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EVALUATION OF THE FISH PASSAGE FACILITIES AT THE PELTON PROJECT ON THE DESCHUTES RIVER IN OREGON

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Gunsolus, R. T., and G. J. Eicher. 1962. Evaluation of the fish passage facilities at the Pelton project on the Deschutes River in Oregon. Fish Comm. Oregon and Portland General Electric Co. 133 p.

THE PELTON PROJECT IS OPERATED ON A PEAKING BASIS; THAT IS, POWER IS ONLY PRODUCED DURING HIGH-DEMAND PERIODS. THE PLANT IS SHUT DOWN COMPLETELY AT TIMES, PARTICULARLY DURING THE NIGHT, AND NO WATER THEN ISSUES FROM THE MACHINES. THE REGULATING DAM (FIGURE 3) COLLECTS AND STORES WATER DURING PERIODS OF MAXIMUM POWER OUTPUT IN ORDER TO MAINTAIN AN EVEN FLOW DOWNSTREAM FROM THE PROJECT. THIS IS ACCOMPLISHED THROUGH AUTOMATIC CONTROLS THAT MAINTAIN A CONSTANT LEVEL AT A POINT ABOUT 400 FEET DOWNSTREAM OF THE REGULATING DAM SPILLWAY.

THE RESERVOIR FORMED BY PELTON DAM IS APPROXIMATELY $7\frac{1}{2}$ MILES IN LENGTH, EXTENDING A FEW HUNDRED YARDS UP BOTH THE METOLIUS AND DESCHUTES RIVERS. IT IS RELATIVELY NARROW, AVERAGING ROUGHLY 200 YARDS IN WIDTH. SURFACE ACREAGE IS APPROXIMATELY 540. FISH FACILITIES ARE DESIGNED TO ACCOMMODATE A DAILY DRAWDOWN OF UP TO SEVEN FEET; HOWEVER, IN ACTUAL PRACTICE, THE FLUCTUATION IS LIMITED TO FIVE FEET.

FISH

THREE SPECIES OF ANADROMOUS FISH PRESENTLY PASS THE PELTON PROJECT EN ROUTE TO UPSTREAM SPAWNING GROUNDS. THESE ARE CHINOOK, ONCORHYNCHUS TSHAWYTSCHA, AND BLUEBACK SALMON, O. NERKA, AND STEELHEAD TROUT, SALMO GAIRDNERI. COUNTS OF ADULTS PASSING THE PELTON PROJECT HAVE BEEN MAINTAINED SINCE 1956 (TABLE 1). CHINOOK SALMON PASS THE PROJECT IN THE MONTHS OF APRIL THROUGH NOVEMBER WITH THE PEAK OCCURRING IN MAY AND JUNE. MOST OF THE RUN IS KNOWN TO BE OF THE SPRING RACE, BUT THE OCTOBER AND NOVEMBER MIGRANTS ARE POSSIBLY OF THE FALL GROUP. COUNTS OF THESE FISH TOTALED 627 IN 1957, 485 IN 1958, 511 IN 1959, 740 IN 1960, AND 582 IN 1961 FOR

TABLE 1. ANNUAL COUNTS OF UPSTREAM-MIGRANT ADULT ANADROMOUS SALMONIDS PASSING THE PELTON PROJECT, 1956-1960.

YEAR	SPECIES		
	CHINOOK	BLUEBACK	STEELHEAD 2/
1956 1/	112	2	323
1957	627	30	1,619
1958	485	56	1,142
1959	511	99	521
1960	740	35	480
1961	582	67	354

1/ COUNTING STARTED AUGUST 15, 1956.

2/ STEELHEAD COUNTS INCLUDE BOTH FALL AND SPRING MOVEMENTS, BUT ARE DATED BY YEAR OF MIGRATION FROM THE OCEAN.

AN AVERAGE OF 589 FISH PER YEAR. THE PRINCIPAL SPAWNING AREA OF CHINOOK ABOVE THE PELTON SITE APPEARS TO BE IN THE UPPER TEN MILES OF THE METOLIUS RIVER. IN 1957, A NUMBER OF CHINOOK AND STEELHEAD, VARIOUSLY ESTIMATED AT BETWEEN 100 AND 300 FISH, ESCAPED THROUGH A TEMPORARY BARRIER, ALLOWING THEM TO REACH A DEAD-END AREA BELOW THE DIVERSION TUNNEL WHERE 70 CHINOOK AND 27 STEELHEAD WERE NETTED AND HAULED ABOVE THE PROJECT. IN 1960, THOSE CHINOOK ARRIVING AT THE COUNTING STATION PRIOR TO MAY 1 ESCAPED THROUGH AN OPENING IN THE STRUCTURE AND PASSED UP THE RIVER UNCOUNTED. FISH COMMISSION ESTIMATES (1959) HAVE PUT THE MAXIMUM NUMBER OF CHINOOK ENTERING THE DESCHUTES RIVER AS BEING IN THE NEIGHBORHOOD OF 5,000 FISH. THIS WOULD INDICATE THAT SLIGHTLY OVER 10% OF THE DESCHUTES RUN PROCEEDS PAST THE PELTON PROJECT. CHINOOK SALMON PRODUCED BY THE DESCHUTES RIVER ARE TAKEN PRINCIPALLY IN THE COLUMBIA RIVER COMMERCIAL FISHERY, IN THE SPORT FISHERY OF THE LOWER DESCHUTES, AND BY THE INDIAN FISHERY AT SHERARS FALLS. THE OREGON GAME COMMISSION (1961) HAS ESTIMATED THAT ANGLERS TAKE FROM 161 TO 2,396 SALMON ANNUALLY NEAR SHERARS FALLS (TABLE 2), THE GAME COMMISSION (1959) REPORTS THE INDIAN DIP-NET FISHERY THERE TAKES UPWARDS OF 650 MORE.

STEELHEAD TROUT ARE VERY IMPORTANT IN THE DESCHUTES RIVER. A LARGE SPORT FISHERY EXISTS FOR THEM ON THE LOWER RIVER WHERE FROM 2,000 TO 4,000 ARE TAKEN ANNUALLY ACCORDING TO THE OREGON GAME COMMISSION (1961). THESE FISH ARE ALSO TAKEN IN THE COMMERCIAL AND SPORT FISHERIES IN THE COLUMBIA RIVER. THE GAME COMMISSION REPORT ESTIMATES THAT THE COMBINED RUN OF CHINOOK SALMON AND STEELHEAD ENTERING THE DESCHUTES RIVER RANGES BETWEEN 15,000 AND 20,000 ANNUALLY. SUBTRACTING THE 5,000 CHINOOK SALMON ESTIMATED BY THE FISH COMMISSION AS A MAXIMUM FROM THE COMBINED TOTAL

TABLE 2. ANNUAL CATCH OF ADULT CHINOOK SALMON AND STEELHEAD TROUT CAUGHT BY ANGLERS IN THE DESCHUTES RIVER, 1953-1960.

YEAR	SPECIES	
	CHINOOK	STEELHEAD
1953	356	3,136
1954	161	2,595
1955	211	4,537
1956	278	1,975
1957	786	3,984
1958	779	5,084
1959	2,396	10,068
1960	1,551	4,803

ESTIMATED BY THE GAME COMMISSION LEAVES AN ESTIMATED 10,000-15,000 STEELHEAD ENTERING THE DESCHUTES RIVER IN A MAXIMUM CHINOOK YEAR.

STEELHEAD OF THE DESCHUTES RIVER SHOULD BE COUNTED ON A SEASONAL BASIS RATHER THAN ON A CALENDAR YEAR. WHILE THESE FISH PASS THE PELTON PROJECT DURING EVERY MONTH OF THE YEAR, EACH ANNUAL RUN APPARENTLY BEGINS IN JUNE AND ENDS IN MAY OF THE FOLLOWING YEAR. ON THIS BASIS, COUNTS OF STEELHEAD PASSING THE PELTON PROJECT HAVE TOTALED 323 (COUNT STARTED IN AUGUST) IN 1956-57, 1,619 IN 1957-58, 1,142 IN 1958-59, 521 IN 1959-60, 480 IN 1960-61, AND 354 IN 1961-62 FOR AN AVERAGE OF 823 FISH PER YEAR (1956-57 NOT INCLUDED). THE PRINCIPAL SPAWNING AREA OF STEELHEAD ABOVE PELTON DAM IS IN THE DESCHUTES RIVER, MOSTLY IN SQUAW CREEK, BUT SOME ARE KNOWN TO SPAWN IN THE METOLIUS AND CROOKED RIVERS.

THE SPAWNING OF BLUEBACK SALMON IS CONFINED TO THE SUTTLE LAKE AREA OF THE METOLIUS RIVER AND THE RUN IS COMPOSED, FOR ALL PRACTICAL PURPOSES, OF HATCHERY FISH WHICH THE OREGON FISH COMMISSION HAS PLANTED IN AN ATTEMPT TO GENERATE A RUN. THE PRINCIPAL MOVEMENT OF THESE FISH PAST THE PELTON PROJECT IS IN AUGUST AND SEPTEMBER. COUNTS OF ADULTS OF THIS SPECIES HAVE TOTALED 30 IN 1957, 56 IN 1958, 99 IN 1959, 35 IN 1960, AND 67 IN 1961. THE ADULT BLUEBACK ARE IMPORTANT ONLY IN THE COMMERCIAL FISHERY IN THE LOWER COLUMBIA RIVER, ALTHOUGH NATURAL STOCKS AND HATCHERY PLANTS HAVE CONTRIBUTED TO SPORT CATCHES OF IMMATURE AND LANDLOCKED INDIVIDUALS IN SUTTLE LAKE, AND MORE RECENTLY IN THE RESERVOIR BEHIND PELTON DAM.

FISH FACILITIES

PROVISIONS FOR UPSTREAM-MIGRANT FISH INCLUDE AN ENTRANCE SYSTEM AT THE

TABLE 7. DESCRIPTION OF HATCHERY SALMONIDS LIBERATED INTO THE METOLIUS AND DESCHUTES RIVERS FOR THE PELTON EVALUATION PROGRAM, 1960 AND 1961.

DESCRIPTION	SPECIES		
	CHINOOK	BLUEBACK	STEELHEAD 1/
1960			
HATCHERY OF ORIGIN	WILLAMETTE 2/	LEAVENWORTH 3/	MARION FORKS 2/
BROOD YEAR	1958	1958	1958
FIN MARK	ADIPOSE	ADIPOSE	ADIPOSE
NUMBER PER POUND	21	22	7 (25%); 22 (75%)
NUMBER LIBERATED	25,513	26,347 4/	16,976
LIBERATION SITE	METOLIUS R.	METOLIUS R.	DESCHUTES R.
LIBERATION DATE	MARCH 31	MARCH 31	APRIL 29
1961			
HATCHERY OF ORIGIN	McKENZIE 2/	LEAVENWORTH 3/	BIG CREEK 2/
BROOD YEAR	1959	1959	1960
FIN MARK	ANAL	ANAL	ANAL
NUMBER PER POUND	24	24	11
NUMBER LIBERATED	46,831	41,454	19,005
LIBERATION SITE	METOLIUS R.	METOLIUS R.	METOLIUS R.
LIBERATION DATE	MARCH 10	MARCH 9	MARCH 31

1/ WINTER RUN. NO SUMMER-RUN STOCK AVAILABLE.
2/ OREGON FISH COMMISSION
3/ BUREAU OF SPORT FISHERIES AND WILDLIFE
4/ INCLUDES 118 WHICH WERE NOT MARKED.

PATTERNS OF THE WILD STOCKS IN THESE TWO YEARS.

CHINOOK OF A WIDE RANGE IN SIZE WERE OBSERVED ENTERING AND LEAVING THE RESERVOIR. THEIR SIZE AT ENTRY AND EXIT WAS DEFINITELY RELATED TO THE TIME OF YEAR. TABLE 23 SUMMARIZES THE SIZE COMPOSITION SAMPLES OF WILD CHINOOK SALMON TAKEN AT THE SCOOP TRAPS AND SKIMMER FROM APRIL, 1960 THROUGH JUNE, 1961. ALTHOUGH INFORMATION AT ENTRY WAS OBTAINED ONLY IN THE SPRING, A SEGMENT OF A ZERO AGE GROUP ENTERED THE RESERVOIR IN MAY AND JUNE. THROUGH SIZE, THE POPULATION CAN BE TRACED BY THE EXIT FROM THE RESERVOIR OF SOME MEMBERS OF THE POPULATION UNTIL ULTIMATELY THE BULK OF THE POPULATION LEAVES DURING THE FOLLOWING SPRING, SUBSTANTIATING THE ASSUMPTION THAT THE SMALLER FISH CAPTURED AT ENTRY INTO THE RESERVOIR WERE NOT SEAWARD MIGRANTS. THE PORTION OF THE POPULATION ENTERING THE RESERVOIR DURING EACH OF THE VARIOUS SEASONS WAS NOT DETERMINED DURING THE STUDY.

BLUEBACK

FEW WILD BLUEBACK ARE PRESENT IN THE WATERSHED ABOVE PELTON DAM. THE PASSAGE OF THOSE OBSERVED COINCIDED WITH THAT OF THE INTRODUCED EXPERIMENTAL FISH. HATCHERY-REARED BLUEBACK SALMON WERE LIBERATED IN THE METOLIUS RIVER ON MARCH 31, 1960. THE MOVEMENT INTO THE RESERVOIR WAS ABRUPT WITH ALL BUT A FEW STRAGGLERS ENTERING THE FIRST NIGHT FOLLOWING LIBERATION. IN 1960, OF THOSE CAUGHT BY THE SCOOP TRAP, 100 PER CENT HAD ENTERED THE RESERVOIR BY THE SECOND DAY. THE FIRST PROMINENT MODE OF BLUEBACK MIGRANTS AT THE SKIMMER IN 1960 OCCURRED 13 DAYS AFTER RELEASE (FIGURE 19), AND THE BALANCE MOVED THROUGH THE SKIMMER IN A MANNER PARALLEL TO THAT OF THE CHINOOK SALMON.

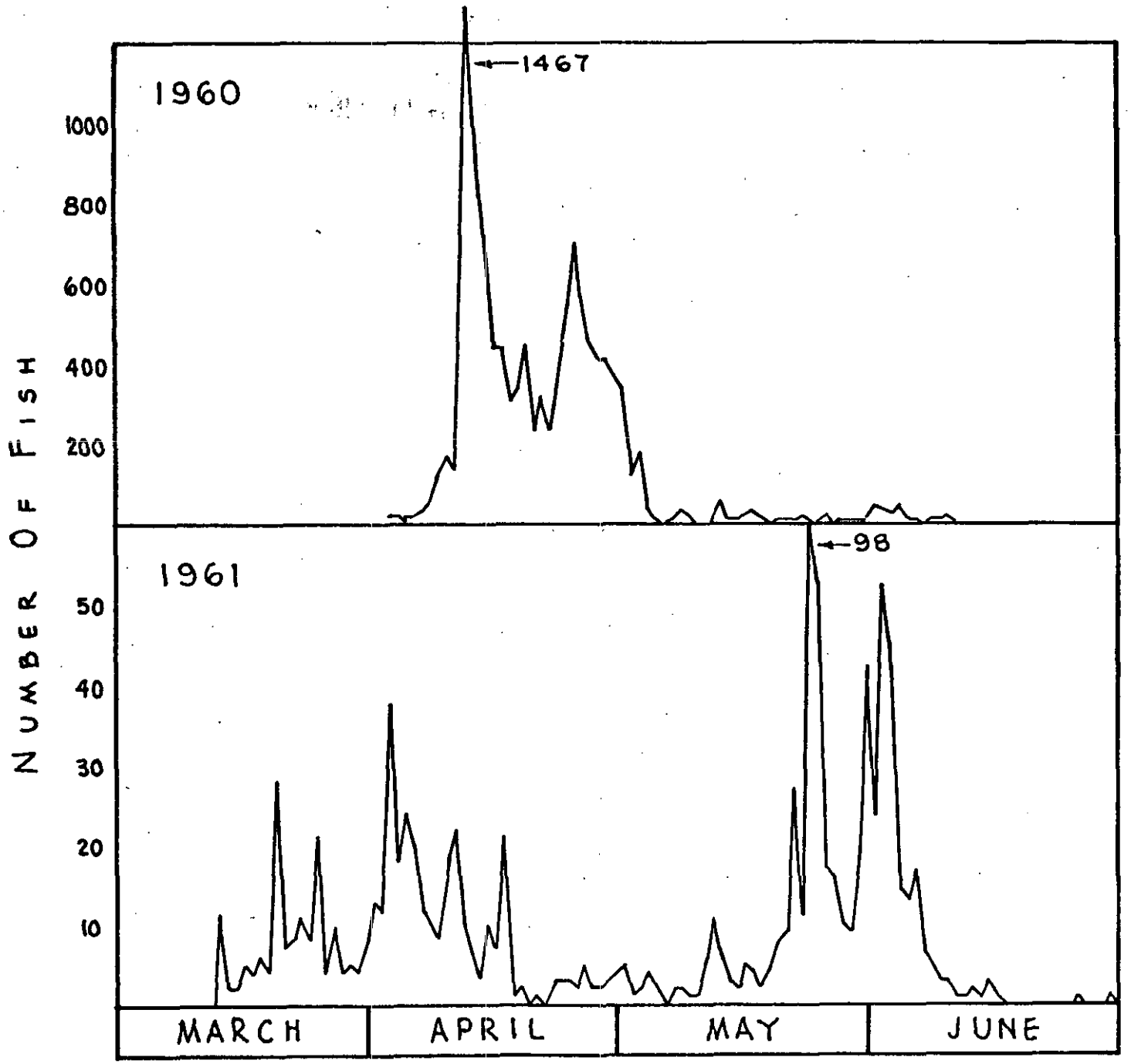

FIGURE 19. DAILY COUNTS OF HATCHERY BLUEBACK SALMON AT THE PELTON SKIMMER, MARCH - JUNE, 1960 AND 1961.

In 1961 the hatchery blueback were released on March 9, and again the movement into the reservoir was abrupt. Movement through the skimmer was in two groups, with few emigrating between mid-April and mid-May. The peak movement occurred on May 24 when 98 fish were counted at the skimmer. No prominent mode occurred in the movement; however an emigration in excess of 10,875 was estimated through the turbines during the period March 13-20. It appears that as the blueback entered the reservoir, a major portion moved at once to the extreme lower end of the reservoir. Here, either they were at a depth beyond which they could perceive the surface outflow, or the skimmer was ineffective in collecting them. Since the skimmer did collect large numbers of blueback in 1960, it is reasonable to assume the migrants were located in the deep water. The emigration through the penstocks apparently ceased within 10 days.

Rainbow-Steelhead

Rainbow-steelhead trout entering Pelton Reservoir in 1960 were captured in both the Metolius and Deschutes Rivers. Size composition data indicated that only the Deschutes River contained fish that could be considered migratory steelhead. The time that Deschutes River steelhead entered the reservoir in 1960 is shown in Figure 20 with the liberation times of hatchery fish indicated for both 1960 and 1961. It is unfortunate that high water conditions prevented scoop trapping in April in the Deschutes River, but if the timing of the non-migratory rainbow-steelhead captured in the Metolius River is comparable, a substantial movement of steelhead may have occurred in the last two weeks of April. The