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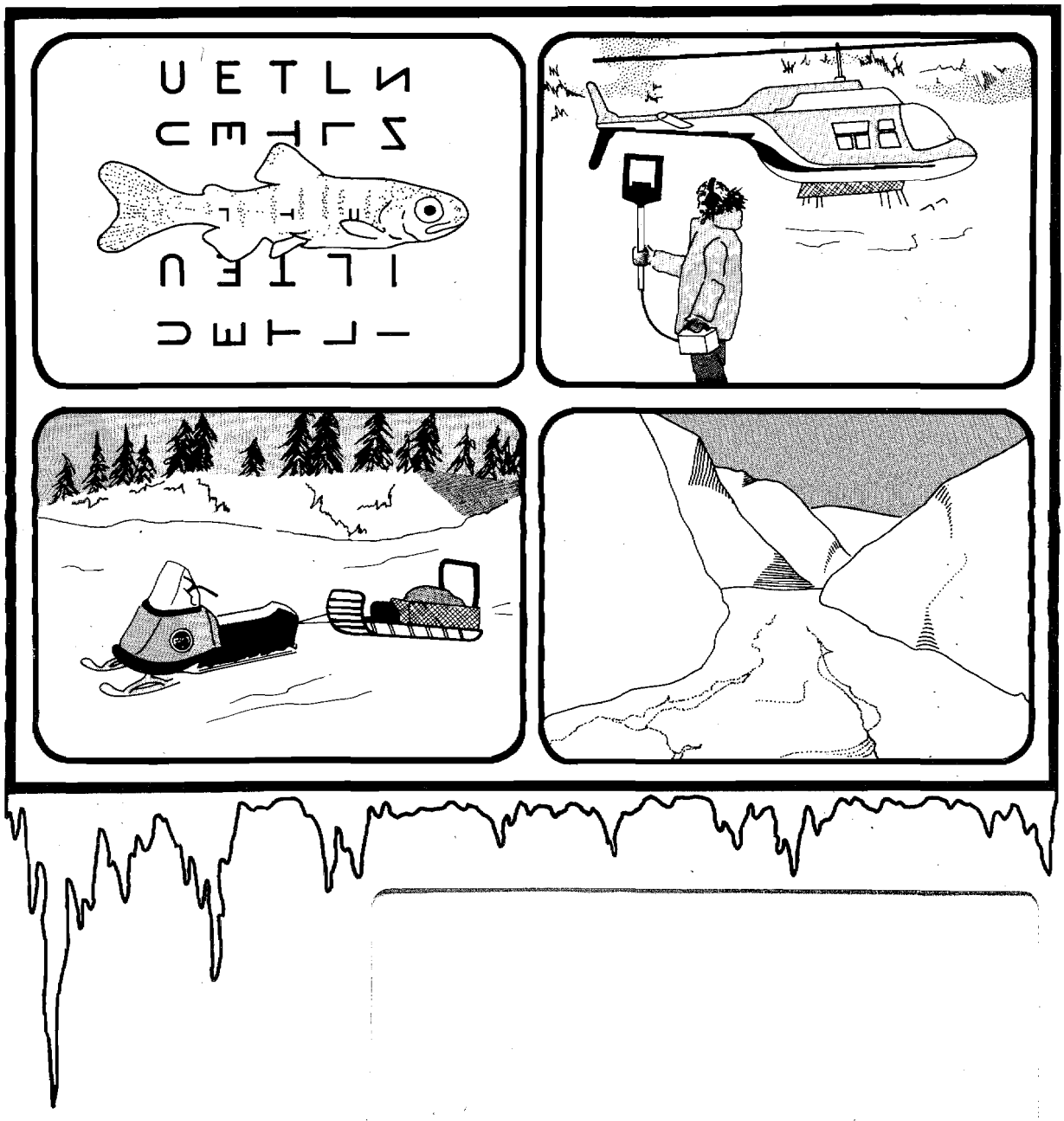

ALASKA DEPARTMENT OF FISH AND GAME
SUSITNA HYDRO AQUATIC STUDIES REPORT SERIES

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ALASKA DEPARTMENT OF FISH AND GAME

SUSITNA RIVER AQUATIC STUDIES PROGRAM

REPORT NO. 11

WINTER STUDIES OF RESIDENT AND JUVENILE ANADROMOUS FISH (OCTOBER 1984 - MAY 1985)

PART 2

Prepared for: Alaska Power Authority
P.O. Box 190869
Anchorage, Alaska 99519-0869

April 1986

PREFACE

This report is one of a series of reports prepared for the Alaska Power Authority (APA) by the Alaska Department of Fish and Game (ADF&G) to provide information to be used in evaluating the feasibility of the proposed Susitna Hydroelectric Project. The ADF&G Susitna River Aquatic Studies Program was initiated in November 1980.

This report covers winter studies (RSA Task 34) conducted from October 15, 1984 through May 15, 1985 on juvenile salmon and resident fish species of the Susitna River. In addition, some radio telemetry monitoring data is also included for resident fish that were radio tagged in September and early October 1984. This report has two parts which were published in separate volumes.

Part 1 presents the results of winter resident fish studies in both the lower and middle river. Monitoring of selected resident fish movements through the use of radio tags was continued. Efforts were also made to describe the overwintering habitat associated with rainbow trout, burbot, and Arctic grayling, and to identify the timing and locations of burbot spawning in the lower river.

Part 2 discusses the winter studies of juvenile chinook and coho salmon that were conducted in the middle river. Findings from this study define the distribution and relative abundance of fish within specific overwintering sites, document limited movements of marked fish between overwintering sites, and present information on fish lengths over the course of the winter. This report also presents mark-recapture data which can be used to generate site specific population estimates of juvenile chinook salmon that overwinter in the middle reach of the Susitna River.

Questions concerning this report should be directed to:

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TITLES IN THIS SERIES

Report Number	Title	Publication Date
1	Adult Anadromous Fish Investigations: May - October 1983	April 1984
2	Resident and Juvenile Anadromous Fish Investigations: May - October 1983	July 1984
3	Aquatic Habitat and Instream Flow Investigations: May - October 1983	September 1984
4	Access and Transmission Corridor Aquatic Investigations: May - October 1983	September 1984
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SUMMARY OF JUVENILE CHINOOK AND COHO SALMON WINTER STUDIES IN THE MIDDLE SUSITNA RIVER, 1984-85

Report No. 11, Part 2

by Michael E. Stratton

Alaska Department of Fish and Game
Susitna River Aquatic Studies Program
620 East 10th Avenue, Suite 302
Anchorage, Alaska 99501

April 1986

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1.0 INTRODUCTION

The Alaska Department of Fish and Game Susitna Aquatic Studies Program initiated winter studies of juvenile salmon in November 1980 to gather baseline data in preparation for proposed hydroelectric development on the Susitna River. These studies were designed to provide a winter inventory of the juvenile salmon and to determine factors that were limiting to their winter survival.

Initial winter studies (1980-81) of juvenile salmon were restricted to cataloging the distribution of juvenile salmon and their overwintering habitat (ADF&G 1981c). Later winter studies conducted during 1982-83 and 1983-84 were primarily concerned with embryo incubation and fry emergence (ADF&G 1983f; Vining et al. 1985) and surface and intragravel water temperatures (ADF&G 1983F; Keklak and Quane 1985; and Keklak and Withrow 1985).

The original purpose of the 1984-85 winter program was to describe the response of juvenile chinook and coho salmon to changes in mainstem river discharge as it affected their overwintering habitat, and to describe their utilization of microhabitat types within their overwintering habitat.

It became evident very early in the winter of 1984-85 that the intended purpose of the study could not be met because the prevailing river ice and climatic conditions exceeded the design capabilities of the program. The study design, therefore, was modified to provide: (1) population

estimates of juvenile chinook salmon at selected overwintering sites, (2) data to detect possible increases in length of fish occupying selected overwintering habitats, (3) potential movement of fish between overwintering habitats and, (4) the abundance index of juvenile chinook and coho salmon (as catch per unit effort; CPUE) in various microhabitat partitions of the overwintering habitat.

The data from the cold branding/mark-recapture study was designed to be analyzed using an open population model to generate population estimates of juvenile chinook salmon at the 1984-85 winter sampling sites. A computer program called POPAN-2 was selected for this purpose. A copy of this computer program was obtained and implemented on the Boeing Computer Services TSO (Time Sharing Option) operating system. Due to funding cuts to the Alaska Department of Fish and Game Susitna Aquatic Studies Program which were implemented in March 1986, funds for use of the contract with Boeing Computer Service were "zeroed out" for this study and the population estimates were not completed. Therefore, the data which is necessary to generate these population estimates, the references which are needed to use and understand the computer model, and the name and phone number of a department biometrician who is familiar with this data set and can be contacted regarding use of the POPAN-2 model is provided in this report.

2.0 METHODS

2.1 Study Locations

In mid-October, after water levels had lowered and stabilized, the following locations in the middle reach of the Susitna River were selected as winter sampling sites: Slough 9A (RM 133.6), Slough 10 (RM 133.8), Slough 22 (RM 144.3), and Indian River (RM 138.6) (Figure 1).

An important consideration in the selection of winter sampling sites was that each had to contain sufficient numbers of juvenile chinook salmon to provide adequate catches throughout the winter. This was necessary to generate a population estimate of the number of juvenile chinook salmon at selected overwintering sites in the middle reach of the Susitna River which may be affected by the proposed hydroelectric project.

2.2 Field Data Collection and Recording

Mark-recapture studies of juvenile chinook and coho salmon using cold branding marking techniques were conducted at the winter sampling sites from October 15, 1984 through May 15, 1985.

To better describe the habitat present at juvenile chinook and coho salmon overwintering sites and to compare the relative abundance of these juvenile salmon in different microhabitat conditions within individual sites, each of the four winter study sites were stratified

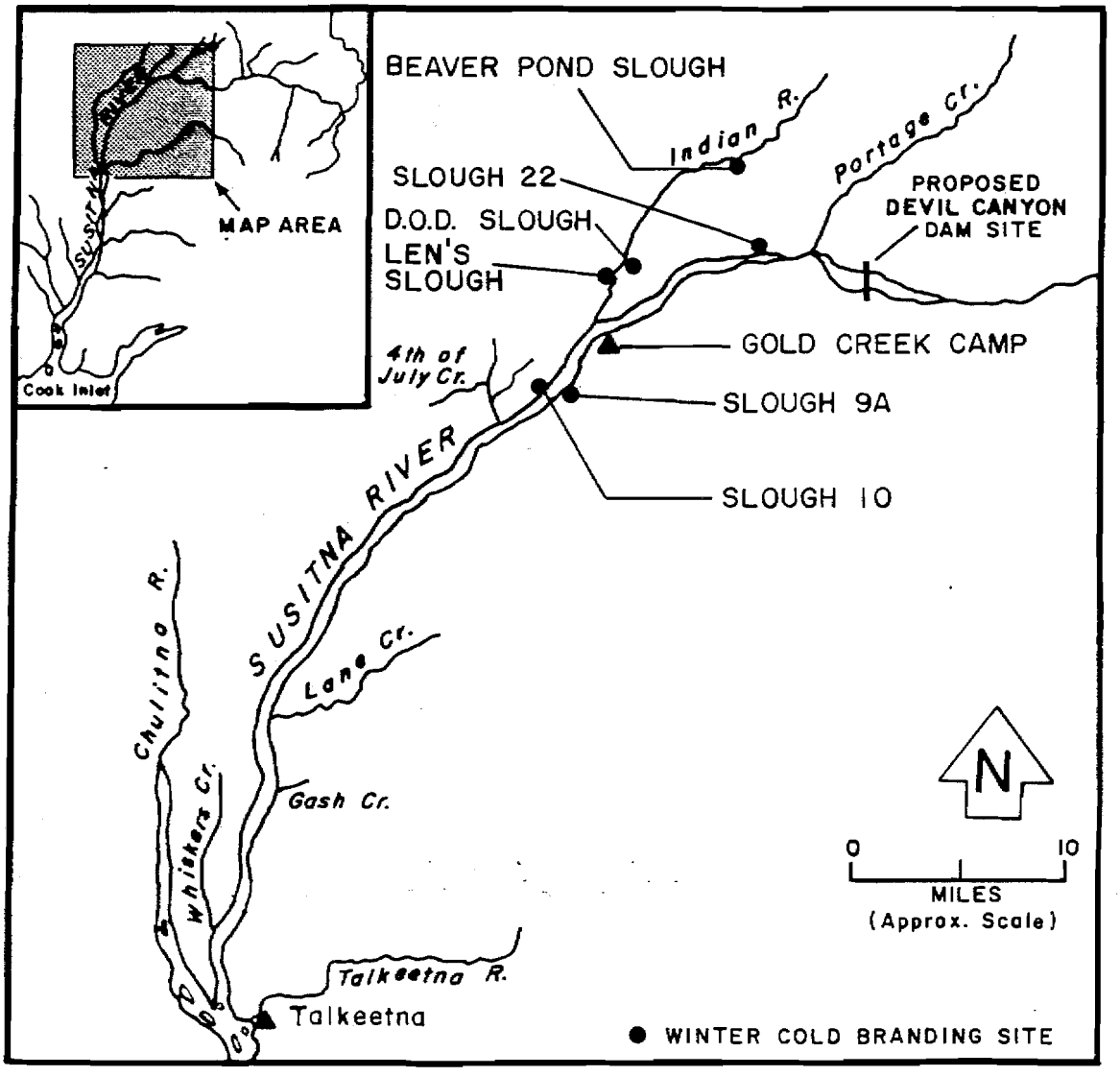


Figure 1. Map of the middle Susitna River showing the 1984-85 winter cold branding sites.

into "partitions" for sampling. Partitions were defined as sections of a study site having similar cover types, substrate, water depth, and flow. Partitions at Slough 9A, Slough 10, and Slough 22 were contiguous and numbered consecutively from the mouth of the slough to the upper limit of each of these sampling areas (Figures 2, 3, and 4). Indian River was too large to stratify into contiguous partitions, therefore one partition was established at each of two sloughs in the lower reach of Indian River and one slough in the upper reach were juvenile chinook and coho salmon were found (Figure 5).

Initially the frequency of sampling was scheduled to be at 3-5 day intervals. After three weeks of sampling, it was determined that the sampling effort could be reduced to 10-15 day intervals.

During November, biologists established that winter sampling should be conducted every 10-15 days. Sampling at intervals of less than 10 days seemed to produce artificially low catches which were attributed to overfishing and/or fish avoiding the minnow traps.

Minnow traps baited with salmon eggs were used to capture juvenile salmon. Five minnow traps were set for about 24 hours in each partition. Minnow traps were set in the same general area each trip. All juvenile chinook and coho salmon that were captured were marked by cold branding and held overnight for observation prior to release in the partition where they were collected.

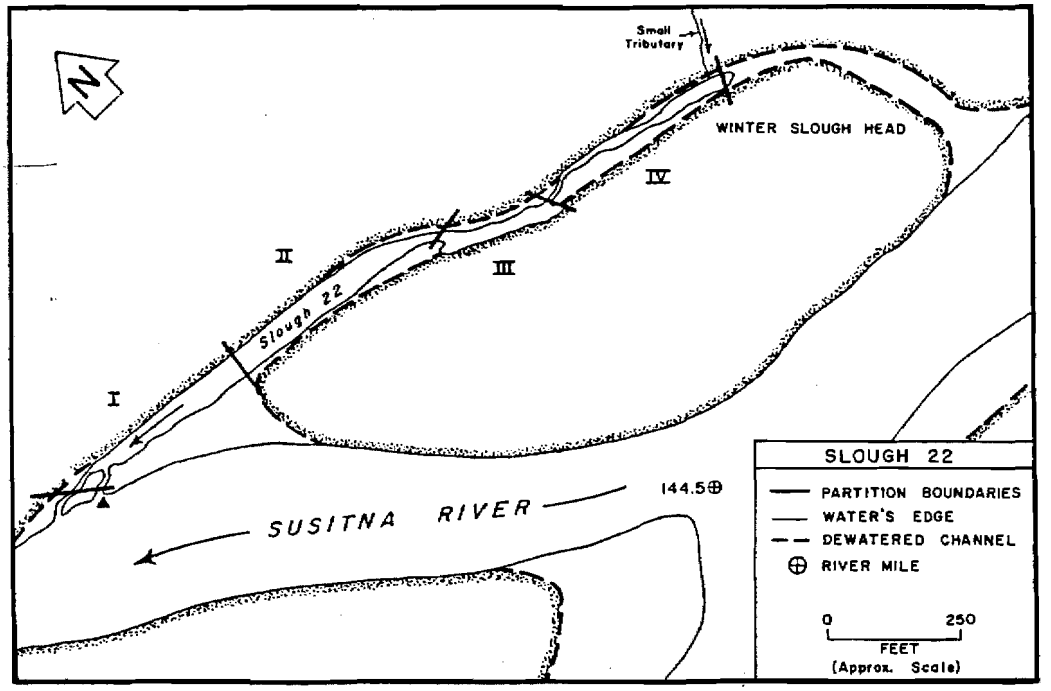


Figure 2. Sampling partitions at Slough 22, winter 1984-85.

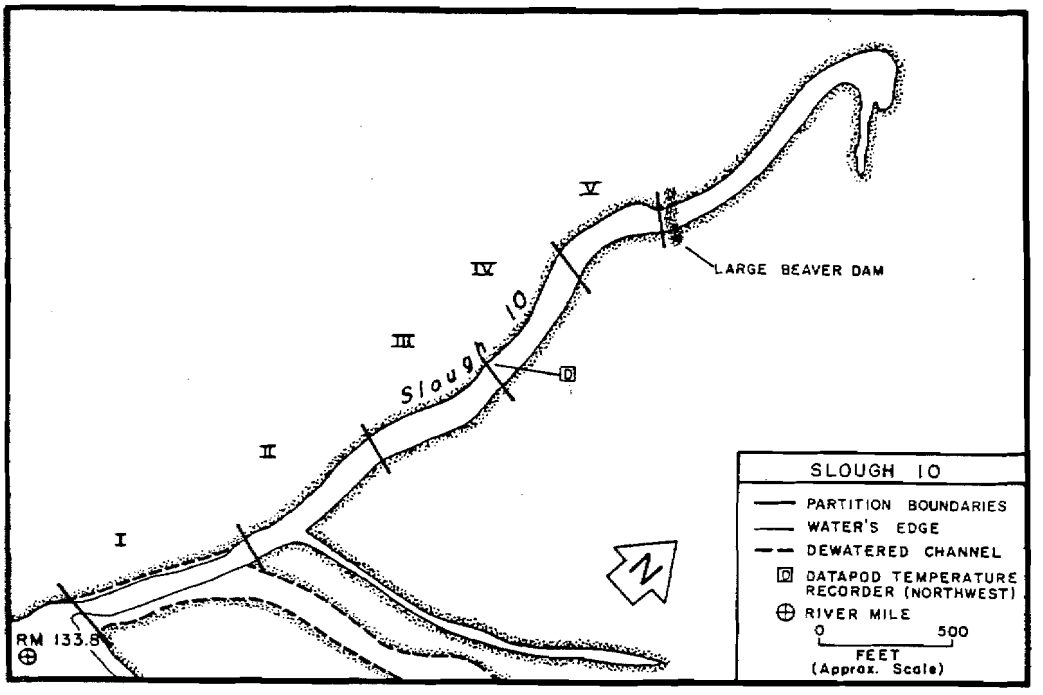


Figure 3. Sampling partitions at Slough 10, winter 1984-85.

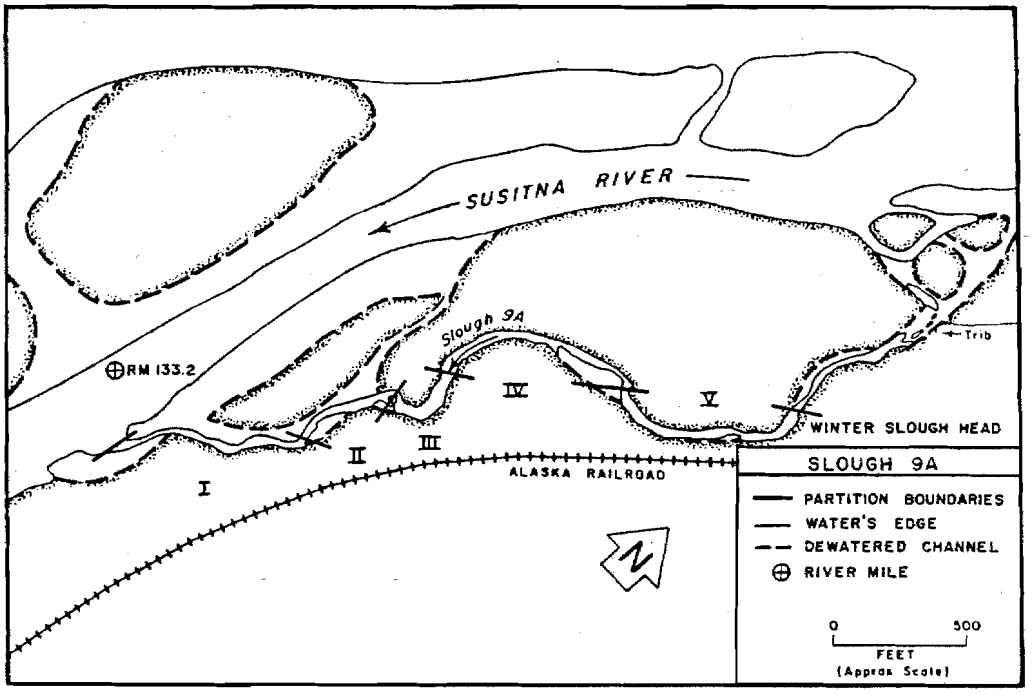


Figure 4. Sampling partitions at Slough 9A, winter 1984-85.

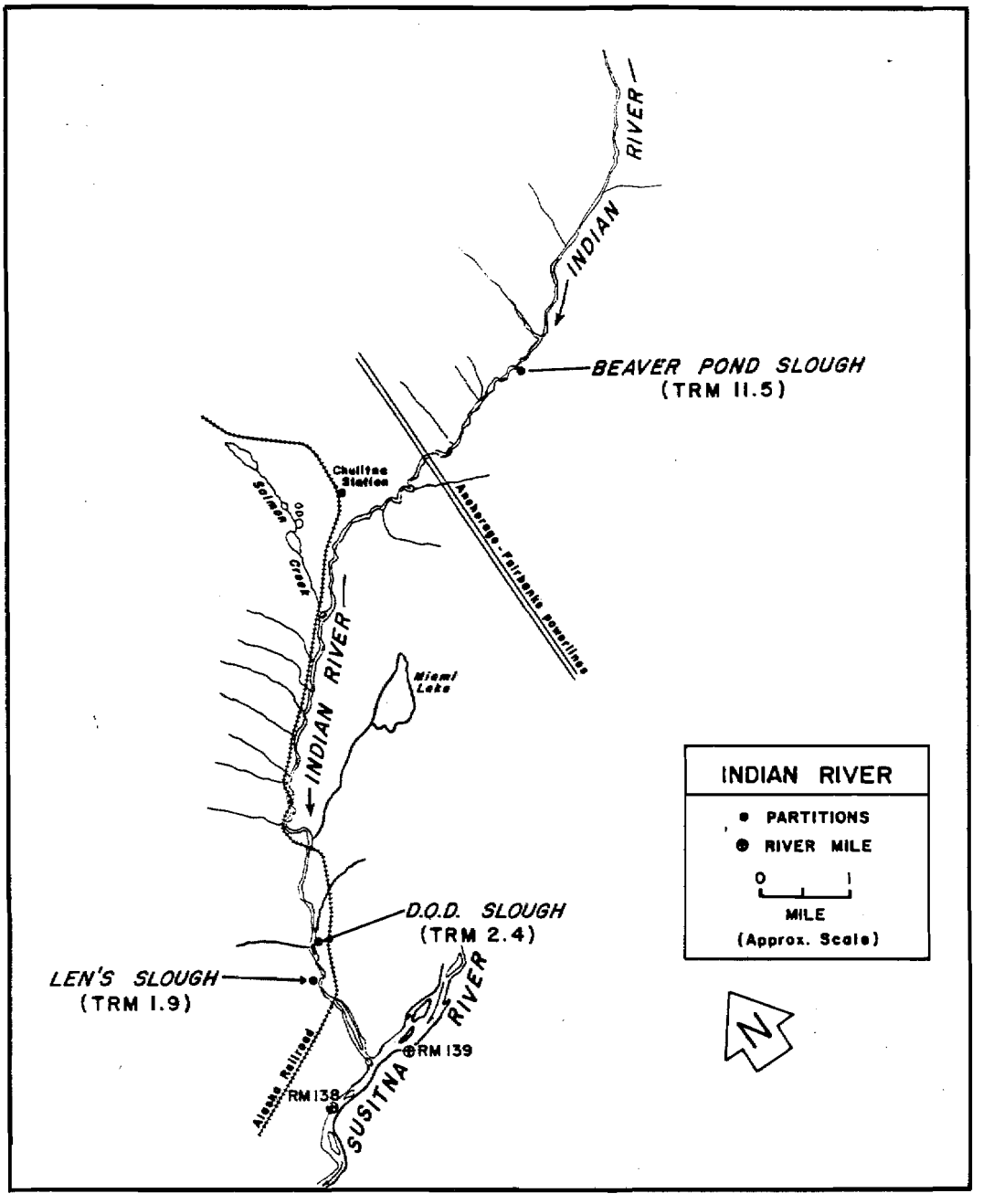


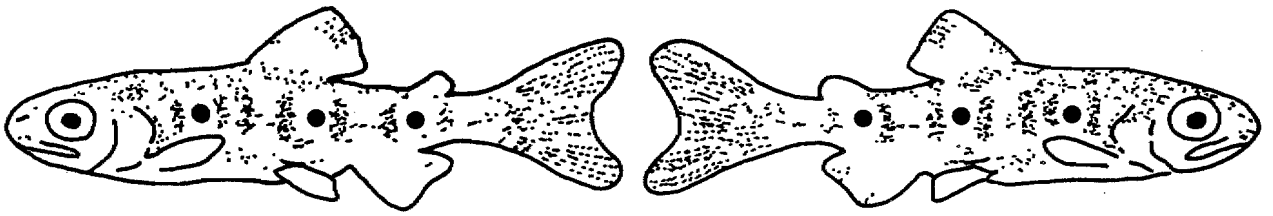
Figure 5. Sampling partitions at Indian River, winter 1984-85.

Cold branding procedures similar to those outlined by Mighell (1969) and Raleigh et al. (1973) were used for marking fish in this study. Each brand consisted of a single, 3 millimeter (mm), brass letter or symbol that was soldered onto a threaded brass cap. Liquid nitrogen was used as the cooling agent.

Juvenile chinook and coho salmon were marked with a distinct brand that signified the day or dates of capture and the location. Fish were branded at one of six branding locations on their bodies (Figure 6) using a branding time of 2 seconds. Branding locations were identified on field data forms by a two-letter code which was recorded in front of each brand. The first code letter (F, M, or B) indicated whether the brand was applied on the front, middle, or back of the fish. The second code letter (L or R) indicated if the brand was placed on the left or right side of the fish. The third letter or symbol recorded was the actual mark that was cold branded on the fish. Therefore a typical brand on a field data form might be "FRT", indicating that the fish was branded on the front section of its right side with the symbol "T". Recaptured fish were rebranded if they did not already have a brand at the designated location for the new sampling period.

Date, location, branding symbol, and fishing effort were recorded for each sampling site. Total number of fish captured by species and total numbers and symbols of recaptures were recorded for each partition. In addition, total length (TL) measurements of 50 juvenile chinook and 50 coho salmon were recorded once each month at each sampling site in an

Six Branding Locations (•)



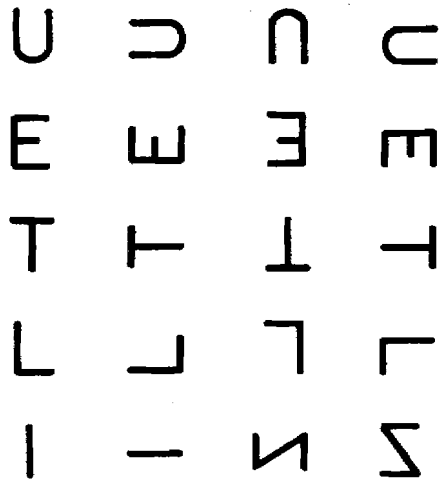
Left Side

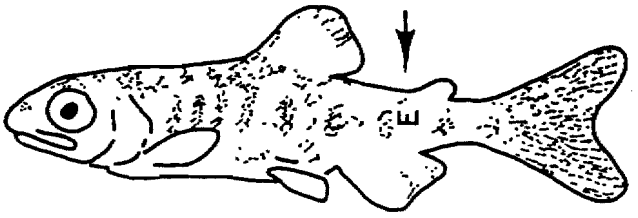
Right Side

BRANDING LOCATION CODES

FL - FRONT LEFT
ML - MIDDLE LEFT
BL - BACK LEFT
BR - BACK RIGHT
MR - MIDDLE RIGHT
FR - FRONT RIGHT

Sample Cold Brands





The brand on this fish would be recorded on the field data form as "BLш", where the BL is the branding location and ш is the brand used.

Figure 6. Branding locations, branding location codes, and sample brands used for cold branding juvenile salmon, winter 1984-85.

attempt to evaluate any tendency for an increase in size during the ice-covered season.

Data on surface and intragravel water temperatures, percent ice cover, and ice thickness were scheduled to be collected within each partition during each sampling period. At the beginning of the study, water temperatures were measured with a Digisense thermometer. Because of frequent malfunctions, use of the Digisense was discontinued early in the study and a hand-held mercury thermometer was used instead.

Cover and percent cover data were collected from each partition at winter sampling sites, once in March. A visual assessment of cover type and percent cover was recorded using criteria defined in Suchanek et al. (1985).

2.3 Data Analysis

The catch per unit effort (CPUE) data presented in this report is calculated as catch per minnow trap day.

Due to problems with the Digisense thermometer and dissatisfaction with the variability of measurements obtained with the hand-held mercury thermometer, surface and intragravel water temperature datapod measurements from Keklak and Withrow (1985) were used in the analysis of water temperatures at Slough 10.

Apparent increases in mean size between groups of juvenile chinook salmon, and between specific sites over time will be proven or disproven by an analysis of variance.

The 1984-85 cold branding/mark-recapture studies were conducted on open populations of juvenile chinook and coho salmon at selected over-wintering sites. Open populations are subject to dilution (recruitment of new fish into the catchable population by birth, growth, or immigration) and/or losses (by handling, death, or permanent emigration). The most widely used methods for obtaining population estimates of open populations are based on methods that were first proposed by Jolly (1965) and Seber (1965) and/or their derivatives. For the analysis of these mark-recapture data, a computer software system written by Arnason and Baniuk (1978) was selected. This system, called POPAN-2, was designed for mark-recapture analysis of open populations and it provides the user with easy access to the full range of variations on the basic Jolly-Seber analysis and many associated tests (as explained in Arnason and Baniuk 1978).

3.0 RESULTS

3.1 Biological Data

3.1.1 Chinook Salmon

3.1.1.1 Distribution and relative abundance

Catch per unit effort (CPUE) data given in Figures 7, 8, 9, and 10 present a general picture of the distribution and relative abundance of juvenile chinook salmon by partition at each winter sampling site over the course of the winter of 1984-85. CPUE's were generally highest between late October 1984 and early January 1985 and then they dropped off steadily thereafter. At Slough 22 and Slough 9A, catch rates were higher in the upper partitions, while catch rates at Slough 10 were generally higher at the mouth. Indian River catch rates were highest at Len's Slough, the furthest downstream site.

Statistical comparisons of catch per unit effort (CPUE) trends between partitions at each site was not attempted because the direct use of CPUE as a measure of population abundance is generally only valid if: 1) a fishes catchability is constant throughout the whole experiment and, 2) if each fish has an equal probability of being caught. The biometric reviewer of these data questions the validity of these assumptions, particularly the constancy of catchability throughout the winter season, because CPUE measurements vary with fish activity levels which are

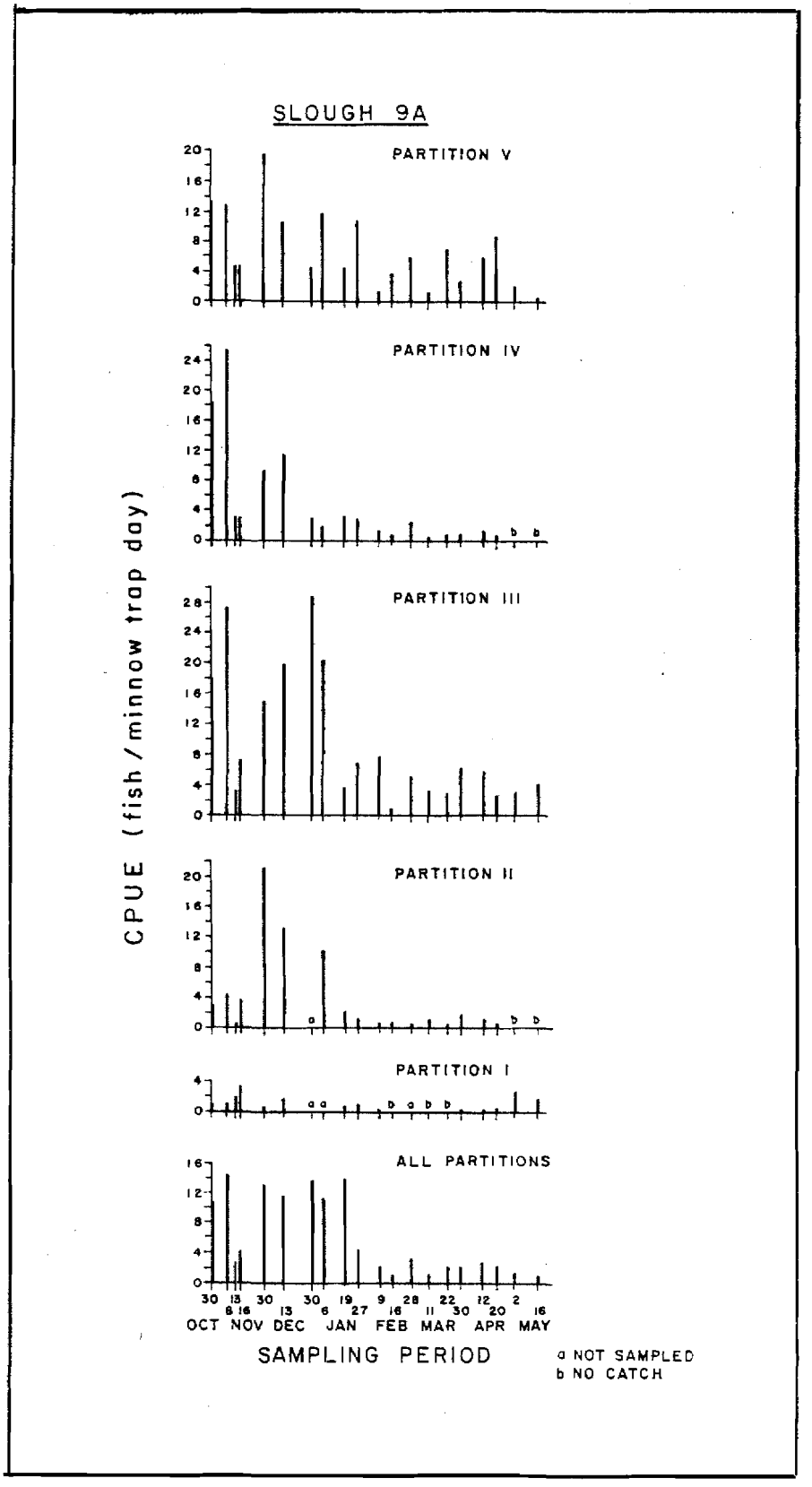


Figure 7. Juvenile chinook salmon catch per unit effort (CPUE) at Slough 9A by partition and sampling period, October 1984 through May 1985.

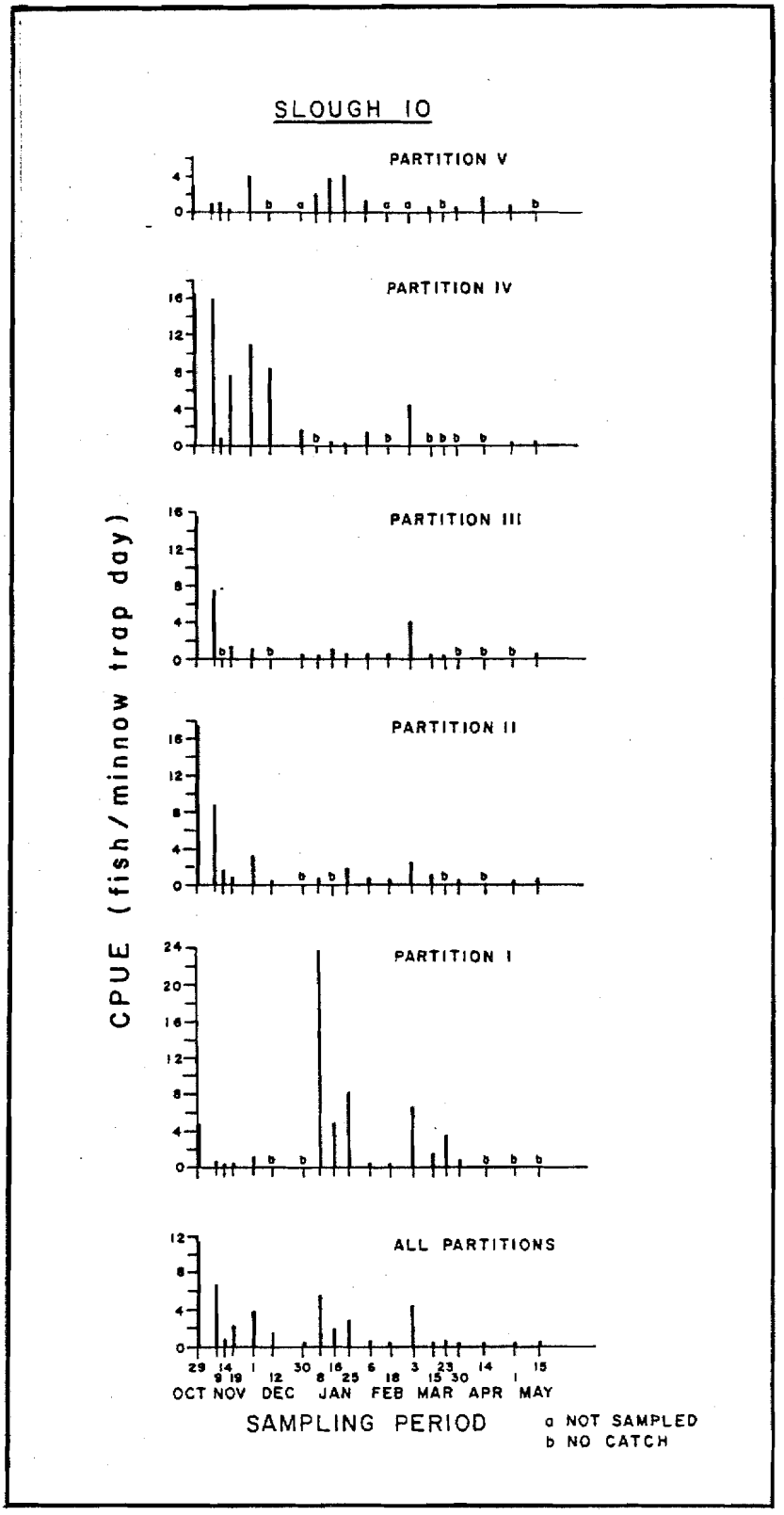


Figure 8. Juvenile chinook salmon catch per unit effort (CPUE) at Slough 10 by partition and sampling period, October 1984 through May 1985.

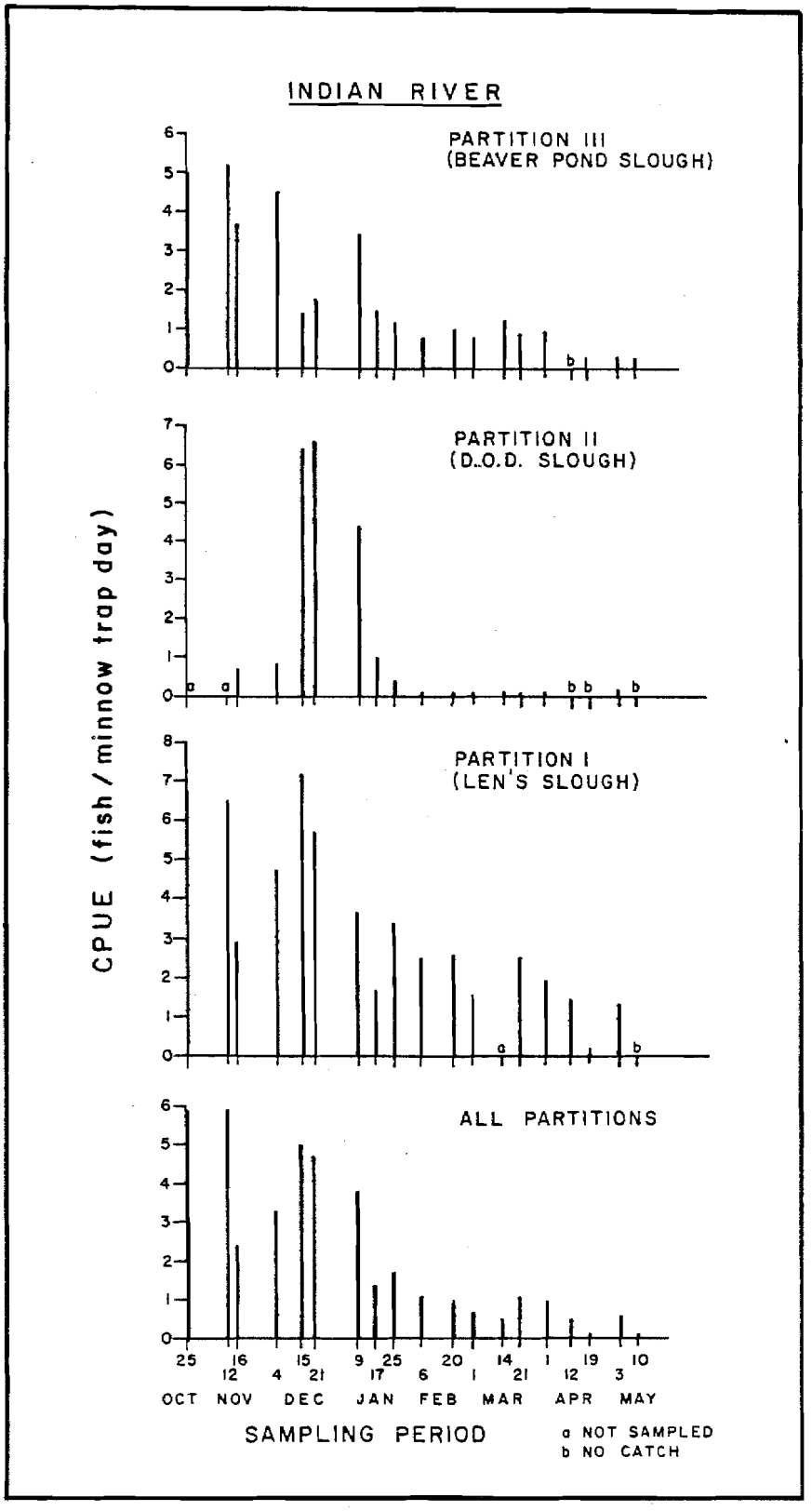


Figure 9. Juvenile chinook salmon catch per unit effort (CPUE) at Indian River by partition and sampling period, October 1984 through May 1985.

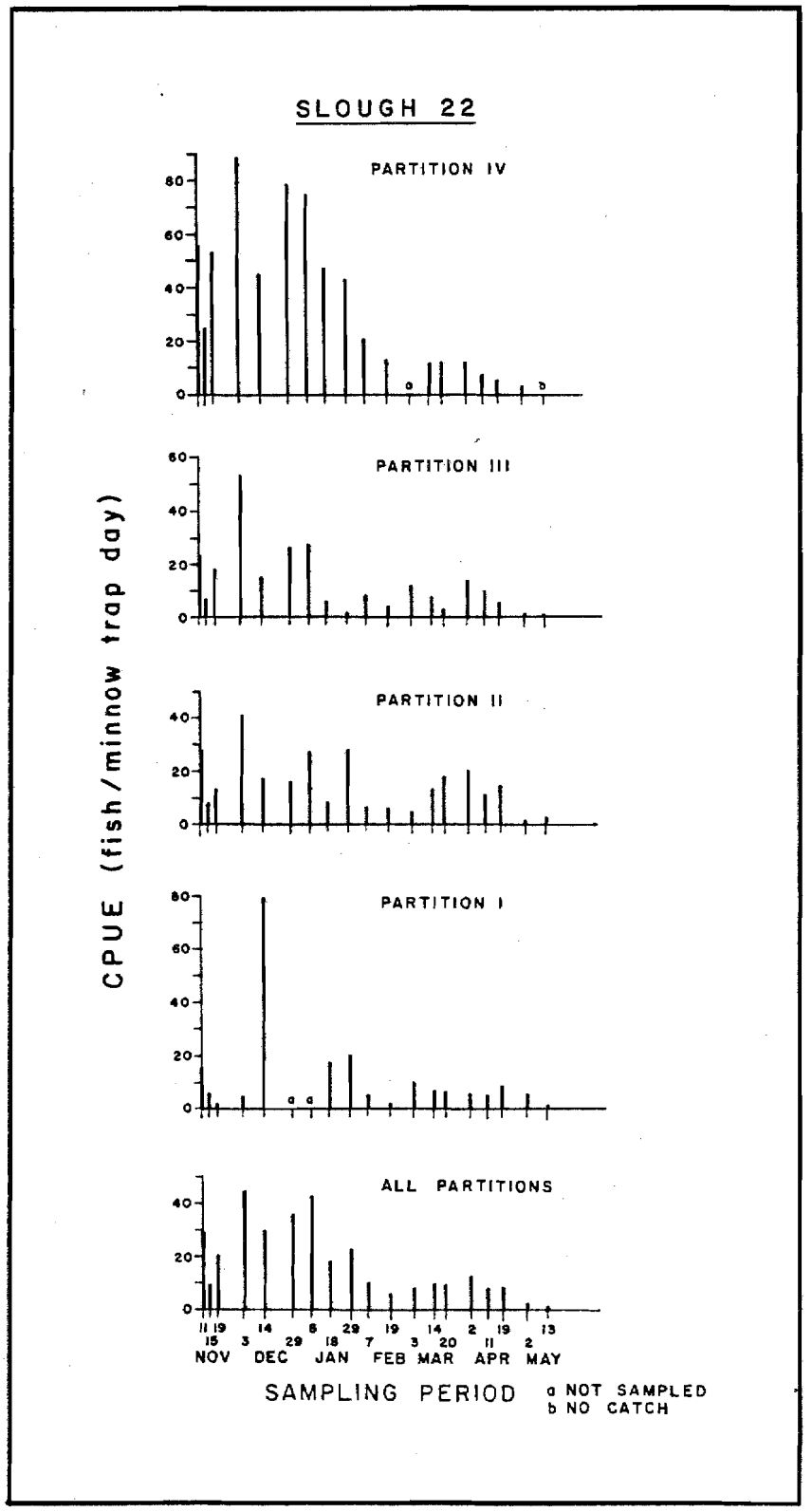


Figure 10. Juvenile chinook salmon catch per unit effort (CPUE) at Slough 22 by partition and sampling period, November 1984 through May 1985.

thought to vary during the winter with changes in water temperature, ice cover, and photoperiod (Bingham 1986).

Catch per unit efforts recorded between November 13 and November 19, 1984 are believed to be artificially low. Sampling during this time was repeated at 3-to-5-day intervals and it is believed that lower CPUE's resulted due to overfishing and fish avoiding the minnow traps. For example, a total of 540 juvenile chinook were captured and released at Slough 22 on November 11 and 12 respectively. However, on November 15, only 155 juvenile chinook were captured at Slough 22 using the same amount of effort. One would expect to catch a similar number of fish with the same amount of effort, if there are no other factors influencing the numbers or behavior of the fish. This problem was addressed by extending the period between sampling trips to 10 to 15 days.

3.1.1.2 Length

In an attempt to evaluate an increase in size of juvenile chinook salmon over the winter a comparison of juvenile chinook length data by site and by two-week periods was prepared (Figure 11). Based on this data set, we cannot verify winter growth in juvenile chinook salmon however we can detect a tendency for an increase in size within sites and between specific sites. A visual observation of Figure 11 indicates a slight difference in the median lengths of juvenile chinook between Indian River and Slough 22 stocks. The median lengths of juvenile chinook in Indian River also appear to be larger than their Slough 22 counterparts. A one-way analysis of variance performed on these data indicated that

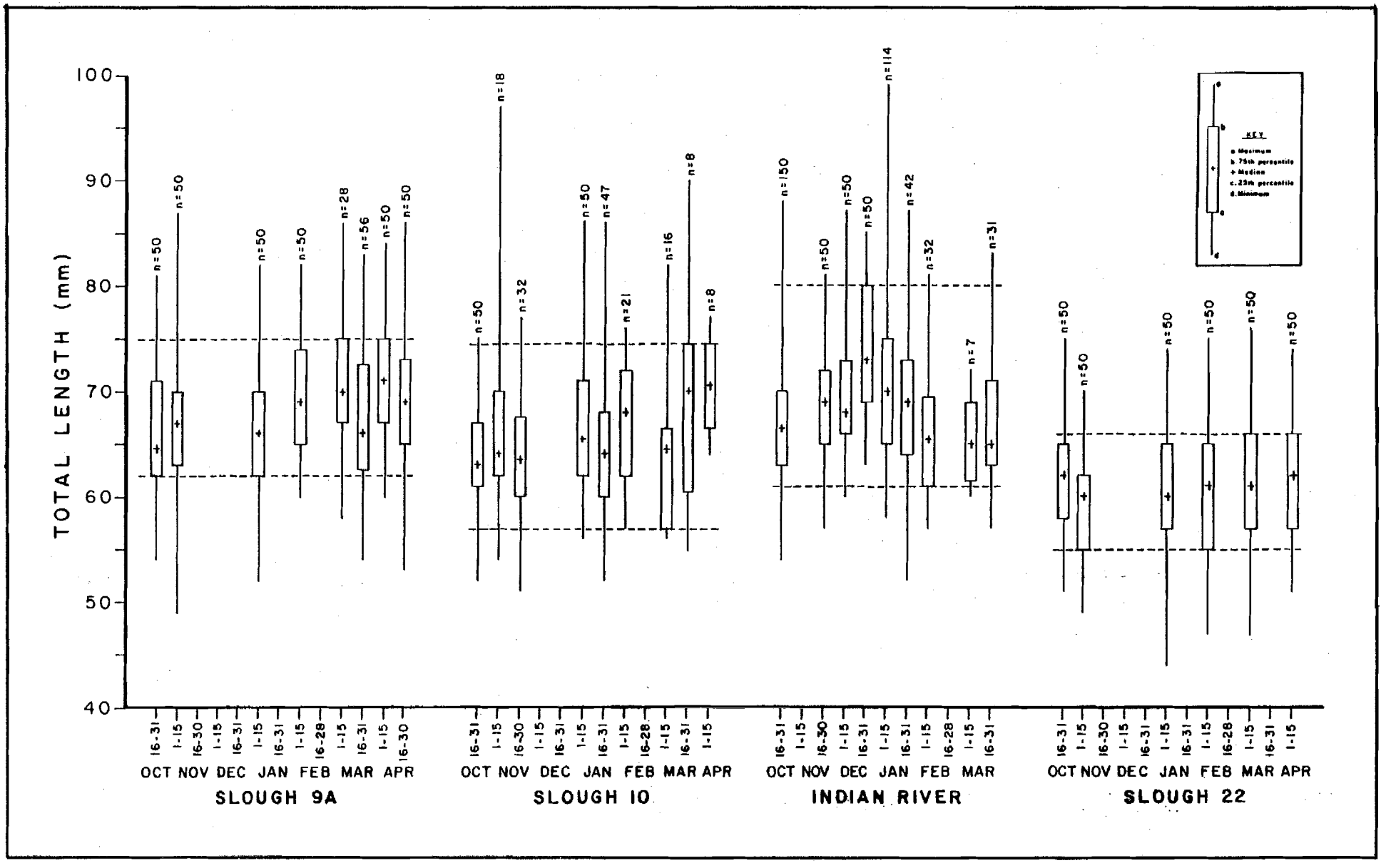


Figure 11. Juvenile chinook salmon length data by site and two-week period, mid-October 1984 through April 1985.

the null hypothesis (Ho) should be rejected, therefore there is a significant difference between the lengths of fish at these two sites (Table 1). A comparison of juvenile chinook salmon mean total lengths ($\overline{TL}$) with 95% confidence intervals for five time periods at Indian River and Slough 22 is presented in Figure 12. There is a statistical significance in the $\overline{TL}$'s between these two sites during the first four periods and the $\overline{TL}$'s of fish in Indian River are larger than the $\overline{TL}$'s of fish in Slough 22. In the last period, the confidence intervals of the $\overline{TL}$'s of juvenile chinook at Indian and Slough 22 overlap and therefore the difference of their $\overline{TL}$'s during the last period is not statistically significant.

3.1.1.3 Movement

Mark recapture techniques were used to monitor the winter movements of juvenile chinook salmon between sites. A total of 9,744 juvenile chinook salmon were marked by cold branding between October 15, 1984 and April 30, 1985 (Table 2). Of these, 3,265 were later recaptured (Table 3). All but two of the recaptures were made at the same site where the fish were originally branded and released. One fish was branded and released in Slough 22 on November 15 and recaptured at the mouth of Slough 10, 10.5 miles downstream on March 30. The other fish was branded on November 16 in Indian River and recaptured at the mouth of Slough 10, 5.4 miles downstream on February 6.

Table 1. ANOVA of the total lengths for juvenile salmon from Indian River and Slough 22 for five time periods.

SOURCE		DF	MSE	F	P
Sites					
October 25	Between	1	1329.08	34.74	*
	Within	198	38.26		
November 15-16	Between	1	2323.24	77.96	*
	Within	98	29.80		
January 8-9	Between	1	3398.96	68.55	*
	Within	162	49.59		
February 6-7	Between	1	491.47	12.17	*
	Within	80	40.39		
March 14	Between	1	99.65	3.03	NS
	Within	55	32.94		

* = P≤.05; NS = P .05

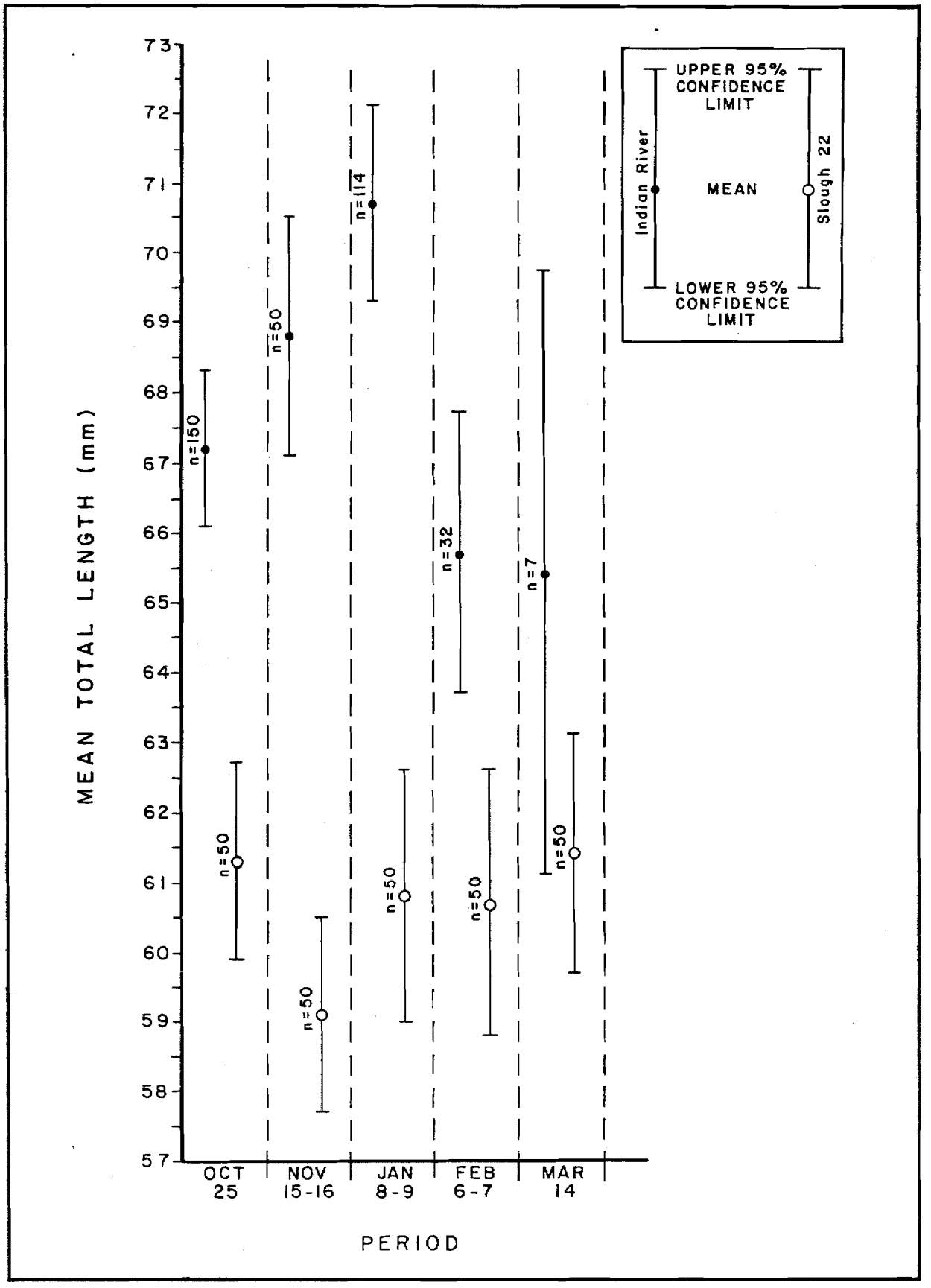


Figure 12. Comparison of juvenile chinook salmon mean total length ($\overline{TL}$) with 95% confidence intervals for five time periods at Indian River and Slough 22.

Table 2. Total juvenile chinook salmon branded by site and month, 1984-85 winter studies.

Location	Number of Fish Branded							
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
Slough 22	938	1,022	1,533	1,266	292	411	271	5,733
Indian River	236	184	377	79	28	7	32	943
Slough 10	237	235	141	115	108	25	7	868
Slough 9A	265	499	707	401	111	89	128	2,200
TOTALS	1,676	1,940	2,758	1,861	539	532	438	9,744

Table 3. Total juvenile chinook salmon recaptured by site and month, 1984-85 winter studies.

Location	Number of Fish Recaptured							
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Total
Slough 22	165	621	627	315	456	270	27	2,481
Indian River	68	113	84	34	34	29	15	377
Slough 10	7	20	24	14	7	4	4	80
Slough 9A	27	86	90	50	38	21	15	327
TOTALS	267	840	825	413	535	324	61	3,265

3.1.1.4 Population estimate data

Population estimates of juvenile chinook salmon at the winter study sites were not generated due to recent budget cuts. However, a site by site summary of the mark-recapture data which is needed to produce these population estimates using the POPAN-2 computer program are presented in Tables 4 through 9.

Appendix B provides a step-by-step procedure for preparing data from Tables 4 through 9 for use in the POPAN-2 computer model.

3.1.2 Coho Salmon

3.1.2.1 Distribution and relative abundance

In general, juvenile coho salmon were not found to be widely distributed or very abundant at the 1984-85 winter study sites in the middle reach of the Susitna River. Juvenile coho salmon were caught regularly at Slough 10 and in Indian River, however very few juvenile coho (10 fish) were caught in Slough 9A and Slough 22. Figures 13 and 14 present the general distribution and relative abundance of juvenile coho salmon by partition at Slough 10 and Indian River between October 1984 and May 1985. At Slough 10, the largest catch rates occurred in the upper partitions of the slough (below a beaver dam) on November 9, December 1, and February 6. The largest catch rates of juvenile coho salmon in Indian River occurred in D.O.D. Slough on December 4, January 9, and January 17.

TABLE 4. Juvenile chinook salmon mark-recapture summary for Slough 9A, 1984-85 winter sampling.

OCCASION	TOTAL CATCH	TOTAL RECAPS	TOTAL MORTS	TOTAL RECAP MORTS	TOTAL NEW FISH	TOTAL NEW MORTS
1	265	0	0	0	265	0
2	501	14	2	0	487	2
3	780	72	73	18	708	55
4	230	29	6	0	201	6
5	186	51	9	0	135	9
6	126	36	15	0	90	15
7	89	23	0	0	66	0
8	137	20	9	0	117	9
9	72	13	0	0	59	0

TABLE 5. Juvenile chinook salmon mark-recapture summary for Slough 10, 1984-85 winter sampling.

OCCASION	TOTAL CATCH	TOTAL RECAPS	TOTAL MORTS	TOTAL RECAP MORTS	TOTAL NEW FISH	TOTAL NEW MORTS
1	237	0	0	0	237	0
2	235	7	0	0	228	0
3	142	19	1	0	123	1
4	122	16	7	0	106	7
5	111	13	3	0	98	3
6	25	6	0	0	19	0
7	7	3	0	0	4	0
8	10	3	0	0	7	0

TABLE 6. Juvenile chinook salmon mark-recapture summary for Len's Slough on Indian River, 1984-85 winter sampling.

OCCASION	TOTAL CATCH	TOTAL RECAPS	TOTAL MORTS	TOTAL RECAP MORTS	TOTAL NEW FISH	TOTAL NEW MORTS
1	136	0	0	0	136	0
2	90	43	1	0	47	1
3	174	68	1	0	106	1
4	69	38	26	0	31	26
5	45	15	24	0	30	24
6	22	17	22	0	5	22
7	30	21	10	0	9	10
8	17	9	0	0	8	0

TABLE 7. Juvenile chinook salmon mark-recapture summary for D.O.D. Slough on Indian River, 1984-85 winter sampling.

OCCASION	TOTAL CATCH	TOTAL RECAPS	TOTAL MORTS	TOTAL RECAP MORTS	TOTAL NEW FISH	TOTAL NEW MORTS
1	7	0	0	0	7	0
2	138	0	1	0	138	1
3	57	0	43	0	57	43
4	3	0	2	0	3	2
5	2	0	1	0	2	1
6	1	0	0	0	1	0
7	2	0	0	0	2	0

TABLE 8. Juvenile chinook salmon mark-recapture summary for Beaver Pond Slough on Indian River, 1984-85 winter sampling.

OCCASION	TOTAL CATCH	TOTAL RECAPS	TOTAL MORTS	TOTAL RECAP MORTS	TOTAL NEW FISH	TOTAL NEW MORTS
1	100	0	0	0	100	0
2	88	22	0	0	66	0
3	76	26	9	0	50	9
4	57	22	35	0	35	35
5	19	6	13	0	13	13
6	15	6	9	0	9	9
7	12	3	1	0	9	1
8	3	0	0	0	3	0

TABLE 9. Juvenile chinook salmon mark-recapture summary for Slough 22, 1984-85 winter sampling.

OCCASION	TOTAL CATCH	TOTAL RECAPS	TOTAL MORTS	TOTAL RECAP MORTS	TOTAL NEW FISH	TOTAL NEW MORTS
1	4195	0	0	0	4195	0
2	940	113	2	0	827	2
3	1042	221	20	1	821	19
4	1385	510	336	130	875	206
5	496	131	12	0	365	12
6	640	221	60	0	419	60
7	793	352	107	0	441	107
8	431	251	139	28	180	111
9	412	237	1	0	175	1
10	314	185	43	2	129	41
11	53	16	0	0	37	0

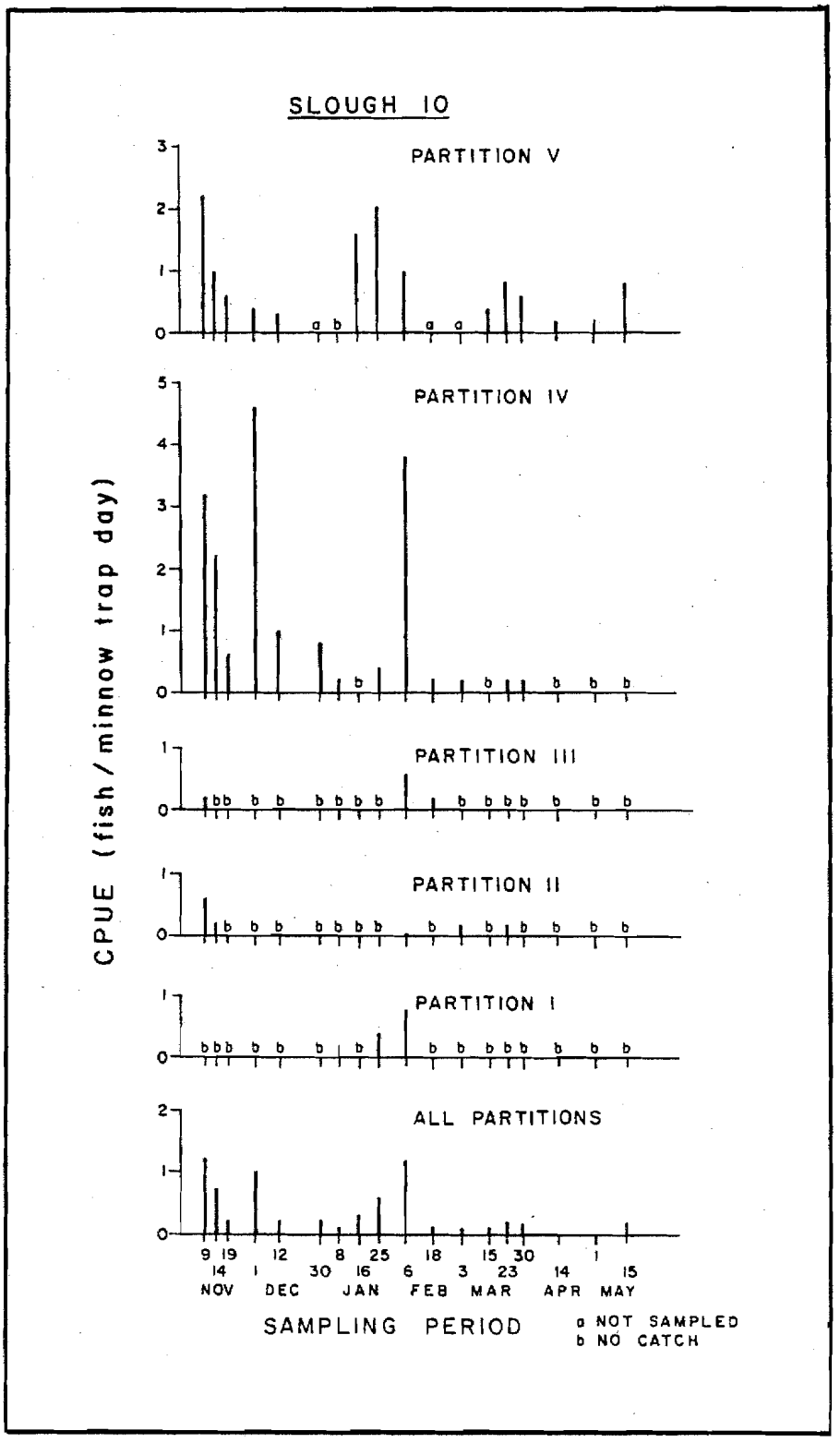


Figure 13. Juvenile coho salmon catch per unit effort (CPUE) by partition and sampling period at Slough 10, October 1984 through May 1985.

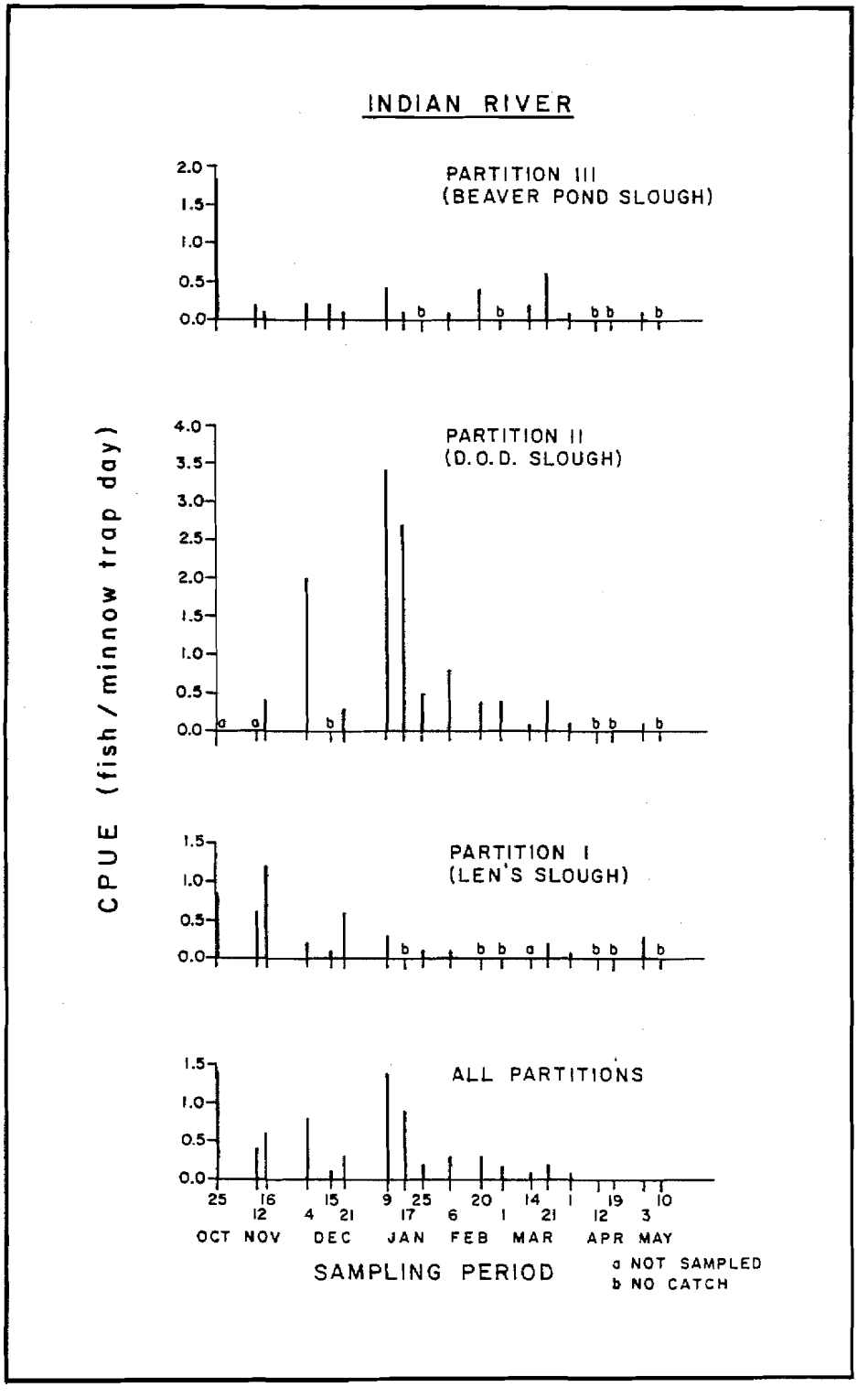


Figure 14. Juvenile coho salmon catch per unit effort (CPUE) by partition and sampling period at Indian River, October 1984 through May 1985.

3.1.2.2 Length

A comparison of juvenile coho salmon length data by site and by two-week period is presented in Figure 15. These data indicate a general trend of increase in size of juvenile coho salmon at Indian River over time which can possibly be attributed to growth or movements of fish into or out of the sample population.

3.1.2.3 Movement

The winter movements of juvenile coho salmon between sites was monitored using mark-recapture techniques. A total of 393 juvenile coho salmon were marked by cold branding between October 15 and April 30 (Table 10). Thirty of these fish were later recaptured; all but one were recaptured in the same site where they were branded and released (Table 11). The one exception was branded and released in Indian River on November 15 and recaptured 4.8 miles downstream in Slough 10 on February 6. The majority of the recaptures, like the catch, occurred prior to January.

3.1.2.4 Population estimate data

Due to the small number of recaptures, no population estimate were attempted for juvenile coho salmon.

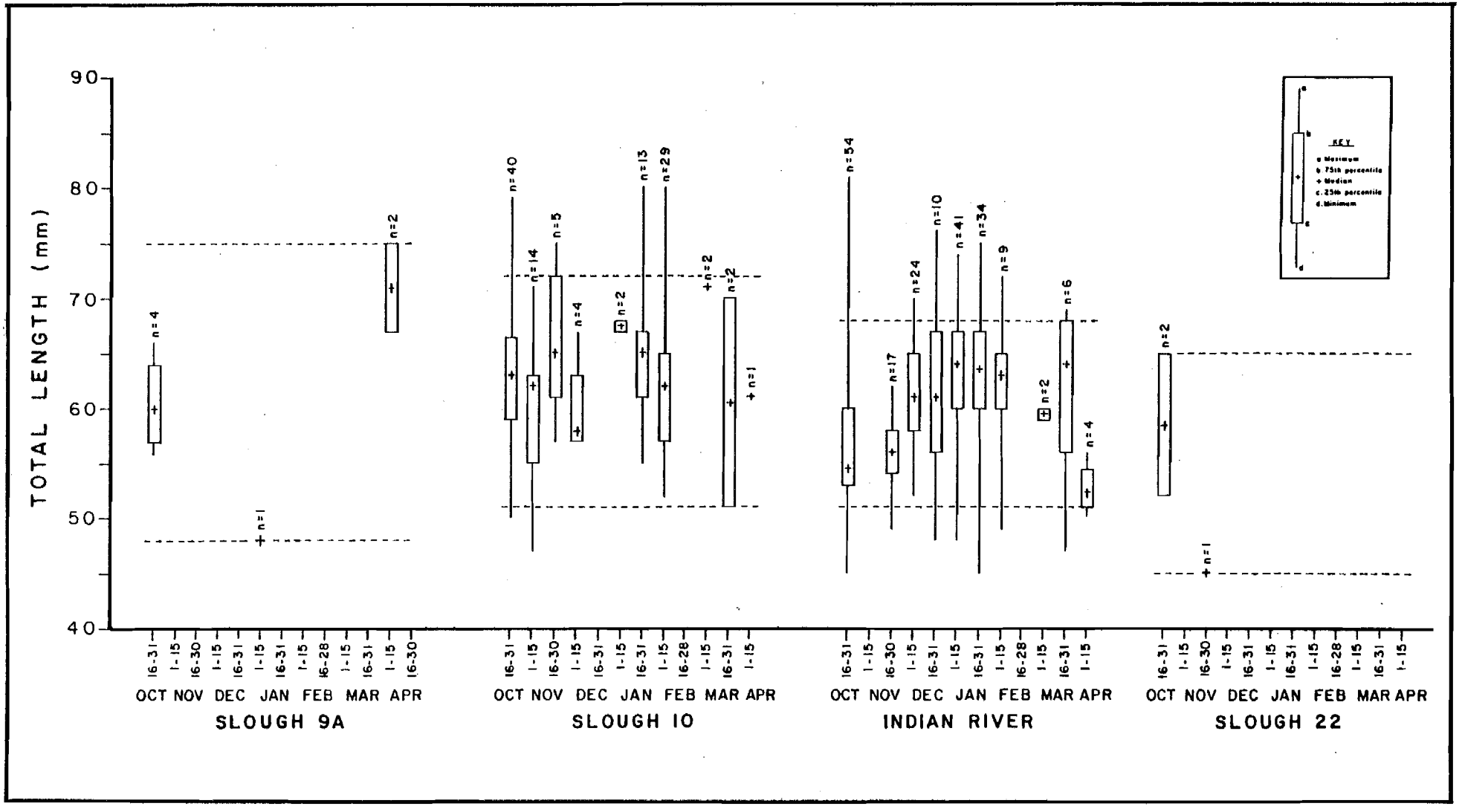


Figure 15. Juvenile coho salmon length data by site and two-week period, mid-October 1984 through April 1985.

Table 10. Total juvenile coho salmon branded by site and month, 1984-85 winter studies.

Location	Number of Fish Branded							
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
Slough 22	2	3	2	3	-	-	-	10
Indian River	55	25	36	34	10	2	3	165
Slough 10	47	49	34	22	31	8	1	192
Slough 9A	5	16	1	1	-	1	2	26
TOTALS	109	93	73	60	41	11	6	393

Table 11. Total juvenile coho salmon recaptured by site and month, 1984-85 winter studies.

Location	Number of Fish Recaptured							Total
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	
Slough 22	-	2	-	-	-	-	-	2
Indian River	3	1	4	-	1	-	1	10
Slough 10	2	8	2	1	1	-	3	17
Slough 9A	-	-	-	-	-	-	1	1
TOTALS	5	11	6	1	2	-	5	30

3.2 Habitat Data

Slough habitat and morphology for the open-water season have been recorded for each of the study sites in previous ADF&G reports (ADF&G 1981a, 1983c; Marshall 1983; Estes and Vincent-Lang 1984).

Discharge in the middle Susitna River averaged 2,100 cubic feet per second (cfs) during the winter study, ranging from a high of 5,600 in October to a low of 1,600 in April (Figure 16).

Table 12 presents the cover characteristics which were observed at the study sites during March 1985. Cover ranged from none to boulders and included debris and aquatic vegetation.

Figures 17, 18, 19, and 20 show the percent ice cover present at the four winter study sites by partition. Ice cover was a highly variable habitat characteristic during the winter study at most of the partitions. Partitions with higher velocities had less ice cover, deeper partitions had more ice cover, and rising and lowering air temperatures decreased and increased ice cover, respectively.

Figure 21 shows the average of the mean air temperatures as recorded at the Sherman Weather Station at RM 129.2 (R&M Consultants 1985) and compares it with the surface water temperatures measured at Partition IV in Slough 10. Surface water temperatures for this partition seem to follow the same general trend as the mean air temperatures observed at these times.

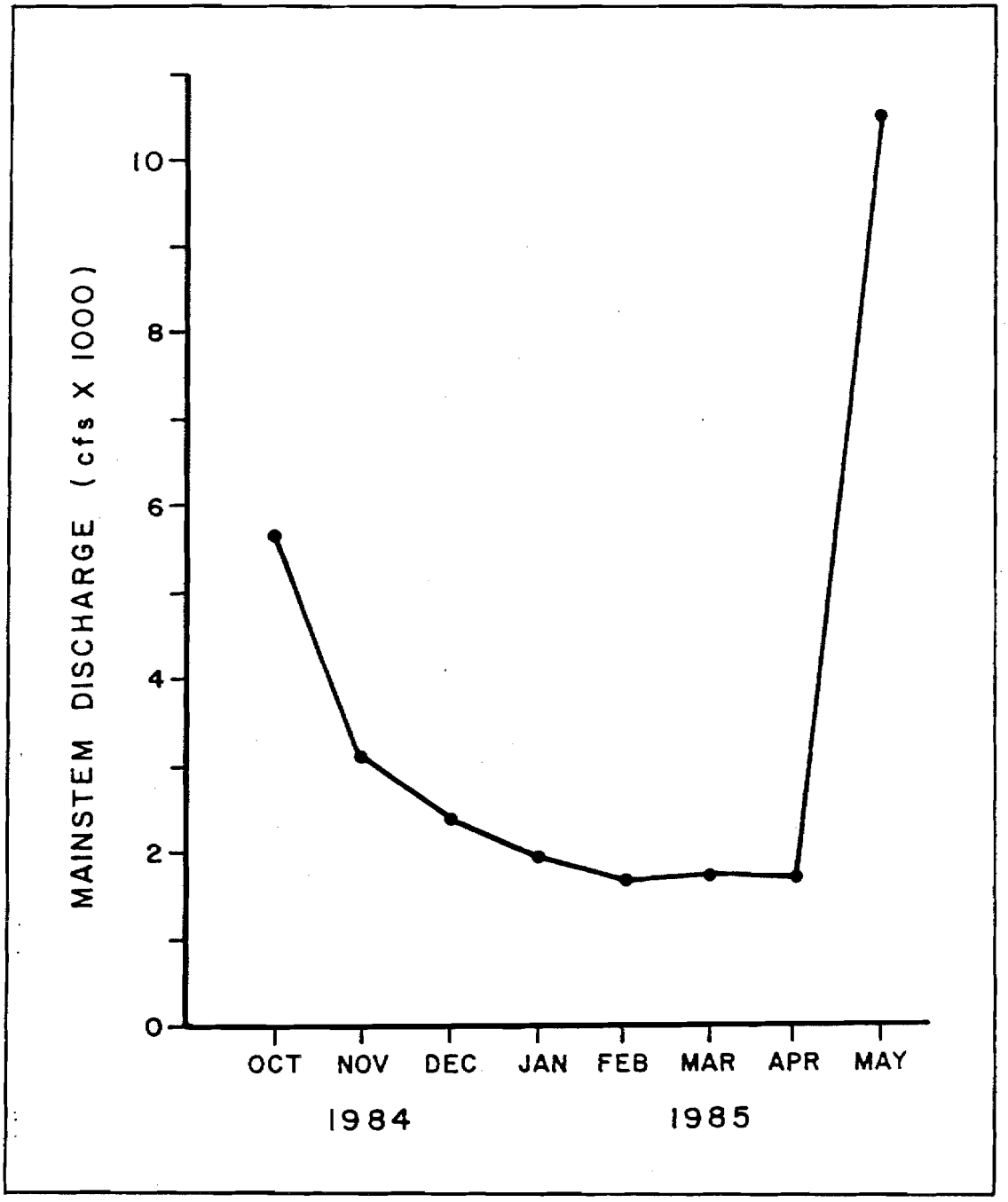


Figure 16. Mean monthly discharge (USGS provisional data) of the Susitna River at the Gold Creek gaging station, winter 1984-85.

Table 12. Cover data at winter study sites by partition, March 1985.

Site	Partition	Primary[a] Cover	Percent[a] Cover	Secondary[a] Cover
Slough 22 (Side Slough)	I	5"+	26 - 50	Debris
	II	5"+	0 - 5	None
	III	5"+	6 - 25	3" - 5"
	IV	5"+	26 - 50	3" - 5"
Indian River (Tributary)	Len's	3" - 5"	6 - 25	5"+
	DOD			
	Lower	3" - 5"	6 - 25	Debris
	Upper	5"+	26 - 50	3" - 5"
	B.P.	3" - 5"	6 - 25	5"+
Slough 10 (Upland Slough)	I	5"+	0 - 5	None
	II	Aq. Veg.	6 - 25	5"+
	III	Aq. Veg.	6 - 25	Debris
	IV	Aq. Veg.	26 - 50	5"+
	V	3" - 5"	6 - 25	5"+
Slough 9A (Side Slough)	I	1" - 3"	6 - 25	3" - 5"
	II	3" - 5"	6 - 25	1" - 3"
	III	Debris	26 - 50	5"+
	IV	5"+	6 - 25	3" - 5"
	V	3" - 5"	26 - 50	5"+

[a] Cover criteria as described by Suchanek et al. (1985).

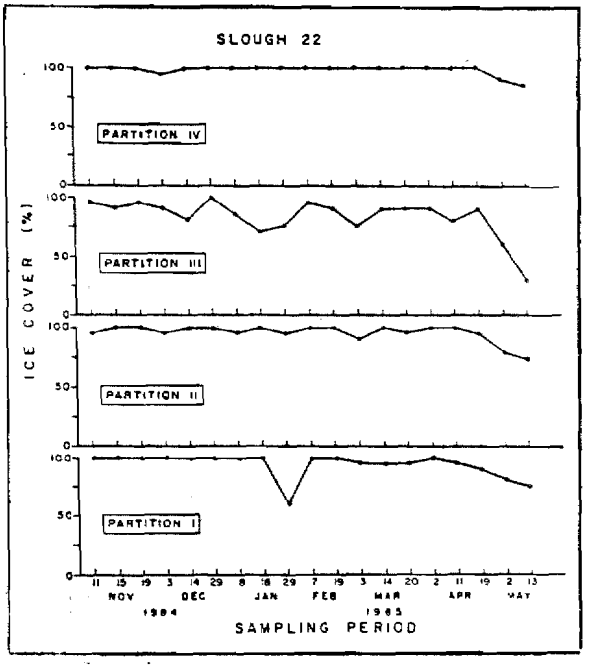


Figure 17. Percent ice cover at Slough 22 by partition and sampling period, winter 1984-85.

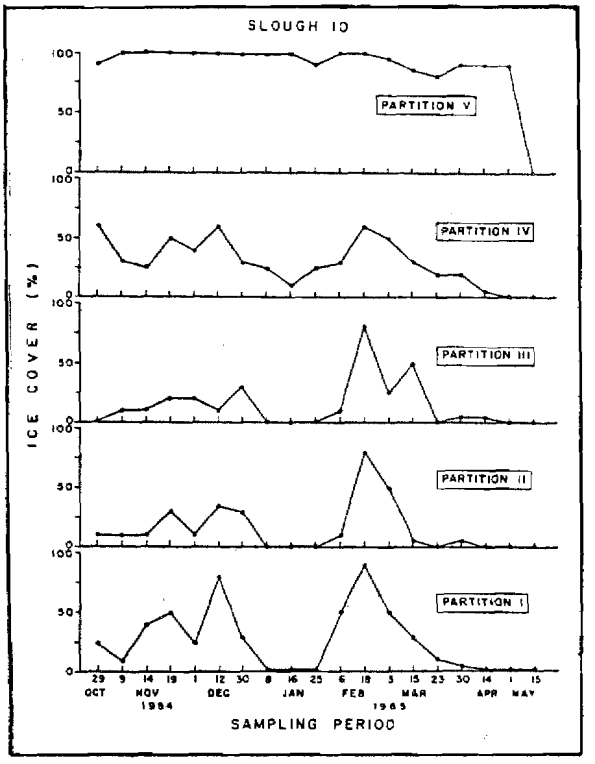


Figure 18. Percent ice cover at Slough 10 by partition and sampling period, winter 1984-85.

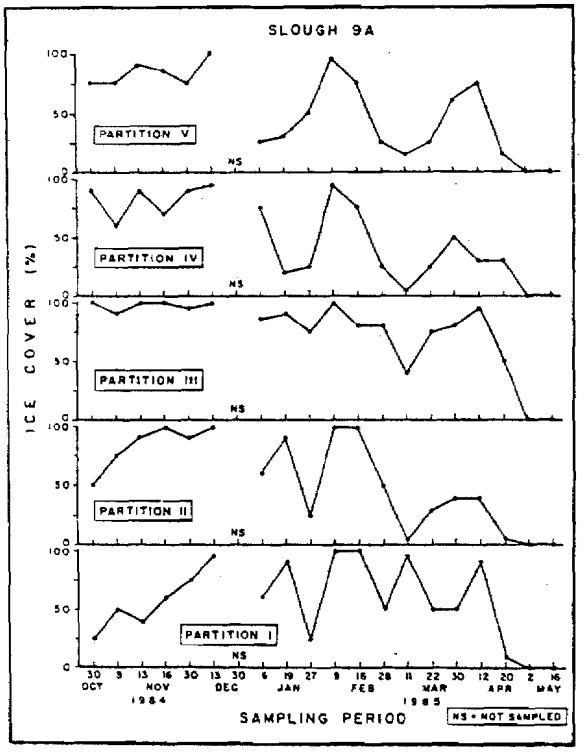


Figure 19. Percent ice cover at Slough 9A by partition and sampling period, winter 1984-85.

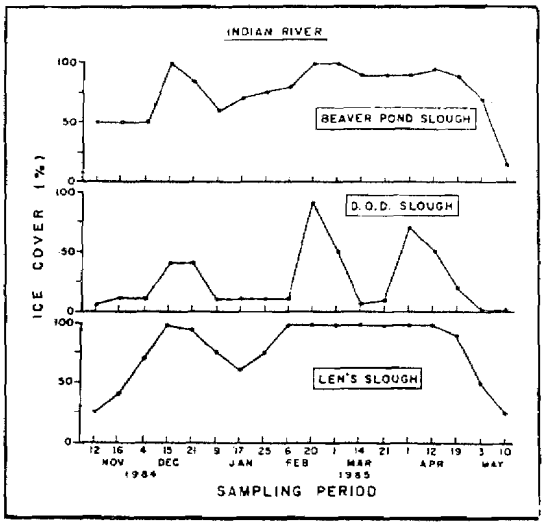


Figure 20. Percent ice cover at Indian River by partition and sampling period, winter 1984-85.

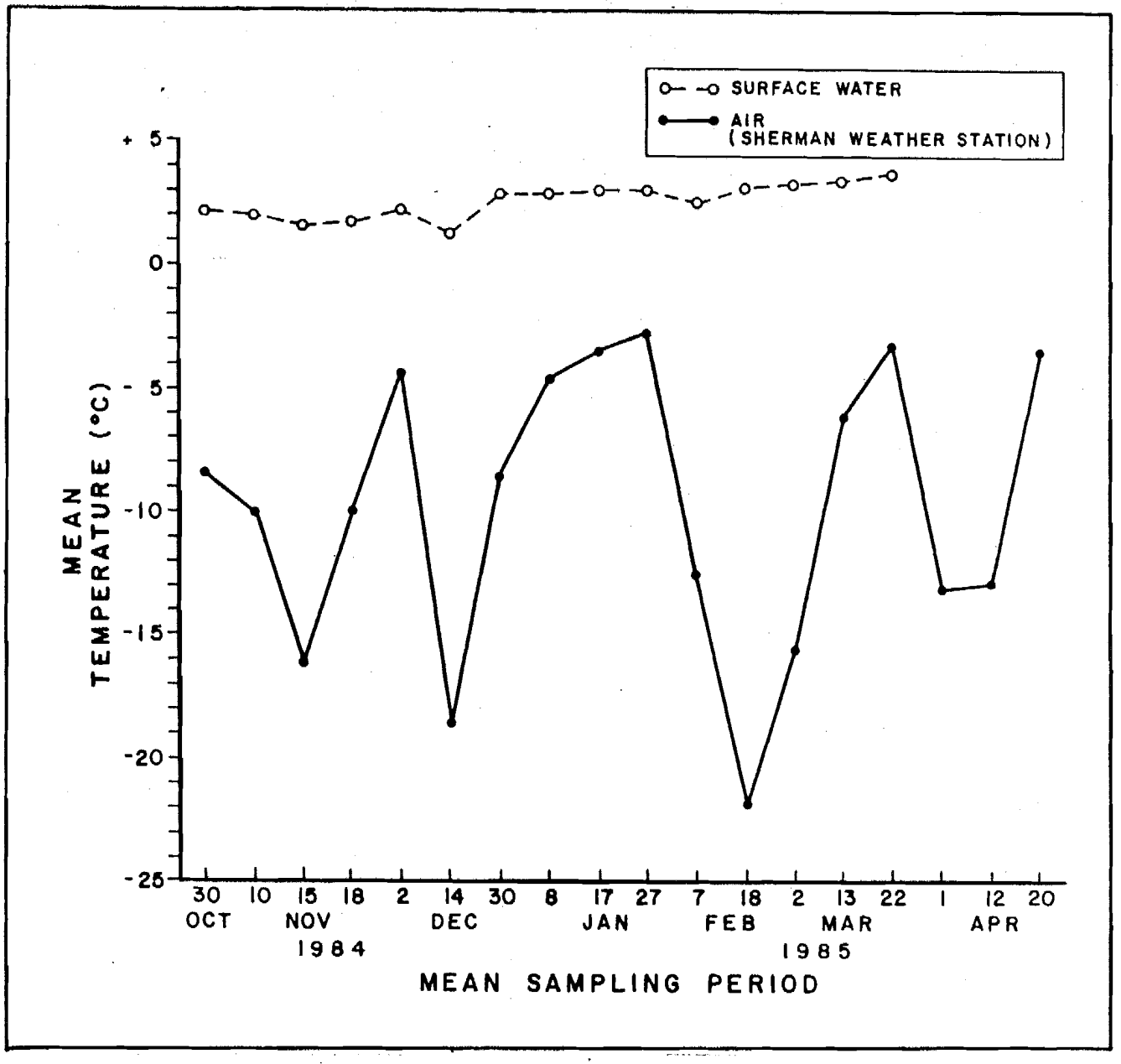


Figure 21. Plot of ambient air temperatures and surface water temperatures at Slough 10 (Partition IV), winter 1984-85.

Ice thickness at the four sites was highly variable, ranging from 0 to 48 inches. Most partitions had thick shelf ice along their perimeters with a strip of ice up to six inches thick out towards the center or main channel. Ice thicknesses are reported in Appendix Table C.

4.0 DISCUSSION

4.1 Chinook Salmon

Adult chinook salmon returning to the middle reach of the Susitna River are not known to spawn in the turbid mainstem. Spawning takes place in clear-water tributaries to the mainstem river during July and August. Emergence of fry takes place the following April. Juvenile chinook salmon rear in fresh water for up to two years. Scale analysis of adult chinook returning to the middle reach of the Susitna River indicates that the majority (98.5% over the past four years) of chinook juveniles were age 1+ juveniles which had reared one year in fresh water. Juveniles rearing in fresh water for two years (age 2+) have never been documented in the Susitna River drainage and it is theorized (Roth & Stratton 1985) the three remaining 1.5% of chinook juveniles migrated to sea in their first year (as age 0+) of fresh water life and may experience high mortality.

Chinook salmon juveniles in the middle reach appear to be separated into two behavioral groups: (1) those that spend a portion of their first summer in the middle reach, then migrate out of this reach before winter; and (2) those which spend their entire first year within the middle reach. The first group was reported in Roth and Stratton (1985), while the second group is the subject of this report. The relative contribution of these two groups with respect to returning adult salmon is not known at this time.

Within the second group are two sub-groups: (a) those which remain an entire year within their natal tributaries before beginning their smolting migration, and (b) those which leave their natal tributaries and overwinter in slough and side channel habitats in the middle reach. Previous winter studies (ADF&G 1981c, 1983a, 1983b) and data from this study indicated that little overwintering other than migrational movements occurs in the mainstem Susitna River.

From late October through mid-January there appears to be a redistribution of juvenile chinook in Indian River from the upper sites to the lower sites (Figure 9). By the middle of January, catch rates at all three Indian River sites had decreased to 1.5 - 3.0 fish per trap day and remained at or below this level for the rest of the ice-covered season. During this same period, catches in the two sloughs downstream from Indian River increased (Figures 7 and 8). These data, combined with the fact that one juvenile chinook and one juvenile coho branded in November in Indian River were recaptured in January and February in Slough 10, suggest that some juvenile chinook may have migrated out of Indian River between mid-December and mid-January. Catches at all winter sampling sites dropped dramatically after mid-January, suggesting that this outmigration of juveniles was not confined to Indian River, but occurred throughout the middle river. The recapture of a fish (branded in November at Slough 22) at Slough 10 in March also lends support to this hypothesis.

The reason or reasons for this movement out of Indian are not known at this time but several possible reasons are suggested by graphically

comparing juvenile CPUE and percent ice cover. Although these data are speculative, when percent ice cover and air temperature are compared to the catch rates at most sites (Figure 22), the catch seems to correspond with the increases and decreases of these two parameters during the first half of the season. This is most evident in Indian River where water temperatures reach the freezing point by early November. During the period when the juvenile movement was thought to have occurred in the Upper Indian River, air temperatures had just risen from their first extreme low of the season (-10 to -24°C in late November and early December), the most extensive ice cover to date was in place. When air temperatures approached the second extreme low of the season in late December, the extent of ice cover remained high and the juveniles were thought to have been in the process of leaving the lower areas of Indian River. The temperatures then rose and were warmer until mid February, after which the coldest weather of the season occurred and virtually all of the sites were ice covered. During the warming period in January, we had expected that catches at all sites would increase due to increased activity by the fish, but this was not the case. Catches at mainstem slough sites increased, but catches at Indian River continued to fall. This could be the result of: (1) a large number of fish moving into the mainstem slough sampling sites, (2) a large number of branded fish moving out of the Indian River sampling sites, or (3) a high winter mortality of juvenile chinook salmon at the Indian River sites.

A similar trend is believed to have taken place within the mainstem slough sites over the course of the winter. In September, large numbers of juveniles were visually observed at the mouths of mainstem sloughs.

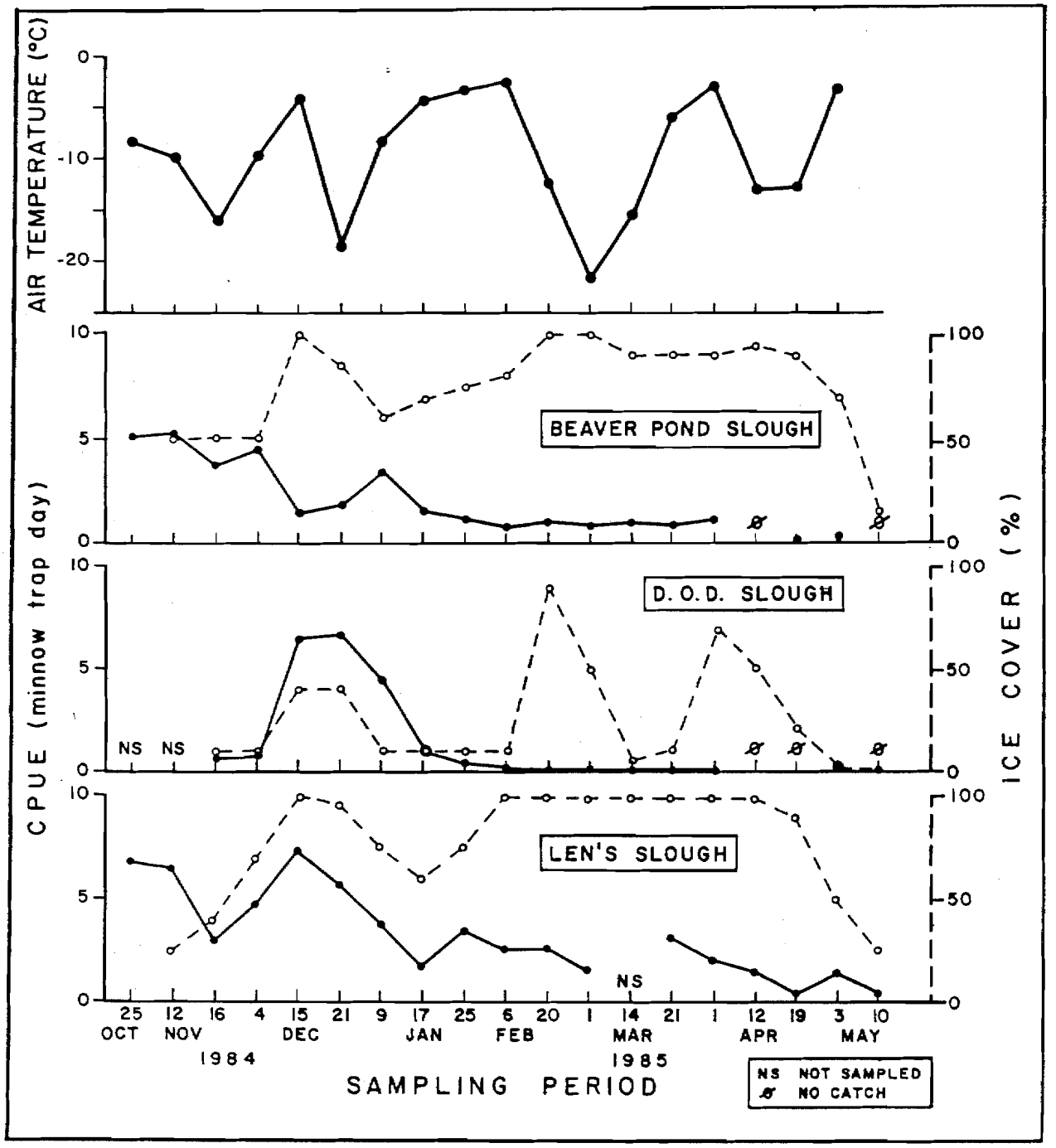


Figure 22. Plot of juvenile chinook catch per unit effort (CPUE) at Indian River versus ice cover and air temperature by partition and sampling period, winter 1984-85.

By mid-October the juveniles seemed to have slowly dispersed within the sloughs with the major concentrations in areas having more cover and groundwater sources (Roth and Stratton 1985).

In early May, as the days became longer, water and air temperatures increased, ice cover receded, and fish became more active. One might expect that catches would increase with improved conditions, especially at partitions in the lower sections of the sites. As can be seen in Figures 7, 8, 9, and 10, this did not occur. Either the majority of juvenile chinook had left the sites prior to this time or the winter mortality among juvenile chinook salmon was very high.

4.2 Coho Salmon

Adult coho salmon spawning in the middle Susitna River has been documented almost exclusively in tributary streams. Very small numbers of coho salmon have also been observed spawning in sloughs and at mainstem sites used by other species of salmon. Spawning occurs from August to October and the alevins emerge in March and April. Coho salmon juveniles remain in freshwater for up to three years, but scale analysis of returning adults indicates that approximately one-half of the returning adults were age 1+ juveniles and the other half age 2+ (ADF&G 1981b, 1983d, 1983e; Barrett et al. 1984, 1985). A total of 472 juvenile coho salmon were captured during the 1984-85 winter studies. Of these, only 18 were age 2+, indicating that the majority of the 2+ fish overwinter in habitats below the middle reach.

Few juvenile coho were captured compared to chinook (472 coho versus 11,543 chinook). In general, coho salmon juveniles were found to exhibit similar movements and responses to mainstem changes as chinook salmon juveniles.

Since so few juvenile coho salmon were captured and subsequently recaptured, no population estimates were calculated.

4.3 Habitat Data

Before freeze-up (prior to mid-October) mainstem discharges were critical for passage of juvenile chinook and coho into the mouths of certain sloughs (e.g., Slough 22). Juvenile chinook and coho salmon that outmigrate from tributaries (e.g., Portage Creek) into the mainstem between mid-August and late September have greater access to sloughs for winter rearing during higher discharges ($>$ 4,000 cfs).

During freeze-up (mid-October through November) winter rearing areas in sloughs and side channels are affected by ice jams which back up mainstem water and result in localized flooding and the formation of overflow ice. Breaching of sloughs and side channels with cold mainstem water during freeze-up can flush out fry which have sought out the warmer ground waters in these areas for overwintering. The formation of overflow ice also reduces the area within a site which is suitable as overwintering habitat. For example, at Slough 22, overflow events during November covered the lower 400 feet of the slough with ice that was 20 inches thick.

After freeze-up (December through mid-May) mainstem discharges in the middle Susitna River were basically stable for the remainder of the winter. During February, staging was observed at Slough 10 after a heavy snowfall. The additional weight of the new snow on the surface ice in this area backed up mainstem water over 2,000 feet into Slough 10, increasing the average water depth at most sampling partitions by about two feet and decreasing the surface water temperature in the slough by about 0.5°C. Although this event increased the wetted area that was available to juvenile salmon in Slough 10, no large influx of fish was observed.

The only major difference observed between chinook and coho juveniles during these winter studies was habitat preference. Cohos preferred areas with greater depth and cover consisting of debris, vegetation, and undercut banks, whereas chinooks preferred shallower, slightly higher velocity and cover consisting of rocks and boulders. Beaver dams and ponds were found to be excellent coho habitat. (Partition V of Slough 10 and Beaver Pond and DOD Slough in Indian River are prime examples.) This corresponds with the findings of Suchanek et al. (1984) for summer coho habitat preference.

5.0 CONTRIBUTORS

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7.0 LITERATURE CITED

Alaska Department of Fish and Game (ADF&G). 1981a. Aquatic habitat and instream flow project (December 1980 - October 1981). Susitna Hydro Aquatic Studies. Phase 1 final draft report. Volume 1. Subtask 7.10. Alaska Department of Fish and Game, Anchorage, Alaska.

_____. 1981b. Adult anadromous fisheries project (June - September 1981). Susitna Hydro Aquatic Studies. Phase 1 final draft report. Subtask 7.10. Alaska Department of Fish and Game, Anchorage, Alaska.

_____. 1981c. Juvenile anadromous fish study on the Susitna River (November 1980 - October 1981). Susitna Hydro Aquatic Studies. Phase 1 final draft report. Subtask 7.10. Alaska Department of Fish and Game, Anchorage, Alaska.

_____. 1983a. Resident and juvenile anadromous fish studies on the Susitna River below Devil Canyon, 1982. Susitna Hydro Aquatic Studies. Phase 2 basic data report. Volume 3 (1 of 2). Alaska Department of Fish and Game, Anchorage, Alaska.

_____. 1983b. Resident and juvenile anadromous fish studies on the Susitna River below Devil Canyon, 1982. Susitna Hydro Aquatic Studies. Phase 2 basic data report. Volume 3 (2 of 2: Appendices). Alaska Department of Fish and Game, Anchorage, Alaska.

_____. 1983c. Aquatic habitat and instream flow studies. 1982. Susitna Hydro Aquatic Studies. Phase 2 basic data report. Volume 4 (1 of 3: Parts I and II). Alaska Department of Fish and Game, Anchorage, Alaska.

_____. 1983d. Adult anadromous fish studies. 1982. Susitna Hydro Aquatic Studies. Phase 2 final report. Volume 2 (1 of 2). Alaska Department of Fish and Game, Anchorage, Alaska.

_____. 1983e. Adult anadromous fish studies. 1982. Susitna Hydro Aquatic Studies. Phase 2 final report. Volume 2 (2 of 2: Appendices A-H). Alaska Department of Fish and Game, Anchorage, Alaska.

_____. 1983f. Winter aquatic studies (October 1982 - May 1983). Susitna Hydro Aquatic Studies. Phase 2 report. Alaska Department of Fish and Game, Anchorage, Alaska.

Arnason, A.N., and L. Baniuk. 1978. POPAN-2: a data maintenance and analysis system for mark-recapture data. Charles Babbage Research Centre, Box 370, St. Pierre, Manitoba, Canada. 269pp.

Barrett, B.M., F.M. Thompson, and S.N. Wick. 1984. Adult anadromous fish investigations: May - October 1983. Susitna Hydro Aquatic Studies. Report No. 1. Alaska Department of Fish and Game, Anchorage, Alaska.

_____. 1985. Adult salmon investigations: May - October 1984. Susitna Aquatic Studies Program. Report No. 6. Alaska Department of Fish and Game, Anchorage, Alaska.

Bingham, A.E. 1986. Review of draft Task 2 Report No. 11, Part 2 - 1984-1985 winter juvenile chinook and coho salmon. Alaska Department of Fish and Game, Susitna Aquatic Studies. Memorandum, File No. 03-86-7.10-4.02.

Estes, C.C., and D.S. Vincent-Lang, editors. 1984. Aquatic habitat and instream flow investigations, May - October 1983 (10 volumes: Chapters 1-10). Susitna Hydro Aquatic Studies. Report No. 3. Alaska Department of Fish and Game, Anchorage, Alaska.

Jolly, G.M. 1965. Explicit estimates from capture-recapture data with both death and immigration-stochastic model. Biometrika 52:225-247.

Keklak, T., and T. Quane. 1985. Appendix F: Winter temperature data. Volume 2 In: C.C. Estes, J. Sautner, D.S. Vincent-Lang, editors. Winter aquatic investigations (September 1983 - May 1984). Susitna Aquatic Studies Program. Report No. 5. Alaska Department of Fish and Game, Anchorage, Alaska.

Keklak, T., and T. Withrow. 1985. Continuous water temperature investigations. Susitna Aquatic Studies Program. Task 29 and 37 Support Technical Report. Alaska Department of Fish and Game, Anchorage, Alaska.

Marshall, B. 1983. Effects of mainstem Susitna discharge on total wetted and backwater surface area at selected study sites. Appendix E In: ADF&G. Synopsis of the 1982 aquatic studies and analysis fish and habitat relationships (2 of 2: Appendices). Susitna Hydro Aquatic Studies. Phase 2 report. Alaska Department of Fish and Game, Anchorage, Alaska.

Mighell, J.L. 1969. Rapid cold-branding of salmon and trout with liquid nitrogen. Journal of the Fisheries Research Board of Canada. 26(10):2765-2769.

R&M Consultants, Inc. (R&M). 1985. 1984-85 Susitna River ice study. Susitna Hydroelectric Project. Prepared for the Alaska Power Authority. Anchorage, Alaska.

Raleigh, R.F., J.B. McLaren, and D.R. Graff. 1973. Effects of topical location, branding techniques and changes in hue on recognition of cold brands in Centrarchid and Salmonid fish. Transactions of the American Fisheries Society 102 (3):637-641.

Roth, K.J., and M.E. Stratton. 1985. The migration and growth of juvenile salmon in the Susitna River. Part 1 In: D.C. Schmidt,

S.S. Hale, and D.L. Crawford, editors. Resident and juvenile anadromous fish investigations (May - October 1984). Susitna Aquatic Studies Program. Report No. 7. Alaska Department of Fish and Game, Anchorage, Alaska.

Seber, G.A.F. 1965. A note on the multiple-recapture census. Biometrika 52:249-259.

Suchanek, P.M., R.P. Marshall, S.S. Hale, and D.C. Schmidt. 1984. Juvenile salmon rearing suitability criteria. Part 3 In: D.C. Schmidt, S.S. Hale, D.L. Crawford, and P.M. Suchanek, editors. Resident and juvenile anadromous fish investigations (May - October 1983). Susitna Hydro Aquatic Studies. Report No. 2. Alaska Department of Fish and Game, Anchorage, Alaska.

Suchanek, P.M., K.J. Kuntz, and J.P. McDonell. 1985. The relative abundance, distribution, and instream flow relationships of juvenile salmon in the lower Susitna River. Part 2 In: D.C. Schmidt, S.S. Hale, and D.L. Crawford, editors. Resident and juvenile anadromous fish investigations (May - October 1984). Susitna Aquatic Studies Program. Report No. 7. Alaska Department of Fish and Game, Anchorage, Alaska.

Sundet, R.L., and M.N. Wenger. 1984. Resident fish distribution and population dynamics in the Susitna River below Devil Canyon. Part 5 In: D.C. Schmidt, S.S. Hale, D.L. Crawford, and P.M. Suchanek,

editors. Resident and juvenile anadromous fish investigations (May - October 1983). Susitna Hydro Aquatic Studies. Report No. 2. Alaska Department of Fish and Game, Anchorage, Alaska.

Sundet, R.L., and S.D. Pechek. 1985. Resident fish distribution and life history in the Susitna River below Devil Canyon. Part 3 In: D.C. Schmidt, S.S. Hale, and D.L. Crawford, editors. Resident and juvenile anadromous fish investigations (May - October 1984). Susitna Aquatic Studies Program. Report No. 7. Alaska Department of Fish and Game, Anchorage, Alaska.

Vining, L.J., J.S. Blakely, and G.M. Freeman. 1985. An evaluation of the incubation life-phase of chum salmon in the middle Susitna River, Alaska. Volume 1 In: C.C. Estes, J. Sautner, and D.S. Vincent-Lang, editors. Winter aquatic investigations (September 1983 - May 1984). Susitna Aquatic Studies Program. Report No. 5. Alaska Department of Fish and Game, Anchorage, Alaska.

8.0 APPENDICES

Appendix A - Juvenile chinook and juvenile coho salmon catch data data by site and month, winter 1984-85.

Appendix B - Creation of tag-recapture data files which can be used in the POPAN-2 computer model to generate population estimates of juvenile chinook salmon at selected winter rearing sites in the middle Susitna River.

Appendix C - Ice thickness data, winter 1984-85.

Appendix D - Field observations on predation and food availability.

APPENDIX A

JUVENILE CHINOOK AND JUVENILE COHO SALMON CATCH DATA BY SITE AND MONTH, WINTER 1984-85

Appendix Table A-1. Total juvenile chinook salmon catch by site and month, 1984-85 winter studies.

Location	Number of Fish Caught								
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Total
Slough 22	940	1,074	1,883	1,442	445	622	327	53	6,786
Indian River	236	190	392	207	70	40	51	22	1,208
Slough 10	237	237	143	252	28	124	17	10	1,048
Slough 9A	265	514	792	416	159	146	137	72	2,501
TOTALS	1,678	2,015	3,210	2,317	702	932	532	157	11,543

Appendix Table A-2. Total juvenile coho salmon catch by site and month, 1984-85 winter studies.

Location	Number of Fish Caught								
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Total
Slough 22	2	3	2	3	-	-	-	1	11
Indian River	55	25	37	75	16	12	3	1	224
Slough 10	47	51	34	24	33	10	5	5	209
Slough 9A	5	7	11	-	1	1	2	1	28
TOTALS	109	86	84	102	50	23	10	8	472

APPENDIX B

CREATION OF TAG-RECAPTURE DATA FILES WHICH CAN BE USED IN THE POPAN-2 COMPUTER MODEL TO GENERATE POPULATION ESTIAMTES OF JUVENILE CHINOOK SALMON AT SELECTED WINTER REARING SITES IN THE MIDDLE SUSITNA RIVER.

Grouping Sampling Periods

For this analysis, it was necessary to group sampling periods (days) with the same brands. These groups have been called "occasions" and they may represent from one to three sampling days when a particular brand was used or the last sampling day or sampling days when branded fish were recaptured at a particular site. Appendix Table B-1 defines the occasions at each 1984-85 winter sampling site by sampling dates when branded fish were released or recaptured.

Creating Record Files

A program entitled CTAGREC.PLI (Appendix Table B-2) was used to create the initial tag records for juvenile chinook salmon that were branded at Slough 9A using the information provided in Table 4. An example of how CTAGREC.PLI interacts with the computer operator using the Slough 9A data is given in Appendix Table B-3 and a sample printout of a partial record file for Slough 9A is shown in Appendix Table B-4. A diskette containing the CTAGREC.PLI program will be transmitted to Harza-Ebasco Susitna Joint Venture with this report. Tag record files for Slough 10, Len's Slough, D.O.D. Slough, Beaver Pond Slough, and Slough 22 can be generated using the CTAGREC.PLI program and the data presented in Tables 5 through 9.

Appendix Table B-1. Definition of occasions at 1984-85 winter sampling sites by sampling dates when branded fish were released or recaptured.

Location	Sampling Dates When Branded Fish Were Released or Recaptured										
	Occasion 1	Occasion 2	Occasion 3	Occasion 4	Occasion 5	Occasion 6	Occasion 7	Occasion 8	Occasion 9	Occasion 10	Occasion 11
Slough 9A	10/30/84	11/8 11/13 11/16	11/30 12/13 12/30	1/6/85	1/19 1/27	2/9 2/28	3/11 3/30	4/12 4/20	5/2 a/ 5/16/85 a/	b/	b/
Slough 10	10/29/84	11/9 11/14 11/19	12/1 12/12 12/30	1/16/85 1/25	2/6 3/3	3/15 3/30	4/14	5/1 a/ 5/15/85 a/	b/	b/	b/
Len's Slough (Indian River)	10/25/84	11/12 11/16	12/4	12/15 12/21	1/17/85 1/25	2/6	4/1/85	/b	/b	/b	/b
D.O.D. Slough (Indian River)	11/16/84	12/4	12/15 12/21	1/17/85 1/25	2/6	3/14 4/1/85	b/	b/	b/	b/	b/
Beaver Pond Slough (Indian River)	10/25/84	11/12 11/16	12/4	12/15 12/21	1/17/85 1/25	2/6	3/21 4/1/85	b/	b/	b/	b/
Slough 22	10/25/84	11/11 11/15 11/19	12/3 12/29	12/14	1/8/85	1/18 1/29	2/7 2/19 3/3	3/14 4/2	4/11 4/19	5/2 a/	5/13/85 a/

a/ Recaptures of previously branded fish only, no new brands deployed.
b/ No new fish branded or branded fish recaptured at this site after the last date shown.

Appendix Table B-2. Printout of the CTAGREC.PLI program.

```
 1  ctagrec:
 2    procedure options(main);
 3    /* generates a record from information supplied interactively,
 4       the file must be edited to include the histories of the re-
 5       captured fish.
 6
 7       Record output
 8         columns      contents
 9           1-7        tag number (f7,0)
10           9-16       identification (a8)
11          18-24       number of captures (f7,0)
12          26-32       occasion of record creation (f7,0)
13
14       execute -
15         evoke - ctagrec
16         input - supplied interactively
17         output - a file of tagged fish info
18       author - alice freeman  adfg/su-hydro /programmer
19                vers 1.0    january 14, 1986
20           vers 1.1    february 24, 1986 adapted and
21                                      "corrected" by A. Bingham
22    ------------------------------------------------------------------*/
23
24     dcl ansm2t entry(char(254) varying) returns (char(254) varying);
25     dcl answer       char(254) external static varying;
26     dcl dskout      file;
27     dcl name_1    char(14) init(' ') static varying;
28
29     put skip list(' Enter output file name                              > ');
30     read into (answer);
31     name_1 = ansm2t(answer);
32
33     open file(dskout) print stream env(b(4096)) linesize(80) pagesize(0) title(name_1);
34
35     dcl (id             char( 8)    /* always the same */
36                                )    init(' ') static;
37
38     dcl (true           init('1'b),
39          false          init('0'b) ) bit(1) static;
40
41     dcl (i,
42          tagno,
43          nrecaps,
44          ocase,
45          ncase,
46          tottags,
47          ntags(512),
48          nmiss,
49          nmorts(512) ) init(0) fixed static;
50
51   /* ------------------------------*/
52
53   /*  start main routine */
54      nrecaps = 1;
55
```

Appendix Table B-2 (Continued).

```
 56     put skip(0) list(' Enter # of occasions, max = 512                    > ');
 57     get list (ncase);
 58
 59     put skip(0) list(' Enter identification (max 8 characters)            > ');
 60     get list (id);
 61
 62     put skip(0) list(' Enter beginning tag number                         > ');
 63     get list (tagno);
 64
 65     put skip(0) list(' Enter # of tag numbers to skip for each occasion > ');
 66     get list (nmiss);
 67
 68  loop1:
 69     /* start loop to get information for each occasion */
 70     do i = 1 to ncase;
 71
 72       put skip list(' Enter # of tags in occasion          ',i,' > ');
 73       get list (ntags(i));
 74
 75       put skip(0) list(' Enter # of mortalities in occasion   ',i,' > ');
 76       get list (nmorts(i));
 77
 78     end; /* i = 1 to ncase for information loop */
 79
 80     /* start loop to print out records */
 81     put skip(2) list (' Records being written to file:                    ',name_1);
 82     do i = 1 to ncase;
 83        tottags = tottags + ntags(i);
 84        do while(tagno <= (tottags-nmorts(i)));
 85           ocase = i;
 86           call write_rec;
 87           tagno = tagno + 1;
 88        end; /* while tagno <= (tottags-nmorts(i)) */
 89
 90        do while (tagno <= tottags);
 91           ocase = -i;
 92           call write_rec;
 93           tagno=tagno + 1;
 94        end; /* while tagno <= tottags */
 95        tottags = tottags + nmiss;
 96        tagno = tagno + nmiss;
 97
 98     end;  /* i=1 to ncase */
 99     close file(dskout);
100     put skip(2) list(' File is complete');
101     put skip(1);
102
103  /* ---------------------- internal procedures --------------------------- */
104
105     write_rec: procedure;
106
107       put file(dskout) edit(tagno,          id,          nrecaps,
108                             ocase )
109                            (col(1),f(7,0), col(9),a(8), col(18),f(7,0),
110                             col(26),f(7,0) );
111       put file(dskout) skip;
112
113     end write_rec;
114
115   end ctagrec;
```

Appendix Table B-3. Sample printout of CTAGREC.PLI interaction using Slough 9A data.

```
ctagrec

 Enter output file name                                  > s19a041.pop
 Enter # of occasions, max = 512                         > 9
 Enter identification (max 8 characters)                 > s19a041
 Enter beginning tag number                              > 1
 Enter # of tag numbers to skip for each occasion        > 250

 Enter # of tags in occasion                        1    > 265
 Enter # of mortalities in occasion                 1    > 0

 Enter # of tags in occasion                        2    > 487
 Enter # of mortalities in occasion                 2    > 2

 Enter # of tags in occasion                        3    > 708
 Enter # of mortalities in occasion                 3    > 55

 Enter # of tags in occasion                        4    > 201
 Enter # of mortalities in occasion                 4    > 6

 Enter # of tags in occasion                        5    > 135
 Enter # of mortalities in occasion                 5    > 9

 Enter # of tags in occasion                        6    > 90
 Enter # of mortalities in occasion                 6    > 15

 Enter # of tags in occasion                        7    > 66
 Enter # of mortalities in occasion                 7    > 0

 Enter # of tags in occasion                        8    > 117
 Enter # of mortalities in occasion                 8    > 9

 Enter # of tags in occasion                        9    > 59
 Enter # of mortalities in occasion                 9    > 0


 Records being written to file:                          SL9A041.POP

 File is complete

End of Execution
C:\>
```

Appendix Table B-4. Sample printout of partial CTAGREC.PLI output for Slough 9A.

Tag Number	Identification [a/]	Number of Times Captured	Occasions Captured
1	s19a041	1	1
2	s19a041	1	1
3	s19a041	1	1
4	s19a041	1	1
5	s19a041	1	1
6	s19a041	1	1
7	s19a041	1	1
8	s19a041	1	1
9	s19a041	1	1
10	s19a041	1	1
11	s19a041	1	1
12	s19a041	1	1
13	s19a041	1	1
14	s19a041	1	1
15	s19a041	1	1
16	s19a041	1	1
17	s19a041	1	1
18	s19a041	1	1
19	s19a041	1	1
20	s19a041	1	1
21	s19a041	1	1
22	s19a041	1	1
23	s19a041	1	1
24	s19a041	1	1
25	s19a041	1	1
26	s19a041	1	1
27	s19a041	1	1
28	s19a041	1	1
29	s19a041	1	1
30	s19a041	1	1
31	s19a041	1	1
32	s19a041	1	1
33	s19a041	1	1
34	s19a041	1	1
35	s19a041	1	1
36	s19a041	1	1
37	s19a041	1	1
38	s19a041	1	1
39	s19a041	1	1
40	s19a041	1	1

a/ Identification indicates the location (e.g., S19A) and the species code (e.g., 041). Species code 041 indicates juvenile chinook salmon.

Creating History Files

After the initial tag record files have been created, the histories of each tagged fish needs to be completed. The recapture histories for all tagged fish by sampling location and occasion are presented in Appendix Tables B-5 through B-10. An explanation of how these history tables should be interpreted is presented using Appendix Table B-5 as an example. The first column indicates the occasion. The headers in columns two through nine give the branding location code, the cold branding symbol that was used, and the occasion that each was deployed. Column ten presents the number of fish which were recaptured by occasion and each number corresponds with a particular brand or brands that are indicated on the same line by one or more X's. The last column refers back to the tag numbers that were assigned to each fish in column one of Appendix Table B-4 and it presents the range of tag numbers that make up this category. The last column in Appendix Table B-5 is provided only to help the reader understand how this table was derived and it is not used in the POPAN-2 analysis. Therefore, in occasion 4 of Slough 9A, 3 fish were recaptured that had an FR - brand which had been deployed in occasion 1; 2 fish were recaptured that had FR and FL - brands which had been deployed in occasion 1 and 2 respectively, etc. In addition to requiring information on recaptures of tagged fish, the POPAN-2 model also needs information on mortalities of tagged fish. There were no known mortalities of tagged juvenile chinook salmon at Slough 10 or at Len's Slough, D.O.D. Slough, or Beaver Pond Slough on Indian River. Mortalities of tagged fish at Slough 9A and Slough 22 are presented in Appendix Table B-11 and B-12.

Appendix Table B-5. Recapture histories of tagged juvenile chinook salmon at Slough 9A by occasion.

	BRANDS (OCCASION THAT BRAND WAS DEPLOYED)									
OCCASIONS	FRS (1)	FLS (2)	BRS (3)	FRV (4)	FLV (5)	BRV (6)	BLS (7)	BLV (8)	NUMBER OF RECAPTURES	TAG NUMBERS AFFECTED (# THRU #)
1									0	
2	X								14	1-14
3	X								22	15-36
		X							50	507-556
4	X								3	37-39
	X	X							2	1-2
	X		X						2	15-16
		X							15	557-571
		X	X						3	507-509
			X						4	1242-1245
5	X								7	40-46
	X	X							2	3-4
	X		X						2	17-18
		X							6	572-577
		X	X						1	510
			X						19	1246-1264
				X					14	2200-2213
6	X								5	47-51
	X	X							2	5-6
	X		X						1	19
		X							8	578-585
		X	X						2	511-512
			X						11	1265-1275
			X	X					1	1242
				X					1	2214
					X				5	2651-2655
7	X								2	52-53
		X							3	586-588
		X	X						1	513
			X						7	1276-1282
			X	X					2	1243-1244
				X					4	2215-2218
					X				2	2656-2657
						X			2	3036-3037
8	X								2	54-55
		X							6	589-594
			X						6	1283-1288
			X	X					1	1245
				X					2	2219-2220
				X	X				1	2200
						X			1	3038
							X		1	3376

Appendix Table B-5 (Continued).

	BRANDS (OCCASION THAT BRAND WAS DEPLOYED)									
OCCASIONS	FRS (1)	FLS (2)	BRS (3)	FRN (4)	FLN (5)	BRN (6)	BLS (7)	BLN (8)	NUMBER OF RECAPTURES	TAG NUMBERS AFFECTED (# THRU #)
9	X								1	56
		X							4	595-598
			X					X	1	1283
				X	X				1	2201
					X				1	2658
						X			1	3039
							X		2	3377-3378
								X	2	3692-3693

Appendix Table B-6. Recapture histories of tagged juvenile chinook salmon at Slough 10 by occasion.

	BRANDS (OCCASION THAT BRAND WAS DEPLOYED)							
OCCASIONS	FRT (1)	FLT (2)	BRT (3)	FL⊥ (4)	BR⊥ (5)	BLT (6)	BL⊥ (7)	NUMBER OF RECAPTURES
1								0
2	X							5
3	X							3
	X	X						1
		X						14
4	X							6
		X						7
			X					2
5	X							5
	X	X						1
		X						3
			X					1
				X				3
6	X							1
		X						1
				X				3
					X			1
7		X						1
				X				1
8		X						1
			X					1
					X			1

Appendix Table B-7. Recapture histories of tagged juvenile chinook salmon at Len's Slough on Indian River by occasion.

	BRANDS (OCCASION THAT BRAND WAS DEPLOYED)							
OCCASIONS	FLC (1)	FRN (2)	BR⊃ (3)	BRN (4)	FL⊃ (5)	BRU (6)	BLC (7)	NUMBER OF RECAPTURES
1								0
2	X							39
3	X							37
	X	X						12
		X						16
4	X							6
	X	X						3
	X		X					3
	X	X	X					1
		X						5
		X	X					1
5	X							5
	X	X						3
	X	X		X				2
			X					1
				X				2
				X	X			1
6	X							4
	X	X						2
	X	X		X				1
		X						3
		X	X	X				2
			X					1
			X	X	X			1
				X				1
					X			1
7	X							1
	X	X						1
		X						2
				X				5
					X			1
						X		3

Appendix Table B-8. Recapture histories of tagged juvenile chinook salmon at D.O.D. Slough on Indian River by occasion.

	BRANDS (OCCASION THAT BRAND WAS DEPLOYED)						
OCCASIONS	FRΠ (1)	BR⊃ (2)	BRΠ (3)	FL⊃ (4)	BRU (5)	FL⊂ (6)	NUMBER OF RECAPTURES
1							0
2							0
3			X				2
4		X					1
			X				2
5							0
6							0

Appendix Table B-9. Recapture histories of tagged juvenile chinook salmon at Beaver Pond Slough on Indian River by occasion.

	BRANDS (OCCASION THAT BRAND WAS DEPLOYED)							
OCCASIONS	FL⊂ (1)	FR∩ (2)	BR⊃ (3)	BR∩ (4)	FL⊃ (5)	BRU (6)	BL⊂ (7)	NUMBER OF RECAPTURES
1								0
2	X							21
3	X							11
	X	X						6
		X						8
4	X							7
	X	X						3
	X	X	X					1
		X						5
			X					2
5	X		X					1
	X			X				1
		X						1
			X					1
6		X						2
			X					1
7	X	X						1
		X						1
			X	X				1

Appendix Table B-10. Recapture histories of tagged juvenile chinook salmon at Slough 22 by occasion.

	BRANDS (OCCASION THAT BRAND WAS DEPLOYED)										
OCCASIONS	MRш (1)	FRE (2)	FLE (3)	BRƎ (4)	BRE (5)	FRm (6)	FLm (7)	BRш (8)	BLE (9)	BLш (10)	NUMBER OF RECAPTURES
1											0
2	X										113
3	X										89
	X	X									12
		X									118
4	X										77
	X	X									15
		X									108
	X	X	X								7
	X		X								25
		X	X								29
			X								143
	X				X						2
	X	X			X						1
	X		X		X						3
		X	X		X						2
		X			X						3
			X		X						16
					X						79
5	X										27
	X	X									9
		X									26
	X	X	X								3
	X		X								5
		X	X								6
			X								43
	X	X	X	X							1
	X		X	X							1
			X	X							2
				X							8
6	X										27
	X	X									6
		X									36
	X	X	X								1
	X		X								2
		X	X								7
			X								43
	X		X	X							1
	X			X							3
		X		X							8
			X	X							11
				X							42
	X	X	X		X						1
	X		X		X						1
	X				X						4
			X		X						3
					X						25

Appendix Table B-10 (Continued).

	BRANDS (OCCASION THAT BRAND WAS DEPLOYED)										
OCCASIONS	MRω (1)	FRE (2)	FLE (3)	BRƎ (4)	BRE (5)	FRᵐ (6)	FLᵐ (7)	BRω (8)	BLE (9)	BLω (10)	NUMBER OF RECAPTURES
7	X										43
	X	X									9
		X									35
	X		X								3
	X	X	X								3
		X	X								11
			X								49
	X			X							4
	X	X		X							1
	X		X	X							5
		X		X							13
		X	X	X							5
			X	X							19
				X							71
	X				X						1
	X	X			X						1
			X		X						7
				X	X						4
					X						37
	X					X					3
	X			X		X					1
		X				X					3
		X		X		X					1
			X			X					3
			X	X		X					1
				X		X					1
						X					21
8	X										27
	X	X									2
		X									25
	X		X								1
	X	X	X								1
		X	X								4
			X								26
	X			X							1
	X	X		X							3
	X		X	X							1
		X		X							7
		X	X	X							2
			X	X							6
				X							34
	X		X		X						2
	X	X	X		X						1
		X			X						2
		X	X		X						1
			X		X						8
					X						13
	X					X					2
			X			X					1
			X	X		X					1
				X		X					5
					X	X					5
						X					17
	X						X				4
		X					X				2
				X			X				6
					X		X				5
						X	X				4
							X				32

Appendix Table B-10 (Continued).

	BRANDS (OCCASION THAT BRAND WAS DEPLOYED)										
OCCASIONS	MRω (1)	FRE (2)	FLE (3)	BR3 (4)	BRE (5)	FRm (6)	FLm (7)	BRω (8)	BLE (9)	BLω (10)	NUMBER OF RECAPTURES
9	X										18
	X	X									6
		X									23
	X		X								1
		X	X								3
			X								24
	X			X							1
	X	X		X							1
	X		X	X							1
		X		X							1
			X	X							1
				X							15
		X	X	X							3
	X	X	X		X						1
		X			X						1
					X						5
			X		X						2
	X					X					2
			X	X		X					1
			X		X	X					1
				X		X					2
					X	X					1
						X					16
	X			X			X				2
		X		X			X				2
		X					X				3
				X	X		X				1
				X			X				5
					X		X				2
					X	X	X				1
						X	X				2
							X				26
	X		X					X			2
	X						X	X			1
	X							X			2
		X					X	X			2
		X						X			1
			X				X	X			1
			X					X			5
						X		X			1
						X	X	X			2
							X	X			5
								X			16
10	X										12
	X	X									1
		X									21
	X	X	X								1
		X	X								4
			X								11
	X	X		X							1
	X		X	X							1
		X	X	X							1
		X		X							2
			X	X							2
				X							9
		X			X						1
			X		X						1
				X	X						1
					X						4

Appendix Table B-10 (Continued).

	BRANDS (OCCASION THAT BRAND WAS DEPLOYED)										
OCCASIONS	MRω (1)	FRE (2)	FLE (3)	BR3 (4)	BRE (5)	FRm (6)	FLm (7)	BRω (8)	BLE (9)	BLω (10)	NUMBER OF RECAPTURES
10	X				X	X					2
	X					X					1
			X	X		X					1
				X		X					3
					X	X					3
						X					15
	X	X					X				1
		X					X				2
				X			X				1
					X		X				1
						X	X				3
							X				9
	X						X	X			1
		X						X			3
			X		X			X			1
			X				X	X			1
			X					X			2
					X			X			2
						X	X	X			1
						X		X			1
							X	X			2
								X			9
	X	X	X		X				X		1
	X						X	X	X		1
	X	X							X		1
	X								X		2
		X	X						X		2
		X							X		1
			X			X			X		1
			X						X		2
				X					X		3
					X		X		X		1
					X				X		5
						X			X		1
							X	X	X		1
							X		X		2
								X	X		2
									X		16
11		X									2
			X								1
				X							2
					X						1
							X				2
		X	X					X			1
								X			1
	X	X							X		1
				X					X		1
					X				X		1
	X					X				X	1
		X					X	X		X	1
										X	1

Appendix Table B-11. Mortality histories of tagged juvenile chinook salmon at Slough 9A by occasion.

	BRANDS (OCCASION THAT BRAND WAS DEPLOYED)								
OCCASIONS	FRS (1)	FLS (2)	BRS (3)	FRN (4)	FLN (5)	BRN (6)	BLS (7)	BLN (8)	NUMBER OF MORTALITIES a/
1									0
2									0
3	X								5
		X							13
4									0
5									0
6									0
7									0
8									0
9									0

a/ Mortalities of recaptured fish only.

Appendix Table B-12. Mortality histories of tagged juvenile chinook salmon at Slough 22 by occasion.

	BRANDS (OCCASION THAT BRAND WAS DEPLOYED)										
OCCASIONS	MRω (1)	FRE (2)	FLE (3)	BR3 (4)	BRE (5)	FRm (6)	FLm (7)	BRω (8)	BLE (9)	BLω (10)	NUMBER OF MORTALITIES a/
1											0
2											0
3	X										1
4	X										19
	X		X								10
			X								42
			X	X							1
				X							1
	X		X		X						1
					X						56
5											0
6											0
7											0
8	X										4
		X									1
	X	X	X								1
		X	X								3
	X	X		X							1
		X		X							1
		X	X	X							1
				X							1
	X					X					1
				X		X					1
					X	X					1
						X					3
						X	X				1
							X				3
						X	X	X			1
								X			1
	X									X	1
										X	2
9											0
10				X							2
11											0

a/ Mortalities of recaptured fish only.

The recapture and mortality histories for each site are then used to update the occasions that individual fish were captured and the number of times each fish was captured in their original tag record file. An example of the updated record file for Slough 9A is presented in Appendix Table B-13 and a brief explanation of how these updates were made is presented below. This record file indicates that there were 265 juvenile chinook salmon that were captured, branded, and released during occasion 1 at Slough 9A. Information from Appendix Table B-5 indicates that fourteen of these occasion-1-branded fish were recaptured during occasion 2; 22 of the occasion-1-branded fish were recaptured during occasion 3; and 3 of the occasion-1-branded fish were recaptured during occasion 4, etc. Of the first fourteen fish which were captured in occasions 1 and 2, two were subsequently recaptured in occasion 4, two were recaptured in occasion 5, and two were also recaptured in occasion 6. Each of these first six fish were captured a total of three times, therefore the updated record file should indicate each occasion when these fish were captured and the total number of times that each of these fish were captured. Appendix Table B-11 shows that five of the twenty-two occasion-1-branded fish, which were recaptured in occasion 3, died. Therefore, a minus sign (-) was added as a prefix to the last five fish in this group to indicate that these fish had died. Similar procedures were used to update the remainder of the record file for Slough 9A. A copy of the updated record file for Slough 9A entitled SL9A041.POP will be contained on the diskette that is transmitted to Harza-Ebasco Susitna Joint Venture with this report.

Appendix Table B-13. Slough 9A record file which has been updated with recapture and mortality history data.

Tag Number	Identification Code	Number of Times Captured	Occasions Captured		
1	sl9a041	3	1	2	4
2	sl9a041	3	1	2	4
3	sl9a041	3	1	2	5
4	sl9a041	3	1	2	5
5	sl9a041	3	1	2	6
6	sl9a041	3	1	2	6
7	sl9a041	2	1	2	
8	sl9a041	2	1	2	
9	sl9a041	2	1	2	
10	sl9a041	2	1	2	
11	sl9a041	2	1	2	
12	sl9a041	2	1	2	
13	sl9a041	2	1	2	
14	sl9a041	2	1	2	
15	sl9a041	3	1	3	4
16	sl9a041	3	1	3	4
17	sl9a041	3	1	3	5
18	sl9a041	3	1	3	5
19	sl9a041	3	1	3	6
20	sl9a041	2	1	3	
21	sl9a041	2	1	3	
22	sl9a041	2	1	3	
23	sl9a041	2	1	3	
24	sl9a041	2	1	3	
25	sl9a041	2	1	3	
26	sl9a041	2	1	3	
27	sl9a041	2	1	3	
28	sl9a041	2	1	3	
29	sl9a041	2	1	3	
30	sl9a041	2	1	3	
31	sl9a041	2	1	3	
32	sl9a041	2	1	-3	
33	sl9a041	2	1	-3	
34	sl9a041	2	1	-3	
35	sl9a041	2	1	-3	
36	sl9a041	2	1	-3	
37	sl9a041	2	1	4	
38	sl9a041	2	1	4	
39	sl9a041	2	1	4	
40	sl9a041	2	1	5	
41	sl9a041	2	1	5	
42	sl9a041	2	1	5	
43	sl9a041	2	1	5	

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured	
44	sl9a041	2	1	5
45	sl9a041	2	1	5
46	sl9a041	2	1	5
47	sl9a041	2	1	6
48	sl9a041	2	1	6
49	sl9a041	2	1	6
50	sl9a041	2	1	6
51	sl9a041	2	1	6
52	sl9a041	2	1	7
53	sl9a041	2	1	7
54	sl9a041	2	1	8
55	sl9a041	2	1	8
56	sl9a041	2	1	9
57	sl9a041	1	1	
58	sl9a041	1	1	
59	sl9a041	1	1	
60	sl9a041	1	1	
61	sl9a041	1	1	
62	sl9a041	1	1	
63	sl9a041	1	1	
64	sl9a041	1	1	
65	sl9a041	1	1	
66	sl9a041	1	1	
67	sl9a041	1	1	
68	sl9a041	1	1	
69	sl9a041	1	1	
70	sl9a041	1	1	
71	sl9a041	1	1	
72	sl9a041	1	1	
73	sl9a041	1	1	
74	sl9a041	1	1	
75	sl9a041	1	1	
76	sl9a041	1	1	
77	sl9a041	1	1	
78	sl9a041	1	1	
79	sl9a041	1	1	
80	sl9a041	1	1	
81	sl9a041	1	1	
82	sl9a041	1	1	
83	sl9a041	1	1	
84	sl9a041	1	1	
85	sl9a041	1	1	
86	sl9a041	1	1	

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
87	s19a041	1	1
88	s19a041	1	1
89	s19a041	1	1
90	s19a041	1	1
91	s19a041	1	1
92	s19a041	1	1
93	s19a041	1	1
94	s19a041	1	1
95	s19a041	1	1
96	s19a041	1	1
97	s19a041	1	1
98	s19a041	1	1
99	s19a041	1	1
100	s19a041	1	1
101	s19a041	1	1
102	s19a041	1	1
103	s19a041	1	1
104	s19a041	1	1
105	s19a041	1	1
106	s19a041	1	1
107	s19a041	1	1
108	s19a041	1	1
109	s19a041	1	1
110	s19a041	1	1
111	s19a041	1	1
112	s19a041	1	1
113	s19a041	1	1
114	s19a041	1	1
115	s19a041	1	1
116	s19a041	1	1
117	s19a041	1	1
118	s19a041	1	1
119	s19a041	1	1
120	s19a041	1	1
121	s19a041	1	1
122	s19a041	1	1
123	s19a041	1	1
124	s19a041	1	1
125	s19a041	1	1
126	s19a041	1	1
127	s19a041	1	1
128	s19a041	1	1
129	s19a041	1	1

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
130	sl9a041	1	1
131	sl9a041	1	1
132	sl9a041	1	1
133	sl9a041	1	1
134	sl9a041	1	1
135	sl9a041	1	1
136	sl9a041	1	1
137	sl9a041	1	1
138	sl9a041	1	1
139	sl9a041	1	1
140	sl9a041	1	1
141	sl9a041	1	1
142	sl9a041	1	1
143	sl9a041	1	1
144	sl9a041	1	1
145	sl9a041	1	1
146	sl9a041	1	1
147	sl9a041	1	1
148	sl9a041	1	1
149	sl9a041	1	1
150	sl9a041	1	1
151	sl9a041	1	1
152	sl9a041	1	1
153	sl9a041	1	1
154	sl9a041	1	1
155	sl9a041	1	1
156	sl9a041	1	1
157	sl9a041	1	1
158	sl9a041	1	1
159	sl9a041	1	1
160	sl9a041	1	1
161	sl9a041	1	1
162	sl9a041	1	1
163	sl9a041	1	1
164	sl9a041	1	1
165	sl9a041	1	1
166	sl9a041	1	1
167	sl9a041	1	1
168	sl9a041	1	1
169	sl9a041	1	1
170	sl9a041	1	1
171	sl9a041	1	1
172	sl9a041	1	1

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
173	sl9a041	1	1
174	sl9a041	1	1
175	sl9a041	1	1
176	sl9a041	1	1
177	sl9a041	1	1
178	sl9a041	1	1
179	sl9a041	1	1
180	sl9a041	1	1
181	sl9a041	1	1
182	sl9a041	1	1
183	sl9a041	1	1
184	sl9a041	1	1
185	sl9a041	1	1
186	sl9a041	1	1
187	sl9a041	1	1
188	sl9a041	1	1
189	sl9a041	1	1
190	sl9a041	1	1
191	sl9a041	1	1
192	sl9a041	1	1
193	sl9a041	1	1
194	sl9a041	1	1
195	sl9a041	1	1
196	sl9a041	1	1
197	sl9a041	1	1
198	sl9a041	1	1
199	sl9a041	1	1
200	sl9a041	1	1
201	sl9a041	1	1
202	sl9a041	1	1
203	sl9a041	1	1
204	sl9a041	1	1
205	sl9a041	1	1
206	sl9a041	1	1
207	sl9a041	1	1
208	sl9a041	1	1
209	sl9a041	1	1
210	sl9a041	1	1
211	sl9a041	1	1
212	sl9a041	1	1
213	sl9a041	1	1
214	sl9a041	1	1
215	sl9a041	1	1

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
216	sl9a041	1	1
217	sl9a041	1	1
218	sl9a041	1	1
219	sl9a041	1	1
220	sl9a041	1	1
221	sl9a041	1	1
222	sl9a041	1	1
223	sl9a041	1	1
224	sl9a041	1	1
225	sl9a041	1	1
226	sl9a041	1	1
227	sl9a041	1	1
228	sl9a041	1	1
229	sl9a041	1	1
230	sl9a041	1	1
231	sl9a041	1	1
232	sl9a041	1	1
233	sl9a041	1	1
234	sl9a041	1	1
235	sl9a041	1	1
236	sl9a041	1	1
237	sl9a041	1	1
238	sl9a041	1	1
239	sl9a041	1	1
240	sl9a041	1	1
241	sl9a041	1	1
242	sl9a041	1	1
243	sl9a041	1	1
244	sl9a041	1	1
245	sl9a041	1	1
246	sl9a041	1	1
247	sl9a041	1	1
248	sl9a041	1	1
249	sl9a041	1	1
250	sl9a041	1	1
251	sl9a041	1	1
252	sl9a041	1	1
253	sl9a041	1	1
254	sl9a041	1	1
255	sl9a041	1	1
256	sl9a041	1	1
257	sl9a041	1	1
258	sl9a041	1	1

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured		
259	s19a041	1	1		
260	s19a041	1	1		
261	s19a041	1	1		
262	s19a041	1	1		
263	s19a041	1	1		
264	s19a041	1	1		
265	s19a041	1	1		
507	s19a041	3	2	3	4
508	s19a041	3	2	3	4
509	s19a041	3	2	3	4
510	s19a041	3	2	3	5
511	s19a041	3	2	3	6
512	s19a041	3	2	3	6
513	s19a041	3	2	3	7
514	s19a041	2	2	3	
515	s19a041	2	2	3	
516	s19a041	2	2	3	
517	s19a041	2	2	3	
518	s19a041	2	2	3	
519	s19a041	2	2	3	
520	s19a041	2	2	3	
521	s19a041	2	2	3	
522	s19a041	2	2	3	
523	s19a041	2	2	3	
524	s19a041	2	2	3	
525	s19a041	2	2	3	
526	s19a041	2	2	3	
527	s19a041	2	2	3	
528	s19a041	2	2	3	
529	s19a041	2	2	3	
530	s19a041	2	2	3	
531	s19a041	2	2	3	
532	s19a041	2	2	3	
533	s19a041	2	2	3	
534	s19a041	2	2	3	
535	s19a041	2	2	3	
536	s19a041	2	2	3	
537	s19a041	2	2	3	
538	s19a041	2	2	3	
539	s19a041	2	2	3	
540	s19a041	2	2	3	
541	s19a041	2	2	3	
542	s19a041	2	2	3	

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured	
543	s19a041	2	2	3
544	s19a041	2	2	-3
545	s19a041	2	2	-3
546	s19a041	2	2	-3
547	s19a041	2	2	-3
548	s19a041	2	2	-3
549	s19a041	2	2	-3
550	s19a041	2	2	-3
551	s19a041	2	2	-3
552	s19a041	2	2	-3
553	s19a041	2	2	-3
554	s19a041	2	2	-3
555	s19a041	2	2	-3
556	s19a041	2	2	-3
557	s19a041	2	2	4
558	s19a041	2	2	4
559	s19a041	2	2	4
560	s19a041	2	2	4
561	s19a041	2	2	4
562	s19a041	2	2	4
563	s19a041	2	2	4
564	s19a041	2	2	4
565	s19a041	2	2	4
566	s19a041	2	2	4
567	s19a041	2	2	4
568	s19a041	2	2	4
569	s19a041	2	2	4
570	s19a041	2	2	4
571	s19a041	2	2	4
572	s19a041	2	2	5
573	s19a041	2	2	5
574	s19a041	2	2	5
575	s19a041	2	2	5
576	s19a041	2	2	5
577	s19a041	2	2	5
578	s19a041	2	2	6
579	s19a041	2	2	6
580	s19a041	2	2	6
581	s19a041	2	2	6
582	s19a041	2	2	6
583	s19a041	2	2	6
584	s19a041	2	2	6
585	s19a041	2	2	6

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured	
586	s19a041	2	2	7
587	s19a041	2	2	7
588	s19a041	2	2	7
589	s19a041	2	2	8
590	s19a041	2	2	8
591	s19a041	2	2	8
592	s19a041	2	2	8
593	s19a041	2	2	8
594	s19a041	2	2	8
595	s19a041	2	2	9
596	s19a041	2	2	9
597	s19a041	2	2	9
598	s19a041	2	2	9
599	s19a041	1	2	
600	s19a041	1	2	
601	s19a041	1	2	
602	s19a041	1	2	
603	s19a041	1	2	
604	s19a041	1	2	
605	s19a041	1	2	
606	s19a041	1	2	
607	s19a041	1	2	
608	s19a041	1	2	
609	s19a041	1	2	
610	s19a041	1	2	
611	s19a041	1	2	
612	s19a041	1	2	
613	s19a041	1	2	
614	s19a041	1	2	
615	s19a041	1	2	
616	s19a041	1	2	
617	s19a041	1	2	
618	s19a041	1	2	
619	s19a041	1	2	
620	s19a041	1	2	
621	s19a041	1	2	
622	s19a041	1	2	
623	s19a041	1	2	
624	s19a041	1	2	
625	s19a041	1	2	
626	s19a041	1	2	
627	s19a041	1	2	
628	s19a041	1	2	

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
629	s19a041	1	2
630	s19a041	1	2
631	s19a041	1	2
632	s19a041	1	2
633	s19a041	1	2
634	s19a041	1	2
635	s19a041	1	2
636	s19a041	1	2
637	s19a041	1	2
638	s19a041	1	2
639	s19a041	1	2
640	s19a041	1	2
641	s19a041	1	2
642	s19a041	1	2
643	s19a041	1	2
644	s19a041	1	2
645	s19a041	1	2
646	s19a041	1	2
647	s19a041	1	2
648	s19a041	1	2
649	s19a041	1	2
650	s19a041	1	2
651	s19a041	1	2
652	s19a041	1	2
653	s19a041	1	2
654	s19a041	1	2
655	s19a041	1	2
656	s19a041	1	2
657	s19a041	1	2
658	s19a041	1	2
659	s19a041	1	2
660	s19a041	1	2
661	s19a041	1	2
662	s19a041	1	2
663	s19a041	1	2
664	s19a041	1	2
665	s19a041	1	2
666	s19a041	1	2
667	s19a041	1	2
668	s19a041	1	2
669	s19a041	1	2
670	s19a041	1	2
671	s19a041	1	2

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
672	sl9a041	1	2
673	sl9a041	1	2
674	sl9a041	1	2
675	sl9a041	1	2
676	sl9a041	1	2
677	sl9a041	1	2
678	sl9a041	1	2
679	sl9a041	1	2
680	sl9a041	1	2
681	sl9a041	1	2
682	sl9a041	1	2
683	sl9a041	1	2
684	sl9a041	1	2
685	sl9a041	1	2
686	sl9a041	1	2
687	sl9a041	1	2
688	sl9a041	1	2
689	sl9a041	1	2
690	sl9a041	1	2
691	sl9a041	1	2
692	sl9a041	1	2
693	sl9a041	1	2
694	sl9a041	1	2
695	sl9a041	1	2
696	sl9a041	1	2
697	sl9a041	1	2
698	sl9a041	1	2
699	sl9a041	1	2
700	sl9a041	1	2
701	sl9a041	1	2
702	sl9a041	1	2
703	sl9a041	1	2
704	sl9a041	1	2
705	sl9a041	1	2
706	sl9a041	1	2
707	sl9a041	1	2
708	sl9a041	1	2
709	sl9a041	1	2
710	sl9a041	1	2
711	sl9a041	1	2
712	sl9a041	1	2
713	sl9a041	1	2
714	sl9a041	1	2

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
715	s19a041	1	2
716	s19a041	1	2
717	s19a041	1	2
718	s19a041	1	2
719	s19a041	1	2
720	s19a041	1	2
721	s19a041	1	2
722	s19a041	1	2
723	s19a041	1	2
724	s19a041	1	2
725	s19a041	1	2
726	s19a041	1	2
727	s19a041	1	2
728	s19a041	1	2
729	s19a041	1	2
730	s19a041	1	2
731	s19a041	1	2
732	s19a041	1	2
733	s19a041	1	2
734	s19a041	1	2
735	s19a041	1	2
736	s19a041	1	2
737	s19a041	1	2
738	s19a041	1	2
739	s19a041	1	2
740	s19a041	1	2
741	s19a041	1	2
742	s19a041	1	2
743	s19a041	1	2
744	s19a041	1	2
745	s19a041	1	2
746	s19a041	1	2
747	s19a041	1	2
748	s19a041	1	2
749	s19a041	1	2
750	s19a041	1	2
751	s19a041	1	2
752	s19a041	1	2
753	s19a041	1	2
754	s19a041	1	2
755	s19a041	1	2
756	s19a041	1	2
757	s19a041	1	2

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
758	sl9a041	1	2
759	sl9a041	1	2
760	sl9a041	1	2
761	sl9a041	1	2
762	sl9a041	1	2
763	sl9a041	1	2
764	sl9a041	1	2
765	sl9a041	1	2
766	sl9a041	1	2
767	sl9a041	1	2
768	sl9a041	1	2
769	sl9a041	1	2
770	sl9a041	1	2
771	sl9a041	1	2
772	sl9a041	1	2
773	sl9a041	1	2
774	sl9a041	1	2
775	sl9a041	1	2
776	sl9a041	1	2
777	sl9a041	1	2
778	sl9a041	1	2
779	sl9a041	1	2
780	sl9a041	1	2
781	sl9a041	1	2
782	sl9a041	1	2
783	sl9a041	1	2
784	sl9a041	1	2
785	sl9a041	1	2
786	sl9a041	1	2
787	sl9a041	1	2
788	sl9a041	1	2
789	sl9a041	1	2
790	sl9a041	1	2
791	sl9a041	1	2
792	sl9a041	1	2
793	sl9a041	1	2
794	sl9a041	1	2
795	sl9a041	1	2
796	sl9a041	1	2
797	sl9a041	1	2
798	sl9a041	1	2
799	sl9a041	1	2
800	sl9a041	1	2

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
801	sl9a041	1	2
802	sl9a041	1	2
803	sl9a041	1	2
804	sl9a041	1	2
805	sl9a041	1	2
806	sl9a041	1	2
807	sl9a041	1	2
808	sl9a041	1	2
809	sl9a041	1	2
810	sl9a041	1	2
811	sl9a041	1	2
812	sl9a041	1	2
813	sl9a041	1	2
814	sl9a041	1	2
815	sl9a041	1	2
816	sl9a041	1	2
817	sl9a041	1	2
818	sl9a041	1	2
819	sl9a041	1	2
820	sl9a041	1	2
821	sl9a041	1	2
822	sl9a041	1	2
823	sl9a041	1	2
824	sl9a041	1	2
825	sl9a041	1	2
826	sl9a041	1	2
827	sl9a041	1	2
828	sl9a041	1	2
829	sl9a041	1	2
830	sl9a041	1	2
831	sl9a041	1	2
832	sl9a041	1	2
833	sl9a041	1	2
834	sl9a041	1	2
835	sl9a041	1	2
836	sl9a041	1	2
837	sl9a041	1	2
838	sl9a041	1	2
839	sl9a041	1	2
840	sl9a041	1	2
841	sl9a041	1	2
842	sl9a041	1	2
843	sl9a041	1	2

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
844	s19a041	1	2
845	s19a041	1	2
846	s19a041	1	2
847	s19a041	1	2
848	s19a041	1	2
849	s19a041	1	2
850	s19a041	1	2
851	s19a041	1	2
852	s19a041	1	2
853	s19a041	1	2
854	s19a041	1	2
855	s19a041	1	2
856	s19a041	1	2
857	s19a041	1	2
858	s19a041	1	2
859	s19a041	1	2
860	s19a041	1	2
861	s19a041	1	2
862	s19a041	1	2
863	s19a041	1	2
864	s19a041	1	2
865	s19a041	1	2
866	s19a041	1	2
867	s19a041	1	2
868	s19a041	1	2
869	s19a041	1	2
870	s19a041	1	2
871	s19a041	1	2
872	s19a041	1	2
873	s19a041	1	2
874	s19a041	1	2
875	s19a041	1	2
876	s19a041	1	2
877	s19a041	1	2
878	s19a041	1	2
879	s19a041	1	2
880	s19a041	1	2
881	s19a041	1	2
882	s19a041	1	2
883	s19a041	1	2
884	s19a041	1	2
885	s19a041	1	2
886	s19a041	1	2

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
887	s19a041	1	2
888	s19a041	1	2
889	s19a041	1	2
890	s19a041	1	2
891	s19a041	1	2
892	s19a041	1	2
893	s19a041	1	2
894	s19a041	1	2
895	s19a041	1	2
896	s19a041	1	2
897	s19a041	1	2
898	s19a041	1	2
899	s19a041	1	2
900	s19a041	1	2
901	s19a041	1	2
902	s19a041	1	2
903	s19a041	1	2
904	s19a041	1	2
905	s19a041	1	2
906	s19a041	1	2
907	s19a041	1	2
908	s19a041	1	2
909	s19a041	1	2
910	s19a041	1	2
911	s19a041	1	2
912	s19a041	1	2
913	s19a041	1	2
914	s19a041	1	2
915	s19a041	1	2
916	s19a041	1	2
917	s19a041	1	2
918	s19a041	1	2
919	s19a041	1	2
920	s19a041	1	2
921	s19a041	1	2
922	s19a041	1	2
923	s19a041	1	2
924	s19a041	1	2
925	s19a041	1	2
926	s19a041	1	2
927	s19a041	1	2
928	s19a041	1	2
929	s19a041	1	2

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
930	sl9a041	1	2
931	sl9a041	1	2
932	sl9a041	1	2
933	sl9a041	1	2
934	sl9a041	1	2
935	sl9a041	1	2
936	sl9a041	1	2
937	sl9a041	1	2
938	sl9a041	1	2
939	sl9a041	1	2
940	sl9a041	1	2
941	sl9a041	1	2
942	sl9a041	1	2
943	sl9a041	1	2
944	sl9a041	1	2
945	sl9a041	1	2
946	sl9a041	1	2
947	sl9a041	1	2
948	sl9a041	1	2
949	sl9a041	1	2
950	sl9a041	1	2
951	sl9a041	1	2
952	sl9a041	1	2
953	sl9a041	1	2
954	sl9a041	1	2
955	sl9a041	1	2
956	sl9a041	1	2
957	sl9a041	1	2
958	sl9a041	1	2
959	sl9a041	1	2
960	sl9a041	1	2
961	sl9a041	1	2
962	sl9a041	1	2
963	sl9a041	1	2
964	sl9a041	1	2
965	sl9a041	1	2
966	sl9a041	1	2
967	sl9a041	1	2
968	sl9a041	1	2
969	sl9a041	1	2
970	sl9a041	1	2
971	sl9a041	1	2
972	sl9a041	1	2

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured		
973	s19a041	1	2		
974	s19a041	1	2		
975	s19a041	1	2		
976	s19a041	1	2		
977	s19a041	1	2		
978	s19a041	1	2		
979	s19a041	1	2		
980	s19a041	1	2		
981	s19a041	1	2		
982	s19a041	1	2		
983	s19a041	1	2		
984	s19a041	1	2		
985	s19a041	1	2		
986	s19a041	1	2		
987	s19a041	1	2		
988	s19a041	1	2		
989	s19a041	1	2		
990	s19a041	1	2		
991	s19a041	1	2		
992	s19a041	1	2		
993	s19a041	1	2		
1242	s19a041	3	3	4	6
1243	s19a041	3	3	4	7
1244	s19a041	3	3	4	7
1245	s19a041	3	3	4	8
1246	s19a041	2	3	5	
1247	s19a041	2	3	5	
1248	s19a041	2	3	5	
1249	s19a041	2	3	5	
1250	s19a041	2	3	5	
1251	s19a041	2	3	5	
1252	s19a041	2	3	5	
1253	s19a041	2	3	5	
1254	s19a041	2	3	5	
1255	s19a041	2	3	5	
1256	s19a041	2	3	5	
1257	s19a041	2	3	5	
1258	s19a041	2	3	5	
1259	s19a041	2	3	5	
1260	s19a041	2	3	5	
1261	s19a041	2	3	5	
1262	s19a041	2	3	5	
1263	s19a041	2	3	5	

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured		
1264	s19a041	2	3	5	
1265	s19a041	2	3	6	
1266	s19a041	2	3	6	
1267	s19a041	2	3	6	
1268	s19a041	2	3	6	
1269	s19a041	2	3	6	
1270	s19a041	2	3	6	
1271	s19a041	2	3	6	
1272	s19a041	2	3	6	
1273	s19a041	2	3	6	
1274	s19a041	2	3	6	
1275	s19a041	2	3	6	
1276	s19a041	2	3	7	
1277	s19a041	2	3	7	
1278	s19a041	2	3	7	
1279	s19a041	2	3	7	
1280	s19a041	2	3	7	
1281	s19a041	2	3	7	
1282	s19a041	2	3	7	
1283	s19a041	3	3	8	9
1284	s19a041	2	3	8	
1285	s19a041	2	3	8	
1286	s19a041	2	3	8	
1287	s19a041	2	3	8	
1288	s19a041	2	3	8	
1289	s19a041	1	3		
1290	s19a041	1	3		
1291	s19a041	1	3		
1292	s19a041	1	3		
1293	s19a041	1	3		
1294	s19a041	1	3		
1295	s19a041	1	3		
1296	s19a041	1	3		
1297	s19a041	1	3		
1298	s19a041	1	3		
1299	s19a041	1	3		
1300	s19a041	1	3		
1301	s19a041	1	3		
1302	s19a041	1	3		
1303	s19a041	1	3		
1304	s19a041	1	3		
1305	s19a041	1	3		
1306	s19a041	1	3		

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
1307	sl9a041	1	3
1308	sl9a041	1	3
1309	sl9a041	1	3
1310	sl9a041	1	3
1311	sl9a041	1	3
1312	sl9a041	1	3
1313	sl9a041	1	3
1314	sl9a041	1	3
1315	sl9a041	1	3
1316	sl9a041	1	3
1317	sl9a041	1	3
1318	sl9a041	1	3
1319	sl9a041	1	3
1320	sl9a041	1	3
1321	sl9a041	1	3
1322	sl9a041	1	3
1323	sl9a041	1	3
1324	sl9a041	1	3
1325	sl9a041	1	3
1326	sl9a041	1	3
1327	sl9a041	1	3
1328	sl9a041	1	3
1329	sl9a041	1	3
1330	sl9a041	1	3
1331	sl9a041	1	3
1332	sl9a041	1	3
1333	sl9a041	1	3
1334	sl9a041	1	3
1335	sl9a041	1	3
1336	sl9a041	1	3
1337	sl9a041	1	3
1338	sl9a041	1	3
1339	sl9a041	1	3
1340	sl9a041	1	3
1341	sl9a041	1	3
1342	sl9a041	1	3
1343	sl9a041	1	3
1344	sl9a041	1	3
1345	sl9a041	1	3
1346	sl9a041	1	3
1347	sl9a041	1	3
1348	sl9a041	1	3
1349	sl9a041	1	3

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
1350	sl9a041	1	3
1351	sl9a041	1	3
1352	sl9a041	1	3
1353	sl9a041	1	3
1354	sl9a041	1	3
1355	sl9a041	1	3
1356	sl9a041	1	3
1357	sl9a041	1	3
1358	sl9a041	1	3
1359	sl9a041	1	3
1360	sl9a041	1	3
1361	sl9a041	1	3
1362	sl9a041	1	3
1363	sl9a041	1	3
1364	sl9a041	1	3
1365	sl9a041	1	3
1366	sl9a041	1	3
1367	sl9a041	1	3
1368	sl9a041	1	3
1369	sl9a041	1	3
1370	sl9a041	1	3
1371	sl9a041	1	3
1372	sl9a041	1	3
1373	sl9a041	1	3
1374	sl9a041	1	3
1375	sl9a041	1	3
1376	sl9a041	1	3
1377	sl9a041	1	3
1378	sl9a041	1	3
1379	sl9a041	1	3
1380	sl9a041	1	3
1381	sl9a041	1	3
1382	sl9a041	1	3
1383	sl9a041	1	3
1384	sl9a041	1	3
1385	sl9a041	1	3
1386	sl9a041	1	3
1387	sl9a041	1	3
1388	sl9a041	1	3
1389	sl9a041	1	3
1390	sl9a041	1	3
1391	sl9a041	1	3
1392	sl9a041	1	3

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
1393	sl9a041	1	3
1394	sl9a041	1	3
1395	sl9a041	1	3
1396	sl9a041	1	3
1397	sl9a041	1	3
1398	sl9a041	1	3
1399	sl9a041	1	3
1400	sl9a041	1	3
1401	sl9a041	1	3
1402	sl9a041	1	3
1403	sl9a041	1	3
1404	sl9a041	1	3
1405	sl9a041	1	3
1406	sl9a041	1	3
1407	sl9a041	1	3
1408	sl9a041	1	3
1409	sl9a041	1	3
1410	sl9a041	1	3
1411	sl9a041	1	3
1412	sl9a041	1	3
1413	sl9a041	1	3
1414	sl9a041	1	3
1415	sl9a041	1	3
1416	sl9a041	1	3
1417	sl9a041	1	3
1418	sl9a041	1	3
1419	sl9a041	1	3
1420	sl9a041	1	3
1421	sl9a041	1	3
1422	sl9a041	1	3
1423	sl9a041	1	3
1424	sl9a041	1	3
1425	sl9a041	1	3
1426	sl9a041	1	3
1427	sl9a041	1	3
1428	sl9a041	1	3
1429	sl9a041	1	3
1430	sl9a041	1	3
1431	sl9a041	1	3
1432	sl9a041	1	3
1433	sl9a041	1	3
1434	sl9a041	1	3
1435	sl9a041	1	3

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
1436	sl9a041	1	3
1437	sl9a041	1	3
1438	sl9a041	1	3
1439	sl9a041	1	3
1440	sl9a041	1	3
1441	sl9a041	1	3
1442	sl9a041	1	3
1443	sl9a041	1	3
1444	sl9a041	1	3
1445	sl9a041	1	3
1446	sl9a041	1	3
1447	sl9a041	1	3
1448	sl9a041	1	3
1449	sl9a041	1	3
1450	sl9a041	1	3
1451	sl9a041	1	3
1452	sl9a041	1	3
1453	sl9a041	1	3
1454	sl9a041	1	3
1455	sl9a041	1	3
1456	sl9a041	1	3
1457	sl9a041	1	3
1458	sl9a041	1	3
1459	sl9a041	1	3
1460	sl9a041	1	3
1461	sl9a041	1	3
1462	sl9a041	1	3
1463	sl9a041	1	3
1464	sl9a041	1	3
1465	sl9a041	1	3
1466	sl9a041	1	3
1467	sl9a041	1	3
1468	sl9a041	1	3
1469	sl9a041	1	3
1470	sl9a041	1	3
1471	sl9a041	1	3
1472	sl9a041	1	3
1473	sl9a041	1	3
1474	sl9a041	1	3
1475	sl9a041	1	3
1476	sl9a041	1	3
1477	sl9a041	1	3
1478	sl9a041	1	3

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
1479	s19a041	1	3
1480	s19a041	1	3
1481	s19a041	1	3
1482	s19a041	1	3
1483	s19a041	1	3
1484	s19a041	1	3
1485	s19a041	1	3
1486	s19a041	1	3
1487	s19a041	1	3
1488	s19a041	1	3
1489	s19a041	1	3
1490	s19a041	1	3
1491	s19a041	1	3
1492	s19a041	1	3
1493	s19a041	1	3
1494	s19a041	1	3
1495	s19a041	1	3
1496	s19a041	1	3
1497	s19a041	1	3
1498	s19a041	1	3
1499	s19a041	1	3
1500	s19a041	1	3
1501	s19a041	1	3
1502	s19a041	1	3
1503	s19a041	1	3
1504	s19a041	1	3
1505	s19a041	1	3
1506	s19a041	1	3
1507	s19a041	1	3
1508	s19a041	1	3
1509	s19a041	1	3
1510	s19a041	1	3
1511	s19a041	1	3
1512	s19a041	1	3
1513	s19a041	1	3
1514	s19a041	1	3
1515	s19a041	1	3
1516	s19a041	1	3
1517	s19a041	1	3
1518	s19a041	1	3
1519	s19a041	1	3
1520	s19a041	1	3
1521	s19a041	1	3

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
1522	sl9a041	1	3
1523	sl9a041	1	3
1524	sl9a041	1	3
1525	sl9a041	1	3
1526	sl9a041	1	3
1527	sl9a041	1	3
1528	sl9a041	1	3
1529	sl9a041	1	3
1530	sl9a041	1	3
1531	sl9a041	1	3
1532	sl9a041	1	3
1533	sl9a041	1	3
1534	sl9a041	1	3
1535	sl9a041	1	3
1536	sl9a041	1	3
1537	sl9a041	1	3
1538	sl9a041	1	3
1539	sl9a041	1	3
1540	sl9a041	1	3
1541	sl9a041	1	3
1542	sl9a041	1	3
1543	sl9a041	1	3
1544	sl9a041	1	3
1545	sl9a041	1	3
1546	sl9a041	1	3
1547	sl9a041	1	3
1548	sl9a041	1	3
1549	sl9a041	1	3
1550	sl9a041	1	3
1551	sl9a041	1	3
1552	sl9a041	1	3
1553	sl9a041	1	3
1554	sl9a041	1	3
1555	sl9a041	1	3
1556	sl9a041	1	3
1557	sl9a041	1	3
1558	sl9a041	1	3
1559	sl9a041	1	3
1560	sl9a041	1	3
1561	sl9a041	1	3
1562	sl9a041	1	3
1563	sl9a041	1	3
1564	sl9a041	1	3

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
1565	sl9a041	1	3
1566	sl9a041	1	3
1567	sl9a041	1	3
1568	sl9a041	1	3
1569	sl9a041	1	3
1570	sl9a041	1	3
1571	sl9a041	1	3
1572	sl9a041	1	3
1573	sl9a041	1	3
1574	sl9a041	1	3
1575	sl9a041	1	3
1576	sl9a041	1	3
1577	sl9a041	1	3
1578	sl9a041	1	3
1579	sl9a041	1	3
1580	sl9a041	1	3
1581	sl9a041	1	3
1582	sl9a041	1	3
1583	sl9a041	1	3
1584	sl9a041	1	3
1585	sl9a041	1	3
1586	sl9a041	1	3
1587	sl9a041	1	3
1588	sl9a041	1	3
1589	sl9a041	1	3
1590	sl9a041	1	3
1591	sl9a041	1	3
1592	sl9a041	1	3
1593	sl9a041	1	3
1594	sl9a041	1	3
1595	sl9a041	1	3
1596	sl9a041	1	3
1597	sl9a041	1	3
1598	sl9a041	1	3
1599	sl9a041	1	3
1600	sl9a041	1	3
1601	sl9a041	1	3
1602	sl9a041	1	3
1603	sl9a041	1	3
1604	sl9a041	1	3
1605	sl9a041	1	3
1606	sl9a041	1	3
1607	sl9a041	1	3

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
1608	s19a041	1	3
1609	s19a041	1	3
1610	s19a041	1	3
1611	s19a041	1	3
1612	s19a041	1	3
1613	s19a041	1	3
1614	s19a041	1	3
1615	s19a041	1	3
1616	s19a041	1	3
1617	s19a041	1	3
1618	s19a041	1	3
1619	s19a041	1	3
1620	s19a041	1	3
1621	s19a041	1	3
1622	s19a041	1	3
1623	s19a041	1	3
1624	s19a041	1	3
1625	s19a041	1	3
1626	s19a041	1	3
1627	s19a041	1	3
1628	s19a041	1	3
1629	s19a041	1	3
1630	s19a041	1	3
1631	s19a041	1	3
1632	s19a041	1	3
1633	s19a041	1	3
1634	s19a041	1	3
1635	s19a041	1	3
1636	s19a041	1	3
1637	s19a041	1	3
1638	s19a041	1	3
1639	s19a041	1	3
1640	s19a041	1	3
1641	s19a041	1	3
1642	s19a041	1	3
1643	s19a041	1	3
1644	s19a041	1	3
1645	s19a041	1	3
1646	s19a041	1	3
1647	s19a041	1	3
1648	s19a041	1	3
1649	s19a041	1	3
1650	s19a041	1	3

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
1651	sl9a041	1	3
1652	sl9a041	1	3
1653	sl9a041	1	3
1654	sl9a041	1	3
1655	sl9a041	1	3
1656	sl9a041	1	3
1657	sl9a041	1	3
1658	sl9a041	1	3
1659	sl9a041	1	3
1660	sl9a041	1	3
1661	sl9a041	1	3
1662	sl9a041	1	3
1663	sl9a041	1	3
1664	sl9a041	1	3
1665	sl9a041	1	3
1666	sl9a041	1	3
1667	sl9a041	1	3
1668	sl9a041	1	3
1669	sl9a041	1	3
1670	sl9a041	1	3
1671	sl9a041	1	3
1672	sl9a041	1	3
1673	sl9a041	1	3
1674	sl9a041	1	3
1675	sl9a041	1	3
1676	sl9a041	1	3
1677	sl9a041	1	3
1678	sl9a041	1	3
1679	sl9a041	1	3
1680	sl9a041	1	3
1681	sl9a041	1	3
1682	sl9a041	1	3
1683	sl9a041	1	3
1684	sl9a041	1	3
1685	sl9a041	1	3
1686	sl9a041	1	3
1687	sl9a041	1	3
1688	sl9a041	1	3
1689	sl9a041	1	3
1690	sl9a041	1	3
1691	sl9a041	1	3
1692	sl9a041	1	3
1693	sl9a041	1	3

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
1694	s19a041	1	3
1695	s19a041	1	3
1696	s19a041	1	3
1697	s19a041	1	3
1698	s19a041	1	3
1699	s19a041	1	3
1700	s19a041	1	3
1701	s19a041	1	3
1702	s19a041	1	3
1703	s19a041	1	3
1704	s19a041	1	3
1705	s19a041	1	3
1706	s19a041	1	3
1707	s19a041	1	3
1708	s19a041	1	3
1709	s19a041	1	3
1710	s19a041	1	3
1711	s19a041	1	3
1712	s19a041	1	3
1713	s19a041	1	3
1714	s19a041	1	3
1715	s19a041	1	3
1716	s19a041	1	3
1717	s19a041	1	3
1718	s19a041	1	3
1719	s19a041	1	3
1720	s19a041	1	3
1721	s19a041	1	3
1722	s19a041	1	3
1723	s19a041	1	3
1724	s19a041	1	3
1725	s19a041	1	3
1726	s19a041	1	3
1727	s19a041	1	3
1728	s19a041	1	3
1729	s19a041	1	3
1730	s19a041	1	3
1731	s19a041	1	3
1732	s19a041	1	3
1733	s19a041	1	3
1734	s19a041	1	3
1735	s19a041	1	3
1736	s19a041	1	3

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
1737	sl9a041	1	3
1738	sl9a041	1	3
1739	sl9a041	1	3
1740	sl9a041	1	3
1741	sl9a041	1	3
1742	sl9a041	1	3
1743	sl9a041	1	3
1744	sl9a041	1	3
1745	sl9a041	1	3
1746	sl9a041	1	3
1747	sl9a041	1	3
1748	sl9a041	1	3
1749	sl9a041	1	3
1750	sl9a041	1	3
1751	sl9a041	1	3
1752	sl9a041	1	3
1753	sl9a041	1	3
1754	sl9a041	1	3
1755	sl9a041	1	3
1756	sl9a041	1	3
1757	sl9a041	1	3
1758	sl9a041	1	3
1759	sl9a041	1	3
1760	sl9a041	1	3
1761	sl9a041	1	3
1762	sl9a041	1	3
1763	sl9a041	1	3
1764	sl9a041	1	3
1765	sl9a041	1	3
1766	sl9a041	1	3
1767	sl9a041	1	3
1768	sl9a041	1	3
1769	sl9a041	1	3
1770	sl9a041	1	3
1771	sl9a041	1	3
1772	sl9a041	1	3
1773	sl9a041	1	3
1774	sl9a041	1	3
1775	sl9a041	1	3
1776	sl9a041	1	3
1777	sl9a041	1	3
1778	sl9a041	1	3
1779	sl9a041	1	3

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
1780	sl9a041	1	3
1781	sl9a041	1	3
1782	sl9a041	1	3
1783	sl9a041	1	3
1784	sl9a041	1	3
1785	sl9a041	1	3
1786	sl9a041	1	3
1787	sl9a041	1	3
1788	sl9a041	1	3
1789	sl9a041	1	3
1790	sl9a041	1	3
1791	sl9a041	1	3
1792	sl9a041	1	3
1793	sl9a041	1	3
1794	sl9a041	1	3
1795	sl9a041	1	3
1796	sl9a041	1	3
1797	sl9a041	1	3
1798	sl9a041	1	3
1799	sl9a041	1	3
1800	sl9a041	1	3
1801	sl9a041	1	3
1802	sl9a041	1	3
1803	sl9a041	1	3
1804	sl9a041	1	3
1805	sl9a041	1	3
1806	sl9a041	1	3
1807	sl9a041	1	3
1808	sl9a041	1	3
1809	sl9a041	1	3
1810	sl9a041	1	3
1811	sl9a041	1	3
1812	sl9a041	1	3
1813	sl9a041	1	3
1814	sl9a041	1	3
1815	sl9a041	1	3
1816	sl9a041	1	3
1817	sl9a041	1	3
1818	sl9a041	1	3
1819	sl9a041	1	3
1820	sl9a041	1	3
1821	sl9a041	1	3
1822	sl9a041	1	3

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
1823	sl9a041	1	3
1824	sl9a041	1	3
1825	sl9a041	1	3
1826	sl9a041	1	3
1827	sl9a041	1	3
1828	sl9a041	1	3
1829	sl9a041	1	3
1830	sl9a041	1	3
1831	sl9a041	1	3
1832	sl9a041	1	3
1833	sl9a041	1	3
1834	sl9a041	1	3
1835	sl9a041	1	3
1836	sl9a041	1	3
1837	sl9a041	1	3
1838	sl9a041	1	3
1839	sl9a041	1	3
1840	sl9a041	1	3
1841	sl9a041	1	3
1842	sl9a041	1	3
1843	sl9a041	1	3
1844	sl9a041	1	3
1845	sl9a041	1	3
1846	sl9a041	1	3
1847	sl9a041	1	3
1848	sl9a041	1	3
1849	sl9a041	1	3
1850	sl9a041	1	3
1851	sl9a041	1	3
1852	sl9a041	1	3
1853	sl9a041	1	3
1854	sl9a041	1	3
1855	sl9a041	1	3
1856	sl9a041	1	3
1857	sl9a041	1	3
1858	sl9a041	1	3
1859	sl9a041	1	3
1860	sl9a041	1	3
1861	sl9a041	1	3
1862	sl9a041	1	3
1863	sl9a041	1	3
1864	sl9a041	1	3
1865	sl9a041	1	3

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
1866	s19a041	1	3
1867	s19a041	1	3
1868	s19a041	1	3
1869	s19a041	1	3
1870	s19a041	1	3
1871	s19a041	1	3
1872	s19a041	1	3
1873	s19a041	1	3
1874	s19a041	1	3
1875	s19a041	1	3
1876	s19a041	1	3
1877	s19a041	1	3
1878	s19a041	1	3
1879	s19a041	1	3
1880	s19a041	1	3
1881	s19a041	1	3
1882	s19a041	1	3
1883	s19a041	1	3
1884	s19a041	1	3
1885	s19a041	1	3
1886	s19a041	1	3
1887	s19a041	1	3
1888	s19a041	1	3
1889	s19a041	1	3
1890	s19a041	1	3
1891	s19a041	1	3
1892	s19a041	1	3
1893	s19a041	1	3
1894	s19a041	1	3
1895	s19a041	1	3
1896	s19a041	1	3
1897	s19a041	1	3
1898	s19a041	1	3
1899	s19a041	1	3
1900	s19a041	1	3
1901	s19a041	1	3
1902	s19a041	1	3
1903	s19a041	1	3
1904	s19a041	1	3
1905	s19a041	1	3
1906	s19a041	1	3
1907	s19a041	1	3
1908	s19a041	1	3

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured		
1909	s19a041	1	3		
1910	s19a041	1	3		
1911	s19a041	1	3		
1912	s19a041	1	3		
1913	s19a041	1	3		
1914	s19a041	1	3		
1915	s19a041	1	3		
1916	s19a041	1	3		
1917	s19a041	1	3		
1918	s19a041	1	3		
1919	s19a041	1	3		
1920	s19a041	1	3		
1921	s19a041	1	3		
1922	s19a041	1	3		
1923	s19a041	1	3		
1924	s19a041	1	3		
1925	s19a041	1	3		
1926	s19a041	1	3		
1927	s19a041	1	3		
1928	s19a041	1	3		
1929	s19a041	1	3		
1930	s19a041	1	3		
1931	s19a041	1	3		
1932	s19a041	1	3		
1933	s19a041	1	3		
1934	s19a041	1	3		
1935	s19a041	1	3		
1936	s19a041	1	3		
1937	s19a041	1	3		
1938	s19a041	1	3		
1939	s19a041	1	3		
1940	s19a041	1	3		
1941	s19a041	1	3		
1942	s19a041	1	3		
1943	s19a041	1	3		
1944	s19a041	1	3		
1945	s19a041	1	3		
1946	s19a041	1	3		
1947	s19a041	1	3		
1948	s19a041	1	3		
1949	s19a041	1	3		
2200	s19a041	3	4	5	8
2201	s19a041	3	4	5	9

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured	
2202	s19a041	2	4	5
2203	s19a041	2	4	5
2204	s19a041	2	4	5
2205	s19a041	2	4	5
2206	s19a041	2	4	5
2207	s19a041	2	4	5
2208	s19a041	2	4	5
2209	s19a041	2	4	5
2210	s19a041	2	4	5
2211	s19a041	2	4	5
2212	s19a041	2	4	5
2213	s19a041	2	4	5
2214	s19a041	2	4	6
2215	s19a041	2	4	7
2216	s19a041	2	4	7
2217	s19a041	2	4	7
2218	s19a041	2	4	7
2219	s19a041	2	4	8
2220	s19a041	2	4	8
2221	s19a041	1	4	
2222	s19a041	1	4	
2223	s19a041	1	4	
2224	s19a041	1	4	
2225	s19a041	1	4	
2226	s19a041	1	4	
2227	s19a041	1	4	
2228	s19a041	1	4	
2229	s19a041	1	4	
2230	s19a041	1	4	
2231	s19a041	1	4	
2232	s19a041	1	4	
2233	s19a041	1	4	
2234	s19a041	1	4	
2235	s19a041	1	4	
2236	s19a041	1	4	
2237	s19a041	1	4	
2238	s19a041	1	4	
2239	s19a041	1	4	
2240	s19a041	1	4	
2241	s19a041	1	4	
2242	s19a041	1	4	
2243	s19a041	1	4	
2244	s19a041	1	4	

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
2245	s19a041	1	4
2246	s19a041	1	4
2247	s19a041	1	4
2248	s19a041	1	4
2249	s19a041	1	4
2250	s19a041	1	4
2251	s19a041	1	4
2252	s19a041	1	4
2253	s19a041	1	4
2254	s19a041	1	4
2255	s19a041	1	4
2256	s19a041	1	4
2257	s19a041	1	4
2258	s19a041	1	4
2259	s19a041	1	4
2260	s19a041	1	4
2261	s19a041	1	4
2262	s19a041	1	4
2263	s19a041	1	4
2264	s19a041	1	4
2265	s19a041	1	4
2266	s19a041	1	4
2267	s19a041	1	4
2268	s19a041	1	4
2269	s19a041	1	4
2270	s19a041	1	4
2271	s19a041	1	4
2272	s19a041	1	4
2273	s19a041	1	4
2274	s19a041	1	4
2275	s19a041	1	4
2276	s19a041	1	4
2277	s19a041	1	4
2278	s19a041	1	4
2279	s19a041	1	4
2280	s19a041	1	4
2281	s19a041	1	4
2282	s19a041	1	4
2283	s19a041	1	4
2284	s19a041	1	4
2285	s19a041	1	4
2286	s19a041	1	4
2287	s19a041	1	4

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
2288	s19a041	1	4
2289	s19a041	1	4
2290	s19a041	1	4
2291	s19a041	1	4
2292	s19a041	1	4
2293	s19a041	1	4
2294	s19a041	1	4
2295	s19a041	1	4
2296	s19a041	1	4
2297	s19a041	1	4
2298	s19a041	1	4
2299	s19a041	1	4
2300	s19a041	1	4
2301	s19a041	1	4
2302	s19a041	1	4
2303	s19a041	1	4
2304	s19a041	1	4
2305	s19a041	1	4
2306	s19a041	1	4
2307	s19a041	1	4
2308	s19a041	1	4
2309	s19a041	1	4
2310	s19a041	1	4
2311	s19a041	1	4
2312	s19a041	1	4
2313	s19a041	1	4
2314	s19a041	1	4
2315	s19a041	1	4
2316	s19a041	1	4
2317	s19a041	1	4
2318	s19a041	1	4
2319	s19a041	1	4
2320	s19a041	1	4
2321	s19a041	1	4
2322	s19a041	1	4
2323	s19a041	1	4
2324	s19a041	1	4
2325	s19a041	1	4
2326	s19a041	1	4
2327	s19a041	1	4
2328	s19a041	1	4
2329	s19a041	1	4
2330	s19a041	1	4

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
2331	s19a041	1	4
2332	s19a041	1	4
2333	s19a041	1	4
2334	s19a041	1	4
2335	s19a041	1	4
2336	s19a041	1	4
2337	s19a041	1	4
2338	s19a041	1	4
2339	s19a041	1	4
2340	s19a041	1	4
2341	s19a041	1	4
2342	s19a041	1	4
2343	s19a041	1	4
2344	s19a041	1	4
2345	s19a041	1	4
2346	s19a041	1	4
2347	s19a041	1	4
2348	s19a041	1	4
2349	s19a041	1	4
2350	s19a041	1	4
2351	s19a041	1	4
2352	s19a041	1	4
2353	s19a041	1	4
2354	s19a041	1	4
2355	s19a041	1	4
2356	s19a041	1	4
2357	s19a041	1	4
2358	s19a041	1	4
2359	s19a041	1	4
2360	s19a041	1	4
2361	s19a041	1	4
2362	s19a041	1	4
2363	s19a041	1	4
2364	s19a041	1	4
2365	s19a041	1	4
2366	s19a041	1	4
2367	s19a041	1	4
2368	s19a041	1	4
2369	s19a041	1	4
2370	s19a041	1	4
2371	s19a041	1	4
2372	s19a041	1	4
2373	s19a041	1	4

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured	
2374	sl9a041	1	4	
2375	sl9a041	1	4	
2376	sl9a041	1	4	
2377	sl9a041	1	4	
2378	sl9a041	1	4	
2379	sl9a041	1	4	
2380	sl9a041	1	4	
2381	sl9a041	1	4	
2382	sl9a041	1	4	
2383	sl9a041	1	4	
2384	sl9a041	1	4	
2385	sl9a041	1	4	
2386	sl9a041	1	4	
2387	sl9a041	1	4	
2388	sl9a041	1	4	
2389	sl9a041	1	4	
2390	sl9a041	1	4	
2391	sl9a041	1	4	
2392	sl9a041	1	4	
2393	sl9a041	1	4	
2394	sl9a041	1	4	
2395	sl9a041	1	-4	
2396	sl9a041	1	-4	
2397	sl9a041	1	-4	
2398	sl9a041	1	-4	
2399	sl9a041	1	-4	
2400	sl9a041	1	-4	
2651	sl9a041	2	5	6
2652	sl9a041	2	5	6
2653	sl9a041	2	5	6
2654	sl9a041	2	5	6
2655	sl9a041	2	5	6
2656	sl9a041	2	5	7
2657	sl9a041	2	5	7
2658	sl9a041	2	5	9
2659	sl9a041	1	5	
2660	sl9a041	1	5	
2661	sl9a041	1	5	
2662	sl9a041	1	5	
2663	sl9a041	1	5	
2664	sl9a041	1	5	
2665	sl9a041	1	5	
2666	sl9a041	1	5	

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
2667	sl9a041	1	5
2668	sl9a041	1	5
2669	sl9a041	1	5
2670	sl9a041	1	5
2671	sl9a041	1	5
2672	sl9a041	1	5
2673	sl9a041	1	5
2674	sl9a041	1	5
2675	sl9a041	1	5
2676	sl9a041	1	5
2677	sl9a041	1	5
2678	sl9a041	1	5
2679	sl9a041	1	5
2680	sl9a041	1	5
2681	sl9a041	1	5
2682	sl9a041	1	5
2683	sl9a041	1	5
2684	sl9a041	1	5
2685	sl9a041	1	5
2686	sl9a041	1	5
2687	sl9a041	1	5
2688	sl9a041	1	5
2689	sl9a041	1	5
2690	sl9a041	1	5
2691	sl9a041	1	5
2692	sl9a041	1	5
2693	sl9a041	1	5
2694	sl9a041	1	5
2695	sl9a041	1	5
2696	sl9a041	1	5
2697	sl9a041	1	5
2698	sl9a041	1	5
2699	sl9a041	1	5
2700	sl9a041	1	5
2701	sl9a041	1	5
2702	sl9a041	1	5
2703	sl9a041	1	5
2704	sl9a041	1	5
2705	sl9a041	1	5
2706	sl9a041	1	5
2707	sl9a041	1	5
2708	sl9a041	1	5
2709	sl9a041	1	5

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
2710	sl9a041	1	5
2711	sl9a041	1	5
2712	sl9a041	1	5
2713	sl9a041	1	5
2714	sl9a041	1	5
2715	sl9a041	1	5
2716	sl9a041	1	5
2717	sl9a041	1	5
2718	sl9a041	1	5
2719	sl9a041	1	5
2720	sl9a041	1	5
2721	sl9a041	1	5
2722	sl9a041	1	5
2723	sl9a041	1	5
2724	sl9a041	1	5
2725	sl9a041	1	5
2726	sl9a041	1	5
2727	sl9a041	1	5
2728	sl9a041	1	5
2729	sl9a041	1	5
2730	sl9a041	1	5
2731	sl9a041	1	5
2732	sl9a041	1	5
2733	sl9a041	1	5
2734	sl9a041	1	5
2735	sl9a041	1	5
2736	sl9a041	1	5
2737	sl9a041	1	5
3738	sl9a041	1	5
3739	sl9a041	1	5
3740	sl9a041	1	5
2741	sl9a041	1	5
2742	sl9a041	1	5
2743	sl9a041	1	5
2744	sl9a041	1	5
2745	sl9a041	1	5
2746	sl9a041	1	5
2747	sl9a041	1	5
2748	sl9a041	1	5
2749	sl9a041	1	5
2750	sl9a041	1	5
2751	sl9a041	1	5
2752	sl9a041	1	5

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured	
2753	sl9a041	1	5	
2754	sl9a041	1	5	
2755	sl9a041	1	5	
2756	sl9a041	1	5	
2757	sl9a041	1	5	
2758	sl9a041	1	5	
2759	sl9a041	1	5	
2760	sl9a041	1	5	
2761	sl9a041	1	5	
2762	sl9a041	1	5	
2763	sl9a041	1	5	
2764	sl9a041	1	5	
2765	sl9a041	1	5	
2766	sl9a041	1	5	
2767	sl9a041	1	5	
2768	sl9a041	1	5	
2769	sl9a041	1	5	
2770	sl9a041	1	5	
2771	sl9a041	1	5	
2772	sl9a041	1	5	
2773	sl9a041	1	5	
2774	sl9a041	1	5	
2775	sl9a041	1	5	
2776	sl9a041	1	5	
2777	sl9a041	1	-5	
2778	sl9a041	1	-5	
2779	sl9a041	1	-5	
2780	sl9a041	1	-5	
2781	sl9a041	1	-5	
2782	sl9a041	1	-5	
2783	sl9a041	1	-5	
2784	sl9a041	1	-5	
2785	sl9a041	1	-5	
3036	sl9a041	2	6	7
3037	sl9a041	2	6	7
3038	sl9a041	2	6	8
3039	sl9a041	2	6	9
3040	sl9a041	1	6	
3041	sl9a041	1	6	
3042	sl9a041	1	6	
3043	sl9a041	1	6	
3044	sl9a041	1	6	
3045	sl9a041	1	6	

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
3046	s19a041	1	6
3047	s19a041	1	6
3048	s19a041	1	6
3049	s19a041	1	6
3050	s19a041	1	6
3051	s19a041	1	6
3052	s19a041	1	6
3053	s19a041	1	6
3054	s19a041	1	6
3055	s19a041	1	6
3056	s19a041	1	6
3057	s19a041	1	6
3058	s19a041	1	6
3059	s19a041	1	6
3060	s19a041	1	6
3061	s19a041	1	6
3062	s19a041	1	6
3063	s19a041	1	6
3064	s19a041	1	6
3065	s19a041	1	6
3066	s19a041	1	6
3067	s19a041	1	6
3068	s19a041	1	6
3069	s19a041	1	6
3070	s19a041	1	6
3071	s19a041	1	6
3072	s19a041	1	6
3073	s19a041	1	6
3074	s19a041	1	6
3075	s19a041	1	6
3076	s19a041	1	6
3077	s19a041	1	6
3078	s19a041	1	6
3079	s19a041	1	6
3080	s19a041	1	6
3081	s19a041	1	6
3082	s19a041	1	6
3083	s19a041	1	6
3084	s19a041	1	6
3085	s19a041	1	6
3086	s19a041	1	6
3087	s19a041	1	6
3088	s19a041	1	6

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured	
3089	s19a041	1	6	
3090	s19a041	1	6	
3091	s19a041	1	6	
3092	s19a041	1	6	
3093	s19a041	1	6	
3094	s19a041	1	6	
3095	s19a041	1	6	
3096	s19a041	1	6	
3097	s19a041	1	6	
3098	s19a041	1	6	
3099	s19a041	1	6	
3100	s19a041	1	6	
3101	s19a041	1	6	
3102	s19a041	1	6	
3103	s19a041	1	6	
3104	s19a041	1	6	
3105	s19a041	1	6	
3106	s19a041	1	6	
3107	s19a041	1	6	
3108	s19a041	1	6	
3109	s19a041	1	6	
3110	s19a041	1	6	
3111	s19a041	1	-6	
3112	s19a041	1	-6	
3113	s19a041	1	-6	
3114	s19a041	1	-6	
3115	s19a041	1	-6	
3116	s19a041	1	-6	
3117	s19a041	1	-6	
3118	s19a041	1	-6	
3119	s19a041	1	-6	
3120	s19a041	1	-6	
3121	s19a041	1	-6	
3122	s19a041	1	-6	
3123	s19a041	1	-6	
3124	s19a041	1	-6	
3125	s19a041	1	-6	
3376	s19a041	2	7	8
3377	s19a041	2	7	9
3378	s19a041	2	7	9
3379	s19a041	1	7	
3380	s19a041	1	7	
3381	s19a041	1	7	

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
3382	sl9a041	1	7
3383	sl9a041	1	7
3384	sl9a041	1	7
3385	sl9a041	1	7
3386	sl9a041	1	7
3387	sl9a041	1	7
3388	sl9a041	1	7
3389	sl9a041	1	7
3390	sl9a041	1	7
3391	sl9a041	1	7
3392	sl9a041	1	7
3393	sl9a041	1	7
3394	sl9a041	1	7
3395	sl9a041	1	7
3396	sl9a041	1	7
3397	sl9a041	1	7
3398	sl9a041	1	7
3399	sl9a041	1	7
3400	sl9a041	1	7
3401	sl9a041	1	7
3402	sl9a041	1	7
3403	sl9a041	1	7
3404	sl9a041	1	7
3405	sl9a041	1	7
3406	sl9a041	1	7
3407	sl9a041	1	7
3408	sl9a041	1	7
3409	sl9a041	1	7
3410	sl9a041	1	7
3411	sl9a041	1	7
3412	sl9a041	1	7
3413	sl9a041	1	7
3414	sl9a041	1	7
3415	sl9a041	1	7
3416	sl9a041	1	7
3417	sl9a041	1	7
3418	sl9a041	1	7
3419	sl9a041	1	7
3420	sl9a041	1	7
3421	sl9a041	1	7
3422	sl9a041	1	7
3423	sl9a041	1	7
3424	sl9a041	1	7

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured	
3425	sl9a041	1	7	
3426	sl9a041	1	7	
3427	sl9a041	1	7	
3428	sl9a041	1	7	
3429	sl9a041	1	7	
3430	sl9a041	1	7	
3431	sl9a041	1	7	
3432	sl9a041	1	7	
3433	sl9a041	1	7	
3434	sl9a041	1	7	
3435	sl9a041	1	7	
3436	sl9a041	1	7	
3437	sl9a041	1	7	
3438	sl9a041	1	7	
3439	sl9a041	1	7	
3440	sl9a041	1	7	
3441	sl9a041	1	7	
3692	sl9a041	2	8	9
3693	sl9a041	2	8	9
3694	sl9a041	1	8	
3695	sl9a041	1	8	
3696	sl9a041	1	8	
3697	sl9a041	1	8	
3698	sl9a041	1	8	
3699	sl9a041	1	8	
3700	sl9a041	1	8	
3701	sl9a041	1	8	
3702	sl9a041	1	8	
3703	sl9a041	1	8	
3704	sl9a041	1	8	
3705	sl9a041	1	8	
3706	sl9a041	1	8	
3707	sl9a041	1	8	
3708	sl9a041	1	8	
3709	sl9a041	1	8	
3710	sl9a041	1	8	
3711	sl9a041	1	8	
3712	sl9a041	1	8	
3713	sl9a041	1	8	
3714	sl9a041	1	8	
3715	sl9a041	1	8	
3716	sl9a041	1	8	
3717	sl9a041	1	8	

Appendix Table B-13 (Continued).

Tag Number	Identification Code	Number of Times Captured	Occasions Captured
3718	s19a041	1	8
3719	s19a041	1	8
3720	s19a041	1	8
3721	s19a041	1	8
3722	s19a041	1	8
3723	s19a041	1	8
3724	s19a041	1	8
3725	s19a041	1	8
3726	s19a041	1	8
3727	s19a041	1	8
3728	s19a041	1	8
3729	s19a041	1	8
3730	s19a041	1	8
3731	s19a041	1	8
3732	s19a041	1	8
3733	s19a041	1	8
3734	s19a041	1	8
3735	s19a041	1	8
3736	s19a041	1	8
3737	s19a041	1	8
3738	s19a041	1	8
3739	s19a041	1	8
3740	s19a041	1	8
3741	s19a041	1	8
3742	s19a041	1	8
3743	s19a041	1	8
3744	s19a041	1	8
3745	s19a041	1	8
3746	s19a041	1	8
3747	s19a041	1	8
3748	s19a041	1	8
3749	s19a041	1	8
3750	s19a041	1	8
3751	s19a041	1	8
3752	s19a041	1	8
3753	s19a041	1	8
3754	s19a041	1	8
3755	s19a041	1	8
3756	s19a041	1	8
3757	s19a041	1	8
3758	s19a041	1	8
3759	s19a041	1	8
3760	s19a041	1	8

Appendix Table B-13 (Continued).

Tag Number	Identification Number	Number of Times Captured	Occasions Captured
3761	sl9a041	1	8
3762	sl9a041	1	8
3763	sl9a041	1	8
3764	sl9a041	1	8
3765	sl9a041	1	8
3766	sl9a041	1	8
3767	sl9a041	1	8
3768	sl9a041	1	8
3769	sl9a041	1	8
3770	sl9a041	1	8
3771	sl9a041	1	8
3772	sl9a041	1	8
3773	sl9a041	1	8
3774	sl9a041	1	8
3775	sl9a041	1	8
3776	sl9a041	1	8
3777	sl9a041	1	8
3778	sl9a041	1	8
3779	sl9a041	1	8
3780	sl9a041	1	8
3781	sl9a041	1	8
3782	sl9a041	1	8
3783	sl9a041	1	8
3784	sl9a041	1	8
3785	sl9a041	1	8
3786	sl9a041	1	8
3787	sl9a041	1	8
3788	sl9a041	1	8
3789	sl9a041	1	8
3790	sl9a041	1	8
3791	sl9a041	1	8
3792	sl9a041	1	8
3793	sl9a041	1	8
3794	sl9a041	1	8
3795	sl9a041	1	8
3796	sl9a041	1	8
3797	sl9a041	1	8
3798	sl9a041	1	8
3799	sl9a041	1	8
3800	sl9a041	1	-8
3801	sl9a041	1	-8

Appendix Table B-13 (Continued).

Tag Number	Identification Number	Number of Times Captured	Occasions Captured
3802	s19a041	1	-8
3803	s19a041	1	-8
3804	s19a041	1	-8
3805	s19a041	1	-8
3806	s19a041	1	-8
3807	s19a041	1	-8
3808	s19a041	1	-8
4059	s19a041	1	9
4060	s19a041	1	9
4061	s19a041	1	9
4062	s19a041	1	9
4063	s19a041	1	9
4064	s19a041	1	9
4065	s19a041	1	9
4066	s19a041	1	9
4067	s19a041	1	9
4068	s19a041	1	9
4069	s19a041	1	9
4070	s19a041	1	9
4071	s19a041	1	9
4072	s19a041	1	9
4073	s19a041	1	9
4074	s19a041	1	9
4075	s19a041	1	9
4076	s19a041	1	9
4077	s19a041	1	9
4078	s19a041	1	9
4079	s19a041	1	9
4080	s19a041	1	9
4081	s19a041	1	9
4082	s19a041	1	9
4083	s19a041	1	9
4084	s19a041	1	9
4085	s19a041	1	9
4086	s19a041	1	9
4087	s19a041	1	9
4088	s19a041	1	9
4089	s19a041	1	9
4090	s19a041	1	9
4091	s19a041	1	9
4092	s19a041	1	9

Appendix Table B-13 (Continued).

Tag Number	Identification Number	Number of Times Captured	Occasions Captured
4093	sl9a041	1	9
4094	sl9a041	1	9
4095	sl9a041	1	9
4096	sl9a041	1	9
4097	sl9a041	1	9
4098	sl9a041	1	9
4099	sl9a041	1	9
4100	sl9a041	1	9
4101	sl9a041	1	9
4102	sl9a041	1	9
4103	sl9a041	1	9
4104	sl9a041	1	9
4105	sl9a041	1	9
4106	sl9a041	1	9
4107	sl9a041	1	9
4108	sl9a041	1	9
4109	sl9a041	1	9
4110	sl9a041	1	9
4111	sl9a041	1	9
4112	sl9a041	1	9
4113	sl9a041	1	9
4114	sl9a041	1	9
4115	sl9a041	1	9
4116	sl9a041	1	9
4117	sl9a041	1	9

Persons interested in generating population estimates for Slough 10, Len's Slough, D.O.D. Slough, Beaver Pond Slough, and Slough 22 will have to create and update the history files for these sites using the same procedures indicated for Slough 9A. After all of these history files have been updated, they can be used in the POPAN-2 computer model to generate population estimates of juvenile chinook salmon at the 1984-85 winter sampling sites.

Generating Population Estimates

Due to funding cuts, population estimates of juvenile chinook salmon at the 1984-85 winter sampling sites were not completed. Therefore, anyone wishing to generate population estimates from this data set will have to complete the analysis him/herself using the POPAN-2 computer model which is discussed in Arnason and Baniuk (1978).

An individual who can be contacted regarding use of the POPAN-2 model is:

Allen Bingham
Biometrician II
Alaska Department of Fish and Game
Sport Fish Division, RTS Unit
333 Raspberry Road
Anchorage, Alaska 99518-1599
Phone: 267-2369

Mr. Bingham secured a copy of this computer program for this analysis and has implemented the program on the Boeing Computer Services TSO operating system.

APPENDIX C

ICE THICKNESS DATA, WINTER 1984-85

Appendix Table C-1. Ice thicknesses (in inches) observed at the winter study sites by partition and sampling period, winter 1984-85.

Location	Partition	Mean Sampling Period Date																
		11-10	11-15	11-18	12-2	12-14	12-30	1-8	1-17	1-27	2-7	2-18	3-2	3-13	3-22	4-1	4-12	4-20
Slough 22																		
	I	1-3	2-16	6-16	6-16	2-18	4-18	4-18	6-24	0-24	2-24	0-20	0-18	0-14	0-12	2-12	0-14	0-10
	II	0-5	4-18	2-18	0-18	2-18	2-22	0-24	1-24	0-24	1-24	0-24	0-18	1-16	0-16	1-16	6-18	0-10
	III	0-5	0-10	0-10	0-16	0-16	2-24	0-24	0-24	0-20	0-18	0-18	0-16	1-16	0-16	0-16	0-16	0-10
	IV	2-10	10-18	10-20	10-24	10-26	10-36	10-36	16-36	10-36	10-36	10-36	10-36	10-36	10-36	10-40	10-48	8-48
Slough 10											0							
	I	0-1	0-4	0-3	0-1	0-2	0-6	0	0	0	0-2	0-6	0-3	0-1	0-2	0-1	0	0
	II	0-1	0-1	0-2	0-1	0-1	0-6	0	0	0	0-2	0-4	0-3	0-1	0	0-1	0	0
	III	0-1	0-1	0-2	0-1	0-1	0-6	0	0	0	0-2	0-4	0-3	0-1	0	0-1	0	0
	IV	0-1	0-3	0-2	0-2	0-1	0-6	0	0-3	0-2	0-2	0-4	0-3	0-2	0-3	0-1	0	0
	V	2-4	6-12	8-16	10-16	6-16	6-20	3-20	4-20	0-12	1-15	1-12	0-18	0-12	0-12	0-12	0-6	0-6
Slough 9A																		
	I	0-1	0-2	0-3	0-2	0-2	N/S	0-2	0-12	0-6	1-6	1-6	0-6	0-2	0-4	0-8	0-2	0-2
	II	0-3	0-8	0-8	0-6	1-6	N/S	0-18	0-24	0-6	1-6	1-12	0-3	0-6	0-4	0-1	0-2	0-1
	III	0-4	6-14	6-14	0-18	6-18	N/S	0-18	0-24	0-24	1-20	0-20	0-18	0-18	0-12	0-14	0-14	0-12
	IV	0--2	0-10	0-2	0-16	0-12	N/S	0-8	0-4	0-3	0-4	0-8	0-8	0-4	0-3	0-3	0-2	0-1
	V	0-3	0-10	0-3	0-16	2-12	N/S	0-6	0-6	0-3	0-4	0-8	0-8	0-6	0-6	0-6	0-2	0-2
Indian River																		
	Len's	0-2	0-3	0-4	0-2	1-12	N/S	0-12	0-12	0-12	1-12	1-12	1-12	0-12	1-12	1-12	1-6	0-6
	DOD Slough	N/S	0-2	0-2	0-1	0-3	N/S	0-1	0-2	0-3	0-2	0-8	0-6	0-4	0-2	0-2	0-1	0
	Beaver Pond	0-2	0-3	0-4	0-2	1-6	N/S	0-6	0-6	0-6	0-4	1-8	1-6	0-4	0-6	0-3	0-2	0-1

N/S - not sampled

APPENDIX D

FIELD OBSERVATIONS ON PREDATION AND FOOD AVAILABILITY

Predation on Juvenile Chinook and Coho Salmon at Winter Sampling Sites

Winter predation on juvenile salmon was observed frequently during the 1984-85 winter studies. As winter ice formation progresses, the amount of area available to the juvenile salmon shrinks, thereby concentrating the fish and making them more susceptible to predators. Although ice and snow cover do replace turbidity as a source of cover from terrestrial predators, juvenile fish are still vulnerable to these predators through open leads. The most active and successful terrestrial predator observed during this study was a bird called a dipper (Cinclus mexicanus). Dippers were observed throughout the winter at almost all open-water areas of the Susitna River. Concentrations of dippers were observed at partitions containing large numbers of fish and were frequently observed capturing juvenile fish.

A species of shrew was also found to prey upon juvenile salmon. On at least three occasions, shrews were found in minnow traps which had been set with a portion above the water surface. The only remains of the fish were pieces of heads and tails. Although no shrew predation on juvenile salmon outside of minnow traps was observed, it is believed to occur.

Other terrestrial predators known to prey upon fish also occur within this area, including mink, marten, and otter. However, no evidence of juvenile salmon predation was documented for these species.

The most abundant and probably the most successful predator of juvenile salmon that we observed is the slimy sculpin (Cottus cognatus). Slimy sculpin are found throughout the Susitna River, with highest concentrations occurring in the sloughs and tributaries containing high numbers of fish (ADF&G 1981c). Sculpin were captured incidentally at all sampling sites throughout the winter. Sculpin were also observed, both in minnow traps and lying on the substrate, dead with juvenile salmon protruding from their mouths. The fish had apparently choked or strangled on a juvenile salmon that was too large for it to swallow. Sculpin predation could be an important factor in winter survival of juvenile salmon, especially the smaller fish.

Other resident fish species are present in the middle reach of the Susitna River, but few have been documented in the sloughs and tributaries during the winter (Sundet and Wenger 1984; Sundet and Pechek 1985). Although these fish do not appear to be a threat to juvenile salmon in the shallower sloughs and side channels, species such as burbot and rainbow trout could present a threat to outmigrating juveniles in the mainstem.

Food Availability for Juvenile Chinook and Coho Salmon at Winter Sampling Sites

With the exception of Partition IV at Slough 22, food was available at all sites throughout the winter. At DOD Slough in Indian River, the rocks were literally covered with larval and pupal stages of aquatic

insects. (Partition IV shrank to a single pool approximately 20 feet in diameter, completely cut off from the rest of the slough.) Fish stomachs examined occasionally throughout the season were always found to contain insects. From mid-April on, large hatches of aquatic insects were present at all sites and still little increase in lengths were recorded.