FINAL REPORT

EVALUATION OF FISH PASSAGE IN THE VERTICAL SLOT REGULATING SECTION OF THE SOUTH SHORE LADDER AT JOHN DAY DAM

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Pij: time in hours for i percentile at j count station
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i=2: 80th percentile
j=1: Corps of Engineers count station
j=2: count station at weir 248
j=3: count station at slot 33 . . . . . .

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EVALUATION OF FISH PASSAGE IN THE VERTICAL SLOT REGULATING SECTION OF THE SOUTH SHORE LADDER AT JOHN DAY DAM

INTRODUCTION

The reluctance of shad to pass through the orifice-type regulating sections (Figure 1) of the fish ladders has been a serious problem at John Day Dam. During the shad run the pools of the regulating sections have become extremely crowded with fish and many shad have died in the ladders before spawning.

After the first year of operation (1968) the Corps of Engineers modified the existing baffles (enlarged the center orifices) in the regulating section of the north fish ladder in an attempt to improve shad passage. These modifications alleviated the condition; however, it was apparent that major changes would have to be made in the regulating section to resolve the shad passage problem. In 1969 studies were initiated at the Fisheries Engineering Research Laboratory at Bonneville Dam to obtain basic information on factors influencing the behavior and performance of shad in fish ladders to aid in the redesign of these facilities. This work was closely coordinated with design studies being conducted by the Corps at the Bonneville Hydraulic Laboratory so that hydraulic characteristics and fish passage attributes of new design concepts could be evaluated simultaneously.

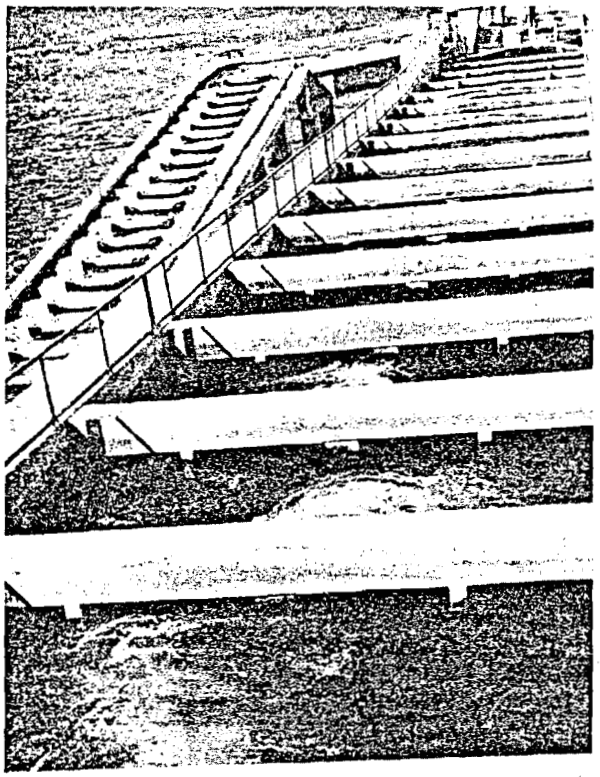


Figure 1.--Orifice-type regulating section of the north fish ladder at John Day Dam. A group of shad is visible in the foreground at the right.

The coordinated effort of Engineers and Biologists resulted in the development of a vertical slot fish ladder (Figure 2) that effectively passed shad in the laboratory and provided adequate flow regulation in the Corps' model of the John Day fish ladder. The Corps, with concurrence of State and Federal fishery agencies, installed the new slot-type ladder in the regulating section of the south ladder at John Day Dam during the winter of 1970 (Figure 3); and, at the request of the fishery agencies, contracted the National Marine Fisheries Service to evaluate the prototype installation the following year. Modification of the regulating section in the north ladder was deferred until the evaluation study was completed.

The objective of the evaluation study was to ensure that the new vertical slot regulating section would satisfactorily pass shad and all other species of fish that ascend the John Day fish ladders.

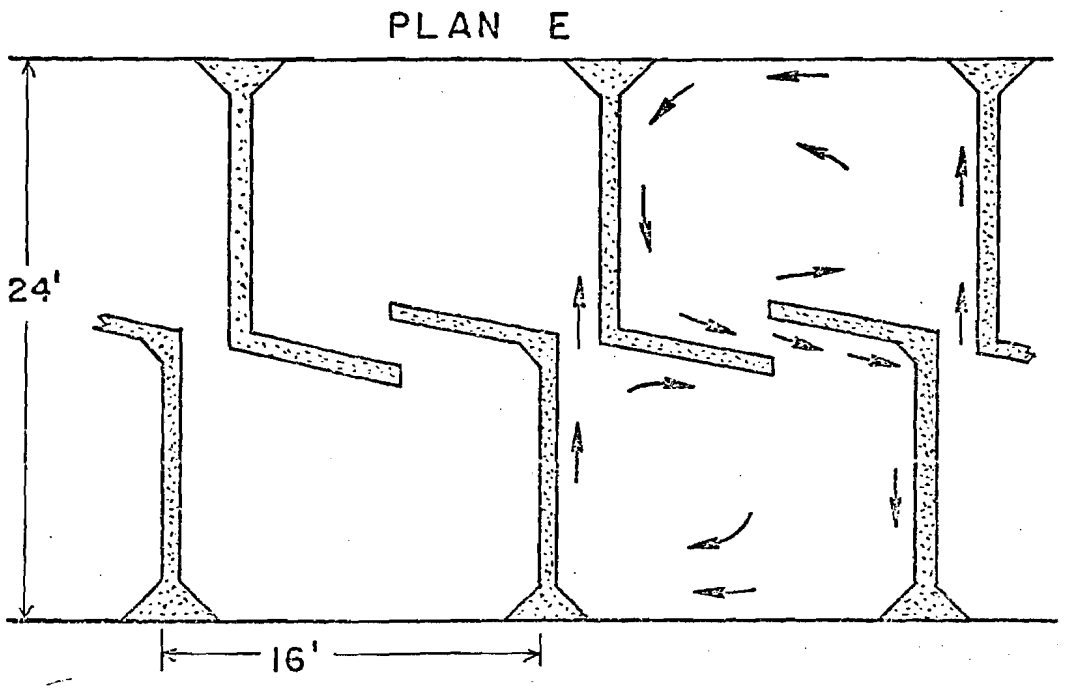


Figure 2.--Plan view of the slot-type fish ladder tested in the laboratory and later installed in the regulating section of the south fishway at John Day Dam. Arrows indicate flows 1 foot below the surface at maximum flow. From Corps of Engineers drawing.

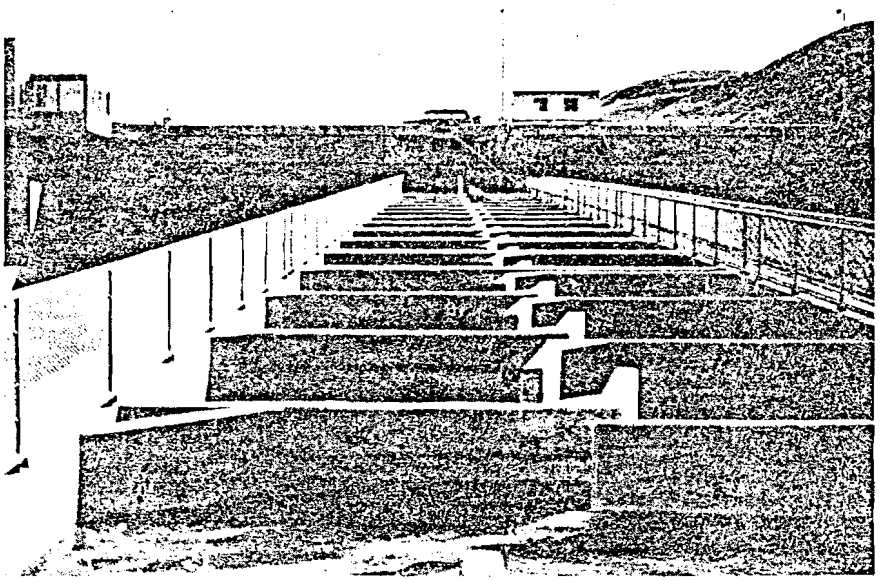


Figure 3.--The new slot-type regulating section of the south fish ladder at John Day Dam. The ladder was photographed from weir 248 and the viewer is looking upstream (east).

METHODS AND MATERIALS

Several criteria were used to evaluate fish passage in the regulating section of the south fish ladder. These included the (1) proportions of fish that completed the regulating section during test periods, (2) rates at which fish passed through the regulating section, (3) frequency of fall-backs or downstream passage from the regulating section, and (4) leaping behavior of fish in the regulating section. Similar observations made in the overfall section of the ladder were used to judge the relative efficiency of the regulating section. If these observations demonstrated that fish performed as well in the regulating section as they did in the overflow section of the ladder, we would conclude that the slot-type regulating section was operating satisfactorily.

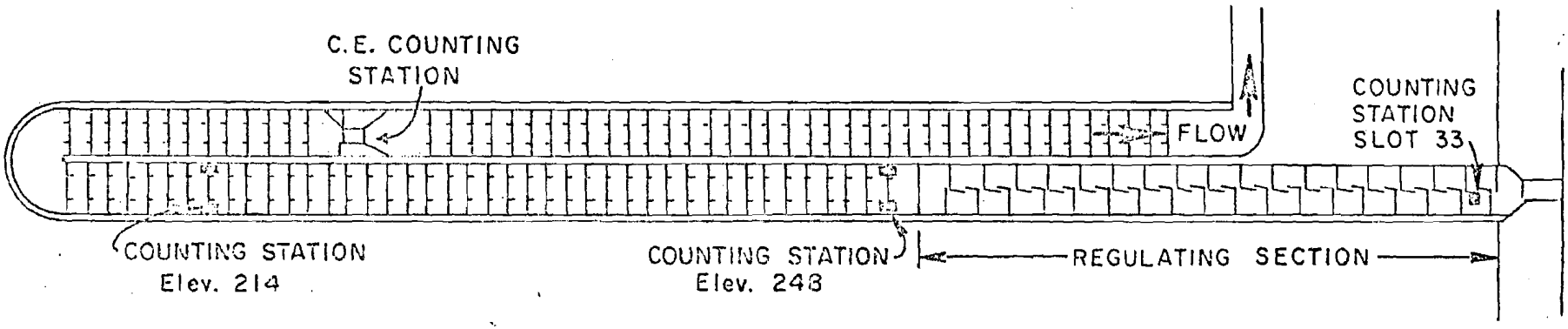
Fish passage was generally monitored at three sites in the south ladder. One site was located at the upper end of the regulating section, another was located at the downstream end of the regulating section, and the third site was located in the overflow section of the ladder. Counting stations were established at each of these sites and all fish passing these stations during our test periods were tallied on a recorder that designated species, direction of passage (either upstream or downstream), and time of passage.

Counting Stations

The original plan was to count at weir elevations[1/] 214 and 248 in the overflow section and at slot 33 in the regulating section (Figures 4 and 5). An extra counting station was added at weir 246 so we could count there in case our counting at weir 248 interrupted fish passage into the regulating section. It was never necessary to count at weir 246.

Fish were counted at weirs 214 and 248 as they swam over the weirs. The orifices in these weirs were screened to force all fish over the weir crests (Figure 6). In the interim between tests, orifice screens were opened and left flat on the fishway floor (Figure 6).

1/ Elevations used in this report are feet above mean sea level.



PLAN VIEW

Figure 4.--South fish ladder at John Day Dam showing location of counting stations that were used in the evaluation study.

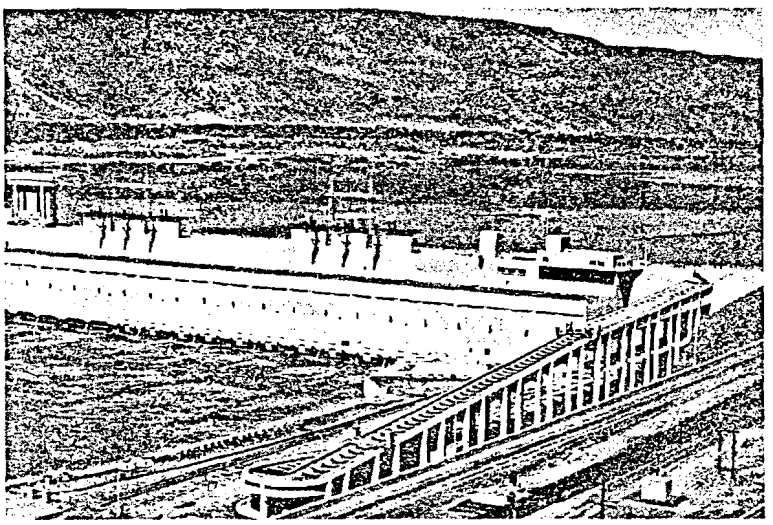
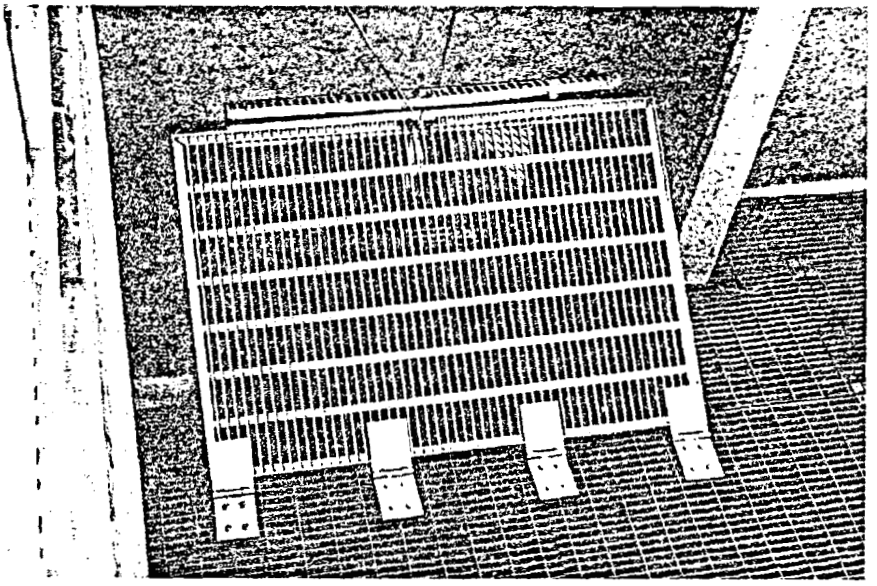


Figure 5.--A view of the south fish ladder at John Day Dam showing counting stations and the operation center (the small building on the roadway above the fishway).



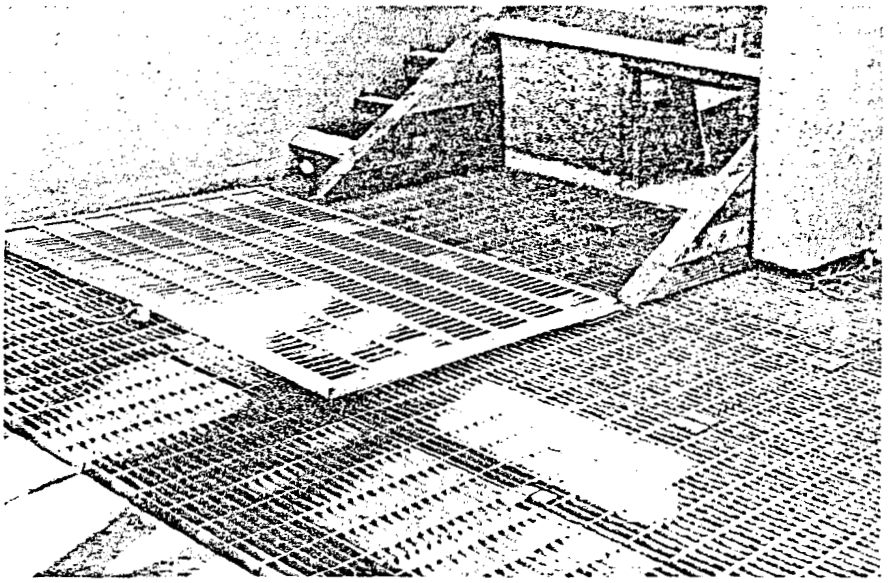


Figure 6.--The upstream side of the south orifice at weir elevation 248 showing the orifice screen closed (top) and opened (bottom). The north orifice was screened in the same manner.

From the beginning we were concerned about the poor visibility for counting at weir 214 (Figure 7) so we stationed an additional counter at the Corps of Engineers counting station at elevation 194 to count during our tests. Conditions at weir 214 were better during the spring run than during the summer run when a combination of small fish and poor visibility in the turbulent overfall made accurate counting and identification impossible. The turbulent overfall was caused by the orifice jet upstream from the counting weir. Early in the summer run we stopped counting at weir 214 but continued counting at the Corps station during all the fishway evaluation tests.

Conditions at weir 248, although vastly better than weir 214, were not up to expectations. Visibility was impaired by turbulence, wind, turbidity, shadows cast from the counting shelters and at times by large numbers of lampreys clinging to the walls of the fish ladder. It was difficult to identify fish and often the smaller ones could not be seen as they crossed the weir. Counting at this station was confounded at times by the behavior of fish in the pool immediately upstream from the weir. Fish frequently drifted back to the weir crest from this pool and then at the verge of falling downstream darted back upstream into the pool. Even with careful surveillance of the weir crest it was difficult for observers to distinguish between this maneuver and the ascent of a fish from the pool below.

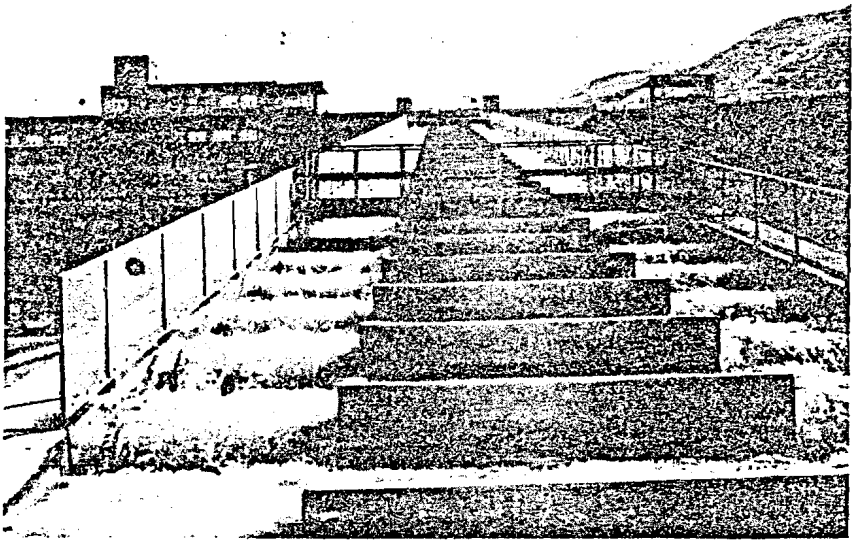


Figure 7.--Overflow pools of the south fish ladder viewed from below weir 214.

Our counts at the Corps station were probably more accurate than at any other counting station. The submerged window in the counting channel afforded the observers an excellent view of the fish and our counters could rely upon the experienced Corps counters to assist them in identifying the fish. Errors were made, however, even under these ideal counting conditions. Comparisons of simultaneous counts made by the Corps counters and our observers indicate that our counters may have missed or misidentified some of the fish that passed the Corps station. We suspect that some small fish (suckers, squawfish, chiselmouth, etc.) were missed by our observers because the bottom of the viewing window was a few inches above the bottom of the passage channel and it was difficult to see these small fish if they were swimming on the bottom and passed close to the wall below the bottom edge of the window.

Counting at slot 33 was accomplished with a submerged tank 4 feet wide, 6 feet long and 18.5 feet deep located adjacent to the slot on the upstream side. The side facing the slot was made of 2-inch thick plexiglass and provided a full view of the 1.5-foot wide slot from about 0.5 foot above the bottom to the surface. Television cameras in the tank photographed everything passing through the slot and observers identified and counted fish on TV monitors (Figure 8)

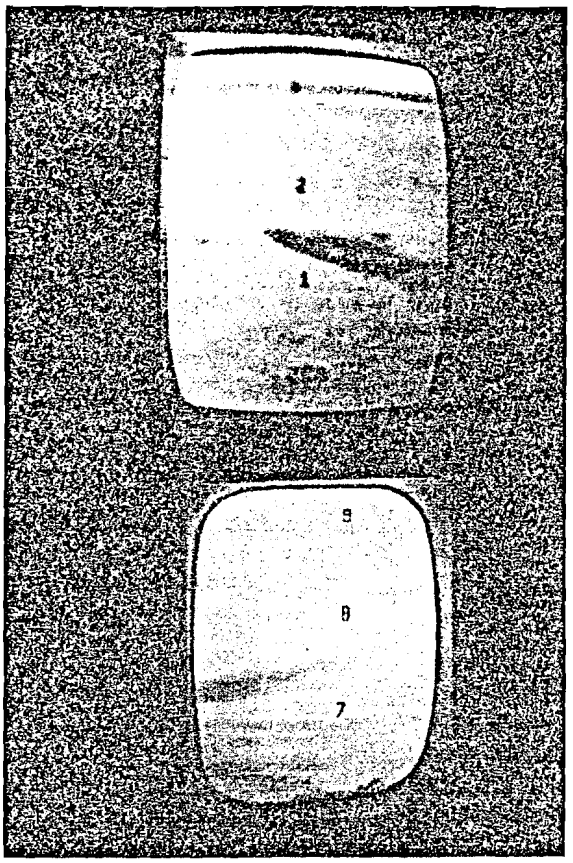


Figure 8.--Fish swimming through the counting station at slot 33 viewed on television screen in the operations center.

in the operations center on the roadway above the fishway. Two cameras were required to cover the passage area during intermediate flows in the spring and summer; but during fall tests, when the forebay rose to elevation 267, three cameras were required. A horizontal grill just upstream from the slot and in line with the top of the movable sill prevented fish from descending out of camera range.

The television cameras in the submerged tank generally transmitted a satisfactory view of the passing fish; and, although some errors were made by the observers in identifying fish, we doubt that many fish passed through the slot unobserved. The reduction in image size and lack of color on the television monitors made it somewhat difficult to distinguish between small salmonids and "other" species.

Lighting

Lights were installed above the water surface at each of the temporary counting stations to illuminate the counting areas. Weirs 214 and 248 were lighted by a 500-watt incandescent flood lamp over the weir crest, a 250-w. flood light just below the weir crest, and a 250-w. flood light over the pools above and below each counting weir. The counting channel at slot 33 was illuminated by two 1,500-w. quartz-iodide lights suspended about a foot above the water surface. These lamps had a combined emission of about 30,000 lumens which generally provided ample light for the TV cameras. The two pools below and above the slot were each lighted by a 550-w.

flood light. Lights in the pools on either side of the counting stations were provided so that fish would not be subjected to abrupt changes in light intensity as they passed the lighted counting stations.

The tunnel connecting the regulating section with the forebay was illuminated with three 500-w. quartz-iodide lights spaced at uniform intervals along the ceiling. The upstream end of the tunnel was illuminated with a 500-w. flood light mounted on the upstream side of the dam.

All lights could be moved some degree for the best effect. Most of the lights required very little adjustment, however, once they were set. All lights except the forebay light, were left on day and night during the tests.

Flow Conditions

Fairly constant flows prevailed in the overflow section of the ladder but flow conditions in the flow-control (regulating) section fluctuated with the forebay level. Velocities in the slots increased as the forebay rose and decreased as it dropped. At maximum forebay level (elevation 268) average head on weirs was 0.50 foot, at intermediate forebay level (elevation 263) 0.25 foot, and minimum forebay level (elevation 257) 0.10 foot.

During spring and summer tests forebay elevations were generally slightly above the intermediate level. They ranged from elevation 262.0 to 265.9.

During fall tests the forebay was generally just below the maximum level of 268. Actual levels on test days ranged from 266.7 to 267.7.

Operation Center

The hub of the evaluation study was the operations center -- a portable building at the upstream end of the south shore ladder. The building was partitioned into two rooms -- a semi-darkened TV viewing room where observers counted fish on TV monitors for the counting station at slot 33, and a data collecting center where an observer recorded data as the test progressed. Telephones at each counting station provided communication between fish counters and the observer recording data.

PROCEDURE

Tests were performed intermittently during the study. Generally testing was scheduled to coincide with the peaks of the different fish runs (Figure 9). Counts were usually made for two or more consecutive days during a run. Counting generally began at 4 a.m. (P.s.t.) and continued until dark (8 to 9 p.m.). On several occasions counting was continued through the night. These continuous counts lasted from 24 to 112 hours. All species of fish (except lampreys) were counted at the monitoring sites. Only three species categories (salmonids, shad, and "others") were used, however, in identifying the fish at each station.

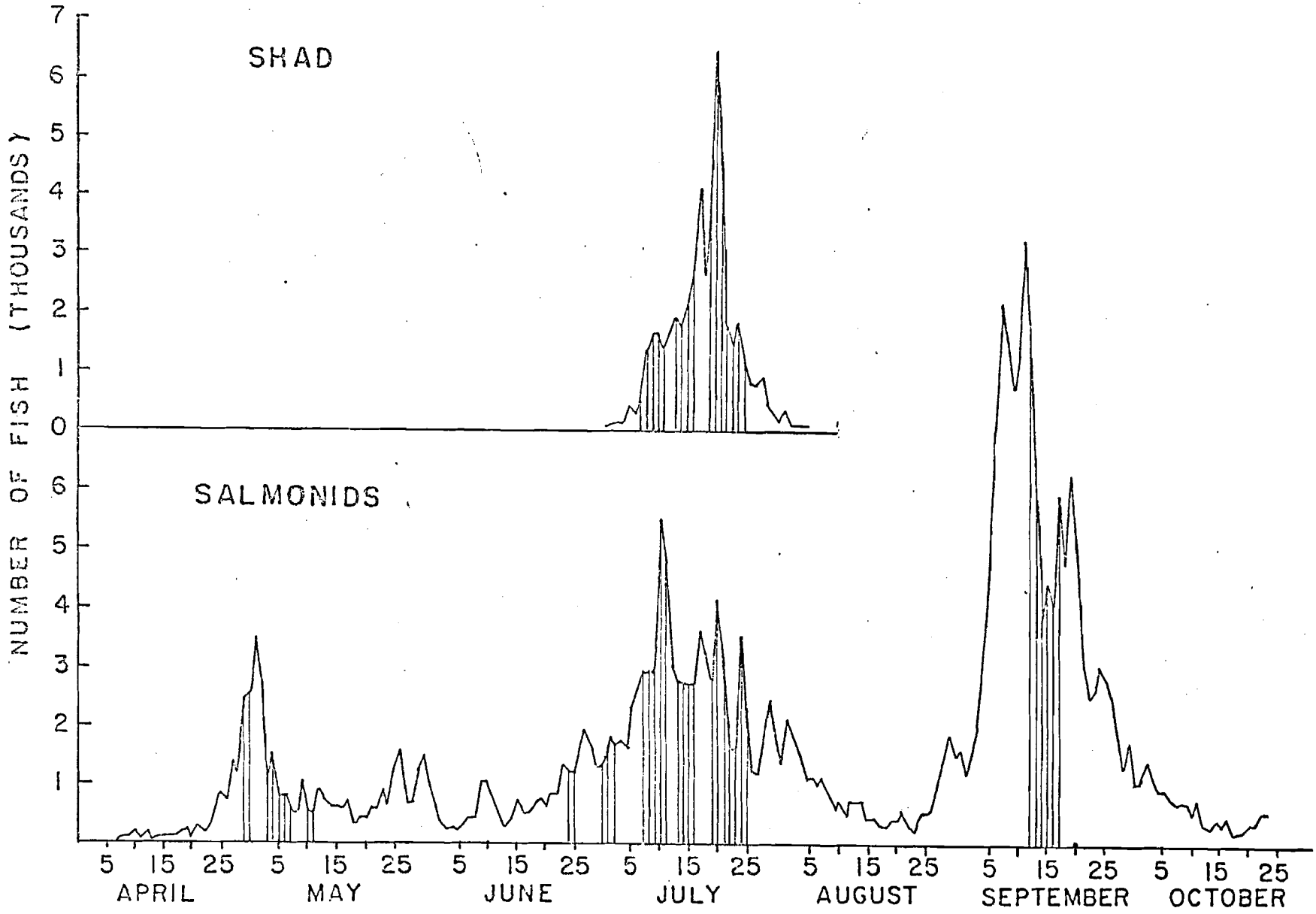


Figure 9.--Daily counts of salmonids and shad in the south shore ladder at John Day Dam. Vertical lines denote test days during the fishway evaluation.

Operational Sequence

Preparations for daily tests began at about 3:45 a.m. Lights were turned on, orifice grills were closed at the counting weirs, and TV cameras and monitors were turned on at slot 33. All fish counters drew a schedule for the day and proceeded to their first station whereupon they checked out their counter switch-buttons with the observer at the operations center. When the Corps fish counter started counting (4 a.m.) the recorder operator turned on the time-event recorders and notified all counters to commence counting. At the end of the test, each observer on duty reported to the operations center again to check out the counter switch-buttons before leaving. Finally, we opened the orifice grills and turned off the lights.

Continous counting was maintained at all stations. Observers were rotated so that each counter had an opportunity to count at each station during the test. Each observer remained at a station for 45-50 minutes, she was then relieved, took a 10-15 minute break, and proceeded to another station to relieve the counter there. Duration of counting periods and breaks varied with the number of observers available and the number of counting stations manned. Several schedules were made up to fit different counting situations.

Recording Fish Passage

Fish passage observed at each counting station was tallied on electric time-event recorders at the operations center. Each observer had a small switch box with six buttons to record the upstream and downstream passage of salmonids, shad, and others. Each button, when depressed activated a pen on the recorder which made a mark on a time-scaled chart. When a fish swam by a counting station the observer pressed the appropriate button and the passage was recorded on the recorder chart. Fish counted at all counting stations were simultaneously recorded in this manner. An observer at the recorder tallied the marks made by each pen at 0.1 hour (6 minute) intervals.

Operation of Corps Counting Station

Counting procedures and operation of the Corps counting station varied during the season. During the spring tests (April 29 to May 11) the gate at the Corps' counting station was closed (fish passage blocked) from 8 p.m. to 4 a.m. and during the counter's rest periods (10 minutes of each hour). Beginning July 1 the Corps left the counting gate open during their counter's 10-minute rest periods but continued to close the gate at night (8 p.m. to 4 a.m.). The Corps multiplied their daily counts by a factor of 1.2 to compensate for the fish that passed the counting station during their counters absence. Our counters continued to count during the rest periods, however, so that complete counts were obtained for our tests.

During the shad run (July 9 to about August 15) the gate at the Corps counting station was left open at night. The Corps did not count at night and no factor was applied to their daily counts to compensate for night passage. We continued counting at night on July 9 and 10 to assess night passage but counted only until 9 p.m. in tests performed thereafter. The gate was left open at night to prevent shad that were passing downstream at night from being impinged upon the closed gate and adjacent fish barriers. This practice had been adapted in previous years when the gates and barriers clogged with dead shad at night.

During the fall tests (September 9 to 17) the gate at the Corps station was closed at night (8 p.m. to 4 a.m.) but open during the counter's rest periods.

PERFORMANCE AND BEHAVIOR OF FISH

As previously stated, evaluation of the regulating section was to be based upon (1) the proportions of fish that passed through the regulating section during the test periods, (2) the rates at which fish passed through the regulating section, (3) frequency of downstream passage at weir 248, and (4) the leaping behavior of fish in the regulating section. Similar observations made in the overflow section of the ladder were to be used to judge whether the regulating section was functioning satisfactorily.

Proportions of Fish Completing Regulating and Overflow Sections of Ladder.

If the new slot-type regulating section was operating satisfactorily, we should expect that most of the fish that passed the Corps counting station would continue their ascent of the ladder and be tallied at the upstream end of the ladder (slot 33). If significant proportions of fish failed to complete the ladder, comparisons of counts at the Corps station, weir 248 and slot 33 could be made to determine if the regulating sections of the ladder was impeding fish passage.

Comparisons of the daily counts at the Corps station and slot 33 indicate that most of the salmonids that were counted at the Corps counting station on a given day reached the upper end of the ladder on the same day (Figure 10). Passage curves at the two stationswere nearly congruent.

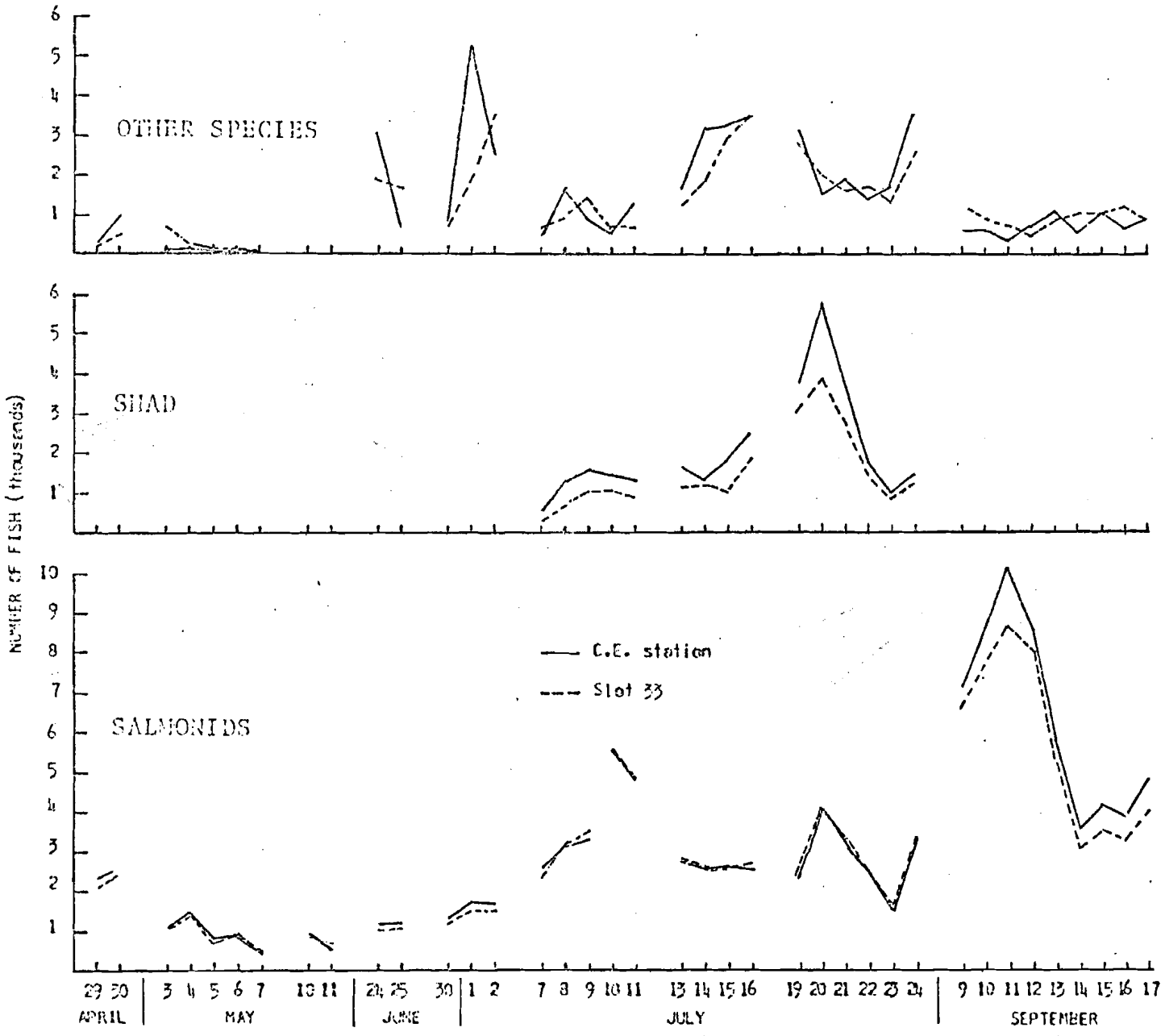


Figure 10.--Daily counts at the Corps of Engineers station and at slot 33 during fishway tests.

Although the configurations of the passage curves for shad at the two stations were similar, differences in daily counts indicate that some fish failed to ascend the ladder during our daily counting periods.

There was less conformity in the passage curves for the miscellaneous species that we have designated as "others". Comparisons of the curves (Figure 10) and the daily counts at the Corps station and slot 33 (Table 1) indicate that many of the fish that were counted at the Corps station on one day may not have reached the upper end of the ladder until the following day.

Average proportions of fish completing the entire test section of the south ladder during the series of tests that were performed on consecutive days are given in Table 2. Daily counts made on consecutive days (Table 1) were combined (Table 3) to compensate for fish that required more than one day to ascend the ladder. It will be noted that in some tests more salmonids and "others" were tallied at slot 33 than were counted at the Corps station. These anomalies were probably due to errors in identifying fish at the counting station and the presence of fish in the ladders when the series of tests were begun.

Table 1.--Net upstream counts of fish at each counting station during evaluation tests in the south fish ladder at John Day Dam. Negative values signify that downstream passage exceeded upstream passage during counting period.

Date		Count at Corps of Engineers counting station				Count at weir 214				Count at weir 248				Count at slot 53			
		Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
April	29	2,316	0	197	2,513					2,168	0	436	2,604	2,036	0	184	2,220
	30	2,471	0	976	3,447					2,337	0	597	2,934	2,324	0	458	2,782
May	3	1,079	0	80	1,159	861	0	86	947	1,210	0	1,402	2,612	1,139	0	681	1,820
1/	4	1,492	0	138	1,630					1,540	0	566	2,106	1,441	0	300	1,741
	5	803	0	- 61	742					716	0	41	757	653	0	112	770
	6	843	0	29	872					728	0	24	752	895	0	48	943
	7	533	0	40	573	367	0	8	375	432	0	16	448	580	0	41	621
	10	1,005	0	164	1,169	821	0	16	837	949	0	34	983	859	0	59	918
	11	595	0	126	721	501	0	25	526	594	0	57	651	635	0	98	733
Total		11,142	0	1,689	12,831	2,550	0	135	2,685	10,671	0	3,173	13,847	10,567	0	1,981	12,548
June	24	1,174	1	3,162	4,337					762	0	1,073	1,835	1,041	0	1,837	2,878
	25	1,197	3	694	1,894					897	8	1,709	2,614	1,106	2	1,659	2,767
	30	1,311	19	780	2,110	847	2	309	1,158	1,019	14	982	2,015	1,125	4	674	1,803
July	1	1,777	44	5,382	7,203	1,177	20	825	2,022	1,472	27	2,045	3,544	1,574	29	1,815	3,418
	2	1,701	106	2,514	4,321	999	71	476	1,546	1,364	30	2,833	4,227	1,480	66	3,564	5,110
	7	2,567	497	423	3,487					1,422	280	725	2,427	2,159	323	607	3,089
	8	3,069	1,301	1,583	5,953					2,372	1,120	661	4,153	3,190	748	935	4,873
	9	3,293	1,620	861	5,774					2,619	1,757	651	5,027	3,569	1,099	1,413	6,081
	10	5,530	1,485	506	7,521					4,478	1,486	486	6,450	5,615	1,116	657	7,388
	11	4,924	1,366	1,302	7,592					4,563	1,681	362	6,606	4,876	991	644	6,511
	13	2,706	1,721	1,612	6,039	1,424	4,616	315	6,355	3,137	2,495	1,314	6,946	2,776	1,188	1,243	5,207
	14	2,649	1,390	3,167	7,206	1,230	3,670	511	5,411	2,746	1,921	1,873	6,540	2,618	1,240	1,833	5,691
	15	2,616	1,816	3,235	7,667					3,160	2,438	2,184	7,782	2,618	1,071	2,953	6,642
	16	2,591	2,535	3,498	8,624					3,331	2,954	3,057	9,342	2,759	1,786	3,310	7,855
	19	2,338	3,666	3,187	9,241					3,890	3,592	3,324	10,806	2,469	3,041	2,805	8,315
	20	4,030	5,782	1,471	11,283					3,712	4,522	1,678	9,912	4,066	3,927	2,070	10,063
	21	3,178	3,895	1,995	9,068					3,071	3,667	1,357	8,095	3,277	2,572	1,666	7,515
	22	2,492	1,805	1,414	5,711					2,446	2,119	1,125	5,690	2,488	1,577	1,752	5,817
	23	1,541	1,026	1,682	4,249					1,525	1,376	850	- 3,751	1,597	965	1,317	3,879
	24	3,289	1,468	3,607	8,364					3,906	1,738	1,878	7,522	3,338	1,294	2,636	7,268
2/	25	19	- 23	189	185					55	75	227	357	71	13	288	372
Total		54,042	31,523	42,264	127,829	5,677	8,379	2,436	16,492	51,947	33,300	30,374	115,621	53,812	23,052	35,678	112,542
September	9	7,206	0	644	7,850					7,031	0	724	7,755	6,520	0	1,225	7,745
	10	8,304	0	617	8,921					7,730	0	300	8,030	7,629	0	988	8,617
	11	10,136	0	270	10,406					9,029	0	257	9,286	8,787	0	760	9,547
	12	8,557	0	646	9,203					7,851	0	180	8,031	8.164	0	533	8,697
	13	5,769	0	1,117	6,886					4,517	0	209	4,726	5,422	0	824	6,246
	14	3,629	0	559	4,188					3,697	0	397	4,094	3,180	0	1,074	4,254
	15	4,233	0	1,065	5,298					3,986	0	442	4,428	3,458	0	1,012	4,470
	16	3,961	0	633	4,494					3,585	0	200	3,845	3,301	0	1,189	4,490
	17	4,817	0	870	5,687					4,441	0	212	4,653	4,005	0	938	4,943
Total		56,512	0	6,421	62,933					51,867	0	2,981	54,848	50,466	0	8,543	59,009

1/ Terminated count early at weir 248. Estimated count for last 4½ hours of the test. 2/ Four-hour count period.

Table 2.--Proportions of fish completing the south ladder (from the Corps counting station to slot 33) during counting periods in tests conducted during the spring, summer, and fall fish runs.

Test period	Net upstream count of fish at Corps of Engineers counting station 1/				Percentage of Corps count tallied at slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
Spring tests								
April 29 - 30	4,787	0	1,173	5,960	91.1	-	54.7	83.9
May 3 - 7	4,755	0	226	4,981	99.1	-	523.0	118.3
May 10 - 11	1,600	0	290	1,890	93.4	-	54.1	87.4
Total	11,142	0	1,689	12,831	94.8	-	117.3	97.8
Summer tests								
June 24 - 25	2,371	4	3,856	6,231	90.6	50.0	90.7	90.6
June 30 - July 2	4,789	169	8,676	13,634	87.3	58.6	69.8	75.8
July 7 - 11	19,383	6,269	4,675	30,327	100.1	68.2	91.0	92.1
July 13 - 16	10,562	7,462	11,512	29,536	102.0	70.8	81.1	86.0
July 19 - 24	16,937	17,619	13,545	48,101	102.2	76.0	92.5	89.9
Total	54,042	31,523	42,264	127,829	99.6	73.1	84.4	88.0
Fall tests								
September 9 - 17	56,512	0	6,421	62,933	89.3	-	133.0	93.8
All tests								
Apr. 29 - Sept. 17	121,696	31,523	50,374	203,593	94.4	73.1	91.7	90.4

1/ Total number of fish counted on consecutive days.

Table 3.--Numbers of fish counted at the Corps of Engineers counting station, weir 248, and slot 33, during tests on the spring, summer, and fall fish runs. Tests made on consecutive days (Table 1) were combined to compare counts at each station.

Test period	Count at Corps of Engineers counting station				Count at weir 248				Count at slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
April 29-30	4,787	0	1,173	5,960	4,505	0	1,033	5,538	4,360	0	642	5,002
May 3-7	4,755	0	226	4,981	4,626	0	2,049	6,675	4,713	0	1,182	5,895
May 10-11	1,600	0	290	1,890	1,543	0	91	1,634	1,494	0	157	1,651
Total	11,142	0	1,689	12,831	10,674	0	3,173	13,847	10,567	0	1,981	12,548
June 24-25	2,371	4	3,856	6,231	1,659	8	2,782	4,449	2,147	2	3,496	5,645
June 30-July 2	4,789	169	8,676	13,634	3,855	71	5,860	9,786	4,179	99	6,053	10,331
July 7-11	19,383	6,269	4,675	30,327	15,454	6,324	2,885	24,663	19,409	4,277	4,256	27,942
July 13-16	10,562	7,462	11,512	29,536	12,374	9,808	8,428	30,610	10,771	5,285	9,339	25,395
July 19-24	16,937	17,619	13,545	48,101	13,605	17,089	10,419	46,113	17,306	13,389	12,534	43,229
Total	54,042	31,523	42,264	127,829	51,947	33,300	30,374	115,621	53,812	23,052	35,678	112,542
September 9-17	56,512	0	6,421	62,933	51,867	0	2,981	54,848	50,466	0	8,543	59,009
Total Apr. 29-Sept. 17	121,696	31,523	50,374	203,593	114,488	33,300	36,528	184,316	114,845	23,052	46,202	184,099

During the entire series of tests 203,593 fish were counted at the Corps station and 184,099 or 90.4 percent of these fish passed the counting station at the upstream end of the ladder (slot 33) during our counting periods (Table 2). Proportions completing passage by species were: 94.4 percent for salmonids, 73.1 percent for shad, and 91.7 percent for the group designated as "others". It should be noted that these data are based largely on 16 to 17 hour counts and do not include fish that passed through the ladder at night after our counters stopped counting.

Countinous (24-hour) counts were made at slot 33 (and at the Corps station when the counting gate was open) during the tests performed from July 7 to 11. The counting period extended from 4 a.m. July 7 to 8 p.m. July 11. During this period there was a net upstream passage of 19,383 salmonids, 6,269 shad, and 4,675 other species at the Corps counting station. Counts at slot 33 indicated that all of the salmonids, 68.2 percent of the shad, and 91.0 percent of the other species completed their ascent of the ladder during the 4-day period.

Since the counts at the Corps station and slot 33 indicated that some of the fish failed to complete their ascent of the south ladder, counts at weir 248 were examined to

determine if the regulating section was impeding fish passage. If the proportions of the fish that ascended the regulating section (pools between weir 248 and slot 33) were not significently less than the proportions that ascended the overflow section (pools between the Corps station and slot 33) we would conclude that the regulating section was functioning satisfactorily.

Difficulties in obtaining accurate counts at our monitoring sites prevented us from determining precisely the proportions of fish that ascended the two sections of the ladder in all tests. Accuracy of counts undoubtedly varied throughout the spring, summer and fall tests depending upon the clarity of the water, number and size of species migrating, numbers of lampreys in the fish ladder, etc. Counts in the spring were probably more accurate than those during the summer and fall tests because there were fewer species migrating and observers could generally rely upon fish size to distinguish between salmonids and "other" species. In the summer and fall tests there were many small salmonids (sockeye, jack chinook, and jack coho) migrating and these were difficult to distinguish from shad and "other" species at weir 248 and slot 33 (Table 4).

Counts made during the spring, summer, and fall tests are discussed in the following sections.

Table 4.--Species composition of salmonids counted at the Corps of Engineers counting station.

Date		Percentage of total salmonids counted							
		Chinook salmon			Steelhead trout	Sockeye salmon	Coho salmon		
		Adults	Jacks	Total			Adults	Jacks	Total
April	29	91.5	7.6	99.1	0.9				
	30	93.9	5.5	99.4	0.6				
May	3	91.3	8.0	99.3	0.7				
	4	86.6	11.8	98.4	1.6				
	5	79.8	17.4	97.2	2.8				
	6	83.4	15.3	98.7	1.3				
	7	73.1	24.3	97.4	2.6				
	10	80.2	18.6	98.8	1.2				
	11	70.6	26.9	97.5	2.5				
June	24	57.5	15.5	73.0	1.1	25.9			
	25	62.3	14.1	76.4	1.3	22.3			
	30	56.9	8.0	64.9	0.6	34.5			
July	1	58.7	6.2	64.9	0.8	34.3			
	2	56.6	7.7	64.3	0.1	35.6			
	7	28.1	7.9	36.0	0.3	63.7			
	8	22.6	3.8	26.4	0.8	72.8			
	9	15.8	2.6	18.4	0.7	80.9			
	10	12.0	2.7	14.7	0.5	84.8			
	11	11.8	3.7	15.5	1.2	83.3			
	13	20.1	2.9	23.0	3.1	73.9			
	14	17.7	2.0	19.7	3.1	77.2			
	15	16.3	2.6	18.9	4.5	76.6			
	16	14.2	3.1	17.3	5.6	77.1			
	19	10.8	5.7	16.5	22.4	61.1			
	20	12.8	4.1	16.9	19.4	63.7			
	21	14.6	4.3	18.9	27.2	53.9			
	22	14.8	4.6	19.4	34.8	45.8			
	23	20.1	4.2	24.3	42.5	33.2			
	24	27.2	4.2	31.4	45.4	23.2			
Sept.	9	32.0	22.0	54.0	22.6		18.1	5.3	23.4
	10	30.8	18.3	49.1	26.8		15.4	8.7	24.1
	11	30.2	13.0	43.2	29.2		17.4	10.2	27.6
	12	34.0	21.5	55.5	23.9		12.5	8.1	20.6
	13	31.1	24.5	55.6	25.2		11.1	8.1	19.2
	14	25.4	25.9	51.3	28.8		9.9	10.0	19.9
	15	28.8	26.2	55.0	24.9		8.6	11.5	20.1
	16	28.6	27.1	55.7	27.2		8.5	8.6	17.1
	17	29.2	26.4	55.6	30.6		8.2	5.6	13.8

Spring tests, April 29 to May 11.--Chinook salmon were the predominate species of fish migrating during the nine days of spring tests (Table 4). We counted at the Corps counting station, weir 248, slot 33, and on four days at weir 214. Normally we counted each day from 4 a.m. to 8 p.m. The gate at the Corps station was closed (fish passage blocked) for 10 minutes of each hour (counter's rest period) and at night. On May 5 our counts at weir 248 and slot 33 were continued through the night (8 p.m. to 4 a.m.) to determine the extent of fish passage at night.

A comparison of counts at weir 248 and slot 33 indicate that few salmonids failed to pass through the regulating section during the tests (Table 1). On three of the test days more salmonids were tallied at slot 33 than at weir 248, indicating that possibly some fish were missed or misidentified at weir 248. Average proportions completing the regulating section based upon total numbers of fish counted at weir 248 and slot 33 during consecutive days of testing (Table 3) were 96.8, 101.9 96.8 percent respectively (Table 5). Proportions completing the 55-pool segment at the overflow ladder (Corps station to weir 248) during these tests were 94.1, 97.3, and 96.4 percent respectively. These data indicate salmonids were slightly more successful in negotiating the regulating section than the overflow section of the ladder.

Table 5.—Comparisons of fish passage in the 55-pool overflow section (Corps counting station to weir 248) and the 34-pool regulating section (weir 248 to slot 33) of the south fish ladder. Percentages completing passage are based upon the numbers of fish completing the two sections in series of tests made on consecutive days during the spring, summer, and fall fish runs (Table 3).

Test period	Number of fish counted at Corps of Engineers counting station				Percentage completing overflow section of ladder 1/				Percentage completing regulating section of ladder 2/			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
April 29 - 30	4,787	0	1,173	5,960	94.1	-	88.1	92.9	96.8	-	62.1	90.3
May 3 - 7	4,755	0	226	4,981	97.3	-	906.6	134.0	101.9	-	57.7	88.3
May 10 - 11	1,600	0	290	1,890	96.4	-	31.4	86.5	96.8	-	172.5	101.0
Total	11,142	0	1,689	12,831	95.8	-	187.9	107.9	99.0	-	62.4	90.6
June 24 - 25	2,371	4	3,856	6,231	70.0	200.0	72.1	71.4	129.4	25.0	125.7	126.9
June 30 - July 2	4,789	169	8,676	13,634	80.5	42.0	67.5	71.8	108.4	139.4	103.3	105.6
July 7 - 11	19,383	6,269	4,675	30,327	79.7	100.9	61.7	81.3	125.6	67.6	147.5	113.3
July 13 - 16	10,562	7,462	11,512	29,536	117.2	131.4	73.2	103.6	87.0	53.9	110.8	83.0
July 19 - 24	16,937	17,619	13,545	48,101	109.8	97.0	76.9	95.9	93.0	78.3	120.3	93.7
Total	54,042	31,523	42,264	127,829	96.1	105.6	71.9	90.4	103.6	69.2	117.5	97.3
September 9 - 17	56,512	0	6,421	62,933	91.8	-	46.4	87.2	97.3	-	286.6	107.6
Total (Apr. 29 - Sept. 17)	121,696	31,523	50,374	203,593	94.1	105.6	72.5	90.5	100.3	69.2	126.5	99.9

1/ $\frac{\text{Count at weir 248}}{\text{Count at Corps station}} \times 100$

2/ $\frac{\text{Count at slot 33}}{\text{Count at weir 248}} \times 100$

Relatively few "other" species were present during the spring tests. These were mostly chiselmouth, suckers, and squawfish. A comparison of daily counts at weir 248 and slot 33 (Table 1) indicate that many of these fish may have failed to pass through the regulating section during our counting periods. Combined counts for tests made on April 29 and 30 indicate that 88.1 percent of the fish ascended the 55-pool overflow section of the ladder but only 62.1 percent ascended the 34-pool regulating section of the ladder (Table 5).

During the tests that followed on May 3 to 7 an average of 57.7 percent of "other" species counted at weir 248 completed passage through the regulating section. A gross difference in the counts at the Corps station and weir 248, however, preclude a meaningful comparison with passage through the overflow section of the ladder. This difference was due largely to the counts on May 3 and 4. During these two days 218 fish were counted at the Corps counting station but 1968 were tallied at weir 248 (Table 1). It is possible that the high counts of "other" species at weir 248 may have been due, in part, to observers being unable to accurately discern between upstream passage and fallback activity at the weir. However, counts at slot 33 were also greater than the counts at the Corps station so we have assumed that many of the "other" species counted at weir 248 on May 3 probably entered the

ladder on the preceeding day. Since tests were not conducted on May 2, and the Corps counters do not count these species this could not be verified.

During the last two days of the spring tests (May 10 to 11) more "other" species were counted at slot 33 than at weir 248. Proportions completing the regulating and overflow sections of the ladder during these tests were 172.5 percent and 31.4 percent respectively (Table 5).

Summer tests, June 24 to July 25.--Tests were conducted on 21 days during the summer tests. Anadromous species migrating during this period included chinook salmon, sockeye salmon, shad, and steelhead trout (Table 4). Our category of "other" species included chiselmouth, suckers, carp, and squawfish. Lampreys were also migrating during the tests but these were not tallied at the counting stations.

Our procedures during these tests were basically the same as those employed during the spring tests. Counts were made at the Corps station, weir 248, and slot 33. On five days counts were also made at weir 214. Counting periods ranged from 16 to 24 hours. A 16-hour counting period (4 a.m. to 8 p.m.) used from June 24 to July 7, continuous counts (24-hour) were performed from 4 a.m. July 7 to 8 p.m. July 11, and 17-hour counting periods (4 a.m. to 9 p.m.) were used in all subsequent tests.

Comparison of the daily counts at the Corps station, weir 248, and slot 33 (Table 1) illustrate the various discrepancies that made it difficult to compare by species, the proportions of fish that completed the regulating and overflow sections of the south ladder. In more than half of the tests, counts of shad at weir 248 were greater than the counts at the Corps station, and the counts of salmonids and "other" species at weir 248 were lower than the counts at slot 33. We believe the counts at the Corps station and slot 33 were more accurate than those at weir 248; and have concluded, therefore, that many of the shad that were tallied at weir 248 were actually salmonids or "other" species. If so, the proportions of shad that ascended the regulating section during the test periods (Table 5) were probably considerably greater than is indicated by the counts.

If the total numbers of fish (all species combined) counted at each station are compared it is evident that some fish were missed by our observers at weir 248 - total counts at slot 33 were frequently higher than at weir 248. Average proportions of fish completing the regulating section for the five series of tests performed on consecutive days ranged from 83.0 to 126.9 percent (Table 5).

Although count discrepancies preclude precise measurements of fish passage, the data indicate that the fish ascended the 34-pool regulating section as well as they did the 55-pool overfall section of the south ladder. During the five

series of tests 127,829 fish (all species) were tallied at the Corps counting station, 115,621 (90.4 percent of the count at the Corps station) were tallied at weir 248, and 112,542 (97.3 percent of the count at weir 248) were tallied at slot 33 (Tables 3 and 5).

During the summer tests periodic inspections of the north and south shore fish ladders were made to determine if we could detect any differences in the concentrations of shad in the pools of the two types of regulating sections. In these inspections we always observed more shad in the orifice-type regulating pools of the north ladder than we did in the slot-type regulating pools of the south ladder. Since about equal numbers of shad ascended the two ladders during the season (approximately 52,900 were counted in the north ladder and 50,500 were counted in the south ladder), it appears that the slot-type baffles in the regulating section of the south ladder passed shad more effectively than the orifice-type baffles in the regulating section of the north ladder.

Some shad were observed in the pools of the north regulating section when testing resumed in September, but none were seen in the south regulating section.

Fall tests, September 9 to 17.--Chinook salmon, steelhead trout and coho salmon, comprised the salmonid species tested during nine days of the fall run (Table 4). "Other" species included suckers, chiselmouth, shiners, and carp. A 16-hour test period was used in these tests. Counting began at 4:00 a.m. and terminated at 8:00 p.m. The counting gate at the Corps station remained open throughout the day but was closed at night.

Counts indicate that many of the fish that passed weir 248 were not seen by the observers. During the 9-day test period 59,009 fish were counted at slot 33 but only 54,848 were tallied at weir 248 (Table 1). The counts also indicate that some of the salmonids that passed slot 33 were probably misidentified and counted as "other" species - 8,543 "other" species were counted at slot 33 but only 6,421 were counted at the Corps station. There were many jack chinook and coho salmon ascending the ladder during these tests (Table 4) and it is quite possible that many of these small fish were identified as "other" species at slot 33 and weir 248.

Average proportions of salmonids and "other" species passing through the regulating section during the 9-day series of tests were 97.3 and 286.6 percent respectively (Table 5). Proportions of salmonids and "other" species completing the 55-pool overflow section were 91.8 and 46.4 percent respectively.

A comparison of the combined counts of all species at each station (total columns, Table 5) indicate that fish ascended the regulating section as well as they did the overflow section of the ladder -- proportions completing the two sections during the test periods were 107.6 percent and 87.2 percent respectively.

Passage Patterns and Rates of Passage

The performances of fish in the regulating and overflow sections of the ladder were further examined by graphic comparisons and statistical analysis of passage patterns at the Corps, weir 248, and slot 33 counting stations.

Graphic comparisons of passage patterns.--Graphic comparisons were made by plotting the daily counts at the Corps station, weir 248, and slot 33 at 30-minute intervals. Tests made on consecutive days were combined and 30-minute counts were expressed as percentages of the combined daily counts (Figures 11-19). Comparisons of passage patterns for the three count stations indicate that salmonids, shad, and other species ascended the regulating section of the ladder as well as they did the overflow section. Passage curves for salmonids were generally quite similar at all three stations. Passage curves for shad at weir 248 and slot 33 were similar but differed somewhat from those at the Corps station (Figures 16-18). The curves indicate that shad entered the ladder later

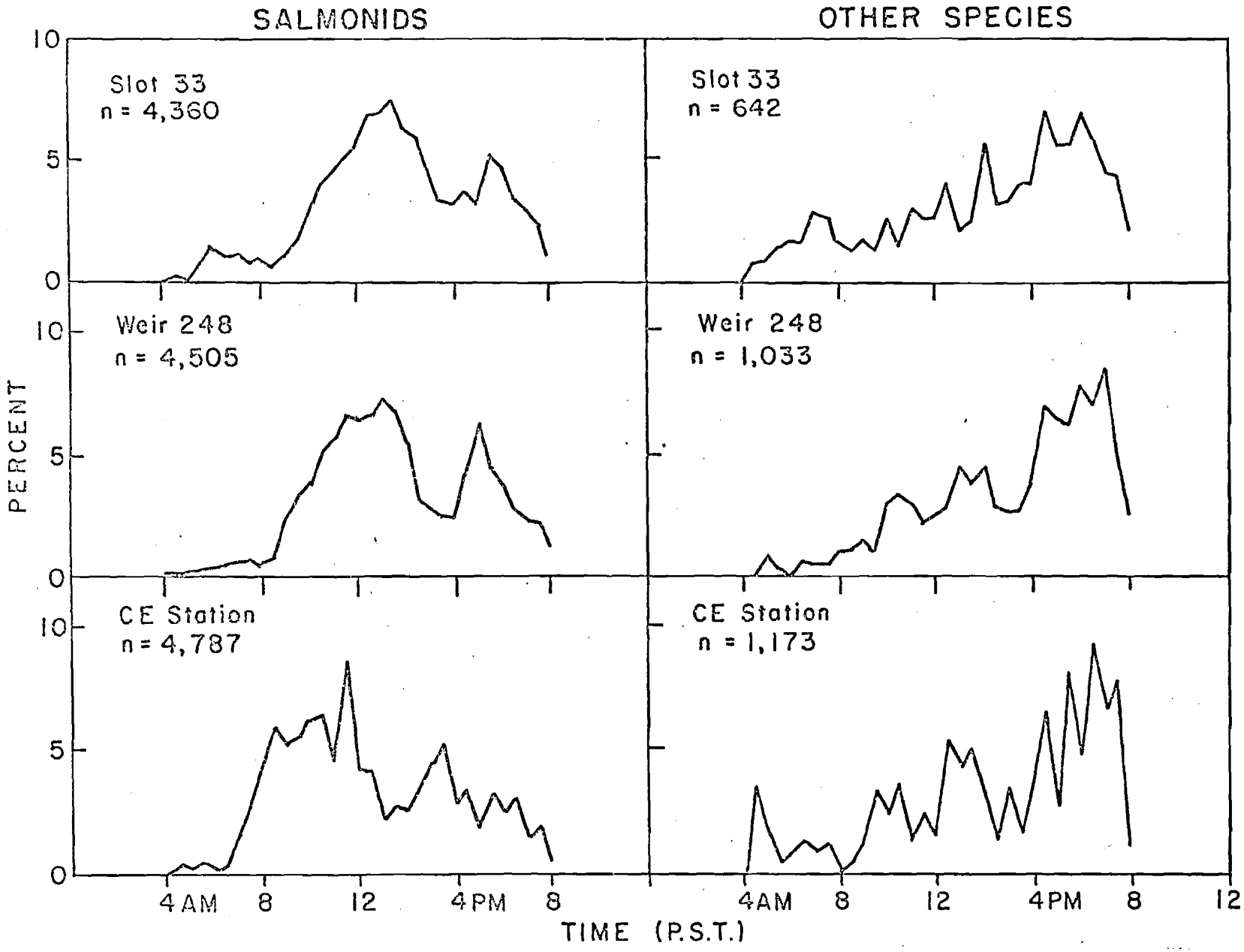


Figure 11.—Passage patterns of salmonids and other species at three counting stations in the south fish ladder during tests from April 29 to 30. Counts for the two days (Appendix tables A-1 and A-2) were combined and percentages of the total numbers of fish counted at each station (n) were plotted at 30-minute intervals. Counting period extended from 4 a.m. (P.s.t.) April 29 to 8 p.m. April 30.

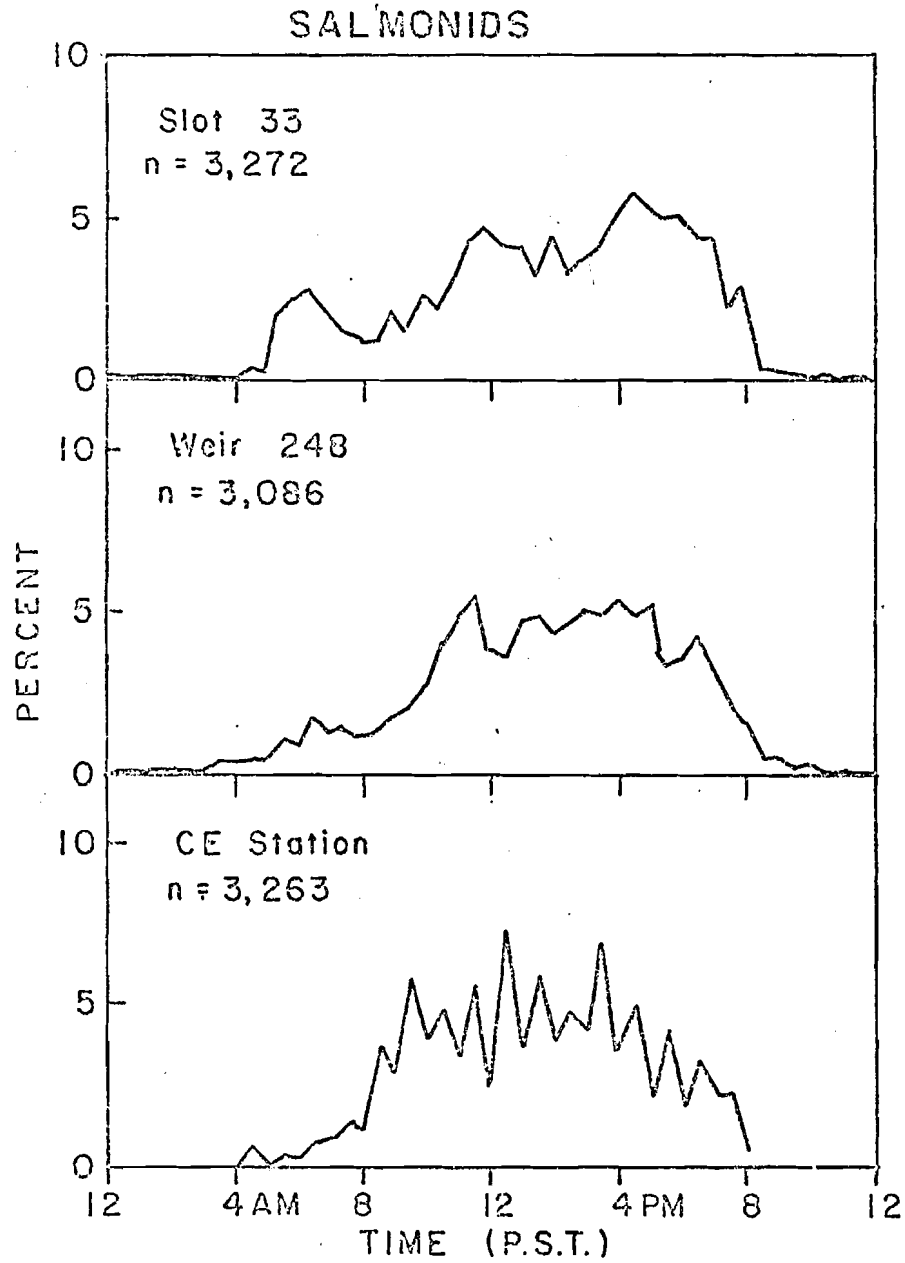


Figure 12.--Passage patterns of salmonids at three counting stations in the south fish ladder during tests from May 5 to 7. Counts for the three days (Appendix tables A-5 to A-7) were combined and percentages of the total numbers of fish counted at each station (n) were plotted at 30-minute intervals. Counting period extended from 4 a.m. (P.s.t.) May 5 to 8 p.m. May 7.

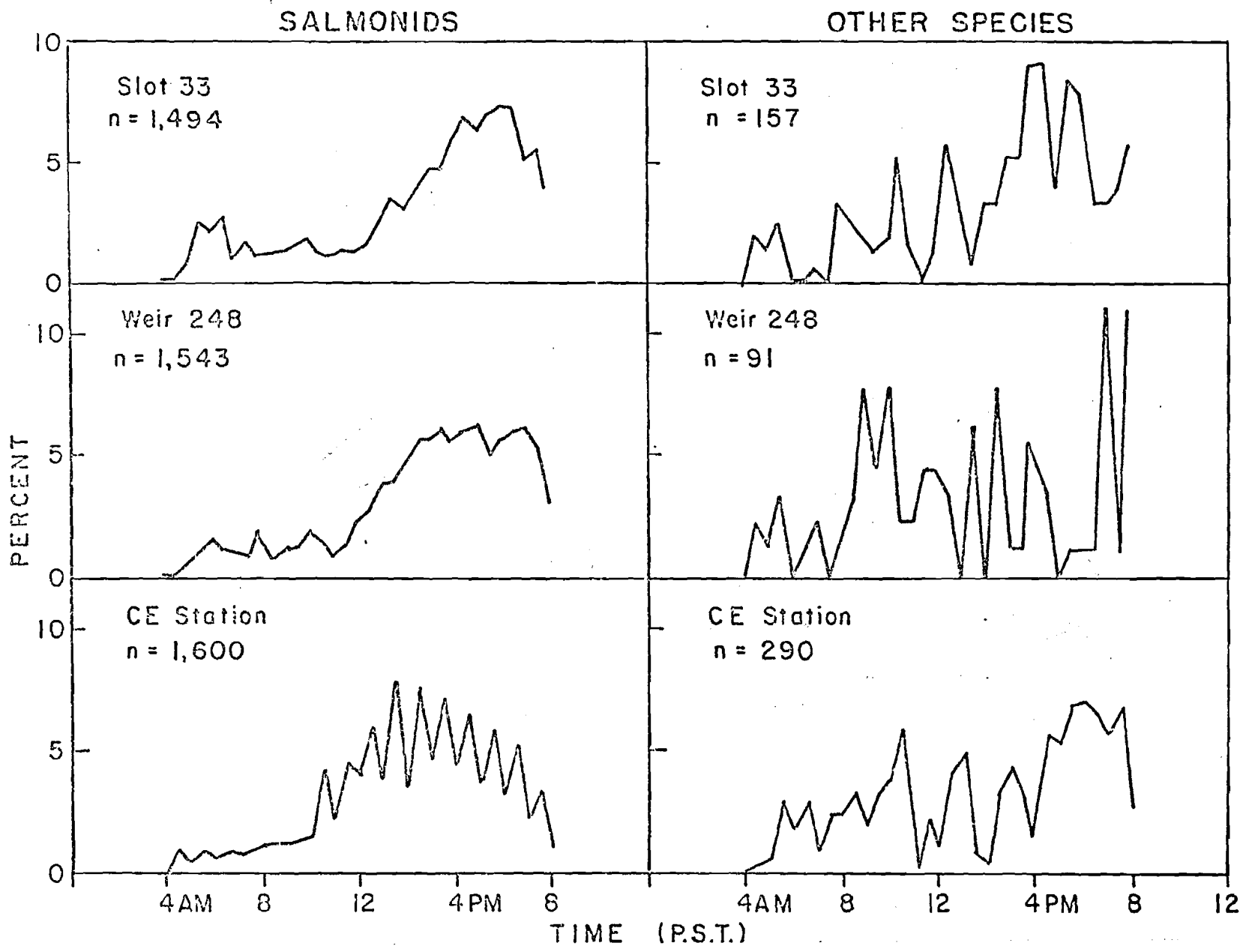


Figure 13.—Passage patterns of salmonids and other species at three counting stations in the south fish ladder during tests from May 10 to 11. Counts for the two days (Appendix tables A-8 and A-9) were combined and percentages of the total numbers of fish counted at each station (n) were plotted at 30-minute intervals. Counting period extended from 4 a.m. (P.s.t.) May 10 to 8 p.m. May 11.

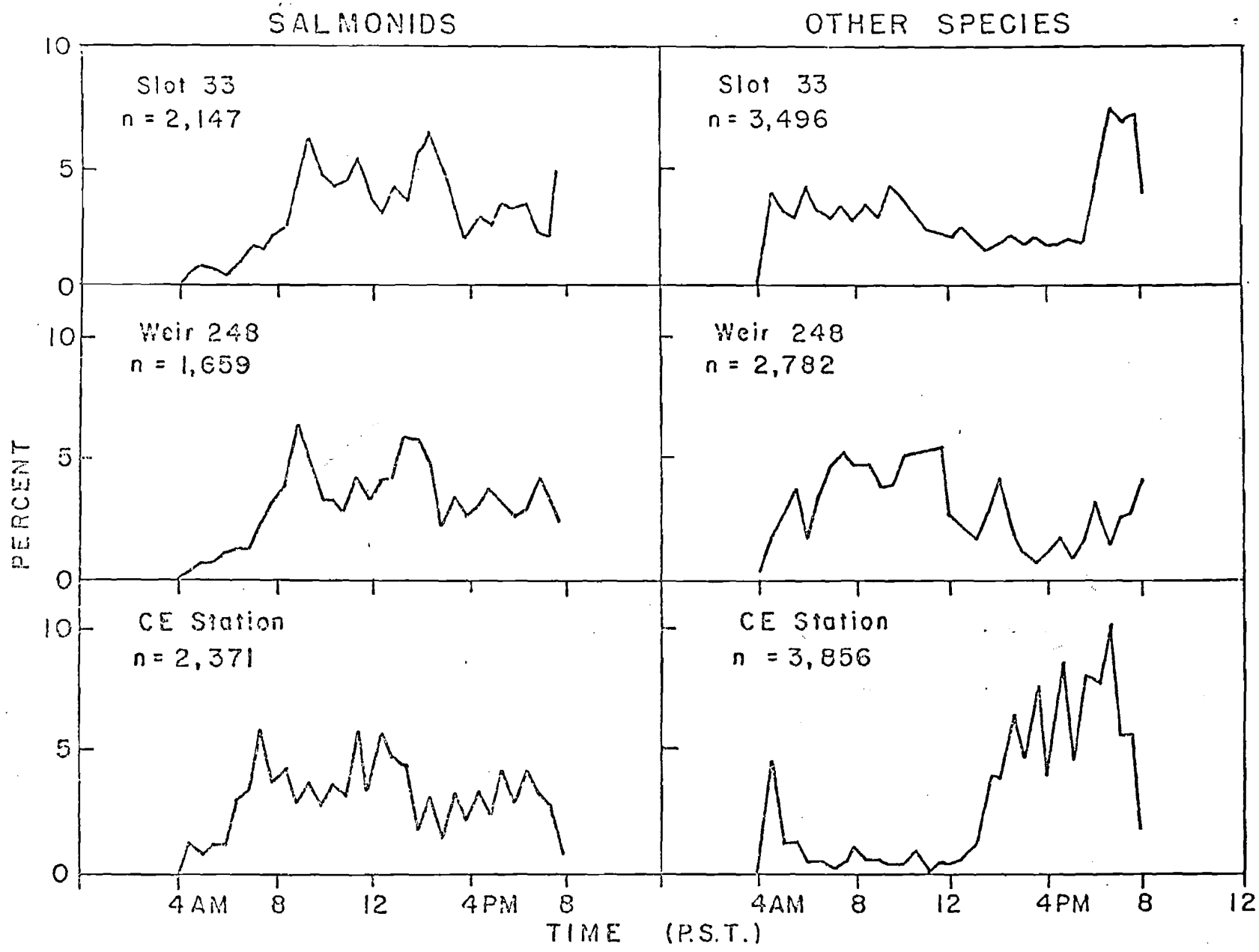


Figure 14.—Passage patterns of salmonids and other species at three counting stations in the south fish ladder during tests from June 24 to 25. Counts for the two days (Appendix tables A-10 to A-11) were combined and percentages of the total numbers of fish counted at each station (n) were plotted at 30-minute intervals. Counting period extended from 4 a.m. (P.s.t.) June 24 to 8 p.m. June 25.

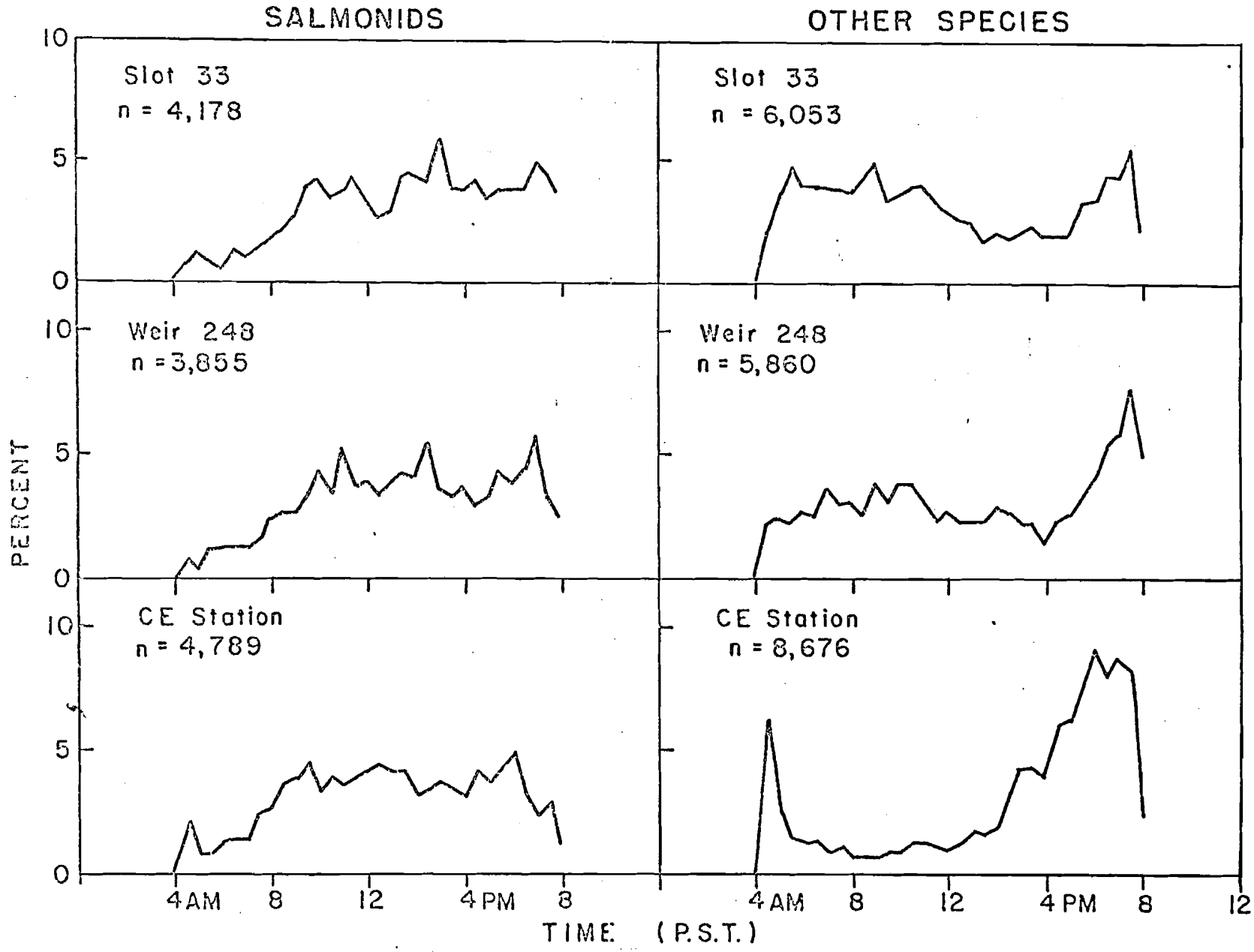


Figure 15.—Passage patterns of salmonids and other species at three counting stations in the south fish ladder during tests from June 30 - July 2. Counts for the three days (Appendix tables A-12 to A-14) were combined and percentages of the total numbers of fish counted at each station (n) were plotted at 30-minute intervals. Counting period extended from 4 a.m. (P.s.t.) June 30 to 8 p.m. July 2.

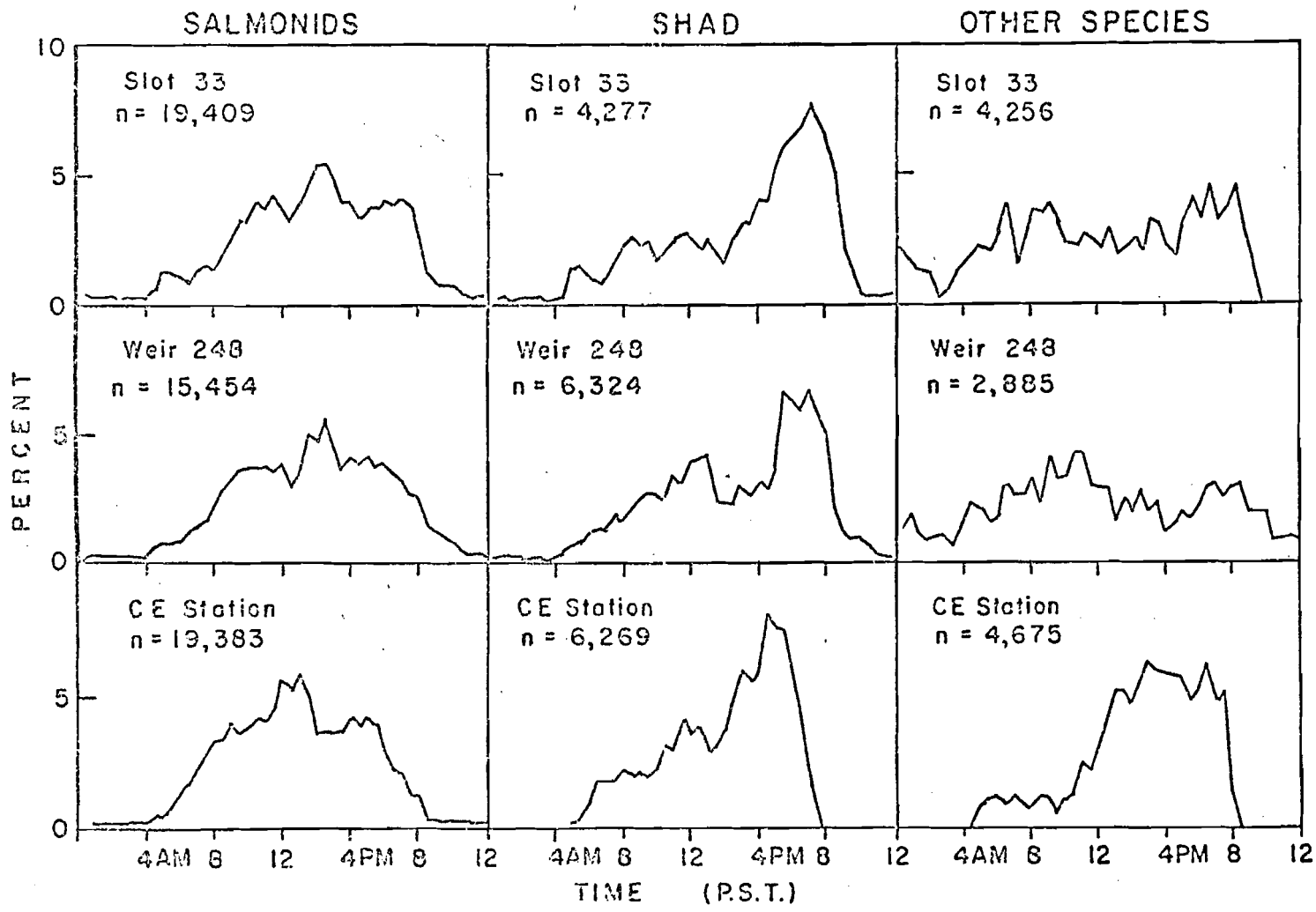


Figure 16.--Passage patterns of salmonids, shad, and other species at three counting stations in the south fish ladder during tests from July 7 to 11. Counts for the five days (Appendix tables A-15 to A-19) were combined and percentages of the total numbers of fish counted at each station (n) were plotted at 30-minute intervals. Counting period extended from 4 a.m. (P.s.t.) July 7 to 8 p.m. July 11.

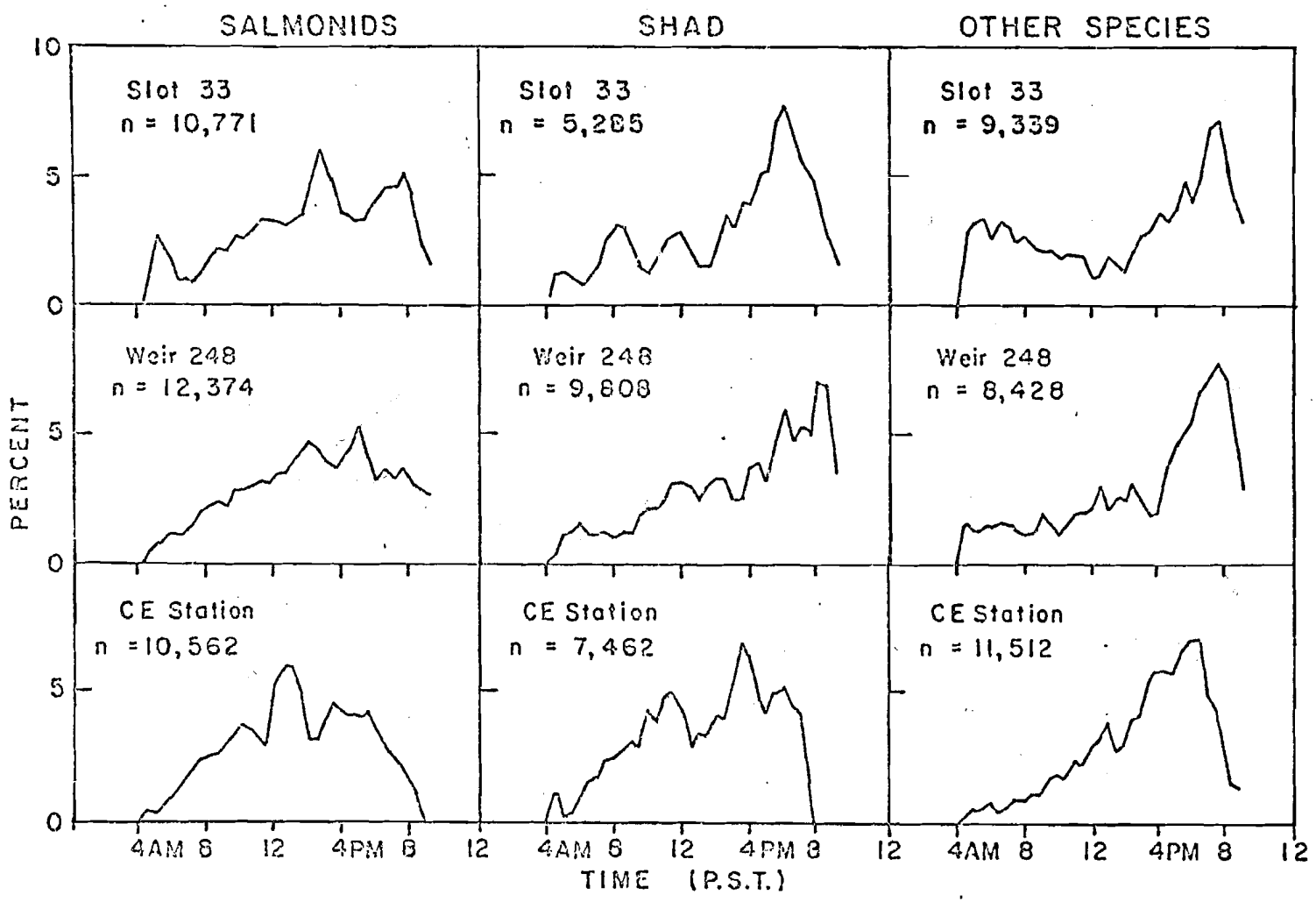


Figure 17.--Passage patterns of salmonids, shad, and other species at three counting stations in the south fish ladder during tests from July 13 to 16. Counts for the four days (Appendix tables A-20 to A-23) were combined and percentages of the total numbers of fish counted at each station (n) were plotted at 30-minute intervals. Counting periods extended from 4 a.m. to 9 p.m. (P.s.t.) on each day.

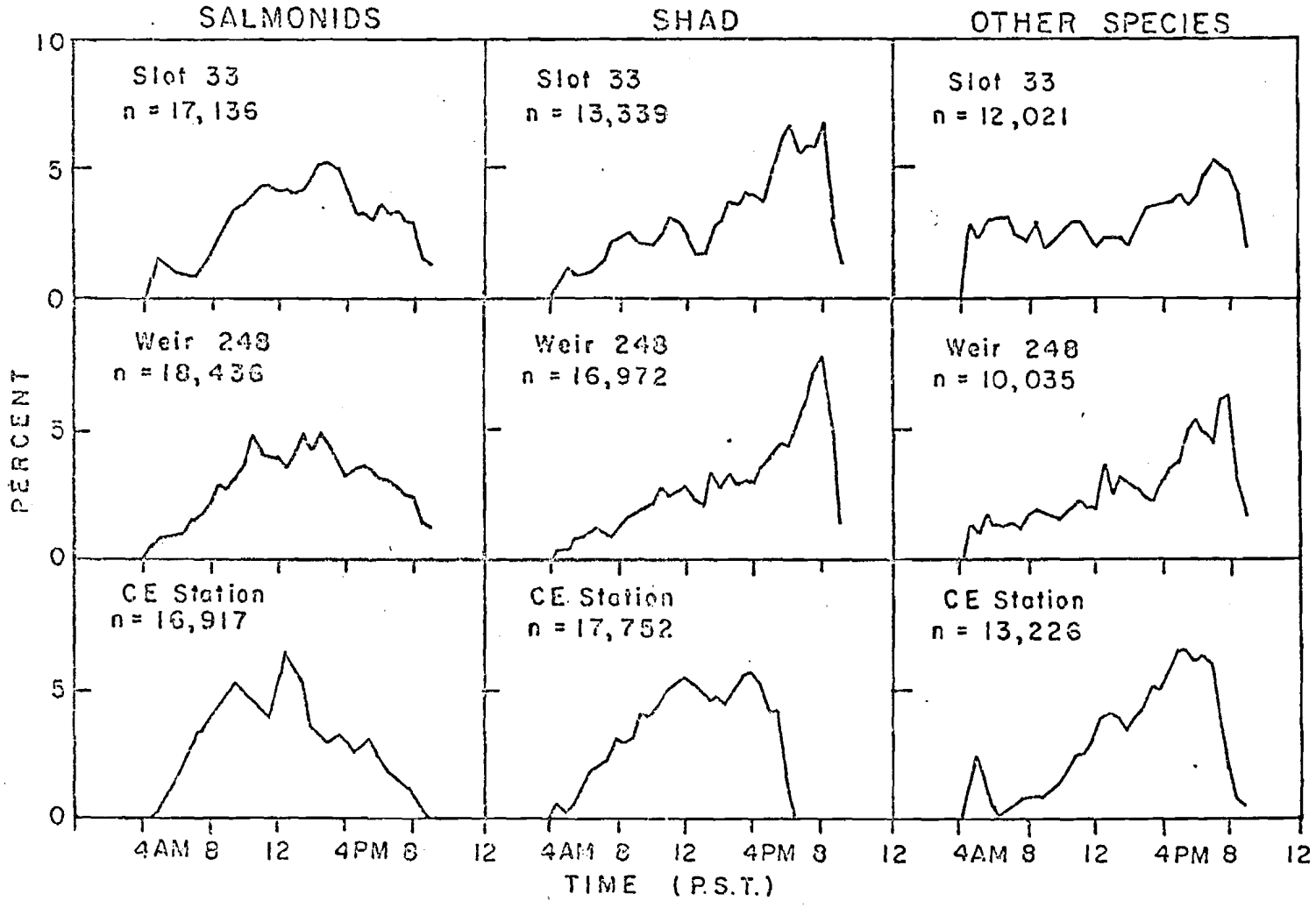


Figure 18.--Passage patterns of salmonids, shad, and other species at three counting stations in the south fish ladder during tests from July 19 to 24. Counts for the six days (Appendix tables A-24 to A-29) were combined and percentages of the total numbers of fish counted at each station (n) were plotted at 30-minute intervals. Counting periods extended from 4 a.m. to 9 p.m. (P.s.t.) each day (counts made after 9 p.m. on July 24 were not included).

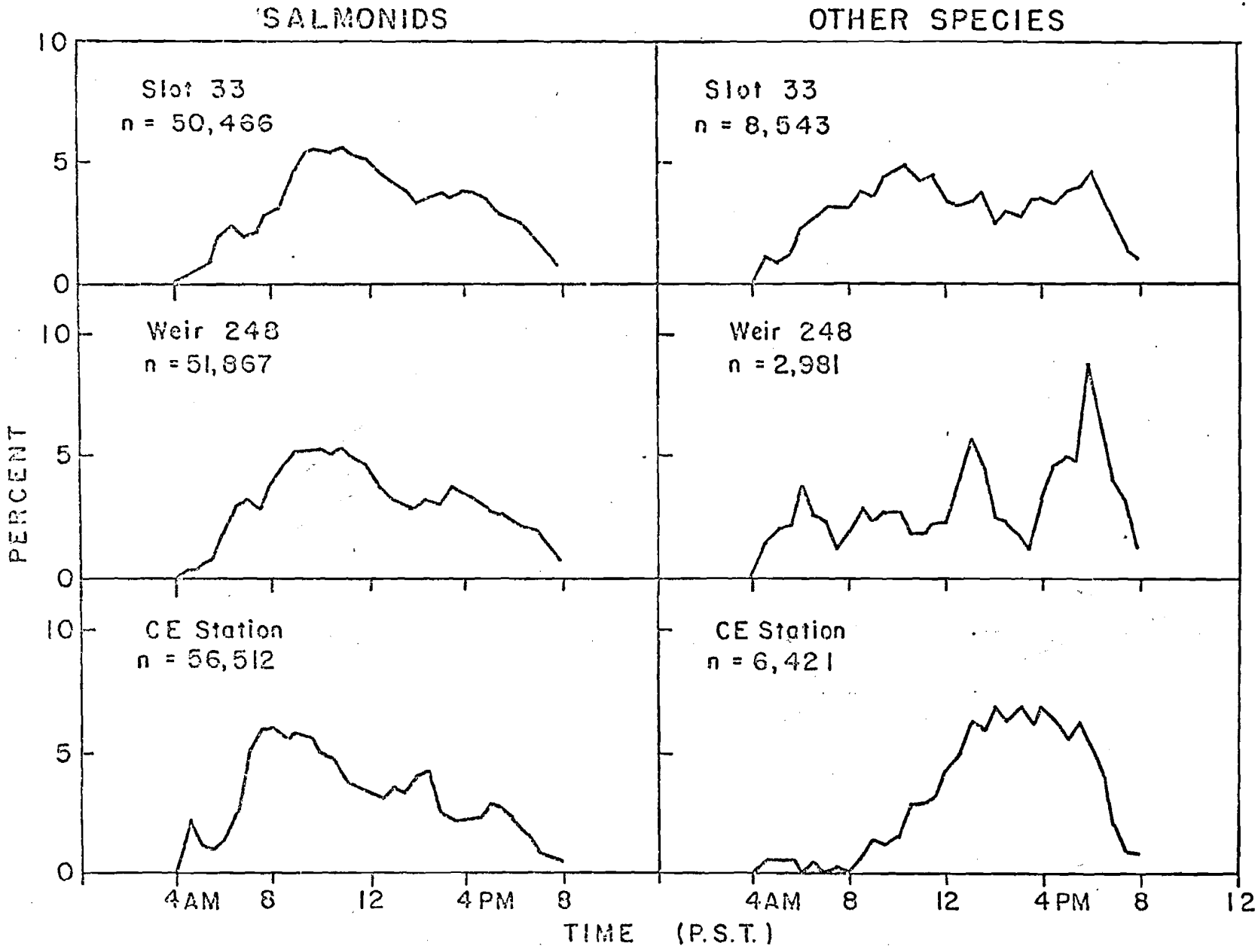


Figure 19.--Passage patterns of salmonids and other species at three counting stations in the south fish ladder during tests from September 9 to 17. Counts for the nine days (Appendix tables A-31 to A-39) were combined and percentages of the total numbers of fish counted at each station (n) were plotted at 30-minute intervals. Counting period extended from 4 a.m. (P.s.t.) September 9 to 8 p.m. September 17.

in the day and ascended the ladder somewhat slower than salmonids. Comparisons of the passage curves for other species indicate that many of the fish that were counted at the Corps station failed to reach weir 248 by the end of the day. Curves at weir 248 and slot 33 indicate, however, that there was no serious delay in the passage of these species through the regulating section.

The serrated shape of the passage curves for the Corps station prior to July 1 reflect the effect of closing the passage gate during the counters 10-minute rest periods.

Statistical analysis of passage patterns--Analyses of the fish passage in the regulating and overflow sections of the south ladder were based on cumulative distribution curves prepared from daily counts at the Corps station, weir 248, and slot 33. These cumulative distribution curves have an S-shaped form composed of a curved initial portion, an essentially straight central portion, and a curved terminal portion (Figure 20). The central portion of the curve (between the 20th and 80th percentile) provides the primary data used in the statistical analysis of rates of passage in the various sections of the ladder (Berry and Belmont, 1951). Only salmonids and shad were included in the analyses. The early

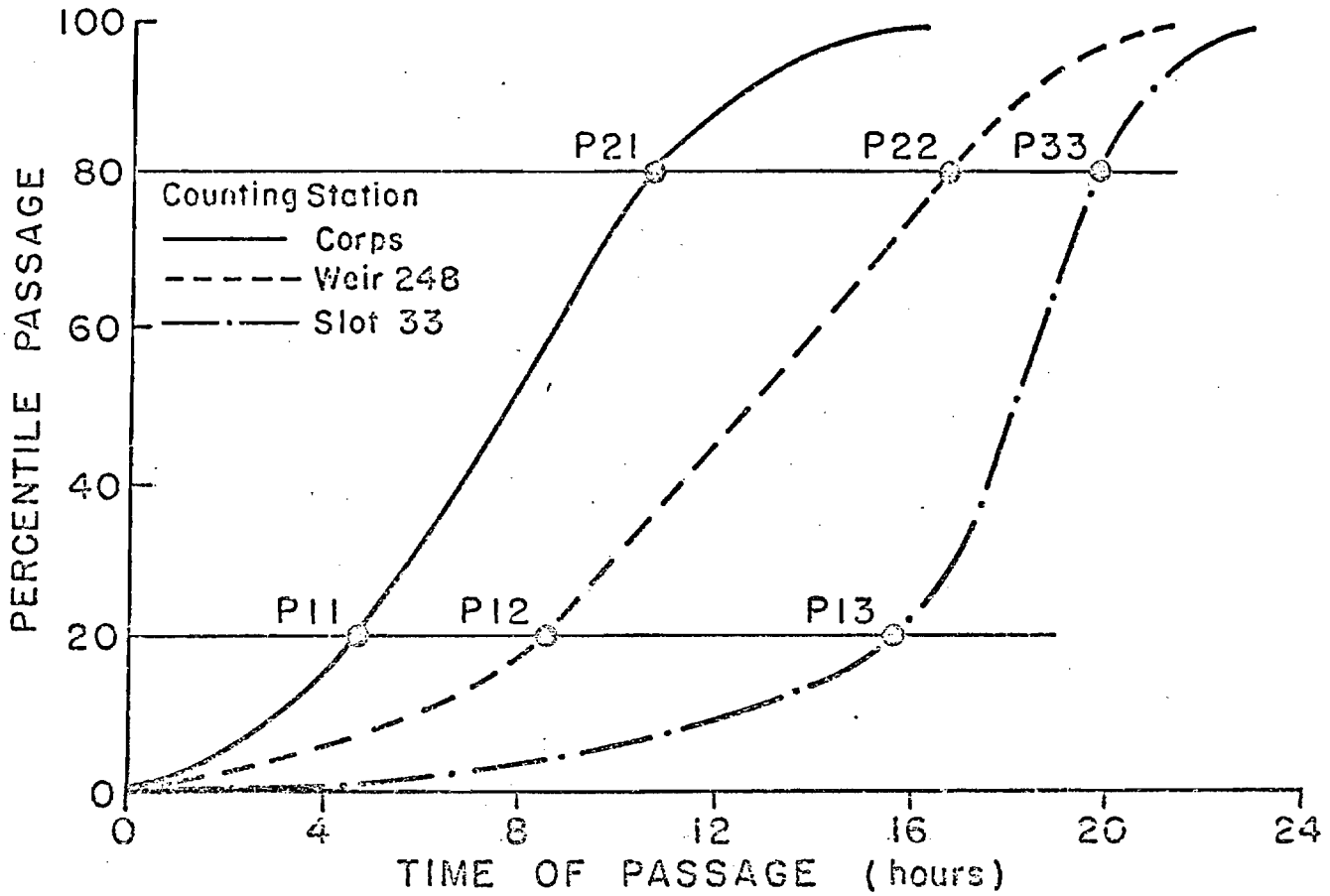


Figure 20.--Schematic diagram of passage patterns which describe passage measurements given in tables 6 and 7.

Pij: time in hours for i percentile at j count station
i=1: 20th percentile
i=2: 80th percentile
j=1: Corps of Engineers count station
j=2: count station at weir 248
j=3: count station at slot 33

morning counts (first 2 to 3 hours) were omitted when preparing the daily passage curves for the counting stations at weir 248 and slot 33 because these fish were already in the ladder when the tests began. Some tests were omitted because of imcomplete counts or because there were two few fish for the data to be comparable to the main fish runs.

Measurements from the central portion of the curves were assembled for each test used in the analyses (Figures 20, Tables 6 and 7), and these data were used to compare the passage rates and distributions between all combinations of counting stations. The data were used to compute a U-statistic (Natrella, 1963) which represents the change in rates of passage between the count stations.

Tests on salmonid data show that there was a significant decrease in the rate of passage in the overflow section of the ladder (between the Corps counting station and weir 248), but in the regulating section (between weir 248 and slot 33) there was an increase in passage rate (Table 8). The shad data show also a significant decrease in the rate of passage in the overflow section but only a sight increase in the regulating section (Table 8).

Passage through the entire ladder (Corps station to slot 33) showed an overall rate increase for salmonids but a significant rate decrease for shad (Table 8). Passage

Table 6--Time at which the 20th and 80th percentiles occurred on the cumulative passage curves for salmonids (Figure 20).

Test Date		20th percentile			80th percentile		
		Corps of Engr. Station P11	Station 248 P12	Slot 33 P13	Corp of Engr. Station P21	Station 248 P22	Slot 33 P23
		Hour	Hour	Hour	Hour	Hour	Hour
April	29	5.0	6.5	7.0	12.0	12.5	13.0
	30	4.5	6.5	6.5	11.0	12.5	12.5
May	3	5.0	6.0	6.0	11.5	12.0	12.5
	5	5.5	7.0	7.0	12.5	14.0	14.0
	6	7.5	8.0	7.5	13.0	14.0	15.0
	7	6.0	5.5	6.0	12.5	13.0	13.5
	10	7.0	8.5	8.5	13.0	14.0	14.0
	11	7.5	8.0	7.5	13.0	14.0	14.0
June	24	4.5	5.5	6.0	12.0	12.5	13.0
	25	3.0	4.5	5.0	13.0	12.5	11.5
	30	4.5	5.5	5.5	13.0	13.0	13.0
July	1	5.0	6.0	5.5	12.0	13.0	13.5
	2	4.5	5.5	5.5	13.0	13.5	13.5
	7	7.0	6.5	7.5	13.0	14.5	14.5
	8	7.0	8.0	8.5	13.5	15.5	15.5
	9	10.5	11.0	11.0	17.0	18.5	18.5
	10	10.0	10.5	11.0	16.5	18.0	17.5
	11	9.0	10.0	10.0	16.5	17.5	17.5
	13	6.0	7.0	6.0	12.5	14.0	14.5
	14	5.5	5.5	5.5	12.5	13.0	13.5
	15	5.0	5.5	5.5	13.0	14.0	14.5
	16	5.0	5.5	6.0	12.0	13.0	13.5
	19	4.0	4.5	5.0	11.5	12.5	13.0
	20	4.0	5.0	5.5	11.0	12.5	13.0
	21	4.5	6.0	6.0	11.0	13.0	13.5
	22	5.0	5.5	5.5	11.5	13.0	13.5
	23	4.5	5.5	5.0	9.0	11.5	11.5
	24	4.5	6.5	6.5	11.0	14.0	14.0
Sept.	9	3.0	4.0	4.5	11.0	11.5	11.5
	10	3.0	4.0	5.0	10.0	11.5	11.5
	11	3.5	4.5	5.5	9.5	11.5	11.5
	12	3.0	4.0	4.5	9.5	11.0	11.0
	13	3.0	4.0	4.5	10.0	11.0	11.5
	14	3.5	3.5	4.5	12.0	11.5	11.5
	15	5.0	4.5	4.5	12.0	12.5	12.5
	16	3.5	3.5	4.0	11.5	11.5	11.0
	17	4.5	4.0	5.0	10.5	11.5	12.0

Table 7—Time at which the 20th and 80th percentiles occurred on the cumulative passage curves for shad (Figure 20).

Test Date	20th percentile			80th percentile		
	Corps of Engr. Station P11	Station 248 P12	Slot 33 P13	Corps of Engr. Station P21	Station 248 P22	Slot 33 P23
	Hour	Hour	Hour	Hour	Hour	Hour
July 9	10.5	11.5	12.0	17.5	19.5	19.5
10	12.5	11.5	12.0	18.0	19.5	20.0
11	11.0	10.5	11.0	18.0	19.0	19.0
13	6.5	8.0	7.5	12.5	15.5	14.0
14	4.5	7.0	7.0	12.0	14.0	14.5
15	5.5	8.5	7.0	13.0	15.5	14.5
16	5.5	7.0	7.5	12.5	15.0	14.5
19	5.5	7.0	8.0	12.0	14.5	14.5
20	5.0	6.5	7.5	12.0	15.0	14.5
21	5.5	7.5	7.0	12.0	15.0	14.5
22	8.0	8.0	6.5	13.5	15.0	14.5
23	6.0	7.5	4.5	12.0	15.0	14.5
24	6.0	8.5	7.5	12.0	15.0	14.5

Table 8.—Results of statistical tests used to compare passage rates of salmonids and shad in the overflow and regulating sections of the south fish ladder at John Day Dam.

Species	Station comparison tested	Symbol 2/	d.f.	(D1i-D2i)	U 1/	Conclusion at $\alpha = .05$
Salmonids	Corps vs sta. 248	D11 vs D21	72	0.298	0.272	D11 $\not\equiv$ D21
	Corps vs slot 33	D12 vs D22	72	0.243	0.308	D12 $\equiv$ D22
	Sta. 248 vs slot 33	D13 vs D23	72	-0.041	0.162	D13 $\equiv$ D23
Shad	Corps vs sta. 248	D11 vs D21	24	1.038	0.672	D11 $\not\equiv$ D21
	Corps vs slot 33	D12 vs D22	24	1.038	0.747	D12 $\not\equiv$ D22
	Sta. 248 vs slot 33	D13 vs D23	24	-1.077	0.716	D13 $\equiv$ D23

1/ Natrella, 1963 (Section 3-3.2 and Table A-4).

2/ D11 = P12 - P11
D12 = P13 - P11
D13 = P13 - P12
D21 = P22 - P21
D22 = P23 - P21
D23 = P23 - P22

of salmonids through the regulating section accelerated more than enough to offset the slower passage through the overflow section of the ladder. Shad passage was also faster through the regulating section but the increased rate was not enough to offset the slower passage through the overflow section.

Passage at Night

Since counting was generally performed only during the daylight hours our counts at slot 33 do not represent the total number of fish that ascended the ladders on test days. Night counting was performed on several occasions to determine what proportion of fish ascended the ladder after we terminated our daily tests. One count was made during the spring tests when the Corps counting gate was closed (fish passage blocked) at night and the others were made during the summer before and after the Corps began leaving the gate at the counting station open at night.

The first night count was performed on May 5. The counting period extended from 4 a.m. May 5 to 4 p.m. May 6. The gate at the Corps station was closed from 8 p.m. May 5 to 4 a.m. May 6. The next four night counts were performed during the continuous counts that were performed from 4 a.m. July 7 to 8 p.m. July 11. The Corps counting gate was closed during the nights of July 7 and 8 but was open during the night of July 9 and 10.

The last night count was made on July 24, The test period extended from 4 a.m. July 24 to 4 a.m. July 25.

Comparisons of the counts made during these 24-hour tests (Table 9) illustrate that night passage varied between species and counting stations. There was generally a net upstream passage at weir 248 and slot 33 and there was both upstream and downstream passage at the Corps station.

During the three tests in which night counts were made at the Corps station there was a net upstream count of 12,037 salmonids during the day (4 a.m. to 8 p.m.) and a net upstream count of 122 salmonids (1.0 percent of the day count) during the night (Table 9). Conversely an average of 12.7 percent of the shad that passed upstream during the day in these tests passed downstream during the night. Net upstream and downstream counts were 5,202 and 661 respectively. "Other" species were not consistent. In two of the tests there was a net downstream passage and in the third there was net upstream passage during the night. Net passage, expressed as proportions of the day counts, ranged from 26.5 percent downstream to 12.5 percent upstream.

There was net upstream passage of all species at weir 248. Proportions of salmonids passing this station at night during the six tests in July ranged from 6.3 to 9.5 percent of the daytime count. Proportions of shad passing at night ranged from 7.7 percent to 14.4 percent of the daytime count and "other" species ranged from 14.9 percent to 49.8

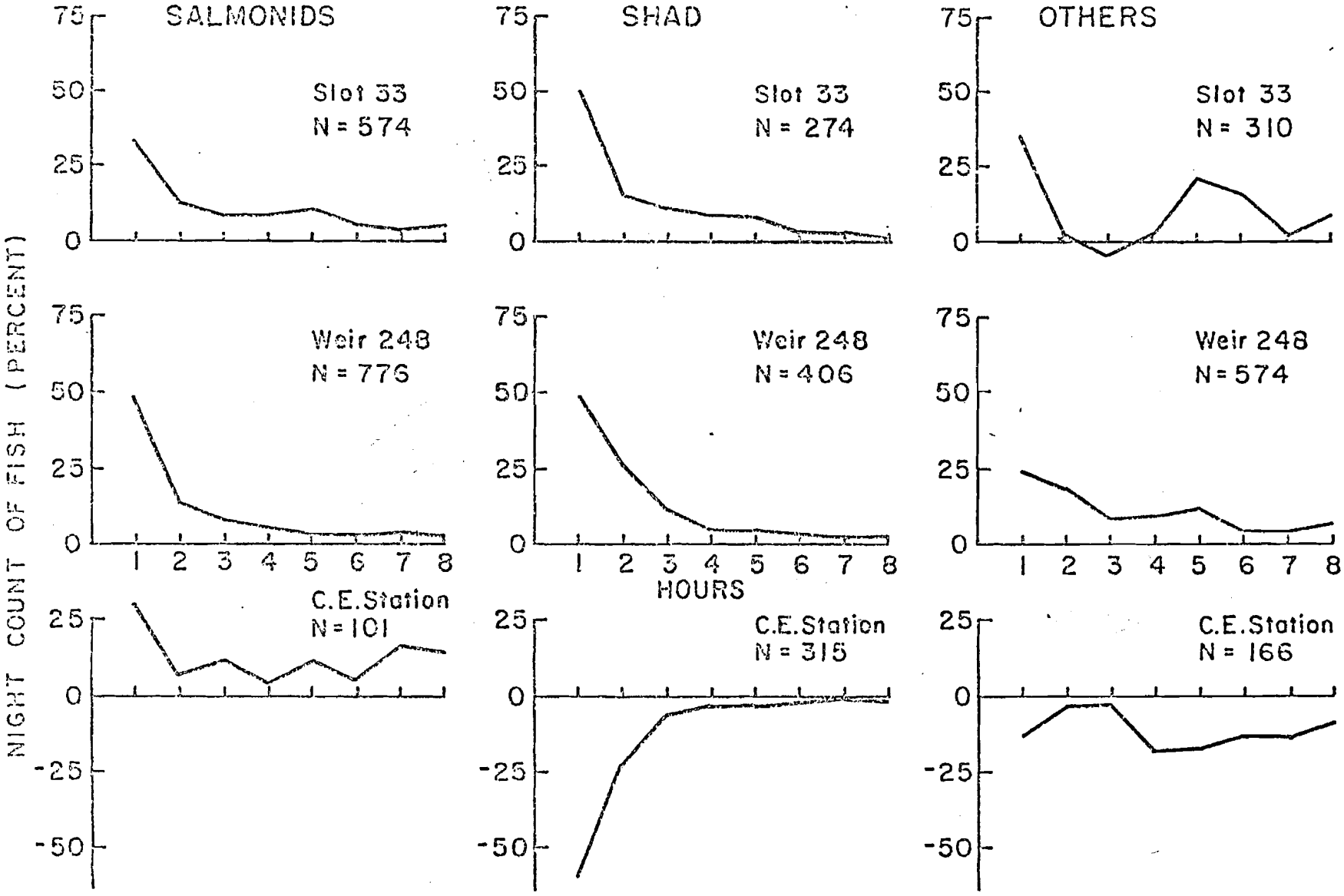


Figure 21.--Passage of fish at three counting stations in the south fish ladder during the nights (8 p.m. to 4 a.m.) of July 7 to 11. Graphs illustrate the number of fish counted at each station (n) and the percentages counted during each hour. Positive values denote upstream passage and negative values denote downstream passage.

Table 9.--Comparisons between day (4:00 a.m. to 8:00 p.m.) and night (8:00 p.m. to 4:00 a.m.) counts during six 24-hour tests. Values are net upstream counts-- negative values signify that downstream passage exceeded upstream passage during the counting period

Species	Date	Corps of Engineers counting station			Weir 248			Slot 33		
		Number of fish counted during 24-hour test		Percentage counted at night	Number of fish counted during 24-hour test		Percentage counted at night	Number of fish counted during 24-hour test		Percentage counted at night
		Day (A)	Night (B)	$\frac{B}{A} \times 100$	Day (A)	Night (B)	$\frac{B}{A} \times 100$	Day (A)	Night (B)	$\frac{B}{A} \times 100$
Salmonids	May 5 - 6		1/		678	43	6.3	642	16	2.5
	July 7 - 8		1/		1,321	101	7.6	2,036	152	7.5
	8 - 9		1/		2,183	207	9.5	2,948	276	9.4
	9 - 10	3,290	22	0.7	2,428	202	8.3	3,351	210	6.3
	10 - 11	5,460	79	1.4	4,209	266	6.3	5,330	325	6.1
	24 - 25	3,287	21	0.6	3,632	279	7.6	3,112	297	9.5
	Total (July)	12,037	122	1.0	13,823	1,055	7.6	16,777	1,260	7.5
Shad	May 5 - 6		1/		0	0	-	0	0	-
	July 7 - 8		1/		255	26	10.2	290	37	12.8
	8 - 9		1/		996	128	12.9	668	86	12.9
	9 - 10	1,749	- 142	- 8.1	1,633	147	9.0	1,057	40	3.8
	10 - 11	1,662	- 173	- 10.4	1,365	105	7.7	1,013	111	11.0
	24 - 25	1,791	- 346	- 19.3	1,585	228	14.4	1,214	93	7.7
	Total (July)	5,202	- 661	- 12.7	5,834	634	10.9	4,242	367	8.7
Other species	May 5 - 6		1/		38	7	18.4	110	3	2.7
	July 7 - 8		1/		671	100	14.9	603	51	8.5
	8 - 9		1/		464	231	49.8	705	401	56.9
	9 - 10	857	- 9	- 1.1	496	119	24.0	1,145	105	9.2
	10 - 11	593	- 157	- 26.5	377	124	32.9	670	- 47	- 7.0
	24 - 25	3,377	419	12.4	1,643	462	28.1	2,333	591	25.3
	Total (July)	4,827	253	5.2	3,651	1,036	28.4	5,456	1,101	20.2

1/ Gate at Corps of Engineers counting station was closed (fish passage blocked) from 8:00 p.m. - 4:00 a.m.

percent of the daytime count (Table 9).

At slot 33 there was net upstream movement of salmonids and shad during the six tests and, in all but one of the tests, there was a net upstream passage of "other" species. Night passage, expressed as proportions of the daytime counts during the six tests ranged from 2.5 percent to 9.5 percent for salmonids, from 3.8 percent to 12.9 percent for shad, and from 7.0 percent downstream passage to 56.9 percent upstream passage for "other" species.

Comparisons of hourly counts at weir 248 and slot 33 during the night illustrate that most of the salmonids and shad were counted during the first two hours (8 p.m. to 10 p.m.) of the counting period (Figure 21). Activity of "other" species varied throughout the night at the two counting stations. More fish were counted during the first hour (8 p.m. to 9 p.m.) than any other 1-hour period, but, significant numbers were also counted during other periods. Downstream passage of shad at the Corps station peaked during the first hour and declined thereafter. Downstream passage of "other" species peaked between 12 p.m. and 1 a.m. Upstream passage of salmonids peaked during the first hour and then continued at a lower rate throughout the night (Figure 21).

A comparison of early morning counts at weir 248 and slot 33 clearly indicate that some fish remained in the fish ladder overnight and did not begin moving until daylight the next morning. Counts generally increased abruptly about 4 a.m. at both stations and generally as many or more fish were tallied at weir 248 and slot 33 as were counted at the Corps station at this time (Appendix tables A-15 to A-19).

Downstream Passage

We assumed that if fish were experiencing difficulty in negotiating the regulating section there would be an unusually high percentage of fish falling back downstream at weir 248. Our observations revealed that although the proportions of fish falling back over weir 248 were generally higher than the proportions falling back over weir 214 they were in many instances lower than the proportions falling back at the Corps counting station.

The percentages of salmonids passing downstream at weir 248 were, with few exceptions, higher than the percentages recorded at the Corps counting station and at weir 214. Average percentages (based upon tests made during the spring, summer, and fall fish runs) were 7.5 percent at the Corps station, 4.1 percent at weir 214 and 16.4 percent at weir 248 (Table 10). These observations indicate that salmonids were somewhat more reluctant to accept the transition from the overfall ladder to the slot-type regulating section than they were from the Corps counting channel to the overfall ladder. Most of the salmonids that fell back downstream over weir 248, however, must have reascended the weir as the net upstream counts at the Corps station and slot 33 demonstrated that most of the salmonids that passed the Corps station were counted at slot 33.

Table 10.—Downstream passage of fish at counting stations during spring, summer, and fall tests.

Test period	Average forebay level	Percentage of fish passing downstream 1/											
		Salmonids				Shad				Other species			
		C. E. station	Weir 214	Weir 248	Slot 33	C. E. station	Weir 214	Weir 248	Slot 33	C. E. station	Weir 214	Weir 248	Slot 33
	Feet												
April 29 - May 11	264.2	6.2	3.7	7.4	21.8	-	-	-	-	52.9	10.6	18.4	27.4
June 24 - July 25	264.8	5.2	4.3	12.3	14.7	27.1	28.3	7.0	3.3	21.6	3.7	11.4	34.1
September 9 - 17	267.3	10.0	-	21.7	8.7	-	-	-	-	41.6	-	20.1	23.9
Total		7.5	4.1	16.4	12.9	27.1	28.3	7.0	3.3	26.4	4.3	12.8	32.2

1/ $\frac{\text{Downstream count}}{\text{Upstream count}} \times 100$

A comparison of the percentages of salmonids that fell back downstream at weir 248 and slot 33 reveal that fall-back activity increased at weir 248 during the season while it decreased at slot 33. We suspect that these differences in behavior may be related to changes in forebay level. The forebay level averaged about 3.1 feet higher in the fall tests than in the spring tests. The higher forebay increased the flows through the slots and increased the depths of the water in the pools of the regulating section. Salmonids may have been more reluctant to pass through the illuminated counting channel at slot 33 in the spring when the water level was low (and thus fell back downstream more often) than in the fall when the passage channel was deeper.

Raising the forebay level did not affect the depth of flow over weir 248, however, it did change flow conditions in the pool above the weir (pool 249) and flows through the slots in the baffle at the upstream end of pool 249. When the forebay is low (spring tests) the regulating section does not furnish sufficient water to operate the overflow section of the ladder so additional water must be introduced into pool 249. As the forebay rises (as in the fall tests) more water came through the regulating section and the auxiliary water input is reduced. The increased flow through the regulating section in the fall created stronger surface currents in pool

248 and it is believed that these stronger currents may have increased the fallback activity at weir 248. The effect was greater in the north side of weir 248 due to the wider slot on the north side of the baffle immediately upstream from 248. Generally more salmonids fell back on the north side than the south side of weir 248. Average proportions falling back during the fall tests were 25.0 percent on the north and 18.9 percent on the south. In the spring tests the proportions were about equal -- 7.2 percent fell back on the north and 7.6 percent fell back on the south side of the weir.

The changing forebay level did not seem to influence the fallback activity of "other" species (suckers, squawfish, carp, etc.) at weir 248 and slot 33. Higher proportions of these fish fell back at slot 33 than at weir 248. Average proportions passing downstream during the tests were 26.4 percent at the Corps station, 4.3 percent at weir 214, 12.8 percent at weir 248, and 32.2 percent at slot 33 (Table 10).

Smaller proportions of shad passed downstream at weir 248 and slot 33 than salmonids or "other" species. Average proportions falling downstream during the entire series of tests were 27.1 percent at the Corps station, 28.3 percent at weir 214, and 7.0 percent at weir 248, and 3.3 percent at slot 33 (Table 10).

During tests performed from July 7 to 24, downstream passage of shad was recorded by the Corps counter at their station in the north fish ladder. This station is located at the downstream end of the regulating section -- the same location as weir 248 in the south ladder. Comparisons of the percentages of downstream passage at these two stations indicate that shad may have been more reluctant to pass through the orifice-type control section on the north ladder than the new slot-type control section in the south ladder. Downstream passage out of the north (orifice-type) control section was twice as great as downstream passage out of the south (slot-type) control section. During the test period 17,918 shad were counted upstream and 5,017 were counted downstream in the north ladder -- an average downstream passage of 28.0 percent. During the same period, 21,015 shad were counted upstream and 2,168 were counted downstream in the south ladder -- an average downstream of only 10.3 percent. In addition 1,241 dead shad drifted out of the north ladder but few if any dead shad were counted downstream at weir 248 in the south ladder. It should be noted, however, that the configurations of the counting stations were different and the weir in the south ladder could have deterred downstream passage more than the slot-type passage in the north ladder.

Downstream passages of "other" species (chiselmouth, suckers, squawfish, carp, etc.) was less at weir 248 than either the Corps station or slot 33 but somewhat greater than at weir 214. Average percentages of fish passing downstream were: 26.4 at the Corps station, 4.3 percent at weir 214, 12.8 at weir 248 and 32.2 at slot 33 (Table 10).

Observations on Leaping

During the course of the study we observed many fish leaping within the south ladder. This occurred frequently at weir 248. Many fish leaped over the weir from the pool below and others leaped vertically from the pool above. Similar behavior was noted at weir 214 when this station was in operation. Several of these fish landed on our temporary bridges that spanned the fish ladder to provide access to the counting stations on the north side of the ladder. These fish were returned to the water when we were present, however, undoubtedly several perished when there was no one on the fish ladder to return them to the water. We removed three dead fish from the bridge at weir 214 and three from the bridge at weir 248. Corps personnel reported others that were removed from the bridges in our absence.

Although the various submerged paraphernalia that was installed at the counting weirs (metal grills, operating rods and chains used to block the orifices) may have incited some of the leaping at these sites it also occurred within other pools of the overflow and regulating sections of the ladder. During our tests, 10 salmonids (chinook, coho and steelhead trout) jumped out of the pool immediately above weir elevation 248 and were stranded on the walkway between the two guard fences. Another seven leaped out of various pools of the regulating section between weir 248 and slot 33. Some of these fish had to leap as high as 12 feet to clear the wall of the fish ladder and the guard fence.

Only two fish, both jack chinooks, were observed to have jumped out of the overflow section of the ladder below weir 248. There were undoubtedly others that leaped out, however, and were not observed by our personnel.

On two occasions during the fall tests we simultaneously monitored leaping in the regulating and overfall sections of the ladder to determine if more jumping was occurring in the regulating section than the overfall section of the ladder. One observer was stationed on the dam at the upstream end of the regulating section and the other was stationed on the walkway at the turn pool just below weir, elevation 207 (Figure 5).

From these vantage points the observers could see most of the fish that leaped up from the pools of the two sections of the ladder. View of the regulating pools was somewhat impaired by the height of the baffles in the pools and it is possible that some leaps in the control section were not seen.

During these two series of observations, 25 leaps were recorded in the overfall section between weir 207 and 248, and 11 were recorded in the regulating section between weir 248 and slot 33. Those in the overflow section were more or less evenly distributed throughout the entire section of the ladder. Six out of the 11 observed in the regulating section occurred within the first few pools of this section. On the basis of these observations we conclude that the frequency of leaping in the regulating section may be no greater than that occurring in other sections of the ladder. It is possible, however, that hydraulic conditions in the regulating pools may cause the fish to leap higher than they do in the overflow pools and the risk of jumping out of the ladder might be greater within the regulating section, especially when the forebay is at near maximum level and the pool levels are high. Most of the recorded instances of fish leaping out of the upper control pools were in the fall when the pool levels were high.

We discovered one area within the control section where leaping fish and lampreys were being trapped. This was the pocket created by the diagonal wall in the northeast corner of the pool above weir 249 (Figure 3). Several salmonids leaped over this wall and were trapped in this area. Several hundred dead lampreys were also removed from this area. Apparently the lampreys entered through the 2-inch square drain hole at the bottom of the wall but were unable to find their way out. This pocket should be filled or screened to prevent fish and lampreys from entering.

OBSERVATIONS RELATING TO THE CORPS OF ENGINEERS FISH COUNTS

It has been noted that beginning July 1 the Corps of Engineers left their counting gate open during the counter's 10-minute rest periods and used a factor to estimate number of fish that passed the station during these periods. During the shad run (July 9 to about August 15) they also left the gate open at night but no factor was used to account for night passage. Our counts during these periods have been tabulated to demonstrate how leaving the counting gate open may have influenced the accuracy of the Corps' count.

Factored Counts vs. Actual Counts

Comparisons between the Corps' factored counts and our actual counts during the 26 days that we counted at the Corps station indicate that there was little disparity between actual and factored counts (Table 11): The Corps' factored counts of salmonids ranged from 3.7 percent lower to 2.2 percent higher than our actual counts, and factored counts of shad ranged from 3.1 percent lower to 4.5 percent higher than the actual counts. The total actual count of salmonids (Corps' 50-minute counts plus our 10-minute counts during each day) for the 26 days was 110,900. The Corps' factored count (50-minute counts x 1.2) for this period was 110,692 -- a difference of 208 fish (Table 11). The actual count of shad at the Corps station during a 17-day period was 35,147 and the Corps' factored count was 35,028 -- a difference of only 119 fish.

Table 11.—Comparisons between actual and factored counts at the Corps of Engineers counting station.

Date		Salmonids					Shad				
		Corps count, 50-min. periods (A)	N.M.F.S. count during Corps' 10-min. rest periods (B)	Total actual count (A + B) (C)	Corps factored count (A x 1.2) (D)	Difference between factored and actual counts (D - C)	Corps count, 50-min. periods (A)	N.M.F.S. count during Corps' 10-min. rest periods (B)	Total actual count (A B) (C)	Corps factored count (A x 1.2) (D)	Difference between factored and actual counts (D - C)
July	1	1,526	317	1,843	1,831	- 12	37	5	42	44	2
	2	1,401	308	1,709	1,682	- 27	79	25	104	95	- 9
	7	2,388	439	2,827	2,865	- 38	396	77	473	475	2
	8	2,408	544	2,952	2,889	- 61	1,068	208	1,276	1,282	6
	9	2,725	644	3,369	3,270	- 99	1,326	309	1,635	1,591	- 44
	10	4,601	1,050	5,651	5,521	- 130	1,356	282	1,638	1,627	- 11
	11	3,978	909	4,887	4,773	- 114	1,128	265	1,393	1,354	- 39
	13	2,322	454	2,776	2,786	10	1,622	329	1,951	1,946	- 5
	14	2,243	431	2,674	2,692	18	1,418	242	1,660	1,702	42
	15	2,232	421	2,653	2,678	25	1,697	291	1,988	2,036	48
	16	2,255	430	2,685	2,706	21	2,240	426	2,666	2,688	22
	19	2,336	465	2,801	2,804	3	3,616	746	4,362	4,339	- 23
	20	3,386	827	4,213	4,063	- 150	5,306	1,131	6,437	6,367	- 70
	21	2,676	605	3,281	3,211	- 70	3,414	812	4,226	4,097	- 129
	22	2,208	506	2,714	2,649	- 65	1,789	300	2,089	2,147	58
	23	1,319	274	1,593	1,583	- 10	1,204	194	1,398	1,445	47
	24	2,893	566	3,459	3,472	13	1,494	315	1,809	1,793	- 16
September	9	6,480	1,141	7,621	7,776	155					
	10	6,942	1,325	8,267	8,330	63					
	11	8,521	1,881	10,402	10,225	- 177					
	12	7,236	1,406	8,642	8,686	44					
	13	4,808	873	5,681	5,771	90					
	14	3,300	594	3,894	3,959	65					
	15	3,690	781	4,471	4,428	- 43					
	16	3,449	597	4,046	4,137	91					
	17	4,920	869	5,789	5,905	116					
Total		92,243	18,657	110,900	110,692	- 208	29,190	5,957	35,147	35,028	- 119

Effect of night passage upon the accuracy of Corps of Engineers fish counts

Night counts were made on only three days during the period that the gate at the Corps station was left open at night. The results of these counts (Table 9) indicate that the daily (4 a.m. to 8 p.m.) counts of salmonids that have been reported by the Corps may be slightly lower than the number that actually ascended the ladder. Conversely, the daily shad count reported by the Corps for this period may have been up to about 20 percent greater than the number that actually ascended the ladder (Table 11).

It appears that downstream passage of shad at night at the Corps station will be a continuing problem in the south ladder, and the Corps will probably continue to leave the counting gate open at night during the shad run. If so, it would seem advisable to perform night counts in 1972 to arrive at a factor that could be applied to day counts to compensate for night passage. This would also apply to the north ladder, however, our counts at weir 248 indicate that the problem of downstream passage at the Corps station in the north ladder may be alleviated by installation of the new slot-type regulating section. The north ladder counting station will be located at the downstream end of the regulating section and our observations indicate that downstream passage of shad at this site may be considerably less than the mid-ladder counting station in the south ladder.

SUMMARY AND CONCLUSIONS

The reluctance of shad to pass through the orifice-type baffles in the flow regulating sections of the John Day fish ladders necessitated the redesign of these facilities. Coordinated studies were initiated in 1969 by the Corps of Engineers and the Bureau of Commercial Fisheries (now National Marine Fisheries Service) to develop satisfactory regulating sections for the two fish ladders at John Day Dam. Hydraulic aspects of new designs were studied in models at the Corps' Bonneville Hydraulic Laboratory and fish behavior was studied by N.M.F.S. in full scale structures at the Fisheries Laboratory at Bonneville. After testing several designs the Corps recommended slot-type baffles for the regulating sections of the John Day ladders. Laboratory tests indicated that this type of regulating ladder (designed by the Corps as Plan E) would provide satisfactory flow regulation and satisfactory fish passage was achieved in a 12-pool segment of this ladder at the Fisheries Laboratory.

With concurrence of State and Federal fisheries agencies the Plan E design was installed in the regulating section of the south fish ladder at John Day Dam during the winter of 1970. Modification of the north ladder was to be deferred until the south-ladder installation could be evaluated. An evaluation study was made by N.M.F.S. under contract with the Corps of Engineers during the 1971 fish runs.

The primary objective of the evaluation study was to determine if the new regulating section would satisfactorily pass shad and other migratory species of fish that ascended the John Day ladders. Special counting stations were installed to monitor fish passage in the regulating and overflow sections of the ladder, and daily counts at these stations were used to determine the relative efficiency of the new regulating section. From our observations of the behavior and performance of fish in the south ladder we have concluded that:

(1) The slot-type regulating section will satisfactorily pass the various species of fish that ascend the John Day fish ladders. An average of 94.4 percent of the salmonids (includes chinook salmon, sockeye salmon, coho salmon, and steelhead trout), 73.1 percent of the shad, 91.7 percent of other species (suckers, squawfish, carp, chiselmouth, etc.) that were counted at the Corps station (lower end of the ladder) completed their ascent of the overflow and regulating sections of the ladder during our test periods. Observations indicated that these fish ascend the regulating section as well as they did the overflow section of the ladder. We were unable to evaluate lamprey passage through the regulating section but lampreys were observed passing upstream at slot 33.

(2) Daily passage data at three counting stations in the ladder were analyzed statistically to compare salmonid and shad rates of passage in the overflow and regulating sections. Cumulative distributions of counts at each station formed passage patterns from which rates of passage were measured and compared. Results of statistical tests showed that the rate of salmon passage decreased in the overflow section of the ladder but increased in the regulating section. Shad showed essentially the same results as salmon expect that passage through the entire ladder was slower.

(3) Leaving the passage channel open at the Corps' counting station during the counter's rest periods had little effect upon the accuracy of the Corps counts. There was little disparity between daily counts resulting from continuous observations and those derived by multiplying the Corps' 50-minute counts by 1.2 (the factor used to compensate for the 10-minute non-counting period).

(4) Leaving the passage channel open and the counting station unattended at night (8 p.m. to 4 a.m.) may result in exaggerated shad counts at John Day Dam unless a factor is applied to compensate for night passage. Few counts were made at night, however, these indicated that significant numbers (up to 19 percent) of the shad that were counted upstream during the day may pass back downstream at night. From the standpoint of fish passage we recommend leaving the counting station open at night throughout the year and that night factors be derived by sample counting to compensate for night passage.

(5) Some salmonids and many lampreys have become trapped behind the concrete wall in the northeast corner of the pool just above weir 249 (Figure 3). The salmon leap into this area and lampreys evidently enter through the 2" square drain at the bottom of the wall. We recommend the void behind this wall be filled or the openings at the top and bottom be screened to prevent fish and lampreys from entering. The cover on the top should be sloped so that if a fish leaps up on the top it will slide back into the water.

(6) Several salmonids leaped out of the pools of the regulating section during the tests. Although observations indicated that leaping was probably no more frequent in the regulating section than the overflow section of the ladder, the risk of fish leaping out of the ladder may be greater in the regulating section than the overflow section of the ladder. The regulating sections of the two ladders should be inspected periodically during the 1972 salmon runs to determine if remedial measures will be required to prevent fish from leaping out of the regulating sections.

ACKNOWLEDGMENTS

The cordial cooperation by personnel of both the Walla Walla and Portland Districts Corps of Engineers at John Day Dam is gratefully acknowledged. We are especially indebted to Project Engineer Dave Larsen and his staff for our operations center, for assistance in setting up our counting facilities, and for the many small but vital services rendered. Corps of Engineers counters at John Day Dam gave valuable assistance in training our counters and making special observations for us.

Biometrician Sueto Murai of the National Marine Fisheries Service programmed the data for this report and materially assisted in the statistical analysis.

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JOHN DAY FISHWAY EVALUATION

APPENDIX TABLES 2/2

APPENDIX TABLES

Table A-1. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 16-hour period, April 29, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	12	0	- 26	- 14	0	0	0	0	0	0	3	3
5:00	15	0	- 1	12	0	0	3	3	- 1	0	3	2
5:30	3	0	0	3	0	0	4	4	8	0	8	16
6:00	3	0	3	6	4	0	0	4	7	0	1	8
6:30	6	0	4	10	10	0	2	12	8	0	5	13
7:00	13	0	0	13	17	0	2	19	12	0	7	19
7:30	38	0	7	45	10	0	5	15	17	0	0	17
8:00	94	0	- 2	92	5	0	4	9	23	0	1	24
8:30	149	0	0	149	6	0	- 1	5	8	0	5	13
9:00	138	0	7	145	28	0	4	32	8	0	1	9
9:30	138	0	7	145	60	0	2	62	15	0	1	16
10:00	163	0	15	135	91	0	11	102	46	0	5	51
10:30	161	0	14	175	115	0	9	124	69	0	5	74
11:00	153	0	13	166	127	0	12	139	95	0	4	99
11:30	136	0	15	151	178	0	13	191	111	0	4	115
12:00 noon	69	0	1	70	133	0	8	141	149	0	2	151
12:30 p.m.	69	0	16	85	129	0	14	143	167	0	9	176
1:00	70	0	30	100	157	0	20	177	147	0	7	154
1:30	54	0	3	57	149	0	20	169	153	0	5	158
2:00	30	0	0	30	94	0	10	104	130	0	6	136
2:30	56	0	- 2	54	60	0	17	77	117	0	3	120
3:00	104	0	15	119	72	0	21	93	81	0	4	85
3:30	124	0	- 5	119	57	0	22	79	71	0	9	80
4:00	61	0	11	72	59	0	29	88	72	0	9	81
4:30	86	0	7	93	79	0	45	124	53	0	11	64
5:00	38	0	10	48	120	0	19	139	72	0	6	78
5:30	81	0	13	94	99	0	25	124	85	0	9	94
6:00	94	0	13	107	79	0	40	119	96	0	13	109
6:30	76	0	7	83	70	0	22	92	79	0	7	86
7:00	34	0	12	46	65	0	25	90	74	0	7	81
7:30	45	0	10	55	70	0	24	94	47	0	16	63
8:00	0	0	0	0	25	0	5	30	17	0	8	25
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	2316	0	197	2513	2168	0	436	2604	2036	0	184	2220

1/ Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m., during counter's 10-minute rest periods, and after 8:00 p.m.

Table A-2. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 16-hour period, April 30, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	4	0	67	71	1	0	0	1	3	0	1	4
5:00	3	0	18	21	9	0	6	15	1	0	2	3
5:30	15	0	3	18	16	0	0	16	24	0	1	25
6:00	6	0	6	12	17	0	1	18	50	0	9	59
6:30	9	0	11	20	11	0	4	15	36	0	5	41
7:00	63	0	10	73	12	0	3	15	30	0	11	41
7:30	87	0	5	92	19	0	0	19	18	0	17	35
8:00	104	0	1	105	17	0	6	23	17	0	9	26
8:30	125	0	6	131	25	0	12	37	19	0	2	21
9:00	109	0	7	116	68	0	10	78	34	0	10	44
9:30	127	0	32	159	81	0	8	89	50	0	7	57
10:00	123	0	11	134	80	0	21	101	81	0	11	92
10:30	146	0	28	174	114	0	25	139	97	0	4	101
11:00	63	0	2	65	124	0	20	144	94	0	15	109
11:30	271	0	11	282	117	0	10	127	111	0	13	124
12:00 noon	141	0	16	157	147	0	17	164	88	0	14	102
12:30 p.m.	121	0	47	168	162	0	16	178	128	0	17	145
1:00	35	0	25	60	167	0	25	192	154	0	7	161
1:30	72	0	62	134	152	0	20	172	164	0	11	175
2:00	91	0	37	128	150	0	35	185	133	0	31	164
2:30	107	0	16	123	78	0	13	91	131	0	17	148
3:00	108	0	26	134	56	0	7	63	113	0	17	130
3:30	122	0	23	145	52	0	6	58	76	0	17	93
4:00	75	0	24	99	50	0	8	58	61	0	17	78
4:30	67	0	69	136	118	0	27	145	104	0	33	137
5:00	47	0	22	69	154	0	48	202	62	0	30	92
5:30	71	0	82	153	100	0	40	140	137	0	27	164
6:00	25	0	43	68	88	0	41	129	108	0	32	140
6:30	66	0	107	173	55	0	50	105	71	0	30	101
7:00	33	0	66	99	42	0	63	105	52	0	22	74
7:30	34	0	81	115	32	0	31	63	46	0	12	58
8:00	1	0	12	13	23	0	24	47	31	0	7	38
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	2471	0	976	3447	2337	0	597	2934	2324	0	458	2782

1/ Corps of Engineers counting station was closed (fish passage blocked) until 4:30 a.m., during counter's 10-minute rest periods, and after 8:00 p.m.

Table A-5. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 20-hour period, May 5, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	2	0	-10	-8	4	0	1	5	1	0	1	2
5:00	1	0	- 4	-3	2	0	2	4	1	0	2	3
5:30	1	0	- 1	0	6	0	-1	5	12	0	0	12
6:00	1	0	1	2	6	0	0	6	11	0	2	13
6:30	4	0	1	5	4	0	2	6	14	0	6	20
7:00	6	0	3	9	7	0	3	10	15	0	1	16
7:30	11	0	2	13	6	0	-1	5	5	0	1	6
8:00	11	0	0	11	6	0	1	7	2	0	5	7
8:30	38	0	- 3	35	4	0	-2	2	4	0	3	7
9:00	21	0	- 1	20	9	0	4	13	7	0	6	13
9:30	46	0	- 4	42	15	0	7	22	4	0	6	10
10:00	39	0	11	50	17	0	0	17	22	0	-1	21
10:30	47	0	8	55	28	0	0	28	16	0	-1	15
11:00	44	0	5	49	27	0	-1	26	21	0	7	28
11:30	41	0	- 7	34	37	0	1	38	34	0	7	41
12:00 noon	17	0	- 2	15	24	0	5	29	39	0	6	45
12:30 p.m.	57	0	- 2	55	27	0	3	30	31	0	5	36
1:00	29	0	- 2	27	31	0	4	35	29	0	10	39
1:30	34	0	- 6	28	35	0	1	36	30	0	2	32
2:00	15	0	- 1	14	28	0	5	33	36	0	3	39
2:30	30	0	-17	13	13	0	0	13	19	0	5	24
3:00	13	0	- 9	4	47	0	0	47	17	0	4	21
3:30	54	0	- 3	51	29	0	3	32	30	0	8	38
4:00	33	0	- 5	28	27	0	0	27	37	0	7	44
4:30	79	0	- 1	78	23	0	-1	22	19	0	4	23
5:00	19	0	3	22	40	0	0	40	25	0	-1	24
5:30	39	0	- 6	33	33	0	0	33	15	0	4	19
6:00	17	0	- 4	13	36	0	0	36	28	0	1	29
6:30	29	0	2	31	43	0	0	43	29	0	0	29
7:00	9	0	- 2	7	25	0	1	26	41	0	5	46
7:30	14	0	- 7	7	22	0	1	23	21	0	2	23
8:00	2	0	0	2	17	0	0	17	27	0	0	27
8:30					12	0	1	13	5	0	1	6
9:00					14	0	0	14	5	0	0	5
9:30					4	0	0	4	4	0	0	4
10:00					5	0	0	5	-2	0	1	-1
10:30					2	0	1	3	2	0	0	2
11:00					0	0	0	0	0	0	0	0
11:30					1	0	1	2	1	0	0	1
12:00 midnight					0	0	0	0	1	0	0	1
Total	835	0	-61	742	716	0	41	757	658	0	112	770

1/ Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m., during counter's 10-minute rest periods, and after 8:00 a.m.

Table A-6. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 20-hour period, May 6, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at (P.S.T.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.					2	0	0	2	0	0	0	0
1:00					1	0	0	1	0	0	1	1
1:30					0	0	0	0	0	0	0	0
2:00					0	0	0	0	0	0	1	1
2:30					0	0	2	2	0	0	-2	-2
3:00					0	0	2	2	0	0	2	2
3:30					1	0	0	1	0	0	0	0
4:00					1	0	0	1	1	0	-1	0
4:30	12	0	2	14	3	0	-4	-1	1	0	0	1
5:00	1	0	0	1	3	0	0	3	2	0	0	2
5:30	0	0	0	0	4	0	-1	3	9	0	-1	8
6:00	4	0	0	4	6	0	2	8	28	0	2	30
6:30	11	0	0	11	19	0	0	19	15	0	3	18
7:00	4	0	0	4	12	0	3	15	21	0	0	21
7:30	15	0	1	16	10	0	-1	9	16	0	0	16
8:00	11	0	0	11	6	0	0	6	8	0	-1	7
8:30	20	0	0	20	4	0	3	7	10	0	2	12
9:00	10	0	0	10	8	0	1	9	22	0	1	23
9:30	40	0	0	40	14	0	2	16	13	0	1	14
10:00	26	0	2	28	25	0	1	26	23	0	-1	22
10:30	17	0	4	21	21	0	0	21	16	0	4	20
11:00	20	0	3	23	14	0	1	15	27	0	1	28
11:30	44	0	-1	43	34	0	0	34	23	0	0	23
12:00 noon	23	0	2	25	24	0	0	24	16	0	0	16
12:30 p.m.	52	0	0	52	22	0	1	23	25	0	2	27
1:00	30	0	1	31	25	0	1	26	23	0	3	26
1:30	70	0	5	75	18	0	0	18	19	0	-1	18
2:00	51	0	3	54	28	0	-1	27	28	0	1	29
2:30	52	0	-2	50	37	0	0	37	30	0	1	31
3:00	60	0	-2	58	34	0	2	36	34	0	4	38
3:30	77	0	0	77	35	0	0	35	20	0	1	21
4:00	39	0	5	44	39	0	0	39	47	0	0	47
4:30	22	0	-2	20	59	0	2	61	61	0	3	64
5:00	26	0	2	28	67	0	1	68	67	0	0	67
5:30	49	0	6	55	35	0	1	36	67	0	4	71
6:00	17	0	1	18	41	0	0	41	65	0	9	74
6:30	15	0	-3	12	24	0	1	25	53	0	4	57
7:00	5	0	2	7	21	0	0	21	53	0	1	54
7:30	17	0	0	17	15	0	2	17	22	0	2	24
8:00	3	0	0	3	16	0	3	19	30	0	2	32
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	943	0	29	872	723	0	24	752	895	0	48	943

1/ Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m., during counter's 10-minute rest periods, and after 8:00 p.m.

Table A-7. Net upstream counts of fish (number counted upstream less number counted downstream) at four stations within the south fish ladder at John Day Dam during a 16-hour period, May 7, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.D.T.)	C.E. station 1/				Weir, elevation 214				Weir, elevation 245				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.																
1:00																
1:30																
2:00																
2:30																
3:00																
3:30																
4:00																
4:30	4	0	-3	-4	1	0	1	2	2	0	0	2	0	0	0	0
5:00	0	0	-2	-2	3	0	0	3	0	0	0	0	3	0	1	4
5:30	4	0	-1	3	3	0	0	3	7	0	0	7	14	0	0	14
6:00	1	0	3	4	7	0	0	7	6	0	0	6	14	0	3	17
6:30	4	0	2	6	3	0	0	3	13	0	1	14	26	0	2	23
7:00	12	0	0	12	4	0	0	4	8	0	0	8	7	0	1	8
7:30	12	0	2	14	8	0	0	8	6	0	0	6	17	0	0	17
8:00	13	0	1	14	10	0	0	10	9	0	0	9	15	0	-1	14
8:30	13	0	5	18	5	0	0	5	12	0	-2	10	9	0	-1	8
9:00	7	0	4	11	9	0	0	9	15	0	0	15	18	0	1	19
9:30	15	0	1	16	5	0	1	6	6	0	1	7	13	0	3	16
10:00	11	0	3	14	8	0	0	8	7	0	2	9	17	0	0	17
10:30	18	0	1	19	12	0	0	12	19	0	3	22	11	0	0	11
11:00	11	0	-1	10	7	0	2	9	17	0	0	17	14	0	0	14
11:30	41	0	0	41	13	0	0	13	12	0	0	12	13	0	7	20
12:00 noon	15	0	-1	14	19	0	0	19	7	0	0	7	10	0	2	12
12:30 p.m.	44	0	-1	43	21	0	1	22	8	0	-1	7	16	0	0	16
1:00	27	0	1	28	20	0	2	22	17	0	1	18	18	0	0	18
1:30	42	0	-3	39	25	0	0	25	19	0	0	19	11	0	0	11
2:00	14	0	1	15	23	0	0	23	23	0	2	25	27	0	2	29
2:30	15	0	5	20	20	0	0	20	37	0	2	39	18	0	3	21
3:00	12	0	-3	9	8	0	0	8	20	0	1	21	25	0	2	27
3:30	38	0	7	45	17	0	0	17	26	0	0	26	28	0	2	30
4:00	26	0	-1	25	17	0	0	17	17	0	2	19	40	0	0	40
4:30	30	0	3	33	20	0	0	20	15	0	1	16	33	0	1	34
5:00	8	0	1	9	15	0	0	15	12	0	1	13	26	0	0	26
5:30	18	0	5	23	17	0	0	17	15	0	0	15	24	0	3	27
6:00	14	0	3	17	11	0	0	11	11	0	0	11	25	0	2	27
6:30	23	0	5	28	7	0	0	7	29	0	0	29	31	0	1	32
7:00	15	0	6	21	18	0	0	18	20	0	0	20	22	0	4	26
7:30	23	0	2	25	5	0	0	5	10	0	0	10	20	0	2	22
8:00	8	0	0	8	6	0	1	7	7	0	2	9	15	0	1	16
8:30																
9:00																
9:30																
10:00																
10:30																
11:00																
11:30																
12:00 midnight																
Total	538	0	40	578	367	0	8	375	432	0	16	448	580	0	41	621

1/ See Table A-6.

Table A-8. Net upstream counts of fish (number counted upstream less number counted downstream) at four stations within the south fish ladder at John Day Dam during a 16-hour period, May 10, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.D.T.)	C.E. station 1/				Weir, elevation 214				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.																
1:00																
1:30																
2:00																
2:30																
3:00																
3:30																
4:00																
4:30	3	0	1	4	0	0	0	0	0	0	1	1	1	0	0	1
5:00	2	0	3	5	2	0	0	2	1	0	1	2	1	0	0	1
5:30	7	0	5	12	2	0	0	2	4	0	1	5	8	0	0	8
6:00	1	0	4	5	2	0	1	3	12	0	0	12	14	0	0	14
6:30	3	0	5	8	4	0	0	4	9	0	0	9	16	0	-1	15
7:00	7	0	0	7	-1	0	0	-1	1	0	1	2	7	0	2	9
7:30	11	0	1	12	6	0	0	6	8	0	-1	7	8	0	-2	6
8:00	15	0	2	17	4	0	0	4	10	0	0	10	7	0	1	8
8:30	19	0	6	25	12	0	1	13	7	0	1	8	9	0	0	9
9:00	8	0	3	11	8	0	0	8	9	0	6	15	9	0	1	10
9:30	9	0	4	13	13	0	0	13	9	0	-1	8	8	0	1	9
10:00	10	0	8	18	6	0	0	6	22	0	0	22	17	0	0	17
10:30	41	0	9	50	6	0	1	7	11	0	0	11	12	0	5	17
11:00	25	0	0	25	17	0	2	19	9	0	0	9	13	0	2	15
11:30	63	0	3	66	37	0	3	40	9	0	2	11	13	0	-1	12
12:00 noon	54	0	-4	50	27	0	0	27	21	0	2	23	9	0	1	10
12:30 p.m.	70	0	3	73	45	0	0	45	23	0	3	26	12	0	8	20
1:00	29	0	8	37	62	0	0	62	35	0	0	35	25	0	3	28
1:30	62	0	-1	61	33	0	0	33	47	0	0	47	28	0	1	29
2:00	30	0	-3	27	47	0	0	47	57	0	0	57	33	0	3	36
2:30	66	0	-1	65	42	0	0	42	62	0	5	67	50	0	1	51
3:00	44	0	3	47	38	0	1	39	54	0	1	55	53	0	2	55
3:30	87	0	4	91	38	0	0	38	66	0	1	67	45	0	3	48
4:00	34	0	3	37	66	0	1	67	57	0	0	57	49	0	6	55
4:30	69	0	7	76	54	0	0	54	52	0	1	53	54	0	6	60
5:00	29	0	6	35	48	0	0	48	65	0	0	65	57	0	5	62
5:30	62	0	16	78	50	0	1	51	45	0	0	45	52	0	3	55
6:00	30	0	17	47	40	0	0	40	49	0	0	49	64	0	1	65
6:30	46	0	18	64	38	0	0	38	56	0	0	56	52	0	4	56
7:00	21	0	18	39	29	0	0	29	58	0	1	59	45	0	3	48
7:30	39	0	11	50	22	0	2	24	54	0	1	55	49	0	0	49
8:00	9	0	5	14	24	0	3	27	27	0	8	35	39	0	1	40
8:30																
9:00																
9:30																
10:00																
10:30																
11:00																
11:30																
12:00 midnight																
Total	1005	0	164	1169	821	0	16	837	949	0	34	983	859	0	59	918

1/ See Table A-6.

Table A-9. Net upstream counts of fish (number counted upstream less number counted downstream) at four stations within the south fish ladder at John Day Dam during a 16-hour period, May 11, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.D.T.)	C.F. station 1/				Weir, elevation 214				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.																
1:00																
1:30																
2:00																
2:30																
3:00																
3:30																
4:00																
4:30	11	0	0	11	1	0	0	1	2	0	1	3	1	0	3	4
5:00	4	0	0	4	6	0	0	6	10	0	0	10	11	0	2	13
5:30	6	0	3	9	8	0	1	9	15	0	2	17	29	0	4	33
6:00	8	0	1	9	11	0	- 1	10	14	0	0	14	18	0	- 2	16
6:30	9	0	3	12	10	0	1	11	9	0	1	10	23	0	1	24
7:00	4	0	3	7	4	0	0	4	14	0	1	15	10	0	- 1	9
7:30	4	0	6	10	8	0	0	8	6	0	0	6	17	0	- 3	14
8:00	3	0	5	8	5	0	0	5	20	0	0	20	11	0	4	15
8:30	- 1	0	3	2	4	0	0	4	5	0	2	7	9	0	4	13
9:00	9	0	2	11	4	0	0	4	8	0	1	9	11	0	2	13
9:30	10	0	5	15	3	0	0	3	9	0	5	14	15	0	1	16
10:00	14	0	3	17	8	0	0	8	7	0	7	14	10	0	3	13
10:30	25	0	8	33	7	0	0	7	12	0	2	14	9	0	3	12
11:00	7	0	1	8	21	0	1	22	5	0	2	7	4	0	0	4
11:30	6	0	3	9	12	0	1	13	11	0	2	13	7	0	1	8
12:00 noon	10	0	7	17	7	0	2	9	15	0	2	17	10	0	1	11
12:30 p.m.	22	0	8	30	15	0	1	16	22	0	0	22	10	0	1	11
1:00	34	0	6	40	11	0	0	11	22	0	0	22	14	0	2	16
1:30	63	0	- 1	62	22	0	0	22	12	0	6	18	23	0	0	23
2:00	26	0	4	30	42	0	3	45	14	0	0	14	12	0	2	14
2:30	54	0	10	64	21	0	4	25	23	0	2	25	6	0	4	10
3:00	29	0	9	38	29	0	2	31	32	0	0	32	16	0	6	22
3:30	27	0	4	31	36	0	3	39	30	0	0	30	24	0	5	29
4:00	32	0	1	33	28	0	1	29	30	0	5	35	34	0	8	42
4:30	34	0	9	43	40	0	0	40	39	0	2	41	45	0	8	53
5:00	27	0	9	36	34	0	0	34	23	0	0	23	35	0	1	36
5:30	29	0	3	32	26	0	0	26	31	0	1	32	49	0	10	59
6:00	20	0	3	23	7	0	1	8	37	0	1	38	44	0	11	55
6:30	36	0	0	36	27	0	0	27	35	0	1	36	52	0	1	53
7:00	14	0	- 2	12	25	0	3	28	34	0	9	43	29	0	2	31
7:30	14	0	8	22	16	0	0	16	26	0	0	26	31	0	6	37
8:00	5	0	2	7	3	0	2	5	17	0	2	19	16	0	8	24
8:30																
9:00																
9:30																
10:00																
10:30																
11:00																
11:30																
12:00 midnight																
Total	595	0	126	721	501	0	25	526	594	0	57	651	635	0	98	733

1/ See Table A-6.

Table A-10..Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 16-hour period, June 24, 1971.. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (p.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Sal-monids	Shad	Other species	Total	Sal-monids	Shad	Other species	Total	Sal-monids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	12	0	81	93	5	0	19	24	3	0	36	39
5:00	6	0	27	33	4	0	16	20	8	0	30	38
5:30	4	0	33	37	4	0	24	28	3	0	16	19
6:00	3	0	7	10	8	0	16	24	2	0	42	44
6:30	32	0	12	44	8	0	47	55	7	0	47	54
7:00	11	0	0	11	8	0	48	56	13	0	43	56
7:30	48	0	6	54	13	0	51	64	5	0	31	36
8:00	27	0	13	40	14	0	61	75	8	0	49	57
8:30	78	0	4	82	11	0	34	45	24	0	59	83
9:00	38	0	6	44	29	0	37	66	30	0	26	56
9:30	55	0	2	57	33	0	28	66	32	0	67	99
10:00	30	0	9	39	36	0	52	88	46	0	62	108
10:30	56	0	20	76	27	0	17	44	54	0	39	93
11:00	38	0	0	38	22	0	28	50	51	0	37	88
11:30	85	0	14	99	33	0	54	87	38	0	47	85
12:00 noon	35	0	10	45	26	0	32	58	38	0	32	70
12:30 p.m.	73	0	24	97	40	0	24	64	37	0	29	66
1:00	56	0	34	90	41	0	21	62	50	0	41	91
1:30	69	0	145	214	42	0	29	71	41	0	28	69
2:00	18	0	128	146	41	0	38	79	62	0	27	89
2:30	59	0	237	296	45	0	9	54	58	0	36	94
3:00	25	0	190	215	15	0	6	21	60	0	20	80
3:30	52	0	234	286	29	0	5	34	39	0	27	66
4:00	21	0	140	161	29	0	5	34	16	0	26	42
4:30	49	1	277	327	20	0	6	26	48	0	17	65
5:00	21	0	149	170	36	0	15	51	40	0	34	74
5:30	60	1	279	340	36	0	42	78	54	0	54	108
6:00	18	0	264	282	13	0	59	77	53	0	115	168
6:30	47	0	357	404	17	0	26	43	35	0	205	240
7:00	26	0	190	216	27	0	51	78	36	0	200	236
7:30	14	-1	184	197	27	0	62	89	15	0	199	214
8:00	8	0	86	94	13	0	111	124	35	0	116	151
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	1174	1	3162	4337	762	0	1073	1835	1041	0	1837	2878

1/ Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m., during counter's 10-minute rest periods, and after 8:00 p.m.

Table A-3. Net upstream counts of fish (number counted upstream less number counted downstream) at four stations within the south fish ladder at John Day Dam during a 16-hour period, May 3, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at (P.S.T.)	C.R. station 1/				Weir, elevation 214				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.																
1:00																
1:30																
2:00																
2:30																
3:00																
3:30																
4:00																
4:30	5	0	-40	-35	1	0	0	1	1	0	2	3	7	0	2	9
5:00	2	0	0	2	7	0	1	8	8	0	2	10	4	0	16	20
5:30	4	0	9	13	11	0	-1	10	14	0	7	21	33	0	17	50
6:00	2	0	1	3	9	0	6	15	9	0	14	23	29	0	24	53
6:30	7	0	11	18	9	0	0	9	17	0	12	29	35	0	20	55
7:00	6	0	- 3	3	5	0	3	8	13	0	16	29	26	0	20	46
7:30	25	0	- 4	21	4	0	-1	3	21	0	25	46	11	0	29	40
8:00	23	0	- 2	21	6	0	1	7	16	0	29	45	14	0	29	43
8:30	50	0	23	73	21	0	2	23	21	0	54	75	15	0	33	48
9:00	56	0	1	57	29	0	3	32	13	0	40	53	21	0	21	42
9:30	85	0	13	98	37	0	4	41	26	0	36	62	12	0	31	43
10:00	51	0	8	59	77	0	5	82	32	0	56	88	22	0	43	65
10:30	77	0	8	85	57	0	4	61	54	0	69	123	33	0	30	63
11:00	37	0	10	47	61	0	6	67	90	0	93	183	41	0	33	74
11:30	58	0	-12	46	43	0	7	50	84	0	102	186	64	0	14	78
12:00 noon	26	0	-17	9	35	0	1	36	63	0	112	175	87	0	42	129
12:30 p.m.	52	0	13	65	41	0	0	41	55	0	70	125	61	0	33	94
1:00	34	0	6	40	40	0	4	44	68	0	58	126	61	0	24	85
1:30	46	0	- 4	42	22	0	7	29	77	0	94	171	42	0	16	58
2:00	52	0	-12	40	18	0	1	19	55	0	90	145	53	0	19	72
2:30	62	0	8	70	30	0	3	33	53	0	71	124	38	0	22	60
3:00	55	0	6	61	44	0	2	46	52	0	29	81	45	0	20	65
3:30	56	0	22	78	47	0	8	55	60	0	33	93	54	0	18	72
4:00	19	0	4	23	46	0	11	57	74	0	26	100	37	0	13	50
4:30	23	0	9	37	19	0	5	24	51	0	25	76	70	0	24	94
5:00	22	0	5	27	28	0	1	29	37	0	26	63	48	0	10	58
5:30	28	0	- 9	19	26	0	-1	25	20	0	21	41	51	0	9	60
6:00	9	0	- 1	8	26	0	0	26	34	0	28	62	42	0	16	58
6:30	36	0	15	51	7	0	0	7	33	0	65	98	27	0	24	51
7:00	42	0	2	44	15	0	3	18	31	0	60	91	25	0	11	36
7:30	20	0	7	27	30	0	1	31	17	0	31	48	13	0	4	17
8:00	4	0	3	7	10	0	0	10	6	0	6	12	18	0	14	32
8:30																
9:00																
9:30																
10:00																
10:30																
11:00																
11:30																
12:00 midnight																
Total	1079	0	80	1159	861	0	86	947	1210	0	1402	2612	1139	0	681	1820

1/ See Table A-2.

Table A-4..Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 16-hour period, May 4, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at (P.S.T.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	7	0	- 4	3	0	0	2	2	1	0	0	1
5:00	2	0	4	6	3	0	2	5	7	0	2	9
5:30	4	0	- 1	3	13	0	3	16	13	0	7	20
6:00	1	0	2	3	15	0	1	16	25	0	10	35
6:30	2	0	1	3	11	0	4	15	25	0	- 1	24
7:00	4	0	1	5	10	0	1	11	17	0	3	20
7:30	26	0	6	32	7	0	4	11	7	0	7	14
8:00	16	0	5	21	7	0	13	20	11	0	8	19
8:30	51	0	11	62	10	0	11	21	6	0	8	14
9:00	43	0	2	45	15	0	11	26	5	0	4	9
9:30	139	0	7	146	20	0	24	44	14	0	11	25
10:00	80	0	2	82	32	0	25	57	16	0	9	25
10:30	138	0	2	140	43	0	20	63	24	0	12	36
11:00	71	0	1	72	85	0	11	96	35	0	6	41
11:30	148	0	9	157	90	0	29	119	57	0	13	70
12:00 noon	35	0	0	35	104	0	21	125	83	0	13	96
12:30 p.m.	103	0	8	111	115	0	38	153	95	0	10	105
1:00	56	0	19	75	116	0	37	153	120	0	10	130
1:30	97	0	- 2	95	86	0	35	121	95	0	12	107
2:00	40	0	- 7	33	90	0	29	119	94	0	3	97
2:30	96	0	16	112	84	0	26	110	76	0	8	84
3:00	25	0	- 6	19	62	0	15	77	80	0	25	105
3:30	47	0	4	51	29	0	4	33	73	0	14	87
4:00	31	0	0	31	Discontinued counting				85	0	13	98
4:30	56	0	11	67	because of high winds.				92	0	18	110
5:00	34	0	12	46					70	0	13	83
5:30	30	0	10	40					54	0	11	65
6:00	24	0	11	35					35	0	15	50
6:30	43	0	13	56					49	0	14	63
7:00	11	0	0	11					31	0	12	43
7:30	25	0	- 2	23					27	0	8	35
8:00	7	0	3	10					19	0	2	21
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	1492	0	138	1630					1441	0	300	1741

1/ Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m., during counter's 10-minute rest periods, and after 8:00 p.m.

Table A-13.. Net upstream counts of fish (number counted upstream less number counted downstream) at four stations within the south fish ladder at John Day Dam during a 16-hour period, July 1, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (p.s.t.)	C.E. station 1/				Weir, elevation 214				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.																
1:00																
1:30																
2:00																
2:30																
3:00																
3:30																
4:00																
4:30	44	0	249	293	5	0	4	9	7	0	15	22	10	0	13	23
5:00	9	0	89	98	30	0	10	40	3	0	27	30	16	0	24	40
5:30	17	1	31	49	23	0	9	32	17	0	15	32	15	-4	29	40
6:00	22	0	21	43	17	0	1	18	14	0	42	56	12	0	39	51
6:30	29	1	25	55	11	0	7	18	18	0	46	64	16	0	41	57
7:00	37	1	34	72	4	0	11	15	21	0	54	75	19	0	43	62
7:30	34	0	35	69	19	0	4	23	26	0	47	73	22	1	55	78
8:00	54	0	26	80	30	0	6	36	36	0	46	82	19	0	44	63
8:30	39	1	26	66	22	1	18	41	40	-1	35	74	35	0	38	73
9:00	51	3	15	69	16	0	12	28	34	0	48	82	54	0	79	133
9:30	68	0	19	87	36	2	20	58	23	0	42	65	71	1	64	136
10:00	71	0	24	95	61	0	10	71	38	1	44	83	44	0	79	123
10:30	68	0	48	116	61	0	11	72	38	0	49	87	54	0	63	117
11:00	67	1	53	121	54	1	16	71	78	0	47	125	40	0	44	84
11:30	93	0	31	124	40	0	25	65	47	0	15	62	55	0	43	98
12:00 noon	107	0	41	148	77	0	14	91	54	0	48	102	37	1	37	75
12:30 p.m.	122	1	63	186	69	0	15	84	52	1	41	94	32	4	37	73
1:00	96	0	93	189	68	-1	23	90	64	14	39	117	49	2	29	80
1:30	71	1	66	138	61	1	12	74	95	-1	57	151	63	0	34	97
2:00	67	2	108	177	44	1	15	60	103	1	45	149	97	1	14	112
2:30	72	3	167	242	38	0	14	52	99	0	17	116	93	2	31	126
3:00	62	2	285	349	62	0	14	76	42	0	22	64	99	0	36	135
3:30	62	3	264	329	55	1	45	101	65	1	30	96	61	5	33	99
4:00	57	2	252	311	32	1	41	74	58	1	24	83	64	3	40	107
4:30	79	3	402	484	49	2	57	108	56	1	53	110	75	0	41	116
5:00	68	4	411	483	39	3	90	132	41	-2	66	105	46	2	32	80
5:30	63	4	486	553	46	2	68	116	60	3	104	167	63	2	61	126
6:00	54	2	576	632	33	1	66	100	53	3	127	183	63	2	97	162
6:30	45	3	439	487	29	4	52	85	61	1	147	209	49	4	154	207
7:00	18	2	484	504	25	0	45	70	77	2	233	312	96	2	154	252
7:30	20	4	441	465	15	0	53	68	43	0	284	327	72	1	225	298
8:00	11	0	78	89	6	1	37	44	9	2	136	147	33	0	62	95
8:30																
9:00																
9:30																
10:00																
10:30																
11:00																
11:30																
12:00 midnight																
Total	1777	44	5382	7203	1177	20	825	2022	1472	27	2045	3544	1574	29	1815	3418

1/ See Table A-35.

Table A-14.. Net upstream counts of fish (number counted upstream less number counted downstream) at four stations within the south fish ladder at John Day Dam during a 16-hour period, July 2, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (p.s.t.)	C.E. station 1/				Weir, elevation 214				Weir, elevation 248				Slot 33			
	Sal-monids	Shad	Other species	Total	Sal-monids	Shad	Other species	Total	Sal-monids	Shad	Other species	Total	Sal-monids	Shad	Other species	Total
0:30 a.m.																
1:00																
1:30																
2:00																
2:30																
3:00																
3:30																
4:00																
4:30	28	1	259	288	2	0	8	10	14	0	93	107	15	0	95	110
5:00	13	0	108	121	20	0	5	25	6	0	92	98	19	1	173	193
5:30	12	0	48	60	13	0	14	27	16	0	94	110	10	0	232	242
6:00	18	1	61	80	20	0	11	31	20	0	84	104	3	0	183	186
6:30	13	0	59	72	23	0	17	40	18	0	81	99	27	0	180	207
7:00	26	0	28	54	10	0	7	17	17	0	116	133	16	0	154	170
7:30	39	2	42	83	20	0	7	27	16	0	76	92	23	1	150	174
8:00	63	2	35	100	28	0	23	51	22	0	81	103	24	1	149	174
8:30	77	2	17	96	47	0	2	49	33	0	86	119	23	1	200	224
9:00	84	1	38	123	57	0	11	68	48	0	138	186	20	0	172	192
9:30	74	1	30	105	53	0	29	82	70	0	98	168	46	0	114	160
10:00	61	0	38	99	54	0	14	68	76	0	158	234	119	0	95	214
10:30	55	1	47	103	50	0	13	63	61	0	141	202	89	0	137	226
11:00	76	2	45	123	42	0	12	54	75	0	95	170	67	0	152	219
11:30	38	1	46	85	55	0	3	58	59	0	95	154	67	0	109	176
12:00 noon	77	0	34	111	50	0	15	65	54	0	83	137	62	1	92	155
12:30 p.m.	43	0	27	70	46	0	1	47	37	2	84	123	42	0	83	125
1:00	12	1	43	56	23	0	12	35	51	2	69	122	57	0	78	135
1:30	47	3	61	111	12	0	9	21	47	0	52	99	64	1	41	106
2:00	55	0	52	107	13	0	19	32	23	0	95	123	64	1	99	164
2:30	37	5	32	74	15	1	9	25	40	0	99	139	31	1	65	97
3:00	71	10	65	146	25	0	12	37	38	0	91	129	55	1	67	123
3:30	53	2	51	106	33	1	19	53	31	1	66	98	34	0	87	121
4:00	65	14	58	137	32	6	22	60	34	1	30	65	44	1	58	103
4:30	78	10	69	157	26	9	34	69	32	4	57	93	43	1	67	111
5:00	81	10	86	177	36	6	25	67	39	4	46	89	47	0	76	123
5:30	88	9	104	201	29	10	22	61	63	1	53	117	57	4	103	164
6:00	109	6	193	308	38	11	17	66	61	4	60	125	58	2	86	146
6:30	68	2	212	282	32	15	18	65	61	1	118	180	70	3	81	154
7:00	68	10	228	306	41	4	12	57	72	1	84	157	57	19	82	158
7:30	54	5	204	263	34	4	25	63	55	6	101	162	65	23	71	159
8:00	18	5	94	117	20	4	29	53	70	3	117	190	62	4	33	99
8:30																
9:00																
9:30																
10:00																
10:30																
11:00																
11:30																
12:00 midnight																
Total	1701	106	2514	4321	999	71	476	1546	1364	30	2833	4227	1480	66	3564	5110

1/ See Table A-15.

Table A-15. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 20-hour period, July 7, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.S.T.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	23	3	20	46	7	0	12	19	22	0	16	38
5:00	7	3	10	20	10	0	17	27	14	0	5	19
5:30	6	3	2	11	10	0	7	17	23	1	12	36
6:00	10	3	14	27	20	0	8	28	16	0	19	35
6:30	16	15	10	41	15	1	14	30	6	5	28	39
7:00	24	1	9	34	13	1	20	34	21	2	17	40
7:30	29	7	18	54	6	6	23	35	9	9	8	26
8:00	45	5	5	55	20	9	22	51	10	8	32	50
8:30	60	8	9	77	32	4	13	49	15	6	18	39
9:00	59	6	- 1	64	19	3	48	70	37	2	30	69
9:30	59	7	3	69	38	8	32	78	44	4	25	73
10:00	65	10	8	83	36	14	35	85	24	6	19	49
10:30	50	9	6	65	50	10	45	105	62	15	25	102
11:00	60	8	10	78	45	12	68	125	63	8	27	98
11:30	75	5	0	80	26	8	55	89	59	9	20	88
12:00 noon	143	10	2	155	41	7	29	77	42	12	19	73
12:30 p.m.	149	11	5	165	26	12	23	61	27	15	31	73
1:00	175	10	22	207	45	9	21	75	45	16	18	79
1:30	147	5	6	158	68	12	25	105	43	7	32	82
2:00	103	6	7	116	72	6	21	99	83	2	27	112
2:30	114	17	12	143	78	7	23	108	103	9	6	123
3:00	104	24	5	133	55	2	7	64	129	18	7	154
3:30	135	23	8	166	36	4	7	47	82	13	31	126
4:00	136	28	5	169	46	4	6	56	102	3	21	126
4:30	177	45	10	232	56	2	7	65	116	5	11	132
5:00	141	32	28	201	79	3	7	89	100	15	16	131
5:30	143	46	30	219	78	3	4	85	153	10	11	174
6:00	125	36	23	184	56	13	6	75	130	12	16	158
6:30	56	31	42	129	54	20	20	94	118	15	11	144
7:00	49	31	33	113	73	29	19	126	130	25	11	166
7:30	45	37	28	110	57	24	9	90	120	18	16	154
8:00	37	12	34	83	49	22	18	89	83	20	18	121
8:30					38	7	27	72	25	7	5	37
9:00					35	7	6	48	34	6	10	50
9:30					19	8	7	34	17	5	- 9	13
10:00					1	1	4	6	- 19	6	7	32
10:30					3	0	0	3	12	7	-15	4
11:00					2	0	4	6	1	1	0	2
11:30					1	1	3	5	9	1	- 5	5
12:00 midnight					2	1	3	6	6	0	11	17
Total	2567	497	423	3487	1422	280	725	2427	2159	323	607	3089

1/ Gate at Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m. and after 8:00 p.m. Gate was open the rest of the day.

Table A-16..Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 24-hour period, July 8, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.D.T.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.					1	0	4	5	10	1	4	15
1:00					0	0	3	3	4	1	8	13
1:30					0	0	6	6	1	2	3	6
2:00					0	1	4	5	2	0	6	8
2:30					0	0	7	7	3	0	4	7
3:00					- 1	0	14	13	2	0	7	9
3:30					0	0	4	4	2	0	8	10
4:00					0	0	4	4	5	0	7	12
4:30	21	0	7	28	12	4	12	28	8	4	13	25
5:00	6	0	10	16	11	4	8	23	52	11	16	79
5:30	16	0	5	21	13	4	5	22	29	2	9	40
6:00	32	10	9	51	17	14	16	47	28	3	3	34
6:30	28	16	11	55	31	9	30	70	19	4	32	55
7:00	40	13	9	62	26	13	14	53	22	4	15	41
7:30	41	10	2	53	26	17	20	63	31	13	21	65
8:00	62	20	10	92	30	7	29	66	30	13	23	66
8:30	100	14	1	115	36	19	26	81	39	13	9	61
9:00	98	25	6	129	64	10	31	105	33	22	18	73
9:30	66	22	0	88	75	11	19	105	46	22	7	75
10:00	82	24	7	113	61	20	15	96	72	4	13	89
10:30	75	20	14	109	51	39	36	126	100	21	17	138
11:00	105	30	52	187	79	27	15	121	63	9	12	84
11:30	152	51	46	249	68	19	1	88	92	9	22	123
12:00 noon	207	43	56	306	58	29	10	97	68	17	15	100
12:30 p.m.	186	33	60	279	25	38	20	83	74	18	20	112
1:00	208	42	72	322	76	58	4	138	96	6	12	114
1:30	176	54	70	300	176	23	4	203	149	11	16	176
2:00	131	50	71	252	108	11	11	130	191	9	15	215
2:30	119	71	82	272	113	16	15	144	206	12	22	240
3:00	84	49	70	203	96	27	17	140	144	11	12	167
3:30	88	46	99	233	71	4	17	92	176	10	8	194
4:00	144	44	104	292	90	8	7	105	152	16	28	196
4:30	151	86	99	336	108	22	1	131	120	35	15	170
5:00	161	79	106	346	83	51	4	138	123	40	27	190
5:30	130	118	87	335	92	84	4	180	120	47	31	198
6:00	84	89	71	244	95	86	11	192	153	63	24	230
6:30	100	81	90	271	121	97	18	236	158	64	57	279
7:00	86	77	88	251	82	86	19	187	133	59	58	250
7:30	51	65	124	240	77	58	7	142	128	42	65	235
8:00	39	19	45	103	112	81	18	211	103	54	50	207
8:30					56	31	33	120	41	25	42	108
9:00					64	20	12	96	33	25	44	102
9:30					27	28	22	77	42	5	23	70
10:00					25	24	30	79	50	2	23	75
10:30					8	8	7	23	18	8	22	48
11:00					5	7	19	31	8	1	10	19
11:30					3	3	14	20	11	1	12	24
12:00 midnight					1	2	14	17	10	9	7	26
Total	3069	1331	1533	5933	2372	1120	661	4153	3190	748	935	4873

1/ Gate at Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m. and after 8:00 p.m. Gate was open the rest of the day.

Table A-17..Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 24-hour period, July 9, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.					0	1	9	10	16	5	30	51
1:00					5	0	6	11	24	3	55	82
1:30					1	1	6	8	13	2	31	46
2:00					2	0	15	17	5	0	32	37
2:30					6	0	10	16	2	-2	3	3
3:00					2	1	7	10	3	1	13	17
3:30					1	1	5	7	0	0	24	24
4:00					1	1	22	24	0	1	30	31
4:30	17	4	37	58	7	2	15	24	11	14	39	64
5:00	10	9	38	57	18	2	15	35	49	20	31	100
5:30	18	1	33	52	25	12	9	46	40	6	33	79
6:00	35	18	28	81	25	13	9	47	40	4	63	107
6:30	36	41	14	91	36	15	14	65	41	9	51	101
7:00	54	43	29	126	32	12	23	67	48	7	11	66
7:30	56	54	7	117	28	21	13	62	47	18	40	105
8:00	99	64	17	180	55	26	31	112	36	12	45	93
8:30	130	42	22	194	50	39	18	107	64	19	67	150
9:00	121	41	26	188	59	41	17	117	58	21	52	131
9:30	91	42	5	138	70	51	23	144	92	18	53	163
10:00	120	36	17	173	78	40	24	142	107	19	35	161
10:30	130	35	12	177	80	50	19	149	106	14	21	141
11:00	174	63	25	262	67	61	16	144	92	33	35	160
11:30	156	84	17	257	70	62	19	151	136	37	33	206
12:00 noon	139	49	23	211	93	102	27	222	133	30	26	189
12:30 p.m.	72	68	21	161	74	74	10	158	130	21	20	171
1:00	145	35	50	230	60	51	8	119	144	18	22	184
1:30	159	46	37	242	63	36	6	105	145	15	22	182
2:00	108	62	30	200	100	22	9	131	97	21	36	154
2:30	174	63	52	289	153	31	11	195	117	31	15	163
3:00	194	120	39	353	139	46	17	202	137	40	70	247
3:30	193	151	36	380	109	54	23	186	144	52	27	223
4:00	153	121	35	292	132	51	11	194	139	58	27	224
4:30	164	173	42	379	132	50	14	196	148	51	27	226
5:00	158	153	31	342	116	62	28	206	199	58	46	303
5:30	130	112	27	269	112	145	9	266	160	84	53	297
6:00	121	68	33	222	103	119	8	230	174	78	30	282
6:30	72	25	41	138	83	100	3	186	144	53	36	233
7:00	42	30	21	93	111	135	13	259	155	72	25	252
7:30	13	-37	10	-14	91	59	14	164	112	87	18	217
8:00	21	-67	4	-42	57	49	20	126	106	37	31	174
8:30	3	-67	2	-62	35	44	15	94	66	5	28	99
9:00	-5	-27	2	-30	33	22	18	73	16	4	3	23
9:30	-6	- 8	--3	-17	46	17	13	76	22	1	0	23
10:00	1	-11	-11	-21	25	12	12	49	17	7	5	29
10:30	6	- 7	- 2	- 3	11	10	7	28	16	4	5	25
11:00	1	- 4	10	7	5	10	1	16	7	5	4	16
11:30	1	- 2	0	- 1	13	2	5	20	7	5	-11	1
12:00 midnight	2	- 3	6	5	5	2	4	11	4	1	16	21
Total	3293	1620	861	5774	2619	1757	651	5027	3569	1093	1413	6031

1/ Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m. It was open during the rest of the day.

Table A-18..Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 24-hour period, July 10, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.d.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.	3	- 1	0	2	2	6	6	14	9	1	14	24
1:00	4	- 3	4	5	1	8	6	15	6	3	- 9	0
1:30	3	- 4	0	- 1	3	4	9	16	9	0	21	30
2:00	1	- 2	- 2	- 3	4	0	7	11	4	1	11	16
2:30	0	0	1	1	3	0	6	9	5	3	- 2	6
3:00	2	- 1	- 7	- 6	6	2	- 1	7	2	1	2	5
3:30	1	- 1	- 2	- 2	4	2	3	9	5	0	12	17
4:00	5	- 1	- 7	- 3	6	6	8	20	15	- 1	6	20
4:30	3	1	0	4	15	10	15	40	26	13	5	44
5:00	14	- 2	4	16	22	11	12	45	56	12	19	87
5:30	31	2	1	34	15	12	11	38	67	8	10	85
6:00	64	4	2	70	12	21	8	41	40	9	19	68
6:30	80	11	6	97	37	21	15	73	29	8	30	67
7:00	106	22	3	131	46	23	10	79	34	17	8	59
7:30	174	23	0	197	60	26	18	104	72	20	14	106
8:00	205	14	- 1	218	78	14	1	93	59	35	34	128
8:30	170	18	5	193	106	35	7	148	86	33	21	140
9:00	232	25	7	264	131	43	14	188	128	16	31	175
9:30	266	33	4	303	165	39	8	212	196	15	20	231
10:00	295	30	9	334	190	11	4	205	196	8	15	219
10:30	341	49	10	400	226	21	8	255	238	15	9	262
11:00	237	44	5	336	212	53	6	271	239	18	18	275
11:30	336	54	14	404	245	52	8	305	309	32	15	356
12:00 noon	363	68	9	440	224	35	2	261	269	27	12	308
12:30 p.m.	298	72	26	396	178	76	13	267	246	14	29	289
1:00	323	65	27	413	201	101	10	312	258	31	26	345
1:30	231	73	32	336	245	36	29	310	357	26	19	402
2:00	168	80	31	279	233	28	6	267	390	22	11	423
2:30	103	99	20	222	218	26	16	260	331	24	20	375
3:00	128	106	58	292	186	32	10	228	262	14	20	296
3:30	146	63	38	247	132	36	5	173	178	33	26	237
4:00	212	106	26	344	146	46	2	194	155	48	19	222
4:30	92	115	28	235	105	32	6	143	159	42	11	192
5:00	158	158	27	323	126	48	10	184	131	72	20	223
5:30	178	106	55	339	93	76	27	196	132	63	13	208
6:00	126	79	55	260	139	93	19	251	129	48	35	212
6:30	91	59	48	198	123	91	21	235	149	75	39	263
7:00	113	50	13	176	121	83	18	222	177	90	36	303
7:30	74	29	34	137	98	78	20	196	127	66	26	219
8:00	52	28	- 3	77	81	56	18	155	95	59	40	194
8:30	20	-61	-17	-58	72	40	12	124	71	43	35	149
9:00	14	-34	-11	-31	51	26	13	90	39	22	20	81
9:30	7	-37	12	-18	39	- 1	11	49	32	15	-10	37
10:00	5	-16	- 5	-16	36	18	6	60	22	3	-32	- 7
10:30	3	- 8	-12	-17	23	7	8	38	14	6	-12	8
11:00	2	- 3	- 2	- 3	5	0	3	8	12	1	-41	-28
11:30	1	- 4	-14	-17	7	1	8	16	19	3	-27	- 5
12:00 midnight	- 1	- 1	-25	-27	7	2	4	13	21	2	- 1	22
Total	5520	1425	506	7521	4478	1486	486	6450	5615	1116	657	7388

1/ Gate at Corps of Engineers counting station was open continuously (24 hours).

Table A-19..Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 20-hour period, July 11, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (p.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.	1	- 5	-28	-32	3	1	18	22	22	1	26	49
1:00	3	0	- 6	- 3	5	0	8	13	11	6	3	20
1:30	0	0	-17	-17	5	0	7	12	18	3	- 6	15
2:00	1	- 2	- 5	- 6	0	5	0	5	3	1	- 4	0
2:30	3	- 1	-13	-11	4	0	7	11	6	2	-11	- 3
3:00	12	0	- 6	6	5	5	6	16	16	2	- 6	12
3:30	2	- 1	- 9	- 8	2	0	4	6	10	0	2	12
4:00	6	0	1	7	2	1	9	12	9	1	17	27
4:30	7	5	2	14	20	4	13	37	24	9	7	40
5:00	26	4	2	32	33	9	6	48	57	18	21	96
5:30	56	8	7	71	28	11	8	47	50	37	20	107
6:00	105	13	4	122	28	14	7	49	37	17	7	61
6:30	125	22	- 2	145	44	26	12	82	39	6	17	62
7:00	193	28	2	223	78	18	9	105	75	6	8	89
7:30	221	15	9	245	120	38	2	160	109	9	4	122
8:00	209	31	3	243	140	41	6	187	100	20	12	132
8:30	190	36	11	237	193	20	3	216	137	30	31	198
9:00	241	31	19	291	202	56	9	267	197	34	28	259
9:30	209	16	5	230	179	46	8	233	219	32	20	271
10:00	179	33	15	227	173	73	14	260	192	28	14	234
10:30	197	81	17	295	155	33	13	201	238	19	17	274
11:00	143	34	29	206	160	57	14	231	223	34	13	270
11:30	165	65	28	258	138	46	2	186	212	23	12	247
12:00 noon	239	57	38	334	150	60	11	221	174	24	13	211
12:30 p.m.	304	46	72	422	133	47	15	195	136	26	18	180
1:00	275	32	79	386	134	38	4	176	144	32	- 1	175
1:30	228	22	98	348	209	38	10	257	191	17	6	214
2:00	151	35	81	267	201	74	7	282	233	10	15	258
2:30	144	60	88	292	288	56	13	357	246	31	21	298
3:00	159	63	126	348	187	68	2	257	240	39	23	302
3:30	144	71	101	316	196	54	7	257	178	19	35	232
4:00	179	74	102	355	191	67	5	263	189	37	4	230
4:30	126	89	89	304	177	62	13	252	127	28	13	168
5:00	157	74	63	294	214	56	3	273	151	37	18	206
5:30	150	88	24	262	178	110	5	293	127	42	62	231
6:00	96	68	53	217	177	80	18	275	168	65	35	268
6:30	82	65	70	217	144	55	21	220	124	77	50	251
7:00	86	78	66	230	99	80	20	199	163	69	0	237
7:30	54	30	42	126	85	126	18	229	163	55	29	252
8:00	56	1	42	99	83	106	7	196	108	45	51	204
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	4924	1366	1302	7592	4563	1681	362	6606	4876	991	644	6511

1/ Gate at Corps of Engineers counting station was open continuously (24 hours).

Table A-20. Net upstream counts of fish (number counted upstream less number counted downstream) at four stations within the south fish ladder at John Day Dam during a 17-hour period, July 13, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (a.m.)	C.E. station 1/				Weir, elevation 214				Weir, elevation 218				Slat 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.																
1:00																
1:30																
2:00																
2:30																
3:00																
3:30																
4:00																
4:30	7	24	4	35	5	110	2	117	14	4	9	27	32	22	22	76
5:00	7	3	5	15	17	52	3	72	5	15	18	38	73	25	23	121
5:30	20	10	17	47	9	81	4	94	22	25	26	73	54	12	59	125
6:00	34	14	22	70	8	64	3	75	35	28	22	85	15	10	52	77
6:30	42	4	11	57	22	54	- 1	75	53	32	22	87	14	17	50	81
7:00	46	30	17	93	14	61	0	75	45	18	19	82	12	26	29	67
7:30	46	22	13	81	31	66	0	97	51	37	12	100	22	41	32	95
8:00	39	10	4	53	18	56	0	74	50	17	18	85	51	44	42	137
8:30	59	30	15	104	12	83	2	97	59	21	37	117	50	41	27	118
9:00	55	46	25	126	34	90	2	126	47	19	31	97	43	24	24	91
9:30	66	43	19	128	12	146	5	163	52	47	13	112	54	17	16	87
10:00	64	76	28	168	33	155	12	200	68	42	17	127	72	15	28	115
10:30	84	64	30	178	52	106	14	172	62	47	20	129	79	17	40	136
11:00	65	83	23	181	74	113	14	201	61	60	31	152	64	17	24	105
11:30	87	57	58	202	40	91	11	142	63	87	29	179	70	35	26	131
12:00 noon	194	57	47	298	42	118	6	166	85	70	43	198	65	27	21	113
12:30 p.m.	192	35	69	296	61	197	16	274	88	68	29	185	87	16	20	123
1:00	155	42	63	260	105	157	15	277	127	70	21	218	68	17	43	128
1:30	89	53	52	194	95	246	14	355	142	68	38	248	102	24	3	129
2:00	59	75	46	180	54	185	19	258	187	82	39	308	150	36	5	191
2:30	82	92	72	246	36	136	14	186	156	68	39	263	157	42	18	217
3:00	95	106	72	273	19	136	3	158	110	42	39	191	147	20	13	180
3:30	139	160	74	373	47	248	18	313	76	42	12	130	66	26	39	131
4:00	172	150	110	432	60	284	24	368	94	84	12	190	92	44	46	182
4:30	172	115	125	412	104	205	22	331	167	113	44	324	61	58	21	140
5:00	146	97	101	344	75	181	7	263	240	79	66	385	70	60	39	169
5:30	126	89	84	299	77	224	4	305	152	113	61	326	102	103	44	249
6:00	107	64	59	230	55	170	11	236	94	159	87	320	178	107	48	333
6:30	82	70	86	238	69	79	16	164	161	160	79	400	147	85	59	291
7:00	59	57	82	198	41	152	21	214	129	146	77	352	181	39	65	285
7:30	53	10	85	148	46	226	5	277	154	110	99	363	171	48	105	324
8:00	38	16	58	112	35	207	10	252	103	227	119	449	137	34	92	263
8:30	28	-39	23	12	11	101	9	121	123	233	57	413	60	28	61	149
9:00	- 3	-49	8	-44	11	36	10	57	82	82	29	193	30	11	7	48
9:30																
10:00																
10:30																
11:00																
11:30																
12:00 midnight																
Total	2706	1721	1612	6039	1424	4616	315	6355	3137	2495	1314	6946	2776	1188	1243	5207

1/ See Table A-19.

Table A-21. Net upstream counts of fish (number counted upstream less number counted downstream) at four stations within the south fish ladder at John Day Dam during a 17-hour period, July 14, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.D.T.)	C.F. station 1/				Weir, elevation 214				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.																
1:00																
1:30																
2:00																
2:30																
3:00																
3:30																
4:00																
4:30	4	28	9	41	16	150	1	167	20	6	30	56	36	13	45	94
5:00	7	- 1	11	17	9	56	0	65	27	36	30	93	57	18	53	128
5:30	11	8	15	34	5	39	5	49	33	35	9	82	48	14	64	126
6:00	27	23	32	82	5	23	0	33	32	55	21	108	21	9	40	70
6:30	47	13	19	79	14	12	6	32	25	41	19	85	24	9	32	65
7:00	70	31	13	114	19	51	14	84	30	40	23	93	18	9	28	55
7:30	75	82	15	172	11	89	6	106	69	29	16	114	31	47	61	139
8:00	79	61	5	145	21	85	3	109	93	28	17	143	32	38	46	116
8:30	64	41	13	118	28	95	13	134	80	35	25	140	76	37	34	147
9:00	55	62	18	135	43	95	12	150	71	29	16	116	73	18	26	117
9:30	74	58	15	147	29	125	14	168	72	37	21	130	95	26	39	160
10:00	119	67	37	223	38	179	9	225	53	41	19	113	64	11	26	101
10:30	92	90	33	215	38	160	10	208	84	52	29	165	59	27	40	126
11:00	94	99	45	238	66	159	9	234	96	67	41	204	81	40	29	150
11:30	80	80	35	195	60	143	11	214	91	84	46	221	73	37	32	142
12:00 noon	147	52	78	277	48	105	20	173	104	67	29	200	79	32	30	141
12:30 p.m.	166	48	85	299	93	136	36	265	129	61	36	226	78	25	26	129
1:00	146	45	93	284	74	148	24	246	155	66	28	249	97	17	34	148
1:30	117	47	80	244	73	203	22	298	157	44	29	230	102	14	27	143
2:00	75	50	66	191	60	77	13	150	136	44	25	205	99	26	29	154
2:30	89	41	96	226	32	96	9	137	102	68	37	207	187	35	40	262
3:00	110	81	158	349	33	147	22	202	117	71	21	209	142	26	56	224
3:30	97	99	207	403	56	232	13	301	111	62	16	189	80	46	24	150
4:00	93	85	208	386	41	131	9	181	81	62	39	182	118	61	34	213
4:30	111	51	227	389	53	120	21	194	100	41	46	187	87	53	42	182
5:00	90	40	197	327	47	157	26	230	114	63	52	229	78	69	31	178
5:30	96	47	319	462	31	195	17	233	92	108	84	284	97	55	89	241
6:00	85	72	314	471	46	58	30	134	49	151	111	311	113	72	56	241
6:30	72	87	288	447	31	103	41	175	84	79	103	266	129	91	73	293
7:00	68	48	147	263	28	71	11	110	58	77	183	318	100	85	148	333
7:30	74	28	152	254	23	121	10	154	66	67	216	349	76	80	152	308
8:00	65	-36	80	109	26	69	36	131	89	83	230	402	83	60	146	289
8:30	36	-163	31	- 96	22	24	15	61	49	69	142	260	47	24	102	173
9:00	14	- 74	26	- 34	11	24	23	58	67	23	84	174	38	16	99	153
9:30																
10:00																
10:30																
11:00																
11:30																
12:00 midnight																
Total	2649	1390	3167	7206	1230	3670	511	5411	2746	1921	1873	6540	2618	1240	1833	5691

1/ See Table A-19.

Table A-22. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 17-hour period, July 15, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.S.T.)	C.F. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	21	13	7	41	25	10	46	81	68	13	79	160
5:00	11	7	22	40	29	26	27	82	81	9	111	201
5:30	17	7	15	39	55	29	36	120	43	8	80	131
6:00	27	16	7	50	30	26	43	99	28	10	98	136
6:30	46	70	28	144	47	27	43	117	32	12	101	145
7:00	63	30	30	123	49	28	43	120	24	21	83	128
7:30	61	34	48	143	60	14	33	107	42	29	73	144
8:00	71	65	58	194	56	18	30	104	41	29	64	134
8:30	64	45	78	187	82	34	21	137	42	34	70	146
9:00	82	48	70	200	70	29	51	150	52	33	72	157
9:30	75	45	107	227	95	26	41	162	63	13	74	150
10:00	79	53	103	235	81	44	27	152	52	14	46	112
10:30	80	58	89	227	80	40	40	160	75	18	49	142
11:00	98	49	110	257	91	32	34	157	73	21	48	142
11:30	85	106	84	275	94	37	33	164	67	20	27	114
12:00 noon	99	80	99	278	112	59	39	210	85	28	18	131
12:30 p.m.	112	57	127	296	109	80	88	277	54	23	14	91
1:00	129	75	160	364	98	56	83	237	93	15	42	150
1:30	130	49	110	289	110	111	103	324	71	18	47	136
2:00	93	72	134	299	110	100	83	293	139	26	39	204
2:30	93	78	119	290	130	85	79	294	129	37	67	233
3:00	100	96	87	283	119	49	54	222	90	30	104	224
3:30	124	96	139	359	121	66	71	258	110	53	121	284
4:00	98	99	106	305	110	125	49	284	79	27	146	252
4:30	93	85	119	297	146	88	75	309	92	54	141	287
5:00	116	56	122	294	156	84	116	356	91	55	128	274
5:30	121	137	143	401	134	140	123	397	97	75	127	299
6:00	92	128	169	389	125	147	82	354	80	75	121	276
6:30	101	93	194	388	82	59	154	295	112	70	110	292
7:00	89	74	132	295	86	88	119	293	131	75	143	349
7:30	65	20	137	222	116	145	108	369	155	50	176	381
8:00	46	18	82	146	115	243	64	422	117	37	90	244
8:30	41	-46	93	93	112	166	91	369	77	18	125	220
9:00	- 6	-97	100	- 3	125	127	55	307	33	21	119	173
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	2616	1816	3235	7667	3160	2438	2184	7782	2613	1071	2953	6642

1/ Gate at Corps of Engineers counting station was open continuously (24 hours).

Table A-23. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 17-hour period, July 16, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	1	20	9	30	26	9	38	73	20	15	110	145
5:00	8	1	30	39	32	26	36	94	71	15	107	193
5:30	18	5	24	47	33	40	48	121	58	9	92	159
6:00	31	14	20	65	41	43	34	118	35	9	34	78
6:30	34	35	- 3	66	23	21	51	100	23	15	104	142
7:00	36	37	12	85	57	37	42	136	32	23	109	164
7:30	67	49	23	139	65	42	46	153	23	23	54	100
8:00	77	55	26	158	59	32	37	128	46	47	84	177
8:30	92	92	30	214	71	37	26	134	46	35	59	140
9:00	103	78	27	208	89	42	56	187	48	35	55	138
9:30	131	75	55	261	119	75	60	254	58	28	69	155
10:00	126	123	41	290	128	75	29	232	75	28	59	162
10:30	119	73	42	234	141	75	38	254	77	27	61	165
11:00	90	125	93	308	148	89	46	283	127	47	73	247
11:30	57	123	85	270	118	107	56	281	137	46	80	263
12:00 noon	138	140	106	384	117	110	68	295	104	51	45	200
12:30 p.m.	141	97	77	305	90	64	99	253	92	29	39	160
1:00	169	94	129	392	111	51	49	211	91	28	48	167
1:30	166	101	64	331	127	71	46	244	95	25	57	177
2:00	105	111	100	317	151	102	60	313	114	31	49	194
2:30	83	85	202	370	140	100	98	338	161	64	68	293
3:00	96	115	161	372	119	71	93	283	137	73	78	288
3:30	116	162	218	496	129	88	49	266	120	79	85	284
4:00	80	131	247	458	139	87	61	337	73	67	99	239
4:30	70	103	213	386	148	130	147	425	89	98	107	294
5:00	74	112	248	434	116	80	153	349	95	92	137	324
5:30	90	97	225	412	97	105	163	365	105	146	175	426
6:00	98	113	265	476	102	127	185	414	93	146	140	379
6:30	63	76	249	388	123	167	221	511	90	97	203	390
7:00	49	124	208	381	130	205	224	559	80	86	293	459
7:30	26	50	137	213	104	173	236	513	123	81	231	435
8:00	29	5	106	140	80	157	206	443	107	90	155	352
8:30	4	-44	15	-25	53	207	168	428	59	64	86	209
9:00	3	-35	12	-20	50	109	83	242	55	37	65	157
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	2591	2535	3493	8624	3331	2934	3057	9342	2759	1786	3310	7855

1/ Gate at Corps of Engineers counting station was open continuously (24 hours).

Table A-24. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 17-hour period, July 19, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (p.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	10	9	9	28	28	24	46	98	29	17	82	128
5:00	9	5	44	58	46	30	20	96	61	13	36	110
5:30	36	4	59	99	60	16	44	120	27	11	84	122
6:00	37	32	8	77	52	24	40	116	14	13	81	108
6:30	62	54	5	121	66	23	40	129	27	9	97	133
7:00	98	50	17	165	109	30	40	179	25	23	60	108
7:30	112	56	19	187	99	18	25	142	33	34	67	134
8:00	98	84	23	205	122	44	45	211	42	41	59	142
8:30	82	83	40	205	190	48	61	299	76	36	109	221
9:00	111	104	25	240	122	54	52	228	97	37	45	179
9:30	161	261	42	464	110	92	33	235	130	39	54	225
10:00	120	166	46	352	171	91	28	290	86	47	85	218
10:30	113	173	47	333	213	109	38	360	82	61	84	227
11:00	87	210	56	353	196	100	56	352	86	86	69	241
11:30	121	219	59	399	145	127	48	320	109	85	57	251
12:00 noon	92	177	87	356	140	93	46	279	109	75	55	239
12:30 p.m.	87	153	109	349	156	123	116	395	95	53	66	214
1:00	68	162	124	354	131	113	76	325	105	51	49	205
1:30	42	115	136	293	160	124	92	376	108	97	46	251
2:00	62	162	95	319	85	70	67	222	107	106	39	252
2:30	73	145	162	385	94	109	96	299	117	129	55	301
3:00	86	119	140	345	148	101	103	352	78	115	55	248
3:30	66	144	185	415	130	118	112	360	89	133	84	311
4:00	83	215	160	458	117	170	174	461	74	106	90	270
4:30	79	215	215	509	146	212	209	567	81	119	91	291
5:00	85	161	228	474	164	191	176	531	74	192	85	351
5:30	63	130	218	411	160	162	193	515	87	248	109	444
6:00	58	105	234	397	99	190	164	453	95	222	111	428
6:30	21	102	197	320	85	229	188	502	91	168	129	388
7:00	36	136	159	331	95	196	197	488	69	174	129	372
7:30	47	85	114	246	67	200	258	525	55	194	152	401
8:00	52	28	84	144	53	139	220	412	49	176	166	391
8:30	23	-113	34	- 56	62	168	140	370	29	91	121	241
9:00	5	- 85	7	- 75	69	49	61	179	33	35	104	172
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	2388	3666	3187	9241	3890	3532	3304	10726	2469	3041	2805	8315

1/ Gate at Corps of Engineers counting station was open continuously (24 hours).

Table A-25. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 17-hour period, July 2[illegible], 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.s.t.)	C.F. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	4	14	8	26	25	15	21	61	12	17	88	117
5:00	11	12	111	134	35	15	27	77	33	19	54	111
5:30	36	40	25	101	34	37	47	118	21	19	72	112
6:00	77	94	15	186	32	35	37	104	28	23	81	132
6:30	103	157	- 3	257	45	72	36	153	26	26	91	143
7:00	136	170	7	313	75	38	32	145	30	23	66	119
7:30	185	181	13	379	94	50	31	175	63	51	73	187
8:00	181	200	26	407	115	76	32	223	94	59	35	188
8:30	213	203	6	422	151	94	33	278	97	63	43	203
9:00	154	210	20	384	121	135	41	297	138	68	25	231
9:30	150	233	20	403	168	139	47	354	167	77	49	293
10:00	143	216	30	389	136	126	43	305	164	77	64	305
10:30	134	200	39	373	166	142	43	351	175	90	53	318
11:00	148	225	46	419	140	120	49	309	157	121	74	352
11:30	143	296	56	495	139	132	46	317	148	83	59	290
12:00 noon	206	308	66	580	144	152	47	343	160	73	36	269
12:30 p.m.	257	316	41	614	111	103	52	271	146	62	51	259
1:00	248	256	47	551	132	88	61	281	143	74	48	265
1:30	241	282	25	548	217	167	77	461	168	124	72	364
2:00	186	313	27	526	169	162	46	377	176	136	56	368
2:30	121	240	29	390	189	123	43	355	212	144	46	402
3:00	111	260	37	408	117	145	30	292	239	180	66	485
3:30	110	288	54	452	126	140	26	292	183	178	80	446
4:00	131	289	87	507	108	151	41	300	177	194	77	448
4:30	121	254	83	458	129	182	50	361	95	146	52	293
5:00	120	155	92	367	134	186	62	382	147	209	67	423
5:30	88	255	108	452	155	232	91	478	118	215	56	389
6:00	38	152	76	266	131	165	86	382	162	281	67	510
6:30	58	229	97	384	78	175	84	337	166	240	75	481
7:00	59	185	78	322	89	238	94	421	146	189	78	413
7:30	53	127	66	246	60	292	97	449	101	227	82	410
8:00	40	-20	28	48	56	278	67	401	85	281	85	451
8:30	18	-339	4	-317	56	231	37	324	53	114	46	213
9:00	6	-170	7	-157	35	81	22	138	26	44	3	73
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	4030	5782	1471	11283	3712	4522	1678	9912	4066	3927	2070	10063

1/ Gate at Corps of Engineers counting station was open continuously (24 hours).

Table A-26..Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 17-hour period, July 21, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Sal-monids	Shad	Other species	Total	Sal-monids	Shad	Other species	Total	Sal-monids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	8	15	3	26	17	12	23	52	27	22	48	97
5:00	9	5	48	62	22	16	22	60	66	45	53	164
5:30	40	4	38	82	23	35	30	88	38	44	31	113
6:00	44	38	22	104	33	51	20	104	22	29	45	96
6:30	74	48	13	135	36	43	19	98	32	25	53	110
7:00	64	85	8	157	38	44	29	111	29	44	27	100
7:30	69	99	8	176	45	26	21	92	34	60	37	131
8:00	115	134	4	253	55	40	22	117	51	71	40	162
8:30	87	136	15	238	63	57	37	157	58	86	33	177
9:00	148	134	21	303	61	41	28	130	98	77	25	200
9:30	171	143	26	340	92	63	28	183	60	37	17	114
10:00	149	191	26	366	114	93	23	230	100	47	36	183
10:30	171	232	36	439	133	81	37	256	120	77	37	234
11:00	122	195	49	366	135	86	31	250	139	89	44	272
11:30	108	172	54	334	130	110	30	270	130	93	49	277
12:00 noon	174	193	36	403	103	117	21	241	128	78	33	239
12:30	208	149	36	393	122	83	52	257	141	35	43	219
1:00	184	150	37	371	115	82	37	234	126	37	24	187
1:30	193	175	48	421	143	100	46	289	135	48	43	226
2:00	122	174	69	365	144	84	51	279	128	62	35	225
2:30	121	203	92	416	169	92	39	300	175	85	15	275
3:00	92	219	92	403	134	106	21	261	180	82	57	319
3:30	106	242	92	440	113	128	35	276	201	93	56	350
4:00	93	190	114	397	129	81	30	240	113	87	73	273
4:30	77	174	128	379	134	89	53	276	79	78	103	260
5:00	91	156	141	388	96	160	44	300	102	100	89	291
5:30	105	154	122	381	84	180	56	320	102	111	21	234
6:00	80	106	148	334	129	132	88	349	113	122	28	263
6:30	28	138	139	305	117	185	57	359	103	121	76	305
7:00	46	105	139	290	61	235	41	337	171	161	100	432
7:30	39	50	137	226	58	353	51	447	89	155	87	329
8:00	24	10	49	83	110	356	129	595	94	153	95	342
8:30	11	-174	14	-149	67	261	68	396	34	76	93	203
9:00	0	-175	- 9	-184	43	60	38	141	54	39	15	108
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	3173	3835	1995	9063	3071	3667	1357	8095	3277	2572	1666	7515

1/ Gate at Corps of Engineers counting station was open continuously (24 hours).

Table A-27. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 17-hour period, July 22, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.D.T.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	8	20	3	31	4	16	24	44	23	21	51	95
5:00	7	0	37	44	16	6	18	40	49	31	46	126
5:30	27	4	24	55	21	19	27	67	44	10	56	110
6:00	36	15	- 7	44	28	23	30	81	36	21	51	108
6:30	50	14	1	65	23	45	25	93	27	21	52	100
7:00	60	1	3	64	35	33	24	92	18	47	41	106
7:30	58	29	3	90	56	15	19	90	35	61	51	147
8:00	62	30	- 5	87	54	38	31	123	31	67	48	146
8:30	83	11	9	103	59	46	29	134	63	64	41	168
9:00	119	28	18	165	60	31	25	116	55	43	46	144
9:30	119	11	16	146	65	20	30	115	66	34	45	145
10:00	117	14	14	145	96	31	15	142	76	30	41	147
10:30	106	40	13	159	111	60	26	197	74	41	47	162
11:00	96	42	38	176	86	49	31	166	117	49	36	201
11:30	95	74	40	209	111	23	33	167	105	31	23	159
12:00 noon	109	63	31	203	98	26	27	151	95	35	37	167
12:30 p.m.	112	73	128	313	77	30	55	162	81	24	41	146
1:00	141	122	97	360	100	27	32	159	100	13	40	153
1:30	144	112	68	324	81	83	48	212	92	26	29	147
2:00	106	82	48	236	104	65	37	206	114	36	32	182
2:30	92	92	54	238	127	89	36	252	82	50	111	243
3:00	97	120	59	276	118	59	39	216	84	34	101	219
3:30	91	161	80	332	87	65	31	183	133	39	38	210
4:00	72	115	77	264	95	56	30	181	120	43	38	201
4:30	56	132	108	296	90	46	26	162	82	56	56	194
5:00	53	122	89	264	100	59	49	208	102	59	47	208
5:30	110	153	92	355	101	108	73	282	84	75	51	210
6:00	106	121	84	311	74	108	59	241	93	90	68	241
6:30	57	115	91	263	73	108	55	236	53	74	83	210
7:00	44	119	59	222	82	153	47	287	30	102	120	252
7:30	22	54	49	125	80	200	37	317	96	76	81	253
8:00	34	- 15	18	37	57	288	23	368	137	101	40	278
8:30	5	-150	-10	-157	46	64	21	133	62	48	59	169
9:00	0	-119	-15	-134	24	25	13	62	39	21	5	65
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	2492	1805	1414	5711	2446	2119	1125	5690	2483	1577	1752	5817

1/ Gate at Corps of Engineers counting station was open continuously (24 hours).

Table A-29. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 17-hour period, July 23, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	10	8	9	27	9	16	10	35	16	12	35	63
5:00	3	- 3	12	12	20	9	18	47	43	18	35	96
5:30	8	3	15	26	30	25	12	67	40	8	45	93
6:00	30	10	4	44	21	31	14	66	40	16	51	107
6:30	26	19	6	51	13	30	12	55	24	28	36	88
7:00	47	29	8	84	28	30	14	72	13	26	51	90
7:30	49	24	5	78	23	11	11	50	26	29	35	90
8:00	71	45	16	132	22	11	19	52	24	42	7	73
8:30	58	20	14	92	35	28	19	82	31	46	45	122
9:00	58	16	12	86	62	13	14	89	33	37	29	99
9:30	67	33	12	112	34	25	7	66	51	22	44	117
10:00	66	44	16	126	47	22	18	87	47	17	33	97
10:30	64	65	28	157	69	37	15	121	60	25	50	135
11:00	60	85	23	168	63	37	28	128	65	22	32	119
11:30	58	50	29	137	55	36	7	98	63	28	24	115
12:00 noon	69	79	30	178	51	30	39	120	60	18	1	79
12:30 p.m.	179	122	45	346	49	21	28	98	42	15	35	92
1:00	185	69	40	294	47	25	26	98	15	14	43	72
1:30	146	62	40	248	81	54	22	157	61	11	24	96
2:00	44	48	27	119	119	42	34	195	68	13	13	94
2:30	15	47	38	100	131	64	20	215	111	20	26	157
3:00	12	70	77	159	105	43	15	163	148	25	22	195
3:30	12	50	67	129	75	30	21	126	113	23	52	188
4:00	24	84	71	179	55	26	9	90	92	30	31	153
4:30	14	72	95	181	13	49	26	88	58	26	36	120
5:00	20	58	131	209	29	31	26	86	15	20	56	91
5:30	29	28	149	206	18	32	31	81	20	48	58	126
6:00	40	56	166	262	29	85	30	144	47	50	28	125
6:30	32	46	156	234	36	77	49	162	24	55	12	91
7:00	14	45	190	249	29	92	50	171	43	46	63	152
7:30	12	0	89	101	46	92	72	210	47	57	58	162
8:00	14	- 77	29	- 34	46	126	87	259	30	68	73	176
8:30	3	-190	5	-182	12	85	25	122	18	37	61	116
9:00	2	- 91	28	- 61	18	11	22	51	9	13	68	90
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	1541	1026	1682	4249	1525	1576	850	3751	1597	965	1317	3879

1/ Gate at Corps of Engineers counting station was open continuously (24 hours).

Table A-29. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 20-hour period, July 24, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	1	1	79	81	13	6	19	33	8	4	25	37
5:00	4	- 3	71	72	7	1	22	30	12	6	45	63
5:30	3	11	22	36	5	6	25	36	22	6	39	67
6:00	19	12	6	37	24	9	14	47	15	10	46	71
6:30	39	23	4	66	9	9	21	39	7	10	26	43
7:00	51	28	12	91	19	11	18	48	8	15	31	54
7:30	87	23	26	136	19	8	25	52	12	29	14	55
8:00	138	51	30	219	41	8	32	81	26	26	58	110
8:30	164	52	37	253	45	22	29	96	35	26	51	112
9:00	212	57	21	290	88	14	29	131	52	18	42	112
9:30	212	50	38	300	113	29	33	175	83	25	53	161
10:00	224	53	54	331	132	34	43	209	117	16	25	158
10:30	196	60	86	342	165	45	47	257	151	29	51	231
11:00	179	92	119	390	165	53	51	269	173	32	74	279
11:30	126	72	102	300	167	34	54	255	190	33	81	309
12:00 noon	172	129	118	419	200	56	39	295	159	33	54	246
12:30 p.m.	220	105	151	476	149	44	92	285	194	30	42	266
1:00	142	103	195	440	217	30	34	281	184	16	59	259
1:30	96	75	180	351	203	53	69	330	146	31	43	225
2:00	88	57	139	284	164	55	75	294	157	30	54	241
2:30	97	93	155	345	197	86	55	338	185	51	73	309
3:00	99	104	169	372	200	55	52	307	157	34	96	287
3:30	104	106	196	408	185	67	40	292	103	61	101	265
4:00	95	93	148	326	112	41	43	196	105	51	100	256
4:30	58	71	150	279	126	48	23	197	124	58	100	282
5:00	81	80	172	333	145	73	47	265	106	44	108	258
5:30	110	65	174	349	125	67	88	280	89	95	128	312
6:00	70	54	105	229	102	79	134	315	95	97	158	350
6:30	95	63	151	309	157	128	78	363	91	72	192	355
7:00	56	48	174	278	169	156	40	365	107	82	141	330
7:30	46	20	130	196	123	137	135	395	113	57	116	286
8:00	13	- 59	113	67	96	116	137	349	86	82	102	270
8:30	0	-151	52	- 99	56	71	43	170	57	26	57	140
9:00	1	- 62	48	- 13	54	40	35	129	70	17	21	108
9:30	1	- 47	62	16	29	5	37	71	37	14	26	77
10:00	- 1	- 25	29	3	16	7	30	53	17	9	45	71
10:30	- 2	- 13	- 5	- 20	31	5	23	59	13	5	22	40
11:00	0	- 2	- 4	- 6	12	19	32	63	8	0	44	52
11:30	2	- 11	24	15	11	1	13	25	11	9	77	97
12:00 midnight	1	- 12	24	13	15	5	22	42	13	0	11	24
Total	3289	1462	3607	8364	3906	1728	1873	7522	3333	1294	2636	7263

1/ Gate at Corps of Engineers counting station was open continuously (24 hours).

Table A-30. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 4-hour period, July 25, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.	0	-11	13	2	10	10	22	42	7	2	12	21
1:00	1	- 6	9	4	8	14	35	57	34	9	4	47
1:30	2	- 2	35	35	9	6	29	44	6	2	8	16
2:00	0	- 3	50	47	6	5	15	26	6	0	55	61
2:30	6	1	28	35	1	5	29	35	7	0	54	61
3:00	4	- 1	13	16	6	16	40	62	5	0	84	89
3:30	3	0	14	17	12	11	35	58	2	0	37	39
4:00	3	- 1	27	29	3	8	22	33	4	0	34	38
4:30												
5:00												
5:30												
6:00												
6:30												
7:00												
7:30												
8:00												
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 noon												
12:30 p.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30												
5:00												
5:30												
6:00												
6:30												
7:00												
7:30												
8:00												
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	19	-23	189	185	55	75	227	357	71	13	288	372

1/ Gate at Corps of Engineers counting station was open continuously (24 hours).

Table A-31. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 16-hour period, September 9, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (p.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	225		2	227	49		25	74	31		8	39
5:00	77		- 5	72	55		19	74	34		2	36
5:30	58		16	74	115		16	131	103		20	123
6:00	71		- 7	64	133		29	162	146		38	184
6:30	206		4	210	153		28	181	174		32	206
7:00	393		0	393	190		24	214	115		65	180
7:30	570		- 6	564	237		21	258	144		40	184
8:00	556		-18	538	336		12	348	173		43	216
8:30	512		- 1	511	360		10	370	192		41	233
9:00	410		3	413	417		21	438	418		38	456
9:30	335		8	343	441		35	476	411		47	458
10:00	158		2	160	446		3	449	383		64	447
10:30	110		17	127	381		3	384	363		71	434
11:00	158		20	178	278		1	279	409		50	459
11:30	185		12	197	229		13	242	369		54	423
12:00 noon	231		18	249	218		22	240	256		37	293
12:30 p.m.	277		41	318	156		14	170	209		51	260
1:00	272		50	322	156		22	178	176		34	210
1:30	210		62	272	222		21	243	156		39	175
2:00	235		41	276	189		13	202	183		27	210
2:30	245		36	281	192		15	207	208		22	230
3:00	200		34	234	251		7	258	214		29	243
3:30	164		46	210	262		1	263	221		50	271
4:00	149		47	196	211		34	245	227		36	263
4:30	142		38	180	183		73	256	244		20	264
5:00	268		42	310	164		55	219	210		43	253
5:30	259		39	298	147		34	181	183		66	249
6:00	183		42	225	191		72	263	170		58	228
6:30	166		44	210	274		23	297	153		27	180
7:00	106		15	121	200		8	208	142		33	175
7:30	49		- 8	41	96		37	133	92		20	112
8:00	26		10	36	99		13	112	31		15	46
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	7206		644	7850	7031		724	7755	6520		1225	7745

1/ Gate at Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m. and after 8:00 p.m. It was open the rest of the day.

Table A-32. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 16-hour period, September 10, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.S.T.)	C.L. station 1/				Weir, elevation 243				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	195		24	219	21		1	22	33		17	50
5:00	91		7	98	40		4	44	29		11	40
5:30	101		0	101	69		7	76	64		12	76
6:00	160		- 8	152	117		11	128	124		12	136
6:30	282		2	284	177		3	180	135		24	159
7:00	424		1	425	239		1	240	158		19	177
7:30	462		1	463	261		1	262	129		31	160
8:00	450		- 6	444	320		11	331	207		23	230
8:30	419		- 6	413	353		11	364	299		35	334
9:00	453		3	456	346		7	353	365		34	399
9:30	389		8	397	415		6	421	416		43	459
10:00	252		5	257	394		14	408	364		50	414
10:30	316		3	319	392		1	393	395		60	455
11:00	304		31	335	340		6	346	412		25	437
11:30	418		25	443	250		5	255	334		36	370
12:00 noon	373		19	392	333		2	335	333		36	374
12:30 p.m.	332		30	362	285		15	300	265		36	301
1:00	270		28	298	309		49	358	291		36	327
1:30	444		45	489	339		12	351	256		53	309
2:00	448		34	482	265		6	271	153		10	163
2:30	330		49	379	305		7	312	401		31	432
3:00	144		41	185	256		3	259	359		23	382
3:30	159		43	202	340		1	341	318		38	356
4:00	165		68	233	346		5	351	300		52	352
4:30	113		57	170	228		4	232	333		36	369
5:00	135		21	156	214		7	221	325		39	364
5:30	124		24	148	147		7	154	258		42	300
6:00	197		16	213	170		31	201	224		28	252
6:30	179		34	213	171		20	191	146		32	178
7:00	79		11	90	168		30	198	97		37	134
7:30	84		5	89	69		12	81	58		10	68
8:00	12		2	14	51		0	51	43		17	60
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	8304		617	8921	7730		300	8030	7629		988	8617

1/ Gate at Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m. and after 8:00 p.m. It was open the rest of the day.

Table A-33. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 16-hour period, September 11, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.S.T.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	173		- 3	170	26		2	28	10		6	16
5:00	71		2	73	28		4	32	19		8	27
5:30	89		4	93	50		1	51	28		12	40
6:00	151		- 6	145	114		8	122	74		7	81
6:30	222		1	223	164		8	172	110		23	133
7:00	591		- 5	586	231		6	237	93		32	125
7:30	756		- 5	751	153		- 1	152	142		25	167
8:00	761		1	762	278		10	288	206		20	226
8:30	629		1	630	444		15	459	266		33	299
9:00	632		6	638	493		1	493	353		33	386
9:30	542		- 2	540	552		0	552	461		22	483
10:00	482		0	482	571		0	571	534		34	568
10:30	461		8	469	410		5	415	495		41	536
11:00	392		14	406	458		8	466	529		4	533
11:30	339		5	344	516		- 1	515	466		25	491
12:00 noon	366		1	367	423		6	429	406		31	437
12:30 p.m.	343		28	371	326		19	345	450		13	463
1:00	348		17	365	327		14	341	480		29	509
1:30	376		11	387	329		8	337	430		31	461
2:00	445		12	457	301		6	307	380		36	416
2:30	423		24	447	371		7	378	315		45	360
3:00	285		25	310	317		11	328	369		16	385
3:30	150		20	170	352		7	359	308		24	332
4:00	146		8	154	411		2	413	385		29	414
4:30	176		26	202	341		1	342	294		27	321
5:00	199		14	213	243		23	266	288		36	324
5:30	161		24	185	171		40	211	233		19	252
6:00	156		15	171	186		26	212	226		46	272
6:30	117		12	129	154		13	167	190		29	219
7:00	72		- 1	71	129		5	134	113		12	125
7:30	8		10	18	100		1	101	68		9	77
8:00	74		3	77	55		2	57	66		3	69
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	10136		270	10406	9029		257	9286	8787		760	9547

1/ Gate at Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m. and after 8:00 p.m. It was open the rest of the day.

Table A-34. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 16-hour period, September 12, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.S.T.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Sal-monids	Shad	Other species	Total	Sal-monids	Shad	Other species	Total	Sal-monids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	238		5	243	15		1	16	35		0	35
5:00	109		4	113	41		2	43	45		2	47
5:30	113		4	117	46		5	51	44		3	47
6:00	176		- 8	168	165		2	167	167		8	175
6:30	258		- 8	250	260		4	264	158		6	164
7:00	464		3	467	246		1	247	131		17	148
7:30	556		4	560	190		0	190	185		14	199
8:00	576		2	578	262		2	264	243		16	259
8:30	614		- 9	605	389		2	391	307		24	331
9:00	452		2	454	468		- 2	466	399		13	412
9:30	470		17	487	472		3	475	443		41	484
10:00	463		14	477	454		6	460	530		22	552
10:30	485		39	524	434		0	434	503		13	516
11:00	452		9	461	463		4	467	454		24	478
11:30	412		26	438	436		11	447	449		26	475
12:00 noon	287		26	313	391		1	392	453		30	483
12:30 p.m.	211		40	251	391		15	406	355		21	376
1:00	295		29	324	303		5	308	344		8	352
1:30	239		36	275	244		17	261	356		17	373
2:00	260		41	301	217		7	224	308		22	330
2:30	256		30	286	200		6	206	284		9	293
3:00	119		23	142	241		1	242	303		16	324
3:30	126		31	157	293		3	296	273		11	284
4:00	108		40	148	258		6	264	243		25	268
4:30	179		37	216	186		- 3	183	256		17	273
5:00	161		50	211	143		10	153	227		16	243
5:30	130		47	177	176		7	183	160		20	180
6:00	129		62	191	149		17	166	163		27	190
6:30	89		33	122	130		21	151	138		24	162
7:00	60		13	73	91		14	105	105		25	130
7:30	61		5	66	57		11	68	48		9	57
8:00	9		- 1	8	40		1	41	30		7	37
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	8557		646	9203	7851		180	8031	8164		533	8697

1/ Gate at Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m. and after 8:00 p.m. It was open the rest of the day.

Table A-35. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 16-hour period, September 13, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.d.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	97		- 9	88	29		- 1	28	22		14	36
5:00	62		- 8	54	22		3	25	13		8	21
5:30	82		7	89	29		- 1	28	42		4	46
6:00	79		-10	69	112		13	125	132		20	152
6:30	178		5	183	172		13	185	151		17	168
7:00	406		0	406	151		8	159	125		25	150
7:30	348		4	352	132		0	132	128		19	147
8:00	405		11	416	164		0	164	175		23	198
8:30	504		18	522	255		2	257	238		36	274
9:00	343		23	366	296		5	301	239		31	270
9:30	266		11	277	272		1	273	302		28	330
10:00	345		14	359	257		11	268	304		36	340
10:30	335		42	377	227		6	233	327		19	346
11:00	229		25	254	278		3	281	279		36	315
11:30	111		35	146	273		10	283	271		37	308
12:00 noon	93		45	138	238		3	241	255		17	272
12:30 p.m.	140		48	188	140		7	147	260		17	277
1:00	135		87	222	113		8	121	232		44	276
1:30	208		99	307	109		11	120	189		49	238
2:00	272		85	357	124		- 2	122	159		19	178
2:30	331		89	420	49		1	50	123		27	150
3:00	142		83	225	128		- 3	125	128		22	150
3:30	92		84	176	169		1	170	191		31	222
4:00	88		84	172	149		6	155	182		34	216
4:30	142		88	230	123		14	137	221		29	250
5:00	194		50	244	103		26	129	186		32	218
5:30	109		34	143	147		21	168	166		35	201
6:00	91		28	119	97		23	120	108		33	141
6:30	73		15	88	94		17	111	106		39	145
7:00	32		17	49	39		- 1	38	96		20	116
7:30	28		6	34	12		3	15	39		7	46
8:00	9		7	16	14		1	15	33		16	49
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	5769		1117	6886	4517		209	4726	5422		824	6246

1/ Gate at Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m. and after 8:00 p.m. It was open the rest of the day.

Table A-36. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 16-hour period, September 14, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (P.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	81		2	83	28		9	37	18		13	31
5:00	45		2	47	31		17	48	17		10	27
5:30	40		5	45	48		11	59	23		15	38
6:00	48		- 1	47	114		3	117	97		20	117
6:30	71		3	74	207		14	221	95		48	143
7:00	114		- 1	113	196		11	207	99		32	131
7:30	171		9	180	127		8	135	71		31	102
8:00	174		- 1	173	112		12	124	102		39	141
8:30	169		5	174	161		3	164	85		57	142
9:00	248		11	259	160		11	171	128		44	172
9:30	235		14	249	159		15	174	161		46	207
10:00	171		18	189	184		19	203	167		49	216
10:30	132		15	147	214		4	218	168		69	237
11:00	125		14	139	218		- 2	216	186		47	233
11:30	137		28	165	167		7	174	188		48	236
12:00 noon	128		24	152	159		18	177	197		40	237
12:30 p.m.	91		31	122	123		11	134	147		32	179
1:00	121		20	141	113		25	138	114		38	152
1:30	78		23	101	58		28	86	105		29	134
2:00	97		39	136	72		8	80	102		21	123
2:30	118		36	154	113		5	118	88		27	115
3:00	75		36	111	70		1	71	95		37	132
3:30	93		19	112	85		10	95	104		26	130
4:00	88		25	113	83		17	100	81		38	119
4:30	80		14	94	86		28	114	83		37	120
5:00	161		28	189	115		11	126	76		26	102
5:30	184		34	218	99		5	104	104		17	121
6:00	165		27	192	123		26	149	101		53	154
6:30	101		37	138	94		34	128	55		27	82
7:00	39		21	60	85		12	95	64		26	90
7:30	37		16	53	71		9	80	35		23	58
8:00	12		6	18	24		7	31	24		9	33
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	3629		559	4188	3697		397	4094	3180		1074	4254

1/ Gate at Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m. and after 8:00 p.m. It was open the rest of the day.

Table A-37. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 16-hour period, September 15, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (p.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	78		13	91	13		4	17	14		11	25
5:00	36		- 3	33	14		0	14	12		13	25
5:30	26		- 1	25	41		8	49	56		24	80
6:00	26		- 2	24	82		17	99	102		28	130
6:30	54		5	59	142		5	147	120		17	137
7:00	105		2	107	91		7	98	78		18	96
7:30	105		- 8	95	93		5	98	81		41	122
8:00	88		4	92	108		2	110	93		26	119
8:30	147		10	157	132		26	158	98		21	119
9:00	199		18	217	120		9	129	96		18	114
9:30	209		15	224	113		16	129	121		27	148
10:00	303		31	334	125		14	139	126		26	152
10:30	297		37	334	172		10	182	121		41	162
11:00	202		37	239	253		22	275	138		59	197
11:30	125		26	151	216		6	222	157		48	205
12:00 noon	125		55	180	232		6	238	179		32	211
12:30	125		36	161	192		14	206	168		22	190
1:00	152		73	225	97		24	121	155		29	184
1:30	103		38	141	101		30	131	133		35	168
2:00	87		70	157	116		17	133	141		31	172
2:30	185		56	241	123		7	130	127		32	159
3:00	179		86	265	87		8	95	92		23	115
3:30	158		49	207	133		6	139	97		39	136
4:00	160		86	246	155		17	172	102		41	143
4:30	174		68	242	190		4	194	146		49	195
5:00	193		86	279	192		3	195	161		50	211
5:30	279		75	354	162		12	174	100		55	155
6:00	151		43	194	126		49	175	122		47	169
6:30	61		34	95	164		52	216	120		58	178
7:00	43		10	53	99		30	129	98		32	130
7:30	43		4	47	67		11	78	62		13	75
8:00	17		12	29	35		1	36	42		6	48
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	4233		1065	5298	3986		442	4428	3458		1012	4470

1/ Gate at Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m. and after 8:00 p.m. It was open the rest of the day.

Table A-38. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 16-hour period, September 16, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at: (p.s.t.)	C.E. station 1/				Weir, elevation 248				Slot 33			
	Sal-monids	Shad	Other species	Total	Sal-monids	Shad	Other species	Total	Sal-monids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	106		13	119	8		2	10	12		23	35
5:00	46		24	70	21		6	27	27		14	41
5:30	31		1	32	44		4	48	34		13	47
6:00	57		0	57	92		14	106	97		34	131
6:30	107		9	116	170		2	172	133		35	168
7:00	163		1	169	190		9	199	113		22	135
7:30	157		1	158	140		- 1	139	143		38	181
8:00	144		8	152	152		5	157	107		29	136
8:30	186		17	203	147		18	165	132		35	167
9:00	244		10	254	188		11	199	149		53	202
9:30	261		8	269	172		4	176	157		54	211
10:00	234		3	237	185		12	197	183		52	235
10:30	158		12	170	168		15	183	171		63	234
11:00	103		16	119	162		9	171	150		70	220
11:30	123		18	141	210		12	222	184		66	250
12:00 noon	127		37	164	199		5	204	190		47	237
12:30	108		27	135	129		12	141	181		49	230
1:00	133		45	178	105		5	110	143		45	188
1:30	88		44	132	52		9	61	88		46	134
2:00	86		31	117	74		8	82	87		21	108
2:30	148		30	178	96		5	101	64		30	94
3:00	69		28	97	81		17	98	97		36	133
3:30	89		37	126	85		4	89	103		28	131
4:00	145		22	167	85		7	92	116		27	143
4:30	156		30	186	86		6	92	74		43	117
5:00	170		26	196	108		4	112	66		35	101
5:30	176		53	229	118		17	135	55		52	107
6:00	101		35	136	90		8	98	60		65	125
6:30	70		14	84	111		2	113	65		25	90
7:00	26		17	43	55		20	75	45		23	68
7:30	30		8	33	29		5	34	46		14	60
8:00	14		8	22	33		4	37	29		2	31
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	3861		633	4494	3585		260	3845	3301		1189	4490

1/ Gate at Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m. and after 8:00 p.m. It was open the rest of the day.

Table A-39. Net upstream counts of fish (number counted upstream less number counted downstream) at three stations within the south fish ladder at John Day Dam during a 16-hour period, September 17, 1971. Negative values signify that more fish passed downstream than upstream.

30-minute interval ending at (p.s.t.)	C.F. station 1/				Weir, elevation 248				Slot 33			
	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total	Salmonids	Shad	Other species	Total
0:30 a.m.												
1:00												
1:30												
2:00												
2:30												
3:00												
3:30												
4:00												
4:30	43		-14	29	15		2	17	19		13	32
5:00	51		12	63	25		3	28	33		1	34
5:30	49		- 3	46	46		10	56	16		3	19
6:00	45		- 5	40	128		11	139	84		33	117
6:30	59		6	65	103		5	108	104		28	132
7:00	134		- 1	133	178		1	179	91		27	118
7:30	199		6	205	179		2	181	55		22	77
8:00	171		0	171	134		- 1	133	86		34	120
8:30	130		1	131	133		2	135	76		34	110
9:00	226		14	240	217		9	226	125		32	157
9:30	399		7	406	155		5	160	188		47	235
10:00	364		10	374	141		4	145	166		47	213
10:30	284		15	299	241		12	253	168		31	199
11:00	172		19	191	306		6	314	187		42	229
11:30	151		29	180	242		7	249	199		39	238
12:00 noon	204		47	251	206		7	213	229		37	266
12:30 p.m.	133		32	165	221		10	231	218		31	249
1:00	233		50	283	144		15	159	206		32	238
1:30	160		30	190	103		3	106	192		23	215
2:00	279		81	360	175		12	187	130		27	157
2:30	288		56	344	151		19	170	143		41	184
3:00	207		84	291	107		9	116	177		35	212
3:30	120		60	180	182		1	183	123		35	158
4:00	163		59	222	142		3	145	140		29	169
4:30	129		52	181	136		9	145	147		38	185
5:00	88		38	126	138		10	148	168		35	203
5:30	109		59	168	154		3	157	165		37	202
6:00	102		62	164	90		10	100	133		38	171
6:30	57		29	86	103		4	107	130		29	159
7:00	37		22	59	58		10	68	43		17	60
7:30	24		9	33	54		8	62	37		12	49
8:00	7		4	11	32		1	33	27		9	36
8:30												
9:00												
9:30												
10:00												
10:30												
11:00												
11:30												
12:00 midnight												
Total	4817		870	5687	4441		212	4653	4005		938	4943

1/ Gate at Corps of Engineers counting station was closed (fish passage blocked) until 4:00 a.m. and after 8:00 p.m. It was open the rest of the day.