

OREGON STATE GAME COMMISSION

RESULTS FROM THE READING OF STEELHEAD TROUT SCALES
FROM THE TILLAMOOK BAY COMMERCIAL CATCH

A Report by

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to the

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Introduction

During the winter of 1941-42, the writer collected scales from angler-caught steelhead. However, it was so difficult to find anglers with their catch by visiting various popular areas and resorts (63 steelhead were checked), that it was decided to get data from gill-netted steelhead at two Bay City packing plants. The netted fish were checked from January 30 to February 28, 1942.

The great majority of the fish were taken in the tide-water section of the Wilson River. The remainder came from set-nets in the lower bay. The fish were delivered to the packer by truck or boat and dumped on the floor of the packing shed on a pier. The writer took data from the fish before they were packed. Steelhead sent to New York markets were boxed with ice, in the round (not cleaned). Those destined for California were cleaned and tagged with a California Fish and Game Commission tag before being boxed in ice.

Data

Eight hundred steelhead were examined. Of the scale samples, 74 (9 percent) showed regeneration in growth and so could not be used. As to sex, 17 specimens were dubious. Other gaps in the data brought the number of specimens used in the appended tables down to 702.

In a previous report by the writer, "Results from the reading of cutthroat and steelhead trout scales with recommendations for future work" (June 16, 1942), a summary of data from 100 of the 800 commercial steelhead is presented in Tables 6 and 8. The percentages by number of fish in the

various age groups essentially follows that for the larger number of fish treated of in the present report, although the figures are by no means so adequate.

Sizes of Steelhead

Table 9 of the previous report gives the average lengths of 800 commercial steelhead. Since there was such a small percentage of fish dubious as to sex, the earlier figures are repeated here. The average fork length of the females is 28.3 inches, and of the males, 28.1 inches (all, 28.2 inches). One hundred seventy-eight fish were weighed, averaging 8.6 pounds (length, 27.1 inches). The shorter length of the weighed fish, taken from January 30 to February 2, may indicate racial distinctness, but more data is needed to prove the point.

Table 1 gives the age-length relationships of 702 commercial steelhead. The smallest netted fish measured was 21.5 inches long, while the smallest sea-run steelhead caught in the sport fishery was 11.25 inches long. The 26-27.9-inch group is the largest in both the commercial and sport fisheries, being 39 percent of the former and 38 percent of the latter. This group also furnishes the largest number of fish to the III, IV and V annulus, or year, classes.

The average lengths of age groups is presented in Table 2. It will be noted that there is very little growth difference between the I-II and III-II groups. There is a regression in the II-III as compared with the I-III group, and also in the III-III as compared with the II-III group. If 3 fish under 26 inches in the III-III group were eliminated, the

average would be the same as for the II-III's. Larger numbers of data are needed to smooth out such irregularities.

Fresh and Brackish Water Growth

A major difficulty in reading the scales of adult steelhead is in interpreting the stream growth. In general, the ocean growth pattern is much more consistent than that for growth in fresh water. Apparently, adult steelhead with one stream annulus are faster growing fish, on the average, than are those which spend more time in the stream, and the single stream annulus often encloses as much area on the scale as may two or three annuli on scales from older, slower growing fish. On scales with 2 or 3 stream annuli, the annuli may be wide and easily seen, or narrow, of but few circuli, and correspondingly difficult to distinguish.

In 85, or 12 percent, of the specimens studied there is stream growth merging into brackish or salt water growth without an annulus. This pattern probably represents late summer downstream migration. Trap studies will aid in clarifying this point. Brackish water, or tidewater, growth is evidently indicated on 420, or 60 percent, of the scale specimens by circuli (outside the stream-growth pattern) which are coarser and more widely spaced, though smooth like stream circuli (in contrast to the wavy circuli in the ocean-growth pattern). Probably a larger proportion of the fish spent some time in brackish water. Tillamook Bay provides a sufficiently large area of brackish water to explain the stay of most of the young steelhead in that medium before venturing into the open ocean. It has been determined* that most of the young

* Trapping data from Kilchis River tributaries.

steelhead migrate downstream in May on their way to the ocean. It is probable that the majority of the migrants spend only a few months at the most intrackish water, for only 28 (4 percent) of 702 specimens show a brackish-water annulus. A comparison of average lengths of fish with such an annulus and those without has shown that growth in tidewater is not generally superior to freshwater growth. Hence, the brackish-water annuli are considered as stream annuli in the tables. The numbers of specimens with a tidewater annulus are shown at the bottom of Table 2.

Age and Sex

Tables 3 and 4 show the age groups and numbers previously spawned, by sex. Of all the fish, 21 percent had spawned previously. While 26 percent of the females had spawned previously, only 15 percent of the males were found to have done so. The difficulty of reading male spawning checks may account for some of the difference. Of the females that had spawned, 27 percent had spawned more than once, while of the males that had spawned, 37 percent had spawned two or more times. A few may have spawned before migrating seaward. However, no clear-cut examples were noted.

Sex Ratio

The sex ratio, as determined from the 702 specimens used, is 1.32 females to 1.0 males. This figure is practically the same as that previously reported (1942) for 800 fish (1.35:1.0). The figures indicate that the nets tend to select females, probably because of their greater plumpness.

Age at Sexual Maturity

Table 5 shows the age of the steelhead on reaching sexual

maturity. The largest group (55.6 percent) had spent the better part of 2 years in fresh water and about 2 years in salt water. The next smaller groups had also spent about 2 years in the ocean. In all, 82 percent became sexually mature after nearly 2 years (II annuli) in the ocean. The comparable figure of 62 percent given on page 5 of the 1942 report should be corrected to 78 percent, and for sport fish, 81 percent. Sixty-seven percent of the fish made the seaward migration after their second winter in the stream.

Hybrids

Of the 702 scale samples studied, three are considerably smaller than the average for their size. Two are from females, III-II-0, 24.5 inches, and I-II-0, 26.5 inches long; the third is from a male, III-II-I, 25.5 inches long. It is believed that these fish may have been hybrids, although nothing striking was noted in their external appearance to set them apart.

Comparison of Sport and Commercial Steelhead

The conclusions drawn from a comparison of sport and commercial steelhead in the 1942 report remain unchanged. The sport fishing tends to take smaller and younger fish. A smaller proportion of the sport fish have spawned previously. Both sport and commercial fishermen take a disproportionate number of females. However, the sport angler takes an even larger proportion of females (1.56:1.0) than the nets. In all the above comparisons the sport fishery suffers, judged from the standpoint of conservation.

However, from the viewpoint of dollars and cents valuation, the sport fishery is undoubtedly superior to the commercial.

In the first place, the gill-netting is carried on by local residents. Very little travelling is involved. Sport anglers, on the other hand, spend a great deal of money to reach their favorite streams, as well as in hotels and restaurants. The nets are not cheap, but the angler also spends considerable sums for tackle. The cost per fish taken by the angler is increased when it is considered that on the Green River in Washington, during the 1940 and 1941 steelhead seasons, 5,938 anglers took only 994 fish, or 0.17 fish per angler. In Tillamook County the angler did better. During the period from November 23, 1941 to March 31, 1942, the 626 anglers checked had taken 202 steelhead, or about one-third (0.32) fish per angler.

Recommendations

Whatever the fate of the commercial fishery for steelhead, it will be desirable to improve the angling regulations in order that the average angler may catch more than the 0.32 of a steelhead previously mentioned. Therefore, the recommendations made in 1942 are repeated here. They are, that the bag limit for adult steelhead be reduced from 3 to 2 fish per day (and from 9 to 6 per week or in possession); that limitations be placed on boat angling; and, that the opening date for angling for 6-inch trout be advanced to May 15 (to permit a greater escapement of young steelhead to the ocean).

Table 1.

Age-length, Commercial Steelhead, January, February, 1942

No. of annuli	III	IV	V	VI	VII	VIII	IX	Totals	Percent
Fork length inches									
22-23.9		5						5	.71
24.25.9	11	48	15	3				77	11.
26-27-.9	35	174	62	1				272	39.
28-29.9	17	96	58	8	2			181	26.
30-31.9	4	39	43	17	1			104	15.
32-33.9		2	23	14	1	1		41	6.
34.35.9		6	12	1	2		1	21	3.
36.37.9		1*						1	.14
Totals	67	370	213	44	6	1	1	702	
Percent	10	53	30	6	.85	.14	.14		
Av. F. length in.	27.1	27.6	29.5	30.4	31.8	32.5	34.0		

* 36 inches

Table 2.

Average Length of Age Groups

In Year	Annuli stream	Annuli ocean	No previous-ly spawned	Total	Percent	Av. F. L. inches
3	I	II	1	67	10.	27.1
4	I	III	14	44	6.	30.8
	II	II	12	326 ^a	47.	27.2
5	I	IV	5	5	.60	32.1
	II	III	67	115 ^b	16.	30.4
	III	II	6	93 ^c	13.	27.4
6	I	V	1	1	.14	32.5
	II	IV	22	22	3.1	31.4
	III	III	12	19 ^d	2.7	29.5
	IV ^e	II	2	2	.28	27.8
7	II	V	2	2	.28	32.8
	III	IV	4	4	.56	31.4
8	II	VI	1	1	.14	32.5
9	III	VI	<u>1</u>	<u>1</u>	.14	34.0
			150	702		

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- a. 7 are I stream, 1 tidewater.
 - b. 7 are I stream, 1 tidewater.
 - c. 8 are II stream, 1 tidewater.
 - d. 4 are II stream, 1 tidewater.
 - e. 2 are III stream, 1 tidewater.

Table 3.

Age and Previous Spawning, Males

In Year	Annuli stream	Annuli ocean	Times spawned	Number spawned	No. not spawned
3	I	II	0		41
			1	1	
4	I	III	0		12
			1	3	
			2	1	
	II	II	0		146
			1	10	
5	II	III	0		18
			1	5	
			2	11	
	III	II	0		58
			1	3	
6	II	IV	1	1	
			2	2	
	III	III	0		1
			1	1	
			2	2	
	IV*	II	0		2
9	III	VI	4	1	258
				<u>41</u>	

Total 302

Percent of males spawned, 15

*III stream, I tidewater

Table 4.

Age and Previous Spawning, Females

In Year	Annuli stream	Annuli ocean	Times spawned	Number spawned	No. not spawned
3	I	II	0		25
4	I	III	0		18
			1	10	
	II	II	0		168
			1	2	
5	I	IV	1	3	
			2	2	
			0		30
	II	III	1	50	
			2	1*	
			0		49
6	I	V	3	1	
			1	3	
			2	16	
	III	III	0		6
			1	8	
			2	1	
7	II	V	2	1	
			3	1	
			1	1	
	III	IV	2	2	
			3	1	
			4	1	
8	II	VI	4	1	
				<u>104</u>	<u>296</u>
			Total	400	

Percent of females spawned, 26

*I stream, I tidewater

Table 5.

Age at Reaching Sexual Maturity

In Year	Annuli stream	Annuli ocean	Number of fish	Percent
2	I	I	2	.28
3	I	II	82	11.66
4	I	III	33	4.70
3	II	I	24	3.42
4	II	II	390	55.60
5	II	III	52	7.41
4	III	I	10	1.42
5	III	II	99	14.09
6	III	III	8	1.14
6	IV*	II	<u>2</u>	.28
			702	

*III stream, I tidewater