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Coho Smolt Coded-wire Tagging and Enumeration (1971 to 1973 Broods) on Three Small Tributaries in the Squamish River System

by
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Data Record Series PAC/D-77-11

Field Operations Directorate
Pacific Region

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ABSTRACT

During April and May, 1973 coho salmon smolts (Oncorhynchus kisutch) were enumerated on Meighn Creek, a tributary of the lower Squamish River and on Tenderfoot Creek, a tributary of the lower Cheakamus River, to determine whether sufficient numbers of smolts could be captured for a binary coded-wire tagging program to assess ocean migration patterns and fishery contributions. Catches from the two study streams totalled 17,679 in 1973.

In 1974 and 1975, trapping and tagging programs were conducted from mid April to early June on the previously mentioned Squamish River system tributaries, and on the Little Stawamus River, a tributary of the Stawamus River which enters the Squamish estuary via Mamquam Blind Channel. A total of 17,849 coho smolts were tagged and released in 1974, and a total of 17,678 coho smolts were tagged and released in 1975. Over the two year period 13,186 tagged coho smolts were released from the Little Stawamus River, 8,327 were tagged and released from Meighn Creek and 14,014 were tagged and released from Tenderfoot Creek. Small numbers of steelhead trout smolts (Salmo gairdneri) from each tributary were tagged with coho tag codes - 52 in 1974 and 102 in 1975.

Biological characteristics were documented for all downstream migrations. The coho smolt migration peaked near May 11 each year in the three tributaries. The steelhead smolt migration peaked approximately two weeks earlier. Numbers of coho smolt migrants from each tributary varied considerably between years. Minimum numbers of coho smolt migrants per accessible stream mile averaged 2,506 for Little Stawamus River and Meighn Creek. Tenderfoot Creek coho smolts were largest in 1974 and 1975, averaging approximately 89 mm fork length at time of migration. Average age composition of smolt migrants was roughly 92% age 1. and 8% age 2.

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INTRODUCTION

This report describes results from a coded-wire tagging program on Squamish River system coho salmon (Oncorhynchus kisutch) smolts. Choice of this river system for a wild stock tagging project was due, in large measure, to the combination of industrial and urban development pressure on freshwater and estuarine coho salmon habitat in the Squamish valley, and heavy ocean exploitation of Squamish coho salmon.

Large scale expansion of deep sea port facilities has been proposed for the Squamish River estuary (Anon., 1972). Streamside urban development has resulted in considerable dyking and channelization on the mainstem and on some tributaries of the Squamish and Cheakamus Rivers (Marshall et al., 1976 MS). Much of the Squamish River system watershed has been logged and logging remains a major industry in the Squamish valley. In addition, much of the eastern portion of the estuary (Mamquam Channel) has been altered or eliminated by dredging, log booming and land fill operations (Anon., 1972). Clearly, these activities conflict to varying degrees with freshwater production of juvenile coho salmon. Fishery recoveries of coded-wire-tagged coho will provide important baseline data for assessing impacts from these kinds of freshwater habitat alteration.

Recent improvements in saltwater fishing technology by the commercial and recreational salmon fleets, and a new appreciation of the magnitude of the Georgia Strait saltwater sport catch (Argue, Coursley and Harris, 1977; Anon., 1977), reinforced the need for accurate management data on ocean distribution, run timing and catch levels for Squamish River system coho. A coded-wire tagging (CWT) program was the only practical approach to obtain this information.

In the spring of 1973, a pilot downstream enumeration was conducted on Meighn Creek, a tributary of the lower Squamish River, and on Tenderfoot Creek, a tributary of the lower Cheakamus River, to assess the feasibility of obtaining sufficient coho smolt numbers for a CWT program. In the spring of 1974 and 1975, CWTs were applied to 1972 and 1973 brood coho smolt migrants from the above mentioned small streams as well as to coho smolts from the Little Stawamus River, a tributary of the Stawamus River which flows into the Squamish estuary through Mamquam Blind Channel (Figure 1).

This report details numbers tagged as well as general biological characteristics of the downstream migrants (abundance, minimum density, timing, age and size) for each study stream. Trapping and tagging methods were similar to those reported by Armstrong and Argue (1977).

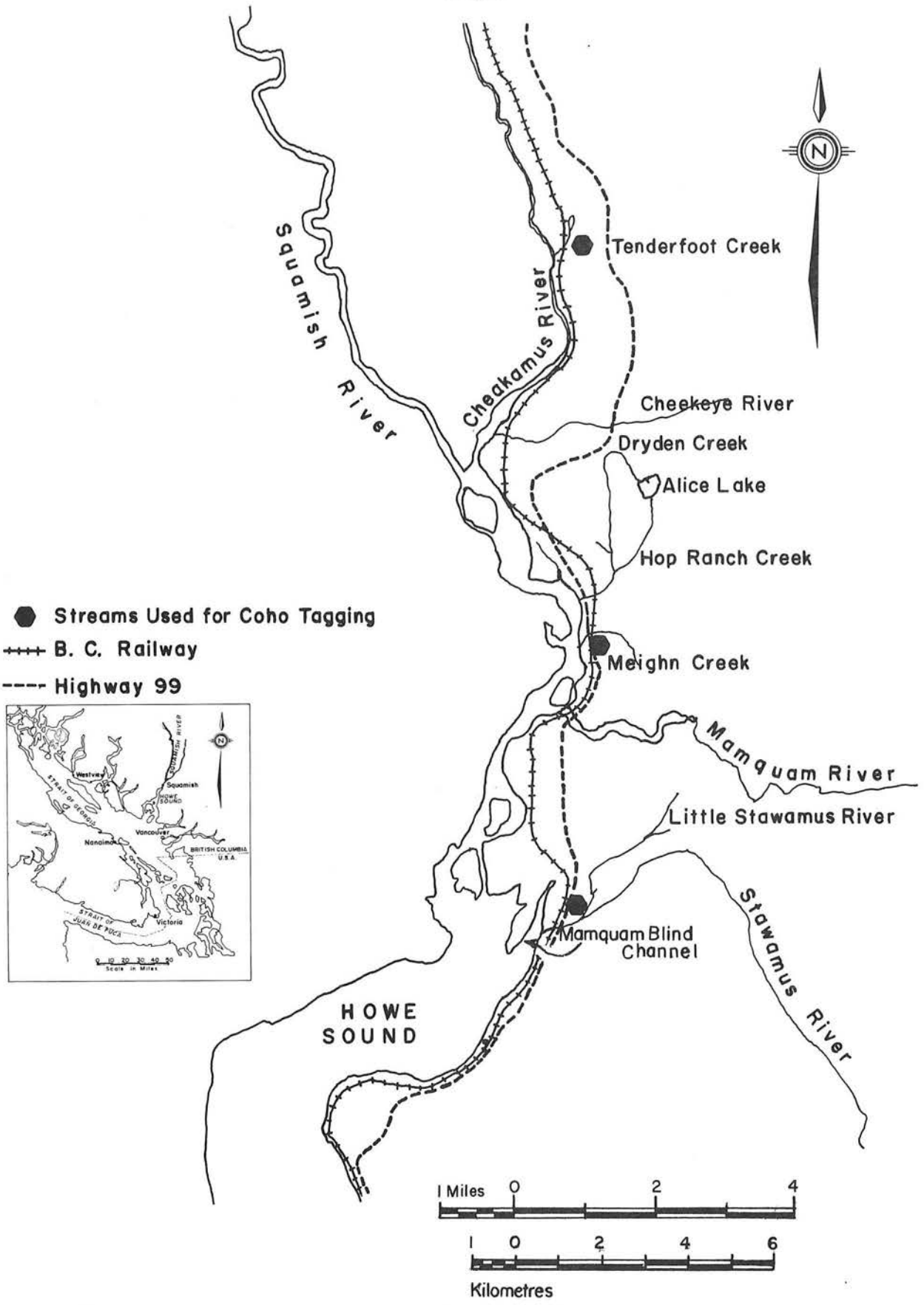

Figure 1. Map showing location of the three Squamish River system study streams: Little Stawamus River, Meighn Creek and Tenderfoot Creek.

GENERAL DESCRIPTION OF THE RIVER SYSTEM

The Squamish River system enters Georgia Strait at the head of Howe Sound and includes four major tributaries, Cheakamus River, Elaho River, Ashlu Creek and Mamquam River.

Over 90 miles (145 km) of the mainstem Squamish and major tributaries are accessible to salmon. Since 1962 coho escapements averaged over 25,000, but this estimate should be used with caution considering the turbid nature of many of the glacial fed tributaries and the propensity of coho to spawn in many small feeder streams - factors that make visual observations of spawners extremely difficult. Coho escapements prior to 1962 were reported at somewhat higher than recent levels (Marshall et al., 1976 MS). Mature coho spawners enter the Squamish River in early September and the run continues until mid February. Significant spawning runs of chinook, chum, and odd year pink salmon utilize the Squamish system (Marshall et al., 1976). Indian food fisheries and a large freshwater sport fishery harvest coho salmon, chinook salmon and steelhead trout. The salmon catch in freshwater is sizeable, but is poorly documented.

The Squamish watershed encompasses approximately 3,500 square miles (9065 km^2) and is characterized by heavily forested valley bottoms and lower slopes. The Squamish River and tributaries frequently shift over the wide valley bottom. As a consequence there are many side channels, a number of which remain accessible to spawning salmon. Others offer great potential for controlled spawning once access and water flow are improved.

Precipitation ranges from 60 inches to over 150 inches (152 cm to 381 cm) annually. Climate is moderate, maritime; strong outflow winds from interior valleys are common during winter months. The Squamish system discharge pattern ranges from summer-fall maximums, sometimes in excess of 35,000 cubic feet per second (991 m^3/second), to winter-spring minimums between 2,000 and 4,000 cfs (57 and 113 m^3/second). This discharge pattern is typical of glacial-fed coastal streams. Short duration floods are relatively common due to heavy rains, augmented by snow melt. The upper reaches of the Cheakamus River have been developed for hydroelectric power.

Some of the preceeding comments and the following general description of the Squamish estuary are from a report titled "Affects of existing and proposed industrial development of the aquatic ecosystem of the Squamish estuary" (Anon., 1972).

> "The Squamish River estuary (including the deltaic lands adjacent to the Mamquam Channel) occupies over 1200 acres. It is characterized by broad reaches of low lying lands, intersected by the main river channel, the old Mamquam Channel, smaller flood channels, and intertidal watercourses. The area has a complex plant community common to developing alluvial lands. Stands

of mixed deciduous and coniferous trees have established on the higher, infrequently flooded uplands. These non-estuarial zones are bordered seaward by both pure and mixed plant communities dominated by sedges, grasses and rushes, typical of areas inundated by fresh or brackish water. The lowermost inter-tidal mud and sand flats exhibit little evidence of rooted vegetation.

As a result of past development which centered around the logging, sawmilling and chemical industries, a large part of the eastern (Mamquam Channel) portion of the estuary has been altered or eliminated by dredge and land fill operations or is utilized for log storage. The town of Squamish is situated on the higher, easterly delta lands adjacent to the old Mamquam Channel. More recently, additional, port-oriented land fill, road and rail access levees, a river training dyke and dredge spoil area has eliminated nearly 100 acres of inter-tidal marsh and mud flat in the central portion of the estuary."

LOCATION AND DESCRIPTION OF TRAPPING SITES

The following study streams were chosen for trapping and tagging because they are relatively small in size, have low and reasonably constant flows (3 to 8 cfs, principally groundwater) and have numerous pool-riffle areas. Most sections of the study streams have dense willow canopies interspersed with alders, maples and some coniferous trees. Each study stream was known to have coho spawners every year.

Fence traps were placed in each stream as near to the main river confluence as possible, but far enough upstream to minimize the problem of backwatering from the main river. Traps were located in a pool-riffle complex where the gravel was relatively stable.

A. Little Stawamus River

The Little Stawamus River flows 2.3 miles (3.7 km) from a swampy groundwater area to the Stawamus River, which in turn enters Mamquam Blind Channel on the east side of the Squamish estuary. Average wetted perimeter of the Little Stawamus is approximately 11 feet (3.4 m). The upper one plus mile (1.61 km) is a tangle of shrubs and dense alders with small gravel patches and mud bottomed pools; windfalls are numerous (Figure 2).

The midsection (approximately 0.5 miles, 0.8 km) is adjacent to a new subdivision, presently under construction. In the upstream portion of this section the developer was planning to relocate the Little Stawamus River against a steep hillside (Figure 3).[1] The lower part of this section had been denuded of stream cover on the left bank and had been channelized (Figure 4).

The lower one-third of a mile (0.5 km) is well protected by salmonberry, alder, vine maple and devil's club. The trap was located in this section approximately 200 feet (61 m) upstream from the confluence of the Little Stawamus and Stawamus Rivers. Here the stream is approximately 12 feet (3.7 m) wide and 1.5 feet (0.5 m) deep. Occasional freshets forced water around the edges of the fence panels (Figure 5). The tagging site was located on the right bank approximately 20 feet (6 m) from the trap (Figure 6) and was accessible by a short trail from Valley Cliff Road. Flows at the trap site ranged from 3 to 8 cfs during trapping periods.

B. Meighn Creek

Meighn Creek, a tributary of the lower Squamish River, originates from a spring in the Garibaldi Heights subdivision. Natural cover and the stream bed have not been significantly altered by the developer (Figure 7). A

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[1] Relocation was completed during summer months of 1977.

Figure 2. Upper section of the Little Stawamus River.

Section of Little Stawamus to be relocated against bank on right side of photograph.

Heavy machinery crossed here.

Figure 3. Midsection of the Little Stawamus River under development for residential homes. Stream flows from left to right.

Looking upstream

Looking downstream

Figure 4. Channelized and denuded section of Little Stawamus River.

Normal flow conditions.

High Flow conditions.

Figure 5. Fence trap on the Little Stawamus River.

Figure 6. Tagging equipment in operation on the Little Stawamus River.

"Coho Park" section.

Typical stream section.

Figure 7. Meighn Creek.

portion of the upper section, called "Coho Park" by local residents (Figure 7, upper) has several well designed walking trails. The stream bed in upper sections is gravelled and in places is covered by dense aquatic vegetation. Lower sections have a sandy and muddy bottom as well as a dense cover of deciduous trees and brush. Over its two mile length (3.2 km) water volume is gradually increased by runoff from swampy areas. Average wetted width of Meighn Creek is approximately 10 feet (3 m).

The trap site was located 200 feet (61 m) upstream from the "swampy" confluence of Meighn Creek and the Squamish River, and just downstream from two culverts that pass Meighn Creek under Highway 99 (Figure 8, upper). This was the only site near the mouth that had a stable gravel bottom and the necessary riffle-pool combination for a trap installation. Flows ranged between 2 and 4 cfs during trapping periods. Backwatering from the Squamish River was an occasional problem after heavy rains and/or high temperatures increased snow melt (Figure 8, lower).

C. Tenderfoot Creek

Tenderfoot Creek originates in Mosley Lake (Figure 9) a large marshy pond that is fed by groundwater (approximately 2.6 acres, 1.1 hectares surface area during April and May). Shallow areas of Mosley Lake are overgrown with sedge grasses and rooted aquatic plants. Groundwater upwells through numerous gravelled patches. During the fall and spring, water depths exceed five feet (1.5 m) (Figure 9, lower); during late summer and early fall months in most years, shallow areas are dry (Figure 9, upper). A small subdivision at the upstream end of the lake utilizes groundwater and likely contributes to reduced summer water levels. The shore of Mosley Lake is lined with alder, willow and deciduous shrubs; at the outlet there is a sizeable log jam that provides excellent juvenile rearing habitat (Figure 10, upper).

Tenderfoot Creek is short, just over 2000 feet (610 m) between Mosley Lake and its entrance into the Cheakamus River through two small culverts. (Figure 10, lower). The culverts are generally one or more feet above the Cheakamus River except during periodic high flows in the Cheakamus River. The wetted width averages approximately 10 feet (3 m) except during late summer and early fall when, in most years, the creek dries completely except for several small pools in the shaded sections. The stream banks provide excellent cover with shrubs, deciduous and coniferous trees (Figure 11, upper). There are numerous dark pools and cut banks from the lake to the mouth (Figure 11, lower). The creek bottom consists of alternating patches of gravel and muddy sand.

The fence trap was located 120 feet (37 m) upstream from the culverts where the creek was approximately 10 feet (3 m) wide and 1.5 feet (0.5 m) deep and had a relatively stable gravel bottom (Figure 12). Flows ranged from 2 to 8 cfs during trapping. Access was by foot from the abandoned Cheakamus Station terminal along the British Columbia Railway right of way. Tagging equipment was often transported to and from the site courtesy of a B.C. Railway "speeder" crew (Figure 13, upper); tagging equipment was assembled and operated (Figure 13, lower) at a convenient site just to the right of the large rock in Figure 12 (lower).

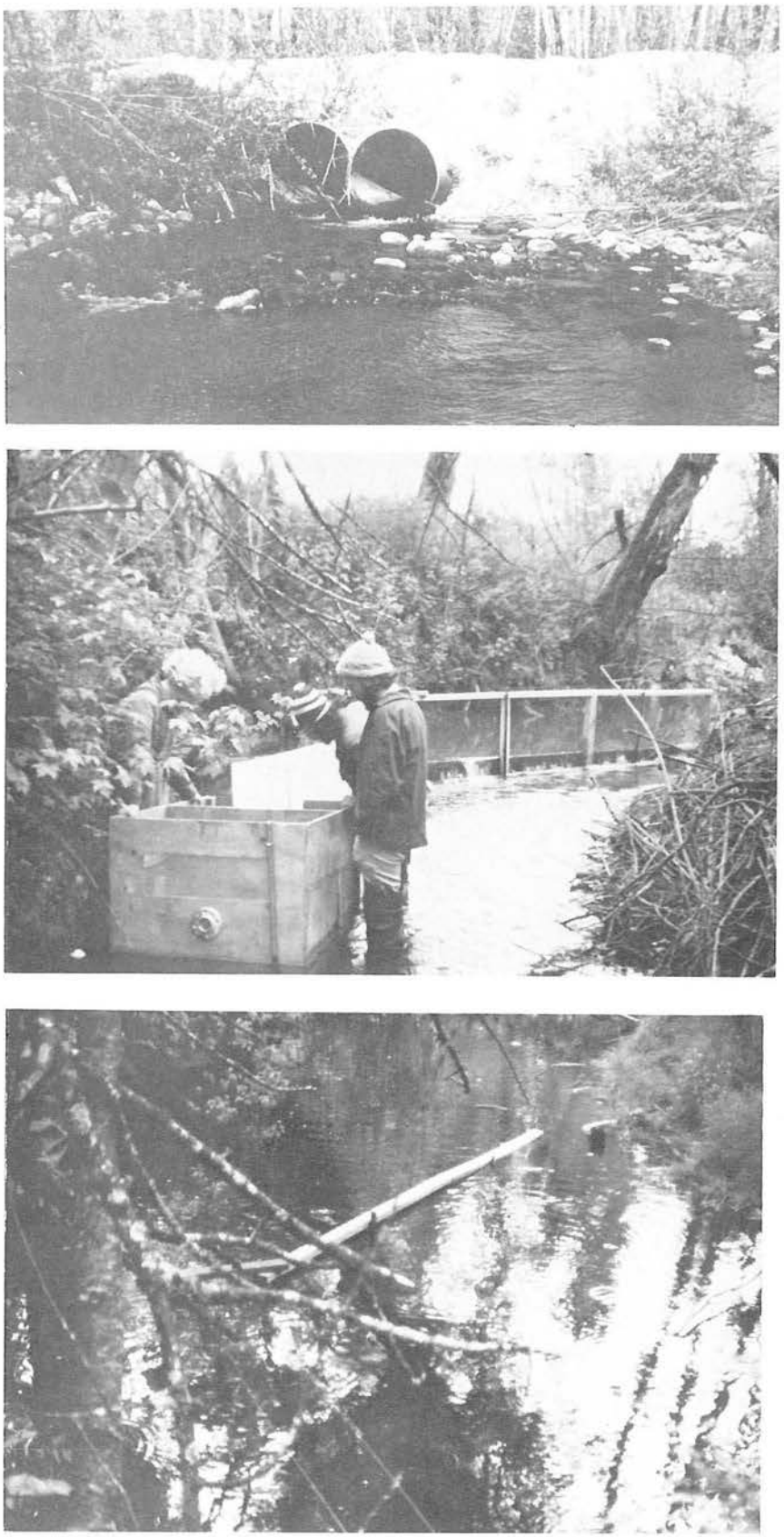
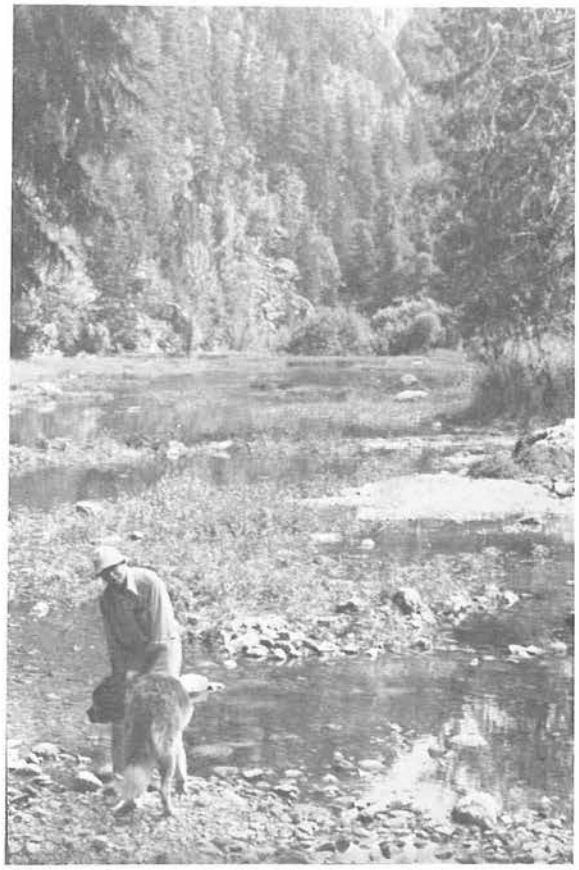


Figure 8. Meighn Creek downstream from Highway 99 (upper); fence trap under normal flows, note debris left on screens to increase flow to live box (middle); fence and sluice trough covered by backwatering from the Squamish River (lower).



Note dry areas and groundwater in the gravelled patches; normal summer water level.

Tagging coho pre-smolts during March; note high lake level.

Figure 9. Mosley Lake, headwaters for Tenderfoot Creek.

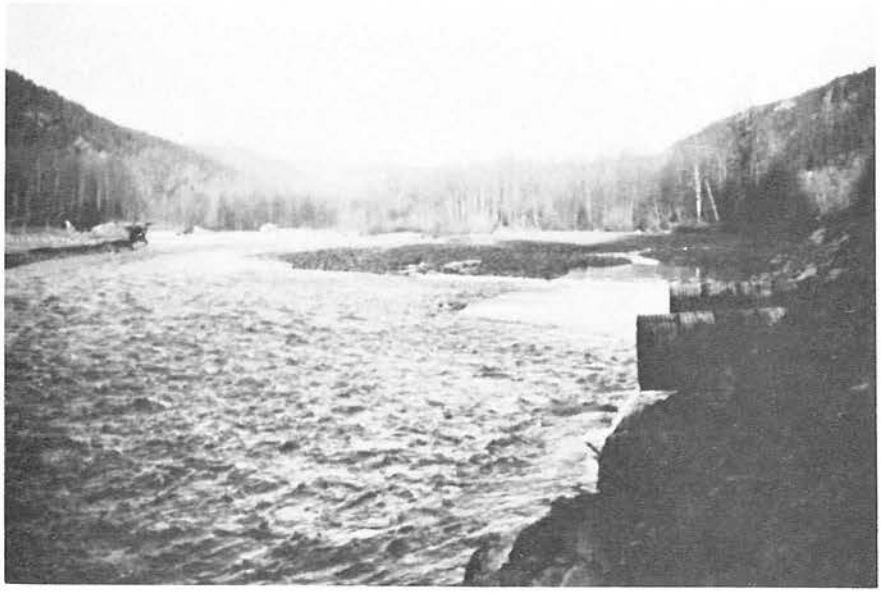


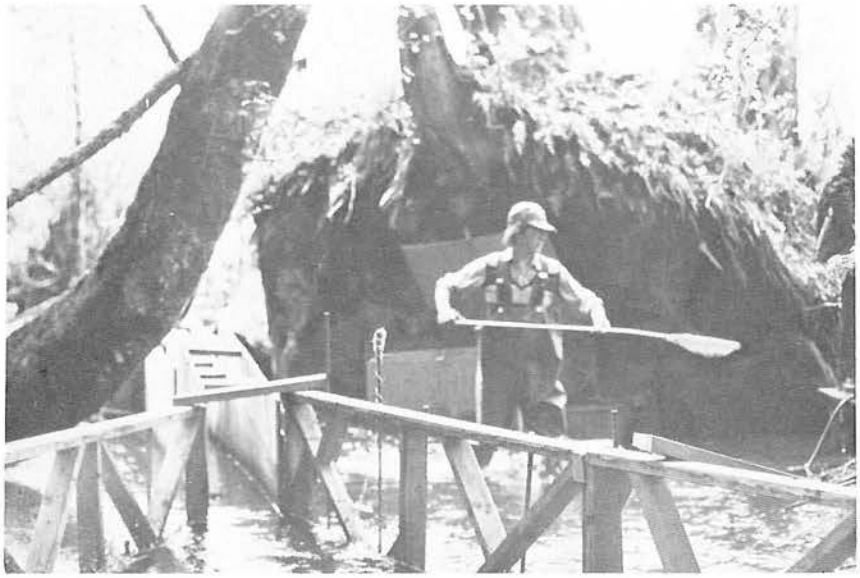
Figure 10. Log jam at outlet of Mosley Lake (upper) and culvert through which Tenderfoot Creek enters the Cheakamus River (lower).

Typical stream section.

Pool near large rock.

Figure 11. Tenderfoot Creek.

Note that the sluice trough originates at the upstream end of a riffle.



Holding box to right of sluice trough. Tagging site just out of picture on right side.

Figure 12. Fence trap and holding box on Tenderfoot Creek.

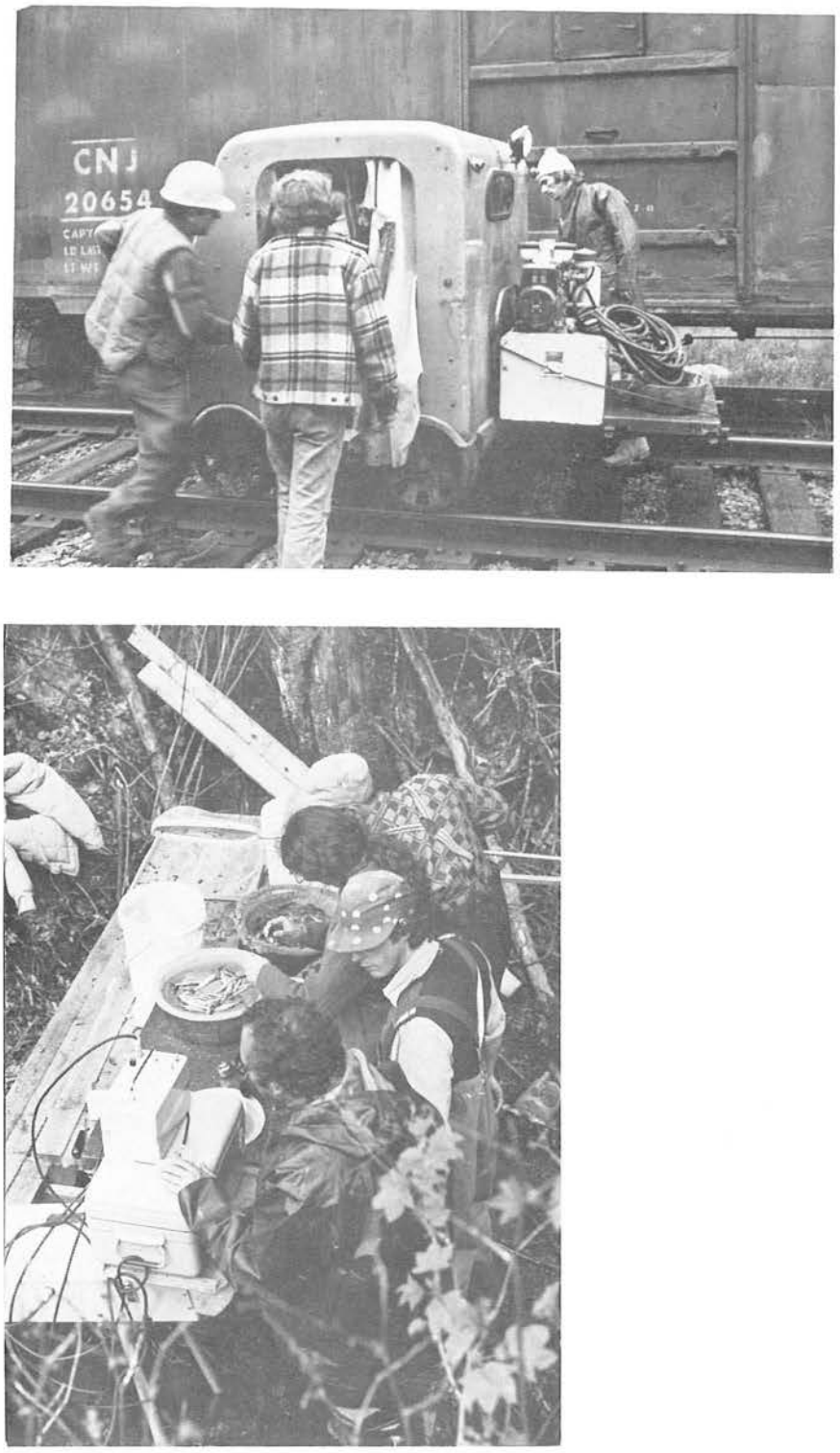


Figure 13. Transporting equipment to tagging site on B.C. Railway speeder (upper); tagging equipment in operation (lower).

CAPTURE AND TAGGING METHODS

A. Fence Traps

Fence trap design, site selection, installation and maintenance were similar in most respects to that documented in detail by Armstrong and Argue (1977) for the Cowichan River system. Figure 14 shows a standard fence trap arrangement (see also Figures 5, 8, 12 and 15).

In 1973, fence traps were used on Tenderfoot and Meighn Creeks for migration timing and enumeration purposes only. In 1974 and 1975 identical trapping gear, plus holding boxes, were used for enumeration and tagging purposes on the above creeks plus the Little Stawamus River. Due to higher water velocity, Tenderfoot Creek and Little Stawamus River required two live boxes to reduce turbulence and hence stress on the smolts (Figure 15, upper); a single live box was sufficient at Meighn Creek. Figure 15 (middle) illustrates the amount of debris that was allowed to accumulate on fence screens at the Tenderfoot Creek trap in order to provide sufficient water flows through the sluice trough. Figure 15 (lower) illustrates the water drop between the sluice trough and live box.

B. Minnow traps

"Gee's Improved Wire Minnow Traps" (Figure 16) were used to trap juvenile coho for tagging between March 18 and 21, 1975 on the upper portion of Tenderfoot Creek and in Mosley Lake. Between 20 and 25 traps were fished continuously over the four-day period using herring roe as bait. Armstrong and Argue (1977) provide further details on minnow trapping procedures.

C. Tagging Equipment and Procedures

Coho smolts were adipose-clipped and then were tagged with binary CWTs at Little Stawamus River, Meighn Creek and Tenderfoot Creek in 1974 and 1975. Tagging equipment and procedures were similar in virtually all respects to that described by Armstrong and Argue (1977) for the 1975 tagging program on Cowichan River coho smolts.

D. Biological Samples

Throughout the Squamish tagging program between 50 and 100 coho smolts were sampled for scales and fork length from weekly enumeration/tagging lots on each study stream. Little Stawamus River samples totalled 550 in 1974 and 700 in 1975. Meighn Creek samples totalled 250, 500 and 531 for 1973, 1974 and 1975 respectively. Tenderfoot Creek samples totalled 250, 599 and 800, for the same years.

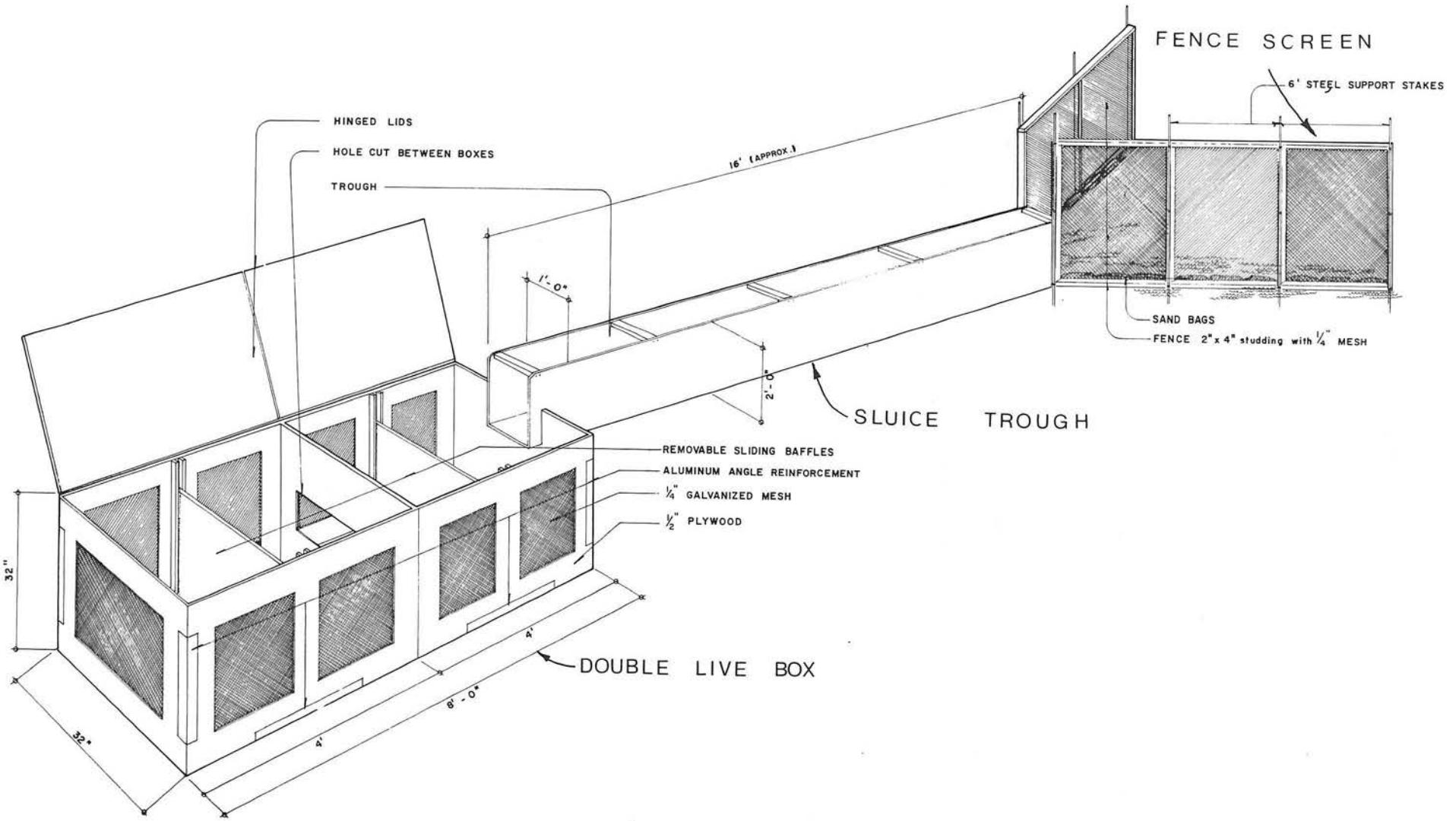
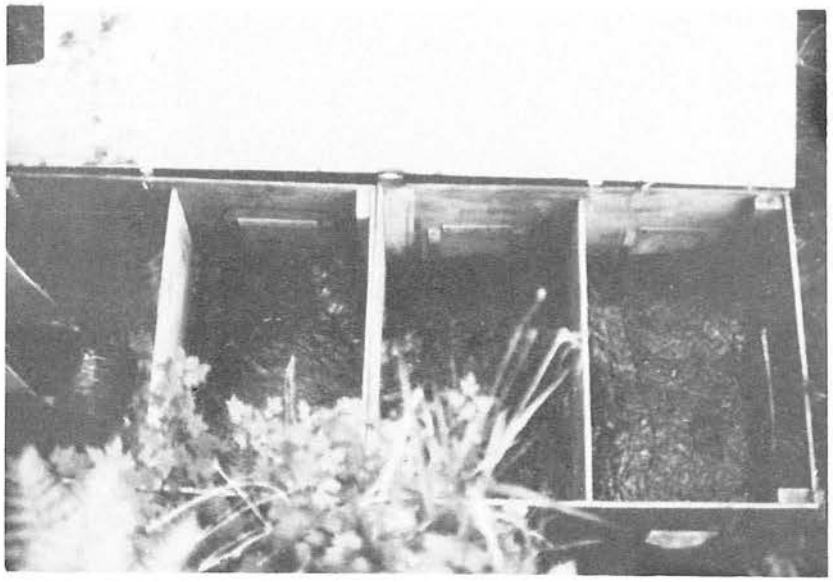
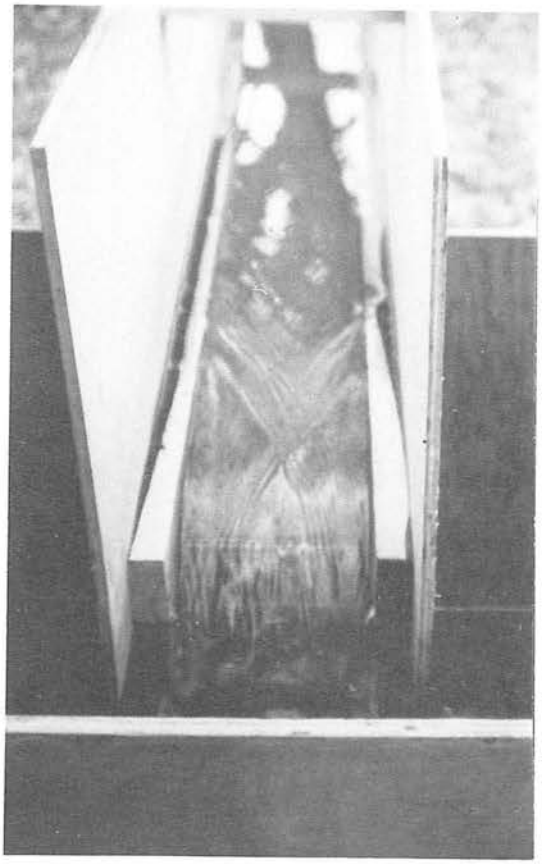


Figure 14. A standard fence trap arrangement.





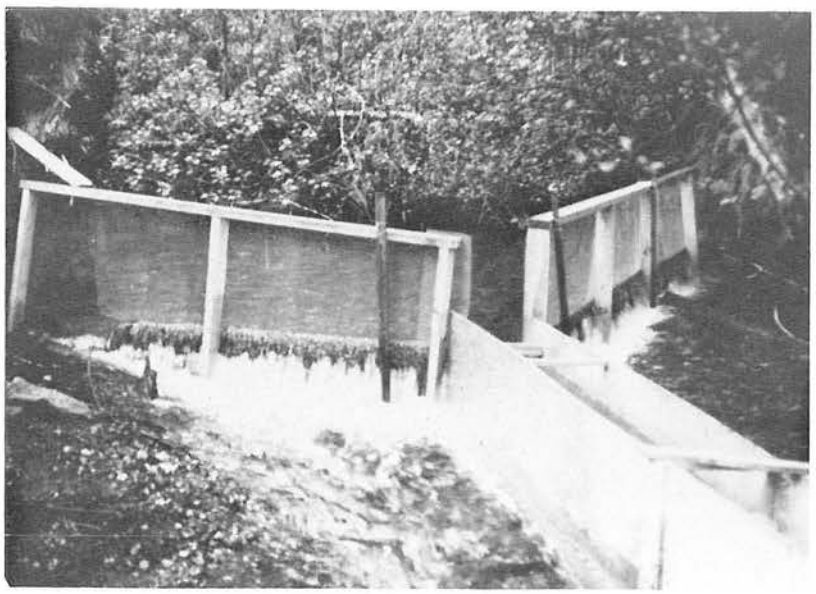
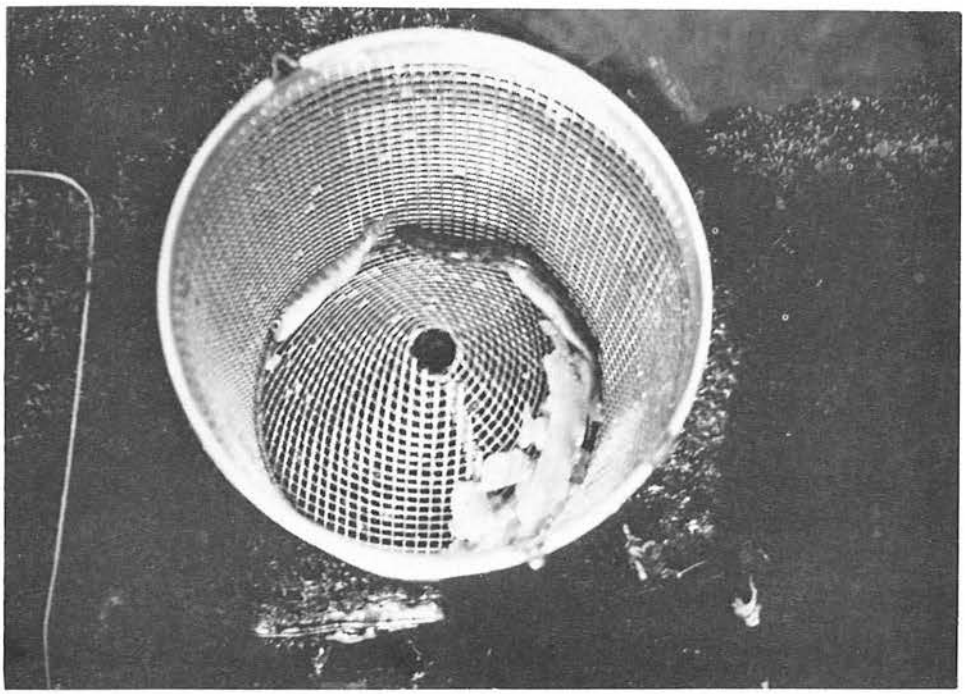


Figure 15. Tenderfoot Creek fence trapping gear: double live box (upper); fence panels with debris build-up (lower:) ; sluice trough to live box connection (right).

Baited minnow traps in fishing position.



Coho smolt catch with herring roe bait.

Figure 16. Minnow trapping coho smolts.

E. Tag Codes

A separate tag code was used for each trapping location in 1974 and 1975 (Table 1). An additional code (15/5) was used for coho juveniles tagged on March 22, 1975 at Tenderfoot Creek. Small numbers of steelhead smolts were tagged with coho tag codes at each location in both years.

Table 1. Squamish River system coho smolt tag code information, 1974 and 1975.[a]

Tagging Location	Capture Timing	Binary Tag Data Codes (Agency 2)
	1974	
Little Stawamus River	April 10 - June 4	1/5
Meighn Creek	April 9 - June 4	2/5
Tenderfoot Creek	April 11 - June 4	3/5
	1975	
Little Stawamus River	April 9 - June 9	8/5
Meighn Creek	April 9 - June 9	5/5
Tenderfoot Creek	March 18 - 22	15/5
	April 9 - June 16	4/5

[a] Small numbers of steelhead smolts were tagged with coho tag codes at each location in both years (except March 18-22, 1975 at Tenderfoot Creek).

Since there was no sure way of separating coho smolts by age class at the time of tagging, both age classes were tagged with identical tag codes on each stream. Age 1. smolts were generally greater than 90% of the downstream migrants (see Table 13, page 57). Thus the brood year for each tag code was defined as the brood year for age 1. coho. On this basis all coho smolts tagged in 1974 were assigned to the 1972 brood year, and all coho smolts tagged in 1975 were assigned to the 1973 brood year.

OBSERVATIONS AND DISCUSSION

A. Numbers Caught and Tagged

Coho Smolts

In 1973, a total of 17,679 coho smolts were trapped at Meighn and Tenderfoot Creeks (Table 2). In 1974 and 1975, total smolt trap catches[2] were 17,943 and 18,367 respectively, only slightly above the 1973 total even though Little Stawamus River had been added as a trapping site. Appendix Tables A to H list daily catch records, daily temperature records and comments on trap operation for each year at each trapping site.

A total of 17,849 tagged coho smolts were released in 1974; 17,678 tagged smolts were released in 1975 (Table 2). Two year tag release totals were 13,186 for the Little Stawamus River, 8,327 for Meighn Creek and 14,014 for Tenderfoot Creek. Tables 3 and 4 present 1974 and 1975 tagging and release data for each tagging lot and present tag release totals for each tag code.

Smolts were held for an average of eight days before tagging (range 4 to 19 days) (Tables 3 and 4). Holding mortality was generally below one percent except for one day on the Little Stawamus River when 215 smolts died, apparently due to suffocation from overcrowding. A few fish that were obviously weakened or injured from capture or holding were released untagged.

Tagged fish were generally held for between 12 and 36 hours after tagging. Immediate tagging mortality (up to 36 hours after tagging) was approximately one percent. Smolts were not checked for tag loss prior to release as it was felt that additional handling would cause undue stress.

In 1975, some adipose-clipped coho had to be released untagged due to occasional problems with the tagging machine's quality control unit. These are totalled under "No. Rejects" in Table 4, and are excluded from the "No. Tags Released" column.

Steelhead Smolts

At the time daily smolt counts were made it was difficult to rapidly distinguish between steelhead smolts, rainbow trout and cutthroat trout; separation of rainbow trout from steelhead smolts was particularly

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[2] Daily coho smolt counts at the trap sites were made quickly to reduce handling time. Thus there are small differences between totals of the daily catches presented in Appendix Tables and totals under "No. Tagged" in Tables 3 and 4. For 1974 and 1975, totals under "No. Tagged" are the best estimates of numbers caught.

Table 2. Summary of 1973 to 1975 coho smolt enumeration/tagging totals for three Squamish River system tributaries. Steelhead totals in brackets.[a]

	Study Year			
	1973	1974	1975	Total
		Catch		
Little Stawamus River	-	7,111 (10)	6,207 (60)	13,318 (70)
Meighn Creek	8,440 (5)[b]	5,843 (7)	2,618 (2)	16,901 (14)
Tenderfoot Creek	9,239 (18)	4,989 (35)	9,542 (40)	23,770 (93)
Total	17,679 (23)	17,943 (52)	18,367 (102)	53,989 (117)
		Tagged and Released		
Little Stawamus River	-	7,025 (10)	6,161 (60)	13,186 (70)
Meighn Creek	-	5,837 (7)	2,490 (2)	8,327 (9)
Tenderfoot Creek	-	4,987 (35)	9,027 (40)	14,014 (75)
Total	-	17,849 (52)	17,678 (102)	35,527 (154)

[a] Source data: Tables 3 and 4; Appendix Tables C and F for 1973.

[b] Steelhead totals in 1973 based on daily totals from Appendix Tables C and F.

Table 3. Coho and steelhead smolt tagging results, 1974.

Tagging Date	Holding Time (days)	Tagging Time		No. Tagged		Immediate Tagging Mortality		No. Tags Released		Post Tagging Holding Time (hrs.)	Tag Data Codes (Agency 2)
		Start	Finish	Coho	Stlhd[a]	Coho	Stlhd	Coho	Stlhd		
Little Stawamus River											
Apr 19	10	0900	1200	352	-	14	-	338	-	22	1/5
30	10	0800	0900	1056	-	1	-	1055	-	12	1/5
May 7	7	0715	0830	1446	7	43	-	1403	7	11	1/5
14	7	1245	1500	1985	2	3	-	1982	2	5	1/5
21	7	0850	1030	1439	-	1	-	1438	-	9	1/5
28	7	1240	1330	484	1	24	-	460	1	7	1/5
Jun 4	7	1030	1115	349	-	-	-	349	-	4	1/5
Meighn Creek											
Apr 19	11	1300	1400	187	-	-	-	187	-	23	2/5
30	10	1000	1100	491	-	1	-	490	-	4	2/5
May 7	7	0930	1105	1770	4	2	-	1768	4	5	2/5
14	7	1000	1240	1614	2	1	-	1613	2	7	2/5
21	7	1145	1245	1037	1	1	-	1036	1	8	2/5
28	7	1030	1105	618	-	1	-	617	-	9	2/5
Jun 4	7	0945	1005	126	-	-	-	126	-	3	2/5
Tenderfoot Creek											
Apr 19	9	1500	1530	192	-	-	-	192	-	24	3/5
30	10	1300	1400	368	-	1	-	367	-	2	3/5
May 7	7	1300	1430	732	18	-	-	732	18	18	3/5
14	7	0730	0900	1229	13	-	-	1229	13	0	3/5
21	7	1325	1420	1084	3	1	-	1083	3	18	3/5
28	7	0800	0910	1168	-	-	-	1168	-	0	3/5
Jun 4	7	0830	0900	216	1	-	-	216	1	4	3/5
Totals By Stream (Tag Code)											
Little Stawamus River	(1/5)			7111	10	86	-	7025	10		
Meighn Creek	(2/5)			5843	7	6	-	5837	7		
Tenderfoot Creek	(3/5)			4989	35	2	-	4987	35		
Combined Total				17943	52	94	-	17849	52		

[a] Steelhead smolts were tagged with coho tag codes.

Table 4. Coho and steelhead smolt tagging results, 1975.

Tagging Date	Holding Time (days)	Tagging Time Start	Tagging Time Finish	No. Tagged Coho	No. Tagged Stlhd[a]	Immediate Tagging Mortality Coho	Immediate Tagging Mortality Stlhd	No. Rejects[b] Coho	No. Rejects[b] Stlhd	No. Tags Released Coho	No. Tags Released Stlhd	Post Tagging Holding Time (hrs.)	Tag Data Code (Agency 2)
						Little Stawamus River							
Apr 29	19	1645	1815	1060	17	7	-	7	-	1046	17	24	8/5
May 5	7	0910	1110	1351	22	5	-	-	-	1346	22	36	8/5
13	7	1030	1200	1283	12	2	-	-	-	1281	12	36	8/5
21	8	0900	1040	1427	4	1	-	-	-	1426	4	32	8/5
27	6	0900	0945	587	2	1	-	-	-	586	2	32	8/5
Jun 2	6	1430	1500	351	2	4	-	19	-	328	2	30	8/5
9	7	1330	1345	148	1	-	-	-	-	148	1	0	8/5
						Meighn Creek							
Apr 29	19	1445	1500	174	-	126 (predator)	-	-	-	48	-	24	5/5
May 5	7	1455	1510	189	-	-	-	-	-	189	-	24	5/5
13	7	1700	1745	608	-	-	-	-	-	608	-	0	5/5
21	8	1120	1140	136	1	-	-	-	-	136	1	28	5/5
27	6	1010	1020	52	-	-	-	-	-	52	-	0	5/5
Jun 2	6	0845	0935	578	1	-	-	-	-	578	1	0	5/5
9	7	1110	1215	881	-	2	-	-	-	879	-	0	5/5
						Tenderfoot Creek							
Mar 22	4	1315	1730	1705	-	37	-	298	-	1370	-	20	15/5
Apr 29	10	1100	1330	260	24	3	-	9	-	248	24	30	4/5
May 5	7	1320	1410	540	5	5	-	-	-	535	5	30	4/5
13	7	1340	1540	1763	8	-	-	-	-	1763	8	30	4/5
21	8	1330	1500	1270	-	9	-	-	-	1261	-	30	4/5
27	6	1205	1245	695	-	2	-	-	-	693	-	30	4/5
Jun 2	6	1030	1300	1885	2	28	-	122	-	1735	2	30	4/5
9	7	0910	1025	1031	1	-	-	-	-	1031	1	0	4/5
16	7	1030	1100	393	-	2	-	-	-	391	-	0	4/5

Totals By Stream	No. Tagged Coho	No. Tagged Stlhd	Immediate Tagging Mortality Coho	Immediate Tagging Mortality Stlhd	No. Rejects Coho	No. Rejects Stlhd	No. Tags Released Coho	No. Tags Released Stlhd
Little Stawamus River	6207	60	20	-	26	-	6161	60
Meighn Creek	2618	2	128	1	-	-	2490	2
Tenderfoot Creek	9542	40	86	-	429	-	9027	40
Combined Total	18367	102	234	1	455	-	17678	102

Totals By Tag Code (steelhead)		
8/5	6161	(60)
5/5	2490	(2)
4/5	7657	(40)
15/5	1370	
	17678	(102)

[a] Steelhead smolts were tagged with coho tag codes.

[b] Some fish were not successfully tagged and were released untagged after being clipped.

[c] Pre-smolt coho that were minnow trapped, tagged and released above the trap.

difficult. However, for the two tagging years, 1974 and 1975, steelhead smolts and rainbow trout (which could be steelhead presmolts) were more easily distinguished during tagging when they were anaesthetized and there was more time to examine each specimen for identifying characteristics, such as bright silver coloration and weak parr marks on smolts. Thus numbers tagged in Tables 3 and 4 are the more accurate estimates of steelhead smolt catches, compared to daily counts in the Appendix Tables.

In 1973, approximately 23 steelhead smolts were captured at the Meighn Creek and Tenderfoot Creek fence traps (Table 2). Numbers tagged and released at all study streams totalled 52 in 1974 and 102 in 1975. Two year tag release totals were 70 for Little Stawamus River, 9 for Meighn Creek and 75 for Tenderfoot Creek. Tables 3 and 4 present 1974 and 1975 tagging and release data for each tagging lot and present tag release totals for each tag code (steelhead were tagged with coho CWT codes).

Coho Fry

Large numbers of coho fry were trapped (Table 5) in Little Stawamus River (1974) and Tenderfoot Creek (1973 & 1974); negligible numbers of coho fry migrated from Meighn Creek. Due to high trap mortality (both coho and chum fry) live box screens at Tenderfoot Creek were increased from 1/8 inch (3 mm) mesh size to 1/4 inch (6 mm) mesh size on May 8, 1974 in order to pass live fry through the trap. All live boxes were converted to 1/4 inch mesh for the 1975 season. Thus low coho fry catches at all trap sites in 1975 do not reflect low numbers of fry migrants.

The coho fry migration peaked just prior to the coho smolt migration in Tenderfoot Creek (1973), and just after the coho smolt migration in the Little Stawamus River (1974). Many of the fry migrants likely rear in downstream sections of the Squamish and Cheakamus Rivers or in undeveloped portions of the Squamish estuary (Anon., 1972).

Chum Fry

Chum fry were absent from the Little Stawamus River (Table 5) and were only present on one day in Meighn Creek (1974). The chum fry migration was sizeable for Tenderfoot Creek in 1974. In this system chums migrated slightly earlier than coho fry and smolts.

Steelhead/Rainbow Trout/Cutthroat Trout

Steelhead/rainbow catches, based on daily totals from the Appendix Tables, were highest in the Little Stawamus River and Tenderfoot Creek (Table 5). The Little Stawamus River also produced by far the largest catches of cutthroat trout. Meighn Creek catches of steelhead/rainbow trout and cutthroat trout were considerably lower than catches in the other two streams. Based on size, most rainbow and cutthroat trout were judged to be age 1.; however, a few cutthroat spawners were included with the trout catch.

Table 5. Total season trap catches of salmon fry, trout, char and other species.

Trap Site		Coho Fry	Chum Fry	Steelhead-Rainbow Trout	Cutthroat Trout	Dolly Varden Char	Sculpins	Sticklebacks	Lamprey
Little Stawamus River	1974	37,830	-	65	324	4	27	-	1
	1975	42	-	104	724	2	41	-	-
	Total	37,872	-	169	1048	6	68	-	-
Meighn Creek	1973	17	-	16	-	-	17	147	2
	1974	571	460	9	41	-	18	53	9
	1975	11	-	2	5	-	2	-	70
	Total[b]	582	460	11	46	-	20	53	79
Tenderfoot Creek	1973	12,273	498	61	-	-	15	-	-
	1974	9,857	33,203	62	90	-	4	-	-
	1975	91	-	21	69	-	8	-	-
	Total[b]	9,948	33,203	83	159	-	12	-	-

[a] Source Data: Appendix Tables A to H.

[b] Total excludes 1973.

Other Species

Dolly Varden char were present in the Little Stawamus River. Sculpins were caught at all three trap sites. Sticklebacks and lampreys were caught in Meighn Creek only (one lamprey was captured in Little Stawamus River in 1974).

B. Incidence of Natural Adipose Marks on Coho Smolts, 1974

Presence of significant numbers of adult coho with naturally missing adipose fins could cause considerable problems during adult CWT recovery, particularly with respect to estimation of tag loss. In 1974, approximately one-third of the coho smolt catch was checked for naturally missing adipose fins (see below). Smolts were not checked in 1975 as presence of age 2. adipose clipped smolts from 1974 tagging could have caused significant overestimation of the incidence of naturally missing adipose fins.

	Number Observed	Missing Adipose	Incidence Missing Adipose
Little Stawamus River	2289	1	1 : 2289
Meighn Creek	1794	3	1 : 598
Tenderfoot Creek	2478	1	1 : 2478

Naturally missing adipose fins were rare in 1974. For the three streams combined, one coho in 1312 had a naturally missing adipose fin; 95 percent confidence limits were 1 : 699 to 1 : 10,629. Such a low incidence of naturally missing adipose fins should not bias analysis of adult coho adipose-CWT recoveries.

C. Coho Smolt Tag Retention, Tenderfoot Creek, 1975

On March 22, 1668 coho juveniles, caught in minnow traps in Mosley Lake between March 18 and March 21, were released in the lake with adipose-clips; 1370 of these smolts contained CWTs (Code 15/5). The remaining 298 smolts were released with adipose clips but no tags. The original purpose of this early release was to check trap efficiency (see next section); however, recoveries two months later also provided some data on tag loss. In future, a better procedure to check for preliberation tag loss would be to hold small random samples of marked smolts from each tagging lot.

Tagged and untagged coho on March 22 averaged 75 mm fork length, significantly smaller ($p < 0.01$) than smolts captured at the downstream trap site between April 29 and June 12 (average length 85 mm).[3] It is possible that minnow traps selected smaller coho smolts. A large proportion of

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[3] This comparison and subsequent size comparisons based on Analysis of Variance and Duncan's New Multiple Range test (Steel and Torrie, 1960).

the coho captured before March 22 had not yet smolted as they still possessed prominent parr marks.

Adipose-clipped coho from the March 22 tagging were recaptured over the total migration period at the Tenderfoot Creek trap; however, only those recaptures after May 21 were passed through the tag quality control unit to check for missing pins. Table 6 illustrates that the percentage of adipose-clips with tags was relatively constant each week. The overall percentage of recoveries with tags (83.9%) did not differ significantly from the percentage of adipose-clipped coho that held tags at time of release (82.1%).

Table 6. Comparison of percentage coho smolts with CWTs at time of tagging and at recovery for code 15/5 released in Mosley Lake, 1975.[a]

	Tagging Date	Tag Recovery Date at Trap Site				
	March 22	May 28	June 2	June 9	June 16	Total
CWT plus Adipose-Clip	1370	45	150	109	30	334
Adipose Only	298	7	21	30	6	64
Total	1668	52	171	139	36	398
Percent Tagged	82.1%	86.5%	87.7%	78.4%	83.3%	83.9%

[a] Adipose-clips recovered prior to May 28 not checked for presence of tag.

At the 95% confidence level, the recovery estimate could be in error by as much as 3.6%. Thus it is possible that up to 2.2% (1 - (83.9 - 3.6)/82.1) of the tags were lost prior to downstream migration. In practical terms we considered that tag loss was a negligible problem up to the time of the 1975 downstream migration. This may not have been the case in 1974 when less attention was paid to tag placement and correct choice of head molds. Furthermore, 1974 was the first year that wild coho were tagged and all tagging was done by inexperienced personnel.

D. Coho Smolt Trap Efficiency, Tenderfoot Creek, 1975

From 1668 adipose-clipped coho released on March 22 in Mosley Lake, only 719, or less than 50%, were recovered in the Tenderfoot Creek trap. Migration timing for adipose-clipped coho was identical to the timing of unmarked coho; for example 50% of both groups were captured by May 28. Therefore if the difference between numbers released and recovered was due to "loss" at the trap, the rate of loss must have been relatively constant throughout the downstream migration.

Such a low recovery percentage was surprising as in 1975 we experienced only one instance of undermining of the fence panels, and only one instance of vandalism (live boxes were padlocked). There was no evidence of otter or mink predation at the trap site.

Tagging crews were carefully instructed and supervised in the search for previous adipose-clips so this was an unlikely source of significant error.

One possible explanation of the low recovery rate is residualism. Data presented in sections E and G suggest that in years when age 1. smolts are small, a significant fraction, perhaps 20% or more, stay in freshwater for an additional year. Tenderfoot Creek smolts tagged on March 22, 1975 were significantly smaller than downstream migrants captured several weeks later (75 mm vs 85 mm fork length). Thus it is plausible that perhaps 20% of the March 22 tagged group did not migrate.[4] Add to this a 20% delayed tagging mortality - undoubtedly high - then the adipose-clip recovery rate at the Tenderfoot trap would still only account for 67% of the migrating portion of the March 22 release 719/(1668)(0.8)(0.8) .

In brief, even though field staff were confident that the Tenderfoot trap captured close to 90% of the downstream migrants, it would be difficult to support this observation with the available data. Thus data in the next section on coho smolt density could underestimate true smolt migrant densities in Tenderfoot Creek and Mosley Lake by as much as 50%. This might also apply to Meighn Creek and Little Stawamus River, although these latter two sites had considerably fewer operational problems such as undermining. In future, a better procedure for assessing trap efficiency would be to release 100 to 200 fin-clipped and coded-wire-tagged migrant smolts immediately above the trap site after each tagging during the downstream migration. This should minimize the problem of residualism reducing the number of mark recaptures.

E. Coho Smolt Density

At the three trap sites great care was taken to ensure that coho smolts would not by-pass trapping gear. In spite of this, undermining occurred on several occasions (see comments in Appendix Tables A to H) and vandalism was a minor problem at Tenderfoot and Little Stawamus. There was no evidence of otter or mink predation at any of the trap sites; however, shrews were observed in the Tenderfoot trap on two occasions.

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[4] Between December 17, 1977 and February 21, 1978 eight adipose-clipped adult coho (from approx. 500 samples) were observed in Mosley Lake (John Wright, Fisheries Patrolman, personal communication); one contained a CWT, code 15/2/5, from the March 22 tagging (age 2.1). We assume that these were all smolts tagged in 1975 that remained one additional year in freshwater. Smolts were large in 1974 and no age 2.1 coho adults were recovered in 1976 from the 1974 tagging.

Based on field observations, Armstrong and Argue (1977) suggested that fence traps at three sites on the Cowichan River captured approximately 90% of the total 1975 smolt migration at these sites. As noted in the previous section, this observation would be difficult to support at Tenderfoot Creek in 1975 and similarly in 1973 and 1974 when we had a somewhat greater number of instances when fence panels were undermined. On the other hand all problems affecting trap efficiency were corrected, usually within hours of their developing, or at most within one day. Thus in our opinion, it is difficult to accept that only 50% of the smolt migrants were captured, considering the frequency that traps were checked and repaired. We are confident that the fence traps at Meighn Creek and Little Stawamus River were more efficient (perhaps as high as 90% efficient) than the Tenderfoot Creek trap, and that trap efficiencies did not change substantially between years for any of the creeks. In brief, we consider that smolt densities in Table 7 are clearly minimum estimates, perhaps understating true values by 25% or more. We consider that proportional changes in smolt densities between years are relatively unbiased.

Based on surface area, Tenderfoot Creek, including Mosley Lake had the highest smolt density, at least 49 smolts per 100 square yards averaged over 1974 and 1975 (Table 7). After converting numbers of smolts per one hundred square yards to pounds (see page 51 for length/weight conversion) Tenderfoot Creek still exceeded the other two systems in productivity (0.9 lb/100 yd^2 versus 0.6 lb/100 yd^2).

Number of coho smolts per 100 yd^2 for Rotary Park pools on the Cowichan River system in 1975 was about double the Tenderfoot Creek level; Rotary Park produced about triple the smolt biomass per 100 yd^2 (Armstrong and Argue, 1977). This difference may reflect a combination of more stable summer water levels for Rotary Park Pools compared to Tenderfoot Creek, lower water temperatures and thus lower growth rates for Tenderfoot Creek coho compared to Rotary Park coho, and a less efficient fence trap set-up for Tenderfoot Creek compared with Rotary Park.[5] Note that doubling Tenderfoot biomass of coho smolts per 100 yd^2 would still place Tenderfoot Creek well below the Rotary Park production level. Of interest, data from Glova and Mason (1977 MS) show average coho juvenile densities during minimum flow months in the fall, of approximately 0.4 lb/100 yd^2, 0.3 lb/100 yd^2 and 0.1 lb/100 yd^2 for pools, glides and riffles respectively in three small streams on the east coast of Vancouver Island.

Tenderfoot coho smolts seemed to compensate for poor numerical production in 1974 (likely due to very low late summer water levels in 1973) by significantly greater size ($p < 0.01$) in 1974 compared to 1973 and 1975. The end result in Tenderfoot Creek over the 1973 to 1975 period was a relatively constant annual value for pounds of smolts per 100 yd^2.

In comparison to previous years, smolt production from Meighn Creek was very low in 1975; Little Stawamus also was somewhat less productive in 1975. Adult escapements were average or better in 1973 and winter incubation con-

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[5] Tenderfoot Creek dries in most summers and lake surface area is reduced by at least one half which likely reduces carrying capacity significantly - compare photos in Figure 9. Morning temperatures averaged 6 °C in Tenderfoot and 10 °C in Rotary Park between April and June.

Table 7. Coho smolt density for each tagging stream.

Stream	Square Yards (m^2)	Accessible Miles (km)		Number Smolts per 100 yd^2 (100 m^2)	Pounds Smolts per 100 yd^2 (kg/100 m^2)	Number Smolts per mile (km)	Pounds Smolts per mile (kg/km)
Little Stawamus R.	14,841 (12,409)	2.3 (3.7)	1974	48 (57)	0.68 (0.37)	3,092 (1,922)	44 (12)
			1975	42 (50)	0.47 (0.26)	2,699 (1,678)	31 (9)
			Mean	45 (54)	0.58 (0.32)	2,896 (1,800)	38 (11)
Meighn Creek	11,732 (9,809)	2.0 (3.2)	1973	72 (86)	1.01 (0.55)	4,220 (2,638)	60 (17)
			1974	50 (60)	0.83 (0.45)	2,922 (1,826)	49 (14)
			1975	22 (27)	0.27 (0.15)	1,309 (818)	16 (5)
			Mean[b]	36 (44)	0.55 (0.30)	2,116 (1,322)	33 (10)
Tenderfoot Creek (incl. Mosley Lake)	14,806 (12,380)	0.4 (0.6)	1973	62 (75)	0.68 (0.37)	23,098 (15,398)	252 (76)
			1974	34 (40)	0.84 (0.46)	12,473 (8,315)	313 (94)
			1975	64 (77)	0.91 (0.49)	23,855 (15,903)	336 (102)
			Mean[b]	49 (59)	0.88 (0.48)	18,164 (12,109)	325 (98)
Annual Averages of all Trap Sites[a]			1974	44 (52)	0.78 (0.42)	3,007 (1,874)	47 (15)
			1975	43 (51)	0.55 (0.31)	2,004 (1,248)	24 (7)
			Mean	43 (52)	0.67 (0.37)	2,506 (1,561)	36 (11)

[a] Tenderfoot Creek excluded from averages for "number smolts per mile" and "pounds smolts per mile" due to distortion caused by large rearing population in Mosley Lake.

[b] Mean for 1974 and 1975.

ditions were normal. Water temperatures for these two creeks during the downstream migration period were about 1.5 °C colder in 1975 compared to 1974. Meterological records confirmed that temperatures for March to May, 1975 were considerably below normal, as was precipitation. Meighn Creek seemed particularly affected by low spring precipitation such that flows were negligible at the trap site for about two weeks in mid May. For Tenderfoot and Meighn Creeks, there were two years when age 1. smolts were small in size that were followed by two years when age 2. smolts comprised a higher proportion of the migration (see below). On the basis of these observations, we speculate that the small smolt migration from Meighn Creek was influenced by abnormal temperature and precipitation conditions contributing to poor spring growth for coho smolts, which in turn resulted in a large proportion of the potential age 1. smolts residing in Meighn Creek for an additional year.

Age 1. Fork Length	Percentage Age 2.	Meighn Creek	Tenderfoot Creek
1973 mean FL	(1974 % age 2.)	81 mm (8.6%)	73 mm (19.9%)
1974 mean FL	(1975 % age 2.)	88 mm (2.7%)	97 mm (0.2%)
1975 mean FL		79 mm	84 mm

It would have been valuable to have continued the downstream enumeration and sampling program in 1976 to see if, in fact, Meighn Creek had a high percentage of age 2. smolts in 1976; and to have minnow trapped both creeks during June 1975 to obtain age/size samples and tag the presumed abundance of residual juveniles.

Average smolt production of at least 2100 and 2900 smolts per mile for Meighn Creek and Little Stawamus River respectively, was near the generally accepted standard of 2000 to 4000 smolts per mile noted by Lister (1968 MS). Production of over 18,000 smolts per mile for Tenderfoot Creek is not comparable because the 2.6 acre headwater lake on this system undoubtedly reared the majority of Tenderfoot Creek coho smolts.

To make more accurate production comparisons between stream systems much more thorough bio-physical surveys would be necessary. Glova and Mason (1976 MS; 1976a MS; 1977 MS) have shown that coho juvenile abundance during low flow periods in the late fall tends to be considerably higher in pools and glides, compared to riffles. Therefore the relative extent of these habitats for each stream could have a considerable influence on standardized production factors based on simple denominators such as wetted surface area or accessible stream length. Also it is conceivable that fingerlings immigrate into small tributaries such as Tenderfoot Creek during fall freshets, and if so this would add a further complexity to production estimates.

Regardless of the technical nuances of stream production assessment, it is clear that the three study streams, in particular Tenderfoot Creek and Mosley Lake, represent important rearing areas in the Squamish River system. Their integrity must be maintained to ensure future production of adult coho.

F. Migration Timing

Coho Smolts

Peak migration, as measured by the date on which 50% of the smolts had been captured (Table 8, Figures 17 to 19) averaged (1974 and 1975) about ten days earlier for Little Stawamus River (May 10) compared to Meighn and Tenderfoot Creeks (May 20). Peak migration timing was similar in 1973 and 1974 for Meighn and Tenderfoot Creeks (around May 11); however, in 1975 both creeks peaked approximately two weeks later (around May 26). In comparison, the Little Stawamus peak was only three days later in 1975 compared to 1974 (May 8 versus May 11).

Figures 17 to 19 illustrate changes in the duration of each year's smolt migration. Figures 20 to 22 show daily coho smolt trap counts and daily water temperatures. Note that in 1973 traps were only operated for 36 days compared to 56 days in 1974 and 68 days in 1975 (Table 8).

All migration curves were similar in shape (Figures 17 to 19) with exception of the curves for Meighn and Tenderfoot Creeks in 1975. In these two instances the migrations were considerably extended (see Figure 19).

Water temperatures were generally lower in 1975 and there was a sharp drop in temperature around May 15; however, Tenderfoot Creek had low water temperatures throughout the 1974 migration and there was no significant migration delay, and the Little Stawamus migration was not delayed in 1975 even though water temperatures were about 1 ^{o}C lower than in 1974. In 1973 and 1974 Tenderfoot Creek had the lowest water temperatures, but Tenderfoot smolt migrations peaked within a few days of peak migrations in the other two creeks. So from the available data, water temperature does not show an obvious correlation with annual variation and between creek variation in migration timing.

On the other hand 1975 was an abnormal year for low water flows. Extreme low flows were such that the traps barely fished for 12 days at Meighn Creek and for 5 days at Tenderfoot Creek; Little Stawamus was not affected by low flows. On low flow days many of the smolts could easily swim back up the sluice trough, and at times large schools of smolts were observed just above the fence traps on Tenderfoot and Meighn Creeks. Thus it appears that the fence traps acted as migration barriers under low flow conditions resulting in distorted and extended migration curves for Tenderfoot and Meighn Creeks in 1975; whereas the Little Stawamus River, not being significantly affected by low flows, showed a more normal migration curve for the 1975 season.

Based on these observations we consider the typical Squamish system migration pattern for coho smolts to be represented by the 1974 timing for all creeks and the 1975 timing for the Little Stawamus River. Averaging these values gives a peak timing of May 11, and timing over which one half of each trap's catch occurred (measured on either side of the peak migration date) of May 3 to 18 or 16 days (Table 8). Note that May 11 represented peak timing in 1973 for Meighn and Tenderfoot Creeks.

Table 8. Coho smolt migration timing at each trap site.

Trap Site	Days Traps Fished[a]	Migration Timing	
		Peak	Peak 50% (days fished)
	1973		
Little Stawamus R.	-	-	-
Meighn Creek	35	May 12	May 5-16 (12)
Tenderfoot Creek	36	May 10	May 4-14 (11)
Mean	36	May 11	May 5-15 (11)
	1974		
Little Stawamus R.	56	May 8	May 1-16 (16)
Meighn Creek	57	May 10	May 4-15 (12)
Tenderfoot Creek	55	May 15	May 6-23 (18)
Mean	56	May 11	May 3-18 (16)
	1975		
Little Stawamus R.	68	May 11	May 3-18 (16)
Meighn Creek	68	May 29	May 8-June 4 (28)
Tenderfoot Creek	68	May 24	May 12-31 (20)
Mean[b]	68	May 21	May 8-28 (21)
	Average of 1974 and 1975		
Little Stawamus R.	62	May 10	May 2-17 (16)
Meighn Creek	53	May 20	May 6-25 (20)
Tenderfoot Creek	53	May 20	May 9-27 (19)
Mean[b]	59	May 11	May 3-18 (16)

[a] Installation date to removal date

[b] Mean excludes Tenderfoot and Meighn Creeks in 1975, see discussion on page 36.

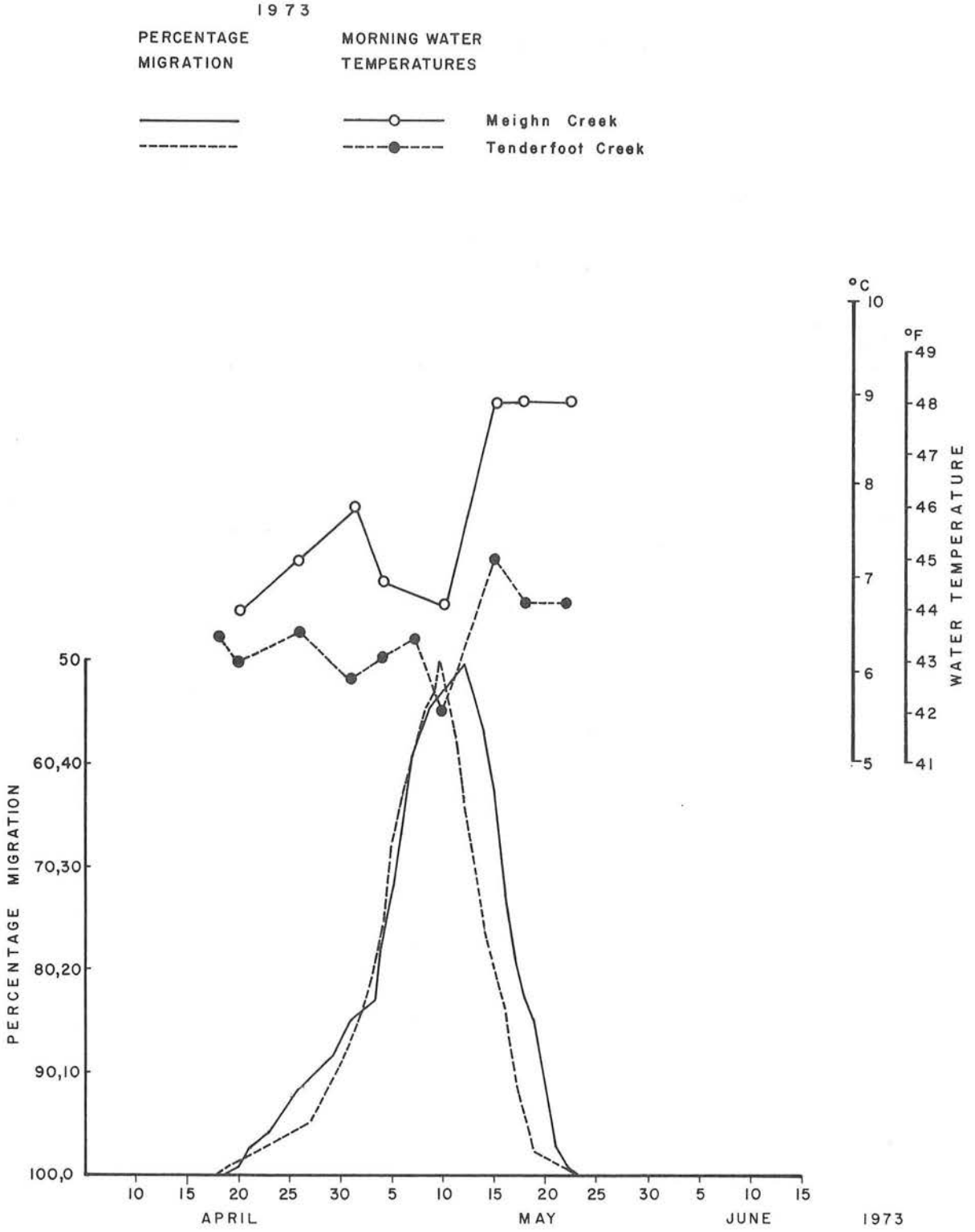

Figure 17. Comparison of coho smolt migration timing with morning water temperatures (approx. 5 day intervals) for Meighn Creek and Tenderfoot Creek, 1973. Left limb of migration curve equals zero to 50 percent of migration, right limb equals 50 percent to 100 percent of migration.

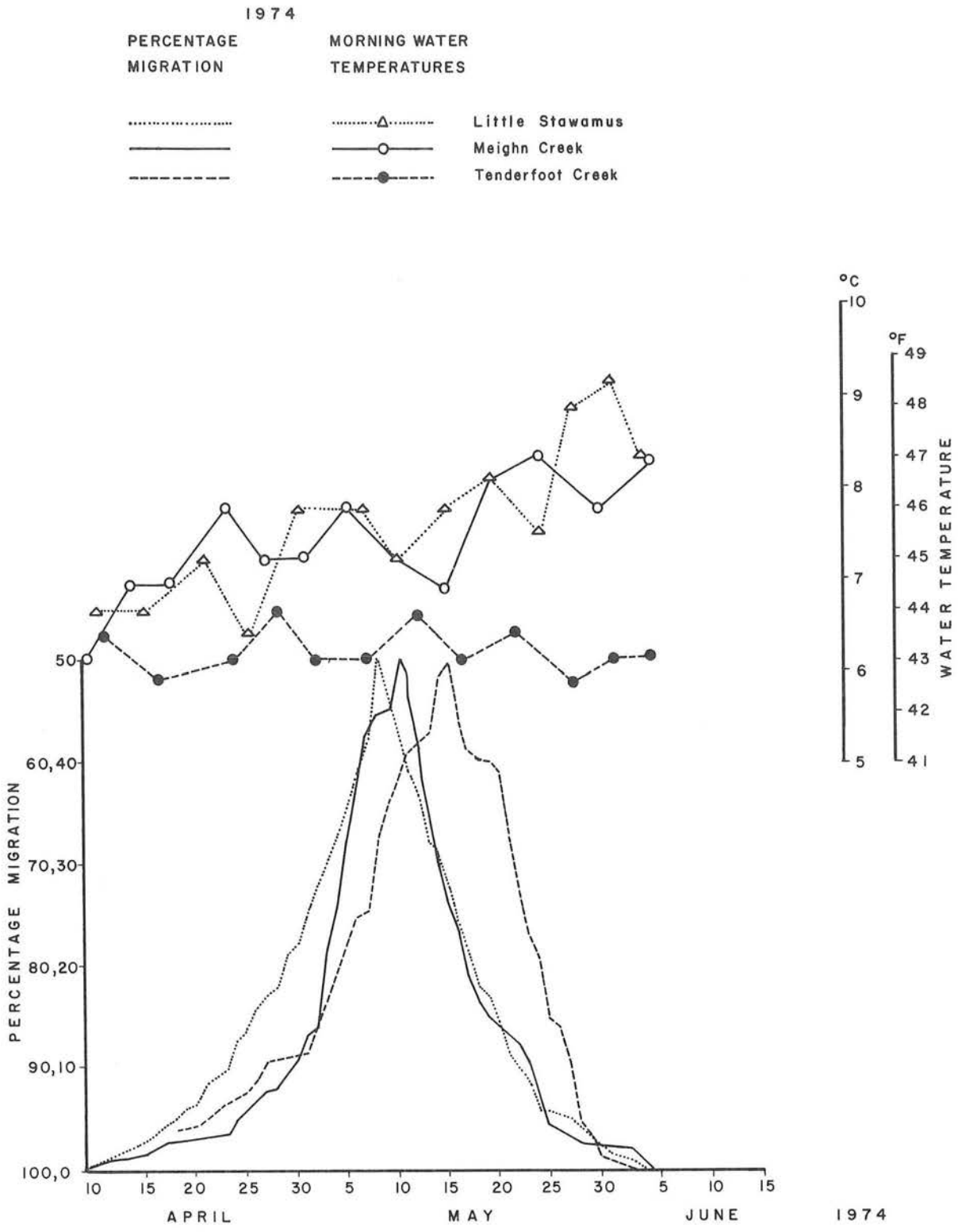

Figure 18. Comparison of coho smolt migration timing with morning water temperatures (approx. 5 day intervals) for Little Stawamus River, Meighn Creek and Tenderfoot Creek, 1974. Left limb of migration curve equals zero to 50 percent of migration, right limb equals 50 percent to 100 percent of migration.

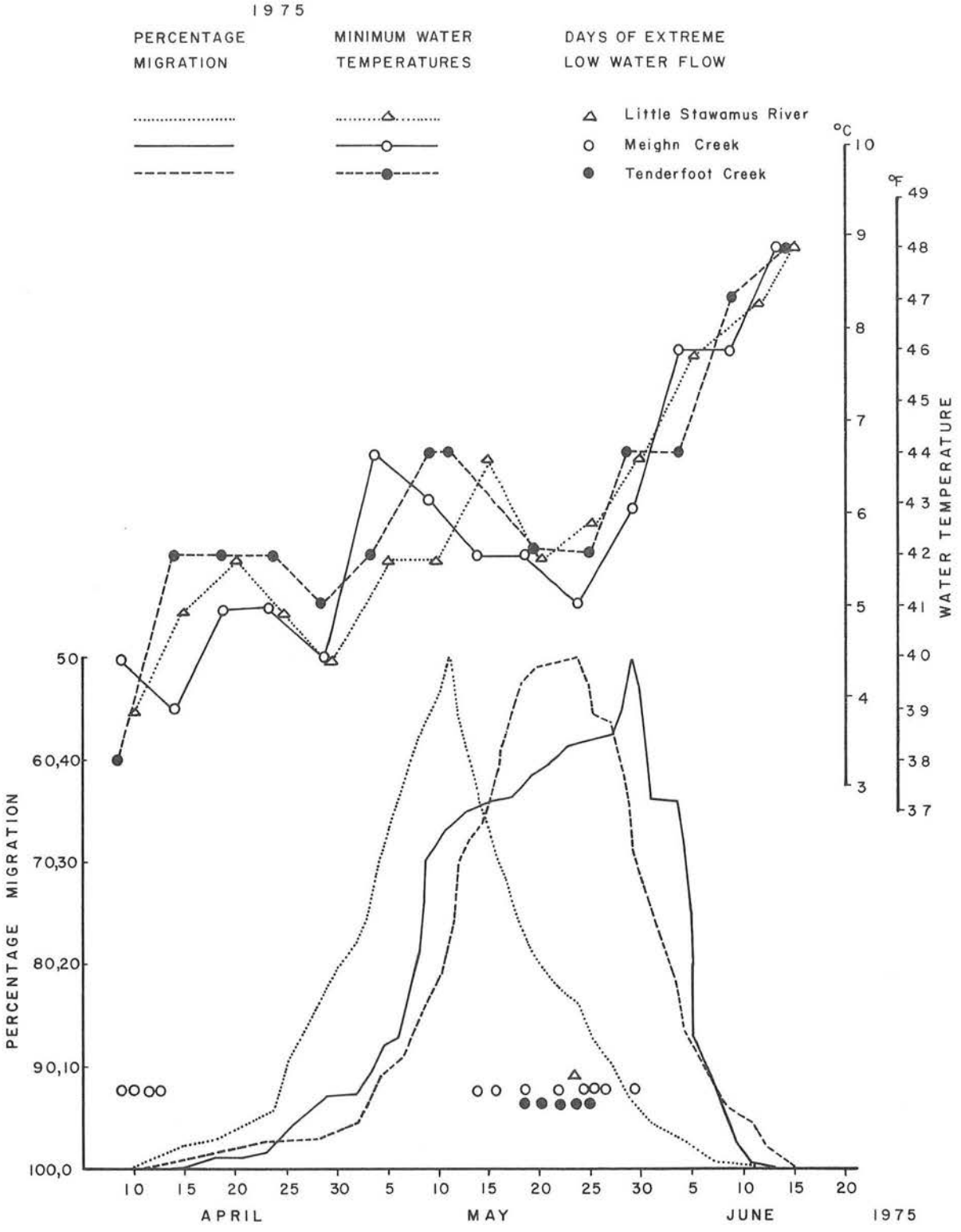

Figure 19. Comparison of coho smolt migration timing with daily minimum water temperatures (approx. 5 day intervals) for Little Stawamus River, Meighn Creek and Tenderfoot Creek, 1975. Left limb of migration curve equals zero to 50 percent of migration, right limb equals 50 percent to 100 percent of migration.

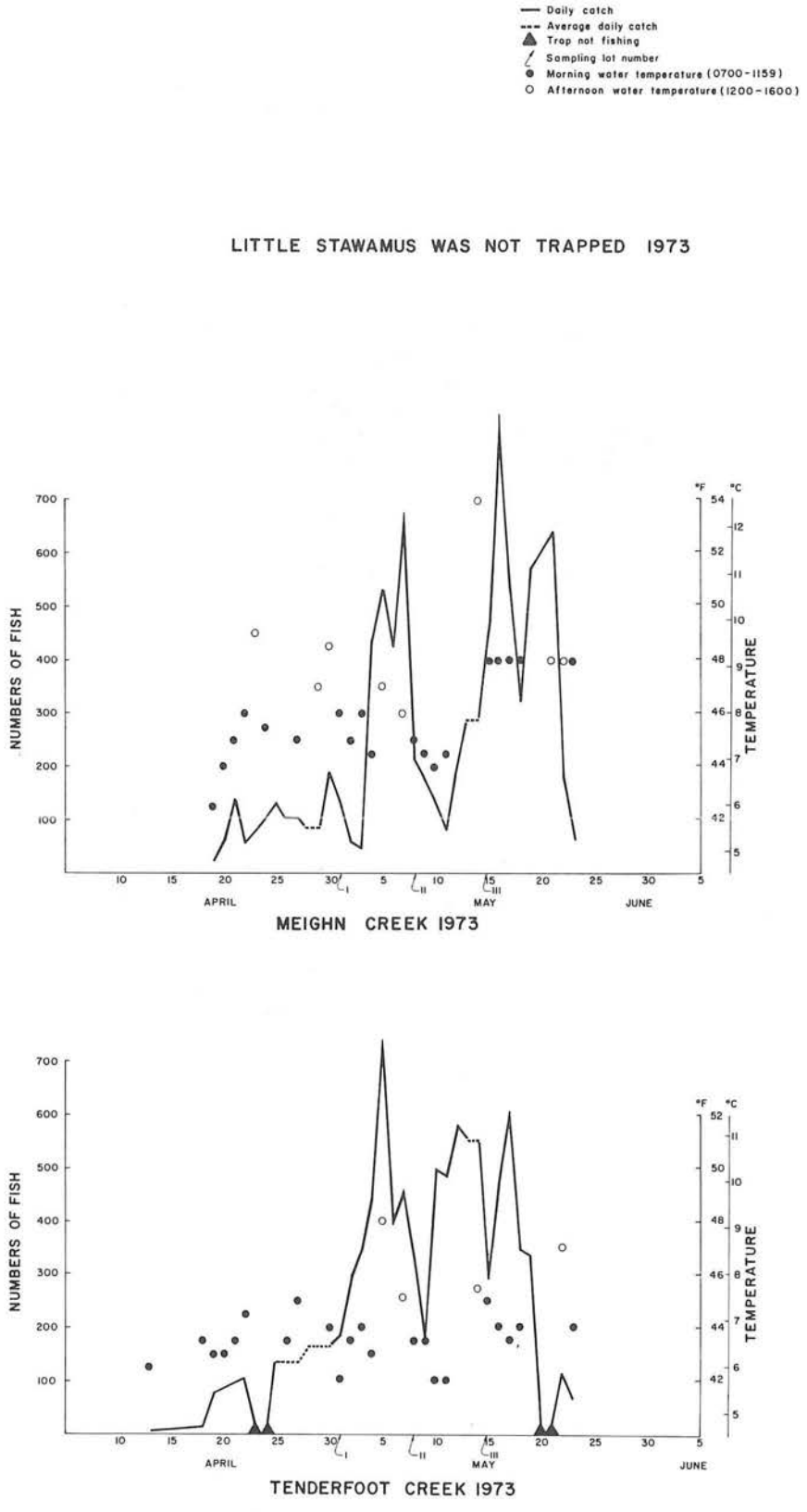

Figure 20. Daily coho smolt trap counts and daily water temperatures, 1973.

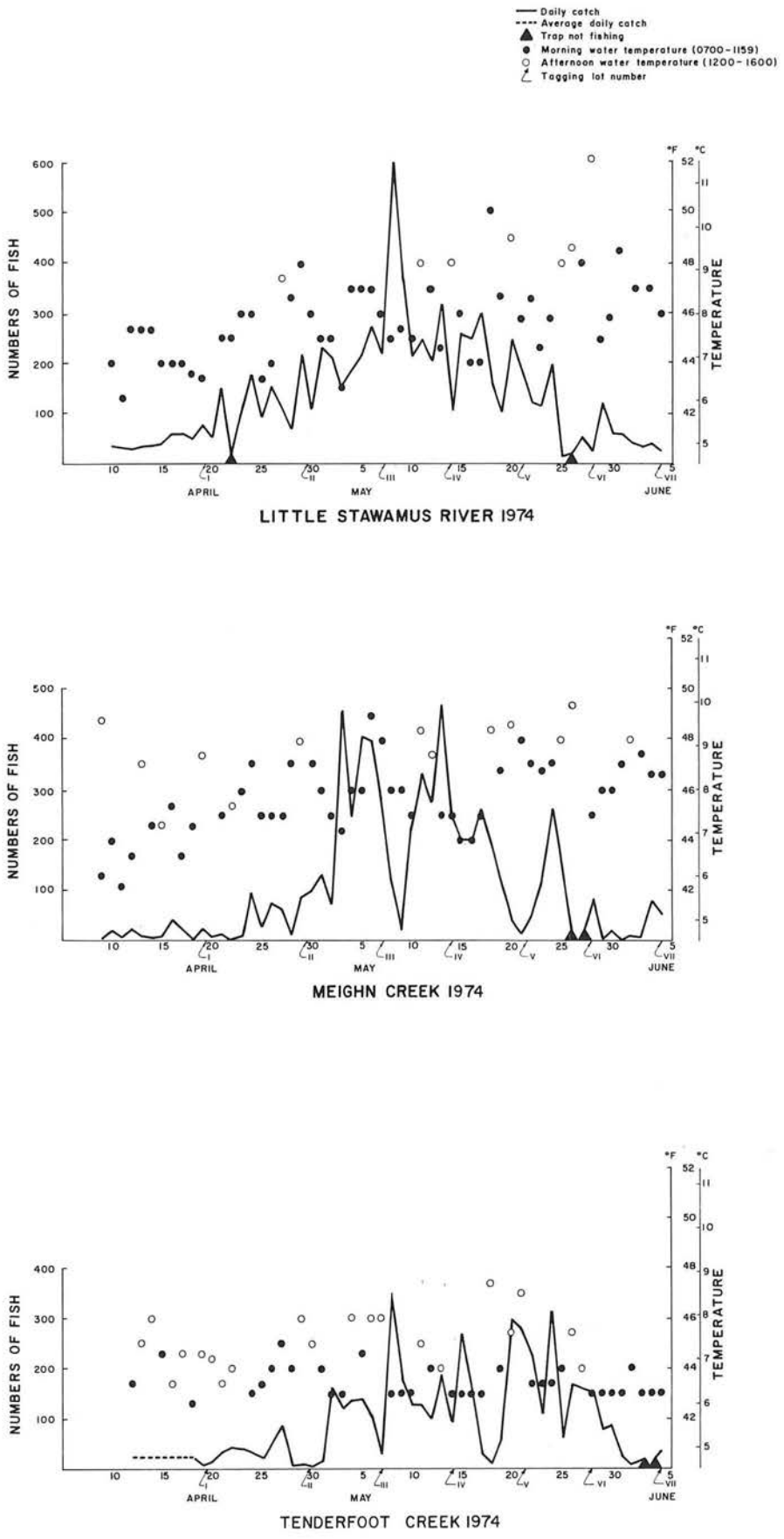

Figure 21. Daily coho smolt trap counts and daily water temperatures, 1974.

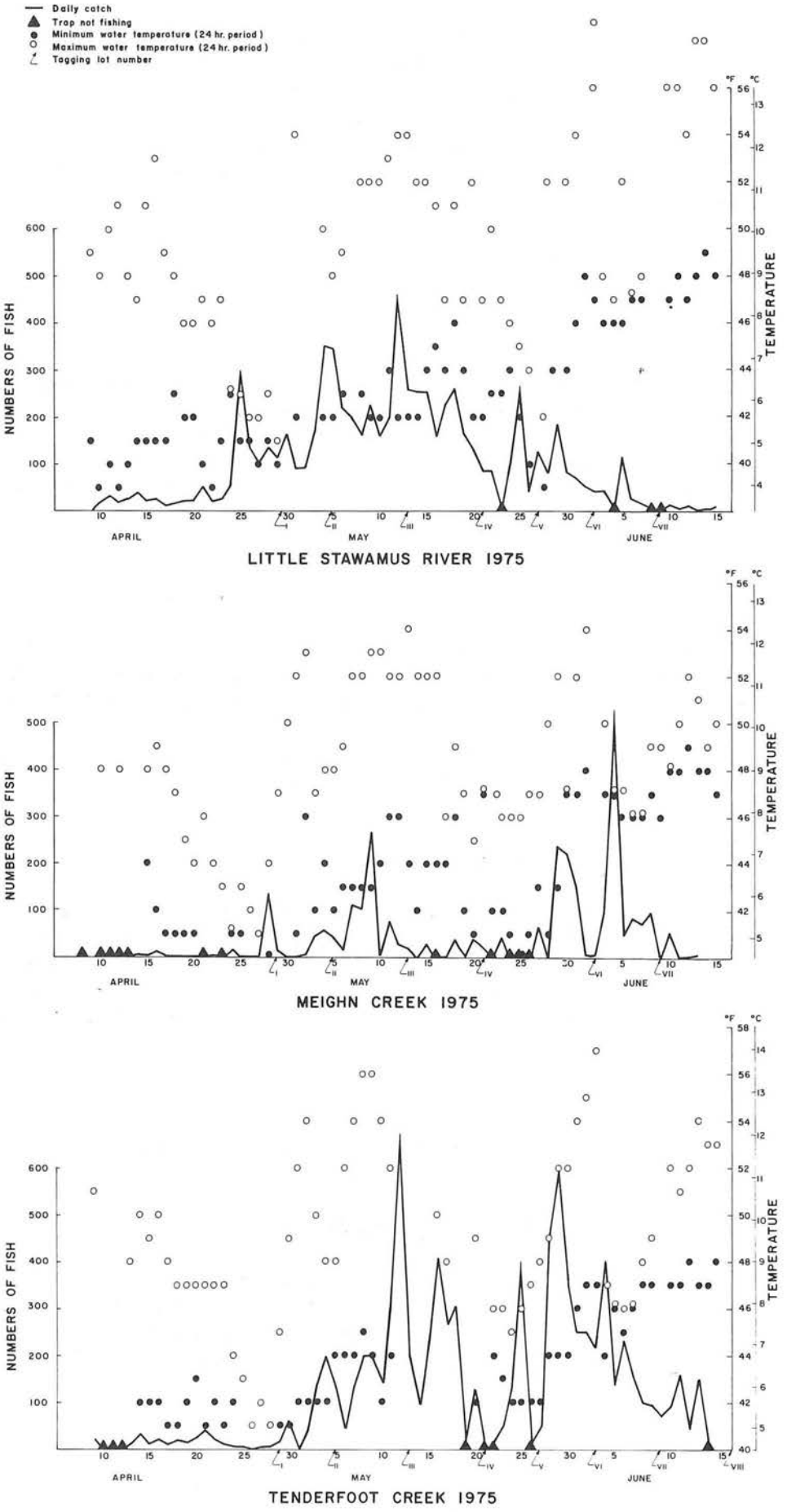

Figure 22. Daily coho smolt trap counts and daily water temperatures, 1975.

On the basis of the above adjustments, Squamish system coho smolt migrations peaked approximately ten days earlier than coho smolt migrations in east coast of Vancouver Island rivers such as the Cowichan River in 1975, the Big Qualicum River in 1973 and 1974 and Lynn Creek in 1972 (Armstrong and Argue, 1977; Paine et al., 1975; Sandercock and Minaker, 1975; Mason, 1975). The duration of 50 percent of the migration was approximately the same for all four river systems.

If objectives were simply to tag a fixed number of coho smolts, then by operating traps only during the peak 60 to 70 % migration period (16 to 22 days) trapping time could be reduced by approximately 60%, giving a considerable saving in cost.

As mentioned above, water temperature fluctuations showed no clear correlation with annual or between creek fluctuations in migration timing. However, on both the Cowichan system (Armstrong and Argue, 1977) and for Squamish study creeks (except Tenderfoot, 1974) all smolt migration peaks occurred during or just before periods of rapidly increasing water temperature.

Comparison Age 1. and 2. Coho Smolt Migration Timing

Table 9 presents numbers of age 1. and 2. coho smolts migrating each week and cumulative percentage migration for standardized weekly periods in 1974 and 1975. In the table, catches from all three creeks have been combined. In both years 50 percent of the age 2. coho smolts had been enumerated about one week earlier than 50 percent of age 1. coho smolts. The earlier age 2. migration was most pronounced in 1975.

Steelhead Smolts

Table 10 presents numbers and cumulative percentage of steelhead smolts migrating in 1974 and 1975, for standardized weekly periods (as above) and for all creeks combined. From the table it is apparent that the steelhead smolt migration peaked during or just before the last week in April, or approximately two weeks before the peak of the age 1. coho smolt migration.

G. Size and Age of Coho Smolt Migrants

Appendix Tables I to P present weekly age/length frequency data for each study stream.

Coho Smolt Length

Tenderfoot Creek age 1. coho smolts were, with exception of 1973, significantly larger ($p < 0.01$) in fork length than Meighn Creek and Little Stawamus River age 1. coho smolts (see below and Figures 23 to 25). Tenderfoot Creek smolts were significantly smaller ($p < 0.01$) in 1973. The 1973

Table 9. Migration timing for age 1. and 2. coho smolts. Catches cumulated for all tagging streams by tagging week.

		April		May				June		Total
		Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	
					1974					
Age 1.	Nos.	628	1664	3162	3916	2990	2168	679	-	15207
	Cum. %	4%	15%	36%	62%	81%	96%	100%	-	
Age 2.	Nos.	103	251	786	912	570	102	12	-	2736
	Cum. %	4%	13%	42%	75%	96%	99%	100%	-	
					1975					
Age 1.	Nos.	-	1458	1988	3519	2751	1326	2738	2434[b]	16214
	Cum. %	-	9%	22%	44%	61%	70%	87%	100%	
Age 2.	Nos.	-	36	92	135	82	8	76	19	448
	Cum. %	-	8%	29%	59%	77%	79%	96%	100%	

[a] Source data: Numbers caught from "No. Tagged" column in Tables 3 and 4, and assigned to ages based on age compositions from Table 13.

[b] June 16 sample from Tenderfoot Creek included (all age 1.).

Table 10. Migration timing for steelhead smolts. Catches cumulated for all tagging streams by tagging week.

		April		May				June		Total
		Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	
1974	Numbers	-	-	29	17	4	1	1	-	52
	Cum. %	-	-	56%	88%	96%	98%	100%	-	
1975	Numbers	No Count	41	27	20	5	2	5	2	102
	Cum. %		40%	67%	86%	91%	93%	98%	100%	

[a] Source data: Numbers caught from "No. Tagged" column in Tables 3 and 4.

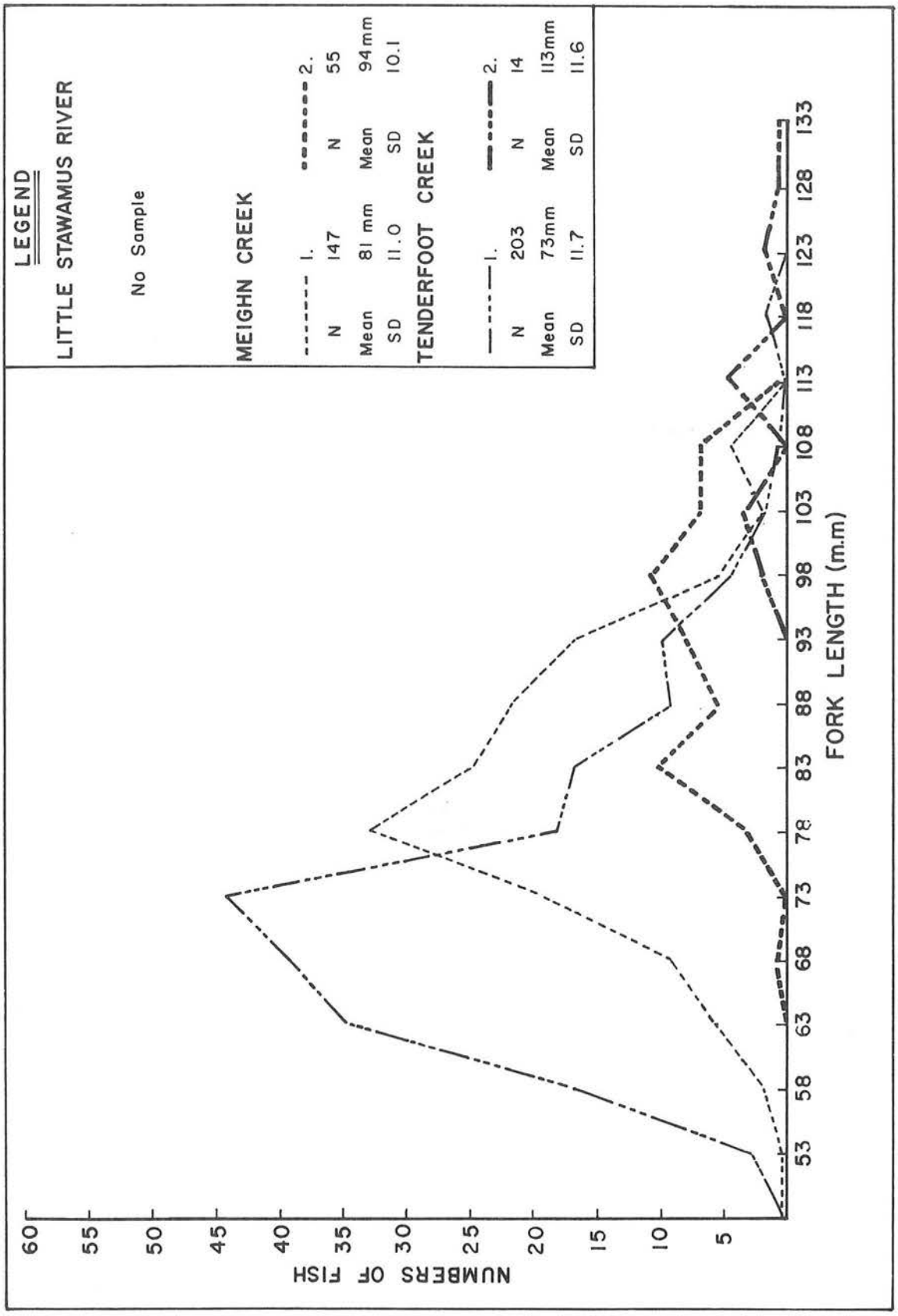

Figure 23. Total season fork length frequency distributions (unweighted) for age 1. and 2. coho smolts at the two trapping locations, 1973.

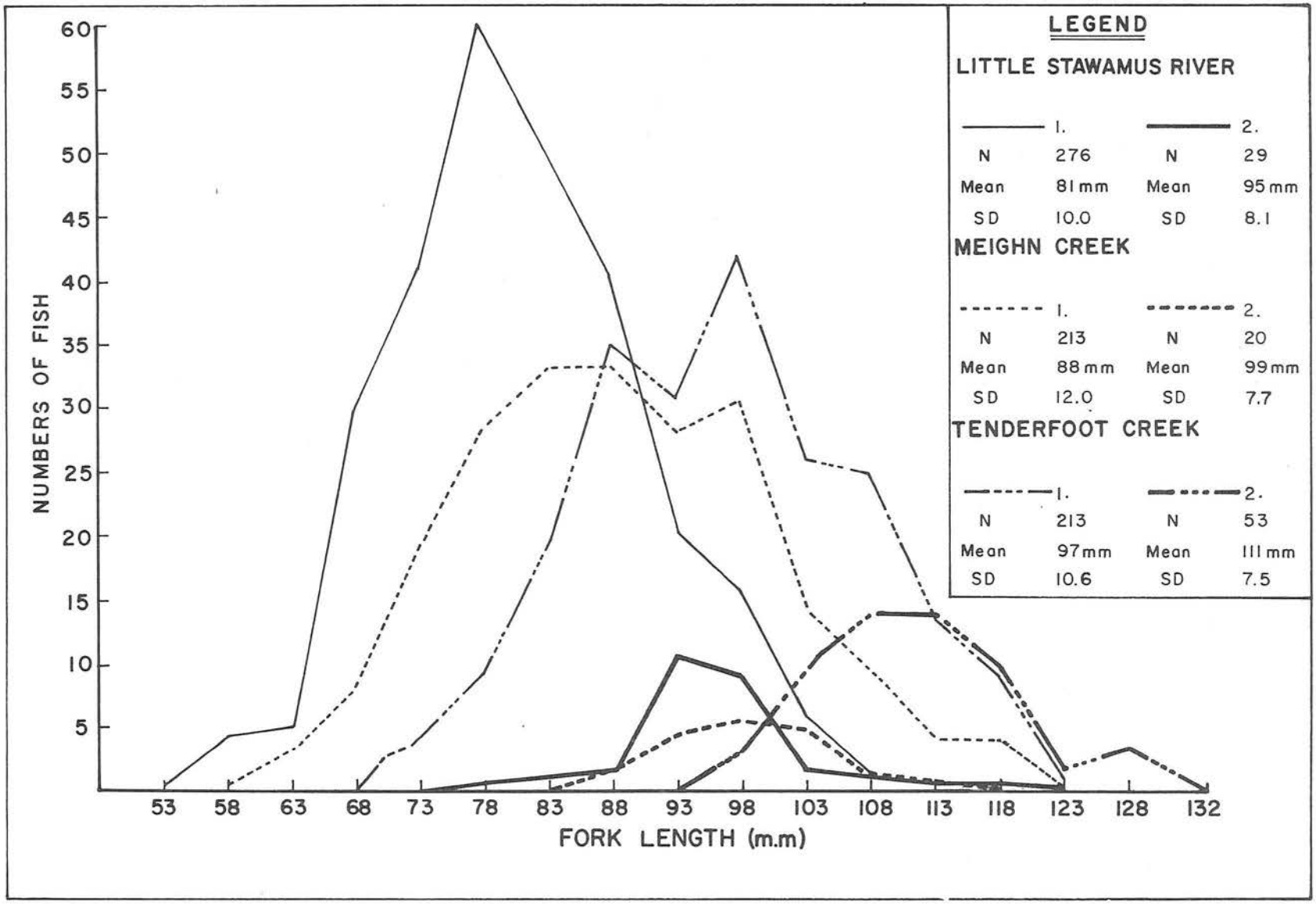

Figure 24. Total season fork length frequency distributions (unweighted) for age 1. and 2. coho smolts at the three tagging locations, 1974.

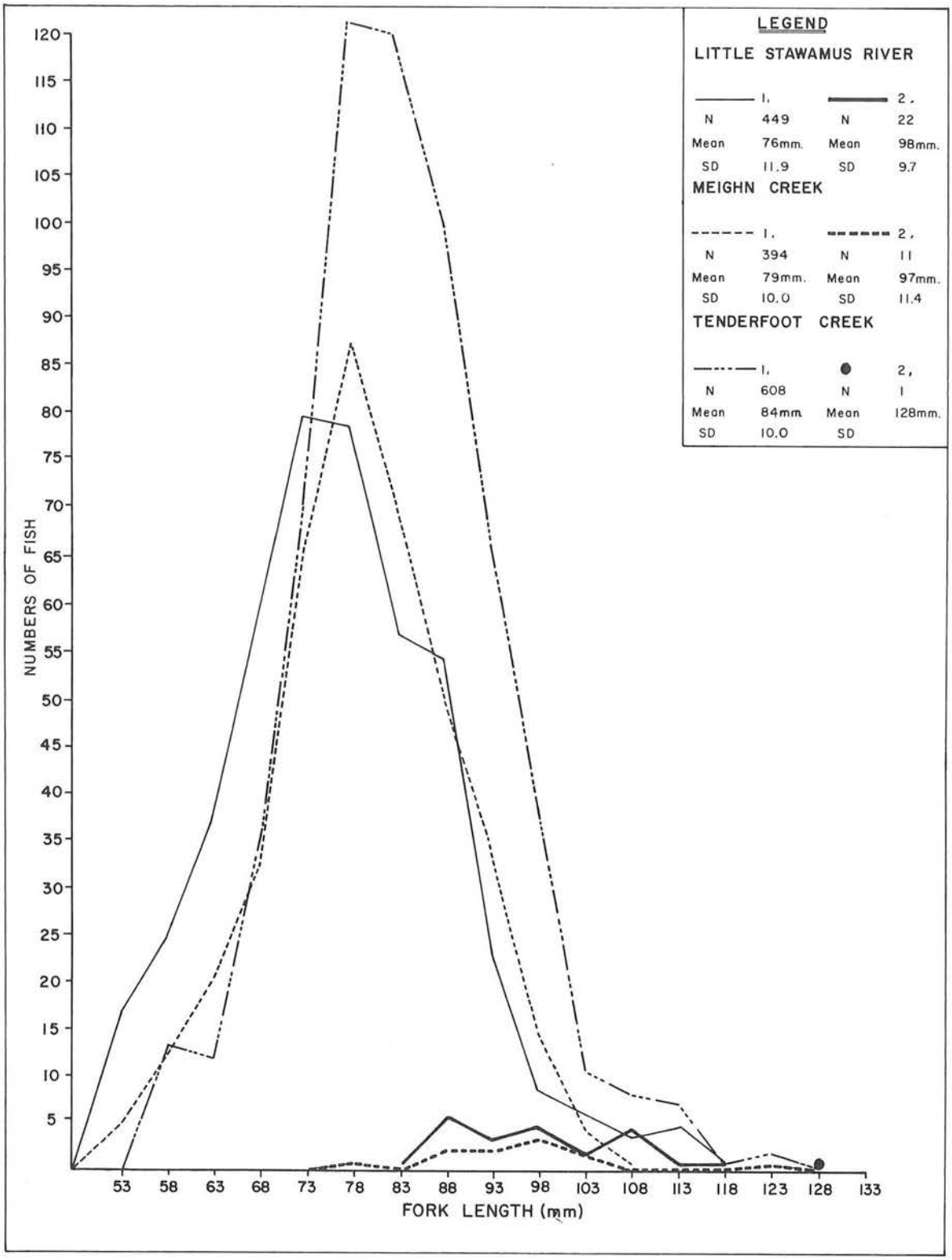

Figure 25. Total season fork length frequency distributions (unweighted) for age 1. and 2. coho smolts at the three tagging locations, 1975.

	Little Stawamus	Meighn	Tenderfoot
1973	-	81 mm (147)	73 mm (203)
1974	81 mm (276)[a]	88 mm (213)	97 mm (213)
1975	76 mm (449)	79 mm (394)	84 mm (608)

[a] Sample size in brackets

smolt migration from Tenderfoot Creek was somewhat atypical as a significant fraction of the early migrants were classified as presmolts based on retention of prominent parr markings and anal fin markings. Mason (1975) observed a similar early outmigration of presmolt coho on Lymn Creek in 1972.

Little Stawamus age 1. coho smolts were significantly smaller ($p < 0.01$) than Meighn Creek age 1. smolts in 1974 and 1975.

Tenderfoot Creek age 2. smolts were also significantly larger ($p < 0.01$) than Meighn Creek and Little Stawamus River smolts (see below) in 1973 and 1974; Meighn Creek age 2. smolts were significantly larger ($p < 0.01$) than Little Stawamus smolts in 1974, but they did not differ significantly in 1975 ($p > 0.05$).

	Little Stawamus	Meighn	Tenderfoot
1973	-	94 mm (55)	113 mm (14)
1974	95 mm (29)	99 mm (20)	111 mm (53)
1975	98 mm (22)	97 mm (11)	Insufficient Sample

Annual differences in average fork length for each creek were significant ($p < 0.01$) in all cases for age 1. smolts (except Meighn Creek 1973 vs 1975), but were only significant in one instance for age 2. smolts (Meighn Creek 1973 vs 1974).

In brief, Tenderfoot Creek smolts were larger than smolts from the other two study streams, and Meighn Creek smolts were larger than Little Stawamus River smolts. Also, within each creek there appears to be greater annual variation in the average size of age 1. smolts than for age 2. smolts. Perhaps during the additional year of freshwater growth age 1. smolts adjust growth rates to produce a relatively uniform size of age 2. smolt. Squamish coho smolts averaged between 10 mm and 20 mm less in fork length than Cowichan and Big Qualicum coho smolts (Armstrong and Argue, 1977; Paine et al., 1975; Sandercock and Minaker, 1975).

Previously we noted that age 2. coho smolts tended to migrate earlier than age 1. coho smolts. As a follow-up to this we examined whether there were any temporal trends in average size of smolt migrants within each age

class. Weekly size frequency distributions for each age class and study stream for 1973, 1974 and 1975 are presented in Figures 26, 27 and 28 respectively. Table 11 presents combined study stream averages of mean fork lengths (from Figures 27 and 28) for both smolt age classes in 1974 and 1975.

Coho smolts appeared to be smallest during the first few weeks of the downstream migration, largest at or just after the peak, and then returned to a somewhat smaller average length towards the end of the downstream migration. These differences were not tested statistically.

Coho Smolt Weight

Estimates of the average weight of tagged coho smolts at each site, and for each year, were calculated from average seasonal fork length data (aged and unaged samples combined) and condition coefficients, K, as follows:

$$\text{Weight (g)} = K(\text{fork length in mm})^3(1 \times 10^{-5})$$

Since smolt weights were not measured during the three study years, we used the average of 1973 and 1974 mean daily K values (average K = 1.0418) for smolts migrating from the Hunts Creek flood channel at the Big Qualicum project (Paine et al., 1975; Sandercock and Minaker, 1975) to calculate smolt weights from average fork length data for Squamish system coho. Table 12 presents numbers of smolts per pound and kilogram for untagged smolts in 1973, and for each tag code in 1974 and 1975. Average weights, calculated as above, were used in the "Coho Smolt Density" section to estimate pounds of smolts produced for each study stream.

It is generally accepted that marine survival is positively related to average smolt size. Tagged coho smolts were 38% heavier in 1974 than in 1975 (Table 12). Accordingly, we expect that 1972 brood coho smolts, tagged in 1974, will have higher marine survival than 1973 brood coho smolts tagged in 1975.

Coho Smolt Age

In 1973 and 1974 the study streams had a somewhat higher percentage of age 2. smolts, 16.8% and 12.7% respectively (Table 13), than is commonly expected based on ocean catch sampling (Milne, 1964 MS). In 1975, age 2. smolts dropped to an average of 2.5% of the total migration, which was almost identical to the age 2. contribution to the 1975 Cowichan system smolt migration (Armstrong and Argue, 1977), and was similar to ocean age compositions for adult coho. Tenderfoot Creek had the highest percentage of age 2. smolts, 10% averaged over 1974 and 1975; Meighn Creek and Little Stawamus Rivers averaged 5.6% and 7.1% age 2. smolts respectively. As previously discussed (page 35), years with a high percentage of age 2. smolts followed years when age 1. smolts were smallest in size. Average age composition of coho smolt migrants was approximately 92% age 1. and 8% age 2. for all study creeks in 1974 and 1975.

Table 11. Coho smolt average fork length (mm) for all streams, by tagging week.[a]

	April		May				June	
	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2
				1974				
Age 1.	85	88	92	91	89	86	87	-
Age 2.	108	101	101	102	102	105	102	-
				1975				
Age 1.	-	74	77	80	82	85	80	81
Age 2.	-	86	94	108	103	113	102	103

[a] Source data: Average of mean lengths from Figures 27 and 28.

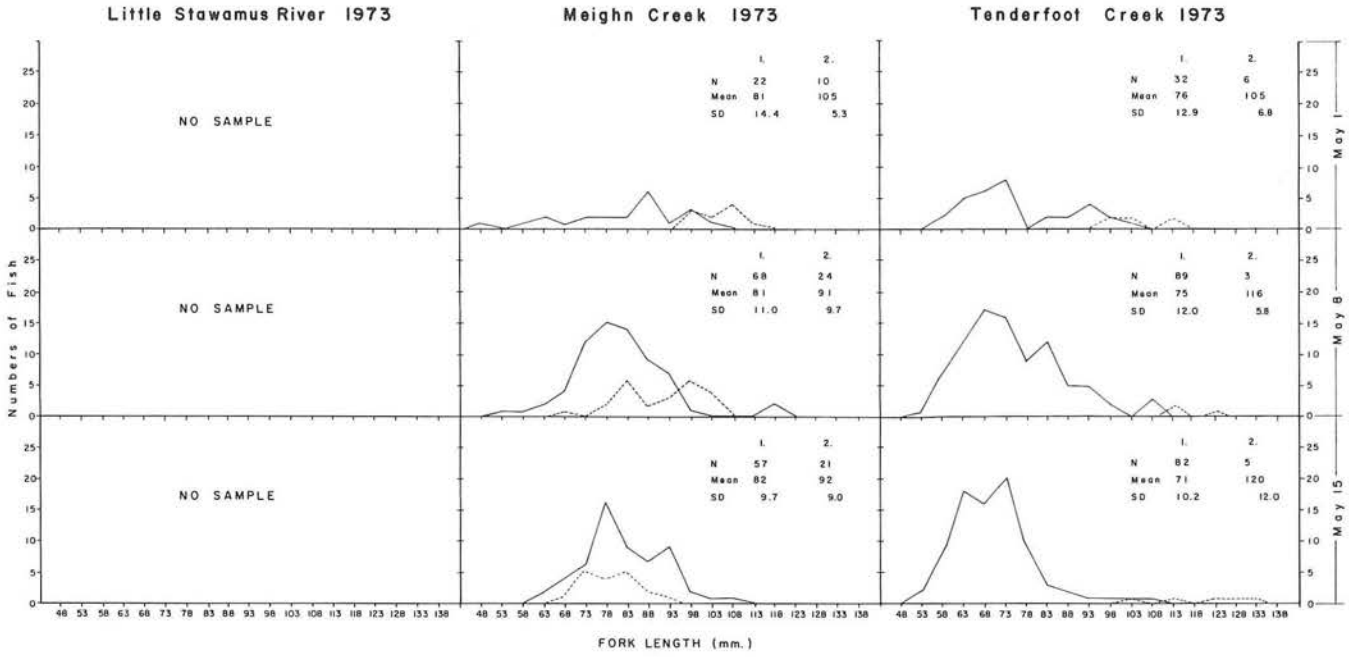

Figure 26. Age 1. and 2. coho smolt fork length frequency distributions for weekly periods at 1973 enumeration sites (Age 1. solid line, Age 2. dotted line.)

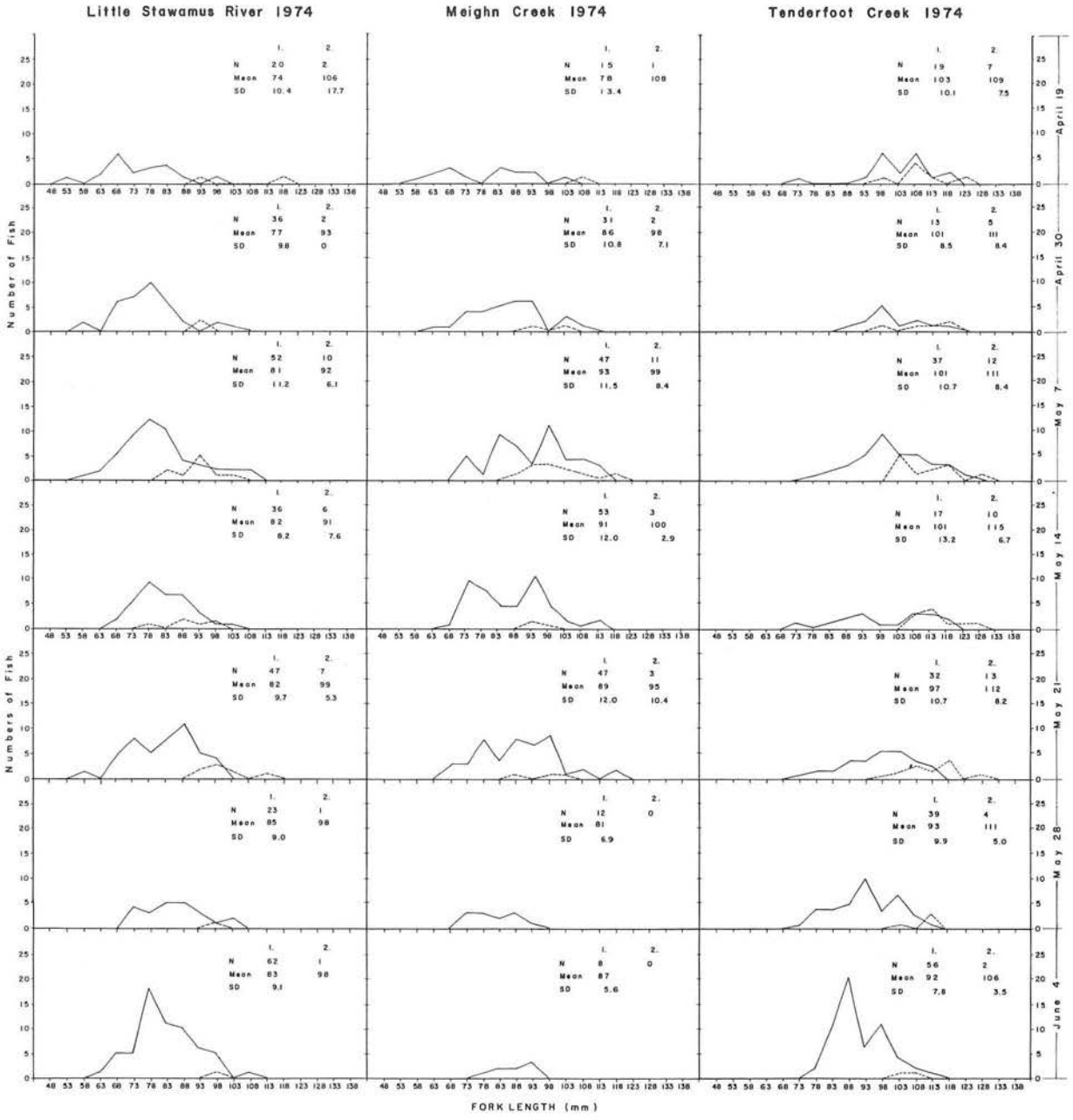

Figure 27. Age 1. and 2. coho smolt fork length frequency distributions for weekly periods at 1974 tagging sites (Age 1. solid line, Age 2. dotted line.)

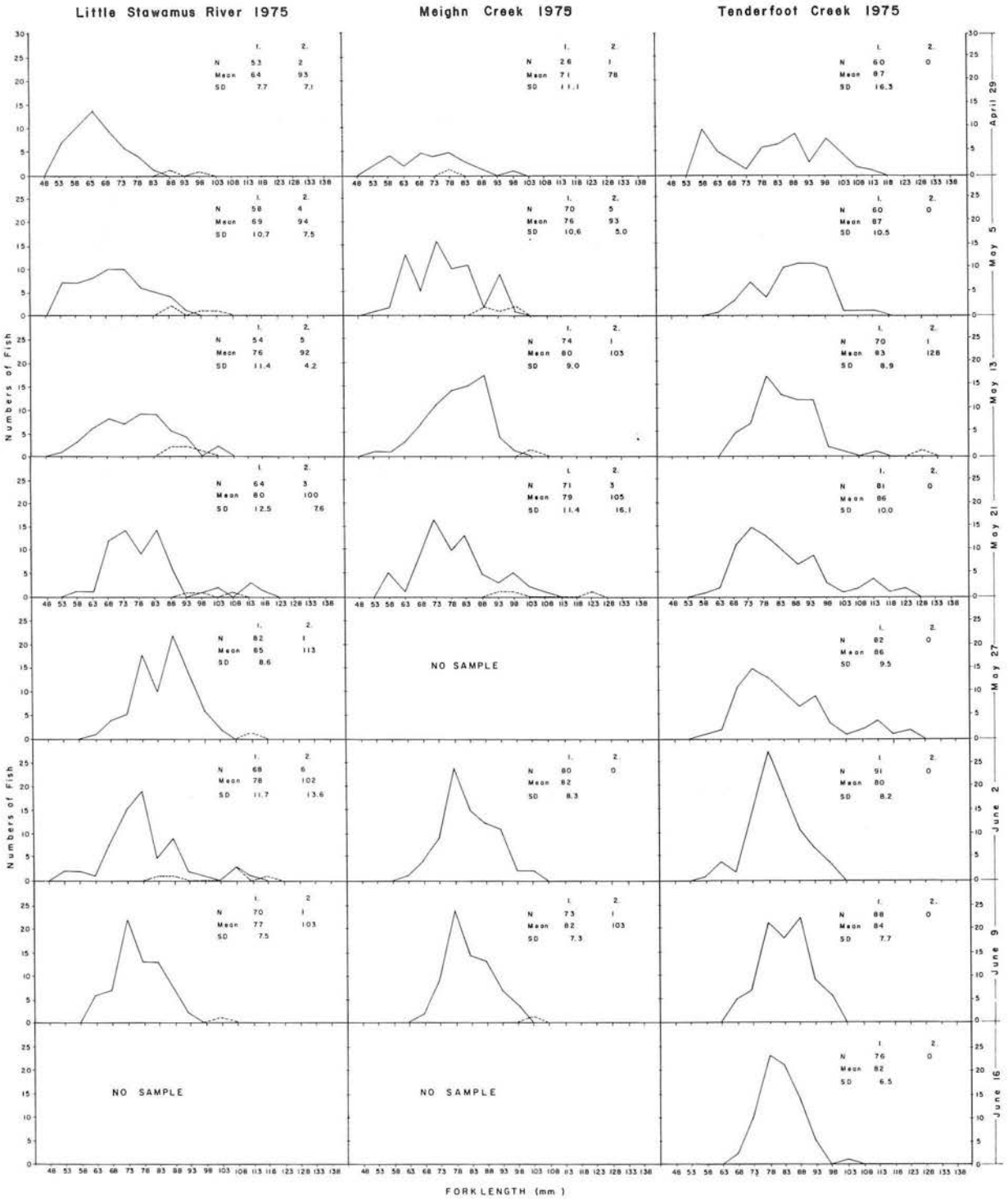

Figure 28. Age 1. and 2. coho smolt fork length frequency distributions for weekly periods at 1975 tagging sites (Age 1. solid line, Age 2. dotted line.)

Table 12. Numbers of coho smolts per pound (kg) for untagged smolts in 1973 and each tag code in 1974 and 1975.

	Tagging Year	Tag Data Codes (Agency 2)	Numbers / lb (Numbers / kg)
Little Stawamus River	1974	1/5	70.9 (156)
	1975	8/5	88.3 (195)
Meighn Creek	1973	untagged	70.9 (156)
	1974	2/5	59.8 (132)
	1975	5/5	81.9 (181)
Tenderfoot Creek	1973	untagged	91.8 (202)
	1974	3/5	39.9 (88)
	1975	4/5	70.9 (156)
	1975	15/5	103.1 (227)
Annual Average[a]	1973	-	81.8 (180)
	1974	-	58.6 (129)
	1975	-	81.0 (179)
	mean		69.8 (154)

[a] Annual averages weighted to numbers caught/tagged.

Table 13. Percentage age composition for coho smolts.

	April				May								June				Total		
	Week 3		Week 4		Week 1		Week 2		Week 3		Week 4		Week 1		Week 2				
Age	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	N	1.	2.
								1973											
Meighn Creek	-	-	68.7	31.3	73.9	26.1	73.1	26.9	-	-	-	-	-	-	-	-	402	72.8	27.2
Tenderfoot Creek	-	-	84.2	15.8	96.7	3.3	94.3	5.7	-	-	-	-	-	-	-	-	217	93.5	6.5
Average %	-	-	76.5	23.5	85.3	14.7	83.7	16.3	-	-	-	-	-	-	-	-		83.2	16.8
								1974											
Little Stawamus R.	90.9	9.1	94.7	5.3	83.9	16.1	85.7	14.3	87.0	13.0	95.8	4.2	98.4	1.6	-	-	305	90.5	9.5
Meighn Creek	93.8	6.2	93.9	6.1	81.0	19.0	94.6	5.4	94.0	6.0	100	-	100	-	-	-	233	91.4	8.6
Tenderfoot Creek	73.1	26.9	72.2	27.8	75.5	24.5	63.0	37.0	71.1	28.9	90.7	9.3	96.6	3.4	-	-	266	80.1	19.9
Average %	85.9	14.1	86.9	13.1	80.1	19.9	81.1	18.9	84.0	16.0	95.5	4.5	98.3	1.7	-	-		87.3	12.7
								1975											
Little Stawamus R.	-	-	96.4	3.6	93.5	6.5	91.5	8.5	95.5	4.5	98.8	1.2	91.9	8.1	98.6	1.4	471	95.3	4.7
Meighn Creek	-	-	96.3	3.7	93.3	6.7	98.7	1.3	95.9	4.1	-	-	100	-	98.6	1.4	405	97.3	2.7
Tenderfoot Creek	-	-	100	-	100	-	98.6	1.4	100	-	100	-	100	-	100	-	609	99.8	0.2
Average %	-	-	97.6	2.4	95.6	4.4	96.3	3.7	97.1	2.9	99.4	0.6	97.3	2.7	99.1	0.9		97.5	2.5
								Average % (1974 and 1975)											
Little Stawamus R.	-	-	95.6	4.4	88.7	11.3	88.6	11.4	91.3	8.7	97.3	2.7	95.2	4.8	-	-		92.9	7.1
Meighn Creek	-	-	95.1	4.9	87.2	12.8	96.7	3.3	95.0	5.0	100	-	100	-	-	-		94.4	5.6
Tenderfoot Creek	-	-	86.1	13.9	87.8	12.2	80.8	9.2	85.6	4.4	95.4	4.6	98.3	1.7	-	-		90.0	10.0
Average %	-	-	92.3	7.7	87.9	12.1	88.7	11.3	90.6	9.4	97.5	2.5	97.8	2.2	-	-		92.4	7.6

SUMMARY

Coho salmon smolts from two small tributaries on the Squamish River system were enumerated in the spring of 1973 to determine whether sufficient numbers could be trapped for a coded-wire tagging (CWT) program. Adequate numbers were trapped in 1973, so between mid April and early June in the following two years trapping and tagging took place on the two 1973 study streams, Meighn Creek, a tributary of the lower Squamish River and Tenderfoot Creek, a tributary of the lower Cheakamus River, as well as on one additional stream, the Little Stawamus River, a tributary of the Stawamus River which enters the Squamish estuary through Mamquam Blind Channel.

Coho smolts were coded-wire-tagged to assess ocean migration patterns and fishery contributions for a wild stock of coho salmon. A small number of steelhead smolts were tagged on each study stream using coho tag codes. General biological characteristics were recorded for downstream migrants from each study stream. Major findings are summarized below:

1. 17,679 coho smolts were trapped in 1973; 17,849 coho smolts were tagged in 1974; and 17,678 coho smolts were tagged in 1975. Holding and immediate tagging mortality was negligible,

2. for 1974 and 1975 combined, coho smolt CWT totals by study stream were 13,186 for the Little Stawamus River, 8,327 for Meighn Creek and 14,014 for Tenderfoot Creek,

3. 23 steelhead smolts were trapped in 1973; 52 steelhead smolts were tagged with coho tag codes in 1974; and 102 steelhead smolts were tagged with coho tag codes in 1975,

4. for 1974 and 1975 combined, steelhead smolt CWT totals by study stream were 70 for the Little Stawamus River, 9 for Meighn Creek and 75 for Tenderfoot Creek,

5. in 1974 the incidence of naturally missing adipose fins for all study streams was 1 in 1,312,

6. one test for tag retention using Tenderfoot Creek coho pre-smolts tagged on March 22, 1975 and recovered between May 22 and June 15, 1975 showed no significant tag loss,

7. a test of trap efficiency on Tenderfoot Creek, based on the March 22, 1975 release, suggested that this trap may capture as little as 50% of the smolt migration; this test likely underestimated trap efficiency,

8. minimum coho smolt densities were generally in excess of 40 per 100 yd^2 (48/100 m^2) for all study streams and survey years, and in

three instances exceeded 60/100 yd^2 (72/100 m^2); clearly the study creeks are important coho rearing areas deserving of protection from habitat degradation,

9. minimum coho smolt densities, expressed in pounds per 100 yd^2 (100 m^2), generally exceeded 0.6 pounds (0.3 kg) and in four instances exceeded 0.8 pounds (0.4 kg) per 100 yd^2 (100 m^2),

10. for Tenderfoot Creek, numerical coho smolt density varied two-fold between years whereas biomass per unit area remained relatively constant,

11. for Meighn Creek and Little Stawamus River, numbers of coho smolts per accessible stream mile averaged 2100 and 2900 respectively (1300 and 1800 per km),

12. the peak coho smolt migration was relatively constant each year averaging approximately May 11; one-half of each trap's catch occurred over approximately 8 days on either side of the peak,

13. the steelhead smolt migration peaked approximately two weeks earlier than the coho smolt migration,

14. age 2. coho smolts migrated about one week earlier than age 1. coho smolts,

15. Squamish system coho smolts averaged between 10 mm and 20 mm less in fork length than coho smolts from the Cowichan and Big Qualicum Rivers on Vancouver Island; Squamish system smolts also appear to migrate about 10 days earlier than smolts from Cowichan and Big Qualicum Rivers and they are exposed to generally colder spring water temperatures than Vancouver Island coho smolts,

16. in 1974 and 1975 age 1. coho smolts were largest in Tenderfoot Creek (average fork length 97 mm and 84 mm); Meighn Creek age 1. smolts averaged 88 mm and 79 mm; and Little Stawamus age 1. smolts averaged 81 mm and 76 mm,

17. in 1974 and 1975 age 2. coho smolts were similar in fork length for Little Stawamus River and Meighn Creek, ranging in average size from 95 mm to 99 mm, and were largest in Tenderfoot Creek, averaging over 110 mm fork length,

18. age 1. coho smolts varied considerably in length between years for each study creek; coho smolts were smallest in 1975,

19. the largest coho smolts of each age class tended to migrate near or just after the peak of the downstream migration,

20. in 1973 and 1974 age 2. coho smolts comprised over 12% of the downstream smolt migrants; in 1975 age 2. smolts represented a more normal 2.5% of the downstream smolt migrants; for 1974 and 1975 combined approximately 92% were age 1. and 8% were age 2.

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APPENDIX TABLES

Appendix Table A. Little Stawamus River daily catch results, 1974.

Date	Time	Water [a] Temp. (°F.)	Coho Smolts	Coho Fry	Chum Fry	Trout		Sculpin	Stickle-back	Other	Remarks
						Stlhd-Rnbw	Cuthrt				
Apr 10	0815	44.0	35	-	-	-	-	1	-	-	Stable water level
11	0845	42.5	32	119	-	1	-	-	-	1 Dolly Varden	
12	1100	45.5	30	135	-	1	-	2	-	-	
13	1030	45.5	32	50	-	-	2	-	-	-	
14	0930	45.5	33	8	-	5	6	1	-	-	
15	1130	44.0	43	-	-	8	-	2	-	-	
16	1020	44.0	60	-	-	1	2	1	-	-	
17	0930	44.0	60	17	-	3	-	2	-	-	
18	0845	43.5	48	-	-	4	2	1	-	-	
19	0900	43.5	71	-	-	2	21	1	-	-	
20	1230	-	45	1	-	-	3	-	-	-	
21	1100	45.0	161	-	-	-	-	-	-	-	
22	1100	45.0	-	-	-	-	-	-	-	-	No catch-trap damaged-vandalism
23	0900	46.0	105	-	-	-	3	-	-	-	
24	1115	46.0	181	-	-	8	6	-	-	2 Dolly Varden	
25	1015	43.5	96	-	-	4	8	-	-	-	
26	0845	44.0	155	64	-	2	11	-	-	-	
27	1235	47.5	110	71	-	-	-	-	-	-	
28	0930	46.5	66	80	-	-	-	-	-	-	
29	1130	48.0	215	395	-	1	7	-	-	-	
30	0810	46.0	104	10	-	1	8	1	-	-	
May 01	0815	45.0	230	180	-	-	12	-	-	-	
02	0820	45.0	209	235	-	1	3	-	-	-	
03	0710	43.0	163	460	-	2	5	-	-	-	
04	1000	47.0	186	450	-	1	6	-	-	-	
05	1000	47.0	215	210	-	2	8	-	-	1 frog	
06	1130	47.0	275	330	-	-	6	1	-	-	
07	0715	46.0	217	375	-	2	9	-	-	2 frogs	
							14				
08	0720	45.0	602	690	-	3	6	-	-	-	
09	1000	45.5	362	540	-	-	-	-	-	-	
10	0745	45.0	209	1005	-	-	4	-	-	-	
11	1450	48.0	257	1500	-	-	4	-	-	-	
12	0930	47.0	193	1720	-	-	5	-	-	-	
13	0830	44.5	318	2325	-	2	7	-	-	-	
14	1255	48.0	94	3000	-	-	9	-	-	-	
							24				
15	1030	46.0	257	1200	-	1	8	-	-	-	
16	0830	44.0	249	750	-	-	4	-	-	-	
17	0730	44.0	302	1800	-	-	6	-	-	-	
18	1100	50.0	164	2640	-	-	14	-	-	-	
19	0845	46.5	92	1270	-	-	14	-	-	-	
20	1400	49.0	246	500	-	-	2	-	-	-	
21	0830	45.5	177	1200	-	-	8	-	-	1 Lamprey	
							10			1 frog	
22	0955	46.5	115	1400	-	3	10	-	-	-	
23	0800	44.5	112	1500	-	3	16	-	-	2 frogs	
24	0700	45.5	199	1800	-	-	9	1	-	-	
25	1415	48.0	6	400	-	-	-	-	-	-	Water level too high for efficient trap operation
26	1200	48.5	-	-	-	-	-	-	-	-	Fence washed out-repaired at 1700
27	0900	48.0	51	700	-	-	-	2	-	1 Dolly Varden	Water level dropping
28	1230	52.0	20	2000	-	1	7	-	-	-	
29	0700	45.0	122	1700	-	2	5	1	-	-	Stable water level
30	0930	45.5	56	700	-	1	1	4	-	-	
31	1000	48.5	57	600	-	-	-	-	-	-	
Jun 01	1400	48.0	36	600	-	-	1	5	-	-	
02	0945	47.0	30	900	-	-	-	-	-	-	
03	0930	47.0	35	700	-	-	4	-	-	-	
04	1030	46.0	17	1500	-	-	4	1	-	-	
	Morning	$\bar{x}$ 45.5									
	Afternoon	$\bar{x}$ 48.6									
		TOTALS	7555	37,830	-	65	324	27	-	4 Dolly Varden 1 Lamprey	

[a] Morning (0700-1159 hrs.), Afternoon (1200-1700 hrs.)

Appendix Table B. Little Stawamus River daily catch results, 1975.

Date	Time	Water Temp. °F Min - Max	Coho Smolts	Coho Fry	Chum Fry	Trout Stlhd-Rnbw	Trout Cuthrt	Sculpins	Stickle-back	Other	Remarks
Apr 9	1000	41 - 49	1	-	-	-	-	-	-	-	Water level stable
10	1130	39 - 48	22	-	-	-	7	-	-	-	Trap fishing well
11	0900	40 - 50	35	-	-	1	11	1	-	-	
12	1530	39 - 51	20	-	-	1	7	-	-	-	
13	1800	40 - 48	26	-	-	2	4	-	-	-	
14	0730	41 - 47	40	4	-	5	1	22	-	-	
15	0800	41 - 51	23	-	-	2	7	1	-	-	
16	1230	41 - 53	25	-	-	3	4	2	-	-	
17	1700	41 - 49	13	2	-	-	1	-	-	-	
18	1200	43 - 48	19	-	-	-	7	-	-	1 dolly varden	
19	0730	42 - 46	23	-	-	1	4	-	-	-	
20	0800	42 - 26	24	5	-	-	9	-	-	-	
21	0630	40 - 47	52	2	-	2	1	-	-	-	
22	1100	39 - 46	24	-	-	-	-	-	-	-	
23	1500	41 - 47	29	7	-	4	7	-	-	-	
24	1500	43 - 43	56	-	-	1	9	-	-	-	
25	1200	41 - 43	296	-	-	3	21	-	-	-	
26	0700	41 - 42	132	-	-	2	9	-	-	-	
27	0630	40 - 42	104	-	-	1	11	-	-	-	
28	0830	41 - 43	136	21	-	2	9	-	-	1 dolly varden	
29	0700	40 - 41	116	-	-	2	7	-	-	-	
30	2000	35 - 49	162	-	-	1	3	-	-	-	
May 1	1700	42 - 54	89	-	-	1	7	-	-	-	
2	0500	45 - 46	93	-	-	3	6	4	-	-	Water level up
3	1200	43 - 47	169	-	-	22	41	-	-	-	
4	0700	42 - 50	351	1	-	3	50	-	-	-	Some flow over top of fence ; repaired with sandbags
5	0700	42 - 48	345	-	-	4	20	-	-	-	
6	0700	43 - 49	219	-	-	4	15	4	-	-	
7	2000	44 - 52	200	-	-	2	10	-	-	-	
8	0800	43 - 52	163	-	-	2	9	-	-	-	
9	1530	43 - 52	225	-	-	4	11	-	-	-	
10	0630	42 - 52	159	-	-	2	10	-	-	-	
11	0900	44 - 53	200	-	-	2	5	-	-	-	
12	1000	42 - 54	463	-	-	-	7	2	-	-	
13	0710	42 - 54	259	-	-	-	7	-	-	-	
14	1900	42 - 52	257	-	-	-	-	-	-	-	215 smolts died in holding pen;
15	1700	44 - 52	257	-	-	-	5	-	-	-	no apparent reason for mortality; possible overcrowding
16	1900	45 - 51	159	-	-	-	-	-	-	-	
17	1800	44 - 47	224	-	-	1	5	-	-	-	
18	1500	46 - 51	263	-	-	3	15	-	-	-	
19	1600	44 - 47	164	-	-	3	11	-	-	-	
20	1700	42 - 52	130	-	-	1	14	-	-	-	
21	0830	42 - 47	85	-	-	1	4	-	-	-	
22	1900	43 - 50	85	-	-	-	9	-	-	-	
23	1700	43 - 47	-	-	-	-	-	-	-	-	Very little flow
24	1200	44 - 56	100	-	-	-	-	3	-	-	Flow improved
25	0900	42 - 45	263	-	-	4	23	-	-	-	
26	1800	40 - 44	40	-	-	3	7	-	-	-	
27	0700	39 - 42	123	-	-	-	22	-	-	-	
28	2000	44 - 52	80	-	-	-	10	-	-	-	
29	1200	44 - 52	183	-	-	-	34	-	-	-	
30	0900	44 - 53	79	-	-	-	18	2	-	-	
31	2000	46 - 54	70	-	-	-	14	-	-	-	
Jun 1	2000	48 - 59	50	-	-	-	19	-	-	1 small duck	
2	1400	47 - 56	40	-	-	-	9	-	-	-	
3	1930	46 - 48	43	-	-	1	9	-	-	-	
4	1930	46 - 47	-	-	-	-	-	-	-	-	Very murky water; no count made
5	1700	46 - 52	112	-	-	1	21	-	-	-	
6	2000	47 - 47	25	-	-	1	18	-	-	-	
7	1900	47 - 48	17	-	-	1	7	-	-	-	
8			-	-	-	-	21	-	-	-	Trap o.k., no coho
9			-	-	-	-	11	-	-	-	" " " "
10	1900	47 - 56	15	-	-	-	2	-	-	-	
11	1730	48 - 56	4	-	-	-	23	-	-	-	
12	1100	47 - 54	9	-	-	1	14	-	-	-	
13	1730	48 - 58	-	-	-	1	19	-	-	-	
14	1900	49 - 58	3	-	-	-	16	-	-	-	
15	1700	48 - 56	7	-	-	-	7	-	-	-	Trap dismantled
	x	43.0-49.6									
	Total		7200	42	0	104	724	41	0	2 dolly varden	

Appendix Table C. Meighn Creek daily catch results, 1973.

Date	Time	Water [a] Temp. °F	Water [a] Level (ft)	Coho Smolts	Coho Fry	Chum Fry	Trout Stlhd - Rnbw	Trout Cuthrt	Sculpins	Stickle-backs	Other	Remarks
Apr 19	-	42.5	-	22	-	-	-	-	1	2	-	
20	1000	44.0	-	60	-	-	1	-	-	4	-	
21	1100	45.0	-	136	9	-	-	-	3	5	1 Lamprey	
22	1100	46.0	-	53	5	-	-	-	1	-	-	
23	1430	49.0	-	78	-	-	-	-	2	2	-	
24	1000	45.5	-	101	-	-	-	-	-	3	-	
25	-	-	-	132	-	-	-	-	-	-	-	
26	-	45.0	-	102	-	-	-	-	1	1	-	
27	0815	45.0	1.95	103	-	-	-	-	-	-	-	
28	-	-	-	-	-	-	-	-	-	-	-	
29	1300	47.0	1.90	167	-	-	-	-	-	5	-	Catch accumulated for 2 days
30	1400	48.5	1.95	190	-	-	-	-	1	5	1 Lamprey	
May 01	1100	46.0	1.90	134	-	-	-	-	-	3	-	
02	0815	45.0	1.92	59	-	-	-	-	-	3	-	
03	0815	46.0	1.95	47	-	-	-	-	-	-	-	
04	0815	44.5	1.95	438	-	-	-	-	-	10	-	
05	1330	47.0	1.95	535	-	-	-	-	-	17	-	
06	-	-	1.96	424	-	-	2	-	-	10	-	
07	1200	46.0	2.00	675	-	-	6	-	1	14	-	
08	0810	45.0	2.05	215	-	-	-	-	-	10	-	
09	0815	44.5	2.10	175	-	-	2	-	-	5	-	
10	0830	44.0	2.00	133	-	-	-	-	-	11	-	
11	1000	44.5	2.00	77	1	-	1	-	-	1	-	
12	-	-	1.95	195	-	-	-	-	1	2	-	
13	-	-	-	-	-	-	-	-	-	-	-	
14	1430	54.0	1.95	578	1	-	-	-	1	10	-	Catch accumulated for 2 days
15	0900	48.0	2.00	444	-	-	1	-	1	10	-	
16	0815	48.0	1.95	858	-	-	1	-	-	7	-	
17	0830	48.0	2.00	535	-	-	2	-	2	4	-	
18	0830	48.0	2.00	319	-	-	-	-	1	1	-	
19	-	-	2.00	574	-	-	-	-	-	-	-	
20	-	-	-	-	-	-	-	-	-	-	-	
21	1200	48.0	-	642	-	-	-	-	1	2	-	Catch accumulated for 2 days
22	1400	48.0	2.00	176	1	-	-	-	-	-	-	
23	1000	48.0	2.00	63	-	-	-	-	-	-	-	
Morning	$\bar{x}$	45.6										
Afternoon	$\bar{x}$	48.4										
TOTALS				8440	17	-	16	-	17	147	2 Lamprey	

[a] Morning (0800-1159 hrs.), Afternoon (1200-1600 hrs.).

Appendix Table D. Meighn Creek daily catch results, 1974.

Date	Time	Water [a] Temp. (°F.)	Coho Smolts	Coho Fry	Chum Fry	Trout		Sculpin	Stickle back	Other	Remarks
						Stlhd-Rnbw	Cuthrt				
Apr 09	0815	43.0	3	-	-	-	-	-	-	-	Trap undermined-possible fish leak
09	1600	49.0	1	-	-	-	-	-	-	-	
10	0830	44.0	21	-	-	-	-	-	-	-	Trap undermined-possible fish leak
11	0845	42.5	10	-	-	-	-	4	2	-	Water stable-much debris
12	1130	43.5	23	-	-	-	-	-	-	-	
13	1330	47.0	9	-	-	-	-	-	-	-	
14	1000	44.5	5	-	-	-	-	-	1	-	
15	1230	44.5	10	-	-	-	-	1	-	-	
16	1130	45.5	50	-	-	-	-	-	-	-	
17	0950	43.5	26	-	-	-	-	1	-	-	
18	0915	44.5	1	1	-	-	-	-	-	-	
19	1330	47.5	28	-	-	-	-	-	-	-	
20	1400	-	7	2	-	-	-	-	1	-	
21	1130	45.0	15	-	-	-	-	-	-	-	
22	1300	45.5	1	1	-	-	-	-	-	-	
23	1000	46.0	6	8	-	-	-	-	-	-	
24	1000	47.0	104	6	-	-	-	-	-	-	
25	1000	45.0	27	-	-	-	1	-	-	-	
26	0900	45.0	79	4	-	-	2	2	-	-	
27	1030	45.0	56	-	-	-	-	-	1	-	
28	1145	47.0	10	-	-	-	-	-	-	-	
29	1200	48.0	89	4	460	-	-	-	-	-	
30	1015	47.0	110	5	-	-	1	-	-	-	
May 01	0855	45.0	138	1	-	-	1	-	-	-	
02	0850	45.0	72	1	-	-	-	-	1	-	
03	0745	44.0	462	2	-	1	2	-	1	-	
04	1040	46.0	247	1	-	-	-	-	-	-	
05	1045	46.0	409	-	-	-	2	-	-	1 Lamprey 1 frog	
06	1145	49.0	393	2	-	-	-	-	1	-	
07	0950	48.0	278	-	-	2	9	-	-	-	
08	0805	46.0	113	-	-	-	1	-	-	1 Lamprey	
09	0910	46.0	19	-	-	-	-	-	-	-	
10	0820	45.0	218	6	-	-	-	-	-	-	
11	1430	48.0	337	-	-	-	-	-	2	-	
12	1230	47.5	273	4	-	-	-	-	-	-	
13	1005	45.0	473	-	-	1	-	-	2	-	
14	1000	45.0	243	2	-	1	3	-	-	-	
15	0930	44.0	204	-	-	1	-	-	1	-	
16	0800	44.0	205	1	-	-	-	-	1	-	
17	0900	45.0	261	-	-	-	1	-	2	-	
18	1200	48.0	183	1	-	-	-	-	-	-	
19	0945	46.5	102	2	-	-	-	-	-	1 frog	
20	1345	48.5	42	-	-	-	-	-	-	-	
21	1145	48.0	56	10	-	1	1	1	-	-	
22	1100	47.0	47	-	-	-	-	-	-	-	
23	1130	46.5	118	4	-	-	-	1	1	-	Raining-water rising
24	1000	47.0	262	100	-	1	5	4	3	5 Lamprey	
25	1200	48.0	136	50	-	-	6	-	6	2 Lamprey	Washout on left side of fence
26	1330	49.5	-	-	-	-	-	-	-	-	Heavy rain-fence washed out
27	-	-	-	-	-	-	-	-	-	-	Trap repaired at 1630
28	1030	45.0	89	102	-	1	1	-	15	-	Water dropping
29	0900	46.0	1	30	-	-	-	3	12	-	Trap undermined-possible fish leak
30	0900	46.0	20	30	-	-	-	1	-	-	Very little debris, water low (4" head)
31	0930	47.0	0	20	-	-	1	-	-	-	Water low and stable
Jun 01	1300	48.0	8	81	-	-	1	-	-	-	
02	0910	47.5	5	30	-	-	-	-	-	-	
03	0845	46.5	77	10	-	-	1	-	-	-	
04	0945	46.5	61	50	-	-	2	-	-	-	
	Morning	x 45.6									
	Afternoon	x 47.6									
		TOTALS	6233	571	460	9	41	18	53	9 Lamprey	

[a] Morning (0700-1159 hrs.), Afternoon (1200-1700 hrs.).

Appendix Table E. Meighn Creek daily catch results, 1975.

Date	Time	Water Temp °F Min - Max	Coho Smolts	Coho Fry	Chum Fry	Trout Stlhd	Trout Rnbw	Trout Cuthrt	Sculpins	Stickle-back	Other	Remarks
Apr 9	1100	40 - 48	1	-	-	-	-	-	-	-	-	
10	1230	39 - 48	-	-	-	-	-	-	-	-	-	No water flow
11	1000	38 - 48	-	-	-	-	-	-	-	-	-	" " "
12	1700	38 - 48	-	-	-	-	-	-	-	-	-	" " "
13	1700	38 - 49	-	-	-	-	-	-	-	-	-	" " "
14	1400	39 - 49	5	-	-	-	1	-	-	-	3 lamprey	Water flow increasing
15	1100	44 - 48	5	-	-	-	-	1	-	-	1 lamprey	
16	1600	42 - 40	14	-	-	-	-	-	-	-	3 lamprey	
17	1530	41 - 48	2	2	-	-	-	-	-	-	1 lamprey	
18	2100	41 - 47	3	1	-	-	-	-	-	-	-	
19	0900	41 - 45	-	-	-	-	-	-	-	-	-	
20	0900	41 - 45	-	2	-	-	-	-	-	-	-	
21	0900	39 - 46	3	-	-	-	-	-	-	-	-	
22	1000	39 - 44	-	-	-	-	-	-	-	-	-	Trap box plugged:
23	0700	39 - 43	14	-	-	-	-	-	-	-	2 lamprey	fish could retreat
24	0900	41 - 41	-	-	-	-	-	-	-	-	-	Trap o.k.; no fish
25	1300	41 - 43	-	-	-	-	-	-	-	-	6 lamprey	" " " " "
26	0630	40 - 42	-	-	-	-	-	-	-	-	4 lamprey	" " " " "
27	0800	40 - 41	-	6	-	-	-	-	-	-	-	
28	1100	40 - 44	136	-	-	-	-	-	-	-	-	
29	1330	39 - 47	13	-	-	-	-	-	-	-	-	
30	1700	39 - 50	-	-	-	-	-	-	-	-	-	
May 1	1600	41 - 52	-	-	-	-	-	-	-	-	-	
2	0700	46 - 53	4	-	-	-	-	-	-	-	-	
3	0800	42 - 47	46	-	-	-	-	-	-	-	-	
4	1000	44 - 48	56	-	-	1	-	-	-	-	-	
5	0800	42 - 48	42	-	-	-	-	-	-	-	-	
6	0800	43 - 49	12	-	-	-	-	-	-	-	-	
7	0800	43 - 52	112	-	-	-	-	-	-	-	-	
8	1700	43 - 52	106	-	-	-	-	-	-	-	-	
9	1400	43 - 53	270	-	-	-	-	-	-	-	10 lamprey	
10	0600	44 - 53	-	-	-	-	-	-	-	-	2 lamprey	Trap o.k.; no fish
11	0600	46 - 52	76	-	-	-	-	-	-	-	-	
12	1500	46 - 52	30	-	-	-	-	-	-	-	-	
13	1600	44 - 54	22	-	-	-	-	-	-	-	-	
14	1700	42 - 52	-	-	-	-	-	-	-	-	-	Very low flow
15	1600	44 - 52	30	-	-	-	-	-	-	-	-	
16	1730	44 - 52	-	-	-	-	-	-	-	-	-	No flow through trap
17	1730	44 - 46	2	-	-	-	-	-	-	-	-	
18	1300	46 - 49	40	-	-	-	-	-	-	-	-	
19	1900	42 - 47	-	-	-	-	-	-	-	-	-	No flow
20	1700	41 - 45	40	-	-	-	-	-	-	-	-	
21	1120	47 - 47	22	-	-	-	-	-	-	-	-	
22	1000	42 - 47	-	-	-	-	-	-	-	-	-	No flow
23	1600	42 - 46	45	-	-	-	-	-	-	-	-	
24	0700	41 - 46	-	-	-	-	-	-	-	-	-	No flow
25	0700	40 - 46	-	-	-	-	-	-	-	-	-	No flow
26	1700	41 - 47	-	-	-	-	-	-	-	-	-	No flow
27	1000	43 - 47	20	-	-	-	-	-	-	-	-	
28	1700	41 - 50	-	-	-	-	-	-	-	-	10 lamprey	Very little flow
29	1200	43 - 52	236	-	-	-	1	-	-	-	28 lamprey	Flow increasing
30	0930	47 - 47	223	-	-	-	-	1	-	-	-	
31	2030	47 - 52	149	-	-	1	2	-	-	-	-	
Jun 1	2030	48 - 54	5	-	-	-	1	-	-	-	-	
2	0830	-	5	-	-	-	-	-	-	-	-	
3	1100	47 - 50	101	-	-	-	-	-	-	-	-	Smolts observed upstream
4	1100	47 - 47	537	-	-	-	-	-	-	-	-	
5	1000	46 - 47	47	-	-	-	-	-	-	-	-	
6	1000	46 - 46	84	-	-	-	-	-	-	-	-	
7	2000	47 - 49	71	-	-	-	-	-	-	-	-	
8	1500	47 - 49	99	-	-	-	-	-	-	-	-	
9	1200	46 - 49	-	-	-	-	-	-	-	-	-	
10	2100	48 - 48	52	-	-	-	-	-	-	-	-	
11	1800	48 - 50	-	-	-	-	-	-	-	-	-	Water too high; fish can retreat
12	1745	49 - 52	-	-	-	-	-	-	-	-	-	" " " " "
13	1900	48 - 57	7	-	-	-	-	-	-	-	-	
14	1500	48 - 49	-	-	-	-	-	-	-	-	-	
15	1630	47 - 50	-	-	-	-	-	-	-	-	-	Trap removed
	$\bar{x}$	43.0-47.7										
	Total		2787	11	-	2	5	2	-		70 lamprey	

Appendix Table F. Tenderfoot Creek daily catch results, 1973.

Date	Time	Water [a] Temp. °F	Water [a] Level (ft)	Coho Smolts	Coho Fry	Chum Fry	Trout Stlhd - Rnbw	Trout Cuthrt	Sculpins	Stickle-backs	Other	Remarks
Apr 18	0830	43.5	-	18	-	3	-	-	-	-	-	
19	0900	43.0	-	78	-	10	11	-	-	-	-	
20	1100	43.0	-	-	-	3	-	-	-	-	-	
21	1100	43.5	-	-	-	19	-	-	-	-	-	
22	1100	44.5	-	-	2	0	-	-	-	-	-	Trap dismantled
23	-	-	-	-	-	-	-	-	-	-	-	No trap fishing
24	-	-	-	-	-	-	-	-	-	-	-	New trap installed and fishing at 1630
25	-	-	-	-	-	-	-	-	-	-	-	
26	1100	43.5	-		-	-	-	-	-	-	-	Catch accumulated for three days
27	1000	45.0	1.60	395	990	16	6	-	1	-	-	
28	-	-	-	-	-	-	-	-	-	-	-	
29	-	46.0	1.50	-	-	-	-	-	-	-	-	Catch accumulated for three days
30	1200	44.0	1.45	495	4003	-	1	-	1	-	-	
May 01	0830	42.5	1.40	190	1901	26	-	-	-	-	-	
02	0900	43.5	1.40	300	1421	16	6	-	-	-	-	
03	0845	44.0	1.45	344	1102	20	3	-	2	-	-	
04	0930	43.0	1.60	440	680	12	1	-	1	-	-	
05	1500	48.0	1.60	736	180	-	2	-	-	-	-	
06	-	-	1.58	390	419	-	1	-	2	-	-	
07	1330	45.0	1.60	456	54	-	6	-	-	-	-	
08	0900	43.5	-	330	66	-	4	-	2	-	-	
09	0930	43.5	1.40	178	178	5	7	-	2	-	-	
10	0900	42.0	1.25	497	10	-	2	-	-	-	-	
11	0900	42.0	1.15	483	12	-	3	-	1	-	-	
12	1300	-	1.05	580	9	-	2	-	1	-	-	
13	-	-	-	-	-	-	-	-	-	-	-	
14	1300	45.5	1.40	1105	1	-	5	-	-	-	-	Catch accumulated for two days
15	1100	45.0	1.75	293	155	3	-	-	-	-	-	
16	0930	44.0	1.80	471	71	7	1	-	-	-	-	
17	0845	43.5	1.90	605	91	7	-	-	-	-	-	
18	0900	44.0	2.00	343	341	19	-	-	-	-	-	
19	1200	-	2.75	333	254	95	-	-	-	-	-	
20	-	-	-	-	-	-	-	-	-	-	-	Trap not checked
21	-	-	-	-	-	-	-	-	-	-	-	Trap washed out
22	1500	47.0	1.40	115	273	186	-	-	2	-	-	
23	0845	44.0	1.75	64	60	51	-	-	-	-	-	
	Morning $\bar{x}$	43.6										
	Afternoon $\bar{x}$	45.9										
	TOTALS			9239	12,273	498	61	-	15	-		

[a] Morning (0800-1159 hrs.), Afternoon (1200-1600 hrs.).

Appendix Table G. Tenderfoot Creek daily catch results, 1974.

Date	Time	Water [a] Temp. (°F.)	Coho Smolts	Coho Fry	Chum Fry	Trout		Sculpin	Stickle-back	Other	Remarks
						Stlhd-Rnbw	Cuthrt				
Apr 11	1100	43.5	-	-	-	-	-	-	-	-	Trap installed
12	1315	45.0	-	-	-	-	-	-	-	-	No daily count-coho catch was
13	1400	46.0	-	-	-	-	-	-	-	-	allowed to accumulate until live
14	1100	44.5	-	-	-	-	-	-	-	-	box was installed April 18th.
15	1420	43.5	-	-	-	-	-	-	-	-	
16	1310	44.5	-	-	-	-	-	-	-	-	
17	1020	42.5	-	-	-	-	-	-	-	-	
18	1530	44.5	193	103	5	3	4	1	-	-	
19	1500	44.5	9	150	-	-	7	-	-	-	
20	1330	-	13	300	300	1	-	-	-	-	
21	1200	43.5	37	255	1445	3	-	-	-	-	
22	1330	44.0	42	360	2040	3	-	-	-	-	
23	1330	-	43	400	1600	1	-	-	-	-	
24	0915	43.0	37	500	1500	2	-	-	-	-	
25	0900	43.5	24	200	1800	2	-	-	-	-	Fence undermined-possible fish leak
26	0930	44.0	57	1000	3000	2	-	-	-	-	Fence remodeled
27	0930	45.0	90	700	1300	1	-	-	-	-	
28	1045	44.0	8	800	1700	1	-	-	-	-	Fence undermined-possible fish leak
29	1355	46.0	10	90	460	-	-	-	-	-	
30	1300	45.0	3	175	675	-	1	-	-	-	
May 01	1000	44.0	17	400	1000	2	-	-	-	-	
02	0930	43.0	168	200	2000	5	1	-	-	-	
03	0815	43.0	126	100	1400	1	1	-	-	-	
04	1215	46.0	139	310	1240	2	2	-	-	-	
05	1145	44.5	141	200	1000	6	2	-	-	-	
06	1300	46.0	107	1500	4000	-	-	-	-	-	
07	1330	46.0	26	1000	6000	2	9	-	-	-	
08	0900	43.0	352	-	200	4	-	-	-	-	Because of fry mortality, 1/8" live box screens were replaced with 1/4" mesh to release fry.
09	0830	43.0	174	-	-	2	-	-	-	-	
10	0910	43.0	123	10	-	1*	-	-	-	-	*1 spawned male steelhead -released in excellent condition
11	1345	45.0	126	-	-	-	-	-	-	-	
12	1100	44.0	107	25	100	3	1	1	-	-	
13	1200	44.0	294	-	-	3	1	-	-	-	
14	0730	43.0	90	-	-	2	9	-	-	-	
15	0830	43.0	276	-	-	-	-	-	-	-	
16	0930	43.0	166	-	-	1	-	-	-	1 frog	
17	0815	43.0	25	-	-	1	2	-	-	-	Hole in live box-possible fish leak
18	1315	47.5	12	-	-	-	-	-	-	-	Hole in live box-repaired
19	1030	44.0	61	50	80	-	1	1	-	-	
20	1300	45.5	303	-	-	-	2	-	-	-	
21	1320	47.0	276	8	-	-	30	-	-	-	
22	0830	43.5	224	50	100	-	5	-	-	-	
23	1000	43.5	108	-	-	-	-	-	-	-	Washout, much debris-fence undermined-possible fish leak
24	0900	43.5	316	-	-	-	3	1	-	-	
25	0930	44.0	51	100	10	-	-	-	-	-	Extreme high water-live box broken and fence washed out
26	1510	45.5	169	200	100	-	-	-	-	-	Water covering live box, fence and holding box
27	1300	44.0	-	-	-	-	-	-	-	-	No count because water covering holding box
28	0800	42.5	319	100	40	6	4	-	-	-	Two days catch
29	0800	43.0	72	6	6	2	2	-	-	-	
30	0800	43.0	81	-	2	1	3	-	-	-	
31	0800	43.0	25	10	-	-	-	-	-	-	
Jun 01	1130	44.0	7	5	-	-	-	-	-	-	
02	0840	43.0	-	50	-	-	-	-	-	-	
03	0800	43.0	-	-	-	-	-	-	-	-	Fence undermined-possible fish leak
04	0850	43.0	37	500	100	-	-	-	-	-	
	Morning	X 43.4									
	Afternoon	X 45.2									
		TOTALS	5084	9857	33,203	62	90	4			

[a] Morning (0700-1159 hrs.), Afternoon (1200-1700 hrs.).

Appendix Table H. Tenderfoot Creek daily catch records, 1975.

Date	Time	Water Temp. °F Min.	Max	Coho Smolts	Coho Fry	Chum Fry	Trout Stlhd-Rnbw	Trout Cuthrt	Sculpins	Stickle-back	Other	Remarks
Apr 9	1230	38	51	20	2	-	1	-	1	-	-	
10	1530	39	51	-	10	-	-	-	-	-	-	
11	1530	37	50	-	-	-	-	-	-	-	-	
12	1600	38	48	-	-	-	-	-	-	-	2 frogs	
13	1600	39	48	16	4	-	3	-	2	-	-	
14	1200	42	50	31	-	-	-	-	-	-	-	Water flow too high from debris on fence
15	1000	42	49	11	-	-	-	2	-	-	-	
16	1400	42	50	20	-	-	-	-	-	-	-	
17	1400	41	48	13	-	-	-	-	-	-	-	
18	0930	41	47	18	-	-	-	-	-	-	-	
19	0930	42	47	14	-	-	-	-	-	-	-	
20	0700	43	47	25	-	-	-	-	-	-	-	
21	0800	41	47	39	3	-	3	-	1	-	-	
22	0800	42	47	19	5	-	-	-	-	-	-	
23	0800	41	47	10	-	-	-	-	-	-	-	Water flow too high from debris on fence;
24	0630	42	44	8	-	-	2	-	-	-	-	trap undermined
25	0700	40	43	6	6	-	1	-	2	-	-	
26	0800	39	41	-	-	-	-	-	-	-	-	
27	0900	39	42	3	-	-	-	-	-	-	-	
28	1100	40	41	7	-	-	-	-	-	-	-	
29	1030	41	45	15	2	-	-	-	-	-	-	
30	1800	41	49	54	-	-	-	-	-	-	-	
May 1	1200	42	52	-	-	-	-	-	-	-	-	
2	1400	42	54	36	-	-	1	-	-	-	-	
3	0900	42	50	140	-	-	1	-	-	-	-	
4	0900	42	48	200	-	-	3	-	-	-	-	
5	1200	44	48	131	-	-	-	-	-	-	-	
6	1300	44	52	39	-	-	-	-	-	-	-	
7	1000	44	54	130	-	-	-	-	-	-	-	
8	1800	45	56	197	-	-	-	-	-	-	-	
9	1300	44	56	200	-	-	-	-	-	-	-	Fence undermined
10	0800	45	56	140	-	-	2	-	-	-	-	Repaired with sandbags
11	0600	44	52	303	-	-	1	-	-	-	-	
12	0530	-	-	669	-	-	2	2	-	-	-	
13	1300	-	-	200	-	-	-	-	-	-	-	
14	1800	-	-	89	-	-	-	-	-	-	-	
15	1200	-	-	229	10	-	-	1	-	-	-	
16	1600	-	-	410	-	-	-	-	-	-	-	
17	1700	48		263	-	-	-	-	-	-	-	
18	1000	50		305	5	-	-	-	-	-	-	
19	1100	-	-	-	-	-	-	-	-	-	-	
20	1000	42	49	129	44	-	-	-	-	-	-	Very little flow
22	2030	44	46	-	-	-	-	-	-	-	-	No flow: no catch
23	1300	43	46	50	-	-	-	-	-	-	-	Very little flow
24	0700	42	45	130	-	-	-	-	-	-	-	
25	1100	42	46	400	-	-	1	-	2	-	-	Water flow improving
26	1530	42	47	-	-	-	-	-	-	-	-	
27	1200	42	48	42	-	-	-	-	-	-	-	
28	2000	44	49	460	-	-	-	1	-	-	-	
29	1200	44	52	603	-	-	-	41	-	-	-	
30	0700	44	52	350	-	-	-	19	-	-	-	
31	1900	46	54	250	-	-	-	-	-	-	-	
Jun 1	1900	47	55	251	-	-	-	-	-	-	-	Vandals killed 92 smolts
2	1300	47	57	215	-	-	-	-	-	-	-	
3	1900	44	47	401	-	-	-	-	-	-	-	
4	1200	46	46	135	-	-	-	1	-	-	-	
5	1130	45	46	233	-	-	-	-	-	-	-	
6	1700	46	46	154	-	-	-	-	-	-	-	
7	1700	47	48	100	-	-	-	-	-	-	-	
8	1600	47	49	95	-	-	-	-	-	-	-	
10	2000	47	51	90	-	-	-	1	-	-	-	
11	2000	47	51	160	-	-	-	-	-	-	-	
12	1700	48	52	43	-	-	-	1	-	-	-	
13	1800	48	54	150	-	-	-	-	-	-	-	
14	1600	47	53	-	-	-	-	-	-	-	-	
15	1500	48	53	22	-	-	-	-	-	-	-	
	$\bar{x}$	42.3	49.1									
	Total			8473	91	-	21	69	8	-	-	

Appendix Table I. Little Stawamus River coho smolt length frequency distributions by age and tagging lot, 1974.

Tagging Lot	April 19			April 30			May 7			May 14			May 21			May 28			June 4			Total		
Age	Total[a]	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.
Fork Length																								
51 - 55 mm	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
56 - 60	1	-	-	2	2	-	1	1	-	-	-	-	1	1	-	-	-	-	1	-	-	6	4	-
61 - 65	4	2	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	3	1	-	9	5	-
66 - 70	11	6	-	6	6	-	5	5	-	2	2	-	6	5	-	-	-	-	5	5	-	35	29	-
71 - 75	10	2	-	7	7	-	15	9	-	13	6	-	11	8	-	6	4	-	5	5	-	67	41	-
76 - 80	9	3	-	17	10	-	14	12	-	21	9	1	13	5	-	4	3	-	24	18	-	102	60	1
81 - 85	6	4	-	7	6	-	21	10	2	11	7	-	16	8	-	11	5	-	15	11	-	87	51	2
86 - 90	3	1	-	3	2	-	11	4	1	22	7	2	20	11	-	10	5	-	18	10	-	87	40	3
91 - 95	3	-	1	4	-	2	13	3	5	8	3	1	14	5	2	10	3	-	15	6	-	67	20	11
96 - 100	1	1	-	2	2	-	8	2	1	11	1	2	11	4	3	5	1	1	10	5	1	48	16	8
101 - 105	-	-	-	2	1	-	4	2	1	9	1	-	3	-	1	4	2	-	2	-	-	24	6	2
106 - 110	-	-	-	-	-	-	4	2	-	2	-	-	4	-	1	-	-	-	1	1	-	11	3	-
111 - 115	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	1	-	-	3	-	1
116 - 120	1	-	1	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	3	-	1
121 - 125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
126 - 130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
131 - 135	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N	50	20	2	50	36	2	100	52	10	100	36	6	100	47	7	50	23	1	100	62	1	550	276	29
$\bar{X}$	76	74	106	80	77	93	85	81	92	87	82	91	86	82	99	88	85	98	85	83	98	85	81	95
S.D.	11.2	10.4	-	10.0	9.8	-	11.7	11.2	6.1	10.5	8.2	7.6	10.8	9.7	5.3	8.6	9.0	-	10.2	9.1	-	11.1	10.0	8.1
% Age Class	-	90.9	9.1	-	94.7	5.3	-	83.9	16.1	-	85.7	14.3	-	87.0	13.0	-	95.8	4.2	-	98.4	1.6	-	90.5	9.5

[a] Total sample from which readable scales obtained.

Appendix Table J. Little Stawamus River coho smolt length frequency distributions by age and tagging lot, 1975.

Tagging Lot	April 29			May 5			May 13			May 21			May 27			June 2			June 9			Total		
Age	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.
Fork Length																								
41 - 45 mm	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2	-	-
46 - 50	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
51 - 55	7	7	-	7	7	-	1	1	-	-	-	-	-	-	-	2	2	-	-	-	-	17	17	-
56 - 60	21	11	-	8	7	-	3	3	-	1	1	-	-	-	-	3	2	-	-	-	-	36	24	-
61 - 65	22	14	-	9	8	-	8	6	-	1	1	-	1	1	-	1	1	-	6	6	-	48	37	-
66 - 70	20	10	-	14	10	-	10	8	-	13	12	-	4	4	-	11	8	-	10	7	-	82	59	-
71 - 75	7	6	-	17	10	-	16	7	-	17	14	-	5	5	-	17	15	-	26	22	-	105	79	-
76 - 80	9	4	-	11	6	-	13	9	-	12	9	-	22	18	-	24	19	-	15	13	-	106	78	-
81 - 85	9	1	-	11	5	-	16	9	-	17	14	-	10	10	-	11	5	1	24	13	-	98	57	1
86 - 90	2	-	1	10	4	2	10	5	2	11	6	-	28	22	-	12	9	1	11	7	-	84	53	6
91 - 95	1	-	-	4	1	-	11	4	2	8	-	1	16	14	-	4	2	-	5	2	-	49	23	3
96 - 100	2	-	1	1	-	1	3	-	1	4	1	1	8	6	-	4	1	-	-	-	-	22	8	4
101 - 105	-	-	-	2	-	1	4	2	-	5	2	-	2	2	-	1	-	-	2	-	1	16	6	2
106 - 110	-	-	-	2	-	-	2	-	-	2	-	1	3	-	-	7	3	3	1	-	-	17	3	4
111 - 115	-	-	-	2	-	-	2	-	-	4	3	-	1	-	1	1	1	-	-	-	-	10	4	1
116 - 120	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	2	-	1	-	-	-	4	1	1
121 - 125	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
126 - 130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
131 - 135	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N	100	53	2	100	58	4	100	54	5	100	64	3	100	82	1	100	68	6	100	70	1	700	449	22
$\bar{x}$	68	64	93	75	69	94	80	76	92	84	80	100	86	85	113	82	78	102	79	77	103	79	76	98
S.D.	10.3	7.7	7.1	14.4	10.7	7.5	13.2	11.4	4.2	14.9	12.5	7.6	9.5	8.6	-	13.6	11.7	13.6	9.0	7.5	-	13.6	11.9	9.7
% Age Class	-	96.4	3.6	-	93.5	6.5	-	91.5	8.5	-	95.5	4.5	-	98.8	1.2	-	91.9	8.1	-	98.6	1.4	-	95.3	4.7

APPENDIX TABLE K. Meighn Creek coho smolt length frequency distributions by age and sampling date, 1973.

Sampling Date	May 1			May 8			May 15			Total		
Age	Total[a]	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.
Fork Length												
46 - 50 mm	1	1	-	-	-	-	-	-	-	1	1	-
51 - 55	-	-	-	1	1	-	-	-	-	1	1	-
56 - 60	1	1	-	1	1	-	-	-	-	2	2	-
61 - 65	3	2	-	2	2	-	3	2	-	8	6	-
66 - 70	3	1	-	5	4	1	6	4	-	14	9	1
71 - 75	4	2	-	13	12	-	6	6	-	23	20	-
76 - 80	3	2	-	19	15	2	21	16	1	43	33	3
81 - 85	10	2	-	22	14	6	16	9	5	48	25	11
86 - 90	6	6	-	12	9	2	15	7	4	33	22	6
91 - 95	5	1	-	10	7	3	16	9	5	31	17	8
96 - 100	6	3	3	7	1	6	8	2	2	21	6	11
101 - 105	3	1	2	6	-	4	4	1	1	13	2	7
106 - 110	4	-	4	-	-	-	5	1	3	9	1	7
111 - 115	1	-	1	-	-	-	-	-	-	1	-	1
116 - 120	-	-	-	2	2	-	-	-	-	2	2	-
121 - 125	-	-	-	-	-	-	-	-	-	-	-	-
126 - 130	-	-	-	-	-	-	-	-	-	-	-	-
131 - 135	-	-	-	-	-	-	-	-	-	-	-	-
N	50	22	10	100	68	24	100	57	21	250	147	55
$\bar{x}$	86	81	105	84	81	91	86	82	92	85	81	94
S.D.	14.6	14.4	5.3	11.4	11.0	9.7	10.8	9.7	9.0	11.9	11.0	10.1
% Age Class	-	68.7	31.3	-	73.9	26.1	-	73.1	26.9	-	72.8	27.2

[a] Total sample from which readable scales obtained.

Appendix Table L. Meighn Creek coho smolt length frequency distributions by age and tagging lot, 1974.

Tagging Lot	April 19			April 30			May 7			May 14			May 21			May 28			June 4			Total		
Age	Total[a]	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.
Fork Length																								
51 - 55 mm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56 - 60	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
61 - 65	3	2	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	-
66 - 70	5	3	-	1	1	-	1	-	-	2	1	-	4	3	-	-	-	-	-	-	-	13	8	-
71 - 75	3	1	-	5	4	-	6	5	-	4	3	-	5	3	-	5	3	-	2	-	-	30	19	-
76 - 80	3	-	-	6	4	-	2	1	-	12	10	-	14	8	-	11	3	-	11	1	-	59	27	-
81 - 85	8	3	-	7	5	-	12	9	-	13	8	-	11	4	1	8	2	-	15	2	-	74	33	1
86 - 90	8	2	-	11	6	-	16	7	1	14	5	-	13	8	-	7	3	-	8	2	-	77	33	1
91 - 95	3	2	-	9	6	1	13	3	3	14	5	-	14	7	-	8	1	-	8	3	-	69	27	4
96 - 100	3	-	-	2	-	-	25	11	3	22	11	2	19	9	1	4	-	-	3	-	-	78	31	6
101 - 105	5	1	-	5	3	1	10	4	2	8	5	1	7	1	1	2	-	-	1	-	-	38	14	5
106 - 110	5	-	1	3	1	-	8	4	1	6	2	-	9	2	-	5	-	-	1	-	-	37	9	2
111 - 115	-	-	-	-	-	-	6	3	-	3	1	-	1	-	-	-	-	-	1	-	-	11	4	-
116 - 120	2	-	-	-	-	-	1	-	1	2	2	-	3	2	-	-	-	-	-	-	-	8	4	1
121 - 125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
126 - 130	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
131 - 135	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N	50	15	1	50	31	2	100	47	11	100	53	3	100	47	3	50	12	-	50	8	-	500	213	20
$\bar{x}$	88	78	108	88	86	98	94	93	99	92	91	100	91	89	95	88	81	-	86	87	-	90	88	99
S.D.	16.2	13.4	-	10.8	10.8	7.1	10.7	11.5	8.4	11.1	12.0	2.9	12.0	12.0	10.4	10.6	6.9	-	8.5	5.6	-	11.7	12.0	7.7
% Age Class	-	93.8	6.2	-	93.9	6.1	-	81.0	19.0	-	94.6	5.4	-	94.0	6.0	-	100	-	-	100	-	-	91.4	8.6

[a] Total sample from which readable scales obtained.

Appendix Table M. Meighn Creek coho smolt length frequency distributions by age and tagging lot, 1975.

Tagging Lot	April 29			May 5			May 13			May 21			June 2			June 9			Total		
Age	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.
Fork Length																					
46 - 50 mm	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-
51 - 55	2	2	-	2	1	-	1	1	-	-	-	-	-	-	-	-	-	-	5	4	-
56 - 60	4	4	-	3	2	-	1	1	-	5	5	-	-	-	-	-	-	-	13	12	-
61 - 65	2	2	-	14	13	-	3	3	-	1	1	-	1	1	-	-	-	-	21	20	-
66 - 70	5	5	-	6	5	-	8	7	-	9	9	-	4	4	-	4	2	-	36	32	-
71 - 75	5	4	-	19	16	-	13	11	-	17	17	-	11	9	-	12	9	-	77	66	-
76 - 80	7	5	1	14	10	-	21	14	-	19	10	-	29	24	-	33	24	-	123	87	1
81 - 85	4	2	-	15	11	-	17	15	-	18	13	-	18	15	-	18	14	-	90	70	-
86 - 90	1	1	-	7	2	2	20	17	-	13	5	-	20	12	-	15	13	-	76	50	2
91 - 95	-	-	-	14	9	1	11	4	-	7	3	1	13	11	-	11	7	-	56	34	2
96 - 100	1	1	-	5	1	2	3	1	-	6	5	1	2	2	-	6	4	-	23	14	3
101 - 105	-	-	-	1	-	-	2	-	1	2	2	-	2	2	-	1	-	1	8	4	2
106 - 110	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	1	1	-
111 - 115	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
116 - 120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
121 - 125	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	1	-	1
126 - 130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
131 - 135	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N	31	26	1	100	70	5	100	74	1	100	71	3	100	80	0	100	73	1	531	394	11
$\bar{x}$	72	71	78	78	76	93	81	80	103	81	79	105	83	82	-	83	82	103	81	79	97
S.D.	10.7	11.1	-	11.7	10.6	5.0	9.6	9.0	-	11.8	11.4	16.1	7.9	8.3	-	7.9	7.3	-	10.3	10.0	11.4
% Age Class	-	96.3	3.7	-	93.3	6.7	-	98.7	1.3	-	95.9	4.1	-	100.0	-	-	98.6	1.4	-	97.3	2.7

APPENDIX TABLE N. Tenderfoot Creek coho smolt length frequency distributions by age and sampling date, 1973.

Sampling Date	May 1			May 8			May 15			Total		
Age	Total[a]	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.
Fork Length												
46 - 50 mm	-	-	-	-	-	-	-	-	-	-	-	-
51 - 55	-	-	-	1	1	-	2	2	-	3	3	-
56 - 60	2	2	-	7	7	-	10	8	-	19	17	-
61 - 65	5	5	-	13	12	-	19	18	-	37	35	-
66 - 70	7	6	-	17	17	-	19	16	-	43	39	-
71 - 75	8	8	-	16	16	-	21	20	-	45	44	-
76 - 80	-	-	-	9	9	-	9	9	-	18	18	-
81 - 85	5	2	-	13	12	-	5	3	-	23	17	-
86 - 90	2	2	-	6	5	-	4	2	-	12	9	-
91 - 95	4	4	-	7	5	-	1	1	-	12	10	-
96 - 100	4	2	2	2	2	-	3	1	-	9	5	2
101 - 105	5	1	2	2	-	-	2	1	1	9	2	3
106 - 110	4	-	-	3	3	-	1	1	-	8	4	-
111 - 115	4	-	2	3	-	2	1	-	1	8	-	5
116 - 120	-	-	-	-	-	-	-	-	-	-	-	-
121 - 125	-	-	-	1	-	1	1	-	1	2	-	2
126 - 130	-	-	-	-	-	-	1	-	1	1	-	1
131 - 135	-	-	-	-	-	-	1	-	1	1	-	1
136 - 140	-	-	-	-	-	-	-	-	-	-	-	-
N	50	32	6	100	89	3	100	82	5	250	203	14
$\bar{x}$	85	76	105	78	75	116	74	71	120	78	73	113
S.D.	17.4	12.9	6.8	14.7	12.0	5.8	15.2	10.2	12.0	16.0	11.7	11.0
% Age Class	-	84.2	15.8	-	96.7	3.3	-	94.3	5.7	-	93.5	6.5

[a] Total sample from which readable scales obtained.

Appendix Table O. Tenderfoot Creek coho smolt length frequency distributions by age and tagging lot, 1974.

Tagging Lot	April 19			April 30			May 7			May 14			May 21			May 28			June 4			Total		
Age	Total[a]	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.
Fork Length																								
51 - 55 mm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56 - 60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
61 - 65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-
66 - 70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
71 - 75	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	3	1	-	-	-	-	5	3	-
76 - 80	1	1	-	-	-	-	1	1	-	2	-	-	2	2	-	6	4	-	3	2	-	15	10	-
81 - 85	-	-	-	3	-	-	3	2	-	3	1	-	2	2	-	9	4	-	15	10	-	35	19	-
86 - 90	-	-	-	1	1	-	5	3	-	7	2	-	5	4	-	7	5	-	29	20	-	54	35	-
91 - 95	1	1	-	2	2	-	5	5	-	6	3	-	8	4	-	20	10	-	11	6	-	53	31	-
96 - 100	11	6	1	9	5	1	10	9	-	15	1	-	19	6	1	14	4	-	14	11	-	92	42	3
101 - 105	8	2	-	6	1	-	18	5	5	10	1	-	18	6	2	15	7	1	9	4	1	84	26	9
106 - 110	13	6	4	12	2	1	18	5	1	15	3	3	12	4	3	8	3	-	8	2	1	86	25	13
111 - 115	7	1	1	8	1	1	19	3	2	22	3	4	11	3	2	11	1	3	4	1	-	82	13	13
116 - 120	5	2	-	6	1	2	13	3	3	14	2	1	20	-	4	4	-	-	4	-	-	66	8	10
121 - 125	4	-	1	1	-	-	4	1	-	4	-	1	1	-	-	1	-	-	1	-	-	16	1	2
126 - 130	-	-	-	-	-	-	3	-	1	1	-	1	1	-	1	-	-	-	2	-	-	7	-	3
131 - 135	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
136 - 140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-
151 - 155	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
N	50	19	7	49	13	5	100	37	12	100	17	10	100	32	13	100	39	4	100	56	2	599	213	53
$\bar{X}$	107	103	109	106	101	111	107	101	111	105	101	115	105	97	112	97	93	111	95	92	106	103	97	111
S.D.	9.0	9.4	7.5	11.8	8.5	8.4	10.9	10.7	8.4	11.6	13.2	6.7	11.0	10.7	8.2	12.8	9.9	5.0	11.4	7.8	3.5	12.3	10.6	7.5
% Age Class	-	73.1	26.9	-	72.2	27.8	-	75.5	24.5	-	63.0	37.0	-	71.1	28.9	-	90.7	9.3	-	96.6	3.4	-	80.1	19.9

[a] Total sample from which readable scales obtained.

Appendix Table P. Tenderfoot Creek coho smolt length frequency distributions by age and tagging lot, 1975.

Tagging Lot	March 22[a]			April 29			May 5			May 13			May 21			May 27			June 2			June 9			June 16			Total[b]		
Age	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.	Total	1.	2.
Fork Length																														
46 - 50 mm	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51 - 55	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56 - 60	6	5	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	-	-	-	-	2	2	-
61 - 65	14	9	-	12	10	-	1	1	-	-	-	-	1	1	-	-	-	-	4	4	-	1	-	-	-	-	-	19	16	-
66 - 70	16	9	-	6	5	-	3	3	-	7	5	-	4	4	-	3	2	-	2	2	-	5	5	-	3	2	-	33	28	-
71 - 75	21	8	-	5	3	-	10	7	-	8	7	-	8	7	-	8	8	-	15	15	-	7	7	-	10	10	-	71	64	-
76 - 80	8	4	-	5	1	-	4	4	-	19	17	-	14	14	-	15	12	-	30	28	-	22	21	-	29	23	-	138	120	-
81 - 85	11	7	-	12	6	-	19	10	-	22	13	-	20	16	-	28	22	-	20	19	-	25	18	-	26	21	-	172	125	-
86 - 90	12	7	-	15	7	-	23	11	-	21	12	-	17	13	-	16	14	-	14	11	-	23	22	-	18	14	-	147	104	-
91 - 95	6	4	-	13	9	-	13	11	-	14	12	-	16	14	-	15	11	-	9	7	-	9	9	-	10	5	-	99	78	-
96 - 100	3	1	-	4	3	-	18	10	-	5	2	-	10	6	-	8	7	-	4	4	-	6	6	-	1	-	-	56	38	-
101 - 105	1	1	-	11	8	-	5	1	-	2	1	-	6	3	-	2	2	-	-	-	-	-	-	-	3	1	-	29	16	-
106 - 110	-	-	-	13	5	-	3	1	-	-	-	-	4	3	-	3	3	-	1	-	-	-	-	-	-	-	-	24	12	-
111 - 115	-	-	-	3	2	-	1	1	-	1	1	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	7	4	-
116 - 120	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
121 - 125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
126 - 130	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
131 - 135	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
155 - 160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-
N	100	55	0	100	60	0	100	60	0	100	70	1	100	81	0	100	82	0	100	91	0	100	88	0	100	76	0	800	608	1
$\bar{x}$	75	75	-	88	87	-	88	87	-	85	83	128	87	86	-	86	86	-	81	80	-	84	84	-	83	82	-	85	84	128
S.D.	11.4	11.8	-	15.2	16.3	-	10.1	10.5	-	9.7	8.9	-	10.1	10.0	-	9.6	9.5	-	8.6	8.2	-	11.0	7.7	-	7.3	6.5	-	10.7	10.0	-
% Age Class	-	100.0	-	-	100.0	-	-	100.0	-	-	98.6	1.4	-	100.0	-	-	100.0	-	-	100.0	-	-	100.0	-	-	100.0	-	-	99.8	0.2

[a] Captured using minnow traps.

[b] Total excludes March 22 sample.