SOUTHEAST ALASKA

PINK SALMON TOTAL ESCAPEMENT AND STREAM LIFE STUDIES, 1987

By

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and

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ABSTRACT

A study designed to estimate pink salmon (*Oncorhynchus gorbuscha* Walbaum) total stream escapements was initiated in 1986 and continued in 1987 in Southeast Alaska in conjunction with the U.S./Canada Salmon Research program. New weirs were operated at Pleasant Bay Creek in Seymour Canal and at Black Bear Creek in Union Bay. Two existing weirs at Kadashan River in Tenakee Inlet and Sashin Creek at Little Port Walter were also operated in 1986 and 1987. Pink salmon stream life estimates were derived from a daily tagging and tag recovery study. Average stream life of pink salmon for all weirs declined from a high weekly average of 33 days early in the run to a low weekly average of 4.5 days near the end of the run. There were differences in mean stream life between streams and between 1986 and 1987. Calculated estimates of the number of live pink salmon present each day were derived from daily escapement and daily stream life for each stream. This was done to calibrate observer aerial and foot estimates. Comparisons of aerial and foot estimates and pink salmon present showed that surveyors estimated about half of the actual number of available salmon.

KEY WORDS: Pink salmon, *Oncorhynchus gorbuscha*, total escapement, stream life, observer calibration, aerial surveys, foot surveys

INTRODUCTION

As part of the joint U.S./Canada salmon research studies, estimates of total pink salmon escapements to Southeast Alaska streams are required to calculate total numbers of tagged fish reaching spawning systems for use in contribution rate analysis. With over 2,000 pink salmon spawning streams in Southeast Alaska, enumerating total annual escapement to each system is not feasible. This study provided annual stream life estimates, aerial and foot observer calibration for use in total escapement estimation, in-season run timing information from daily escapement counts, and pink salmon sex ratio sampling at each of the weir locations. This report covers the results of two years of study.

The specific objectives of this study were to:

1. Determine daily stream life of pink salmon at representative sites in Southeast Alaska.
2. Calibrate aerial and foot observer counts with actual number of salmon.
3. Provide the methodology for estimating total pink salmon escapement in Southeast Alaska.

The stream life studies were designed to measure the number of days that pink salmon remain alive after they enter a stream to spawn. The stream life data from several representative streams were used to calculate actual total pink salmon escapements to all Southeast Alaska streams. These calculations considered two things: (1) that some portion of the live fish counted during a stream survey were fish that had entered the stream since the previous survey; and (2) that other fish which had been in the stream during the previous survey had since died and were now absent from the stream. This was the goal of a previous study (Thomason and Jones 1984) that found the stream life varies between streams and that more stream life data were required for reliability. The ultimate goal of these studies is to adjust and greatly refine the standard peak aerial and foot escapement counts to arrive at more accurate estimates of actual total escapement by stream and district.

We have located few published studies of observer calibration, and no studies incorporating stream life data with weir counts. Cousens et al. (1982) reviewed numerous techniques for estimating salmon escapements. Symons and Waldichuk (1984) suggest research on the accuracy and cost of various methods for monitoring salmon escapement. Different estimating techniques under varying conditions may introduce large inaccuracies in the estimation of optimal escapements that could result in a 25-30% loss in the average long term yield from the stock (Ludwig and Walters 1981; Walters and Ludwig 1981; Symons and Waldichuk 1984). Johnston et al. (1986) have addressed the problems of evaluating weir counts, mark-recapture, and Bendix sonar estimates for pink salmon in a British Columbia stream. They found their mark-recapture estimates had good precision, but that their location of the sonar provided poor results. In this report we present another method of evaluating escapement by combining observer calibration and stream life data with observer estimates of salmon to provide an estimate of total escapement.

The information from this study will be used to enhance in-season management and post-season evaluation of management strategies, and help improve estimates of optimum escapement.

METHODS

Site Selection

There were two primary considerations when choosing weir locations. The first consideration was the location of an easily surveyed stream between at least two management areas so that more than one area biologist could survey the stream on a regular weekly basis for observer calibration. Area biologists were consulted for recommendations on streams that could be surveyed from the air. The second was the amount of area available for recovering tags from carcasses after the fish had spawned and died. The stream had to be small enough to be walked on a daily basis, be large enough to support a minimum of 20,000 spawners, and have a maximum length of four miles of spawning area. Streams with excessive windfalls, braided channels, and many tributaries were not considered suitable for daily tag recovery operations. We assumed these criteria did not affect the results and that the streams chosen were representative for fish behavior in all streams in the region.

Weirs were located at Pleasant Bay Creek in Seymour Canal near Juneau, Black Bear Creek in Union Bay near Ketchikan, and Sashin Creek at Little Port Walter near Sitka. In addition, existing weirs on Kadashan River in Tenakee Inlet between Sitka and Juneau were operated in 1986 and 1987. The location of each weir is shown in Figure 1. The Kadashan River weirs were operated primarily for in-season management considerations, and secondarily for stream life studies. Kadashan River cannot be surveyed by air because of overstory and windfalls. A limited number of tags were applied to East Fork pink salmon in 1986 for a stream life study and a section of the river was examined every other day as time allowed to recover tags. Kadashan River is the only pink salmon system in Southeast Alaska that has been weired annually since 1969 and it provides valuable data for in-season management for one of the largest pink salmon producing streams in the region. The weir on Sashin Creek at Little Port Walter was operated in cooperation with the U.S. National Marine Fisheries Service (NMFS), which provided an existing weir and lodging for the field crew.

Total Escapement

Salmon were counted upstream through the weir by pulling one or more pickets up from the bottom of the stream. Separate hand tally counters were used for each species of salmon as they passed upstream across a white board placed on the streambed for contrast.

In addition to enumerating upstream migrating salmon, other data were collected. The water level was recorded each morning from a centimeter stick attached to a stake in the stream near the weir; the temperature was recorded at the same time. Chum salmon scales and lengths (mid-eye to fork of tail) were collected on samples taken from the fish trap. Data were recorded on mark-sense forms for correlation with age data from scale samples by the ADF&G stock biology group.

A minimum of 50 pink salmon per day were checked for sex ratio data. When more fish were in the trap than were to be tagged, on that day excess fish were checked for sex ratio.

Estimating Total Escapement from Multiple Surveys

Pink salmon stream life information can be used with multiple stream surveys to estimate the numbers of new fish entering a stream at each new stream survey. When the dates of two surveys are close enough together, some of the fish from the previous survey are still alive at the next survey. Using stream life and the general formula developed by Ivan Frohne (Figure 2) from the Traitors River study (Kingsbury 1977) near Ketchikan and information from the additional stream life studies we have conducted in the past (Thomason and Jones 1984) and in the weir studies reported here, we can estimate the numbers of live fish remaining from one survey to the next.

Figure 3 shows the general process used in deriving an estimate of the total numbers of new fish with seven aerial surveys done on Nakwasina River near Sitka in 1979. E(i) is the estimate of new fish at the "i"th survey. All the fish in the first survey (i=1) (Table 1) are new fish so E(1) = 20,000. The second survey is only 2 days from the first so all the fish from the first survey are still there. Therefore, E(2) (the number of new fish present at the second survey) is the total of second survey (25,000) minus the first survey (20,000) or 5,000. As the season progresses the number of new fish is estimated at each new survey and then summed up at the end for an estimate of the total number of new fish entering from the first survey to the last. In this example the peak survey, which is what we are currently using as an index of escapement, was 110,000 and the estimated total escapement through the last survey was 176,445 pink salmon. A program written in PASCAL has been developed to do the estimates of new fish at each survey from the escapement data files.

One additional adjustment can be made if a weir was operated in a nearby system with similar run timing. The total estimated escapement (TEE) can be adjusted using the run timing observed at the weir by dividing the TEE in the study stream by the cumulative percent daily escapement through the weir at the date of the last survey. This will give an estimate of the numbers of fish through the end of the run (assuming the weir was operated through the end of the run).

This method assumes that the observer is seeing all the fish present which we know is not the case from the results of this study and that each observer is seeing a comparable proportion of the fish present, also shown to be a poor assumption later in this report. Therefore, prior to any estimates of total

escapement, each survey needs to be corrected for the observer that conducted the survey.

Stream Life Studies

Pink and chum salmon were tagged daily from the trap installed in the weir. The trap remained open only long enough to capture the number of fish desired and to avoid overcrowding the trap. A minimum of 500 pink salmon were tagged weekly with tagging to be conducted daily as fish were available and time allowed. Fluorescent international orange streamer tags (Floy Tag and Manufacturing, Inc., Type Ft-4) were placed behind the dorsal fin. The sex of each tagged fish and the unique tag number were recorded on data forms.

The stream above the weir was examined daily to recover tags from salmon carcasses. Data on the condition of the carcass, sex, and tag recovery date were recorded in field notebooks. The stream data were transferred to the tagging operation forms for later computer analysis. A daily stream life or days at large was calculated by averaging the number of days between tagging and tag recovery for natural mortalities (leaving out loose tags).

Observer Calibration

For observer calibration surveys, area management biologists were encouraged to continue with at least a minimum of a weekly aerial survey as in past years and to continue foot surveys, since weir results would not be available in-season. Survey counts and weir counts were confidential and not released until the end of the season to avoid biasing estimates. Foot surveyors were management personnel and weir personnel did not make foot surveys because they knew the numbers of actual fish passed.

RESULTS

Total Escapement

Weir escapements in 1986 totaled 38,016 pink salmon in Pleasant Bay, 242,352 pink salmon in Black Bear Creek, 10,487 pink salmon in Sashin Creek, and 196,450 pink salmon in both forks of the Kadashan River. In 1987 weir escapements totaled 111,495 pink salmon in Pleasant Bay, 55,634 pink salmon in Black Bear Creek, 9,284 pink salmon in Sashin Creek, and 152,147 pink salmon in both forks of the Kadashan River (Table 2).

Weir counts have been historically depicted as a cumulative count over time. By using stream life data to discount the salmon that have died, we were able to estimate a daily number of live pink salmon present in the stream (Figures 4 through 9 and Appendices A.1.a through A.3.b). In Figures 4 through 9, the solid line is the cumulative escapement, the dotted line is the calculated stream live, and letter codes are observer estimates. This calculated stream live value is the estimated number of live pink salmon present in the stream

on a particular day. This estimate is calculated using the number of days at large and the daily count of weir escapement. The calculation discounts those fish that have entered the stream and have already died. The pink salmon present estimates of total escapement by stream were used for observer calibration of aerial and foot surveys.

Stream Life Studies

At the four locations in 1986, a total of nearly 10,000 pink salmon were tagged and slightly over half of the tags were later recovered from carcasses. In 1987 over 8,000 pink salmon were tagged at the same sites except Kadashan River. Recoveries were more variable this year due to flooding (Table 2).

There was no significant difference between stream life of males and females (Appendix B.1.a through B.4). The number of days at large, or stream life, for pink salmon ranged from a high weekly average of 33.3 days in 1986 at Black Bear Creek at the beginning of the season to a low weekly average of 4.5 days near the end of the run in 1987 in Pleasant Bay Creek (Figures 10 and 11). Chum salmon steam life in 1987 at Pleasant Bay Creek ranged from 16.0 to 5.0 days at large (Figure 11).

There were differences in mean stream life between streams and between 1986 and 1987 (Figure 12). Pleasant Bay mean stream life increased 34.6% from 10.7 days in 1986 to 14.4 days in 1987. Black Bear Creek mean stream life decreased 48.8% from 20.9 days in 1986 to 10.7 days in 1987. Sashin Creek mean stream life decreased only 1.9% from 10.5 days in 1986 to 10.3 days in 1987.

Observer Calibration

All of the study streams except Kadashan River were surveyed by their respective area management staff in routine aerial and foot surveys; additional surveys were conducted by management staff from adjacent areas (Figures 4 through 9). Individual observer names were coded and have not been included. Weighted mean percentages for estimated versus actual number of pink salmon for each stream by aerial and foot were calculated by dividing the sum of observed counts by the sum of the estimated daily pink salmon present for that day (Figure 13).

Pleasant Bay Creek was surveyed by foot in 1986 and the weighted mean estimate was 54% of the calculated pink salmon present. In 1987 the weighted mean estimate of foot surveys was 31% of the calculated pink salmon present. Black Bear Creek foot surveys in 1986 provided a weighted mean estimate of 94% of the calculated pink salmon present. In 1987 Black Bear Creek foot surveys were not included because they occurred after the last flood and the actual number of pink salmon present could not be calculated accurately due to the collapsed weir. Sashin Creek has not been surveyed regularly by foot since it has traditionally had a weir in use. The average of foot estimates for the two streams for both years was 56% of the calculated pink salmon present.

For Pleasant Bay Creek aerial surveys the weighted mean estimate for all surveyors in 1986 was 42% and in 1987 it was 40% of the calculated pink salmon present (Figure 13). Sashin Creek aerial surveys varied from 24% in 1986 to 71% in 1987 in the weighted mean estimate of the percentage of estimated versus calculated number of pink salmon present. Black Bear Creek aerial surveys had weighted mean estimates of 35% in 1986 and 25% in 1987. The weighted mean percentage estimate for all locations for both years was similar at 35% for 1986 and 39% for 1987.

There were considerable differences in the mean percentage estimates by aerial observers, although the percentages estimated remained relatively constant by year and observer. Figure 14 compares the calculated number of pink salmon with the smoothed observations of two different observers for Pleasant Bay in 1986. One observer that surveyed all three locations had extremely accurate estimates and most surveys fell within the 95% confidence interval of the linear regression with a r value of .95 (Figure 15).

DISCUSSION

The only previous study that compares observer counts with weir counts in Southeast Alaska was by Meyer (1964). Our study was similar to his but differed in our addition of the stream life study and observer capability to estimate live pink salmon present on a daily basis. A comparison of observer estimates of live fish to our estimated pink salmon present is more appropriate than comparing observer counts with weir cumulative counts because the latter includes dead fish. Meyer did attempt to obtain surveys before significant "die off" had occurred.

ADF&G previously conducted stream life studies in Southeast Alaska (Kingsbury 1977 and Thomason and Jones 1984). It found that pink and chum salmon entering the stream latest had the shortest stream life and that stream life varies considerably between streams. Therefore, stream life data were required from additional streams before improved estimates of pink salmon total escapements could be calculated. Our present project is gathering the needed data and we plan to place more emphasis on chum salmon where feasible. Pleasant Bay Creek had several excellent characteristics to aid study. In 1986 it had adequate numbers of chum salmon with separate timing from the majority of the pink salmon, and a convenient spawning area for tag recovery. In 1987 Pleasant Bay Creek chum salmon were more intermixed with pink salmon than in 1986. However, the larger 1987 run of pink salmon made more fish available for the bears, thereby allowing most chum salmon to complete their spawning and more chum salmon tags were recovered. Although the first part of the run to Pleasant Bay in 1986 consisted mainly of chum salmon, no aerial surveys recorded chum salmon present in the stream.

Environmental variables may affect the stream life results for pink salmon which show considerable differences by year and by stream. Pleasant Bay Creek had an increase of 34.6% in pink salmon stream life in 1987 over the previous year; the difference occurred in the first few weeks when bear

predation on tagged fish was 50% in 1986, but only 5% in 1987. Black Bear Creek stream life decreased by 48.8% from 1986 to 1987, primarily in the first two-thirds of the run when water levels were considerably lower in 1987 than 1986. Sashin Creek stream life varied within years but was overall nearly the same for both years.

Most total escapement studies have been for salmon species with relatively few fish (Crone and Bond 1976, Gangmark and Fulton 1952, and Willis 1964). Estimating elusive coho salmon in small numbers is quite different than estimating large numbers of pink and chum salmon. Bevan (1961) found the variance in an observer's estimate to be proportional to the size of the estimate for pink salmon aerial surveys. His experiments indicated that an observer will detect differences in population size of plus or minus fifty percent. He found that the relationship between counts of different observers changed within different streams, but within the same river, counts were correlated between observers. Our results show considerable differences between observers within the same stream and between streams. Our one experienced observer who surveyed all three sites was remarkably consistent within and between streams.

An early study on pink salmon foot surveys by Sheridan (1962) concentrated on redd life because only riffle areas could be counted accurately. Present ADF&G surveying methods concentrate on aerial surveys with limited emphasis on foot surveys. Other authors have described calculating escapements using the area under the curve method of an index count of salmon and number of days of stream life. Gangmark and Fulton (1952) reported estimating total escapement of spawners of sockeye salmon in the Wenatchee system based on several foot surveys and a single redd life factor. Neilson and Geen (1981) used aerial counts of chinook salmon and several correction factors of the redd life over time. The area under the curve method was used by Helle (1970) for foot survey counts of pink salmon in the intertidal zone of Olsen Creek in Prince William Sound. He divided the calculated area under the curve by the average stream life (Helle et al. 1964) to obtain estimates of the intertidal and freshwater spawning populations. Like our study, Helle used stream life because all the pink salmon in the stream were counted whether they were spawning or not. Our methods of determining stream life differed, however, because Prince William Sound has predominantly intertidal spawning areas. We chose to place our weirs just above the intertidal zone where we could operate and maintain them. Pleasant Bay Creek and Sashin Creek do not have any significant intertidal spawning because of bedrock. For Black Bear Creek we excluded spawners in the intertidal area below the weir and used the upstream spawning areas for our analysis.

A number of authors have used population estimates based on mark-recapture and observer counts, but few researchers have compared estimates with weir counts of actual known numbers of fish. Brett (1952) compared weir counts with foot counts and tagging population estimates for sockeye salmon. He found that foot counts estimated about one-third of the actual number of fish present. Estimates from tagging were about twice the number present. Johnston et al. (1986) found area under the curve estimates were inaccurate but found that their mark-recapture estimates were only 7% below the weir counts. They also estimated stream life by tagging pink salmon at the weir

and recovered tags from carcasses. The mean stream life was 16 days for both males and females and ranged upwards to 60 days. They found no significant difference between males and females which is consistent with the results of our study. Shardlow et al. (1987) confirmed that species, habitat type, method of observation, and observer's experience all affect the probability of observing fish. Their observers counted an average of 20% of the fish present for foot surveys and 85% for fixed wing aerial surveys.

CONCLUSIONS

Most other researchers on escapement methods agree that further research is needed for the length of stream residence by species in different locations, between and within years. It is particularly important to have this information to evaluate the reliability of historic escapement data used for management of the fisheries and in scientific papers. Escapement counting is a scientific problem that should be treated as such, with experiments performed and standardized methods developed (Shardlow et al. 1987).

RECOMMENDATIONS

We recommend continuing the project to collect data on the variance of stream life between cycles and years of pink salmon. Observers should continue aerial and foot estimation of salmon throughout the region as in the past and try not to be influenced by the percentage of salmon counted in this study.

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Table 1. Nakwasina River pink salmon escapement estimation and peak survey comparison.

Date	Escapement	New Fish-E(i)
8/7	20,000	20,000
8/10	25,000	5,000
8/14	48,000	23,154
8/20	77,000	30,972
8/27	105,000	38,286
9/6	110,000	39,872
9/18	75,006	19,161
Total		176,445

Table 2. Southeast Alaska pink and chum salmon weir counts and stream life tagging summary.

Location	Year	Chum Salmon	Pink Salmon	Pink Salmon Tagged	Pink Salmon Tags Recovered	Percentage Recovered
Pleasant Bay Creek	1986	922	38,016	2,989	2,195	73.4
	1987	1,221	111,495	3,967	3,045	76.8
Black Bear Creek	1986	108	242,352	3,920	1,641	41.9
	1987	84	55,634	2,894	946	32.7
Sashin Creek	1986	176	10,487	1,982	1,375	69.4
	1987	11	9,284	1,392	676	48.6
Kadashan River	1986	21,759	196,450	1,013	168	16.6
	1987	30,132	152,147	0	0	

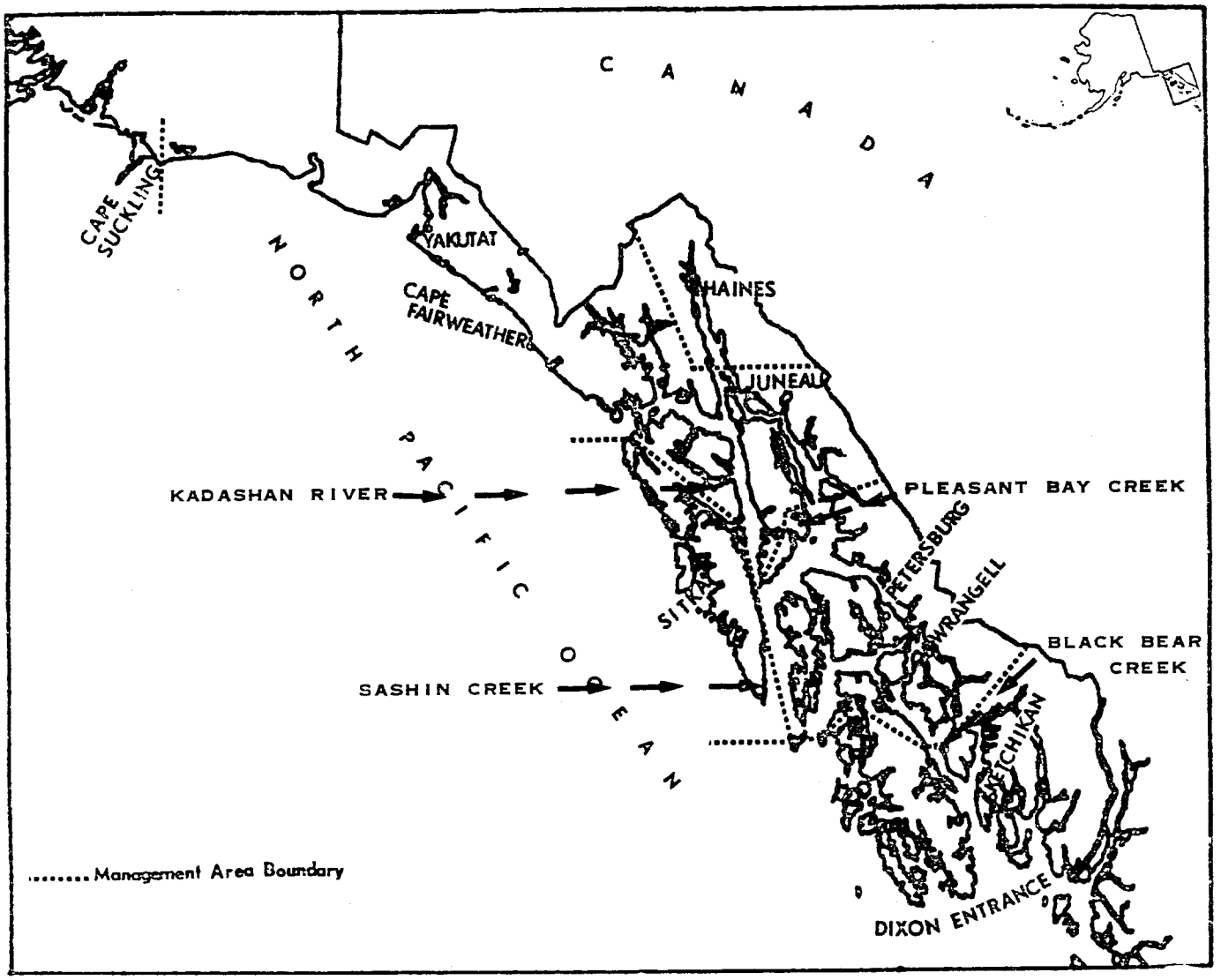

Figure 1. Southeast Alaska with Commercial Fisheries Division management areas and pink salmon weir locations.

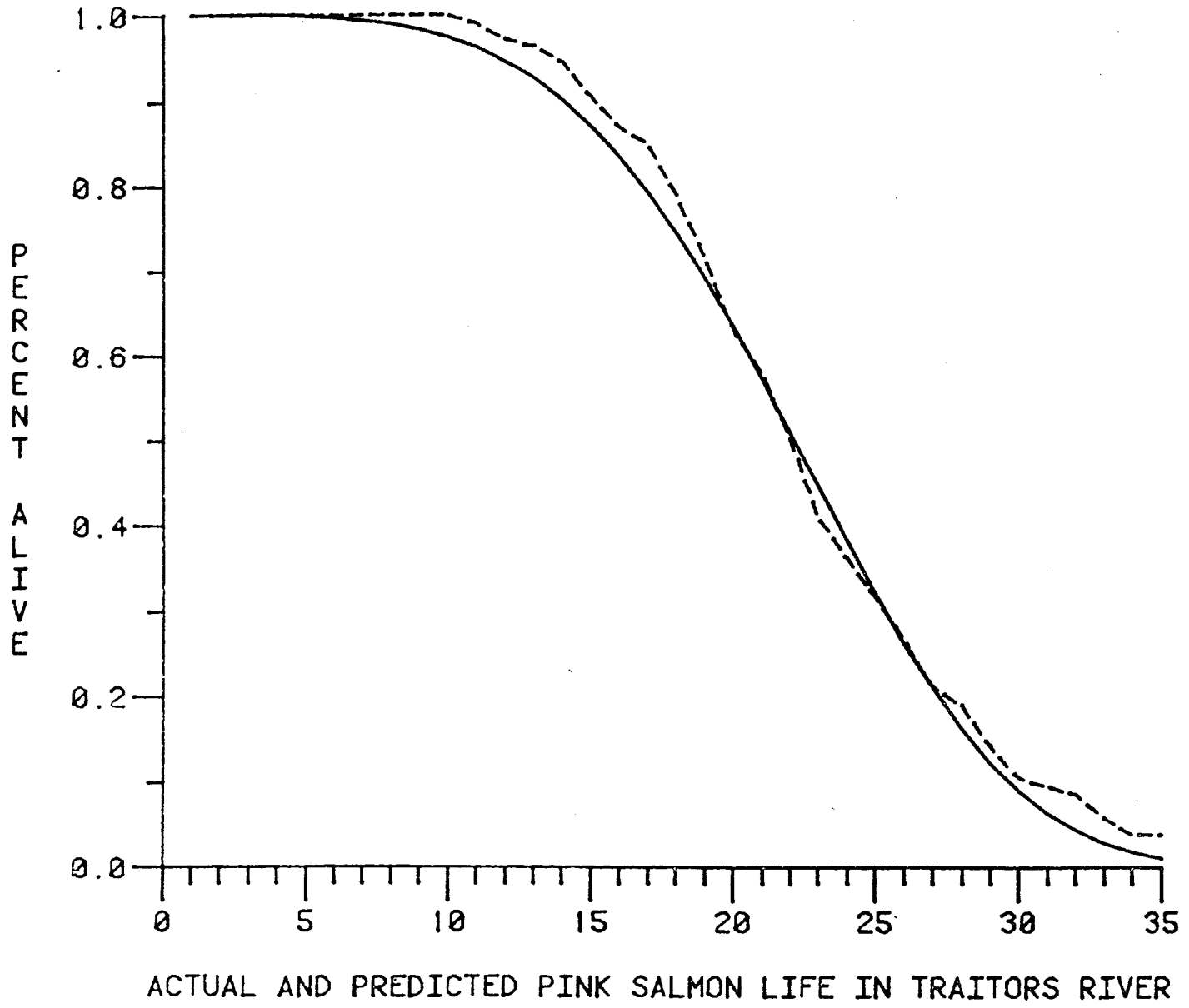

Figure 2. Actual and predicted pink salmon life in Traitors River.

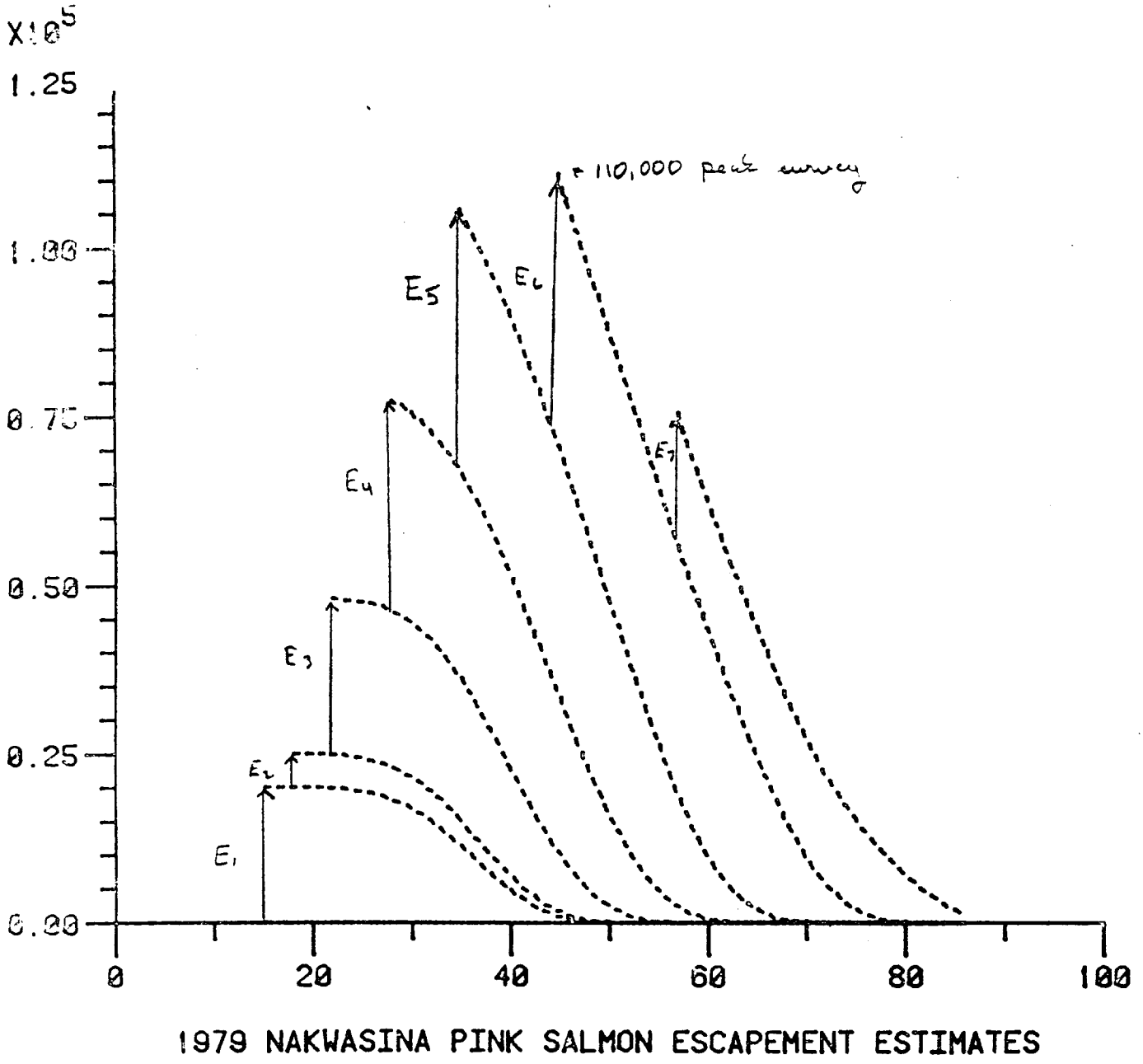

Figure 3. 1979 Nakwasina River pink salmon escapement estimates.

1986 Pleasant Bay (111-12-005) Escapement Pink Salmon Daily Counts and Observer Counts

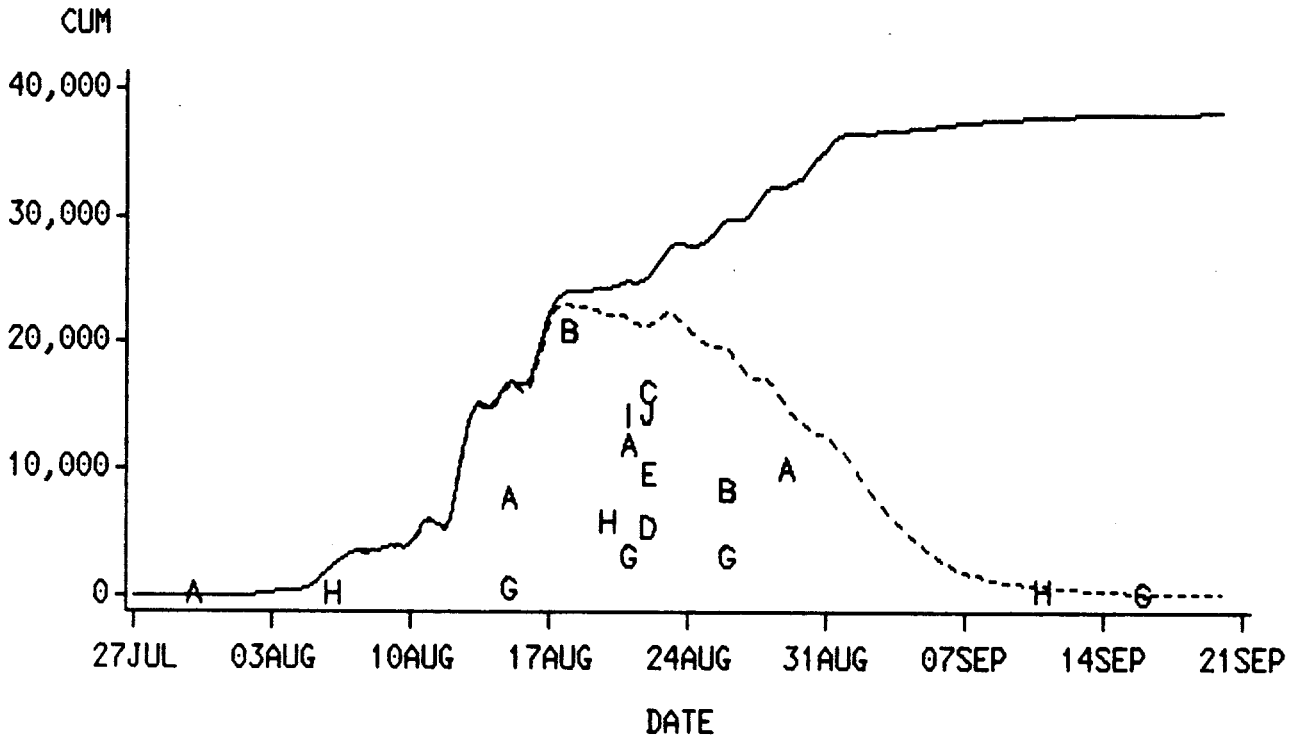

Figure 4. 1986 Pleasant Bay Creek pink salmon cumulative escapement, pink salmon present, and observer estimates.

1987 Pleasant Bay (111-12-005) Escapement Pink Salmon Daily Counts and Observer Counts

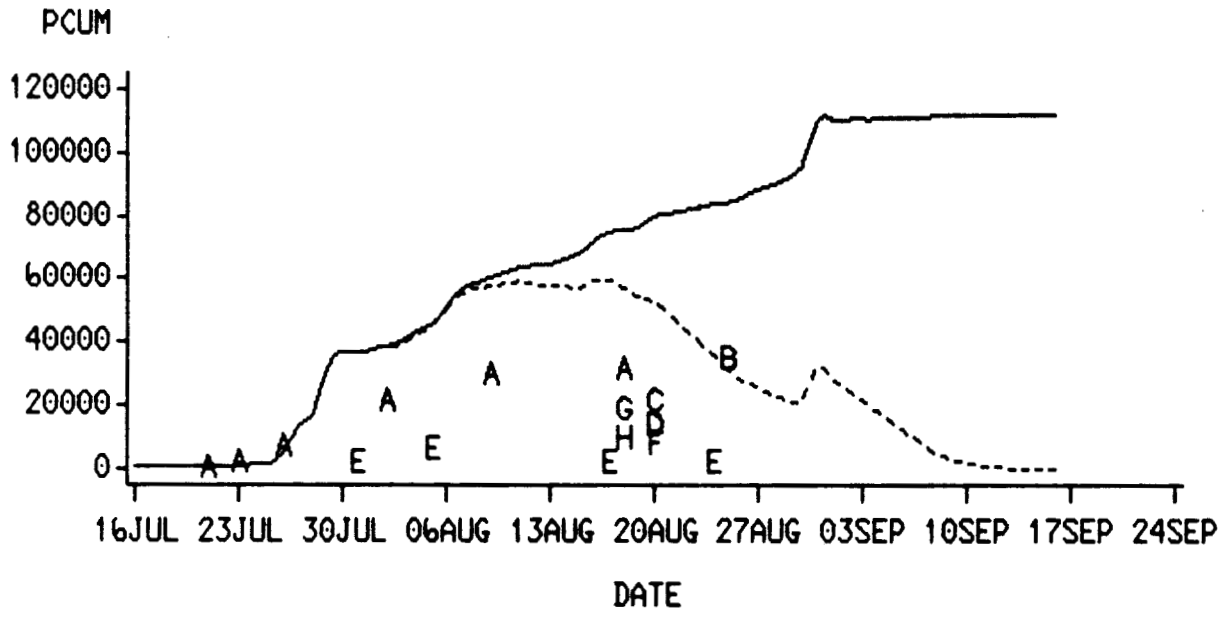

Figure 5. 1987 Pleasant Bay Creek pink salmon cumulative escapement, pink salmon present, and observer estimates.

1986 Black Bear Creek (107-10-030) Escapement Pink Salmon Daily Counts and Observer Counts

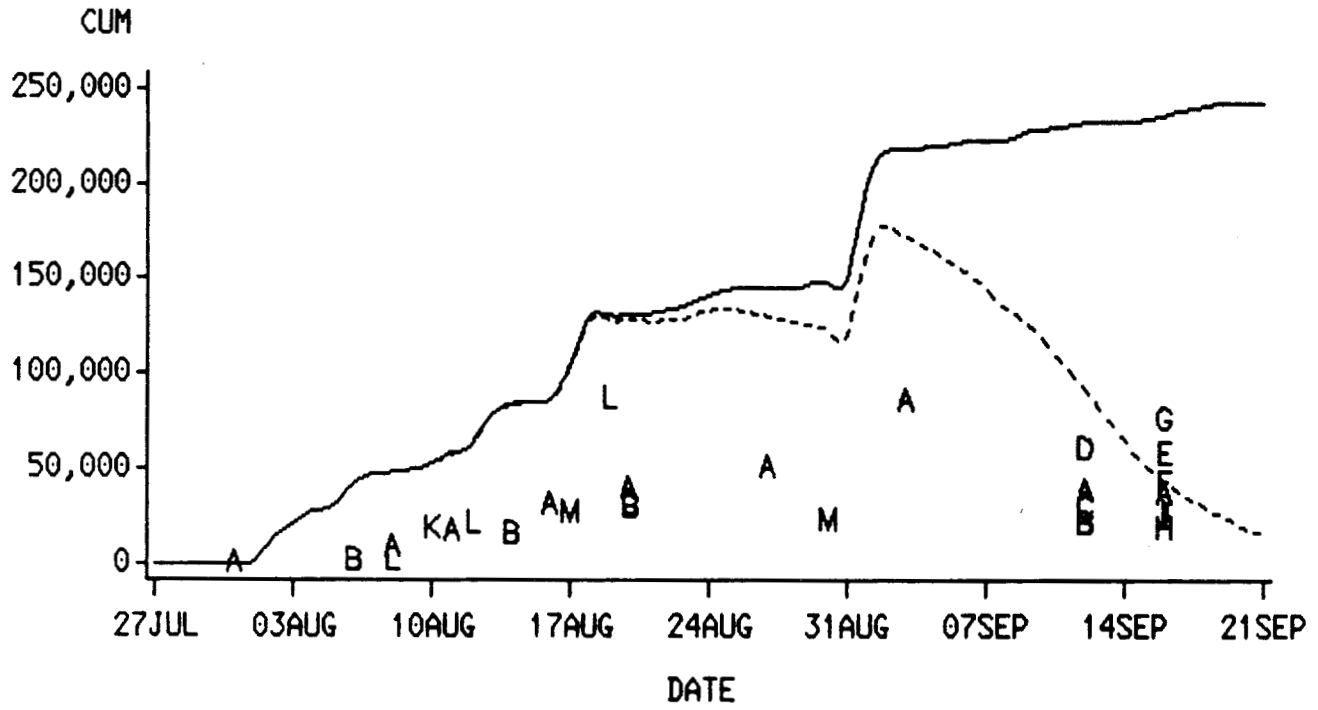

Figure 6. 1986 Black Bear Creek pink salmon cumulative escapement, pink salmon present, and observer estimates.

1987 Black Bear Creek (107-10-030) Escapement Pink Salmon Daily Counts and Observer Counts

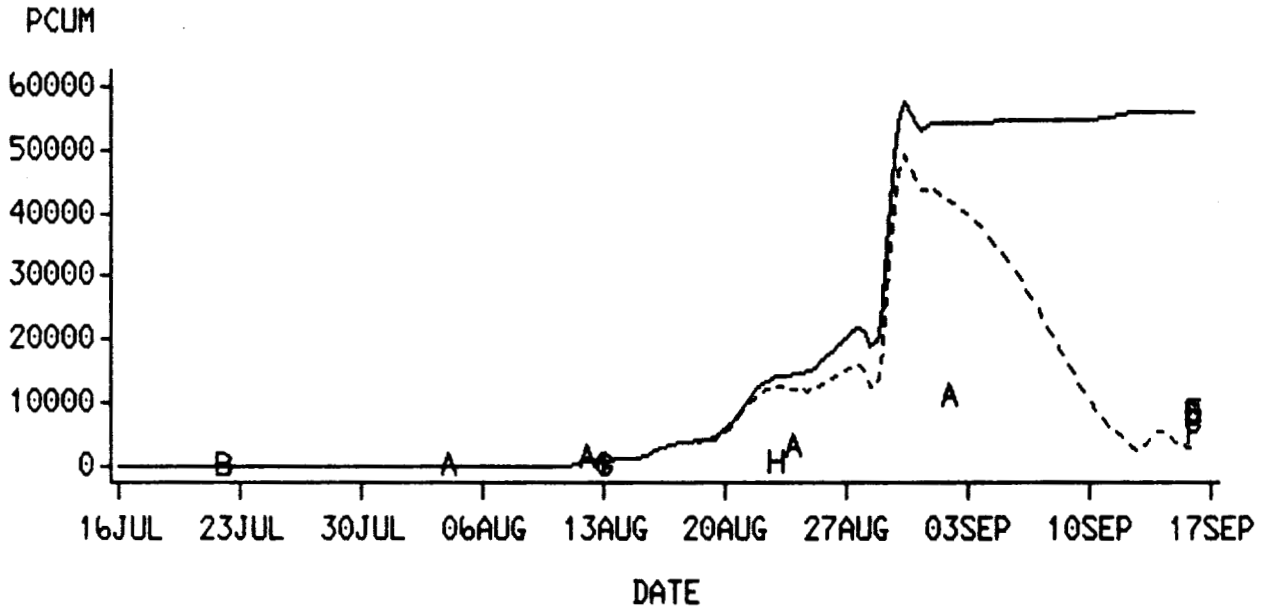

Figure 7. 1987 Black Bear Creek pink salmon cumulative escapement, pink salmon present, and observer estimates.

1986 Sashin Creek (109-10-006) Escapement
Pink Salmon Weir and Observer Counts

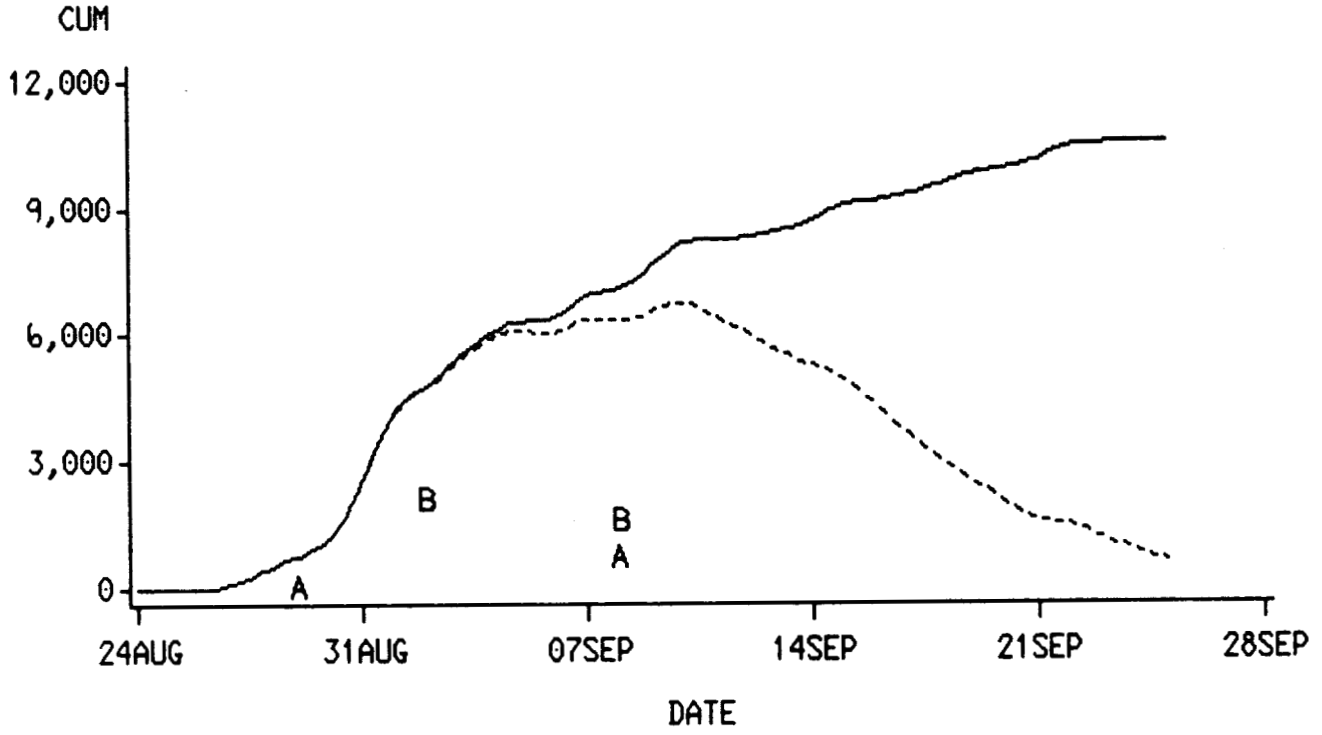

Figure 8. 1986 Sashin Creek pink salmon cumulative escapement, pink salmon present, and observer estimates.

1987 Sashin Creek (109-10-006) Escapement
Pink Salmon Weir and Observer Counts

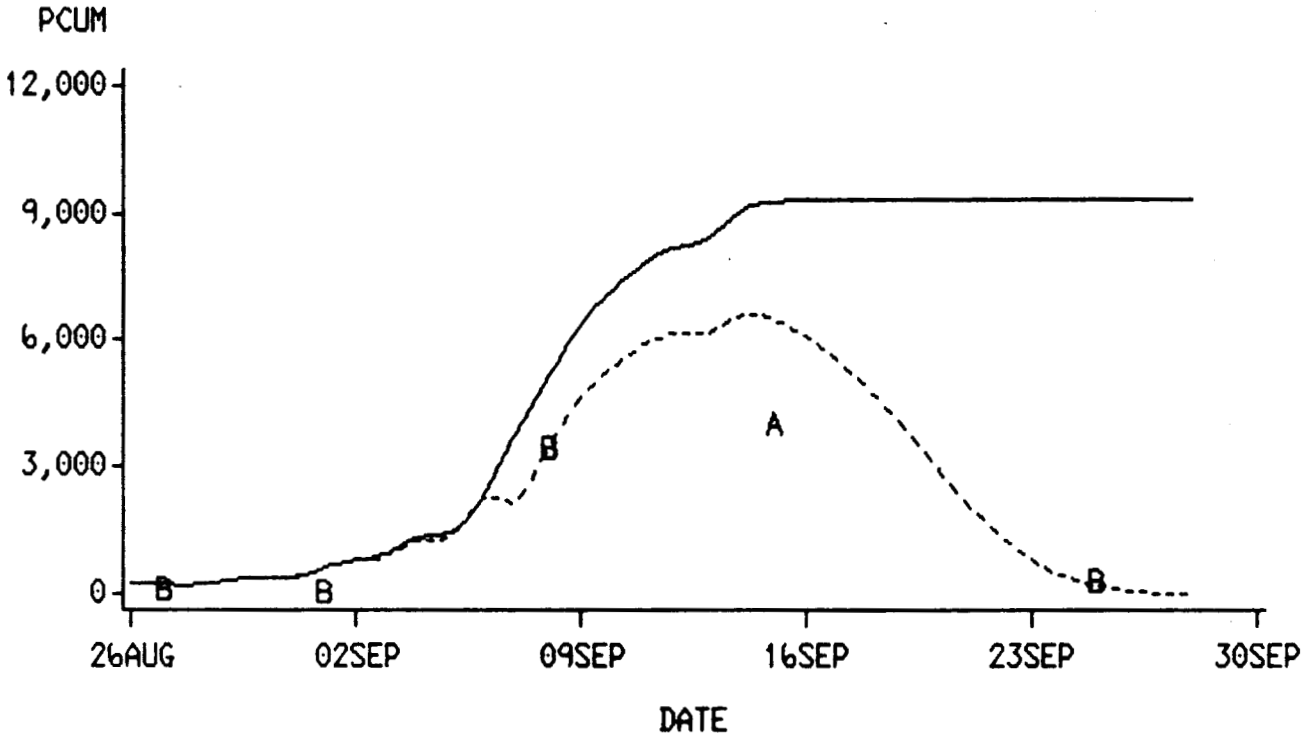

Figure 9. 1987 Sashin Creek pink salmon cumulative escapement, pink salmon present, and observer estimates.

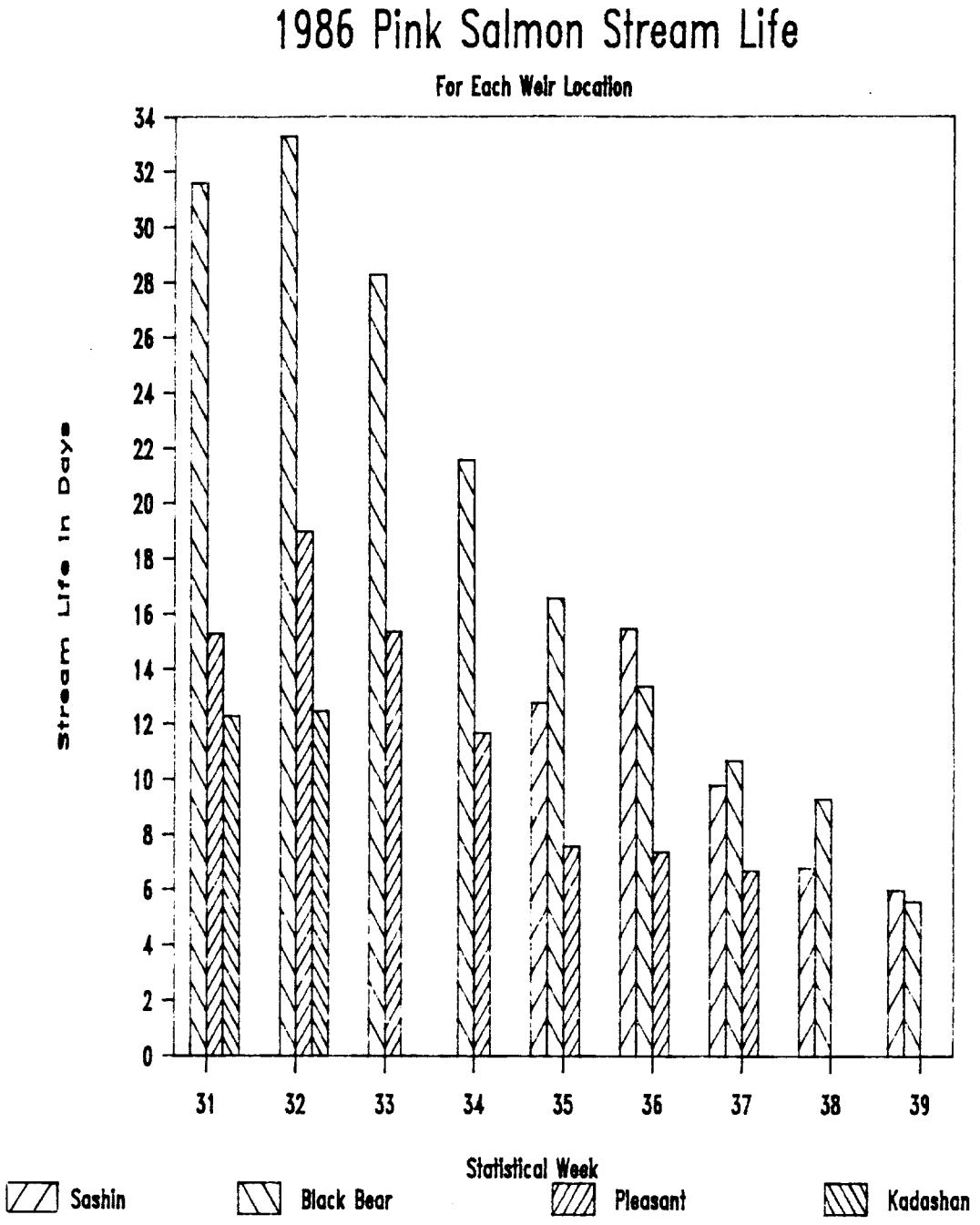

Figure 10. 1986 Pink salmon mean stream life for each weir location.

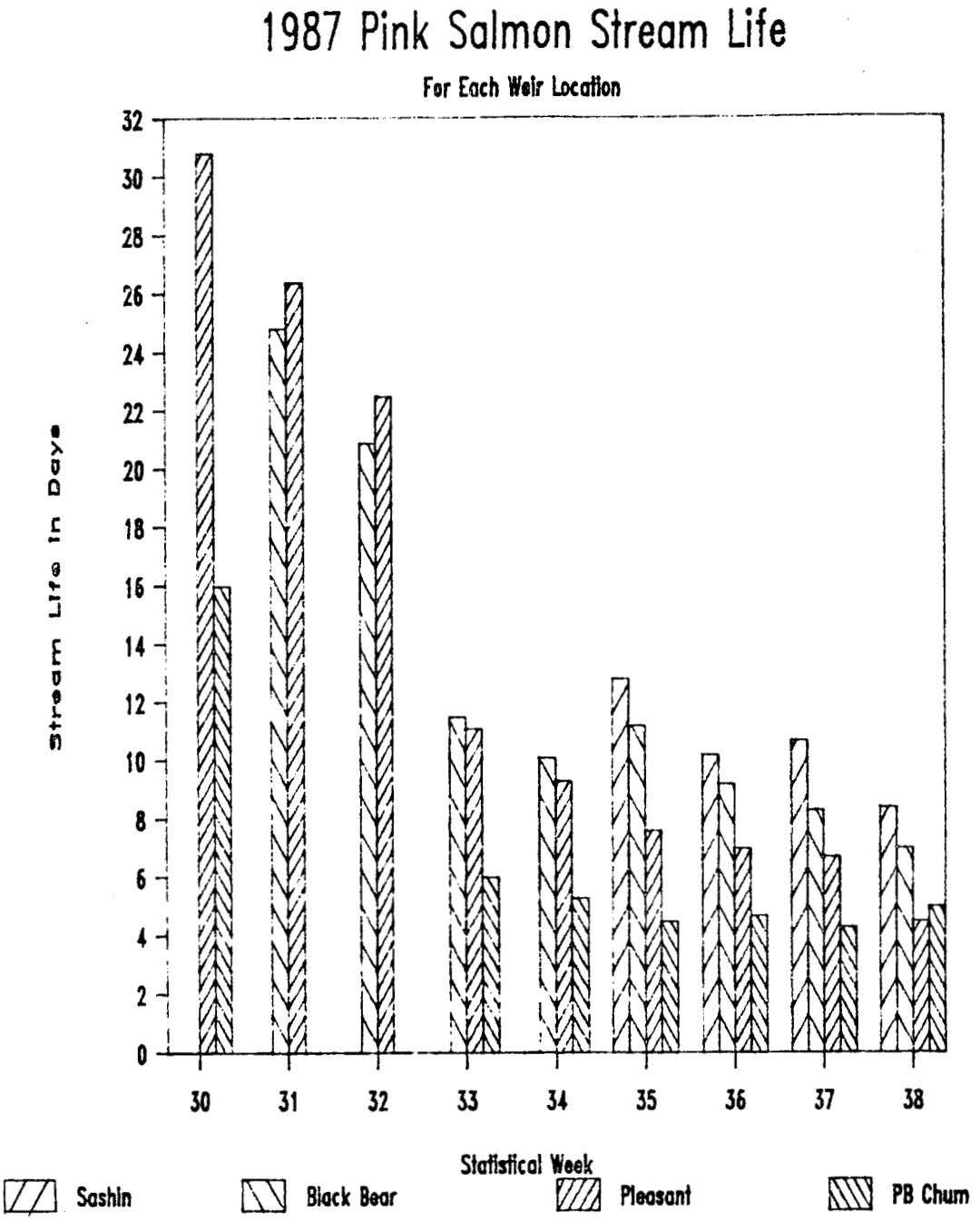

Figure 11. 1987 Pink and chum salmon mean stream life for each weir location.

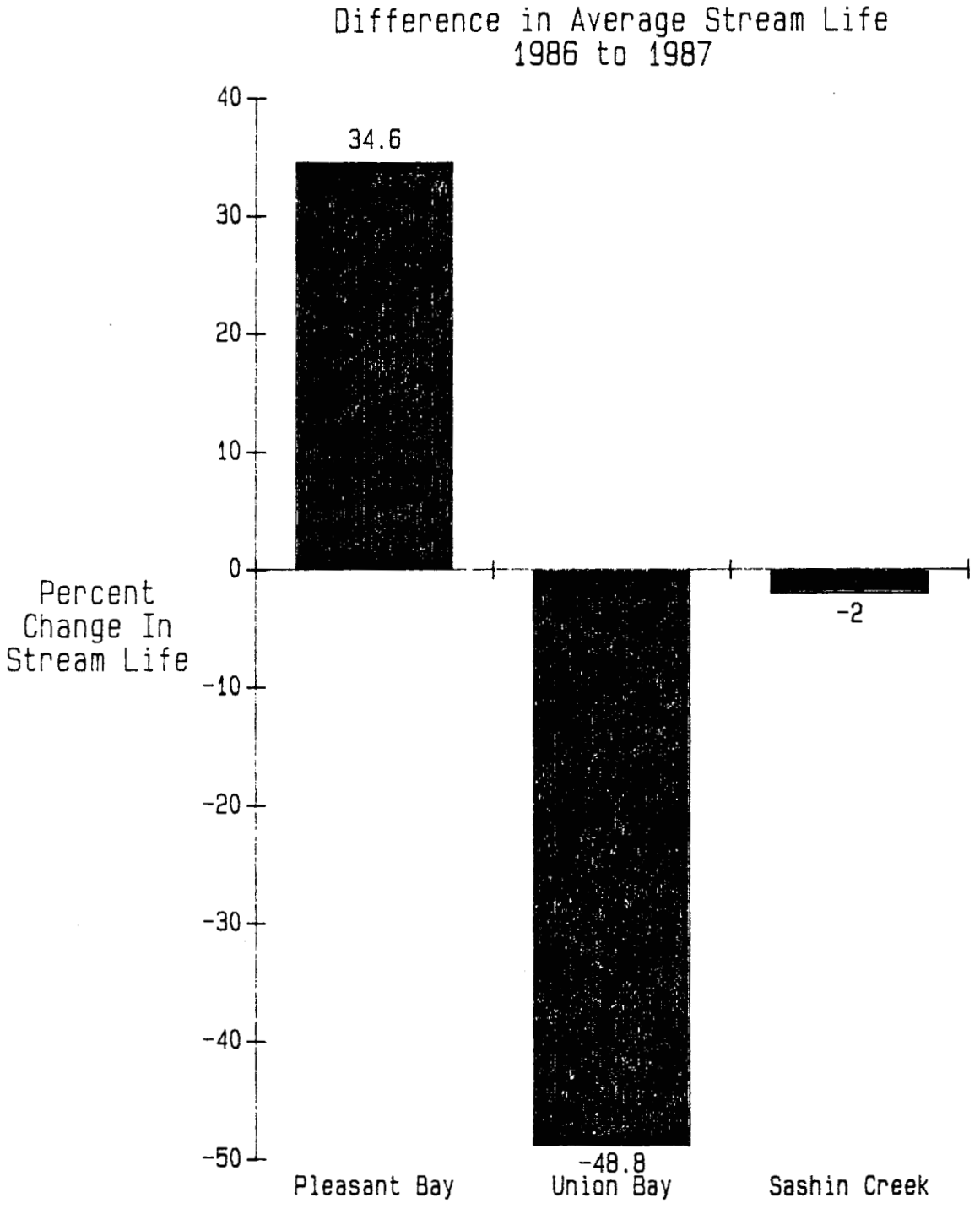

Figure 12. Difference in average stream life 1986 to 1987.

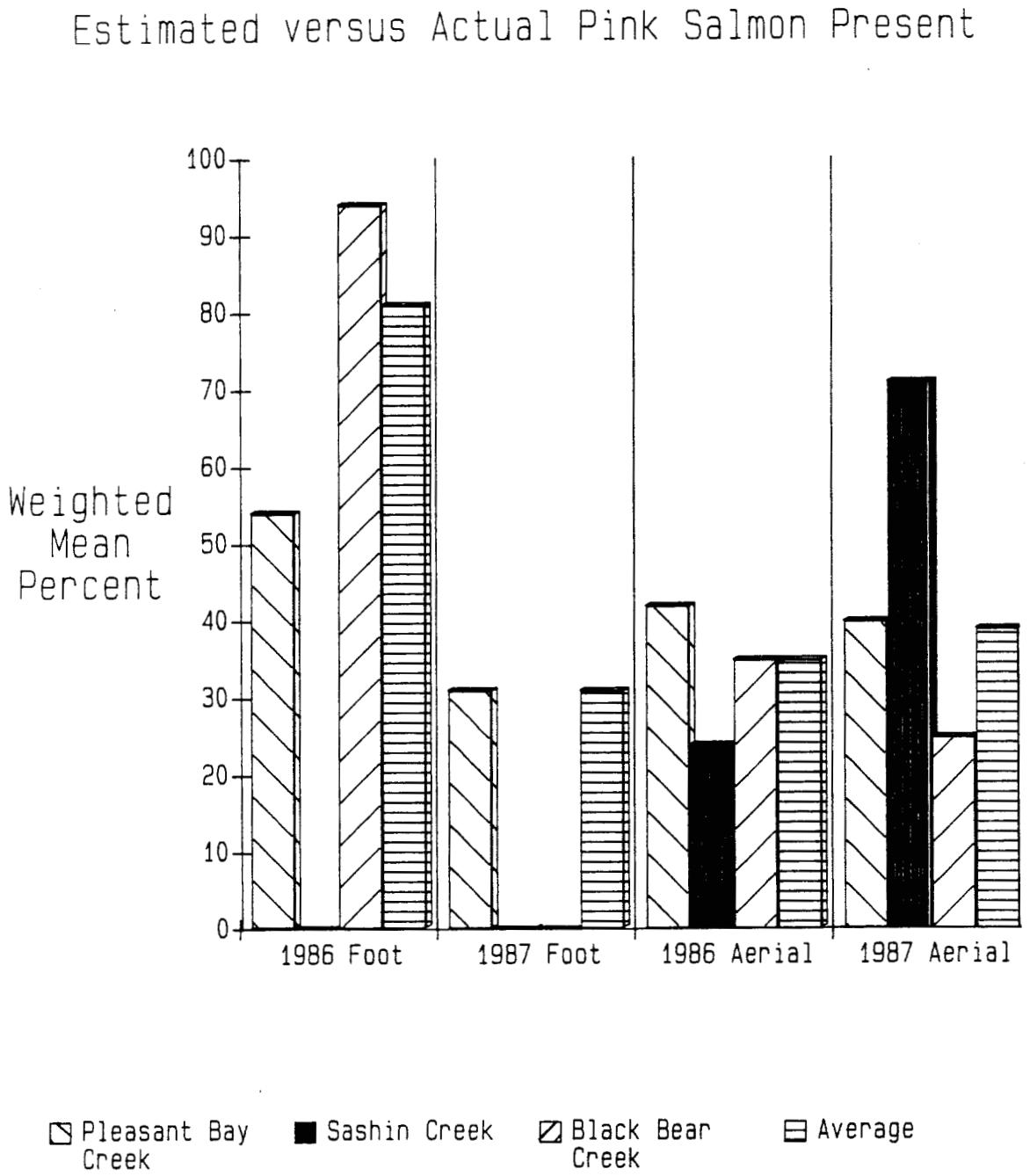

Figure 13. Aerial and foot estimate weighted mean percentages for calculated pink salmon present.

1986 Pleasant Bay (111-12-005) Escapement Pink Salmon Daily Counts and Observer Counts

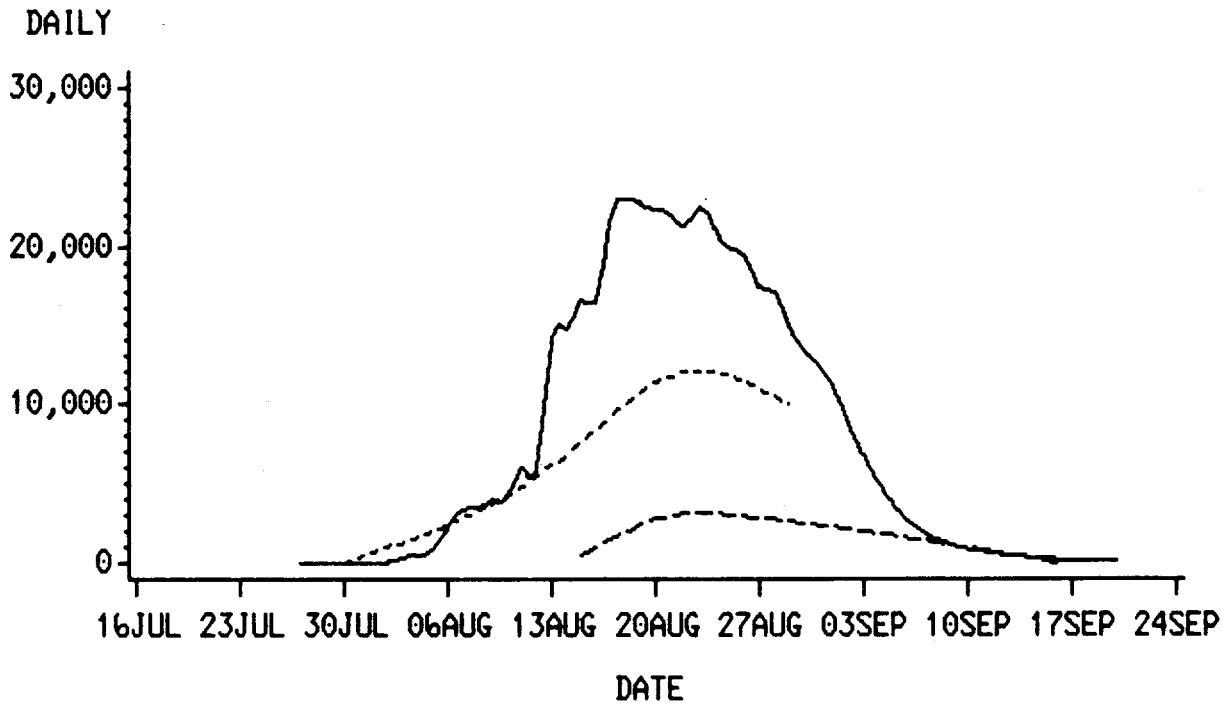

Figure 14. Comparison of two aerial observers for Pleasant Bay Creek in 1986.

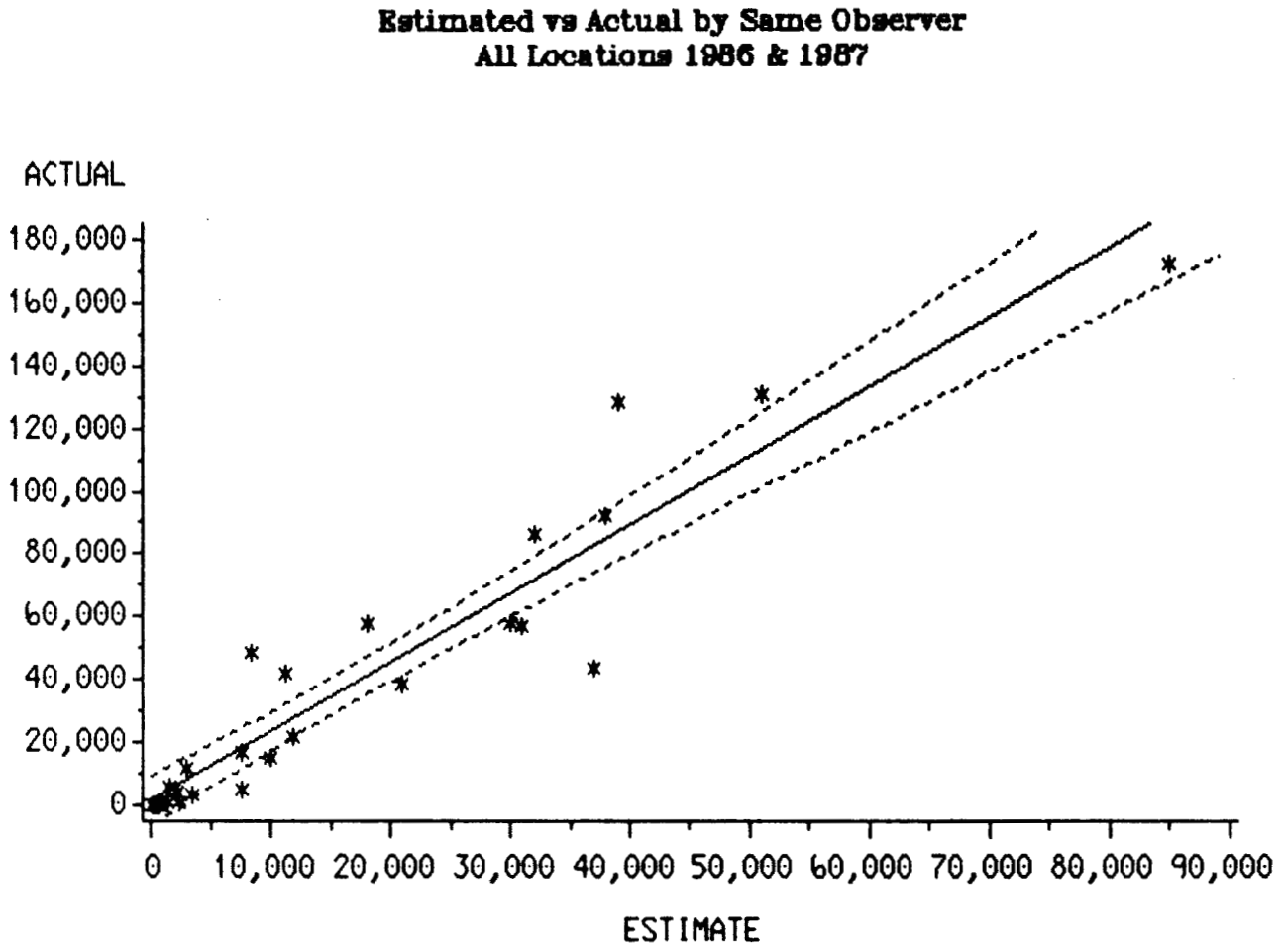

Figure 15. Linear regression of estimated versus actual pink salmon present by the same observer for all locations in 1986 and 1987.

APPENDICES

Appendix A.1.a. Pleasant Bay Creek 1986 daily weir escapement.

Date	Water Level	Water Temp	Chum Salmon Daily	Chum Salmon Cumulative	Pink Salmon Daily	Pink Salmon Cumulative	Sex Ratio Male	Sex Ratio Female	Percent Male	Calculated Stream Live	Morts On Weir	Remarks
7/27/86	310	11.0	40	40	3	3				3		
7/28/86	265	12.0	25	65	5	8				8		
7/29/86	240	12.0	9	74	0	8				8		
7/30/86	238	11.0	8	82	1	9				9		
7/31/86	228	12.0	6	88	11	20				20		
8/01/86	245	13.0	23	111	26	46	14	12	53.8	46		
8/02/86	262	12.5	93	204	72	118	42	15	73.7	118		2 sockeye
8/03/86	256	13.0	28	232	230	348	39	15	72.2	348		
8/04/86	256	12.0	36	268	183	531	54	21	72.0	530		
8/05/86	271	12.5	76	344	327	858	55	20	73.3	856		
8/06/86	290	12.0	120	464	1,476	2,334	63	12	84.0	2,331		1 sockeye
8/07/86	268	13.0	11	475	1,124	3,458	56	19	74.7	3,452		
8/08/86	255	13.0	0	475	66	3,524	38	12	76.0	3,512		
8/09/86	240	13.5	31	506	461	3,985	55	20	73.3	3,963		
8/10/86	240	13.0	24	530	188	4,173	51	24	68.0	4,136		
8/11/86	260	13.5	114	644	1,918	6,091	57	18	76.0	6,030	2	1 sockeye
8/12/86	250	13.0	4	648	45	6,136	31	14	68.9	6,038	1	
8/13/86	270	13.0	102	750	8,190	14,326	71	34	67.6	14,176	4	
8/14/86	250	12.0	2	752	568	14,894	38	22	63.3	14,669	5	
8/15/86	238	12.0	13	765	2,004	16,898	52	25	67.5	16,565	7	
8/16/86	260	12.0	11	776	150	17,048	46	24	65.7	16,557	12	
8/17/86	328	11.0	39	815	5,392	22,440	37	33	52.9	21,723	45	
8/18/86	275	11.0	4	819	1,566	24,006	39	36	52.0	22,969	27	
8/19/86	250	10.5	4	823	143	24,149	40	35	53.3	22,669	32	
8/20/86	235	10.0	4	827	204	24,353	36	39	48.0	22,274	31	1 sockeye
8/21/86	230	10.0	8	835	464	24,817	19	40	32.2	21,952	39	
8/22/86	228	9.5	9	844	308	25,125	39	41	48.8	21,260	39	
8/23/86	260	11.0	32	876	2,356	27,481	26	49	34.7	22,382	43	
8/24/86	250	11.0	4	880	139	27,620	32	29	52.5	21,04	74	

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Appendix A.1.a. (p. 2 of 2)

Date	Water Level	Water Temp	Chum Salmon Daily	Chum Salmon Cumulative	Pink Salmon Daily	Pink Salmon Cumulative	Sex Ratio Male	Sex Ratio Female	Percent Male	Calculated Stream Live	Morts On Weir	Remarks
8/25/86	267	11.5	1	881	508	28,128	29	46	38.7	19,830	82	
8/26/86	240	10.5	2	883	1,541	29,669	24	51	32.0	19,407	103	
8/27/86	230	12.5	2	885	188	29,857	25	50	33.3	17,404	157	
8/28/86	240	13.0	5	890	2,066	31,923	34	41	45.3	17,075	228	
8/29/86	235	12.0	0	890	390	32,313	38	37	50.7	14,909	329	
8/30/86	231	11.5	0	890	1,068	33,381	26	49	34.7	13,321	336	
8/31/86	320	12.0	4	894	1,826	35,207	16	34	32.0	12,480	635	
9/01/86	340	12.0	9	903	1,157	36,364	63	137	31.5	11,063	962	
9/02/86	270	12.5	0	903	59	36,423	18	32	36.0	8,743	640	
9/03/86	258	12.0	2	905	163	36,586	19	31	38.0	6,809	768	
9/04/86	240	10.5	2	907	93	36,679	11	39	22.0	5,120	498	
9/05/86	229	10.5	0	907	140	36,819	12	38	24.0	3,769	462	
9/06/86	230	10.0	5	912	156	36,975	10	40	20.0	2,701	537	
9/07/86	229	9.5	1	913	225	37,200	18	32	36.0	1,996	644	
9/08/86	220	9.5	1	914	130	37,330	53	77	40.8	1,481	527	
9/09/86	223	11.0	2	916	107	37,437	49	56	46.7	1,144	461	
9/10/86	219	10.5	1	917	124	37,561	19	46	29.2	945	331	
9/11/86	214	10.0	3	920	122	37,683	16	34	32.0	825	305	
9/12/86	210	9.0	0	920	35	37,718				670	208	
9/13/86	208	9.0	0	920	49	37,767				557	242	
9/14/86	205	9.0	0	920	33	37,800				450	143	
9/15/86	201	9.5	1	921	25	37,825				357	129	
9/16/86	199	8.0	0	921	22	37,847				283	64	
9/17/86	195	8.0	1	922	54	37,901	13	41	24.1	259	69	
9/18/86	195	9.0	0	922	17	37,918	9	7	56.3	214	89	
9/19/86	190	10.0	0	922	47	37,965	1	2	33.3	212	105	
9/20/86	190	10.0	0	922	51	38,016				210		

Appendix A.1.b. Pleasant Bay Creek 1987 daily weir escapement.

Date	Water Level	Water Temp	Chum Salmon Daily	Chum Salmon Cumulative	Pink Salmon Daily	Pink Salmon Cumulative	Sex Ratio Male	Sex Ratio Female	Percent Male	Calculated Stream Live	Salmon Mortalities Coho	Salmon Mortalities Pink	Salmon Mortalities Chum
7/17/87	280	13.0	0	4	0	800				800			
7/18/87	273	12.0	0	4	0	800				800			
7/19/87	270	12.0	0	4	2	802	2	0	100.0	800			
7/20/87	272	12.0	0	4	40	842	27	13	67.5	802			
7/21/87	283	13.0	2	6	44	886	29	15	65.9	842			
7/22/87	275	14.0	0	6	379	1,265	235	144	62.0	885			
7/23/87	268	13.0	2	8	138	1,403	84	52	61.8	1,264			
7/24/87	265	13.0	0	8	92	1,495	61	31	66.3	1,401			
7/25/87	245	13.0	2	10	334	1,829	43	25	63.2	1,492			
7/26/87	245	14.0	16	26	3,495	5,324	54	42	56.3	1,824			
7/27/87	264	13.0	24	50	8,599	13,923	44	31	58.7	5,317		1	
7/28/87	250	13.0	13	63	3,994	17,917	60	36	62.5	13,913		1	
7/29/87	272	13.0	60	123	14,705	32,622	45	41	52.3	17,901		2	
7/30/87	260	13.0	29	152	4,106	36,728	43	39	52.4	32,598		3	
7/31/87	240	12.0	6	158	251	36,979	80	93	46.2	36,689		4	
8/01/87	227	13.0	23	181	937	37,916	59	49	54.6	36,910		6	
8/02/87	223	13.0	16	197	949	38,865	30	29	50.8	37,802		0	
8/03/87	219	13.0	61	258	1,256	40,121	33	46	41.8	38,681		3	
8/04/87	215	12.5	35	293	3,577	43,698	46	41	52.9	39,827		1	
8/05/87	215	13.0	91	384	2,025	45,723	37	41	47.4	43,247		3	
8/06/87	219	13.5	37	421	5,647	51,370	68	74	47.9	45,051		5	
8/07/87	219	13.0	22	443	5,334	56,704	53	41	56.4	50,394		12	
8/08/87	219	14.0	37	480	2,164	58,868	35	65	35.0	55,335		23	1
8/09/87	210	13.0	75	555	1,275	60,143	21	36	36.8	56,987		19	
8/10/87	205	13.0	74	629	1,956	62,099	36	47	43.4	57,609		30	
8/11/87	210	12.0	63	692	1,410	63,509	36	49	42.4	58,758		35	
8/12/87	207	13.0	10	702	746	64,255	26	64	28.9	59,185		49	
8/13/87	207	12.5	23	725	227	64,482	27	53	33.8	58,740		62	
8/14/87	205	14.0	49	774	1,682	66,164	33	68	32.7	57,549		80	

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Appendix A.1.b. (p. 2 of 3)

Date	Water Level	Water Temp	Chum Salmon Daily	Chum Salmon Cumulative	Pink Salmon Daily	Pink Salmon Cumulative	Pink Salmon Sex Ratio Male	Pink Salmon Sex Ratio Female	Pink Salmon Percent Male	Pink Salmon Calculated Stream Live	Salmon Mortalities Coho	Salmon Mortalities Pink	Salmon Mortalities Chum
8/15/87	200	14.0	80	854	1,621	67,785	21	63	25.0	57,556		139	2
8/16/87	205	13.0	114	968	4,406	72,191	42	68	38.2	57,218		207	1
8/17/87	205	13.0	54	1,022	2,736	74,927	27	60	31.0	59,339		469	6
8/18/87	215	12.5	8	1,030	583	75,510	42	55	43.3	59,411		444	6
8/19/87	211	12.5	11	1,041	922	76,432	61	91	40.1	56,865		424	7
8/20/87	204	12.0	16	1,057	2,929	79,361	55	77	41.7	54,106		537	4
8/21/87	196	12.0	8	1,065	1,074	80,435	35	61	36.5	52,736		436	3
8/22/87	192	12.0	5	1,070	1,117	81,552	41	45	47.7	48,909		525	4
8/23/87	190	11.5	7	1,077	1,001	82,553	35	58	37.6	44,646		440	5
8/24/87	190	12.0	8	1,085	1,350	83,903	31	62	33.3	40,062		498	2
8/25/87	188	12.0	1	1,086	310	84,213	36	44	45.0	35,927		436	1
8/26/87	194	13.0	10	1,096	1,554	85,767	40	61	39.6	31,107		514	
8/27/87	202	13.5	13	1,109	2,057	87,824	31	51	37.8	27,969		420	
8/28/87	195	12.0	13	1,122	1,969	89,793	25	64	28.1	25,705		369	2
8/29/87	192	12.0	12	1,134	1,806	91,599	16	41	28.1	23,624		416	
8/30/87	204	13.5	18	1,152	4,838	96,437	19	57	25.0	21,548		508	1
8/31/87	280	12.5	47	1,199	13,101	109,538	36	58	38.3	22,635	3	2371	11
9/01/87	275	12.0	7	1,206	447	109,985	30	64	31.9	32,093	2	746	
9/02/87	231	12.0	1	1,207	39	110,024	17	22	43.6	28,983	1	454	
9/03/87	230	12.0	1	1,208	72	110,096	19	53	26.4	25,478	1	479	1
9/04/87	226	12.0	1	1,209	101	110,197	39	62	38.6	21,966	0	511	
9/05/87	290	11.5	0	1,209	432	110,629	48	65	42.5	18,378	2	1023	
9/06/87	250	11.0	1	1,210	85	110,714	40	45	47.1	15,064	1	854	6
9/07/87	235	11.5	0	1,210	76	110,790	36	40	47.4	11,488	0	835	1
9/08/87	235	12.0	1	1,211	164	110,954	84	80	51.2	8,193	0	810	
9/09/87	250	12.0	6	1,217	261	111,215	44	50	46.8	5,447	2	1379	1

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Appendix A.1.b. (p. 3 of 3)

Date	Water Level	Water Temp	Chum Salmon Daily	Chum Salmon Cumulative	Pink Salmon Daily	Pink Salmon Cumulative	Pink Salmon Sex Ratio Male	Pink Salmon Sex Ratio Female	Pink Salmon Percent Male	Pink Salmon Calculated Stream Live	Salmon Mortalities Coho	Salmon Mortalities Pink	Salmon Mortalities Chum
9/10/87	510	11.5	1	1,218	191	111,406	33	59	35.9	3,432	2	3469	6
9/11/87	595	11.0	0	1,218	56	111,462	9	37	19.6	2,086	8	4042	8
9/12/87	470	10.0	1	1,219	17	111,479	3	14	17.6	1,271	7	1033	1
9/13/87	370	10.0	1	1,220	7	111,486	6	1	85.7	846	22	688	
9/14/87	350	10.0	3	1,223	5	111,491	1	4	20.0	612	11	529	1
9/15/87	368	9.0	1	1,224	1	111,492	1	0	100.0	443	4	754	
9/16/87	360	9.5	1	1,225	3	111,495	1	2	33.3	293	37	1668	
9/17/87	700	9.0	0	1,225	0	111,495				174	14	3175	4
9/18/87	530	8.5	8	1,233	0	111,495					0	1154	
9/19/87	800	8.5	0	1,233	0	111,495					0	2386	
8/20/87	690	8.0	0	1,233	0	111,495					4	1160	4
9/21/87	590	8.0	0	1,233	0	111,495					10	664	1
9/22/87	430	7.5	0	1,233	0	111,495					5	216	
										Total	136	37521	90

Appendix A.2.a. Black Bear Creek 1986 daily weir escapement.

Date	Water Level	Water Temp	Chum Salmon Daily	Chum Salmon Cumulative	Pink Salmon Daily	Pink Salmon Cumulative	Sex Ratio Male	Sex Ratio Female	Percent Male	Calculated Stream Live	Sex Change to Male	Sex Change to Female	Remarks
7/27/86			4	4	31	31				31			
7/28/86	432	13.0	0	4	32	63	23	9	71.9	63			
7/29/86	381	13.0	2	6	29	92	20	9	69.0	92			
7/30/86	330	14.0	0	6	30	122	26	4	86.7	122			
7/31/86	381	14.0	0	6	48	170	19	18	51.4	170	3	1	
8/01/86	432	14.0	0	6	1,870	2,040	44	57	43.6	2,040	1	2	
8/02/86	432	13.0	4	10	12,147	14,187	60	15	80.0	14,187	1	3	
8/03/86	991	12.0	10	20	7,046	21,233	39	23	62.9	21,233	2		
8/04/86	584	13.0	1	21	6,555	27,788	53	22	70.7	27,786	4	1	
8/05/86	660	12.5	1	22	2,864	30,652	57	18	76.0	30,648	3	3	
8/06/86	737	13.0	9	31	11,743	42,395	79	21	79.0	42,385	6	2	
8/07/86	533	14.0	0	31	4,747	47,142	21	4	84.0	47,121	1	2	
8/08/86	457	11.0	2	33	1,386	48,528	73	27	73.0	48,488	1	9	
8/09/86	406	12.0	1	34	1,261	49,789	50	25	66.7	49,719	2	2	
8/10/86	356	14.0	3	37	3,097	52,886				52,769			
8/11/86	330	15.0	2	39	5,241	58,127	88	36	71.0	57,942	1	8	
8/12/86	381	14.0	3	42	4,959	63,086				62,804			
8/13/86	559	13.0	3	45	15,201	78,287	74	75	49.7	77,872	1	6	
8/14/86	483	12.0	4	49	5,810	84,097				83,504			
8/15/86	419	12.0	0	49	1,643	85,740	25	85	22.7	84,913	2	15	
8/16/86	381	12.0	0	49	1,522	87,262				86,132			
8/17/86	483	11.0	18	67	17,894	105,156	54	37	59.3	103,641	2	1	
8/18/86	648	11.0	5	72	24,907	130,063	33	43	43.4	128,064		1	
8/19/86	445	11.0	1	73	672	130,735	37	40	48.1	128,134	2	5	
8/20/86	406	10.0	1	74	638	131,373	92	48	65.7	128,032	2	3	
8/21/86	381	11.0	0	74	473	131,846				127,600			
8/22/86	356	10.0	0	74	1,532	133,378	43	36	54.4	128,037		1	
8/23/86	356	11.0	0	74	3,105	136,483	44	41	51.8	129,827		1	
8/24/86	457	11.0	1	75	4,783	141,266	38	42	47.5	133,042	2	3	

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Appendix A.2.a. (p. 2 of 2)

Date	Water Level	Water Temp	Chum Salmon Daily	Chum Salmon Cumulative	Pink Salmon Daily	Pink Salmon Cumulative	Sex Ratio Male	Sex Ratio Female	Percent Male	Calculated Stream Live	Sex Change to Male	Sex Change to Female	Remarks
8/25/86	419	11.0	0	75	2,844	144,110	43	36	54.4	134,034		1	
8/26/86	394	11.0	2	77	586	144,696	39	37	51.3	132,446	2		
8/27/86	343	11.0	0	77	276	144,972	58	32	64.4	130,190	1		
8/28/86	330	11.0	0	77	235	145,207	36	49	42.4	127,496			
8/29/86	330	11.0	0	77	890	146,097				125,024			
8/30/86	305	12.0	0	77	1,523	147,620	36	54	40.0	122,717			
8/31/86	305	12.0	1	78	2,345	149,965	28	62	31.1	120,735	1		
9/01/86	533	12.0	4	82	47,811	197,776	37	57	39.4	163,697	1		
9/02/86	483	12.0	4	86	18,536	216,312	13	12	52.0	176,832			1 coho
9/03/86	457	12.0	0	86	647	216,959	53	47	53.0	171,477	2	1	
9/04/86	381	11.0	2	88	1,502	218,461				166,303			1 coho
9/05/86	356	11.0	3	91	1,010	219,471	56	39	58.9	159,870			
9/06/86	356	12.0	0	91	1,780	221,251	48	47	50.5	153,336	1		
9/07/86	330	11.0	1	92	370	221,621	42	37	53.2	144,416			
9/08/86	305	11.0	0	92	496	222,117	33	38	46.5	134,566			
9/09/86	381	12.0	2	94	4,057	226,174				127,189			
9/10/86	381	12.0	3	97	1,753	227,927	58	28	67.4	116,474	1	1	1 coho
9/11/86	356	10.0	4	101	1,329	229,256				104,469			
9/12/86	356	10.0	0	101	1,880	231,136	86	47	64.7	92,452		1	
9/13/86	330	10.0	0	101	170	231,306	79	53	59.8	78,590			
9/14/86	330	10.0	0	101	222	231,528	45	39	53.6	65,150			
9/15/86	330	10.0	0	101	781	232,309	45	40	52.9	53,149		1	
9/16/86	305	9.0	3	104	2,328	234,637	34	51	40.0	43,991			
9/17/86	279	9.0	1	105	2,416	237,053	54	31	63.5	36,477			
9/18/86	254	7.0	0	105	2,160	239,213				30,337			2coho3jack
9/19/86	254	7.0	0	105	1,668	240,881	50	35	58.8	25,254			
9/20/86	254	7.0	3	108	390	241,271	29	49	37.2	20,254			
9/21/86	254	8.0	0	108	220	241,491	42	38	52.5	16,193			
9/22/86	508		0	108	781	242,272	43	37	53.8	13,513			Partial, weir flooded

Appendix A.2.b. Black Bear Creek 1987 daily weir escapement.

Date	Water Level	Water Temp	Chum Salmon Daily	Chum Salmon Cumulative	Pink Salmon Daily	Pink Salmon Cumulative	Pink Salmon Sex Ratio Male	Pink Salmon Sex Ratio Female	Pink Salmon Percent Male	Pink Salmon Calculated Stream Live	Remarks
7/16/87		12.5	0	0	2	2				2	
7/17/87	200	13.0	0	0	5	7				7	
7/18/87	195	13.0	0	0	0	7				7	
7/19/87	190	14.0	0	0	0	7				7	
7/20/87	190	14.0	0	0	0	7				7	
7/21/87	185	14.5	0	0	0	7				7	
7/22/87	180	15.0	0	0	0	7				7	
7/23/87	180	15.0	0	0	0	7				7	
7/24/87	180	15.0	0	0	0	7				7	
7/25/87	175	15.0	0	0	0	7				7	
7/26/87	210	14.0	0	0	0	7				7	
7/27/87	195	13.0	0	0	0	7				7	
7/28/87	210	12.5	0	0	0	7				7	
7/29/87	210	12.5	0	0	12	19	10	2	83.3	19	
7/30/87	200	13.0	0	0	39	58	33	6	84.6	58	
7/31/87	210	13.5	0	0	46	104	32	14	69.6	104	
8/01/87	200	13.5	0	0	0	104				103	
8/02/87	200	14.0	0	0	17	121	11	6	64.7	120	
8/03/87	180	14.0	0	0	14	135	10	4	71.4	134	
8/04/87	175	14.0	0	0	0	135				134	
8/05/87	170	14.0	0	0	6	141	5	1	83.3	139	
8/06/87	170	14.0	0	0	34	175	18	16	52.9	173	
8/07/87	170	14.0	0	0	23	198	17	2	89.5	193	
8/08/87	170	14.0	0	0	44	242	29	15	65.9	237	
8/09/87	165	14.5	0	0	13	255				250	
8/10/87	160	14.0	0	0	0	255				246	
8/11/87	160	14.0	0	0	0	255				244	
8/12/87	170	14.0	0	0	765	1,020	103	114	47.5	1,006	
8/13/87	170	14.0	0	0	31	1,051	22	9	71.0	1,033	
8/14/87	165	13.0	0	0	219	1,270	41	26	61.2	1,244	
8/15/87	160	13.5	0	0	43	1,313	22	21	51.2	1,273	
8/16/87	170	13.0	0	0	1,300	2,613	85	93	47.8	2,533	

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Appendix A.2.b. (p. 2 of 3)

Date	Water Level	Water Temp	Chum Salmon Daily	Chum Salmon Cumulative	Pink Salmon Daily	Pink Salmon Cumulative	Sex Ratio Male	Sex Ratio Female	Percent Male	Calculated Stream Live	Remarks
8/17/87	175	12.0	1	1	988	3,601	55	36	60.4	3,504	
8/18/87	170	12.0	0	1	418	4,019	143	63	69.4	3,863	
8/19/87	160	12.5	1	2	475	4,494	52	54	49.1	4,233	
8/20/87	160	12.5	0	2	1,287	5,781	126	54	70.0	5,356	
8/21/87	170	12.0	3	5	3,680	9,461				8,775	
8/22/87	170	12.0	7	12	3,204	12,665	55	58	48.7	11,583	
8/23/87	170	12.0	2	14	1,494	14,159	48	40	54.5	12,522	
8/24/87	160	12.0	0	14	404	14,563	42	41	50.6	12,201	
8/25/87	155	13.5	1	15	748	15,311	53	42	55.8	12,101	
8/26/87	155	14.0	4	19	2,321	17,632	56	54	50.9	13,510	
8/27/87	160	13.0	2	21	2,606	20,238	45	33	57.7	15,208	
8/28/87	165	12.5	0	21	1,012	21,250				15,339	
8/29/87	165	12.0	3	24	1,216	22,466	42	48	46.7	15,664	
8/30/87	380	12.0	37	61	31,333	53,799	45	39	53.6	46,048	1 sockeye 7 coho
8/31/87	820	12.0	0	61	0	53,799				44,940	flooded weir
9/01/87	795	12.0	0	61	0	53,799				43,552	lost fish
9/02/87	420	12.5	1	62	44	53,843			why	41,815	fish tight
9/03/87	360	13.0	2	64	283	54,126	128	130	0.0	39,829	1 coho
9/04/87	330	13.0	7	71	19	54,145	13	6	0.0	36,999	
9/05/87	295	13.0	11	82	130	54,275	72	54	57.1	33,652	1 coho
9/06/87	270	13.0	0	82	83	54,358	45	33	57.7	29,627	
9/07/87	250	12.5	0	82	39	54,397	24	12	66.7	25,019	
9/08/87	240	12.5	0	82	24	54,421	10	10	50.0	20,058	
9/09/87	235	13.0	0	82	66	54,487	33	30	0.0	15,119	1 coho
9/10/87	225	13.0	0	82	96	54,583	49	42	0.0	10,584	1 coho
9/11/87	275	13.0	0	82	173	54,756	86	87	0.0	6,877	2 coho

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Appendix A.2.b. (p. 3 of 3)

Date	Water Level	Water Temp	Chum Salmon Daily	Chum Salmon Cumulative	Pink Salmon Daily	Pink Salmon Cumulative	Pink Salmon Sex Ratio Male	Pink Salmon Sex Ratio Female	Pink Salmon Percent Male	Pink Salmon Calculated Stream Live	Remarks
9/12/87	355	10.5	2	84	611	55,367	143	119	54.6	4,598	4 coho
9/13/87	345	10.5	0	84	128	55,495	76	52	59.4	2,844	3 coho
9/14/87	350	10.5	0	84	119	55,614	53	65	44.9	5,583	2 coho
9/15/87	750	10.0	0	84	0	55,614				3,970	
9/16/87	470	10.5	0	84	20	55,634				3,087	
9/17/87			0	84	0	55,634					flooded

Appendix A.3.a. Sashin Creek 1986 daily weir escapement.

Date	Water Level	Water Temp	Chum Salmon Daily	Chum Salmon Cumulative	Pink Salmon Daily	Pink Salmon Cumulative	Pink Salmon Sex Ratio Male	Pink Salmon Sex Ratio Female	Pink Salmon Percent Male	Pink Salmon Calculated Stream Live	Remarks
8/24/86			0	0	3	3	2	1	66.7	3	
8/25/86			0	0	1	4	1	0	100.0	4	
8/26/86			0	0	0	4				4	
8/27/86			0	0	147	151	99	48	67.3	151	
8/28/86			16	16	321	472	254	67	79.1	472	
8/29/86			4	20	320	792	254	66	79.4	791	
8/30/86			9	29	470	1,262	344	126	73.2	1,260	
8/31/86	1,194		39	68	1,311	2,573	624	298	67.7	2,566	1 coho
9/01/86	889	12.0	55	123	1,607	4,180	277	163	63.0	4,163	1 coho
9/02/86	826	12.0	6	129	604	4,784	323	281	53.5	4,745	
9/03/86	572	12.0	6	135	657	5,441	126	116	52.1	5,362	2 coho
9/04/86	546	10.5	4	139	592	6,033	98	90	52.1	5,888	
9/05/86	495	14.0	1	140	271	6,304	60	75	44.4	6,060	
9/06/86	470	15.0	1	141	104	6,408				6,023	
9/07/86	445	14.5	2	143	487	6,895	77	94	45.0	6,322	
9/08/86	470	13.0	0	143	183	7,078	25	40	38.5	6,269	
9/09/86	445	12.5	1	144	495	7,573	45	54	45.5	6,479	
9/10/86	419	13.0	1	145	557	8,130	48	36	57.1	6,705	
9/11/86	406	14.0	0	145	77	8,207	48	29	62.3	6,402	
9/12/86	394	13.5	0	145	74	8,281	33	41	44.6	6,045	
9/13/86	381	14.0	0	145	121	8,402	31	35	47.0	5,675	
9/14/86	368	14.0	1	146	264	8,666	36	26	58.1	5,382	
9/15/86	432	14.0	3	149	360	9,026	95	123	43.6	5,113	
9/16/86	406	13.0	2	151	103	9,129	42	61	40.8	4,521	
9/17/86	394	12.0	1	152	148	9,277	24	39	38.1	3,921	
9/18/86	381	11.5	2	154	213	9,490	26	37	41.3	3,364	
9/19/86	381	13.0	3	157	250	9,740	28	48	36.8	2,862	
9/20/86	381	12.5	1	158	136	9,876	54	82	39.7	2,301	

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Appendix A.3.a. (p. 2 of 2)

Date	Water Level	Water Temp	Chum Salmon Daily	Chum Salmon Cumulative	Pink Salmon Daily	Pink Salmon Cumulative	Pink Salmon Sex Ratio Male	Pink Salmon Sex Ratio Female	Pink Salmon Percent Male	Pink Salmon Calculated Stream Live	Remarks
9/21/86	406	13.5	2	160	177	10,053	45	78	36.6	1,860	
9/22/86	1,054	11.5	13	173	322	10,375	150	172	46.6	1,648	23 coho
9/23/86	965	11.5	3	176	71	10,446	37	34	52.1	1,266	8 coho
9/24/86	914	10.5	0	176	32	10,478	15	17	46.9	928	5 coho
9/25/86	876	10.0	0	176	8	10,486	5	3	62.5		
9/26/86	787	11.0	0	176	1	10,487	0	1			5 coho
9/27/86	572	10.0	0	176	0	10,487					1 coho
9/28/86	749	10.0	0	176	0	10,487					1 coho

Appendix A.3.b. Sashin Creek 1987 daily weir escapement.

Date	Water Level	Water Temp	Chum Salmon Daily	Chum Salmon Cumulative	Pink Salmon Daily	Pink Salmon Cumulative	Sex Ratio Male	Sex Ratio Female	Percent Male	Calculated Stream Live	Remarks
8/26/87	606	14.0	0	0	236	236	98	38	72.1	236	rain pm and night
8/27/87	801	13.0	0	0	0	236				236	
8/28/87	707		0	0	0	236				236	
8/29/87	502		0	0	84	320	67	17	79.8	318	rain pm and night
8/30/87	807		0	0	72	392	48	24	66.7	388	still raining
8/31/87	1000	12.5	0	0	0	392				384	rmvd planks/drop H2O level
9/01/87	500	12.5	2	2	249	641	171	78	68.7	625	4 coho
9/02/87	407	13.0	2	4	167	808	50	25	66.7	781	rain again pm
9/03/87	505	13.5	2	6	166	974	52	22	70.3	930	
9/04/87	600		2	8	368	1,342	48	19	71.6	1,275	rain PM and night
9/05/87		13.0	0	8	135	1,477	39	18	68.4	1,377	rmvd planks/drop H2O level
9/06/87		13.5	0	8	924	2,401	61	36	62.9	2,262	1 coho
9/07/87	430	13.0	1	9	1,411	3,812	67	51	56.8	2,212	begin upstream H2O level
9/08/87	425	13.0	0	9	1,319	5,131	34	23	59.6	3,470	
9/09/87		12.5	0	9	1,227	6,358	42	28	60.0	4,627	recovery poor-bad vis
9/10/87	550	12.0	1	10	817	7,175	74	69	51.7	5,360	1 coho
9/11/87	580	12.0	0	10	629	7,804	38	32	54.3	5,889	
9/12/87	605	12.0	0	10	380	8,184	65	57	53.3	6,141	approx H2O level
9/13/87	435	12.0	1	11	208	8,392	65	65	50.0	6,177	
9/14/87	573	11.0	0	11	652	9,044	72	145	33.2	6,596	
9/15/87	540	11.0	0	11	191	9,235	25	45	35.7	6,468	dropped H2O level/LHT
9/16/87	760	10.5	0	11	43	9,278	20	23	46.5	6,080	3 coho/high H2O/50-100fish bk down
9/17/87	810	10.5	0	11	1	9,279				5,513	H2O level prbly btw 1500-2000
9/18/87		10.0	0	11	0	9,279				4,799	high water
9/19/87		9.5	0	11	0	9,279				3,963	high water
9/20/87	775	9.5	0	11	0	9,279				3,053	
9/21/87	620	9.0	0	11	2	9,281				2,164	
9/22/87	545	9.0	0	11	1	9,282				1,389	
9/23/87	530	9.0	0	11	2	9,284				808	
9/24/87	495	9.0	0	11	0	9,284				422	
9/25/87	525	9.0	0	11	0	9,284				203	
9/26/87		9.0	0	11	0	9,284				89	no stream survey/heavy rain
9/27/87	602	9.0	0	11	0	9,284				36	

Appendix A.4. Kadashan River 1986 daily weir escapement.

Date	Water Level	Water Temp	East Fork Chum Salmon Daily	East Fork Chum Salmon Cumulative	East Fork Pink Salmon Daily	East Fork Pink Salmon Cumulative	West Fork Chum Salmon Daily	West Fork Chum Salmon Cumulative	West Fork Pink Salmon Daily	West Fork Pink Salmon Cumulative	Pink Salmon Sex Ratio Male	Pink Salmon Sex Ratio Female
7/04/86	60	8.9	0	0	0	0	0	0	0	0		
7/05/86	60	8.9	0	0	0	0	0	0	0	0		
7/06/86	50	8.9	0	0	0	0	0	0	0	0		
7/07/86	40	9.4	0	0	0	0	0	0	0	0		
7/08/86	30	10.0	0	0	0	0	0	0	0	0		
7/09/86	25	10.0	0	0	0	0	0	0	0	0		
7/10/86	25	10.0	0	0	0	0	0	0	0	0		
7/11/86	10	10.0	0	0	0	0	0	0	0	0		
7/12/86	5	10.0	0	0	0	0	0	0	0	0		
7/13/86	65	10.0	2	2	1	1	0	0	0	0		
7/14/86	30	10.0	0	2	0	1	0	0	0	0		
7/15/86	10	10.0	0	2	0	1	0	0	0	0		
7/16/86	3	10.0	0	2	0	1	0	0	0	0		
7/17/86	-3	10.0	0	2	0	1	0	0	0	0		
7/18/86	-3	10.0	0	2	0	1	0	0	0	0		
7/19/86	-3	10.0	1	3	0	1	0	0	0	0		
7/20/86	-25	11.1	63	66	138	139	704	704	21	21	26	10
7/21/86	-10	11.1	0	66	0	139	0	704	0	21		
7/22/86	-10	10.6	18	84	28	167	116	820	4	25	18	10
7/23/86	-10	10.6	54	138	20	187	85	905	0	25	11	1
7/24/86	-10	10.6	42	180	35	222	0	905	0	25		
7/25/86	35	10.0	1,655	1,835	712	934	2,854	3,759	286	311	29	8
7/26/86	180	10.6	7	1,842	14	948	0	3,759	0	311	14	0
7/27/86	180	10.0	761	2,603	9,257	10,205	2,043	5,802	8,150	8,461	90	19
7/28/86	50	10.6	2	2,605	0	10,205	0	5,802	0	8,461		
7/29/86	10	10.8	9	2,614	31	10,236	9	5,811	0	8,461	26	5
7/30/86	-10	11.1	23	2,637	42	10,278	0	5,811	0	8,461	32	10
7/31/86	-20	10.0	24	2,661	86	10,364	0	5,811	0	8,461	54	21
8/01/86	-20	11.1	336	2,997	1,062	11,426	634	6,445	590	9,051	110	68

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Appendix A.4. (p. 2 of 2)

Date	Water Level	Water Temp	East Fork Chum Salmon Daily	East Fork Chum Salmon Cumulative	East Fork Pink Salmon Daily	East Fork Pink Salmon Cumulative	West Fork Chum Salmon Daily	West Fork Chum Salmon Cumulative	West Fork Pink Salmon Daily	West Fork Pink Salmon Cumulative	Pink Salmon Sex Ratio Male	Pink Salmon Sex Ratio Female
8/02/86	-20	11.1	1,474	4,471	9,542	20,968	1,707	8,152	3,993	13,044	109	56
8/03/86	30	11.1	213	4,684	1,037	22,005	487	8,639	1,594	14,638	88	33
8/04/86	50	11.7	970	5,654	9,505	31,510	882	9,521	8,928	23,566	103	45
8/05/86	70	11.1	132	5,786	1,293	32,803	136	9,657	2,171	25,737	41	15
8/06/86	320	11.7	1,464	7,250	38,940	71,743	2,025	11,682	22,341	48,078	82	62
8/07/86	100	10.6	0	7,250	0	71,743	0	11,682	0	48,078		
8/08/86	35	9.4	1	7,251	23	71,766	0	11,682	5	48,083	9	14
8/09/86	5	11.1	17	7,268	637	72,403	5	11,687	439	48,522	44	49
8/10/86	-10	10.0	50	7,318	567	72,970	11	11,698	608	49,130	37	57
8/11/86	30	12.2	1,014	8,332	10,902	83,872	762	12,460	13,243	62,373	59	57
8/12/86	80	12.2	0	8,332	0	83,872	0	12,460	0	62,373		
8/13/86	260	12.2	31	8,363	734	84,606	78	12,538	1,592	63,965	15	44
8/14/86	100	10.0	0	8,363	0	84,606	0	12,538	0	63,965		
8/15/86	45	9.7	7	8,370	143	84,749	0	12,538	0	63,965	23	53
8/16/86	130	9.4	93	8,463	2,375	87,124	67	12,605	3,540	67,505	96	171
8/17/86	300	9.2	111	8,574	8,064	95,188	305	12,910	6,449	73,954	23	41
8/18/86	200	8.9	5	8,579	138	95,326	4	12,914	166	74,120	54	86
8/19/86	100	8.3	8	8,587	460	95,786	3	12,917	1,033	75,153	20	52
8/20/86	50	8.3	6	8,593	450	96,236	1	12,918	240	75,393	10	18
8/21/86	30	7.8	1	8,594	50	96,286	0	12,918	75	75,468	7	18
8/22/86	0	0.0	14	8,608	768	97,054	1	12,919	1,672	77,140	24	27
8/23/86	310	3.9	101	8,709	5,325	102,379	109	13,028	9,303	86,443	27	31
8/24/86	120	2.8	0	8,709	0	102,379	1	13,029	389	86,832		
8/25/86	60	9.4	1	8,710	106	102,485	0	13,029	312	87,144	14	43
8/26/86	40	10.0	3	8,713	288	102,773	0	13,029	796	87,940	32	53
8/27/86	20	10.0	1	8,714	1,410	104,183	0	13,029	992	88,932	24	68
8/28/86	20	10.0	4	8,718	641	104,824	12	13,041	2,694	91,626	23	55

Appendix B.1.a. Pleasant Bay Creek 1986 pink salmon tag recovery summary.

Tagging Date	Stream Life			Number of Recoveries		
	Male	Female	Total	Male	Female	Total
8/01/86	20.0	14.7	16.0	1	3	4
8/02/86	15.1	15.1	15.1	10	7	17
8/03/86	19.5	22.5	20.2	14	4	18
8/04/86	15.8	19.8	17.1	19	9	28
8/05/86	17.4	19.4	18.2	16	9	25
8/06/86	20.6	18.8	20.2	19	6	25
8/07/86	20.3	23.0	20.9	23	6	29
8/08/86	19.3	18.0	18.8	12	7	19
8/09/86	18.3	16.9	17.7	15	10	25
8/10/86	15.5	12.6	14.2	20	16	36
8/11/86	18.0	17.4	17.8	23	11	34
8/12/86	12.7	14.0	12.9	16	4	20
8/13/86	15.2	14.3	14.9	38	23	61
8/14/86	18.0	16.9	17.6	18	12	30
8/15/86	16.1	14.1	15.3	21	16	37
8/16/86	14.3	13.9	14.2	25	10	35
8/17/86	15.3	16.3	15.9	15	20	35
8/18/86	16.1	15.8	16.0	20	18	38
8/19/86	13.0	14.4	13.7	22	22	44
8/20/86	13.0	11.3	12.0	22	28	50
8/21/86	11.1	8.7	9.6	16	24	40
8/22/86	8.2	8.4	8.3	27	24	51
8/23/86	9.2	7.7	8.3	16	26	42
8/24/86	9.7	8.5	9.2	22	17	39
8/25/86	8.6	8.0	8.2	15	28	43
8/26/86	7.0	7.3	7.2	16	41	57
8/27/86	7.6	7.3	7.4	20	40	60
8/28/86	6.7	6.5	6.6	21	24	45
8/29/86	7.9	6.7	7.3	23	20	43
8/30/86	7.8	7.5	7.6	16	30	46
8/31/86	7.0	6.2	6.5	9	22	31
9/01/86	7.5	8.4	8.2	36	82	118
9/02/86	7.0	8.1	7.7	12	25	37
9/03/86	7.0	6.8	6.8	11	22	33
9/04/86	4.7	7.2	6.6	7	21	28
9/05/86	7.0	6.6	6.7	7	25	32
9/06/86	7.3	6.5	6.7	8	25	33
9/07/86	7.0	6.6	6.8	11	16	27
9/08/86	6.1	6.9	6.6	30	42	72
9/09/86	7.1	6.1	6.6	33	27	60
9/10/86	7.8	6.5	6.8	8	23	31
9/11/86	7.3	6.9	7.1	9	17	26

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Appendix B.1.a. (p. 2 of 2)

Stat Week	Stream Life			Number of Recoveries		
	Male	Female	Total	Male	Female	Total
31	15.5	15.0	15.3	11	10	21
32	18.8	19.4	19.0	118	51	169
33	15.7	14.6	15.3	161	92	253
34	12.1	11.4	11.7	138	162	300
35	7.9	7.4	7.6	133	200	333
36	7.1	7.5	7.4	90	222	312
37	6.8	6.6	6.7	91	125	216

Average Stream Life of Males	12.0	Number	742
Average Stream Life of Females	9.6	Number	862
Total Average Stream Life	10.7	Number	1604

Appendix B.1.b. Pleasant Bay 1987 pink salmon tag recovery summary.

Tagging Date	Stream Life			Number of Recoveries		
	Male	Female	Total	Male	Female	Total
7/19/87	35.0	0.0	35.0	1	0	1
7/20/87	42.3	27.0	36.2	9	6	15
7/21/87	35.0	24.6	31.1	15	9	24
7/22/87	33.7	28.7	32.3	88	33	121
7/23/87	33.8	27.9	31.4	20	14	34
7/24/87	30.2	23.1	27.5	24	15	39
7/25/87	28.6	21.7	25.9	20	13	33
7/26/87	22.7	24.3	23.3	25	18	43
7/27/87	25.0	24.0	24.5	23	21	44
7/28/87	30.4	25.5	28.7	31	16	47
7/29/87	27.2	24.7	26.3	26	15	41
7/30/87	29.2	25.5	27.5	27	23	50
7/31/87	27.2	24.1	26.0	30	19	49
8/01/87	29.3	26.5	28.0	21	20	41
8/02/87	24.1	22.8	23.4	16	17	33
8/03/87	24.0	21.0	22.4	22	24	46
8/04/87	25.6	22.8	24.5	27	17	44
8/05/87	28.3	21.5	24.8	22	24	46
8/06/87	23.7	24.1	23.8	33	19	52
8/07/87	26.7	20.1	23.5	26	25	51
8/08/87	18.4	15.5	16.5	18	36	54
8/09/87	18.4	12.6	14.8	13	21	34
8/10/87	16.3	14.3	15.3	27	27	54
8/11/87	11.5	10.9	11.2	28	36	64
8/12/87	12.1	9.5	10.4	20	40	60
8/13/87	12.4	8.3	9.5	17	38	55
8/14/87	9.2	7.8	8.3	20	36	56
8/15/87	11.4	8.6	9.5	16	36	52
8/16/87	7.8	8.2	8.0	18	24	42
8/17/87	8.2	9.2	8.8	21	33	54
8/18/87	10.2	9.8	10.0	28	34	62
8/19/87	12.8	7.3	9.4	23	39	62
8/20/87	10.8	9.2	9.9	23	26	49
8/21/87	11.7	7.9	9.3	22	37	59
8/22/87	10.7	7.9	9.3	27	26	53
8/23/87	10.6	7.8	9.2	26	27	53
8/24/87	9.2	7.3	8.0	22	34	56
8/25/87	8.0	6.6	7.1	21	34	55
8/26/87	7.2	7.1	7.2	19	30	49
8/27/87	7.0	7.2	7.1	17	30	47
8/28/87	8.7	6.3	7.0	17	40	57
8/29/87	7.9	7.1	7.4	10	18	28
8/30/87	8.5	6.4	6.9	13	38	51
8/31/87	9.4	8.2	8.7	20	28	48

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Appendix B.1.b. (p. 2 of 2)

Tagging Date	Stream Life			Number of Recoveries		
	Male	Female	Total	Male	Female	Total
9/01/87	8.4	6.8	7.2	15	36	51
9/02/87	7.2	7.3	7.3	12	19	31
9/03/87	6.9	5.6	6.0	15	42	57
9/04/87	7.2	5.8	6.3	28	44	72
9/05/87	8.9	5.8	7.0	19	31	50
9/06/87	7.0	6.3	6.7	31	26	57
9/07/87	5.9	5.9	5.9	26	30	56
9/08/87	7.4	6.5	6.8	23	34	57
9/09/87	7.1	6.4	6.8	32	22	54
9/10/87	7.5	7.1	7.2	11	27	38
9/11/87	4.5	7.6	7.0	6	25	31
9/12/87	3.5	6.7	6.2	2	10	12
9/13/87	3.8	6.0	4.2	5	1	6
9/14/87	0.0	6.0	6.0	0	3	3
9/15/87	3.0	0.0	3.0	2	0	2

Stat Week	Stream Life			Number of Recoveries		
	Male	Female	Total	Male	Female	Total
30	33.2	26.1	30.8	177	90	267
31	27.4	25.0	26.4	183	132	315
32	24.6	20.5	22.5	164	162	326
33	12.9	10.0	11.1	141	234	375
34	10.4	8.5	9.3	162	219	381
35	8.6	7.0	7.6	132	213	345
36	8.1	6.4	7.0	122	238	360
37	6.8	6.6	6.7	131	174	305
38	3.6	6.0	4.5	7	4	11

Average Stream Life of Males	17.6	Number	1219
Average Stream Life of Females	11.8	Number	1466
Total Average Stream Life	14.4	Number	2685

Appendix B.1.c. Pleasant Bay 1987 chum salmon tag recovery summary.

Tagging Date	Stream Life			Number of Recoveries		
	Male	Female	Total	Male	Female	Total
7/21/87	16.0	0.0	16.0	1	0	1
8/02/87	0.0	10.0	10.0	0	1	1
8/09/87	8.0	0.0	8.0	1	0	1
8/10/87	9.0	7.0	7.7	1	2	3
8/11/87	6.5	4.8	5.3	2	5	7
8/12/87	0.0	7.0	7.0	0	1	1
8/13/87	6.5	6.2	6.3	2	5	7
8/14/87	6.0	5.5	5.7	1	2	3
8/15/87	5.0	4.0	4.5	1	1	2
8/16/87	7.5	0.0	7.5	2	0	2
8/17/87	4.5	6.0	5.0	2	1	3
8/18/87	0.0	3.0	3.0	0	1	1
8/19/87	8.0	5.0	6.0	1	2	3
8/21/87	0.0	3.5	3.5	0	2	2
8/23/87	7.0	0.0	7.0	1	0	1
8/26/87	0.0	4.0	4.0	0	1	1
8/27/87	3.0	4.0	3.5	1	1	2
9/02/87	4.0	0.0	4.0	1	0	1
9/03/87	5.0	0.0	5.0	1	0	1
9/04/87	0.0	5.0	5.0	0	1	1
9/06/87	0.0	4.0	4.0	0	1	1
9/08/87	0.0	4.0	4.0	0	1	1
9/09/87	0.0	5.0	5.0	0	1	1
9/15/87	0.0	5.0	5.0	0	1	1

Stat Week	Stream Life			Number of Recoveries		
	Male	Female	Total	Male	Female	Total
30	16.0	0.0	16.0	1	0	1
33	6.8	5.7	6.0	8	16	24
34	6.4	4.3	5.3	5	6	11
35	5.0	4.0	4.5	2	2	4
36	4.5	5.0	4.7	2	1	3
37	4.5	4.3	4.3	0	3	3
38	4.5	5.0	5.0	0	1	1

Average Stream Life of Males	6.7	Number	18
Average Stream Life of Females	5.3	Number	30
Total Average Stream Life	5.8	Number	48

Appendix B.2.a. Black Bear Creek 1986 pink salmon tag recovery summary.

Tagging Date	Stream Life			Number of Recoveries		
	Male	Female	Total	Male	Female	Total
7/31/86	30.7	33.0	31.4	9	4	13
8/01/86	29.7	30.0	29.7	27	5	32
8/02/86	34.3	29.5	33.4	26	6	32
8/03/86	36.6	30.4	34.5	17	9	26
8/04/86	34.8	36.0	35.1	23	8	31
8/05/86	33.2	34.6	33.5	23	7	30
8/06/86	33.5	32.6	33.3	31	8	39
8/07/86	34.1	32.0	33.3	10	6	16
8/08/86	33.6	28.8	31.7	27	18	45
8/09/86	32.3	32.9	32.5	23	10	33
8/11/86	30.0	27.6	29.1	36	21	57
8/13/86	30.9	28.2	29.5	29	33	62
8/15/86	29.6	24.3	27.0	48	46	94
8/17/86	25.1	27.0	25.8	22	13	35
8/18/86	26.1	27.0	26.6	12	16	28
8/19/86	26.9	22.0	24.2	15	18	33
8/20/86	17.5	18.2	17.7	34	18	52
8/22/86	21.0	16.5	18.7	11	11	22
8/23/86	18.6	19.4	19.0	25	20	45
8/24/86	17.6	18.5	18.1	18	23	41
8/25/86	16.9	15.0	16.1	22	16	38
8/26/86	16.9	17.8	17.3	17	16	33
8/27/86	18.1	16.5	17.4	21	15	36
8/28/86	17.9	14.1	16.0	21	20	41
8/30/86	15.2	14.2	14.5	10	22	32
8/31/86	13.2	13.6	13.5	12	27	39
9/01/86	14.0	13.2	13.6	23	21	44
9/02/86	13.0	17.2	15.8	3	6	9
9/03/86	13.5	15.0	14.1	31	21	52
9/05/86	12.8	11.4	12.2	24	21	45
9/06/86	13.0	13.9	13.3	24	15	39
9/07/86	10.9	12.4	11.5	20	12	32
9/08/86	11.4	10.8	11.1	15	13	28
9/10/86	10.1	10.7	10.3	30	12	42
9/12/86	10.7	10.1	10.5	26	14	40
9/13/86	10.0	11.3	10.5	23	15	38
9/14/86	10.0	10.1	10.1	6	7	13
9/15/86	10.0	10.3	10.2	7	9	16
9/16/86	9.4	9.4	9.4	5	7	12
9/17/86	9.7	8.5	9.2	3	2	5
9/19/86	8.2	8.0	8.1	5	4	9
9/20/86	5.0	7.3	6.4	2	3	5
9/21/86	3.0	7.0	5.0	1	1	2
9/22/86	6.0	6.0	6.0	1	2	3

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Appendix B.2.a. (p. 2 of 2)

Stat Week	Stream Life			Number of Recoveries		
	Male	Female	Total	Male	Female	Total
31	31.8	30.6	31.6	62	15	77
32	33.9	31.9	33.3	154	66	220
33	30.1	26.3	28.3	113	100	213
34	21.5	21.6	21.6	119	96	215
35	17.3	16.0	16.6	109	112	221
36	13.3	13.6	13.4	117	111	228
37	10.5	11.0	10.7	114	66	180
38	9.2	9.4	9.3	28	32	60
39	4.5	6.3	5.6	2	3	5

Average Stream Life of Males	22.1	Number	818
Average Stream Life of Females	19.3	Number	601
Total Average Stream Life	20.9	Number	1419

Appendix B.2.b. Black Bear Creek 1987 pink salmon tag recovery.

Tagging Date	Stream Life			Number of Recoveries		
	Male	Female	Total	Male	Female	Total
7/29/87	27.5	0.0	27.5	2	0	2
7/31/87	23.5	0.0	23.5	4	0	4
8/02/87	25.0	0.0	25.0	2	0	2
8/03/87	31.5	0.0	31.5	2	0	2
8/06/87	17.0	23.0	20.0	1	1	2
8/07/87	0.0	20.0	20.0	0	1	1
8/08/87	12.0	18.8	16.5	2	4	6
8/12/87	10.6	13.4	12.3	7	11	18
8/13/87	11.8	13.0	12.2	6	3	9
8/14/87	10.0	10.3	10.2	4	6	10
8/15/87	0.0	9.7	9.7	0	3	3
8/16/87	8.5	10.8	10.3	4	14	18
8/17/87	10.0	10.1	10.1	7	7	14
8/18/87	6.5	9.8	8.3	11	13	24
8/19/87	6.3	7.6	6.7	10	5	15
8/20/87	7.9	10.4	8.6	13	5	18
8/22/87	15.4	16.1	15.8	8	12	20
8/23/87	11.7	12.8	12.2	6	6	12
8/24/87	12.2	12.5	12.4	4	8	12
8/25/87	8.8	11.6	10.4	6	8	14
8/26/87	12.7	10.4	11.3	4	7	11
8/27/87	10.2	10.4	10.4	5	9	14
8/29/87	12.0	10.6	10.8	1	5	6
8/30/87	12.5	10.4	11.5	8	7	15
9/03/87	9.1	8.0	8.5	23	23	46
9/04/87	20.0	0.0	20.0	1	0	1
9/05/87	8.9	7.4	8.3	12	8	20
9/06/87	7.9	8.2	8.0	7	5	12
9/07/87	8.2	7.0	8.0	4	1	5
9/08/87	0.0	11.5	11.5	0	2	2
9/09/87	8.3	12.0	9.8	3	2	5
9/10/87	6.0	7.4	7.0	2	5	7
9/12/87	0.0	8.5	8.5	0	2	2
9/13/87	0.0	5.0	5.0	0	2	2
9/14/87	9.0	0.0	9.0	2	0	2

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Appendix B.2.b. (p. 2 of 2)

Stat Week	Stream Life			Number of Recoveries		
	Male	Female	Total	Male	Female	Total
31	24.8	6.0	24.8	6	0	6
32	22.0	19.7	20.9	7	6	13
33	10.9	12.0	11.5	17	23	40
34	8.8	11.3	10.1	53	56	109
35	11.0	11.4	11.2	26	43	69
36	9.9	8.3	9.2	44	38	82
37	7.8	8.8	8.3	16	17	33
38	9.0	5.0	7.0	2	2	4
Average Stream Life of Males			10.6	Number		171
Average Stream Life of Females			10.8	Number		185
Total Average Stream Life			10.7	Number		356

Appendix B.3.a. Sashin Creek 1986 pink salmon tag recovery summary.

	Stream Life			Number of Recoveries		
Tagging Date	Male	Female	Total	Male	Female	Total
8/27/86	13.0	14.7	13.7	24	18	42
8/28/86	12.6	15.7	12.9	34	4	38
8/29/86	10.2	16.3	11.0	24	4	28
8/30/86	13.3	11.4	13.1	30	5	35
8/31/86	16.0	15.3	15.7	22	15	37
9/01/86	16.9	16.3	16.6	23	19	42
9/03/86	17.9	15.5	16.9	27	19	46
9/04/86	15.7	15.3	15.6	22	9	31
9/05/86	14.3	13.8	14.0	36	50	86
9/07/86	12.7	11.6	12.1	23	24	47
9/08/86	12.1	10.1	10.8	16	29	45
9/09/86	12.2	11.2	11.6	30	39	69
9/10/86	9.7	8.0	8.8	26	27	53
9/11/86	10.3	8.1	9.4	27	19	46
9/12/86	8.4	8.2	8.3	21	28	49
9/13/86	7.5	6.7	7.1	24	30	54
9/14/86	7.2	7.9	7.5	22	16	38
9/15/86	7.9	7.8	7.8	15	27	42
9/16/86	7.4	6.9	7.1	20	39	59
9/17/86	7.0	6.0	6.4	13	23	36
9/18/86	7.8	6.6	6.9	8	18	26
9/19/86	5.8	5.3	5.5	18	30	48
9/20/86	6.2	5.8	5.9	6	16	22
9/21/86	5.3	6.2	5.9	19	41	60

	Stream Life			Number of Recoveries		
Stat Week	Male	Female	Total	Male	Female	Total
35	12.4	14.5	12.8	112	31	143
36	16.0	14.8	15.5	130	112	242
37	10.4	9.2	9.8	167	196	363
38	7.0	6.6	6.8	102	169	271
39	5.3	6.2	5.9	19	41	60

Average Stream Life of Males	11.4	Number	530
Average Stream Life of Females	9.6	Number	549
Total Average Stream Life	10.5	Number	1079

Appendix B.3.b. Sashin Creek 1987 pink salmon tag recovery summary.

	Stream Life			Number of Recoveries		
Tagging Date	Male	Female	Total	Male	Female	Total
8/26/87	12.7	15.7	13.6	15	7	22
8/29/87	12.2	10.7	12.0	21	4	25
8/30/87	13.8	8.0	11.8	8	4	12
9/01/87	11.1	11.6	11.3	14	11	25
9/02/87	11.3	8.2	10.6	14	4	18
9/03/87	12.0	8.9	10.7	10	7	17
9/04/87	8.5	10.8	8.9	22	5	27
9/05/87	9.3	7.7	8.5	11	9	20
9/06/87	11.9	12.5	12.0	19	2	21
9/07/87	11.9	9.0	11.0	11	5	16
9/08/87	7.8	7.8	7.8	12	6	18
9/09/87	9.6	9.7	9.7	8	4	12
9/10/87	12.2	10.2	11.8	17	5	22
9/11/87	10.9	11.7	11.1	9	3	12
9/12/87	11.0	9.8	10.7	14	5	19
9/13/87	10.0	9.2	9.4	7	13	20
9/14/87	8.9	8.5	8.7	13	11	24
9/15/87	8.3	6.8	7.3	6	12	18
9/16/87	8.2	7.0	7.6	6	5	11

	Stream Life			Number of Recoveries		
Stat Week	Male	Female	Total	Male	Female	Total
35	12.4	13.9	12.8	36	11	47
36	10.5	9.4	10.2	79	40	119
37	11.0	9.7	10.7	90	30	120
38	8.9	8.0	8.4	32	41	73

Average Stream Life of Males	10.8	Number	237
Average Stream Life of Females	9.4	Number	122
Total Average Stream Life	10.3	Number	359

Appendix B.4. Kadashan River 1986 pink salmon tag recovery summary.

	Stream Life			Number of Recoveries		
Tagging Date	Male	Female	Total	Male	Female	Total
7/31/86	11.2	11.0	11.2	5	1	6
8/01/86	14.0	12.0	13.3	4	2	6
8/02/86	13.1	12.5	13.1	15	2	17
8/03/86	11.2	0.0	11.2	10	0	10
8/04/86	12.1	11.0	12.0	18	1	19
8/05/86	11.2	10.0	11.0	10	2	12
8/06/86	15.9	16.8	16.3	10	9	19
8/08/86	11.0	18.0	13.3	4	2	6
8/09/86	11.2	10.0	10.9	9	3	12
8/10/86	10.6	10.7	10.6	10	7	17

	Stream Life			Number of Recoveries		
Stat Week	Male	Female	Total	Male	Female	Total
31	12.9	12.0	12.7	24	5	29
32	12.2	14.6	12.7	61	17	78
33	10.6	10.7	10.6	10	7	17

Average Stream Life of Males	12.2	Number	95
Average Stream Life of Females	13.2	Number	29
Total Average Stream Life	12.4	Number	124