AYK REGION
YUKON SALMON ESCAPEMENT
REPORT #21

ENUMERATION OF SUMMER CHUM AND KING SALMON BY SIDE-SCANNING SONAR IN THE MELOZITNA RIVER IN 1983

by

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February 1984

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ABSTRACT

The 1983 sonar-estimated escapement of summer chum salmon to the Melozitna River was 20,126, similar in magnitude to that of 1982. The total escapement estimate for 1981 was revised and expanded to 96,000 chum salmon. Based upon date of 50% run passage (July 9), run timing in 1983 was 5 days earlier than in 1982 and at least 5 days later than in 1981. Forty-seven percent of the 1983 spawning migration was enumerated along the west bank and 41% along the east bank. Surface water temperatures and velocities were measured daily. Attempts to collect salmon age, sex, and size data were unsuccessful due to low water conditions.

MELOZITNA RIVER SONAR

Introduction

King and summer chum salmon are the most important commercial species in the lower Yukon River, while fall chum salmon are most important in the upper river, above the Koyukuk River. King salmon spawning occurs throughout the Yukon River drainage, while most summer chum salmon spawn in tributaries to the Yukon River below the confluence of the Koyukuk River, as well as within the Koyukuk River drainage. A smaller percentage spawns in several tributaries of the Yukon River between Galena and Tanana. A few streams in the Tanana River drainage are also utilized. By comparison, most fall chum salmon spawn in the upper Yukon River drainage, particularly the Porcupine and Tanana River systems.

Management of king and summer chum salmon is made difficult due to lack of in-season escapement information; salmon cannot be visually enumerated until runs have reached clear-water tributaries, some of which are hundreds of miles above the fishery. To provide more timely in-season escapement data in the lower and middle Yukon River tributaries, two rivers were selected for side-scanning sonar feasibility studies in 1981--the Andreafsky and Melozitna rivers. The Andreafsky River is the second most important in the Yukon River drainage for summer chum salmon production, while the Melozitna River was believed to be a substantial producer of summer chum salmon in the middle Yukon River area. Based upon 1981 feasibility study results, both rivers were monitored with side-scanning sonar in 1982 and 1983 to document salmon spawning escapements.

This report presents results of the 1983 Melozitna River sonar studies, with reference made to results obtained in 1981 and 1982 when appropriate for comparative purposes. A more in-depth review of 1981 and 1982 results can be found in Barton (1982a, 1983). Results of Andreafsky River studies are documented by Buklis (1982, 1983).

The Melozitna River heads northwest of the Ray Mountains and flows southwest in excess of 135 miles through the Kokrines Hills to its confluence with the Yukon River near the village of Ruby (Figure 1). A unique feature of the river is that the upper portion is characterized by a low gradient and slow-moving water. Only within the lower 10 to 15 miles does the river increase in water velocity, after flowing through a large canyon. Although total salmon escapement estimates are lacking, it is known that summer chum salmon utilize three or four clear-water tributaries to this river. Spawning in the mainstem river is suspected, but the extent is unknown. Few king salmon are believed to utilize the Melozitna River.

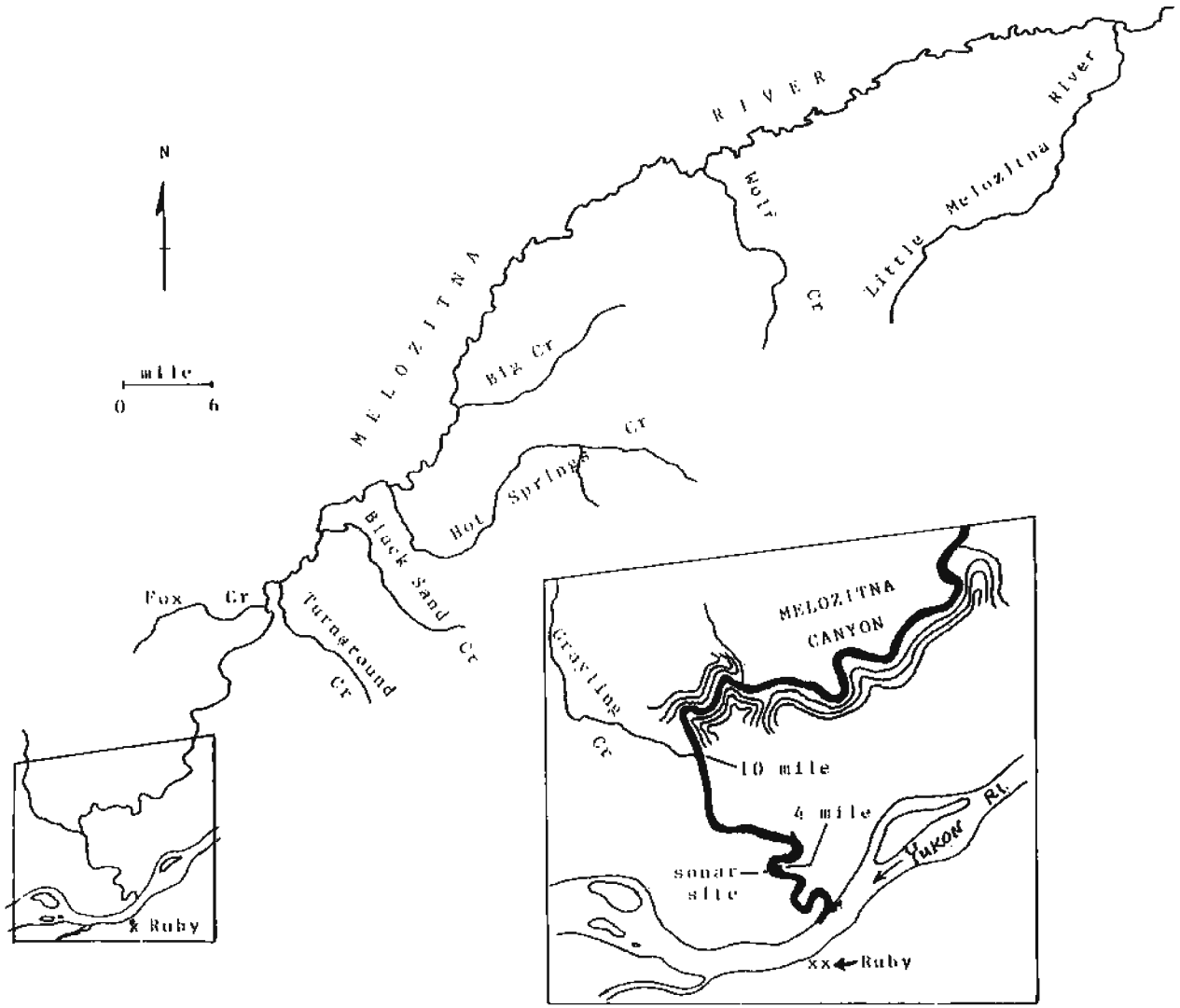


Figure 1. Melozitna River drainage and 1983 sonar site.

Objectives

Whereas the major objective of the 1981 Melozitna River study was to examine the feasibility of using sonar as a means of escapement enumeration, overall objectives in 1982 and 1983 were redesigned to determine timing and magnitude of the total salmon spawning escapement and to collect salmon age-sex-size information. The following were specific objectives in the past 2 years:

1. Enumerate migrating adult salmon with two side-scan sonar counters (one on either side of the river);

2. Test fish with gillnets to examine species composition and age-sex-size characteristics of adult salmon escapement; and

3. Monitor selected climatological and hydrological parameters at the sonar site.

Methods

The feasibility of counting salmon hydroacoustically in the Melozitna River was examined by the installation of a single side-scan sonar counter in 1981. A 1978-model counter, developed by the Hydrodynamics Division of Bendix Corporation, was operated from the east bank of the Melozitna River approximately 4 river miles upstream from its confluence with the Yukon River (Figure 1). In 1982 and 1983, a 1977- and a 1981-model Bendix side scan sonar were employed. In both years, the 1977-model counter was used to enumerate salmon along the east bank, while the 1981 model was used on the west bank. The same site location was used in all 3 years.

Methods of collecting daily hydrological, climatological, and salmon age-sex-size data were consistent each year. Likewise, sonar installation, operation, and calibration procedures were the same, as was weir construction. All methods and procedures, as well as important differences between the 1977 and 1981 sonar counters, are described by Barton (1983).

Results and Discussion

Timing: Sonar counting operations began on June 29 in 1983. Although both sonar counting units were installed, only the west-bank unit was functional due to very low river level and resulting shallow water depth on the east side. The east-bank counter became functional on July 3 after water levels rose enough to eliminate water surface counts by that counting unit.

Only 172 salmon were counted by the west-bank counter on June 29. An aerial survey of the lower 10 miles of the Melozitna River was flown under excellent survey conditions on June 29, the first day of counting

to determine the number of salmon already upstream of the counting site. Only 21 salmon were observed, 8 downstream and 13 upstream of the sonar site, confirming very few salmon had yet entered the river on their spawning migration.

Temporal distribution of the salmon run in 1983 was bimodal, with peak counts occurring on July 7 and July 18 (Figure 2). The July 7 counts comprised 7.4% of the total sonar-estimated escapement, while July 18 counts comprised 8.9%. Approximately 50% of the run had passed by July 9. By comparison, 50% run passage occurred on July 14 in 1982, with peak sonar counts occurring on the same date in that year. From this standpoint, it could be said that 1983 run timing in the Melozitna River was 5 days earlier than in 1982.

Run timing in 1981 was much earlier, the peak occurring on or just prior to July 4, the date when sonar operations began (Barton 1982a). Sonar operations began when perhaps as much as 50% of the 1981 run had already passed. Since only a single east-bank counting unit was used in 1981, a comparison of east-bank counts in each year illustrates temporal distribution of the salmon runs annually since 1981 (Figure 3). Earlier timing of the 1981 salmon run can be easily seen.

Timing of salmon migration along the east and west banks was similar in 1983 (Figure 4) and 1982, and no differences in temporal distribution of upstream migrants with respect to day or night were observed in any year.

A few salmon were still passing the sonar site on July 23, 1983 when operations terminated. However, only 1.9% of the total sonar-estimated escapement was counted on that date.

Surface water temperatures in 1983 ranged from 56°F on July 17 to 68°F on July 7, 8, and 9, with an average of 62.5°F for duration of the project (Figure 5 and Table 1). The average 1983 temperature was 2.8°F and 7.6°F warmer than the 1982 and 1981 average temperatures, respectively. In all 3 years, observations revealed an inverse relationship between water level and water temperatures, with high water levels accompanied by lower water temperatures.

Aerial escapement surveys have been flown since 1975 of several clear-water streams of the Melozitna River (Figure 1). Surveys are generally conducted within the last 2 weeks of July. During this period, estimates of salmon spawning within the mainstem river are hindered due to dark-stained and turbid water. Consequently, only a general statement on spawn timing can be made which, at best, applies only to chum salmon in those clear-water streams where aerial surveys have been successful. Little can be said in reference to king salmon spawn timing due to the few individuals that have been observed.

Observations since 1975 indicate that chum salmon spawn in tributary streams during the latter part of July. However, in 1981 some spawning

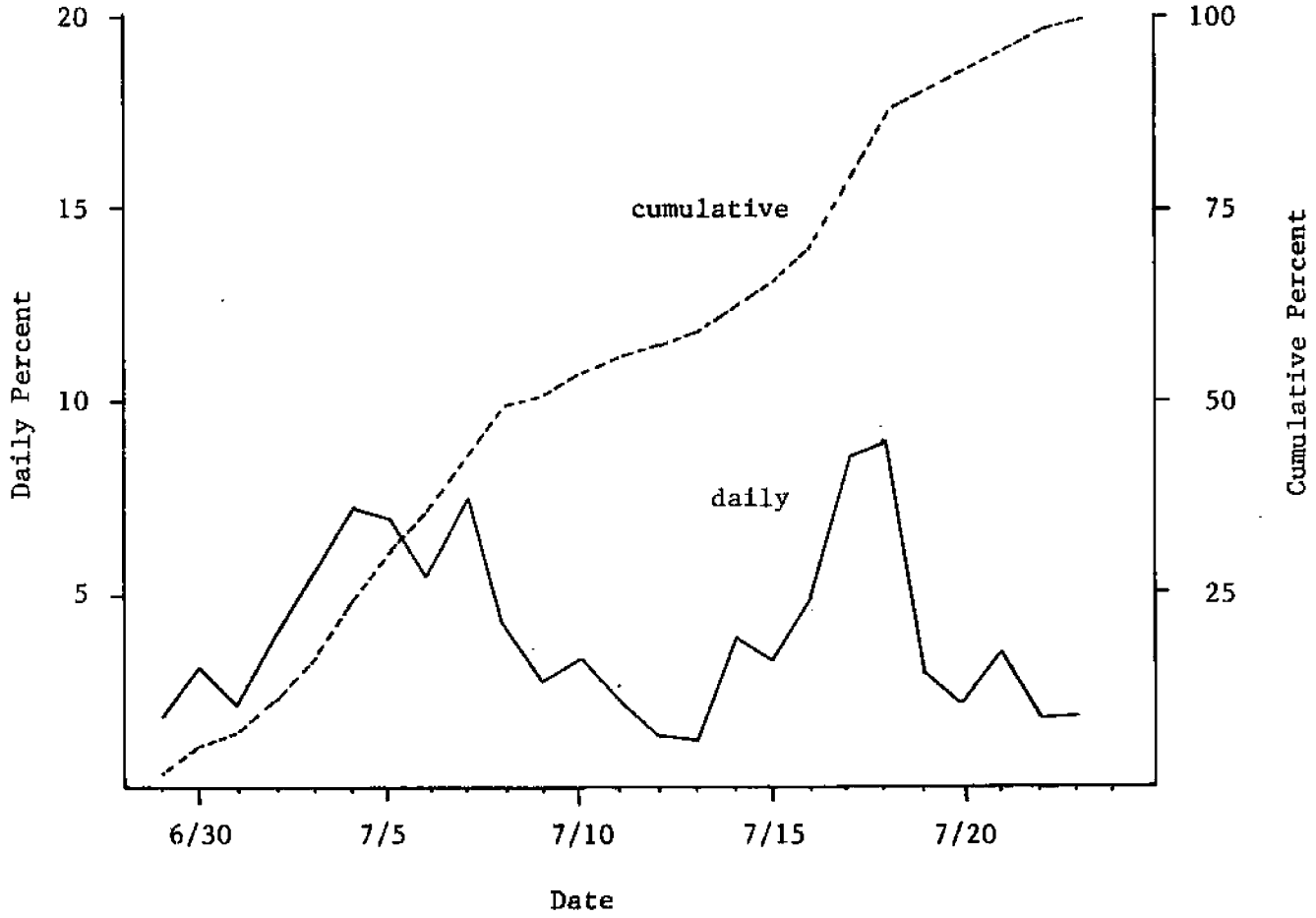


Figure 2. Relative timing of Melozitna River summer chum salmon escapement, June 29 through July 23, 1983.

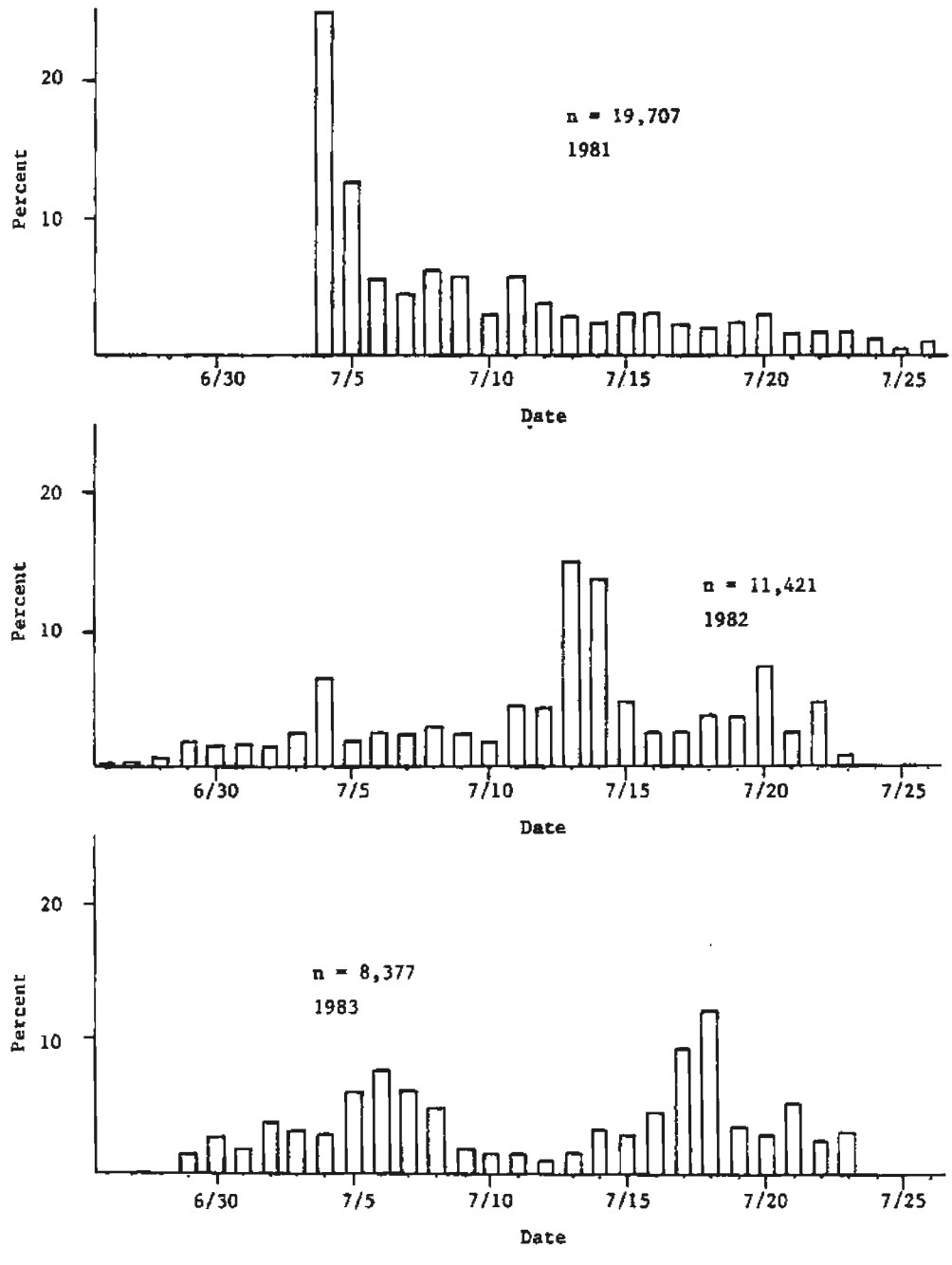


Figure 3. Comparison of Melozitna River summer chum salmon escapement timing past the east bank sonar counter in 1981, 1982, and 1983.

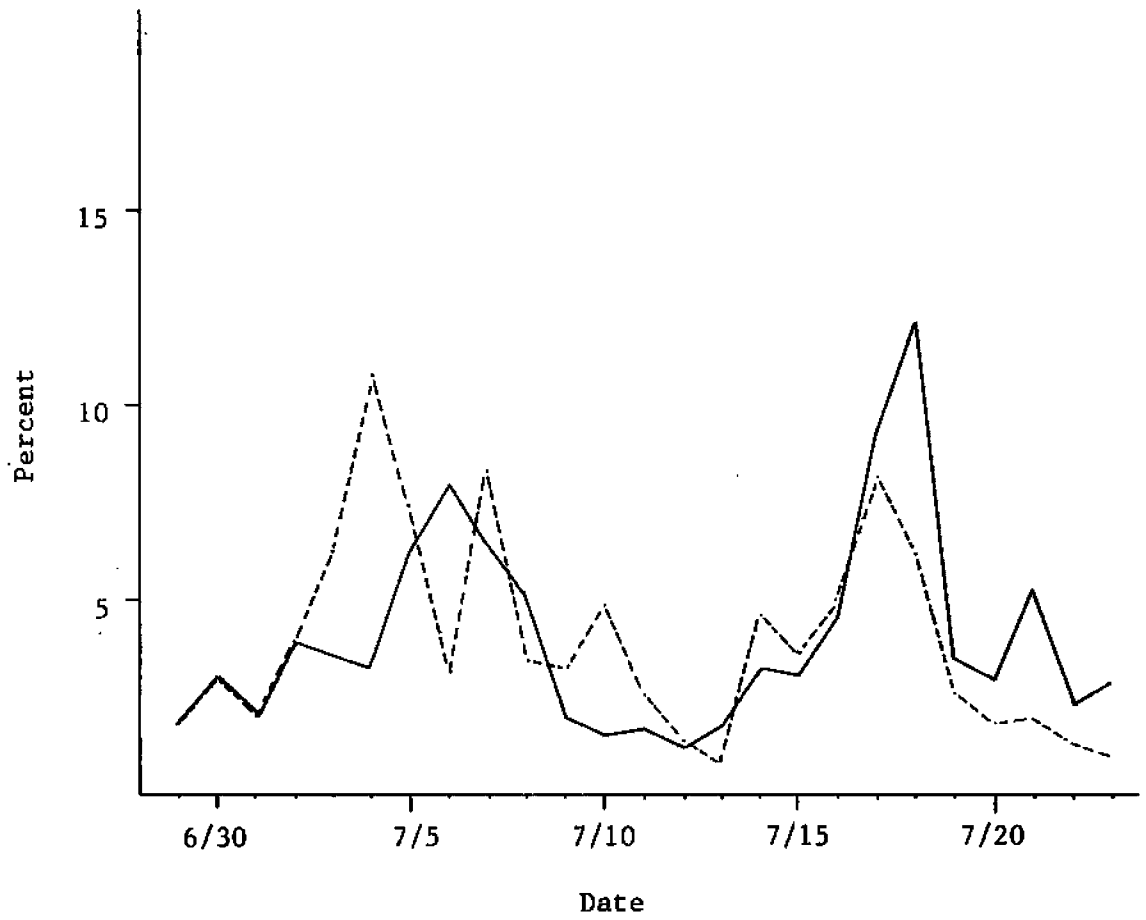


Figure 4. Relative timing of Melozitna River summer chum salmon escapement past east bank sonar counter (solid line) and west bank counter (broken line), June 29 through July 23, 1983.

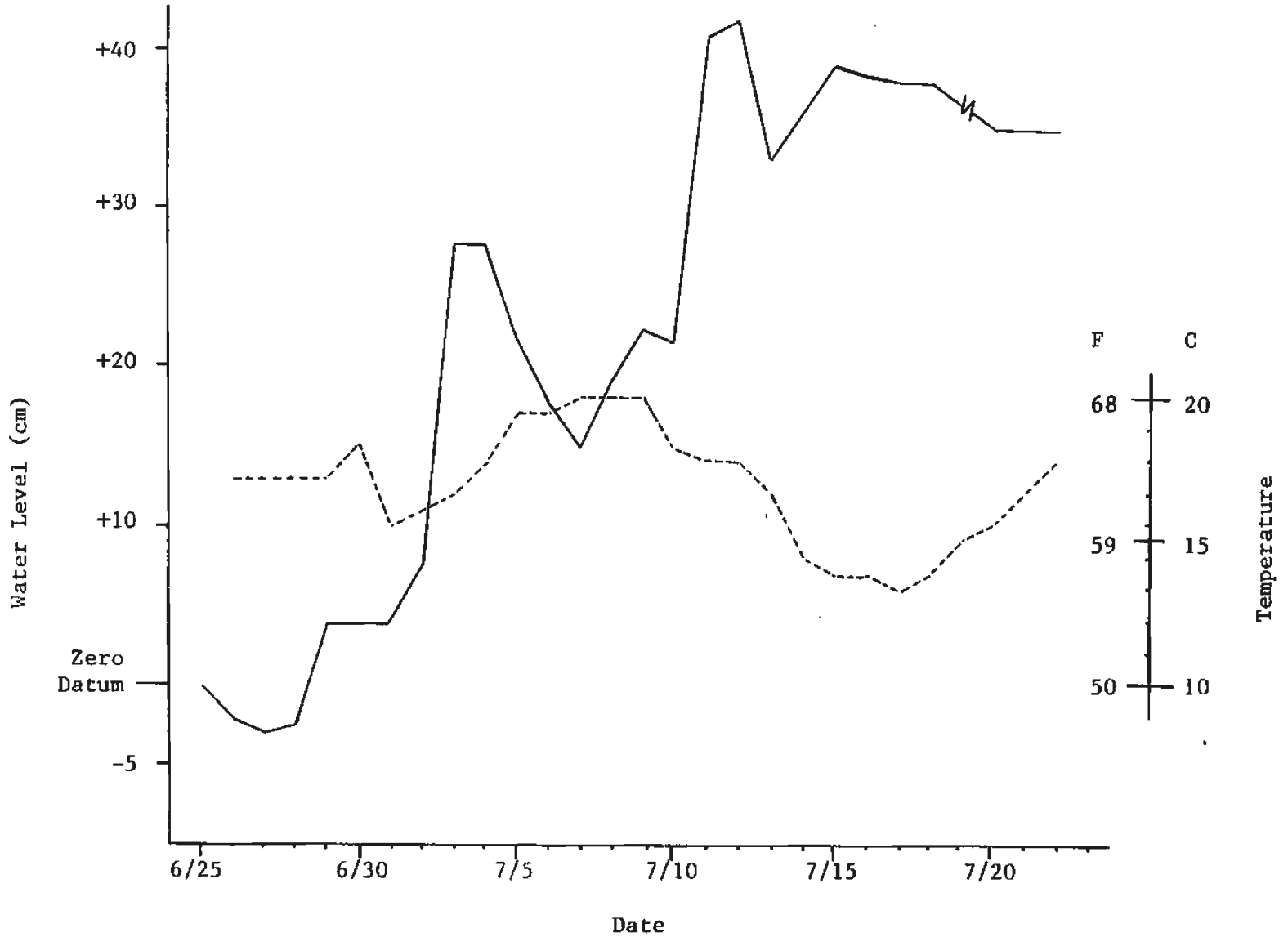


Figure 5. Daily changes in water level (solid line) and surface water temperature (broken line) at the Melozitna River sonar site, June 25 through July 22, 1983.

Table 1. Surface water temperature measured in the Melozitna River at the sonar counting site, 1981-83.

Date	Surface water temperature (°F)		
	1983	1982	1981
6/25	--	62	--
6/26	63	64	--
6/27	63	62	--
6/28	63	60	--
6/29	63	58	--
6/30	65	57	--
7/1	60	57	57
7/2	61	56	57
7/3	62	58	57
7/4	64	--	53
7/5	67	60	51
7/6	67	58	52
7/7	68	59	52
7/8	68	64	52
7/9	68	64	43
7/10	65	65	48
7/11	64	--	54
7/12	64	63	57
7/13	62	61	57
7/14	58	61	57
7/15	57	59	59
7/16	57	57	59
7/17	56	56	57
7/18	57	59	55
7/19	59	59	54
7/20	60	61	55
7/21	62	63	54
7/22	64	55	55
7/23	--	54	55
7/24	--	--	57
7/25	--	--	59
7/26	--	--	59
7/27	--	--	57
Average	62.5	59.7	54.9

occurred in early July, as revealed from the first appearance of spawned-out chum salmon carcasses on July 10 on the gravel bar at the sonar site. Two surveys were flown in 1983 on July 25 and July 29. Both surveys were conducted under poor counting conditions and included only Melozi Hot Springs Creek. The highest count was made on July 29. Eleven king salmon and 776 chum salmon were observed. Extent of spawning could not be precisely evaluated due to poor survey conditions. Live chum salmon were difficult to see, and the above count was 67% carcasses. It is likely that spawning was near its peak.

Distribution: Width of the Melozitna River at the sonar site was estimated to be 186 feet on June 29, 1983. Only 20 feet of river width remained un-insonified after substrate installation and weir construction were completed. However, only the west-bank counting unit was operated from June 29 through July 2. Consequently, 96 feet of the eastern portion of the river was unsampled during that period. The east-bank counter was not operable until July 3. Surface water velocities, measured daily at four locations across the sonar counting site, are shown in Table 2.

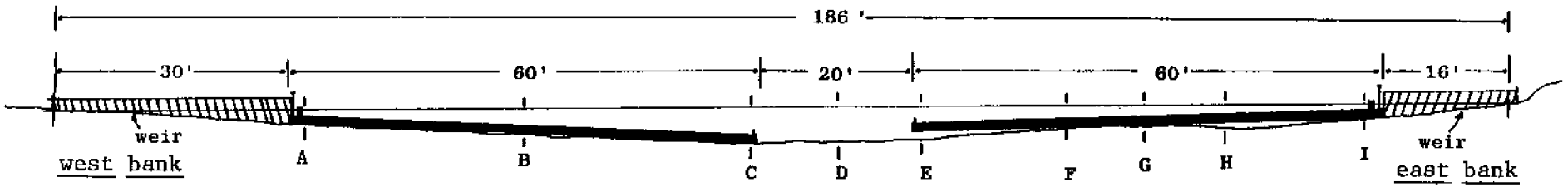
The transducer for each model sonar counter normally transmits a 4° beam which enumerates fish passing through the first half of the counting range and, alternately, a 2° beam which enumerates fish passing over each substrate in the outer half of the counting range. The approximate diameter of insonified water at the end of the 4° and 2° beams at 30 and 60 feet from the transducer, respectively, is 25.2 inches. Thus, a minimum water depth above the midsection and target end of each deployed substrate of 26 to 27 inches is required to prevent river-surface counts. On June 29, only 28 and 19 inches of water flowed over the target and midsection, respectively, of the east-bank substrate (Figure 6). Not until July 3 did the river level rise enough (9.4 inches) to allow function of the east-bank counter. The east-bank counter was operated only on the 2° beam for duration of the project, as water level conditions were never high enough to allow operation with both 2° and 4° beams without generating false counts from the water surface near the midsection of the substrate (i.e., the end of the 4° beam counting range). After both counters were operable, no less than 89% of the river's width was insonified for duration of the project. Only 20 feet remained unsampled.

Although distribution of salmon counts by sonar sector differed between riverbank (Figure 7), distribution across each substrate was similar to that in 1982. In both years, only 27% of the west-bank counts occurred in the outer half of the counting range. In 1983, 4% were in the last 3.75 feet of the counting range as compared to 5% in 1982, suggesting some salmon may have passed upstream undetected.

Sixty-four percent of the salmon counted on the east side of the river in 1983 passed through the outer half of the counting range, with 9% in the last 5 feet. Corresponding figures in 1982 were 61% and 7%, respectively.

Table 2. Surface water velocities (ft/sec) measured at four locations across the east- and west-bank sonar substrates, Melozitna River, 1983.

Date	West substrate		East substrate	
	Transducer	Target	Transducer	Target
6/25				4.3
6/26			2.3	3.9
6/27	1.8	3.8	2.5	4.2
6/28	1.8	3.7	2.4	4.1
6/29	2.1	4.1	2.7	4.6
6/30	1.9	3.9	2.7	4.4
7/1	1.9	3.9	2.6	4.4
7/2	2.0	4.0	2.7	4.6
7/3	2.8	4.8	3.5	5.2
7/4	2.5	4.6	3.6	5.2
7/5	2.3	4.3	3.1	4.9
7/6	2.3	4.2	3.0	4.8
7/7	2.3	4.4	2.9	4.9
7/8	2.5	4.4	3.1	4.9
7/9	2.5	4.6	3.3	4.9
7/10	2.5	4.6	3.3	5.2
7/11	2.8	5.1	3.8	5.3
7/12	2.8	4.9	3.8	5.2
7/13	2.5	4.4	3.2	4.9
7/14	2.7	4.6	3.3	5.1
7/15	2.6	4.7	3.5	5.2
7/16	2.7	4.7	3.4	5.2
7/17	2.5	4.4	3.3	4.9
7/18	2.5	4.4	3.1	4.9
7/19	2.5	4.4	3.1	4.7
7/20	2.4	4.3	3.0	4.6
7/21	2.3	4.2	3.0	4.6
7/22	2.3	4.2	3.0	4.6
Average	2.3	4.3	3.0	4.7



Location	Inches of Water: Above Substrate	Inches of Water: Below Substrate
A	13	0
*B	29	4
*C	44	0
D	54	(water depth)
*E	28	16
F	21	5
*G	19	4
H	17	10
I	12	1

*A minimum of 26" above the substrate is necessary to prevent surface counts.

Figure 6. Depth profile (upstream view) of the Melozitna River taken at the sonar site on June 29, 1983.

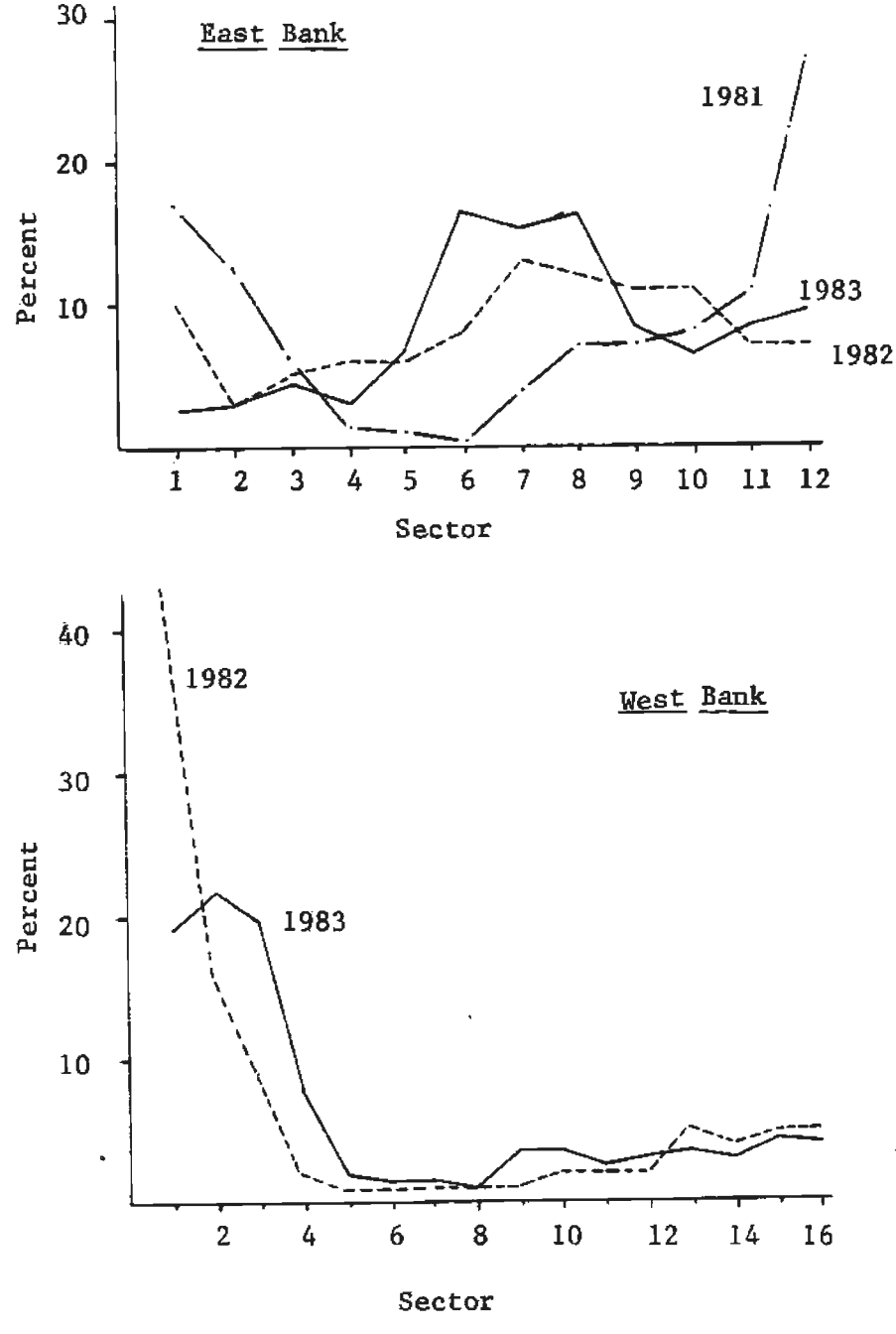


Figure 7. Distribution of salmon counts by sonar sector along the east bank (top) and west bank (bottom) Melozitna River, 1981 through 1983.

Although distribution of fish across each sonar substrate was similar between years, distribution by bank differed in 1982 and 1983, with the west-bank unit sampling a higher proportion of the salmon run in 1983 than in 1982:

	Estimates of Salmon Distribution in Percent	
	1982	1983
East-bank sonar	50	41
Midriver[a]	13	12
West-bank sonar	37	47
	100 (22,710 fish)	100 (20,126 fish)

[a] Midriver estimates are based upon analysis of total salmon counts by sector for each substrate and distance of un-insonified water between substrates.

It is likely that less than 41% of fish passing the sonar site in 1981 was sampled by the east-bank counter, based upon the distribution of counts across the substrate in that year (Figure 8). Again, similar to 1982 and 1983, 63% of the east-bank counts in 1981 were over the outer half of the substrate. However, 26% were recorded in the outer 5 feet in 1981 and nearly 38% in the last 10 feet. This strongly suggests that a substantial number of salmon passed beyond the counting range undetected.

Knowledge of salmon spawning distribution within the Melozitna River drainage is primarily confined to observations made on about six clear-water streams (Figure 1). King salmon have only been observed in two of the index streams, Blacksand Creek and Melozi Hot Springs Creek, while chum salmon occur in all six streams. Both species have been observed in the mainstem Melozitna River between Fox Creek and Melozi Hot Springs Creek. Whether salmon spawn in this area or use it only during migration to tributary streams is not known.

Aerial surveys indicate that Melozi Hot Springs Creek is the most important for both king and chum salmon spawning, followed by Blacksand Creek. Fox, Turnaround, and Wolf creeks are next in importance for chum salmon spawning. The fewest number of chum salmon has been observed in Big Creek.

Personnel from the Bureau of Land Management reported the presence of numerous chum salmon carcasses in the Little Melozitna River in September 1980 and 1981 (J. Webb, personal communication). Webb also reported chum salmon carcasses present in early September 1982, but in markedly reduced numbers. It is not known if those chum salmon are a later spawning

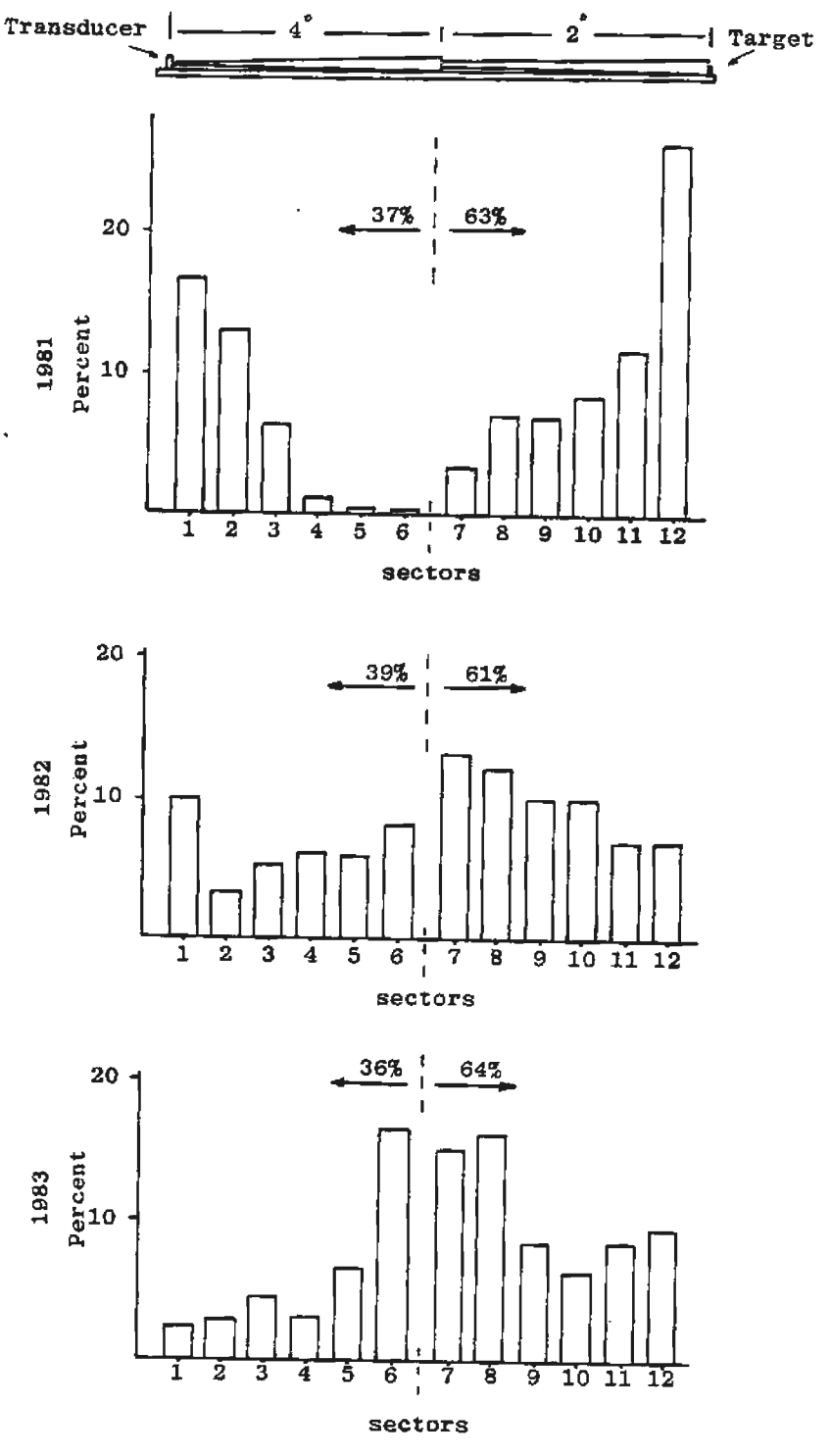


Figure 8. Distribution of salmon counts by sonar sector across the east bank substrate in the Melozitna River, 1981 through 1983.

population (fall chums) or late spawning summer chums. The Department has never surveyed the Melozitna River drainage in the fall months.

Abundance: The salmon sonar estimate from June 29 through July 23, 1983 was 17,761 (Table 3). A minimum of 2,365 additional salmon are estimated to have passed between the sonar substrates undetected, based upon an analysis of salmon distribution over each substrate (Figure 9). Total salmon counts by sector for each substrate were plotted, and a minimum estimate of salmon passing between the sonar units undetected was considered to be represented by the area under the curve between the two substrate targets. The final sonar-estimated Melozitna River salmon escapement in 1983 is 20,126.

The large-fish discriminator in the west-bank sonar counter identified 61 fish (0.66%) as king salmon. Applying this percentage to the total salmon escapement estimate (20,126) would result in a species composition of 132 king salmon and 19,994 summer chum salmon. The percentage identified as king salmon during 1982 studies was 0.36%. The same 1981 sonar counter used on the west bank during Melozitna River field investigations was deployed in the Sheenjek River in September 1981 and 1982 to monitor fall chum escapements to that river. Although there are no king salmon that utilize the Sheenjek River during the September migration of fall chum salmon, 0.37% and 0.35% of the 1981 and 1982 sonar counts, respectively, were registered by the counter as king salmon (Barton 1982b). Consequently, the final 1983 Melozitna River escapement estimate (20,126) is considered summer chum salmon, with a very small and unknown percentage of king salmon. Only 11 king salmon were observed in Melozi Hot Springs Creek on the July 29 aerial survey.

Test gillnet catches in the Melozitna River in 1983 were extremely small for the duration of the project due to very low water conditions. Consequently, results cannot be used to examine salmon timing, distribution, or species composition. However, past aerial surveys and our studies show that few king salmon utilize the Melozitna River drainage (Table 4). The largest number of king salmon observed (136) was in 1975.

As previously stated, Melozitna River summer chum salmon escapements in 1983 and 1982 ware similar, 20,126 and 22,710 fish, respectively. A total estimate of 19,707 fish was made with a single sonar unit during the 1981 feasibility study. Test-netting results in that year, together with an examination of upstream migrant distribution across the east-bank substrate, show that a substantial number of salmon passed beyond the sonar counting range. These observations suggest that no more than 41% of the salmon passing the sonar site in 1981 were counted by the east-bank unit. Simple expansion of this figure would result in an escapement estimate of 48,065 salmon from July 3 through July 26, 1981. However, in view of the early run timing in 1981 in comparison to 1982 and 1983, and the likelihood of 50% run passage having occurred prior to sonar operations in that year, it is hypothesized that the 1981 summer chum

Table 3. Melozitna River daily and cumulative sonar counts from June 29 through July 23, 1983.

Date	East-bank counter		West-bank counter		Daily total		Cumulative total	
	Sonar count	%	Sonar count	%	Counts	%	Counts	%
6/29[a]	153[b]	1.8	172	1.8	325	1.8	325	1.8
6/30[a]	251[b]	3.0	283	3.0	534	3.0	859	4.8
7/1[a]	177[b]	2.1	200	2.1	377	2.1	1236	7.0
7/2[a]	335[b]	4.0	378	4.0	713	4.0	1949	11.0
7/3	303	3.6	676	7.2	979	5.5	2928	16.5
7/4	273	3.3	1000	10.7	1273	7.2	4201	23.7
7/5	530	6.3	690	7.4	1220	6.9	5421	30.5
7/6	659	7.9	291	3.1	950	5.3	6371	35.9
7/7	533	6.4	783	8.3	1316	7.4	7687	43.3
7/8	420	5.0	328	3.5	748	4.2	8435	47.5
7/9	166	2.0	313	3.3	479	2.7	8914	50.2
7/10	135	1.6	451	4.8	586	3.3	9500	53.5
7/11	142	1.7	240	2.6	382	2.2	9882	55.6
7/12	99	1.2	130	1.4	229	1.3	10,111	56.9
7/13	143	1.7	77	0.8	220	1.2	10,331	58.2
7/14	264	3.2	435	4.6	699	3.9	11,030	62.1
7/15	246	3.0	336	3.6	582	3.3	11,612	65.4
7/16	383	4.6	464	4.9	847	4.8	12,459	70.1
7/17	771	9.2	763	8.1	1534	8.6	13,993	78.8
7/18	1006	12.0	570	6.1	1576	8.9	15,569	87.7
7/19	289	3.4	243	2.6	532	3.0	16,101	90.7
7/20	239	2.9	167	1.8	406	2.3	16,507	93.0
7/21	437	5.2	176	1.9	613	3.5	17,120	96.4
7/22	189	2.3	122	1.3	311	1.8	17,431	98.1
7/23	234[c]	2.8	96[d]	1.0	330	1.9	17,761	100.0
Total	8377	100.2	9384	99.9	17,761	100.1	-	-

[a] River level was too low to operate east-bank sonar counter.
[b] These estimates are based on percent distribution of counts between banks when both counters were functional from July 3-23.
[c] Actual count was 161 from 0001-1655 hours. Count was expanded to 234 based on average percentage of salmon counted along east bank on July 20, 21, and 22 from 1701-2400 hours.
[d] Actual count was 63 from 0001-1140 hours. Count was expanded to 96 based on average percentage of salmon counted along west bank on July 20, 21, and 22 from 1201-2400 hours.

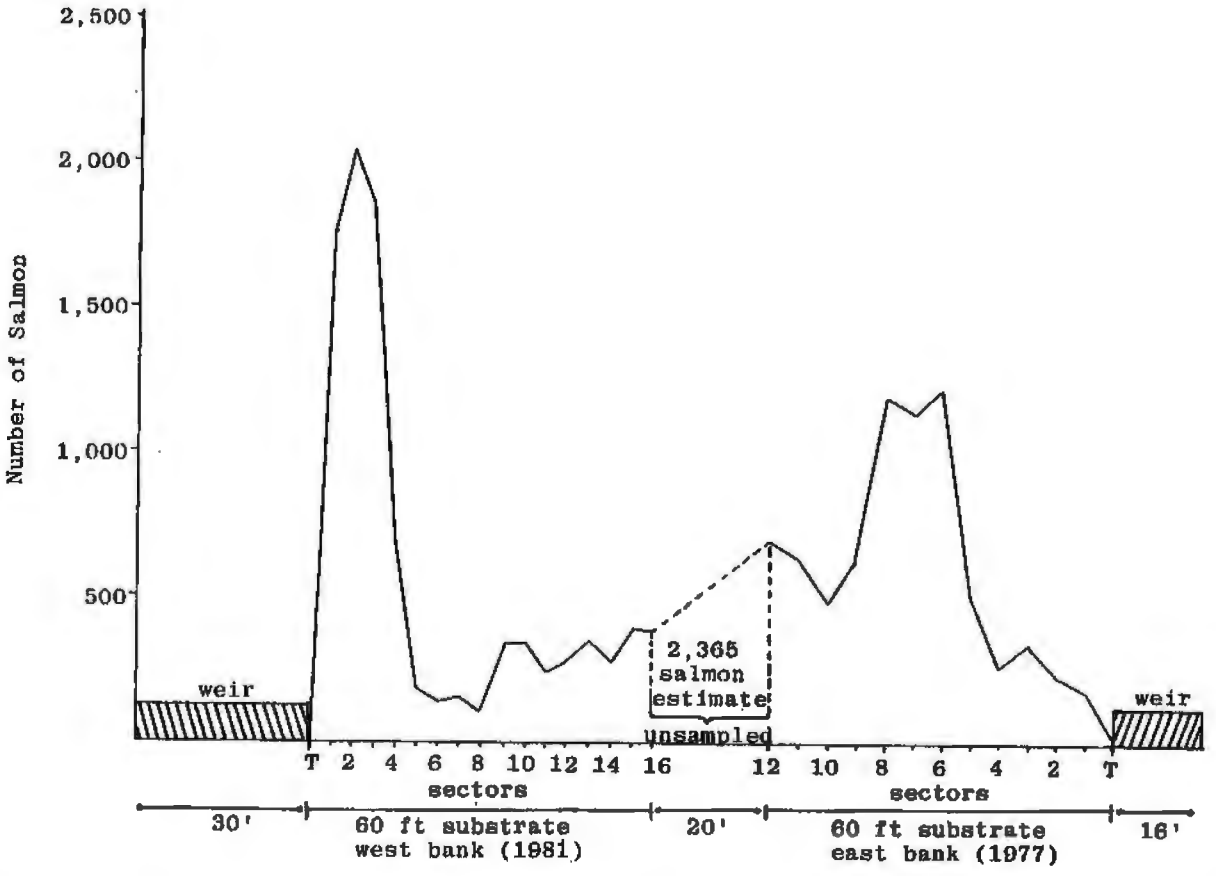


Figure 9. Estimated number of salmon in the Melozitna River passing the sonar site undetected based upon salmon distribution over each substrate from June 29 through July 23, 1983.

Table 4. Comparative king and summer chum salmon escapement estimates based on aerial surveys of selected index streams in the Melozitna River drainage, 1975–1983.[a]

	1975		1976		1977		1978		1979		1980		1982		1983	
	Kings	Chums	Kings	Chums	Kings	Chums	Kings	Chums	Kings	Chums	Kings	Chums	Kings	Chums	Kings	Chums
Mainstem Melozitna R.	31	2068	1	200												
Blacksand Cr.		2971	3	450	2	75	1	1054		625(23)						
Fox Creek		1835				41		309		57(16)		73(17)				
Turnaround Cr.		863		40				196		268(16)						
Melozi Hot Springs Cr.	105	4196	9	1768	13	1014	8	4012	9	1469(16)	11	6345(29)	9[b]	464[b]	11	776(29)
Wolf Creek										160(16)						
Big Creek										4(20)						
Totals	136	11,933 (29)	13	2458 (25)	15	1130 (20)	9	5571 (13)	9	2583 (16,20,23)	11	6418 (17,29)	9	464	11	776 (29)

[a] Numbers in parentheses show dates in July that observations were made.
No surveys were flown in 1981 due to bad weather.

[b] Survey flown August 5.

salmon run to the Melozitna River may have actually been on the order of 96,000.

Age-Sex-Size Composition: Twenty-four gillnet drifts were made from July 1-15 in the vicinity of the sonar site in 1983, amounting to more than 14 hours of total fishing time. Extreme low water levels, together with low numbers of salmon migrating upstream, resulted in no catch. From July 10-22, 14 set gillnet sets were made for a total soak time of 72 hours. Five five chum salmon were captured: two females and three males.

Unlike 1981, when chum salmon carcasses appeared on the gravel bar near the sonar site, providing additional AWL samples, no carcasses appeared in the area in 1983.

Summary

1. An escapement estimate of 20,126 summer chum salmon was made in the Melozitna River from June 29 through July 23, 1983. The count includes an estimated 2,365 salmon that migrated upstream beyond the sonar range of either counter. It is likely that a very small percentage (less than 1.0%) of the count was king salmon.

2. The 1983 salmon run was bimodal, with peaks occurring on July 7 and 18. Based upon date of 50% run passage (July 9), the 1983 run was 5 days earlier than in 1982.

3. The west-bank counter accounted for 47% of the 1983 migration; the east-bank counter 41%. An estimated 12% migrated upstream between the counting unit substrates undetected by sonar.

4. Upstream migration timing was similar between riverbanks, and no differences in timing were observed with respect to daylight versus darkness.

5. River surface water temperature at the sonar site ranged from 56°F to 68°F, with an average of 62.5°F for duration of the project. The average in 1983 was 2.8°F and 7.6°F warmer than the 1982 and 1981 average temperatures, respectively, probably due to low water conditions prevailing in 1983.

6. Low water level greatly hindered gillnet test fishing, resulting in a catch of only five chum salmon.

7. Two aerial escapement surveys of Melozi Hot Springs Creek were flown in 1983 under poor survey conditions. The highest count was 11 king and 776 chum salmon on July 29.

Conclusions

1. Timing and magnitude of the 1982 and 1983 chum salmon runs to the Melozitna River were similar, peaking near mid-July. However, the 1981 run peaked approximately a week to 10 days earlier and was much larger in magnitude. The 1981 sonar-estimated escapement was expanded from 19,707 to 48,065 for the period July 3-22 based upon subsequent years' studies, with a total escapement estimate of approximately 96,000 after expansion for the time period missed. This would indicate that the 1982 and 1983 summer chum salmon escapements to the Melozitna River were 76% and 79% lower than the 1981 escapement, respectively. By comparison, the 1982 (444,581) and 1983 (362,912) Anvik River sonar-estimated summer chum salmon escapements were 70% lower than the 1981 (1,479,582) escapement, respectively (Buklis, 1984).

2. Mainstem spawning in the Melozitna River does occur, at least in years of high returns (e.g., 1981). The extent and location of mainstem spawning still remain unknown. Gillnetting studies, together with aerial surveys, are needed to examine the extent of mainstem spawning.

3. Daily acquisition of salmon escapement data to the Melozitna River provides information on a timely basis which is useful to biologists for managing commercial salmon harvests in the middle Yukon River, particularly in commercial fishing district Y-4 upstream of the confluence of the Koyukuk River. However, intensive escapement monitoring on the Melozitna River has been terminated after evaluation against the importance of other data-acquisition field programs that provide in-season management data. For example, daily test fish catches at a Department site near Kaltag provide a measure of relative run magnitude and timing, not only of that segment bound for the Melozitna River, but populations bound for other middle Yukon River spawning streams as well.

Literature Cited

Barton, L. H. 1982a. Enumeration of summer chum and king salmon by side-scanning sonar in the Melozitna River in 1981. Alaska Dept. Fish and Game, Fairbanks. January 1982. 19 pp.

_____. 1982b. Side-scan sonar (1981-16 sector model). Intra-Departmental memorandum, Alaska Dept. Fish and Game, Fairbanks. December 8. 6 pp.

_____. 1983. Enumeration of summer chum and king salmon by side-scanning sonar in the Melozitna River in 1982. Alaska Dept. Fish and Game, Fairbanks. February 1983. 19 pp.

Buklis, L. S. 1982. Anvik, Andreafsky and Tanana River escapement studies, 1981. Alaska Dept. Fish and Game, Anchorage. March 1982. 40 pp.

_____. 1983. Anvik and Andreafsky River salmon studies, 1982. Alaska Dept. Fish and Game, Anchorage. February 1983. 52 pp.

_____. 1984. Anvik and Andreafsky River salmon studies, 1983. AYK Region, Yukon Salmon Escapement Report #23, Alaska Dept. Fish and Game, Anchorage.