

COPY SHASTA RIVER ARTICLE

SNYDER

1933

swiftly upon some luckless individual who knows not what that rush of wings portends. With the Cooper hawk comes a lesser number of a near relative, the sharp-shinned hawk, and (the author admits the heresy) all too frequently the redtail. At night, as the pole traps placed at each pen mutely testify, comes the horned owl with several of his cousins. Among the mammals, the weasel and the little spotted skunk, constitute the greatest menace, and traps must be set for them. Even then, a pen must be well put together to prevent the wanton slaughter of its inmates. As the result of at least one harrowing experience, each pen has been provided with an eighteen-inch strip of wire mesh, tacked to the lower edge of the bottom boards on the outside. A trench is then dug and the wire buried therein, well covered with earth and stones. So far, this method has circumvented any attempts at digging in by predatory mammals.

Quite different from the "direct to cover" method—this making use of holding pens; but, as the presence of coveys at each point of liberation where it has been done will testify, it is far superior.

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A STEELHEAD MIGRATION IN SHASTA RIVER

By J. O. SNYDER

FOR SOME TIME, the Bureau of Commercial Fisheries in connection with its salmon investigation has been taking an annual census of the salmon which migrate into Shasta River from the main channel of the Klamath. This work was in the hands of Merrill Brown, and had for its purpose, among other things, an evaluation of natural propagation when sufficiently protected.

Last year, the period of observation was lengthened to include as much of the steelhead run as possible. The latter begins, rises and waxes as the salmon run wanes. Some conditions of more than passing interest appear in connection with the steelhead migration.

The water at the mouth of the Shasta is clear enough to permit a view of the passing fish, but at times they come in such numbers as to make necessary a more accurate means of observation. To meet this need, a rack was constructed across Shasta River near its mouth. Two counting gates were built in this barrier, through which the passing fish were lead over a white apron. The observer, seated above one of these, had no difficulty in distinguishing the steelheads, and the enumeration proceeded with accuracy.

Carleton Rogers is to be credited with the steelhead count and the following notes were gleaned from his report.

At night, the gates were kept closed, as it was learned that few fish moved after darkness set in. It also became apparent that a real migration did not appear until after noon.

On September 19th, the first fish was recorded, and before October 10th, only 15 were observed. From then, the migration went on as the following table illustrates:

Date No. Oct. 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 Nov. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 Dec. 1 2 3 4 5 6 7 8 9 10

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Date	No. Fish	Temperature F.		Weather
		Klamath River	Shasta River	
Oct. 10	5	62	60	Clear
11	5	61	58	Clear
12	26	60	58	Clear
13	44	60	59	Clear
14	23	63	61	Clear
15	44	63	60	Rain
16	11	60	57	Rain
17	55	58	54	Cloudy
18	25	57	54	Rain
19	14	57	53	Clear
20	8	57	52	Clear
21	17	57	54	Cloudy
22	27	25	52	Rain
23	4	54	51	Clear
24	12	54	51	Clear
25	11	55	52	Clear
26	13	54	52	Clear
27	33	55	52	Clear
28	18	54	52	Clear
29	35	53	51	Clear
30	2	51	50	Clear
31	1	54	49	Cloudy
Nov. 1	36	52	50	Cloudy
2	59	50	48	Cloudy
3	0	50	49	Clear
4	7	47	46	Rain
5	11	50	49	Rain
6	285	52	52	Rain
7	10	49	49	Cloudy
8	6	49	50	Cloudy
9	283	51	50	Clear
10	9	49	48	Clear
11	1	48	47	Clear
12	0	48	50	Clear
13	0	48	48	Cloudy
14	459	49	49	Cloudy
15	43	48	46	Rain
16	184	51	49	Cloudy
17	703	51	52	Clear
18	2675	50	49	Fog
19	255	49	50	Fog
20	16	48	50	Fog
21	77	48	48	Fog
22	0	46	47	Fog
23	25	47	47	Clear
24	1	47	48	Cloudy
25	58	48	49	Clear
26	14	48	47	Cloudy
27	112	47	51	Rain
28	2124	48	53	Cloudy
29	553	46	51	Rain
30	21	47	50	Clear
Dec. 1	15	47	48	Fog
2	30	48	48	Fog
3	1	47	46	Fog
4	0	45	44	Fog
5	7	45	44	Fog
6	0	45	44	Cloudy
7	0	42	39	Cloudy
8	0	38	35	Snow
9	0	40	33	Clear
10	0	38	33	Clear

It will be noted that migration progresses not as a steady wave of increasing magnitude, but by a series of irregular spurts which rise to a maximum after the middle of November. This peculiarity, common to most animal migrations, is graphically shown in Figure 81. The rack went out of use on December 10th, but the mass movement of fish was then apparently over.

Between September 19th and December 10th, 8525 fish were counted. During this period, winter was approaching, both air and water were rapidly cooling, and cloudy and stormy weather came apace. The afternoon temperature of the Klamath River fell from 72 to 38 degrees F., while Shasta River went from a like temperature

to 33. During the early part of the migration, fish were constantly passing from warmer to colder water, but on the sixth of November, the temperatures of the river and its tributary were equalized without arresting the migration. After this date, the early condition was reversed at times, the Shasta becoming warmer and the fish passing from cooler to warmer water.

A summary discloses that of the 8513 migrating trout, 974 passed from warmer to cooler water, 1075 moved on even temperatures, while 6464 went from colder to warmer water.

It will be recalled that these migrating trout, starting from the sea, have progressed over a long distance and passed the open mouths of many tributary streams, several of which are larger than the Shasta, to finally select and enter this particular branch. Temperature has been ascribed as the factor in determining the selection of tributaries in the case of certain migrating salmon in Alaska, and had an observer taken occasional temperatures during the early part of this trout migration, a similar conclusion might have been reached. Continued

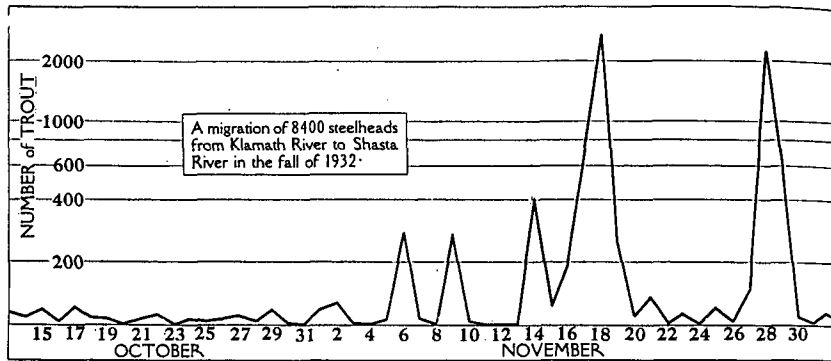


FIG. 81.

observation in this case puts temperature in the discard as appears. It might be remarked also, that observations on the movements of king salmon at this same place do not support a temperature thesis for that species.

As the season and likewise the migration advanced, the weather became unsettled and at times stormy, the work being brought to an untimely close because of the formation of ice during a severe cold snap. It may be noted that during all the clear days, 24 in number, 1353 fish migrated; during 13 cloudy days, 2966 passed; while through 10 foggy days, 3076 moved; and in 10 rainy days, 1118 fish passed. During 33 dark days, 7160 fish migrated. While the character of the day may have influenced movement, it very evidently had nothing to do with the selection of this particular tributary.

Steelheads appear in the Shasta and begin their spawning operations long before they do in several other tributaries of the Klamath which enter the main channel both below and above the Shasta. In cases where observations have been made, the migrations are similar in that they progress in a series of lesser waves, the cause or contributing factors of which are not known.

THIRD ANNUAL

By JAMES MOFFITT, Editor

THE FIRST ANNUAL (1931) was taken by the Fish and Game employee (1931, pp. 396-401). The second (1932, pp. 298-310). The third (1933) was made February 1933. The census are hereby recorded.

For various reasons the first was less satisfactory than those which followed. The counts were obtained at a time when the writer was unable to undertake the work at that point by another. Hence the first was an important area.

The writer took the first when conditions for obtaining were less favorable than in the second. This year was with enormous numbers of steelheads rather limited area (Point and Blake's Land, vol. 18, 1932, p. 301). Within this area, there were (mostly Brandt's, *Phalacrocorax*, *Phalacrocorax* (*Melanitta perspicillata*), mingled with the brant and geese. The dark bodied were annoying in this respect. They were quite evidently attracted by enormous numbers of spawning in this part of the water. The gulls were themselves that were common to the water in schools by 1000. To run my noisy outboard motor, the least of the gulls, the least of the herring spawn, upon the herring spawn,