

Volume 25

Study G-II

STATE OF ALASKA
Bill Sheffield, Governor

Annual Performance Report for
FISH MIGRATION STUDIES IN SOUTHEAST ALASKA

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Research Project Segment

State: Alaska Name: Sport Fish
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Job No: G-II-D Job Title: Fish Migration
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ABSTRACT

Catch rates for Dolly Varden char, Salvelinus malma (Walbaum), in the Juneau area have continued to decline despite increasingly restrictive regulations. A weir constructed on Montana Creek and an existing weir on Auke Creek were used in 1983 to capture Dolly Varden for enumeration and tagging. Cutthroat trout, Salmo clarki Richardson, passing the Auke Creek weir were also enumerated.

Between April 28 and June 15, 1,250 Dolly Varden (primarily smolt) passed the Montana Creek weir. The weir was destroyed by a flood on June 15. Subsequently, alternate methods were used to capture Dolly Varden for tagging.

A total of 1,828 Dolly Varden were tagged in Montana Creek. These Dolly Varden were recovered in Auke Creek, Steep Creek, and Auke Bay. A total of 1,561 of the 3,718 Auke Creek Dolly Varden outmigrants were tagged. These Dolly Varden were recovered in Cowee Creek, Montana Creek, McGinnis Creek, Mendenhall Lake, Steep Creek, Jordan Creek, Salmon Creek, Fish Creek, Peterson Creek (on Douglas Island), and in saltwater areas from False Pt. Arden to Echo Cove. Most of the outmigrants were either smolt or Dolly Varden that had spent 1 year in the ocean and had wintered in Auke Lake. There was a conspicuous shortage of the larger mature Dolly Varden which are necessary to rebuild the local stocks. Therefore, more conservative regulations should be considered.

The Auke Creek cutthroat outmigration numbered 227, including 77 hatchery-reared cutthroat. This demonstrated the success of the experimental cutthroat enhancement project.

KEY WORDS

Dolly Varden char, Salvelinus malma (Walbaum), cutthroat trout, Salmo clarki Richardson, migration, Auke Lake, Montana Creek, Juneau, Alaska.

BACKGROUND

Catch rates for Dolly Varden in the Juneau area (Figure 1) have continued to decline despite increasingly restrictive regulations (Table 1). In 1960, anglers reported harvesting Dolly Varden along the Juneau road system at the healthy rate of 1.2 Dolly Varden per hour of fishing (non-targeted effort) (Baade, 1961), but the catch rate had fallen to 0.08 by 1983 (Figure 2). It is most likely that the declining catch rates primarily reflect a decrease in the abundance of Dolly Varden; although several additional factors, including a shift in angling effort toward other species (notably, toward hatchery-enhanced runs of pink salmon) (Neimark, 1984a) and time area closures (Table 1), must also have had an adverse effect on catch rates.

Although the relative level of Dolly Varden abundance may be inferred from catch rates, obviously more rigorous data are obtained by directly counting the Dolly Varden in a system. Two systems were selected for Dolly Varden censuses; Montana Creek, a major producer of Dolly Varden, and Auke Lake, a major wintering area (Reed and Armstrong, 1971). Montana Creek was selected as a study site because the system has been closed to Dolly Varden fishing since 1980. Data collected there could be used to evaluate the utility of the regulatory closure. Auke Lake was chosen as a study site for several reasons: 1) like Montana Creek, the Auke Lake watershed is also closed to Dolly Varden fishing, 2) a weir, run by the National Marine Fisheries Service (NMFS), was already in operation at the mouth of Auke Creek, the outlet of stream of Auke Lake, and 3) data on Dolly Varden had been collected periodically at the weir since 1970.

Besides Dolly Varden, cutthroat trout were also enumerated at the Auke Creek weir to evaluate a cutthroat enhancement project. A total of 5,334 juvenile cutthroat reared in the NMFS Auke Creek hatchery were released in the Auke Lake system during 1983 (Neimark, 1984b).

Table 2 contains a list of the common names, scientific names, and abbreviations of the species mentioned in this report.

RECOMMENDATIONS

Management

1. Maintain existing time and area closures on Dolly Varden. Consider establishing a 12" maximum size limit on Dolly Varden if stocks do not show signs of recovery in 1984.
2. Post additional regulatory markers in areas closed to Dolly Varden fishing.

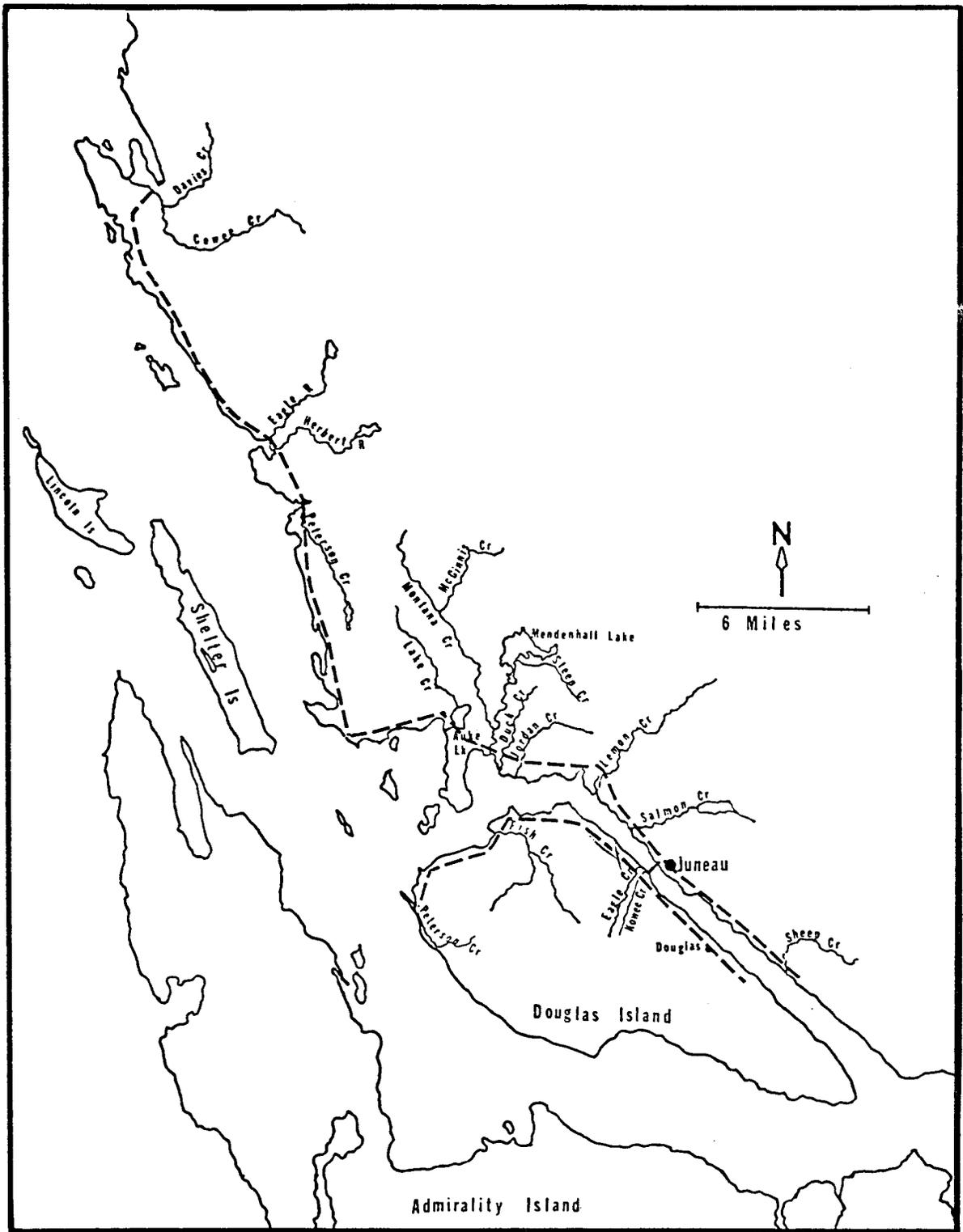


Figure 1. Map of the Juneau Area.

Table 1. Summary of the Changes in the Regulations Governing Dolly Varden Fishing in the Juneau Area.

	FRESHWATER			SALTWATER AREAS within ¼ mile of shore		SALTWATER AREAS beyond ¼ mile of shore	
	Bag Limit	Possession Limit	Area Closures ¹	Bag Limit	Possession Limit	Bag Limit	Possession Limit
Until 1968	20 ^{*2,3,4}	2 Bag limits	None	None	None	None	None
1969-1974	15 ^{*2,3}	2 Bag limits	None	None	None	None	None
1975-1977	10 ^{*5,6}	2 Bag limits	None	10 ^{*5,6}	2 Bag limits	10 ^{*5,6}	2 Bag limits
1978-1979	5 ^{*7}	1 Bag limit	None	5 ^{*7}	1 Bag limit	10 ^{*5,6}	2 Bag limits
1980-1981	2 ^{*8}	1 Bag limit	Montana Creek McGinnis Creek	2 ^{*9}	1 Bag limit	10 ^{*5}	1 Bag limit
1982	2 ^{*8}	1 Bag limit	Montana Creek McGinnis Creek	2 ^{*9}	1 Bag limit	10 ^{*2}	1 Bag limit
1983-1984	2	1 Bag limit	Montana Creek McGinnis Creek Auke Lake System Menhenhall Lake System	10 ^{*10}	1 Bag limit	10	1 Bag limit

* Footnotes on the next page.

Table 1 (cont'd). Footnotes

- *1. Areas closed year-round specifically to Dolly Varden fishing. This does not include areas that were closed to fishing in general.
- *2. Char, trout and grayling combined.
- *3. No more than three of the species could exceed 20 inches in length.
- *4. No more than 15 trout and grayling.
- *5. Char, trout, grayling and salmon (under 16 inches in length except chinook) combined.
- *6. No more than two of the char, trout or grayling species could exceed 20 inches.
- *7. Only two could exceed 12 inches in length.
- *8. Closed to Dolly Varden fishing from September 1 through May 30.
- *9. Closed to Dolly Varden fishing from April 1 through May 30.
- *10. Except at Auke Bay and Eagle River Beach where the bag and possession limits are two Dolly Varden, and fishing is closed in April and May.

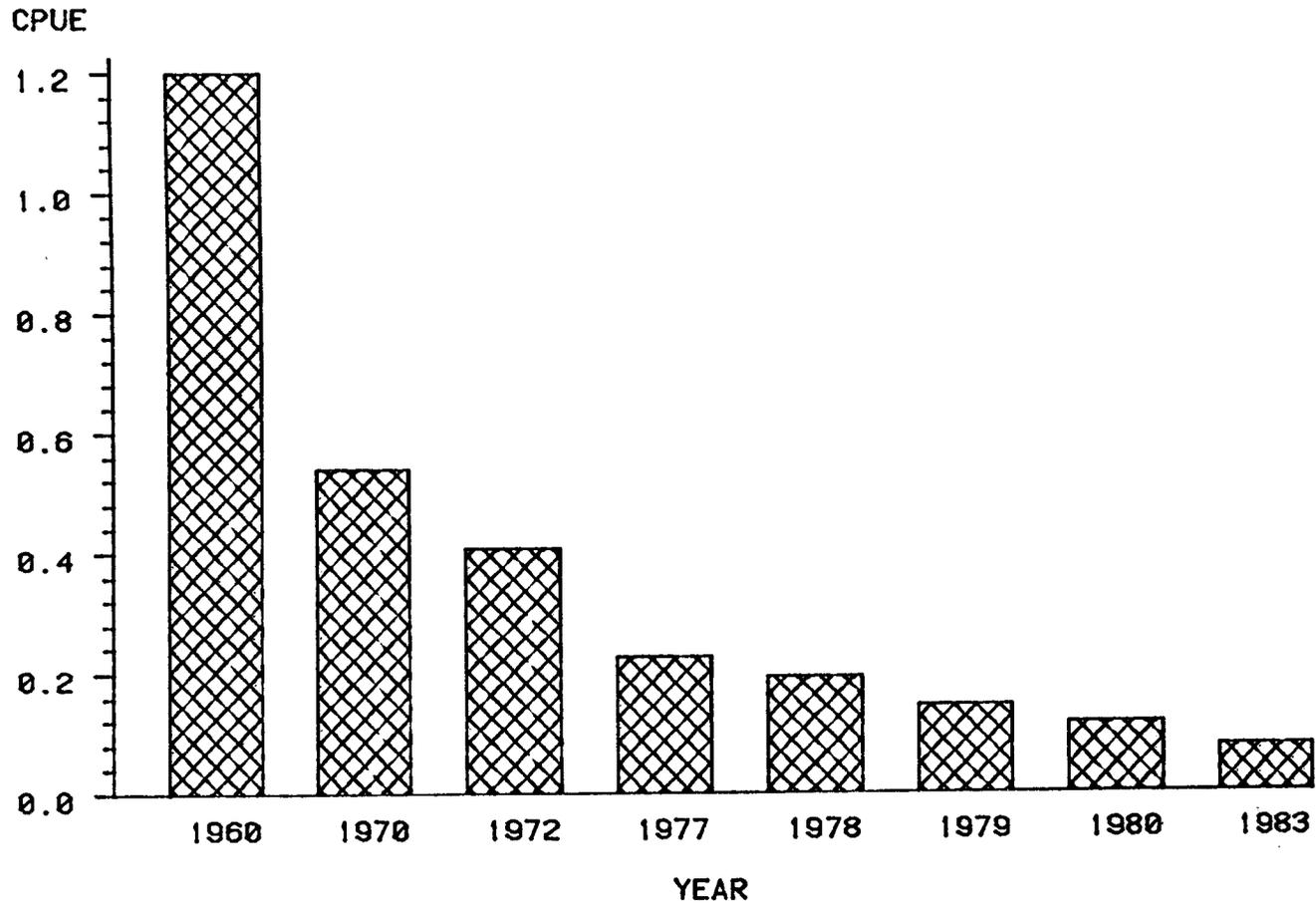


Figure 2. Catch Rates for Dolly Varden Harvested by the Juneau Roadside Sport Fishery, 1960-1983, (Dolly Varden Harvested per Hour of Non-Targeted Angling Effort).

Sources: Baade, 1961; Reed and Armstrong, 1971; Schmidt et. al. 1973; Robards, 1978; Marriot et. al. 1979; Schwan, 1980; 1981; Neimark, 1984a.

Table 2. List of Common Names, Scientific Names, and Abbreviations.

Common Name	Scientific Name and Author	Abbreviation
Cutthroat trout	<u>Salmo clarki</u> Richardson	CT
Dolly Varden char	<u>Salvelinus malma</u> (Walbaum)	DV
Pink Salmon	<u>Oncorhynchus gorbuscha</u> (Walbaum)	PS

3. Do not allow commercial fisheries on Dolly Varden stocks that contribute to the Juneau recreational fishery.

Research

1. Continue monitoring the size and number of Dolly Varden char and cutthroat trout emigrating from Auke Creek.
2. Examine the salinity tolerances of Dolly Varden immigrating into Auke Creek.
3. Stock existing hatchery-reared Dolly Varden in Auke Lake.
4. Discontinue future rearing Dolly Varden in favor of more desirable species such as cutthroat.

OBJECTIVES

1. Determine the number and run timing of the Dolly Varden char immigrating into and emigrating from Montana Creek.
2. Determine the length, weight, and sex (if possible) composition of the Dolly Varden char immigrating into Montana Creek.
3. Determine the number and run timing of the Dolly Varden char and cutthroat trout emigrating from Auke Lake.
4. Determine the length, weight, and sex (if possible) composition of the Dolly Varden char and cutthroat trout emigrating from Auke Lake.
5. Determine the number and run timing of the steelhead trout immigrating into Peterson Creek.
6. Determine the length, weight, sex and age composition of the Peterson Creek steelhead immigration.
7. Determine the effort and harvest by steelhead anglers fishing Peterson Creek during the spring of 1984.

TECHNIQUES USED

Montana Creek

A weir was constructed across Montana Creek approximately one quarter mile above the creek mouth. The design was very similar to one described by Armstrong (1965). Rock-filled wooden cribs held down a wooden platform. Screens made of five-eighths inch hardware cloth, placed between the cribs, prevented passage of fish. Fish moving downstream were captured in two "Wolf" traps. Upstream migrants were captured in 3

"v"-entrance traps. The weir was operated from April 28 until June 15, when it was destroyed by a flood. Following that, a variety of methods were used to capture Dolly Varden; including fish traps, a beach seine, an electroshocker, and sport gear.

Captured Dolly Varden were measured and those over 200 mm (fork length) were tagged with an orange colored, individually numbered, single-barbed dart tag described by Armstrong and Blackett (1966). The tags were inserted under the dorsal fin with a stainless-steel applicator. Dolly Varden less than 200 mm were not tagged because poor tag retention rates were expected for small Dolly Varden (Armstrong and Blackett, 1966).

It would be relatively easy to estimate the Dolly population size from the capture ratio of tagged and untagged Dolly Varden if Montana Creek was a closed system. However, since Dolly immigration and emigration occurred, it will be necessary to use more complicated statistical procedures, best performed on a computer. An estimate of the population will be made following installation of POPAN-2 (Arnason and Baniuk, 1978; 1980) on the state computer. POPAN-2 is the state-of-the-art software package for analyzing capture-recapture data from open populations (White et. al, 1982).

To minimize handling stress, Dolly Varden were not weighed. Since no Dolly Varden were dissected, their sexes could not be determined unless they were ready to spawn.

Coho smolt collected while the weir was in operation were tagged with coded-wire tags. Smolt were grouped by size and each group was marked with a separate tag code in an attempt to examine differences in the survival of the size groups to the adult spawning stage.

Auke Creek

The Auke Creek weir was installed on March 11 by NMFS personnel. It was arranged to capture all sizes of fish moving downstream, from pink salmon fry to large Dolly Varden. On June 24, several days after the downstream migration of fish had ended, the weir structure was rearranged to capture salmon moving upstream. It remained in place until November 9 (Taylor, 1983).

The weir was not very effective in capturing Dolly Varden and trout moving upstream. Fish traps placed behind the weir were used to capture a sample of these fish which might otherwise have squeezed through the weir undetected. Initially, Dolly Varden captured in these traps were tagged, but this was discontinued when a large number of these fish were found dead against the weir and it was believed that their deaths were caused by handling stress. Yet when tagging was discontinued and Dolly Varden, in the early stage of the run, were still dying, it was hypothesized that salinity may have been a factor. Dolly Varden entering Auke Creek may not have completely adjusted physiologically to the freshwater, but they may have been unable to easily return to saltwater because of the weir. Lab experiments are needed to test this hypothesis.

If this proves to be the case, it may be necessary to pass Dolly Varden back downstream through the weir for a period in late June and early July.

Dolly Varden over 200 mm in length were tagged with yellow colored dart tags. One trial attempt was made to tag Dolly smolt with Floy fingerling tags (a product of the Floy Tag and Manufacturing Company, Seattle, Washington); however, these tags were very cumbersome, so their use was discontinued after only 20 smolt were tagged.

Peterson Creek

There was no work done on the Peterson Creek steelhead or steelhead fishery. Instead, steelhead studies were performed by Jones (1984) on the Karta River, Prince of Wales Island.

FINDINGS

Results

Montana Creek:

Coho. The weir traps did not capture very many coho smolt. Most of them probably passed the weir during periods of high water when the screens were removed. Also, some of the smaller smolt may have squeezed through the screen mesh. A total of 174 coho were tagged. This included 38 in the 80-100 mm size range (mean fork length=89 mm, tag code=41-21-53, release date=5/26/83) and 136 in the 100-200 mm size range (mean fork length=107 mm, tag code=04-21-52, release date=6/3/83). There were no tag recoveries. These coho would not have attained a harvestable size in 1983.

Dolly Varden. During its operation (April 28 to June 15), 1,250 Dolly Varden were captured and measured at the Montana Creek weir. This was only a sample of the outmigration since occasionally the weir screens were removed during periods of high water. Almost all of the captured Dolly Varden were smolt less than 200 mm in length (mean fork length=161 mm, SD=72 mm, range=88-473 mm). The peak of the outmigration occurred in mid-May (Table 3). After the weir washed out, an additional 1,665 Dolly Varden were captured and measured (mean fork length=323 mm, SD=56, range=140-508 mm). For the whole season, the mean length of captured Dolly Varden was 254 mm (n=2,915, SD=102 mm, range=88-508 mm). Larger Dolly Varden were captured in summer and fall as mature spawning fish entered the system (Figure 3). A total of 1,828 Dolly Varden were dart tagged. The areas where these tags were recovered by anglers or observed during coho escapement surveys are shown in Figure 4.

Auke Creek:

Dolly Varden. A total of 3,718 Dolly Varden were counted at the Auke Creek weir. The outmigration began on April 1, peaked in early May (71% of the run occurred between April 30 and May 15), and ended on June 9

Table 3. Char and Trout Captured in the Montana Creek Weir,
April 28-June 15, 1983.

Date*	Dolly Varden	Cutthroat	Steelhead	Rainbow
4/28	3	0	0	0
5/02	3	2	1	0
5/05	9	2	0	0
5/06	2	1	0	0
5/07	1	0	0	0
5/08	19	2	0	0
5/09	4	0	1	0
5/10	67	7	0	1
5/11	13	1	0	0
5/12	5	1	0	0
5/13	43	0	0	0
5/14	205	5	0	3
5/15	76	5	0	0
5/16	0	5	0	0
5/17	195	11	0	1
5/18	120	5	0	1
5/24	39	3	0	0
5/26	4	1	0	0
5/27	71	12	0	0
5/31	0	0	0	1
6/01	68	2	0	1
6/02	84	7	0	5
6/03	22	6	0	5
6/04	4	4	0	6
6/05	1	0	0	7
6/06	12	3	0	7
6/07	13	8	0	3
6/08	14	8	0	4
6/09	23	4	0	5
6/10	25	1	0	1
6/11	22	1	0	3
6/12	22	1	0	0
6/13	10	0	0	0
6/14	21	2	0	1
6/15	27	0	0	0
Total	1,247	110	2	55

* There were no captures of these species on the dates that are not listed.

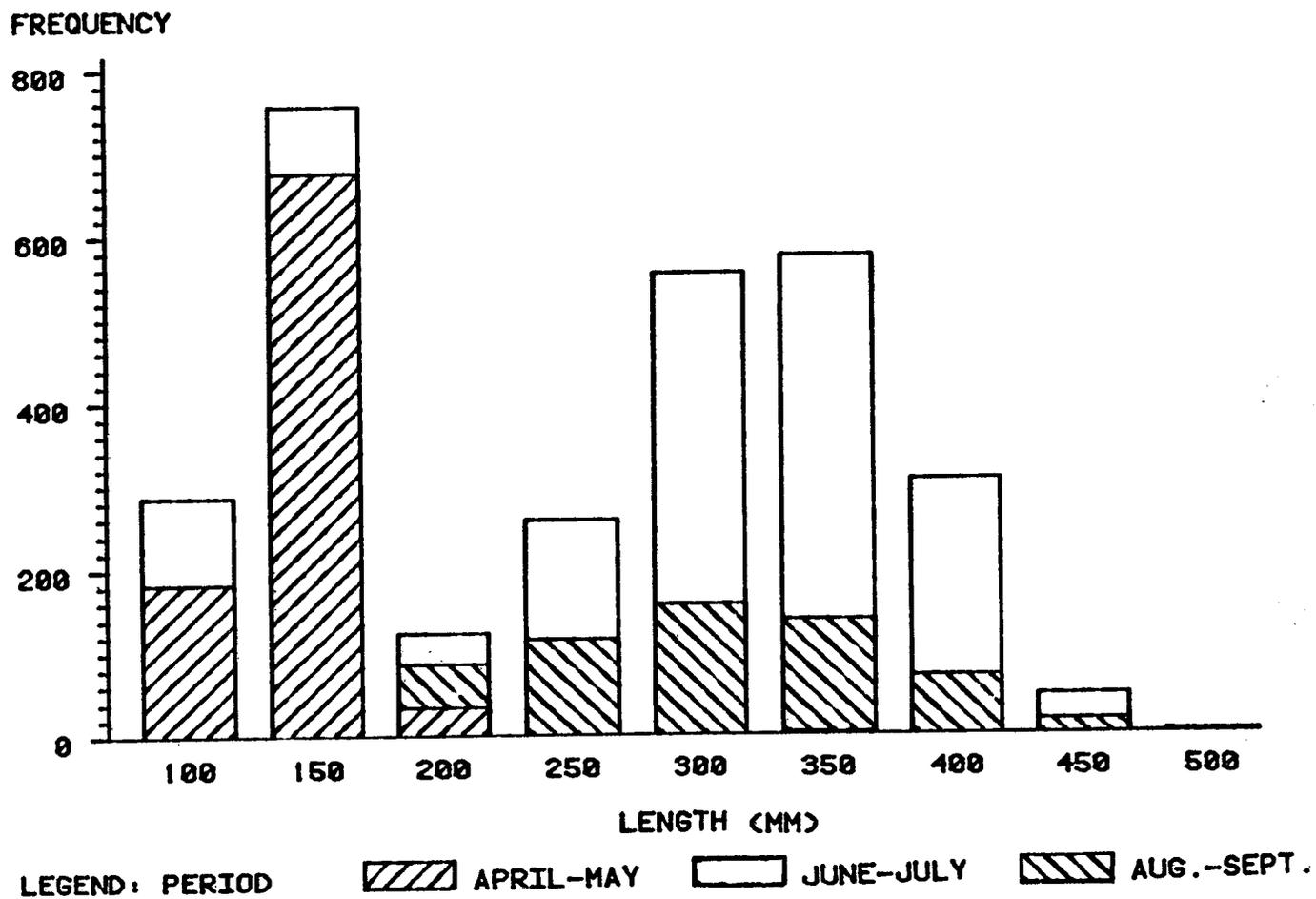


Figure 3. Length-Frequency Distribution of Dolly Varden Captured in Montana Creek, 1983.

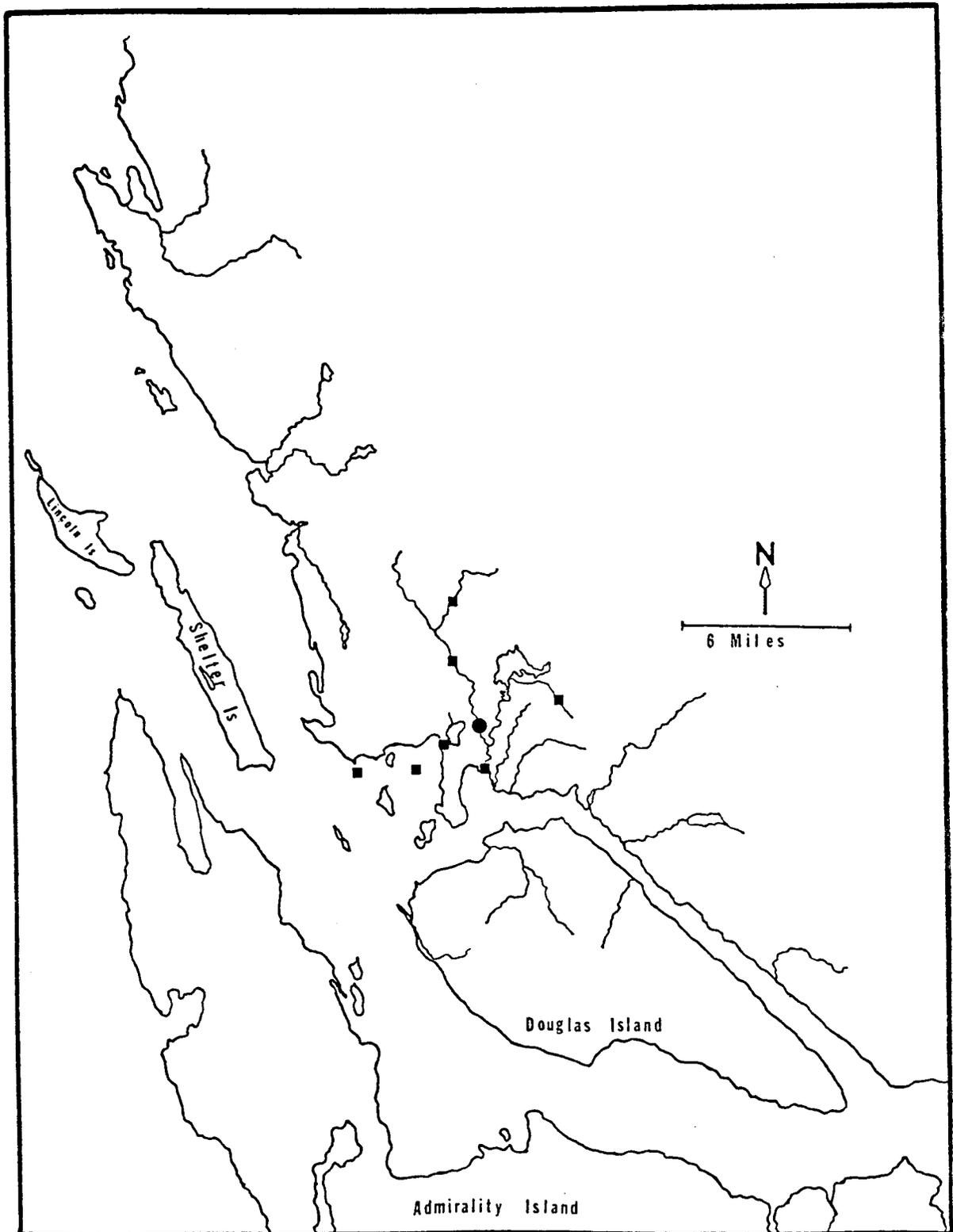


Figure 4. Recovery Sites (■) of Dolly Varden Tagged in Montana Creek (●), 1983.

(Table 4). Most of the Dolly Varden ($n=2,629$) were measured (Figure 5) and 1,561 were tagged. These tags were recovered or observed in a greater number of locations than the Montana Creek tags (Figure 6).

Cutthroat. The Auke Creek cutthroat outmigration began on April 6 and ended April 21 (Table 4). During that period, 227 cutthroat left Auke Creek. This number included 77 hatchery-reared cutthroat planted in Auke Creek on April 26, 1983 (Taylor, 1983). A sample of the outmigrants were measured. Most of the outmigrants under 200 mm were hatchery-reared (Figure 7). The wild fish averaged 243 mm (mean fork length, $n=76$, $SD=44$ mm, range=60-330 mm), while the hatchery fish averaged only 171 mm ($n=8$, $SD=11$ mm, range=155-190 mm).

DISCUSSION

Dolly Varden:

Two factors indicate the depressed state of the local Dolly Varden stocks: 1) the consistent decline in the catch rate (Figure 2) and 2) the conspicuous shortage of large (>300 mm) Dolly Varden in the Auke Creek out-migration (Figure 5). The shape of the 1983 length-frequency distribution is compared to available data from past years in Figure 8. While the abundance of smaller size classes appeared about average, the abundance of larger size classes reached a low level, markedly below the 1970 level (Figure 9). Even in 1970, when fishing pressure was much lower than in 1983 (Neimark, 1984a), the abundance of larger Dolly Varden may have been somewhat depressed below the level of a natural unharvested population. For example, Armstrong (1974) found that Hood Bay Creek (Admiralty Island), which is relatively free from fishing pressure, had a high percentage of Dolly Varden in the 300-500 mm size range (Figure 10).

This lack of large Dolly Varden in the local Juneau systems is a critical problem because these are the Dolly Varden than anglers desire (Figure 11) and they are also the mature fish required to maintain the population. Heiser (1966) conducted a study of the age and growth of Dolly Varden in Eva Creek (Baranof Island). The mean lengths of the age classes he observed are shown in Figure 12 superimposed upon the length-frequency distribution of the 1983 Auke Creek Dolly Varden outmigration. The first peak (at about 140 mm) represents the smolt production, mostly 3-year-old fish. The second and highest peak represents the abundance of 4-year-old fish. These Dolly Varden spent one season in the ocean, resulting in their large growth increment. The abundance of this size and age class exceeds the smolt production because it includes Dolly Varden that were reared in other systems but wintered in Auke Lake. This pattern of movement, of Dolly Varden reared in non-lake systems entering a lake system after their initial seaward migration, was previously documented in Auke Lake (Reed and Armstrong, 1971) and in Eva Lake (Armstrong, 1965). Dolly Varden mature at age 5 or age 6 (Heiser, 1966) and it may be the mortality after first-spawning that greatly reduces the size of these age classes. The larger classes are probably cropped by fishing pressure. It is the larger size classes that are selectively harvested in the sport fishery (Figure 11). These

Table 4. Daily Counts of Downstream Migrant Cutthroat Trout and Dolly Varden Char, Auke Creek, 1983 (Taylor, 1983).

Auke Creek Downstream Migrants 1983

Date	Cutthroat Trout	Dolly Varden	Date	Cutthroat Trout	Dolly Varden
04/01	0	1	05/13	13	255
04/02	0	2	05/14	5	143
04/03	0	2	05/15	12	93
04/04	0	0	05/16	0	0
04/05	0	21	05/17	1	11
04/06	1	33	05/18	10	55
04/07	0	14	05/19	6	48
04/08	0	12	05/20	9	175
04/09	0	7	05/21	1	2
04/10	0	5	05/22	4	18
04/11	0	8	05/23	1	6
04/12	0	3	05/24	3	32
04/13	0	0	05/25	2	6
04/14	0	7	05/26	0	19
04/15	0	27	05/27	5	22
04/16	5	61	05/28	1	4
04/17	0	0	05/29	3	7
04/18	0	0	05/30	2	6
04/19	1	17	05/31	0	4
04/20	0	26	06/01	2	3
04/21	0	2	06/02	0	2
04/22	1	8	06/03	11	2
04/23	0	30	06/04	5	0
04/24	0	21	06/05	4	0
04/25	2	57	06/06	3	0
04/26	4	94	06/07	0	0
04/27	4	29	06/08	4	1
04/28	2	58	06/09	5	1
04/29	9	92	06/10	4	0
04/30	3	257	06/11	13	0
05/01	0	17	06/12	2	0
05/02	1	99	06/13	0	0
05/03	2	337	06/14	4	0
05/04	5	207	06/15	1	0
05/05	3	35	06/16	25	0
05/06	3	199	06/17	1	0
05/07	0	240	06/18	1	0
05/08	2	24	06/19	1	0
05/09	1	85	06/20	0	0
05/10	1	245	06/21	1	0
05/11	5	204	06/22	0	0
05/12	7	217			

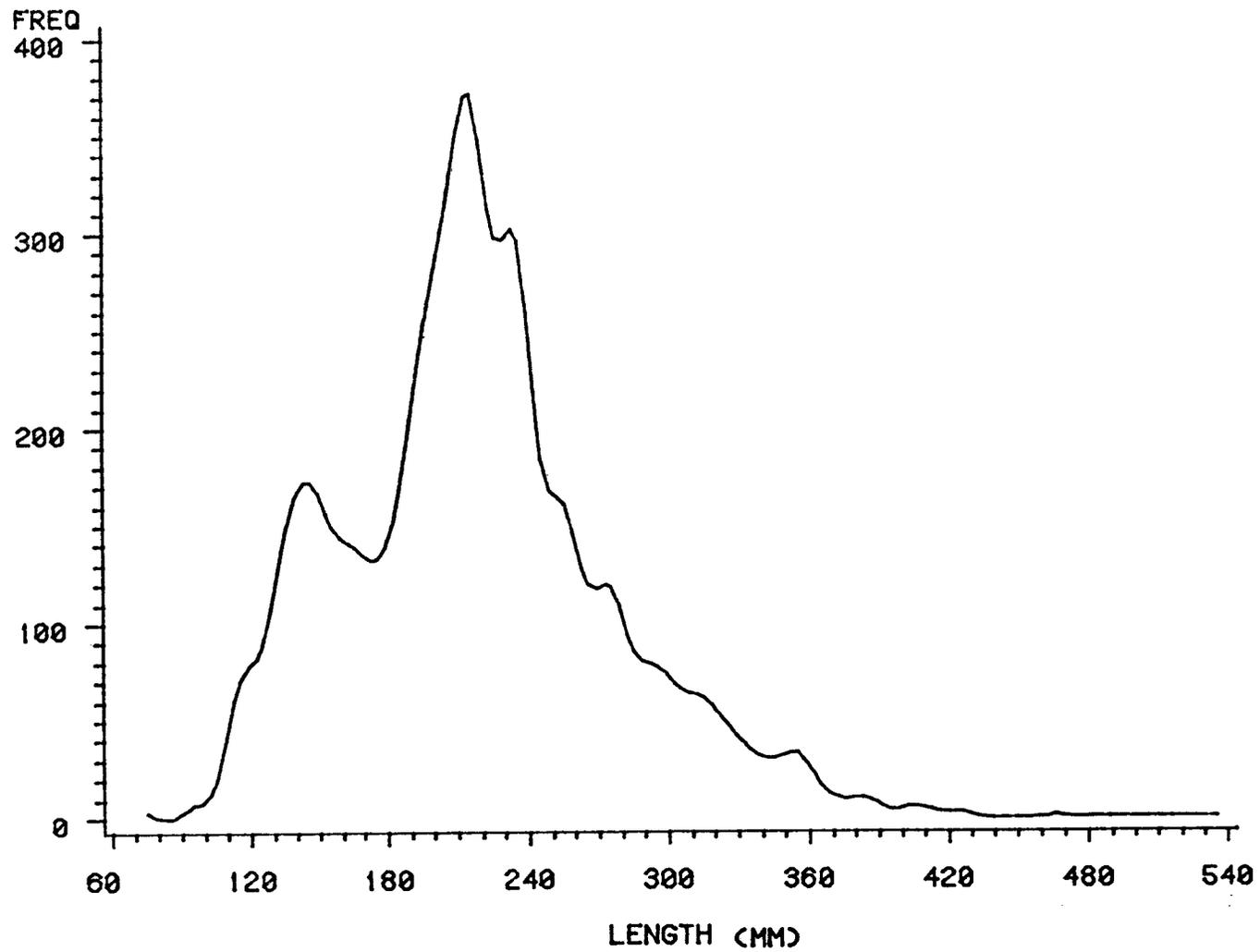


Figure 5. Length-Frequency Distribution of Outmigrant Auke Creek Dolly Varden, 1983. (The data were plotted as a continuous curve for comparison purposes. Refer to Figure 8).

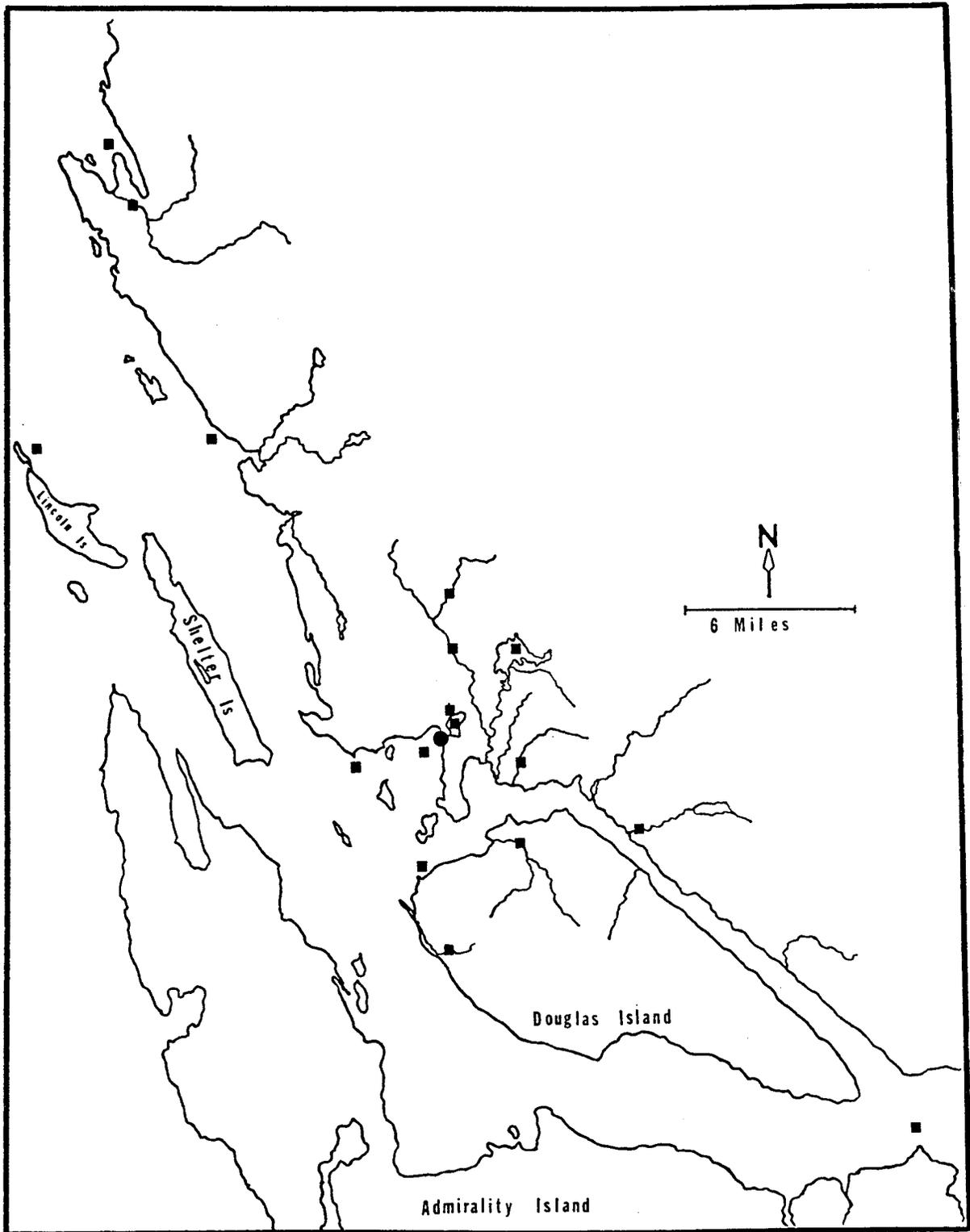


Figure 6. Recovery Sites (■) of Dolly Varden Tagged in Auke Creek (●), 1983.

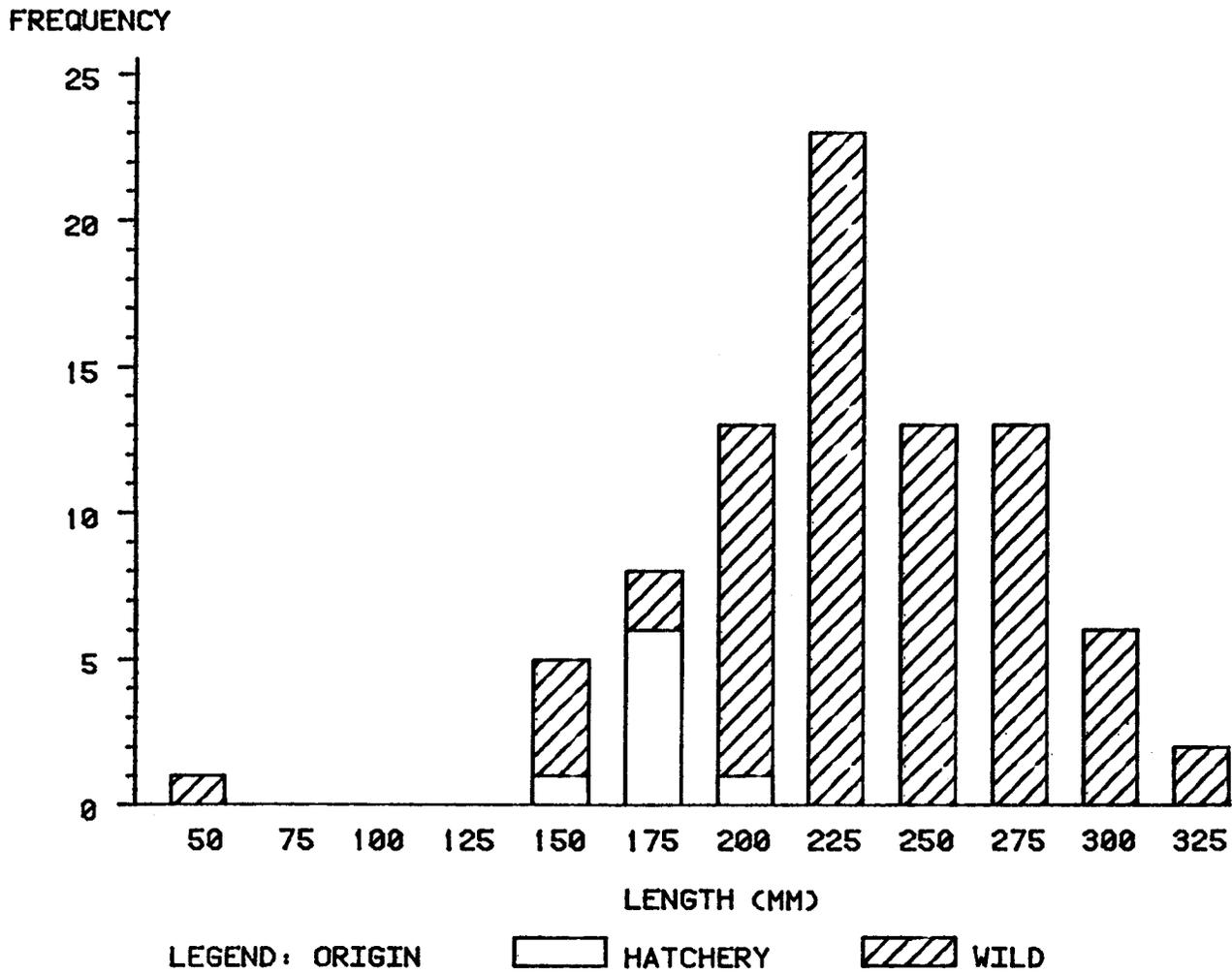


Figure 7. Length-Frequency Distribution of a Sample of Wild and Hatchery-Reared Outmigrant Auke Creek Cutthroat Trout, 1983.

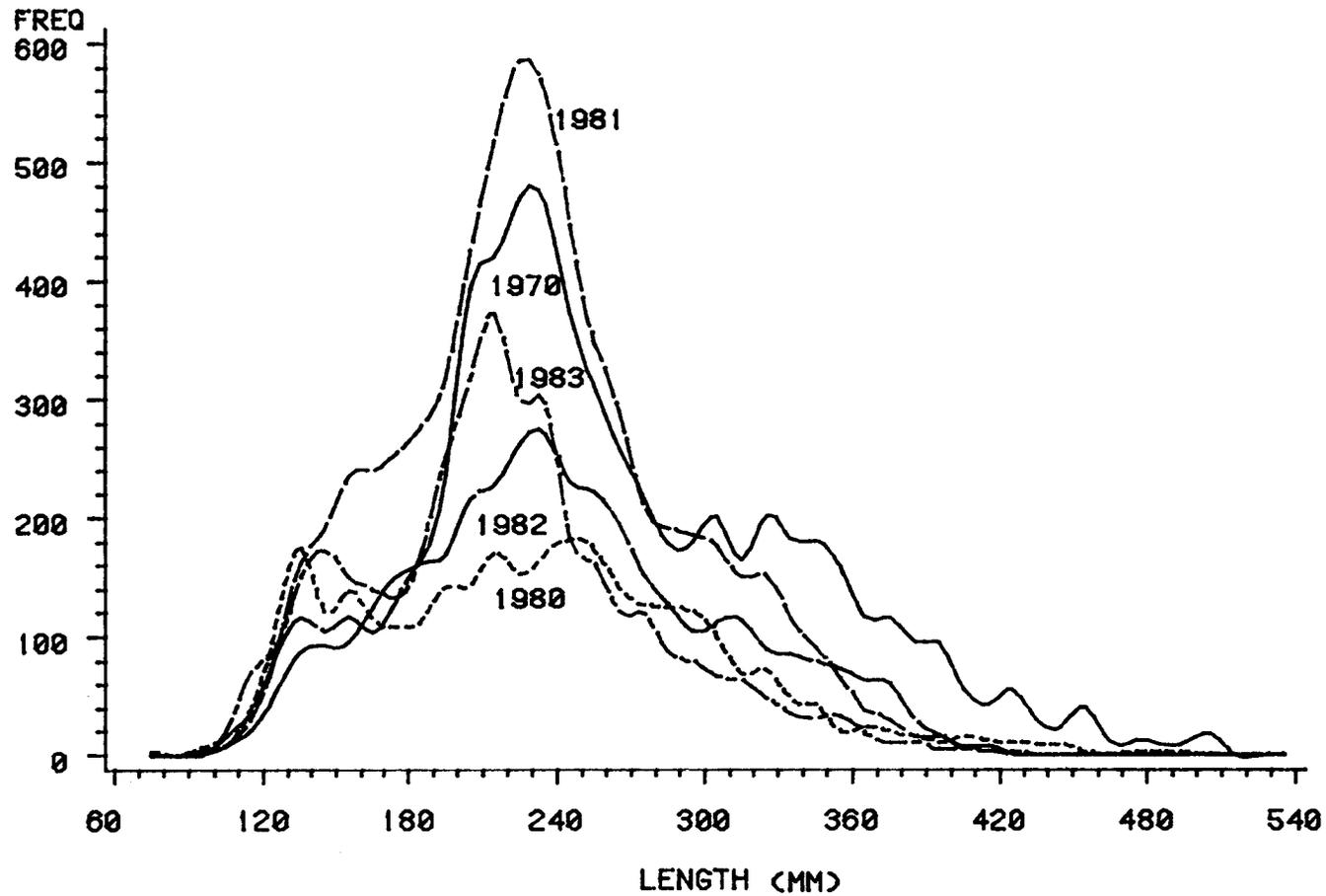


Figure 8. Length-Frequency Distribution of Outmigrant Auke Creek Dolly Varden, 1970-1983.

Sources: Reed and Armstrong, 1971; Unpublished Data, ADF&G Files, 1980; 1981; 1982.

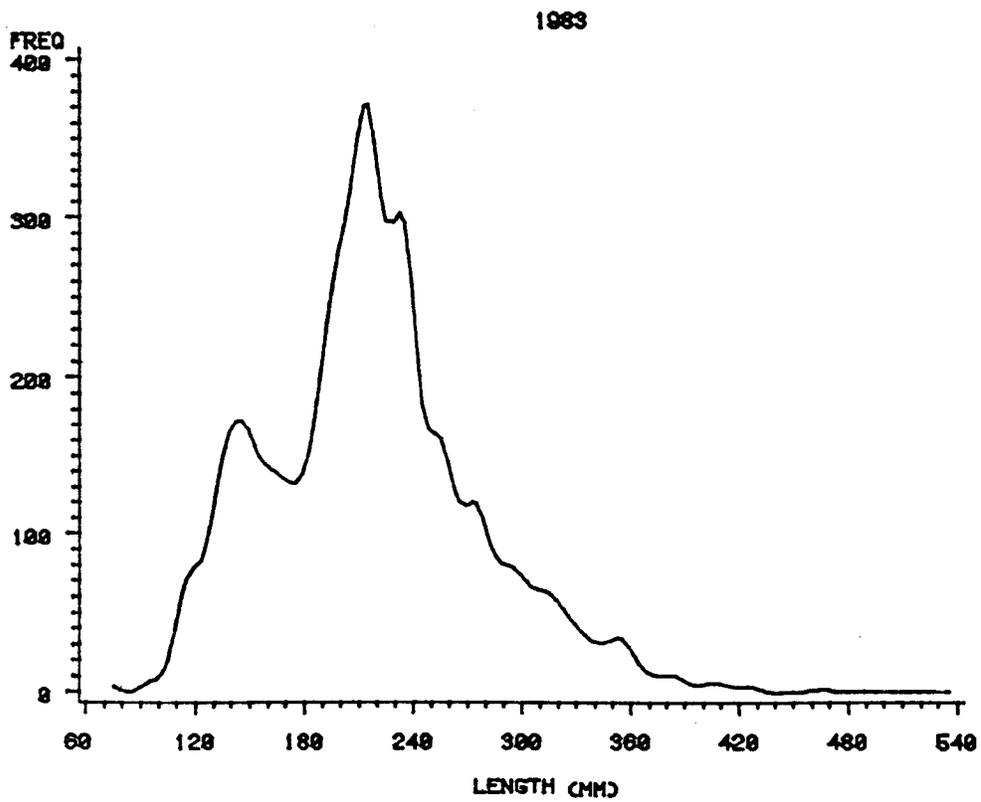
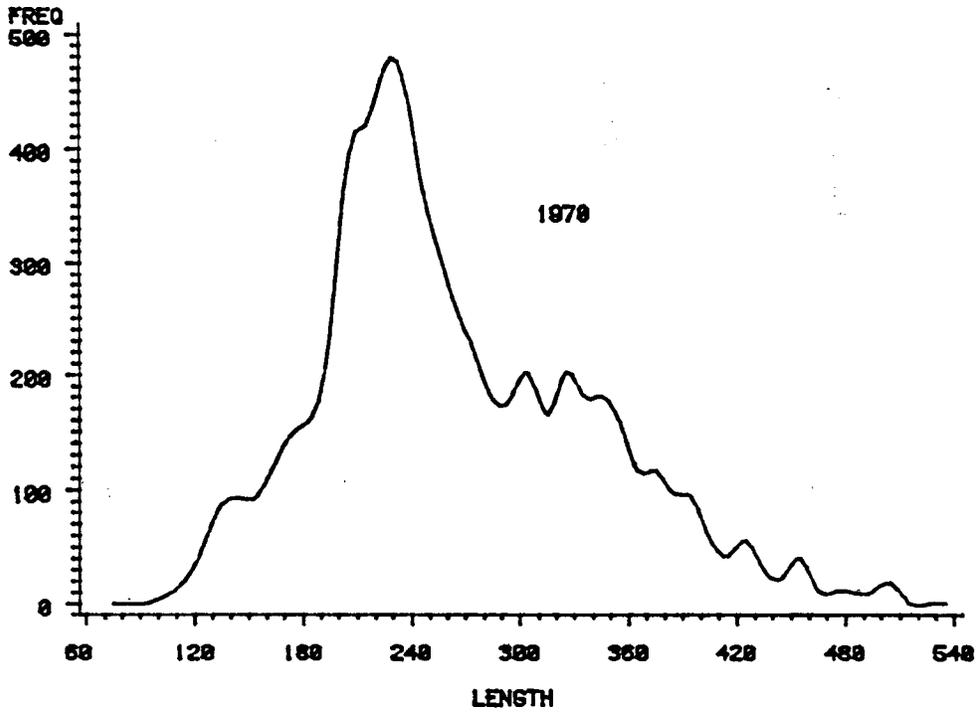


Figure 9. Comparison of the Length-Frequency Distributions of Outmigrant Auke Creek Dolly Varden, 1970 and 1983.

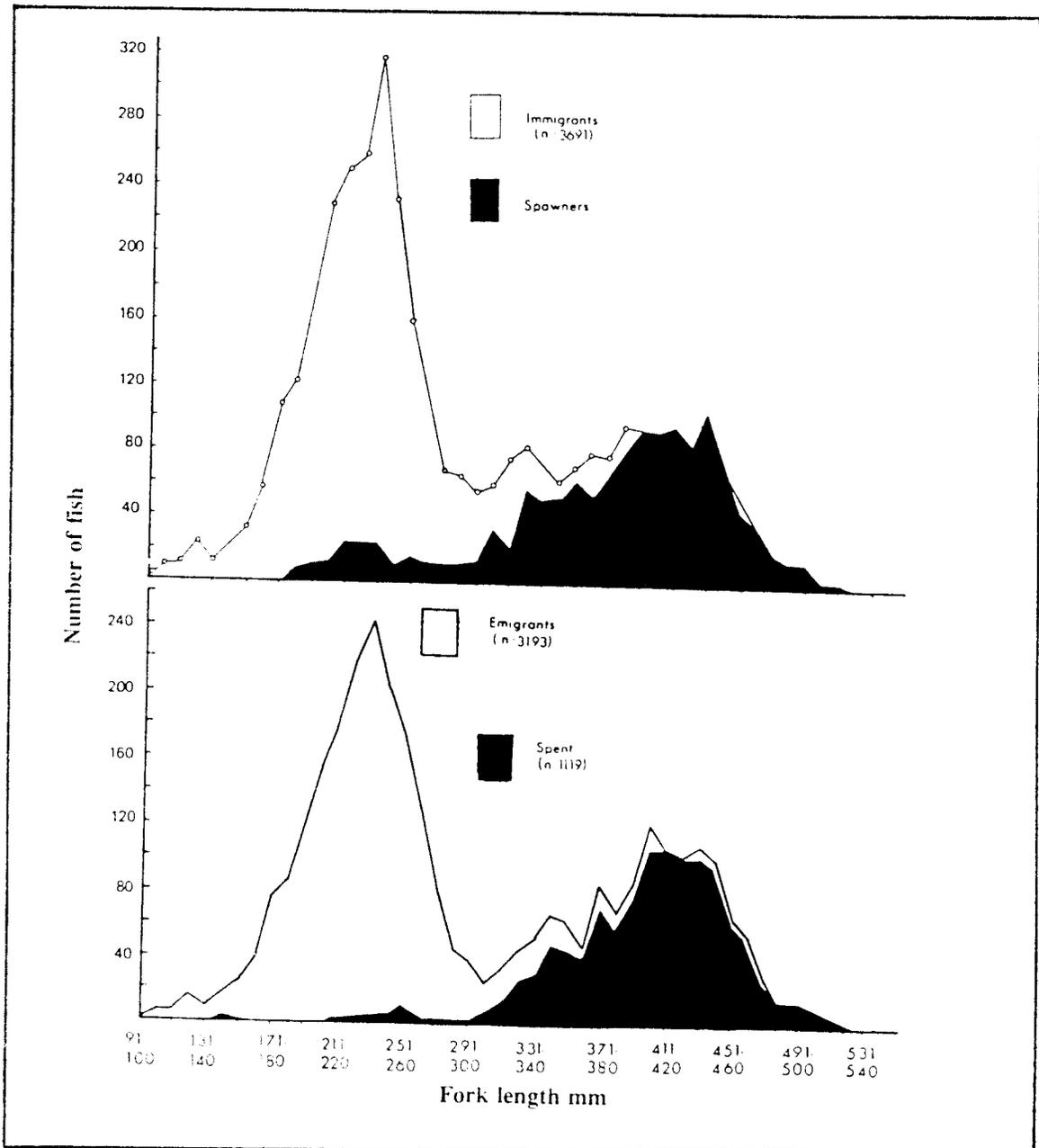


Figure 10. Length-Frequency Distributions of Dolly Varden Char Passing the Hood Bay Creek Weir, July to November, 1967.

The numbers of immigrant spawners are estimates from a sample of immigrants (338 fish) and those of emigrant spawners are counts of spent fish.

Source: Armstrong, 1974.

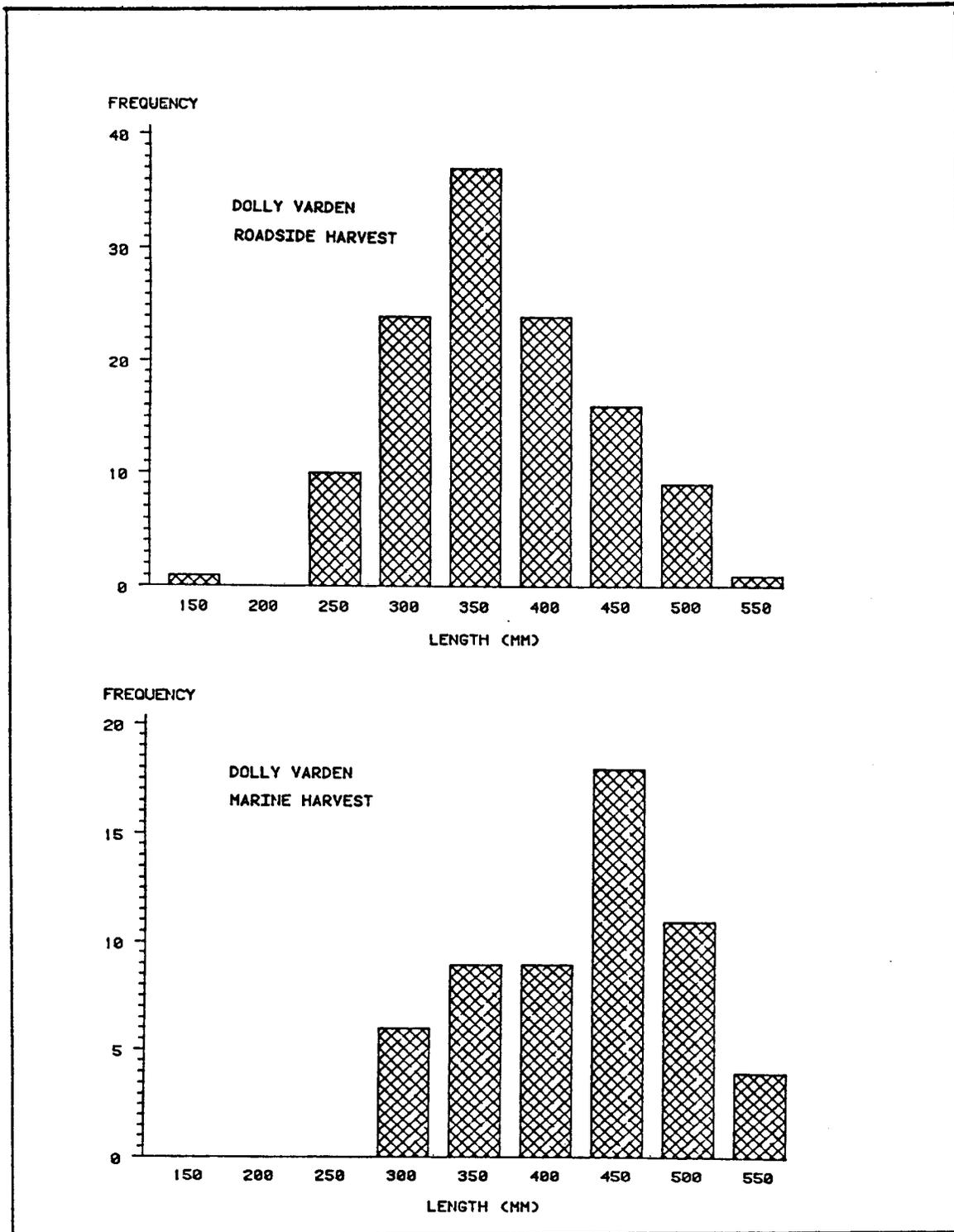


Figure 11. Length-Frequency Distributions of Dolly Varden Harvested in the Juneau Roadside and Marine Sport Fisheries, 1983.

Sources: Neimark, 1984a; 1984c.

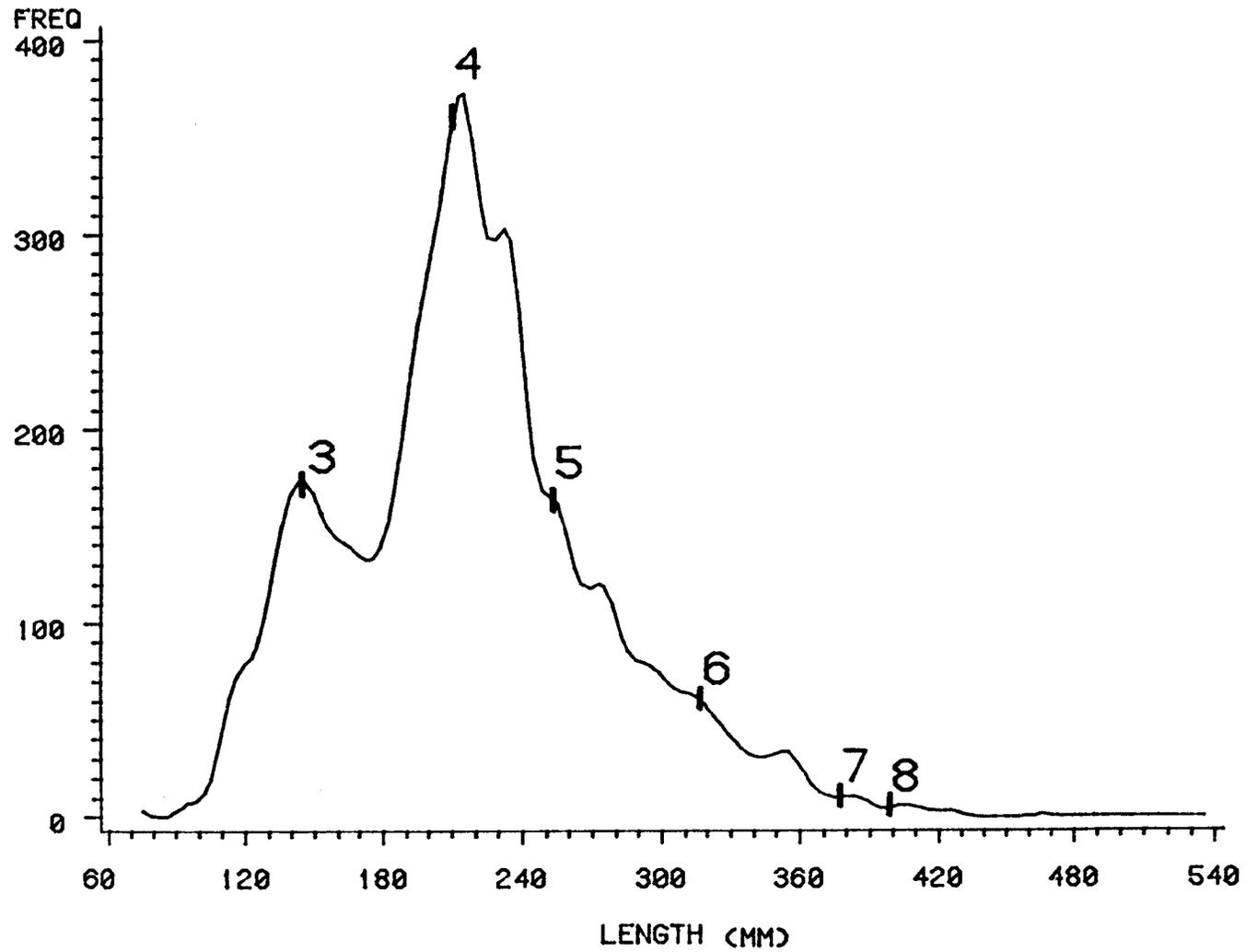


Figure 12. Length-Frequency Distribution and Approximate Age of Outmigrant Auke Creek Dolly Varden, 1983.

classes might also be harvested, incidentally, by the subsistence and commercial herring fisheries and by other commercial fisheries. This is unfortunate, because these fish would have had the greatest potential for rebuilding the stocks, since fecundity increases with the size of the fish (Blackett, 1968).

The closure of Montana Creek and Auke Creek protects Dolly Varden in those systems, but this may not be sufficient to improve Dolly Varden fishing, in general, since these systems are not major contributors to the Dolly Varden recreational fisheries. None of the 102 Dolly Varden examined during 1983 creel surveys of marine-boat anglers had been tagged (Neimark, 1984c); and only one of the 160 Dolly Varden examined during creel surveys of roadside anglers bore a tag - a yellow dart tag from Auke Creek (Neimark, 1984a). Nor were many tagged Dolly Varden observed in local systems during coho escapement surveys (Table 5).

Admittedly, because Auke Creek and Montana Creek were closed, they could not contribute directly to the roadside fishery. However, even when the Auke Creek watershed was open, its contribution was minor. In 1970, the contribution of Auke Creek Dolly Varden to the roadside fishery was only 5% (Reed and Armstrong, 1971); and in 1980, when the entire out-migration was marked with left ventral fin clips, none were observed in the creels of roadside anglers (Schwan, pers. com., 1984).

Therefore, while the value of the Auke Creek and Montana Creek watersheds as wintering and spawning areas is not disputed, a more comprehensive approach to Dolly Varden management is warranted. One option would be a 12 inch maximum size limit on Dolly Varden in all roadside systems to protect spawners.

A second option, hatchery enhancement, would not be recommended at this time since Dolly Varden would displace more desirable sport species from the currently limited hatchery facilities. However, 1,900 Dolly Varden have been raised to smolt size at the Snettisham hatchery. They are currently scheduled to be stocked in the Glacier and Moraine Lakes. This could provide an alternate opportunity for Dolly Varden anglers, but since this area receives little angler use (Neimark, 1984a), a better plan would be to stock these fish in an area where they could supplement local runs. For example, if these Dolly Varden were placed in Auke Lake, this could substantially increase the outmigration. The results of this enhancement effort could be easily monitored at the weir.

The proposed commercial harvest of Dolly Varden in northern Lynn Canal should not be allowed since it is likely that many of the Dolly Varden that are harvested in the Juneau area may originate in northern systems, including the Berners, Taku, Chilkat, and Chilkoot Rivers. Armstrong (1965) found that Eva Creek stocks ranged over 70 miles. Any additional pressure on stocks that frequent the Juneau area must be discouraged.

Cutthroat:

Cutthroat are less abundant than Dolly Varden and more desired by anglers (Schwan, 1984). The fact that they are uncommon may even enhance their

Table 5. The Numbers of Tagged and Untagged Dolly Varden Char Observed in Juneau Streams During Coho Salmon Escapement Surveys, 1983.

	Dates	Un-Tagged	Yellow-Tagged	Orange-Tagged*	Total
Cowee/Davies Cr.	10/13	0	0	0	0
Duck Creek	10/14	23	0	0	23
Fish Creek	10/07	0	0	0	0
Johnson Creek	10/07	13	0	0	13
	10/21	8	0	0	8
Jordan Creek	10/13	164	1	0	165
	10/22	41	0	0	41
	10/31	182	0	0	182
Mendenhall Ponds	10/19	2	0	0	2
Montana/ McGinnis Creek	10/10	374	0	31	405
Outer Point	10/05	275	0	0	275
	10/17	491	1	0	492
Peterson Creek	10/06	15	0	0	15
	10/28	10	0	0	10
Salmon Creek	10/04	34	0	0	34
	10/15	36	0	0	36
Steep Creek	07/26	151	0	4	155
	10/06	45	0	0	45
	10/19	59	0	2	61
	10/21	82	0	1	83
	10/31	3	0	0	3
Switzer Creek	10/06	204	0	0	204
	10/26	39	0	0	39
	11/07	400	0	0	400
Vanderbilt Creek	10/16	43	0	0	43
	11/15	1	0	0	1
Windfall Lake	10/11	10	0	0	10
	11/01	19	0	0	19
Total		2,724	2	38	2,764

* Yellow-tagged Dolly Varden were originally tagged in Auke Creek and orange-tagged Dolly Varden were tagged in Montana Creek during spring and summer, 1983.

popularity. The bag limit on cutthroat (1 per day-16 inches or over, 4 per day-under 16 inches; in combination with rainbow and steelhead trout) is typically non-restrictive because so few cutthroat are caught in the Juneau area; but there is no indication that their numbers are declining. In 1970 only 88 cutthroat were counted through the weir (size range = 230-530 mm; Reed and Armstrong, 1971). One of the goals of the Juneau roadside enhancement project was to bolster local cutthroat stocks (Neimark, 1984b). The fact that a third of the total Auke Creek outmigration (and almost all of the smolt production) were hatchery-reared demonstrates the potential of that project.

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