
June	23	135
July	--	62
August	--	51
Total	227	272

Adult Steelhead Age-Sex Relationships

To determine the age-sex relationships of the Petersburg Creek steelhead, scale samples were collected and sex determined from all steelhead trapped at the weir during the in and outmigrations. A total of 389 scales were readable for total age determinations.

Twenty-nine age classes (ages 2.2-5.3 S) were found among the Petersburg Creek steelhead population in 1972 (Table 2). Age classes are presented using the aging method described by Narver et al. (1971). Repeat spawning steelhead are listed with an "S" after the ocean age. This "S" represents a spawning run and is added to the total to determine the overall total age of repeat spawners. Initial spawners are those steelhead without an "S" in their total age.

Steelhead sampled in 1972 had spent 2 (13.1%), 3 (60.4%), 4 (24.9%) and 5 (1.1%) winters in freshwater. The numbers of winters spent in saltwater by the sampled steelhead were 2 (23.1%), 3 (54.2%), 4 (14.6%), 5 (6.4%), 6 (1.3%) and 7 (.3%).

Table 2. Trout by Age Classes in Petersburg Creek, Steelhead, 1972.

Age Classes	No. SH	No. Females	No. Males	% Total
2.2	16	8	8	4.1
2.2s	9	1	8	2.3
2.2ss	3	3	-	.8
2.3	15	9	6	3.8
2.3s	4	4	-	1.0
2.3ss	3	3	-	.8
2.3sss	1	1	-	.3
3.1s	1	-	1	.3
3.2	57	25	32	14.6
3.2s	42	25	17	10.7
3.2ss	12	7	5	3.0
3.2sss	3	3	-	.8
3.2ssss	1	1	-	.3
3.3	78	48	30	20.0
3.3s	25	20	5	6.4
3.3ss	11	9	2	2.8
3.3sss	3	2	1	.8
3.3ssss	1	1	-	.3
4.2	15	8	7	3.8
4.2s	32	14	18	8.2
4.2ss	7	6	1	1.8
4.2sss	4	4	-	1.0
4.3	35	19	16	8.9
4.3s	4	3	1	1.0
4.3ss	1	1	-	.3
5.2s	1	-	1	.3
5.2ss	1	-	1	.3
5.3	4	1	3	1.0
5.3s	1	1	-	.3
29	390	227	163	100.0

Freshwater ages of the 1972 steelhead were somewhat heavier in the older age groups (3 & 4) than those in 1971 (Jones, 1972). Saltwater ages for 1971 and 1972 Petersburg Creek steelhead are nearly equal in all age classes. The majority of both female and male steelhead were in age classes 3.3 and 3.2.

Steelhead Frequency of Spawning

During the operation of the Petersburg Creek weir in 1972, 56.3% of the steelhead sampled for total age were first time spawners and 43.7% had spawned two or more times. This is almost exactly the same as 1971 when 43.0% of the total were repeat spawners. The number of years the 1972 sampled steelhead spawned is presented in Table 3.

Table 3 Steelhead Trout Spawning Frequency, Petersburg Creek, 1972.

Sex	Number of Spawning Runs					Total
	One	Two	Three	Four	Five	
Male	101	51	8	2	0	162
Female	118	68	29	10	2	227
Total	219	119	37	12	2	389

Initial Steelhead Spawners

Steelhead spawning for the first time numbered 219 or 56.3% of the total run. These steelhead were from seven age classes with age 3.3 the most common age for females and age 3.2 for males (Table 4). The sex ratio of initial spawners was almost 1:1 with females only slightly more numerous than males.

Table 4. Age Classes of Initial Steelhead Trout Spawners by Sex, Petersburg Creek Weir, 1972

Age Classes	No. of Steelhead	No. of Females	No. of Males	Percentage of Total
2.2	16	8	8	7.3
2.3	15	9	6	6.8
3.2	57	25	32	26.0
3.3	78	48	30	35.6
4.2	15	8	7	6.8
4.3	35	19	16	16.0
5.3	3	1	2	1.4
Totals	219	118	101	99.9

Repeat Steelhead Spawners

The high occurrence of observed repeat spawning steelhead noted in the 1971 Petersburg Creek population was again repeated in the 1972 run. In 1971, 43.0% of the total run showed a previous spawn check (Jones, 1972). The 1972 steelhead run contained 43.7% repeat spawners.

Repeat steelhead spawners by sex show females to outnumber males by a ratio of 1.8:1. Twenty-two age classes were represented among the repeat spawners with the majority of both females and males falling in the 3.2S and 4.2S age classes (Table 5).

Table 5 Age Classes of Repeat Steelhead Trout Spawners by Sex, Petersburg Creek Weir, 1972.

Age Class	No. SH	No. Females	No. Males	% Total
2.2s	9	1	8	5.3
2.2ss	3	3	-	1.8
2.3s	4	4	-	2.3
2.3ss	3	3	-	1.8
2.3sss	1	1	-	.6
3.1s	1	-	1	.6
3.2s	42	25	17	24.7
3.2ss	12	7	5	7.0
3.2sss	3	3	-	1.8
3.2ssss	1	1	-	.6
3.3s	25	20	5	14.7
3.3ss	11	9	2	6.5
3.3sss	3	2	1	1.8
3.3ssss	1	1	-	.6
4.2s	32	14	18	18.8
4.2ss	7	6	1	4.1
4.2sss	4	4	-	2.3
4.3s	4	3	1	2.3
4.3ss	1	1	-	.6
5.2s	1	-	1	.6
5.2ss	1	-	1	.6
5.3s	1	1	-	.6
Total	22	170	61	100.0

Of the 109 repeat spawning females, 68 (62.0%) were spawning for the second time, 29 (27.0%) were spawning for the third time, ten (9.0%) for the fourth time and two (2.0%) for the fifth time. Of the 61 repeat spawning males, 51 (83.0%) were spawning for the second time, eight (13.0%) were spawning for the third time and two (3.0%) were spawning for the fourth time.

Steelhead Length-Weight Relationships

Length-weight relationships were collected from 389 steelhead as they passed the Petersburg Creek weir during 1972. The overall average length and weight of males and females for all age groups was nearly identical. The only large difference in size was length and weight between initial spawners and repeat spawners. The repeat spawners averaged 5.5 Kg. (Table 6), which is greater than the standard of 5.4Kg. set for a "trophy fish" in Alaska. The average length and weight of initial spawners was comparable to that found in 1971 (Jones 1972). The only difference in the 1972 run was that the repeat spawners averaged approximately 1 Kg. less in weight than they did in 1971.

Table 6 Steelhead Trout Length-Weight Relationships, Petersburg Creek Weir, 1972.

	No. in Sample	Length Rg. in cm	Ave. Lt.	Weight Rg. in Kg.	Ave. Wt.
Initial Spawners	219	59.7-92.7	74.4	2.0-7.6	4.0
Repeat Spawners	170	67.3-100.3	82.3	2.7-9.1	5.5

Steelhead Smolt Outmigration

The seaward outmigration of steelhead smolt through the Petersburg Creek weir began in late April, peaked between June 1 and July 4 and was complete by late August (Table 7). This was the first year that steelhead smolt were trapped and a total of 1,251 were counted past the weir.

Table 7 Numbers and Lengths of Outmigrant Steelhead Trout Smolt by Bi-Weekly Periods, Petersburg Creek Weir, 1972.

Bi-Weekly Period	No.	Length Range in mm.	Average Length in mm.	Percent of Total
4/23 - 5/7	3	127 - 161	147	0.2
5/8 - 5/21	5	135 - 176	151	0.4
5/22 - 6/4	47	119 - 226	168	3.8
6/5 - 6/18	568	118 - 275	177	45.4
6/19 - 7/2	419	92 - 241	170	33.5
7/3 - 7/16	94	100 - 237	160	7.5
7/17 - 7/30	49	90 - 206	153	3.9
7/31 - 8/13	18	99 - 187	136	1.4
8/14 - 8/27	48	105 - 197	148	3.8
Totals	1,251	90 - 275	161	99.9

Water temperatures during the outmigration averaged 6°C during the peak of migration. The steelhead smolt migrated at a later date than the Dolly Varden (*S. malma*) and salmon smolt in the Petersburg Creek system. This late migrational timing appears to be the rule for southeast Alaskan steelhead as steelhead smolt migrated in late June at Lake Eva (Armstrong, 1963) and at the Situk River at Yakutat (Furniss, per. comm.).

It would appear that migration timing is correlated to smolt size with the larger smolt migrating during the first of the migration and then followed by the smaller size groups. The 1972 adult steelhead run was comprised of 56.3% or 303 initial spawners. To produce this return, the smolt to adult survival rate would be approximately 24.0% for all age groups based on the outmigration of 1,251 smolt.

Steelhead Smolt Age-Length Relationships

Age and length data were collected from a sample of 123 outmigrant steelhead smolt as they passed the Petersburg Creek weir. These smolt were found to range in age from two to five years, with 92% showing three or four annuli on their otoliths (Table 8).

Table 8 Age-Length Relationships of Steelhead Trout Smolt, Petersburg Creek Weir, 1972.

Fork Length in mm.	Age (Number of Annuli)				Total	% of Total
	2	3	4	5		
71 - 90	1	-	-	-	1	0.8
91 - 110	2	-	-	-	2	1.6
111 - 130	2	6	-	-	8	6.5
131 - 150	2	8	-	-	10	8.1
151 - 170	1	33	8	-	42	34.1
171 - 190	-	23	17	1	41	33.3
191 - 210	-	-	16	-	16	13.0
211 - 230	-	-	1	1	2	1.6
231 - 250	-	-	1	-	1	0.8
Totals	8	70	43	2	123	
Percent of Total	6.5	56.9	35.0	1.6		99.8
Avc. Fork Length in mm	122	159	187	198		

Cutthroat Trout Outmigration

A total of 837 cutthroat trout (S. clarki) migrated to sea past the Petersburg Creek weir in 1972. The outmigration began in early May, peaked in mid-June, and was complete by late August (Table 9). Water temperatures during the outmigration ranged from 3°C to 12°C with the peak of migration occurring at temperatures above 6°C. This migration pattern closely parallels the cutthroat outmigration in 1971 (Jones, 1972), with the only difference being the 2°C warmer water temperatures in 1972. Nearly all of the outmigrant cutthroat entered the traps during the hours of darkness on moderate to rising stream flows. A total of 213 cutthroat under 200 mm outmigrated with the peak movement occurring in mid-July. It is thought that most of the Petersburg Creek cutthroat smolt migrate to sea at a fork length less than 200 mm and that most of these fish are smolt.

Table 9 Outmigrant Cutthroat Trout Bi-Weekly Periods, Petersburg Creek Weir, 1972.

Bi-Weekly Period	No.	Length Range in mm	Average Length	Cutthroat Less Than 200 mm
4/23 - 5/7	1	-	349	-
5/8 - 5/21	28	148 - 445	349	1
5/22 - 6/4	135	158 - 430	268	8
6/5 - 6/18	253	138 - 403	229	27
6/19 - 7/2	170	120 - 481	254	24
7/3 - 7/16	75	134 - 380	215	28
7/17 - 7/30	163	123 - 345	182	115
7/31 - 8/13	4	158 - 207	173	3
8/14 - 8/27	8	132 - 218	169	7
Totals	837	120 - 481	247	213

Age-Length Relationships of Outmigrant Cutthroat Trout

Ages were determined from the outmigrant cutthroat trout by counting the number of annuli on their otoliths. These trout ranged from age 3 to 8 with 93.6% of the fish from age 3 to 6 (Table 10). Sixty-five percent outmigrant cutthroat sampled were between 171 - 270 mm in fork length.

Table 10 Age-Length Relationships of Outmigrant Cutthroat Trout, Petersburg Creek Weir, 1972.

Fork Length (mm)	Age (Number of Annuli)						Total	% of Total
	3	4	5	6	7	8		
131 - 150	6	-	-	-	-	-	6	6.3
151 - 170	4	2	-	-	-	-	6	6.3
171 - 190	8	5	2	-	-	-	15	15.8
191 - 210	1	7	5	1	-	-	14	14.7
211 - 230	-	2	7	-	-	1	10	10.5
231 - 250	-	4	5	-	-	-	9	9.5
251 - 270	-	-	9	4	1	-	14	14.7
271 - 290	-	1	2	3	-	-	6	6.3
291 - 310	-	-	-	1	-	-	1	1.0
311 - 330	-	-	1	4	1	-	6	6.3
331 - 350	-	-	2	1	-	-	3	3.2
351 - 370	-	-	-	1	1	-	2	2.1
371 - 390	-	-	-	1	2	-	3	3.2
Totals	19	21	33	16	5	1	95	
% of Total	20.0	22.1	34.7	16.8	5.2	1.2		99.9
Avg. Fork Length	163	205	243	297	342	225		

Cutthroat Trout Immigration

An estimated 1,103 cutthroat entered Petersburg Creek from the sea in 1972. The immigration of cutthroat to Petersburg Creek began in mid-July, peaked in late September, and was complete by late October (Figure 1).

The immigrant cutthroat entered the traps at night on moderate to rising stream flows. Very little movement occurred during extreme high or low water levels. Stream water temperatures were 14°C at the start of immigration, averaged 7°C during the peak and dropped to 3°C at the end of migration.

Immigrant Cutthroat Trout Tag Recoveries

The immigration of tagged and/or marked cutthroat to Petersburg Creek followed closely the timing for unmarked cutthroat. A total of 179 (31.9%) cutthroat bearing

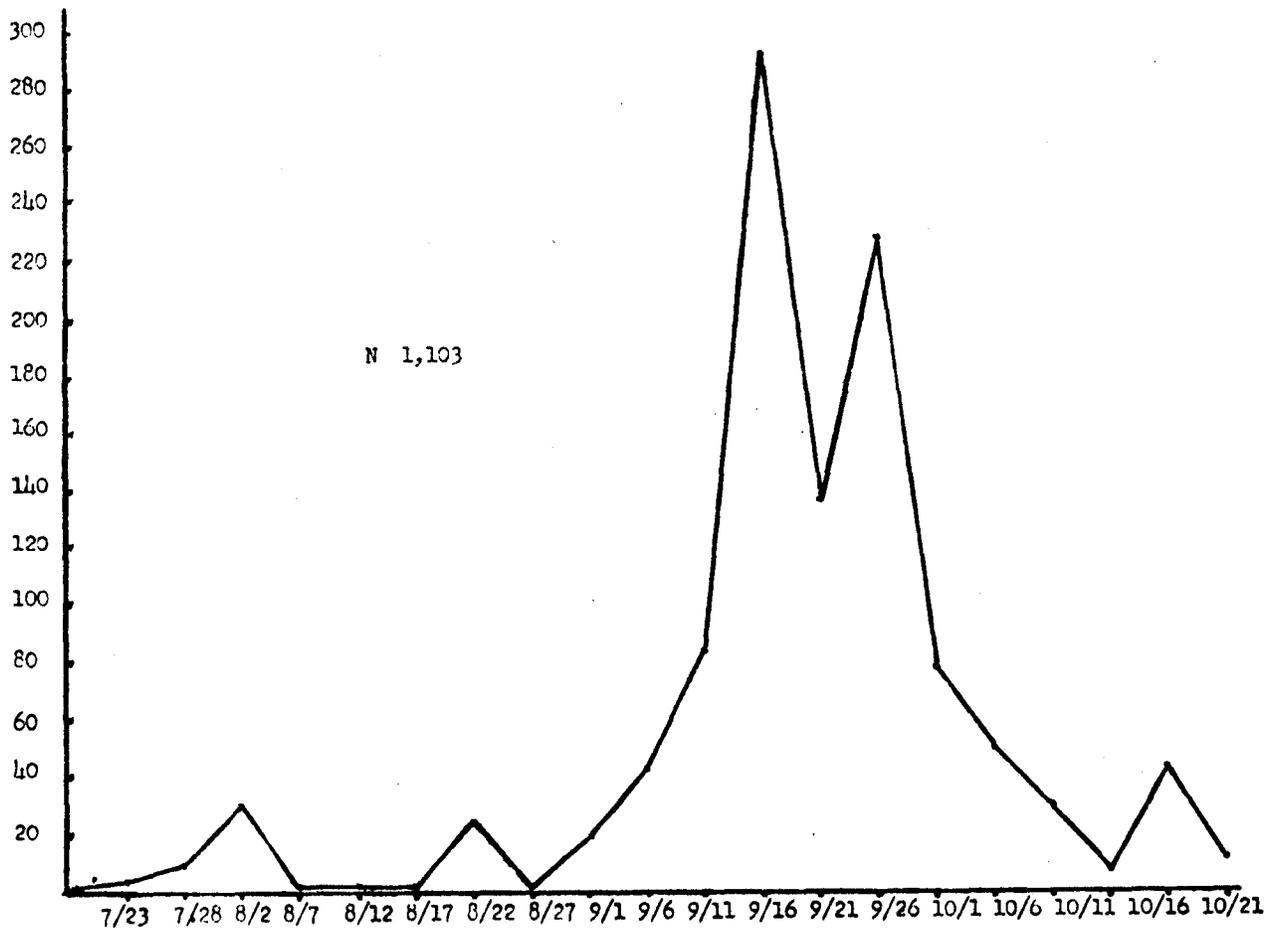


Figure 1. Inmigrant Cutthroat Trout by Five Day Periods, Petersburg Creek Weir, 1972

either a tag or fin clip were recovered from a total of 560 tagged on the outmigration. In addition, 33 (15.4%) cutthroat smolt, marked on their outmigration, were recovered from a total of 213 marked. A grand total of 224 marked cutthroat were recaptured out of a total of 773 released on the outmigration for an overall 28.9% recovery rate for all marked cutthroat.

Tagged cutthroat spent from 12 - 149 days at sea. Early spring migrant cutthroat averaged 108 days at sea while the late outmigrants averaged 53 days (Table II). Average growth increments were highest for that group of cutthroat that migrated during the peak of the outmigration. These cutthroat grew an average of 35 mm and were at sea an average of 85 days. Recovery rates at the weir for tagged cutthroat was directly correlated to the time the cutthroat spent at sea. Those migrating early in the season and spending the greatest time away from Petersburg Creek returned nearly at half the rate as did those cutthroat that migrated late in the run.

Cutthroat Tag Recoveries - Other Streams

Eleven stream systems in the Petersburg area contained cutthroat tagged at the Petersburg Creek weir in 1972. This information was obtained from tags turned in by sport anglers in the Petersburg area. Tagged cutthroat were caught on hook and line in nine streams and were observed in two others.

Table 11 Days at Sea and Growth Increment for Tagged Cutthroat Trout Recaptured at the Petersburg Creek Weir 1972.

Monthly Period	No. Tagged	No. Recovered*	Percent Recovery	Days at Sea		Growth Increment	
				Range	Avg.	Range	Ave.
5/15-6/15	200	39	19.5	52-149	108	3-58mm	30mm
6/16-7/15	317	93	29.3	30-127	85	2-134mm	61mm
7/16-8/30	43	17	39.5	12-85	53	0-62mm	24mm
Totals	560	149**	26.6	12-149	82	0-134mm	29mm

* Represents cutthroat captured throughout the immigration period.
 ** Includes cutthroat captured in Petersburg Creek Below the weir.

Recovery areas of tagged sea-run cutthroat after leaving Petersburg Creek are presented in Figure 2. The names of the recovery streams, their distance from the Petersburg Creek weir and the numbers of cutthroat recovered or observed are presented in Table 12.

As shown in Figure 2, the recovered cutthroat had migrated in all directions. They were recovered as close as 2.5 miles from the weir in Coho Creek to as far as 44 miles in the Duncan Salt Chuck. The numbers of days between tagging and recovery ranged from 13 days for a cutthroat caught in Hammer's Slough to 104 days for Cutthroat trout captured in Big Creek, Mitkof Island.

Inmigrant Cutthroat Age - Length Relationships

Age-length data was collected from a random sample of 101 inmigrant cutthroat. These cutthroat ranged in age from three to eight years with 53.5% showing four and five annuli on their otoliths (Table 13). In the 1972 immigration there were more cutthroat in the older age groups (ages six through eight) while age groups four and five were less abundant in 1972.

Degree of sexual maturity was noted for the inmigrant cutthroat sampled at the weir. It was found that 53.0% of the inmigrants were not maturing and would not spawn in the spring of 1973. This closely parallels what was noted in 1971 when 56.0% of the immigration was immature (Jones, 1972).

Inmigrant cutthroat fork length ranged from 140mm to 460mm (Figure 3). The average fork length of 759 measured inmigrants was 274 mm.

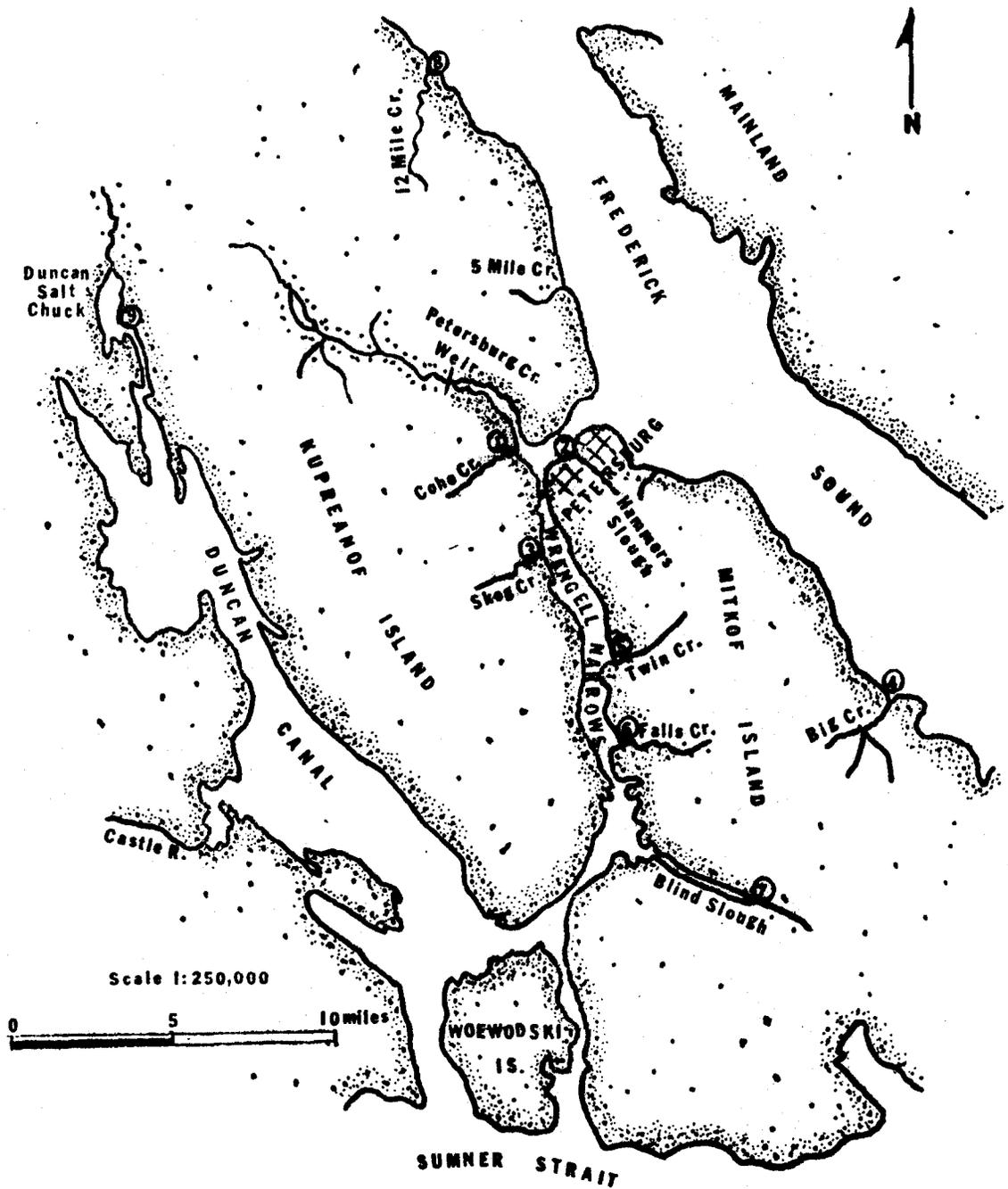


Figure 2. Recovery Areas of Cutthroat Tagged at the Petersburg Creek Weir, 1972.

Table 12 Tagged Cutthroat Trout Recoveries From Streams Other Than Petersburg Creek.

Stream Number	Stream	Date Recovered	Miles From Psg. Cr. Weir	No. Recovered	No. of Days After Tagging
1	Coho Cr.	8/13	2.5	1	84
1	Coho Cr.	8/13	2.5	1	62
2	Hammer's Slough	5/31	4.5	1	13
3	Skog Cr.	8/14	6.0	1	60
4	Big Creek	9/21	14.5	1	104
5	Twin Creek	6/16	12.0	1	92
6	Falls Creek	8/1	14.0	1	50
6	Falls Creek	8/1	14.0	1	44
7	Blind Slough	10/10	17.0	1	101
8	"12 Mile" Cr.	7/24	18.0	1	28
8	"12 Mile" Cr	7/31	18.0	1	66
9	Duncan Salt Chuck	7/9	44.0	1	25
9	Duncan Salt Chuck	8/17	44.0	1	84
10	"5 Mile"Cr.	8/15	11.5	1*	
11	Castle R.	9/10	34.0	1*	

*Observed but not recovered

Table 13 Age Length Relationship of Immigrant Cutthroat Trout, Petersburg Creek, 1972.

Fork Length in mm	Age (Number of Annuli)						Total	Percent of Total
	3	4	5	6	7	8		
151 - 170	-	2	-	-	-	-	2	2.0
171 - 190	4	8	-	-	-	-	12	11.9
191 - 210	6	7	-	-	-	-	13	12.9
211 - 230	3	9	1	-	-	-	13	12.9
231 - 250	-	7	5	-	1	-	13	12.9
251 - 270	-	1	6	2	-	-	9	8.9
271 - 290	-	-	3	-	1	-	4	4.0
291 - 310	-	-	4	1	-	-	5	4.9
311 - 330	-	-	-	4	1	-	5	4.9
331 - 350	-	-	-	2	3	-	5	4.9
351 - 370	-	-	1	3	2	1	7	6.9
371 - 390	-	-	-	5	-	-	5	4.9
391 - 410	-	-	-	1	-	-	1	1.0
411 - 430	-	-	-	-	3	-	3	3.0
431 - 450	-	-	-	1	1	2	4	4.0
Totals	13	34	20	19	12	3	101	100.0
Percent of Total	12.9	33.7	19.8	18.8	11.9	3.0		
Average Fork Length in mm	201	211	272	325	357	429		

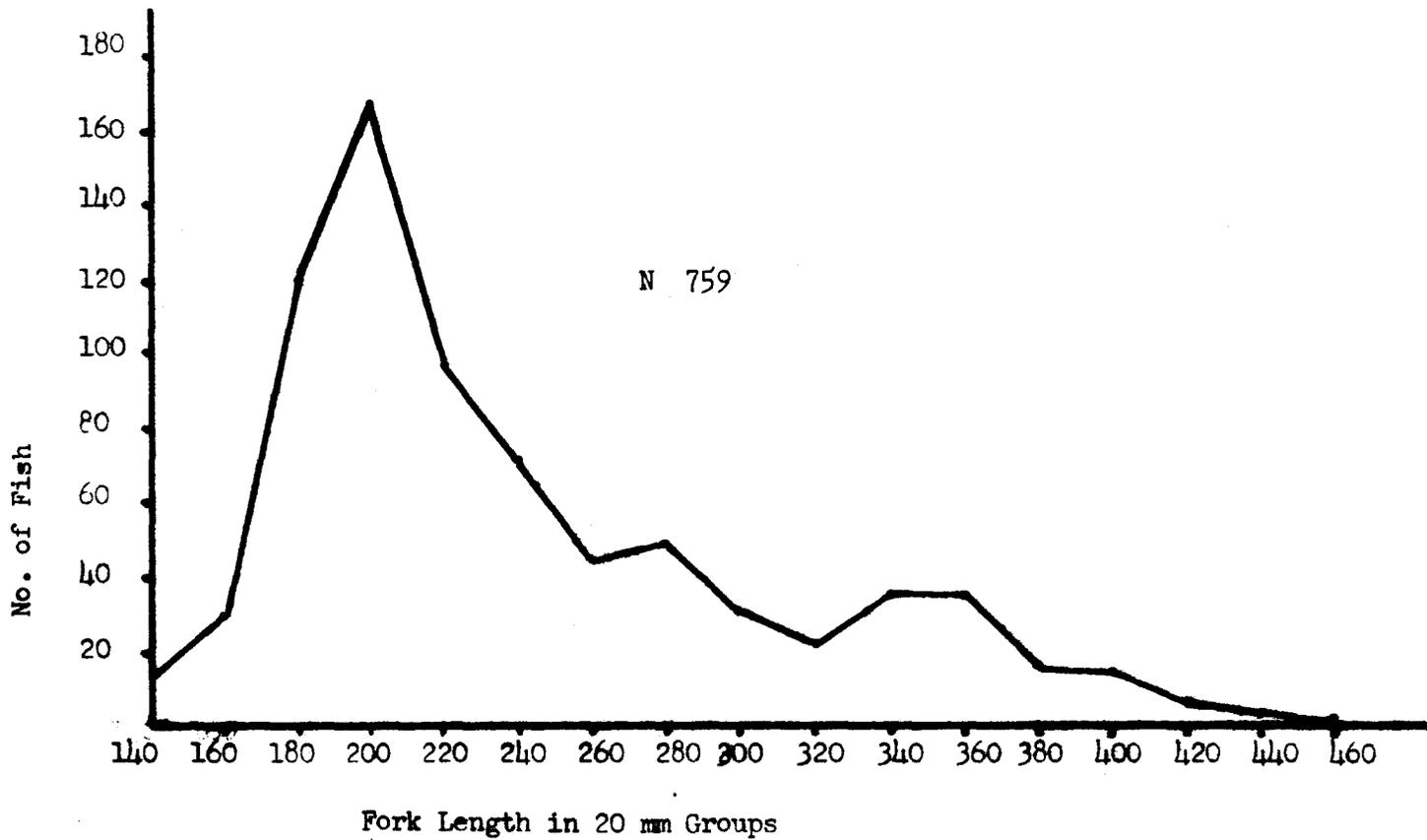


Figure 3. Length Frequency of Cutthroat Trout Immigrants, Petersburg Creek Weir, 1972

Other Migrants

The seaward migration of Dolly Varden from the Petersburg Creek system usually begins in March and an undetermined number had already passed the weir site when construction was completed on April 23, 1972. The 1972 outmigration of Dolly Varden was somewhat later than 1971.

The weir screens during the 1972 season were of small mesh (1.6 cm) which enabled enumeration of the smolt outmigration of steelhead and coho salmon (O. kisutch). Presented in Table 14 are the number of outmigrant fish captured at the Petersburg Creek weir in 1972.

Table 14 Number of Outmigrant Fish by Species and Month Petersburg Creek Weir, 1972.

Month	<u>Fish Species</u>			
	Cutthroat	Dolly Varden	Steelhead	Coho
April	1	599	(1)*	(335)*
May	177	18,522	24 (49)	(3,992)
June	419	1,073	136 (959)	(440)
July	229	8	61 (178)	(35)
August	11	6	51 (64)	(2)
Totals	837	20,208	272 (1,251)	(4,804)

* () Indicates smolt

The immigrant traps were completed on April 23, 1972 and the first adult steelhead were captured on April 24th. Steelhead and cutthroat were the only immigrants captured in April and May. The salmon immigration started with the first red salmon (O. nerka) in late June and reached a peak in August. Dolly Varden passed upstream in good numbers from late June until termination of the field season on November 1, 1972 (Table 15). Presented in Table 15 are the monthly immigrant trap counts by species for the Petersburg Creek weir for 1972.

Table 15 Numbers of Immigrant Fish by Species and Month, Petersburg Creek Weir, 1972.

Month	<u>Fish Species</u>						
	Steelhead	Cutthroat	Dolly Varden	Red	Pink	Chum	Coho
April	9	---	---	---	---	---	---
May	195	1	---	---	---	---	---
June	23	---	2	5	---	---	---
July	---	13	2,462	2,769	1,914	590	---
August	---	61	5,089	198	13,623	231	4
September	---	752	9,555	---	665	107	231
October	---	222	6,559	---	---	20	247
Totals	227	1,048	23,667	2,972	16,202	948	452

Totals presented in Tables 14 and 15 do not represent the entire run for the species listed. Dolly Varden were passing downstream and steelhead upstream before the weir was completed in April. All species passed in both directions during periods of extreme high water when the weir screens were removed. Several thousand salmon normally spawn in the intertidal area below the weir and are not included in the total counts.

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