# DEENA CREEK STEELHEAD:

# SOME ASPECTS OF THEIR LIFE HISTORY,

# POPULATION SIZE AND SPORT FISHERY,

# SPRING 1983

By

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## ABSTRACT

deLeeuw, A.D. 1986. Deena Creek steelhead: some aspects of their life history, population size and sport fishery, Spring 1983. Fisheries Progress Report No. SK—53.

In the spring of 1983, a steelhead tagging study was undertaken on Deena Creek, Queen Charlotte Islands. One hundred and twenty—seven steelhead were tagged, by angling and beach seining during late March, April and May, of which only 12 were recaptured. Using multiple sample analysis techniques, population estimates of 625, 577 and 684 steelhead were calculated, range 336 to 1599 fish. Of the 16 age groups identified, 3.2 dominated and accounted for 40.5%. The large number of age groups was likely the result of high incidence of repeat spawners which accounted for 25.6% of the total. Over 83% of all steelhead sampled had spent 3 years in the stream prior to spending 1 (35%), 2 (83%) or 3 (7%) years in the ocean. The average length of steelhead sampled was 74.9 cm and ranged from 55 to 93 cm. These results and the sports fishery are discussed relative to other Queen Charlotte steelhead streams.

## INTRODUCTION

Angling is an important activity on the Queen Charlotte Islands. Approximately 40% of all eligible Charlotte residents purchase a non—tidal angling licence of which 1/3 to 1/2 also angle for steelhead trout (Salmo gairdneri). Despite this intense angling, very little steelhead life history and population information is available for Charlotte streams. As a consequence, in order to better understand Charlotte steelhead a study was undertaken on Deena Creek steelhead during the spring of 1983. The objectives were to:

1. Determine steelhead run timing and movement;
2. Describe life history characteristics;
3. Estimate population size.

## DESCRIPTION OF THE STUDY AREA AND FISHERY

Flowing in a northeasterly direction into South Bay, Skidegate Channel, Deena Creek drains an area of 6,920 hectares on northern Moresby Island (Fig. 1). Anadromous fish migrate throughout the lower 12 km of the mainstem and some of the tributaries. In addition to steelhead, Deena Creek is also inhabited by coho salmon (Oncorhynchus kisutch), chum salmon (0. keta), pink salmon (0. gorbuscha), Dolly Varden char (Salvelinus malma) and the prickly sculpin (Cottus asper).

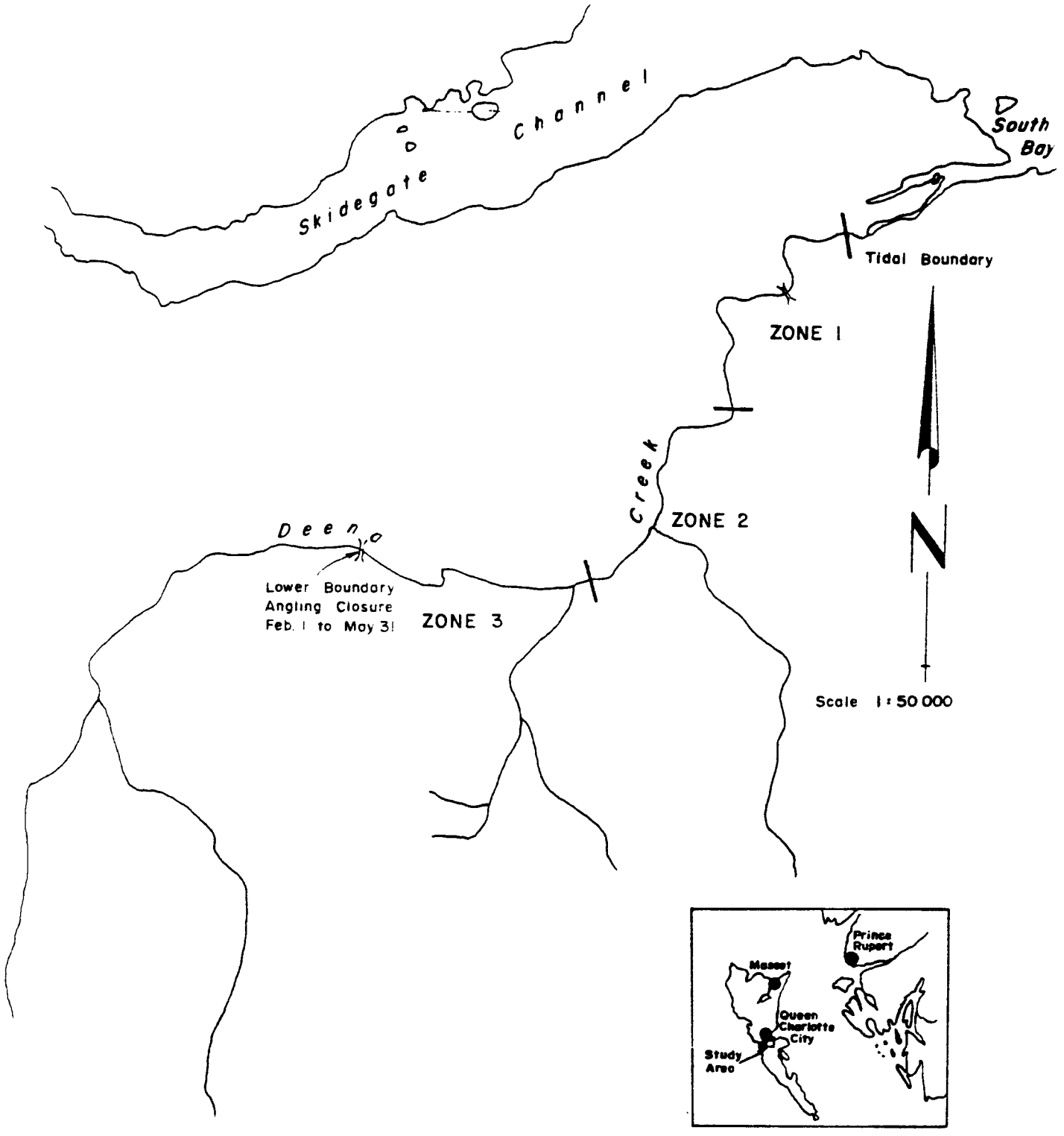
Skidegate Channel
South Bay
Tidal Boundary
ZONE 1
Creek
ZONE 2
Deena
Lower Boundary
Angling Closure
Feb. 1 to May 31
ZONE 3
N
Scale 1:50 000
Prince Rupert
Masset
Queen Charlotte City
Study Area

Fig. 1  Deena Creek , Queen Charlotte Islands

Stream discharges on the Deena are extremely variable, not unlike other Charlotte streams. Flows were recorded from June to September 1963 only and ranged from .74 $m^3/s$ to 5.86 $m^3/s$ (Environment Canada, 1982). Total dissolved solids ranged from 76 to 80 ppm, pH ranged from 6.8 to 7, and temperatures varied from 0.5°C in winter to 17°C in summer. Salmon escapements have been documented for a number of years (Marshall, et al., 1978).

Questionnaire—estimated angling effort for steelhead in the Deena increased until the 1979—80 season and then stabilized at a somewhat lower level (Table 1). The number of steelhead killed was as high as 78 during the 1976—77 season, but has since declined, while the number of fish released has tended to fluctuate sporadically during the period of record. On average, success or catch/day has tended to be better on the Deena than for all Charlotte streams combined except for 1970—71, 1971—72 and 1979—80.

The river upstream of the second bridge, located about 8 km above tide water, is closed to all angling from February 1 to May 31 to protect steelhead which spawn during that time.

## METHODS

For sake of convenience, the lower 8 km of river was partitioned into 3 equal 2.66 km sections (Fig. 1). Steelhead were both angled and seined, then tagged with coloured, numbered anchor (spaghetti) tags.

Table 1. Deena Creek steelhead harvest analysis[1], 1970—71 to

1983.

| Season | Days Fished | No. of Anglers | Kept | Released | Kept/ Day | Catch/ Day | Charlottes Catch/Day |
|---|---|---|---|---|---|---|---|
| 70—71 | 50 | 28 | 6 | 4 | 0.12 | 0.20 | .36 |
| 71—72 | 11 | 5 | 0 | 0 | 0.00 | 0.00 | .52 |
| 72—73 | 66 | 23 | 73 | 13 | 1.11 | 1.30 | .31 |
| 73—74 | 153 | 23 | 23 | 86 | 0.15 | 0.71 | .33 |
| 74—75 | 35 | 14 | 11 | 2 | 0.31 | 0.37 | .27 |
| 75—76 | 121 | 22 | 23 | 101 | 0.19 | 1.02 | .47 |
| 76—77 | 165 | 43 | 78 | 104 | 0.47 | 1.10 | .37 |
| 77—78 | 106 | 34 | 13 | 65 | 0.12 | 0.74 | .48 |
| 78—79 | 104 | 42 | 11 | 39 | 0.11 | 0.48 | .41 |
| 79—80 | 299 | 50 | 15 | 37 | 0.05 | 0.17 | .48 |
| 80—81 | 188 | 65 | 37 | 165 | 0.20 | 1.07 | .79 |
| 81—82 | 191 | 51 | 14 | 235 | 0.07 | 1.30 | .93 |
| 82—83 | 147 | 40 | 15 | 100 | 0.10 | 0.78 | .23 |
| Mean: | 126 | 34 | 25 | 65 | 0.23 | 0.71 | .46 |

[1]Steelhead Harvest Analysis; B.C. Fish and Wildlife Branch Annual Reports

Weights were generally estimated while fork lengths were measured. Gender, date of capture, tag number and colour as well as location of capture were noted. After the removal of a few scales, fish were released at the capture site.

Scales were viewed using a disecting microscope, and the two best examples from the sample selected were cleaned and mounted on gummed cards. Impressions of the scales were made on acetate cards by applying heat and pressure. A Leitz Prado projector was then used to examine each scale for freshwater and ocean age determination (Narver and Withler, 1974).

Population size was determined using the Schnabel, Schumacher and Schnabel—Chapman adjusted multiple census techniques (Ricker, 1970). The formulae were:

$$\text{Schnabel:} \quad N = \frac{\text{sum } (Ct\ Mt)}{R}$$

$$\text{Schumacher:} \quad N = \frac{1}{N} = \frac{\text{sum } (Mt\ Rt)}{\text{sum } (Ct\ Mt^2)}$$

$$\text{Schnabel, Chapman revised:} \quad N = \frac{\text{sum } (Ct\ Mt)}{R+1}$$

where: t = 5-day time period
Ct = total catch during time t
Mt = total fish tagged and released during time t
M = sum of Mt
Rt = total recapture during time t
R = sum of Rt

## RESULTS

From March through May, 1983, 127 steelhead were tagged in the Deena River. Of these, 31 were taken by beach seine in the lower river on May 3, while the remaining 96 were angled. Twelve fish were recaptured, 3 by anglers and 9 by beach seine. Fish seined, tagged and recaptured again by seine within the catch period (May 3), were excluded from the information set. In other words, only angler— recaptured fish were included in the population estimation.

### SPATIAL AND TEMPORAL DISTRIBUTION

The largest number of steelhead (101) were taken in the lower reaches of Deena Creek (Table 2), with only marginal catches in the middle and upper zones. Although fish were available throughout the March to May period, largest catches occurred during April (Table 3).

Table 2. Deena Creek steelhead catch by zone.

| Zone | Zone length (km) | Catch | Catch/km |
|---|---|---|---|
| 1 (lower r.) | 2.66 | 101 | 38.0 |
| 2 (middle r.) | 2.66 | 7 | 2.6 |
| 3 (upper r.) | 2.66 | 17 | 6.4 |
| Not recorded | - | 2 | - |
| Total | 8 | 127 | 15.9 (127 / 8) |

Table 3. Number of steelhead captured during the spring of 1983 tagging study on Deena Creek. Catch grouped by 10–day periods.

| Date | Males | Females | Total |
|---|---|---|---|
| 03/1–10 | 0 | 0 | 0 |
| 03/11–20 | 6 | 4 | 10 |
| 03/21–31 | 11 | 4 | 15 |
| 04/1–10 | 16 | 16 | 32 |
| 04/11–20 | 9 | 11 | 20 |
| 04/21–30 | 4 | 3 | 7 |
| 05/1–10 | 7 | 33 | 40 |
| 05/11–20 | 0 | 2 | 2 |
| 05/21–31 | 0 | 1 | 1 |
| Total | 53 | 74 | 127 |

Seine catches in the tidal portion of the river accounted for the majority of fish recorded during May. Large numbers of fish were schooled in the intertidal area as a result of extreme low water conditions during this time.

Overall sex ratio of steelhead captured favoured female (n = 74) to males (n = 53).

The average number of days between recaptures of the three fish recorded was only 4.3 days (Table 4). Intertidal seine hauls captured 9 previously-tagged fish, all originally angled further downstream.

Table 4. Movement and residency of recaptured steelhead in Deena Creek spring of 1983.

| Tag # | Original Capture Zone | Original Capture Date | Recapture Zone | Recapture Date | # of Days |
|---|---|---|---|---|---|
| Y0O804 | 3 | Mar. 12 | 3 | Mar. 12 | 0 |
| Y00849 | 2 | Apr. 4 | 2 | Apr. 5 | 1 |
| Y00836 | 1 | Apr. 4 | 1 | Apr. 18 | 12 |
| 9 fish not recorded | | | 1 | May 3 | |
| | | | | | X=4.3 |

AGE AND SIZE

Scales were removed from 127 adult steelhead, of which only two were not readable. Absorbtion of the fresh water anulli (R) had occurred in 33 sets of scales, therefore, 92 samples were readable for total age.

Sixteen age groups were represented in the Deena Creek steelhead sample. Of these, 5 age groups (15 fish) occurred as kelts (Table 5).

Table 5. Steelhead trout age groups from Deena Creek, spring of 1983 (n = 92)

| Age group | Males | Females | Total | % of Total |
|---|---|---|---|---|
| 3.2 | 24 | 24 | 48 | 40.5 |
| 3.3 | 1 | 5 | 6 | 6.5 |
| 4.2 | 7 | 1 | 8 | 8.7 |
| 4.3 | 1 | 0 | 1 | 1.1 |
| 2.1S1 | 1 | 0 | 1 | 1.1 |
| 3.1S1 | 5 | 7 | 12 | 13.0 |
| 3.2S1 | 0 | 1 | 1 | 1.1 |
| 3.1SS1 | 0 | 2 | 2 | 2.2 |
| 4.1S1 | 1 | 1 | 2 | 2.2 |
| 4.2S1 | 0 | 1 | 1 | 1.1 |
| 4.1SS1 | 0 | 1 | 1 | 1.1 |
| 3.1S(kelt) | 0 | 4 | 4 | 4.3 |
| 3.2S(kelt) | 0 | 2 | 2 | 2.2 |
| 3.1SS(kelt) | 0 | 1 | 1 | 1.1 |
| 3.1SSS(kelt) | 0 | 1 | 1 | 1.1 |
| 4.1S(kelt) | 0 | 1 | 1 | 1.1 |
| Total | 40 | 52 | 92 | 100 |
| R.1 | 0 | 1 | 1 | |
| R.2 | 10 | 8 | 18 | |
| R.1S1 | 2 | 1 | 3 | |
| R.1SS1 | 0 | 2 | 2 | |
| R.2S1 | 0 | 2 | 2 | |
| R.2SS1 | 0 | 1 | 1 | |
| R.1S(kelt) | 0 | 3 | 3 | |
| R.1SS(kelt) | 0 | 1 | 1 | |
| R.2SS(kelt) | 0 | 2 | 2 | |

Three years of fresh water growth followed by two years of marine growth prior to first spawning (i.e., age 3.2) was the dominant age, and accounted for 40.5% of all scales where both fresh and marine growth were readable. The next dominant age group was 3.1S1 at 13%, followed by 4.2 at 8.7%.

Seventy-seven or 83.7% of all Deena Creek steelhead sampled had spent three years in the stream prior to smolting (Table 6). The two other fresh water age groups had spent four (15.2%) and two (1.1%) years in the stream.

Among first time spawners, those with 2 years marine residency accounted for 66.4% of the total, while those with one year ocean growth accounted for 28% of the scales examined. A little less that 6% of all fish sampled had spent three years in the ocean prior to spawning (Table 7).

Of all fish sampled, 32 or 25.6% had spawned prior to the year of capture. The majority (75%) of repeat spawners, i.e. both males and females, were on their second spawning run (.1S1 and .2S1) (Table 8).

Size of fish was not obviously indicative of duration of ocean residency. One and two year ocean fish averaged 75.6 and 79.0 cm respectively, while the fork length of the 30 adults measured was 74.9 cm (Table 9). Since weights were hand—estimated, these measurements were not included in the comparison. Also, only three males were measured compared to 27 females.

Table 6. Number and percentage of male and female Deena Creek Steelhead of different fresh water ages, spring of 1983 ( n = 92 ).

| Fresh water age | Males | Females | Total | % of Total |
|---|---|---|---|---|
| 2 | 1 | 0 | 1 | 1.1 |
| 3 | 30 | 47 | 77 | 83.7 |
| 4 | 9 | 5 | 14 | 15.2 |
| Total | 40 | 52 | 92 | 100.0 |

Table 7. Number and percentage of male and female Deena Creek steelhead of different ocean ages, prior to first spawning, spring of 1983 ( n = 125 ).

| Ocean Age | Males | Females | Total | % of Total |
|---|---|---|---|---|
| .1 | 9 | 26 | 35 | 28.0 |
| .2 | 41 | 42 | 83 | 66.4 |
| .3 | 2 | 5 | 7 | 5.6 |
| Total | 52 | 73 | 125 | 100.0 |

Table 8. Numbers and percentage of repeat spawning Deena Creek steelhead of different ocean age groups, spring of 1983, kelts excluded, ( n = 32, or 25.6% of all fish sampled).

| Age | Males | Females | Total | % of Total |
|---|---|---|---|---|
| .1S1 | 8 | 11 | 19 | 59.1 |
| .2S1 | 0 | 6 | 6 | 18.8 |
| .1SS1 | 0 | 6 | 6 | 18.8 |
| .2SS1 | 0 | 1 | 1 | 3.0 |
| Total | 8 (25%) | 24 (75%) | 32 | 100.0 |

Table 9. Fork lengths (cm)of male and female Deena Creek steelhead of different ocean ages, spring of 1983, repeat spawners excluded.

| Ocean Age | No. Males | $\bar{X}$ | Range | No. Females | $\bar{X}$ | Range | Total | $\bar{X}$ | Range |
|---|---|---|---|---|---|---|---|---|---|
| .1 | 1 | 76 | —— | 15 | 75.6 | 67—88 | 16 | 75.6 | 67—88 |
| .2 | 2 | 69 | 69 | 12 | 74.8 | 55—93 | 14 | 74.0 | 55—93 |
| Total | 3 | 71.3 | 69—76 | 27 | 75.2 | 55—93 | 30 | 74.9 | 55—93 |

POPULATION ESTIMATION

Results of the three estimators indicate a population of between 577 and 684 steelhead in Deena Creek during the spring of 1983 (Table 10). Large confidence limits are likely due to few repeat captures.

Table 10. Deena Creek steelhead population estimates during the spring of 1983.

| Method 5 | Estimate | 95% Confidence Limits Poisson distribution | Normal distribution |
|---|---|---|---|
| N Schnabel | 625 | 357 – 1210 | 388 — 1599 |
| N Schumacher | 577 | 481 – 1182 | ----- |
| N Chapman | 684 | 336 - 1087 | 375 — 1250 |
| Average | 629 | | |

# DISCUSSION

The large numbers of steelhead taken in the lower reaches of Deena Creek is not typical of Charlotte streams. In Pallant and Copper Creeks, both on northern Moresby Island, steelhead were generally angled in the mid to upper sections of the stream (Chudyk, 1982; de Leeuw, 1985a, 1985b). On the Yakoun River also, steelhead were generally angled in the middle and upper reaches (de Leeuw, 1983). It is possible that because of the small size of Deena Creek, steelhead hold in the lower reaches prior to rapid upstream migration and subsequent spawning when the stream is in freshet conditions. Almost 40 steelhead were seined from an intertidal pool in early May during low water conditions. These fish migrated upstream when a freshet condition occurred a few days later.

In addition to the distribution, the timing of Deena Creek steelhead is also different from other Charlotte study streams such as the Copper, Pallant and Yakoun Rivers. In these streams, peaks in run timing generally occur in early to late winter rather than the April to May period. Late run timing of steelhead has been observed in several other Charlotte streams including Mathers Creek and Skedans Creek on Louise Island, and Bonanza and Gregory Creeks on the west coast of Graham Island. No doubt different streams have steelhead runs which maximize their production potentials by developing specific migration

strategies. Noteworthy is the disproportionately large number of females (36) as opposed to males taken in the lower river during May. Overall sex ratio favoured females (74) considerably over males (53) and is not unlike other Charlotte streams.

Since Deena Creek appears to have a very late winter steelhead run of limited duration, fish likely migrate into, spawn and exit the stream all within a very short time period. The average time between captures (3 recaptures) was only 4.1 days and ranged from 0 to 12 days. On Pallant Creek, the average number of days between recaptures during 1983—84 and 1984-85 was 45 and 39.1 days respectively, while on the Yakoun the average steelhead spent 26.5 days in the river (de Leeuw, 1983, l985a, l985b). Time duration between captures on these latter two streams, ranged from 0 to 152 days.

The number of age groups represented in Deena Creek steelhead samples (16) is considerably greater than for the Yakoun (de Leeuw, 1983), Pallant (de Leeuw, 1985a, l985b) and Copper Rivers (Chudyk, 1982). The high observed incidence of repeat spawners in Deena Creek is the most likely reason for the large number of age groups.

The dominance of three year old juveniles is typical of other Charlotte streams. Unlike other streams however, Deena Creek steelhead have a shorter ocean residency. On the Yakoun, Copper and Pallant Rivers, the major portion of the steelhead run is comprised of three year ocean fish. On the Deena, 66.4% of the steelhead examined had spent only two years in the ocean. The remaining 28% and 5.6% had

spent one and three years respectively in the marine environment prior to spawning. This relatively short marine residency was not reflected in their size. The lengths of Deena Creek steelhead (55 to 98 cm) was well within the expected range for other Charlotte streams. In these streams, however, three years of ocean residency occurred more frequently.

The low repeat capture rate (9.4%) and therefore large confidence limits around the population estimates is possibly the result of a short adult stream residency. Since the total run is of limited duration, Deena Creek steelhead likely migrate into, spawn and exit the stream all within a few weeks.

## SUMMARY

1. During the spring of 1983, 127 steelhead were tagged in the Deena River of which 12 or 9.4% were recaptured.

2. The greatest number of steelhead were captured in the lower river, and the time duration between original and recapture was about four days.

3. Of the 16 age groups identified, age 3.2 dominated and accounted for 40.5% of all scale samples where both fresh and marine growth was readable. Of all Deena Creek steelhead sampled, 83.7% had spent three years in the stream prior to smolting. Two and one years of marine residency prior to first spawning accounted for 66.4% and 28.0% respectively of the total number of steelhead examined.

4. Lengths of steelhead ranged from 55 to 93 cm and averaged 74.9 cm. An increase in length relative to duration of ocean residency was not apparent.

5. Population abundance of the 1983 Deena Creek steelhead run was estimated using multiple sample techniques. Three estimates were calculated and include: 625, 577 and 684 steelhead. Wide confidence limits, ranging from 336 to 1599, result from few repeat captures.

# ACKNOWLEDGEMENTS

This project was largely the result of volunteer work by the Queen Charlotte Islands Chapter of the B. C. Steelhead Society. Their help was invaluable and is greatly appreciated. Interpretations of scales collected were accomplished by R. Tetreau and G. Schultze. M. Lough calculated the population estimates.

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# REFERENCES


Chudyk, W.E. 1982. Copper Creek (Q.C.I.) Steelhead Trout, a report on the effects of non—random release of kelts from a fence barrier on their incidental capture in an Indian net fishery, and some notes on population size and life history characteristics. Skeena Fisheries Report #81—1, 27 pp., Fish and Wildlife Branch, Smithers, B.C.

De Leeuw, A.D. 1983. Steelhead of the Yakoun River, some aspects of their life history, population size and the sport fishery, 1981—82. Skeena Fisheries Report #82—1, 23 pp., Ministry of Environment, Smithers, B.C.

de Leeuw, A.D. l985a. Pallant Creek steelhead: some aspects of their life history, population size and sports fjshery, 1981—82. Fisheries Progress Report No. SK—5O, Ministry of Environment, Smithers, B.C.

de Leeuw, A.D. l985b. Pallant Creek steelhead: 1983—84. Fisheries Progress Report No.SK—51, Ministry of Environment, Smithers, B.C.

Environment Canada, 1981. Historical stream flow summary, B.C.

Marshall, D.E., R.F. Brown, G.A. Buxton, V.D. Chanley and D.G. Demontier, 1978. Preliminary catalogue of salmon streams and spawning escapements of Statistical Area 2E (Queen Charlotte Islands). Fisheries and Marine Service Data Report #72, 346 pp.

Narver, D.W. and F.C. Withler, 1974. Steelhead of the Nanaimo River, aspects of their biology and the fishery from three years of angler catches. Fisheries and Marine Services, Nanaimo, B.C., Cir. No. 99, 25 pp.

Ricker, W.E. 1970. Handbook of computations for biological statistics of fish populations. Bulletin #119, Fisheries Research Brd., Canada.

Steelhead Harvest Analysis. 1970-71 through 1981—82, Fish and Wildlife Branch, Victoria, B.C.

# APPENDICES

I. Original steelhead captures from Deena Creek during The spring of 1983.

II. Steelhead recaptures from Deena Creek during the spring of 1983.

APPENDIX I. Original steelhead captures from Deena Creek during the spring of 1983.

| Fish No | Date | Sex | Length (cm) | Weight (kg) | Tag No. Colour | Area | Remarks | Age |
|---|---|---|---|---|---|---|---|---|
| 1 | Mar 12 | M | | 2.7 | YOO 801 | Lower R. | Dark | 3.2 |
| 2 | " | F | | 3.6 | " 802 | Upper R. | Bright | 3.1S1 |
| 3 | " | M | | 2.3 | " 803 | Upper R. | Coloured | R.2 |
| 4 | " | M | | 2.7 | " 804 | Upper R. | Bright | 3.2 |
| 5 | " | M | | 3.2 | " 805 | Lower R. | Bright | 3.2 |
| 6 | " | F | | 4.1 | " 806 | Lower R. | Kelt | 3.3 |
| 7 | Mar 13 | F | | 4.5 | " 807 | Upper R. | Bright | 3.1S1 |
| 8 | " | M | | 4.1 | " 808 | Lower R. | Coloured | 4.1S1 |
| 9 | " | M | | 4.1 | " 809 | Lower R. | Coloured | 4.2 |
| 10 | " | F | | 4.1 | " 810 | Lower R. | Bright | 3.2 |
| 11 | Mar 26 | M | | 4.1 | " 811 | Lower R. | Bright | 3.2 |
| 12 | " | F | | 5.0 | " 812 | Lower R. | Bright | 3.2S1 |
| 13 | " | M | | 4.1 | " 813 | Lower R. | Bright | 3.2 |
| 14 | " | F | | 4.5 | " 814 | Lower R. | Kelt | 3.2S |
| 15 | " | M | | 2.7 | " 815 | Upper R. | Bright | 3.2 |
| 16 | " | M | | 4.5 | " 816 | Upper R. | Dark | 3.1S1 |
| 17 | " | M | | 2.7 | " 891 | Lower R. | Coloured | 3.2 |
| 18 | Mar 27 | F | | 2.7 | " 817 | Upper R. | Bright | 3.2 |
| 19 | " | F | | 4.5 | " 818 | Upper R. | Bright | 3.3 |
| 20 | " | M | | 5.0 | " 819 | Lower R. | Bright | 4.3 |
| 21 | " | M | | 2.7 | " 820 | Lower R. | Coloured | R.2 |
| 22 | " | M | | 4.1 | " 821 | Lower R. | Coloured | R.1S1 |
| 23 | Mar 29 | M | | 4.1 | " 893 | Lower R. | Coloured | 3.1S1 |
| 24 | Mar 30 | M | | 3.2 | " 881 | --- | Coloured | R.2 |
| 25 | Mar 31 | M | | 3.6 | " 894 | Lower R. | Coloured | 3.2 |
| 26 | Apr 1 | F | | 1.8 | " 822 | Lower R. | Bright | 3.2 |
| 27 | " | M | | 4.1 | " 823 | Lower R. | Dark | R.2 |
| 28 | " | M | | 4.5 | " 824 | Lower R. | Bright | 4.2 |
| 29 | " | M | | 4.1 | " 825 | Lower R. | Coloured | 3.2 |
| 30 | " | F | | 5.0 | " 826 | Lower R. | Coloured | 3.3 |
| 31 | " | M | | 6.4 | " 827 | Lower R. | Bright | 3.3 |
| 32 | " | F | | 3.2 | " 828 | Lower R. | Bright | 3.2 |
| 33 | " | M | | 2.7 | " 829 | Lower R. | Bright | 3.2 |
| 34 | " | M | | 5.0 | " 830 | Lower R. | Coloured | 3.1S1 |
| 35 | Apr 2 | M | | 3.2 | " 837 | Lower R. | Bright | 3.2 |
| 36 | " | M | | 4.5 | " 838 | Lower R. | Bright | 4.2 |
| 37 | " | M | | 4.1 | " 839 | Upper R. | Bright | 3.2 |
| 38 | " | F | | 5.0 | " 840 | Upper R. | Bright | R.2 |
| 39 | " | M | | 2.7 | " 841 | Lower R. | Bright | R.2 |
| 40 | " | F | | 2.3 | " 842 | Middle R. | Kelt | 3.2 |
| 41 | " | F | | 4.5 | " 843 | Lower R. | Bright | 3.3 |
| 42 | " | F | | 5.4 | " 844 | Lower R. | Bright | R.2S1 |

APPENDIX I, continued. Original steelhead captures from Deena Creek during the spring of 1983.

| Fish No | Date | Sex | Length (cm) | Weight (kg) | Tag No. Colour | Area | Remarks | Age |
|---|---|---|---|---|---|---|---|---|
| 43 | Apr 2 | M | | 4.5 | Y00 845 | Lower R. | Coloured | 2.1S1 |
| 44 | " | F | | 2.7 | " 895 | Lower R. | Bright | R.2 |
| 45 | " | F | | 2.7 | " 862 | Lower R. | Bright | —— |
| 46 | " | F | | 2.3 | " 863 | Lower R. | Bright | 3.2 |
| 47 | " | F | | 4.5 | " 864 | Middle R. | Bright | 4.1S1 |
| 48 | " | F | | 5.4 | " 854 | Middle R. | Bright | R.2S1 |
| 49 | Apr 4 | M | | 2.7 | " 846 | Upper R. | Bright | 3.2 |
| 50 | " | F | | 5.0 | " 847 | Lower R. | Bright | 3.3 |
| 51 | " | F | | 4.5 | " 848 | Middle R. | Kelt | 3.1S1 |
| 52 | " | M | | 3.6 | " 849 | Middle R. | Dark | 3.2 |
| 53 | Apr 9 | F | | 3.6 | " 850 | Lower R. | Bright | 3.2 |
| 54 | " | M | | 2.7 | " 831 | Upper R. | Coloured | 3.2 |
| 55 | " | M | | 2.7 | " 832 | Upper R. | Coloured | R.2 |
| 56 | " | F | | 3.6 | " 833 | Lower R. | Bright | 3.2 |
| 57 | " | M | | 3.6 | " --- | Lower R. | Bright | 3.2 |
| 58 | Apr 13 | F | | 4.1 | " 834 | Lower R. | Coloured | 3.2 |
| 59 | " | M | | 3.6 | " 835 | Lower R. | Kelt | 3.1S1 |
| 60 | " | F | | 3.2 | " 836 | Lower R. | Bright | R.2 |
| 61 | " | M | | 3.2 | " 892 | Lower R. | Bright | 4.2 |
| 62 | " | M | | 4.5 | " 896 | Lower R. | Coloured | 4.2 |
| 63 | " | F | | 4.5 | " 897 | Lower R. | Bright | 3.2 |
| 64 | " | F | | 3.6 | " 898 | Lower R. | Bright | R.2 |
| 65 | " | F | | 4.1 | " 899 | Middle R. | Bright | 3.2 |
| 66 | " | M | | 3.6 | " 900 | Middle R. | Kelt | R.2 |
| 67 | Apr 14 | M | | 2.7 | " 866 | Lower R. | Bright | 3.2 |
| 68 | " | F | | 3.2 | " 871 | Lower R. | Bright | R.2 |
| 69 | " | M | | 5.0 | " 872 | Lower R. | Coloured | 4.2 |
| 70 | " | F | | 6.4 | " 873 | Lower R. | Bright | 3.1SS1 |
| 71 | " | F | | 2.5 | " 874 | Upper R. | Bright | 3.2 |
| 72 | " | M | | 3.2 | 03097 | Lower L. | Bright | 4.2 |
| 73 | Apr 17 | F | | 2.7 | YOO 875 | Lower R. | Bright | 3.2 |
| 74 | " | F | | 2.7 | " 876 | Lower R. | Bright | 3.2 |
| 75 | " | M | | 3.6 | " 877 | Upper R. | Dark | 3.2 |
| 76 | " | F | | 5.4 | " 878 | Lower R. | Bright | 3.1SS1 |
| 77 | Apr 18 | M | | 3.2 | " 879 | Lower R. | Coloured | 3.2 |
| 78 | Apr 21 | F | | 3.2 | " 882 | --- | Bright | 3.2 |
| 79 | Apr 24 | M | | 4.5 | " 880 | Lower R. | Dark | R.1S1 |
| 80 | " | M | | 2.7 | 03187 | Lower R. | Coloured | 3.2 |
| 81 | " | M | | 3.6 | 03188 | Lower R. | Bright | R.2 |
| 82 | " | M | | 2.7 | 03189 | Lower R. | Kelt | R.2 |
| 83 | " | F | | 1.4 | 03190 | Upper R. | Bright | R.1 |
| 84 | " | F | | 4.5 | 03191 | Upper R. | Bright | 3.1S1 |

APPENDIX I, continued. Original steelhead captures from Deena Creek during the spring of 1983.

| Fish No | Date | Sex | Length (cm) | Weight (kg) | Tag No. Colour | Area | Remarks | Age |
|---|---|---|---|---|---|---|---|---|
| 85 | May 1 | F | | 3.6 | 03192 | Lower R. | Bright | 3.2 |
| 86 | " | F | | 3.2 | 03193 | Lower R. | Kelt | 3.1S1 |
| 87 | " | F | | 3.6 | 03194 | Lower R. | Bright | 3.2 |
| 88 | " | F | | 4.1 | 03195 | Lower R. | Bright | 3.2 |
| 89 | May 3 | F | 65 | --- | Y00 884 | Lower R. | Kelt | 3.2 |
| 90 | " | F | 67 | --- | " 885 | Lower R. | Kelt | R.1S |
| 91 | " | M | 69 | --- | " 890 | Lower R. | Dark | 3.2 |
| 92 | " | F | 74 | --- | 000 834 | Lower R. | Bright | 3.2 |
| 93 | " | F | 81 | --- | " 836 | Lower R. | Kelt | R.1S |
| 94 | " | F | 81 | --- | " 837 | Lower R. | Kelt | 3.1SSS |
| 95 | " | F | 84 | --- | " 840 | Lower R. | Bright | 4.2S1 |
| 96 | ' | M | 69 | --- | " 841 | Lower R. | Dark | 3.2 |
| 97 | " | F | 72 | --- | " 842 | Lower R. | Bright | 3.1S |
| 98 | ' | F | 67 | --- | " 843 | Lower R. | Kelt | 4.1S |
| 99 | " | M | 63 | --- | " 844 | Lower R. | Kelt | ——- |
| 100 | " | F | 71 | --- | " 845 | Lower R. | Kelt | R.1S |
| 101 | " | F | 55 | --- | 06976 | Lower R. | Bright | 3.2 |
| 102 | " | M | 71 | --- | 06977 | Lower R. | Dark | 3.2 |
| 103 | " | F | 71 | --- | 06978 | Lower R. | Bright | R.2 |
| 104 | " | F | 74 | --- | 06979 | Lower R. | Kelt | R.1SS |
| 105 | " | F | 65 | --- | 06981 | Lower R. | --- | 4.2 |
| 106 | " | F | 75 | --- | 06983 | Lower R. | Bright | R.1S1 |
| 107 | " | F | 91 | --- | 06984 | Lower R. | Kelt | R.2SS |
| 108 | " | F | 76 | --- | 06985 | Lower R. | Bright | R.1SS1 |
| 109 | " | F | 67 | --- | 06986 | Lower R. | Bright | R.2 |
| 110 | " | F | 71 | --- | 06987 | Lower R. | Bright | R.2 |
| 111 | " | F | 73 | --- | 06988 | Lower R. | Kelt | 3.1S |
| 112 | " | F | 68 | --- | 06989 | Lower R. | Kelt | 3.1S |
| 113 | " | F | 87 | --- | 06990 | Lower R. | Bright | 4.1SS1 |
| 114 | " | F | 76 | --- | 06991 | Lower R. | Bright | 3.1S1 |
| 115 | " | M | 76 | --- | 06992 | Lower R. | Bright | 3.1S1 |
| 116 | " | F | 88 | --- | 06993 | Lower R. | Bright | R.1SS1 |
| 117 | " | F | 90 | --- | 06999 | Lower R. | Kelt | R.2SS |
| 118 | " | F | 93 | --- | 07000 | Lower R. | Bright | R.2SS1 |
| 119 | " | F | 76 | --- | 09996 | Lower R. | Kelt | 3.1SS |
| 120 | May 7 | M | | 4.1 | 03098 | Lower R. | Kelt | 3.2 |
| 121 | " | F | | 3.6 | 03196 | Lower R. | Bright | 3.2 |
| 122 | " | M | | 2.7 | 03099 | Lower R. | Dark | R.2 |
| 123 | " | F | | 3.2 | 03100 | Lower R. | Bright | 3.2 |
| 124 | " | F | | 3.2 | 03176 | Lower R. | Kelt | 3.1S |
| 125 | May 14 | F | | 3.2 | 03177 | Lower R. | Bright | 3.2 |
| 126 | " | F | | 5.0 | 03178 | Lower R. | Kelt | 3.2S |
| 127 | May 21 | F | | 4.1 | 03179 | Lower R. | Kelt | 3.1S |

APPENDIX II. Steelhead recaptures from Deena Creek during the spring of 1983.

| Fish No. | Date | Length (cm) | Weight (kg) | Tag No. & Colour | Area | Remarks | Age |
|---|---|---|---|---|---|---|---|
| 1 | Mar 12 | | | YOO 804 | Upper R. | --- | |
| 2 | Apr 5 | | | YOO 849 | Middle R. | Killed | |
| 3 | Apr 18 | | | YOO 836 | Lower R. | --- | |
| *4-12 | May 3 | | | Not recorded | Lower R. | --- | |

* These fish (9) were seined in the Lower River.