

Relationship between number of
Pyloric caeca and length of
juvenile Rainbow Trout,

Northcote, T. G., - Copeia 1960

(3): 249-60. - Loon Lk. - under

30mm - fewer caeca - (see Lindsay).

40-65 caeca -

goldens - 21-33

x 26.88

Fecundity of Rainbow Trout
from Actual Count of Eggs.

Allen, G. H. 1960 - Copeia (3): 260-61.

Hatchery stock - 1596-3073
36-45 cm,

THE UNIVERSITY OF MANITOBA

Department of Zoology

WINNIPEG, CANADA

June 27, 1962.

Mr. Robert J. Behnke,
Research Assistant,
Department of Zoology,
University of California,
BERKELEY 4, California,
U.S.A.

Dear Mr. Behnke:

Please accept my apologies for this delayed reply to your letter of May 7. It arrived during a move of the Department from one building to another and somehow became mislaid.

I regret to say that our collection of fishes does not contain the specimen of Salmo irideus morpha argentatus referred to by the late Dr. Bajkov. However, we have a couple of specimen, probably collected by Bajkov, from the Jasper Park area as follows:

	<u>Place</u>	<u>Date</u>
<u>Salmo trutta</u>	? Jasper Park	?
<u>Salmo gairdneri</u>	Buffalo Prairie Lake, Jasper Park.	1926

In recent months I have had numerous inquiries regarding specimens referred to by Bajkov. What became of his collection is unknown to me but it was not turned over to this Department. I strongly suspect it was abandoned somewhere and probably has been destroyed since.

Yours truly,

J.A. McLeod

J.A. McLeod,
Professor & Chairman.

JAMcL/des

1870

1871

1872

1873

1874

1875

1876

1877

argentatus

1878

May 8, 1962

Dr. C. C. Lindsey
Institute of Fisheries
University of British
Columbia
Vancouver, British Columbia
Canada

Dear Dr. Lindsey:

We are attempting to track down the specimens on which Bajkov described Salmo irideus morpha argentatus in 1927. Dr. Scott of the Royal Ontario Museum has suggested that you may be a possible source of information. I know you are familiar with Bajkov's work on the Jasper National Park fishes. Do you have any ideas on Bajkov's belief that there were two types of rainbow trout in the Athabasca system? Are there any extant specimens of "argentatus"?

You mentioned that you hoped to initiate a study of Salmo clarkii alpestris. We have data on four specimens and find a very striking character is the number of scales in the lateral line (number of pores). Most rainbow and cutthroat trout have from 120-125 such scales, rarely more than 130. The specimens of alpestris we examined have from 145 to 150. This is far more than any other trout we have seen. Dr. Neave has shown there is generally a correlation between scales in the lateral line and the number of vertebrae; typically, 2 scales for each vertebrae. The alpestris specimens have the typical cutthroat number of vertebrae; 61-62. Our scale count in the lateral series, made two rows above the lateral line, ranged from 195-210, a high count, but not as high as reported by Dymond (200-230). All of the specimens we examined were from Isaac Creek. On the basis of the scale count in the lateral line, the Isaac Creek trout form a distinct subspecies. The question remains, however, do the trout of all the disjunct localities where alpestris was described from share the peculiarities of the Isaac Creek trout?

One more question: in your paper on the trout of Loon Lake you presented scale counts which I find to be about

Dr. C. C. Lindsey
Page 2
May 8, 1962

10 to 15 higher than my own counts on Loon Lake trout.
Could you tell me just how your counts were made: how many
rows above the lateral line and was the count continued
to the last scale on the body (in contact with the caudal
rays)?

Very truly yours,

Robert J. Behnke
Research Assistant

RJB:fbc

Airmail

cc Dr. Paul R. Needham

Fishes of Jasper Park Lakes - 1925-1926

Alexander B. S. B. - Contrib. Canada Biol. Bd.

3 1926-27 C.H. 1 C24

- Jordan Everman Fishes of N. & Mid. Am. I p 501 -
6 varieties rainbow trout. - *irideus*, *mansoni*, *shasta*,
gilberti, *stonei*, *agua bonita*

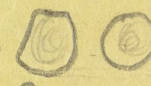
bottom pg. 11 B. S. B. states: "Probably *S. irideus* *agua-bonita*
= mutation". ? - morphae = mutation - sub sp. with
no special geographic distribution (occurring within a sympatric
pop.?)

- 2 types rainbows in Park.

I: Dark, large spots firm scales. l. l. 120-140
length of head $\frac{1}{4}$ in body

II: Silvery, small spots or few spots, loose scales,
length of head $5-5\frac{1}{2}$ in body. scales l. l. 75-100.

says J. O. Snyder found similar conditions in
S. henshawii in northern Calif. (- Pyreneal-Tony & red.)

S. i. argentatus - scales differ in shape also 

They live together in Buffalo Prairie Lake & Caledonia
Lake also in Athabasca R.

- Snyder, J. O. The Fishes of the Lahontan System
of Nevada & N. Calif. Bull. U.S. Bur. Fish vol. XXXV 1917

Smith, S. B. 1960

A note on two stocks of
steelhead trout (Salmo gairdneri)
in Capilano R., Brit. Col. J. F. R.
B. Can. 17(5): 739-742.

- Summer & winter runs - 11 mo. w/o feed.
(740) - 2ndary sex character dif. &
flattened & bifurcated gill rakers. (741) -
returns back theory of genetic control.

Rainbows -

Dymond, J. R., 1928. The trout of
British Columbia. Trans. Am. Fish. Soc. 58:
71-77.

The trout of the genus Salmo
belong to 3 species - steelhead (s-g.),
Kamloops (s-k.), and cut-throat trout (s-c.).

Jordan believed the Kamloops trout to
be a landlocked steelhead but such is not
the case. The two species are no doubt
derived from a common ancestor at some
distant time but the Kamloops trout is a
true fresh-water species.

and 1 - cutthroat dominant fish in lakes.

1931. Description of two new forms of
British Columbia trout. Contr. Canad. Biol. Fish.
series 6 (16): 391-395. p. 393

Salmo kamloops whitakeri new subspecies

- much variation in Kamloops - environment effect
body parts - "Gradations between the most
extreme of all these characters occur, but it
seems necessary to recognize the extremes of
the series nomenclatorially. Jordan's name

Kamloops, was given to the form characteristic of the large lakes, and the name whitehousei is here proposed for the small, brightly-coloured heavily spotted form, which retains its pan marks throughout life and possesses increased numbers of scales. - nake 16-18 scale 139-164. - name mountain Kamloops.

p. 394 - Salmo clarkii alpestris new subsp.

Type from Canyon Ch. near Revelstoke

5 paratypes Isaac Ch, same vicinity, scales 218 in type 200-230 in paratypes

Fraser R. - Kootenay L. trib. (6 mi. x 9 mi. Ch.)

Canyon - Crazy, Yard, Frog Chs. trib. to Eagle R.;
Isaac Maple Lake. Shuswap area.
- mountain cutthroat.

Mottley, C. McC. 1936 - The classification of the rainbow trout of British Columbia. Prog. Rept. Pacific Biol. Sta., Biol. Bd. Canada, No. 27: 3-5.

- Since Dymond's - Nat. & Geog. J. B.C. published experiments showing environmental modification - as result classification revised - whole group in B.C.

considered as single species. } - variety = subspecies?
S. gairdnerii variety gairdnerii
S. ? kamloops
whitehousei

● Morphes argentatus ●

Bajkov, A. 1927. Reports of the Jasper Park
Lakes Investigations, 1925-26 I The Fishes
Contrib. to Canad. Biol. and Fisheries. New series
vol. 3 (16): 379-404.

- Reports only 56-60 vert. in malma from
Jacques L.

some fishes have morphes (= mutations)
which have no special geographical distribution,
but occur together with original form.

- S. i. - 120-140 scales head longer

S. i. morph argentatus silvery, almost spotless.
shorter head, scales 75-100.

- different scale shapes -

- S. i. - gill rakers 13-15

S. i. as - lives w/ S. i. in Buffalo Prairie Lake,
Caldonia L., and Athabasca R.

S. i. from Minaga Ck. like argentatus but
w/ 8-12 bright red spots. (prob. Trutt)

Buffalo Prairie L.

Salmo irideus - vert. 54-59 -

pyloric caeca - ³¹34-41

gill rakers 14-17

Salmo trutta introduced in 1924 -

vert. 51-54

caeca 41-46

- Letter from J. S. Nelson - Zool. Dept. Univ. Alberta
dated Dec. 17, 1961 - Rainbows were stocked in
Jasper Park prior to Bajkov's study. First ^{stocking} record
in Caldron Lake was 1921. - Perhaps Bajkov
handled metric = hatchery stocks.

- 2 theories on ^{origin} rainbows entering - ① over
rocks by headwater transfer from Fraser R.
near Jasper - ② - Down Peace R. & up Athabasca.

Lindsey 56

- drainage basin

- Coquihalla - trib. Fraser - Wm B.C.
(Steelhead) - only ones - coarse scaled
(Vernon & McWynn etc.) - never -
pelvic rays - 10

- Lower Kathleen Lake - ^{about 15 mi. South} near Hains Junction, Yukon Terr.

trib. Alsek R. - ~~63-66 vert. & 64.0~~
62-66 63.9 - 10 ^{all} pelvic rays
25-31 27.5 scales above

(make counts
2 rows above)

into Michody Ch. - trib. Weldhoy R.
location Athabasca drainage.

range

- undoubtedly derived from Fraser R. rainbow
- no cuts here - & no bows in
Saskatchewan system -

* - morphs - argentatus - B. J. C.

- Lindsey 1956 - S. gardneri in Peace

R. drainage at least as far downstream as
Dawson Ch. - but planting may account for
this - native to Athabasca drainage in Alberta,

- never reported from McKenzie below L. Athabasca,

- no Salmo from Laird, or Teelin L.

- Trout from Summit L. resemble S. clarkii
in the possession of definite reddish-orange

thyroid markings forming a broken stripe
on either side of the isthmus. In all
other characters examined, including a
relatively short maxillary and the absence
of thyroid teeth, they conform to S. gairdneri

- prob. - native - ^{① independent} - Paranis K. - close to
Fraser & Peace ^② & Athabasca in close contact
in western Alberta.

- cutthroat in Skeena to continental divide
- not reported from McKenzie system.

* cuts in Fraser

- cuts from Columbian basin over
naturally in all higher parts of So. Saskatchewan
drainage

- not in N. Saskatchewan
① williamsi - crossed divide many
times - Saskatchewan - Athabasca - Peace - Laird

- large areas N. & W. of Prima George -
comprise glacial lake deposits - at least 3
major glacial lake basins were formed by the
melting of the last ice sheet which covered the
Kechako plateau (Armstrong & Tupper, 1948, Amer.
J. Sci. 246: 283-310. - most of old basins now within
Fraser - but at one time ~~probably~~ drained north.

Wynne - Edwards, V.C. 1952.

Freshwater Vertebrates of the Arctic and subarctic. Fish. Res. Bd. Can., Bull, 94: 1-28.

- Great River of Arctic characterized by extreme turbidity & muddiness - visibility less than .5 m. - unsuitable for Thymallus & Trout which must see food. (p. 3) - 6 mo. or more at 0°C - great ice flows -

- S. salar - Ungava Bay (Inuit R.) -

(Legendre & Roussseau, 1949: 135)

- S. gairdneri - Enters Yukon Terr. by Alaskan R. & Trib. -

- Salvelinus - both shores Hudson Bay on west from Churchill R. northward. to Coppermine R.

- East Hudson Bay - from Great Whale R. to Ungava Bay, in Labrador & Greenland.

- char may run 100 mi up rivers up to 20 lb.

- fontinalis m. to 24 km. north of Great Whale R. E. shore Hudson Bay - W. shore Nelson R. - outlet Payne's L. northernmost Ungava.

- "Squanga" found in Squanga L. southern
Yukon Ter. - notable for extraordinary development
of - so-called mysticil tubercles; from head to
tail; - has 26 rows of scales counted diagonally
down side of body - more than any other described
form; - 28-29 gill rakers - most of any nearctic
Coregonus. - Superficially and in some fundamental
characteristic it comes closest to C. muksum
aspinus from L. Omega, Kuskis.

- Motley, C. M. C., 1937 (cont.)

- no. of vert. in Salmo is extremely
unstable -

Mottley, C. McC, 1934

The origin and relations of the rainbow trout. Trans. Am. Fish. Soc., 64: 323-327.

- Fast interglacial period - 2 sp. trout. evolving from single salmonine stock. - This stock separated from progenitors of Oncorhynchid type by previous glaciation. - Oncorhynchid type isolated in Pacific salmonine in Atlantic. gradually attain circumpolar distrib. during interglac. period by wandering.
- permanent freshwater colonies & incipient species formed from this migratory type.
- Seems quite probable that the stocks which produced the present rainbow & cutthroats were cut off from general circumpolar distrib. by last glaciation. - ice barrier separated at. - Pac. salmonine.
- "The cutthroats in S.E. B.C. apparently came in from glacial Lake Bonneville.
- ~~In~~ Subsequent to glaciation. marine inundation formed a great inland sea. ^{This} sea was gradually lifted and formed ~~of~~ freshwater basins. such as Shuswap, Okanagan. and Kootenay lakes. - Gradation in characters from sea to interior → increase scales, decrease gill raker, branchiostegal ray, dorsal & anal rays. Larger fins - ~~long~~ longer head & jaw - retention of juvenile characters

Mr. Kamloops

Forest Stream
Nov. 10

Jordan, W. S. 1892^a. Description of
a new species of salmon. Oncorhynchus
kamloops, from the lake of British Columbia.
Forest and Stream, 39(12): 405-406 (Nov. 10, 1892)
(copy of mss sent to Smithsonian Instit. for
publ.) - scales ³⁰ 145 (135 in second specimen)
16 ¹/₄ in. - 2nd 15 ³/₄.

body in general form resembling that of
silver salmon (Oncorhynchus kisutch);
teeth on tongue and vomer so usual in
Oncorhynchus; anal fin lower and
smaller than usual in Oncorhynchus.
- when fresh middle of side w/ broad band
of bright, light rose pink.

p. 406
This seems to be a species of salmon
entirely distinct from the fish hitherto
recorded from the waters of the Pacific coast. There
is not much doubt from the account of Mr.
Bassett as well as from the appearance of the
fish that it is a "landlocked" species of salmon.
Its nearest relationships seem to be with the
king salmon or quinnat (O. t.) ^{shoytsho}, but
differs somewhat in coloration and especially in
very much smaller size of the anal fin.

and in the reduced nos of branchiostegals.

- one of the 2 types in Nat. Mus. ~~the~~ at Stanford

- This discovery of beakless salmon adds wt. to theory that O. kennerlyi is really distinct species & not a form of O. merley.

Salmo kamloops - Cal. Rept.
Dec. 5?

Jordan, W.S. 1892. Description of a
new species of trout (Salmo kamloops) from
the lakes of British Columbia. Bien. Rept.
Calif. St. Bd. Fish Comm., 1891-92: 60-61.

Scale 30-145 (135 in second specimen)

body in general form resembling silver
salmon (Oncorhynchus hearted) - Teeth as usual in

Salmo gairdnerii. anal fin smaller
than usual in Oncorhynchus, but larger
than usual in the trout - fish caught
by A.C. Bassett from Kamloops L., B.C.

Kamloops L. at outlet into Smith Thompson R.
connect w/ Shuswap Lakes - Trib. Fraser
also in Okanagan - Trib. Col. - Also in
Kootenay Lake. - Its nearest relative

w/ steelhead trout (S.g.) - differ in
longer pectoral fin, coloration, and shape of
pauciperch - Really intermediate between
Salmo and Oncorhynchus and - replace it
in Salmo.

Bean
T. H. B.

Kamloops is a rainbow - Bean
Dec. 22, 1892)

1892. California fishculture and
protection. Forest and Stream, 39(25): 538-539.

(Dec. 22, 1892) - Bean. summary of bean. rept.

of Calif. Fish Comm. for Mar. 17, 1891 - Sept. 1, 1892

p. 537 - "Dr. Jordan's description of a new species
of trout, Salmo kamloops has also appeared in
this journal. In the reprint before us a figure
of the Kamloops trout is presented for the first
time. One of the type upon which this description
is based was deposited ⁱⁿ the National Museum at
Washington, and we have examined this specimen. After
having studied the fish we find it difficult to
understand why the describer of the species failed to
recognize in it the Gairdner's trout of Richardson. The
Kamloops trout can be seen any day of the week
at Blackford's in Fulton Market, but if you ask
Mr. Blackford its name he will tell you that it
is the steelhead."

- No mention of Nov. 10 description
in own magazine!

- ~~Miller~~ (1892) r. - believes Jordan changed proof
of Bean. Rept. write-up,

Evermann, B. W., and E. L., Goldsborough

1907. The fishes of Alaska. Bull. U. S. Bur.

Fish., 26 (1906): 221-360, pls. XXIII-XLII
23-42

Salmo clarkii

Bean - S. purpuratus - St. Paul (Kobik Is.)

Δ northern Alaska, -

- collections from - Union Bay -

Sitka Harbor

not determined how far north -

We did not find it north of Sitka -

Salmo gairdnerii - steelhead

- Bean - Kobik Is.

- headwaters - Salmon R. Idaho

Salmo irideus - rainbow trout

(10 miles)
Cottonwood Cr. - on coast range

no records N. of Alaskan peninsula

Vernon & McMynn (1957) 14(2):203-12
 Scale Characteristics of steelhead & cutts

- Steelhead N=96 127-146 \bar{x} = 136
 counting 4 rows above.
 cutthroat & hatcheries 166 vs. 137

Jordan 1923 Copeia 121:85
 - Can't use gairdneri - .64 vert. steelhead has 58
 no Salmo more than 60.

- Neve (1944) - Vancouver Is. - B.C.
 Cowichan R. - B.C.
 rainbow steelhead all (99%) anadromous before 3 yrs

	resident rainbow steelhead	rainbow
wild lateral line	123.29	119.72
hatchery " "	125.65	122.08
wild lateral series	132.23	122.3
hatchery	130.4	125.48

- use of irideus - represented coarse scaled coastal
 rainbow - should not be considered fine scaled
 resident trout - oldest name - stonei - (masoni-gibbi)

The rainbow series

Coastal rainbows Salmo gairdnerii gairdnerii
morpho trutta and morpho fario.

- Synonyms - ?

- distribution

- character - scales? - J. & E. 150-180 ??

habits.

Shapovalov . . .

- fin count - . . .

Schultz fine & coarse scaled

- Nerve - anadromous & resident . . .

Figures

Skeels - stonei - McClelland -

- Jordan & Weiss 1884 - rainbow & steelhead same species

S. g. g. & S. g. i. - 1896 -

- rainbow vs. steelhead - Jordan's view

g. w. i.

fine vs coarse

vert. - (Kendall) - ?
63 vs 60 -

- Trewavas. 1953 S. & T. 4139:199
Sea trout - Brown trout

- Handgribe - physiology & Thyroid
1941 - J. Exp. Biol. 18: 162.

J. & E. - Am. Food & Game Fish
- Cutthroat - rainbow - steelhead
also J. & E. -

vert. Calif. -

low
Klamath - Snoddy
60-65
x 62. +

Neave, F. 1949, Game fish populations
of the Cowichan River. Bull. Fish. Res.
Bd. Can., 84: 1-32.

Steelhead & rainbow
Cowichan has 3 types - steelhead - ^{winter} - spring
rainbow - resident
humble - introduced.

- Steelheads migrate the whole length of river,
and to certain tributaries of the lake -

Winter-spawning steelheads

"winter" fish begins in Oct., continues
throughout winter - estimated between ⁵⁰⁰⁰ 5-15,000
fish. - most 4-5 yrs. old.

- relatively few winter fish ascend the
smaller tributaries. - migrate to sea as
yearlings or 2 yr. olds - height of downstream
run occurs Apr. May. - Spawning of
winter fish from beginning Jan. to March.

Spring-spawning steelheads

- In common w/ other streams on Vancouver
Is. - Cowichan has late run - begins
late Mar. continues to mid May (at least)

Brown Trout - not abundant as native fish - no authentic records of sea-run.

- average wt. about 2 lbs. less -
6 vs. 8 lbs - age structure - same -
↓
- because high percentage (84%) spent
2 yrs. in freshwater.
* - more repeat spawners (10-11 mo. no food)
- Don't lose condition as fast as winter.
- reproduce - Apr, May - many breed in
certain trib. of river & lake.

Courshan rainbows - upper part River &
in lake.

- most ^(resident) rainbows spawn same season and
frequently on same grounds, as winter
run steelhead - (Jan. - Mar. in main river)
first spawning 3-5 yrs. (generally 4)
3 yrs. 12-14 in. 4 yrs. over 16 in. - largest
seen 21 in. 4 3/4 lb. -

- No. marked trout recaptured
Kemloops - 136,011 - 25 return
native bows - 2976 - 57

- Cutthroat most widely distributed in river system.
- dominant trout in smaller streams - in deeper waters
of lake - later in year near river mouth - spawning
winter & early spring - ascend trib. (small-moderate size)
1-2 yrs. in spawning streams. - move in and out w/
tide in estuary. a wt. of at least 9 lbs. known
from lake.

Neave 43 -

Cowichan hatching steelhead = 131.5

" " kamloops 142.6

Caeca
count

Vernon & Mc Mijm

- count ^{steelhead} _{method} - 96 - 127-146 - 136

4 runs above

- Bull. Fish. Res. Bd.

1949: no. 84-32pp

Lindsey - Northcote scales 155.52 outlet caeca 50.48

150.94 - inlet - 52.73

- Northcote - Horn L.

over 30mm.

40-60 caeca

Of No Am. ^{are considered} which have resident and unknown
 numbers and ~~to~~ 2 races of steelhead, one realizes
 that such slight taxonomic difference can not be
 named although it is important to recognize the
 significance of such ^{great} diversity in behavior
 and physiology ^{for management purposes} and
 to ^{ponder} grasp the ^{biological} basis ^{mechanism} which provides
^{ready} ^{facile} genetic isolation and "mis-incipient"
 speciation in ^{among} ^{many} of its ^{Salmonids}.

Dymond, J. R. 1932. The trout and other game fishes of British Columbia. Biol. Bd. Can., Bull. 32: 51 pp.

- Scales usually 140-150 rows - *S. kamloops*
(130-160)

130-135 - *S. gairdneri*
(124-146)

- Kamloops - throughout Fraser drainage above Hell's Gate - & most of Col. K. basin in B.C.

- large specimens - kamloops have longer heads * than steelheads - maxillary always longer in kamloops of all sizes

- fish from Kootenay, Okanogan, Paul Lakes 707. from 135-153 average about 145.

p. 26. The question as to whether some of the striking ~~also~~ variations exhibited are in the nature of specific difference has been discussed (p. 17) and the conclusion reached that they are not. Every gradation of difference between the most extreme forms is found. It has seemed advisable, however, to designate

the extremes by subspecific names and, therefore, the small, heavily-spotted, brightly-colored Kamloops trout, characteristic of small lakes at high altitudes, has been designated as the mountain Kamloops trout (Salmo kamloops whitehousei), the typical form of large lakes at lower altitudes being then recognized as (Salmo kamloops kamloops).

- Trout are small, slender, head longer, parr marks persistent even in spawning fish.
orange tipped dorsal, white tipped ventrals and average about 150 diagonal rows. 140-164.
Ben L. usually about 160 diagonal rows.

- Coastal cult - not beyond Hell's Gate. but common in Harrison and Chilliwack lakes and rivers.

- cult - only native trout in waters of upper Kootenay R. - (basin of Moyie, & Elk R.) -

Hybrid trout - p. 35 - fertile hybrids between Kamloops & cutthroat - produced at - Kamloops range - hatchery of Cranbrook Rod & Gun Club
1923 began Fis 1926 F2.
27
28

Mottley, C. McC.
1934

The effect of temperature during development on the number of scales in the Kamloops trout, Salmo kamloops Jordan. Contr. Canad. Biol. and Fish. 8(20): 253-263.

Kootenay L. trout used (~~typical~~) migrate into L ardean R - temp. rising during spawning - eggs spawned early in May subjected to lower temp. - so -- 2 lots - separated -

- water heated in 3rd exp. -
- Made counts - to S.L. - (correct count) - Mottley made count 10-15 rows above lat. line to advise then dropped down to 5-10 rows above l.l.

- Parents - (adult spawners) 130-160 \bar{x} 144.84 N=216

lot from end of run 126-146 \bar{x} 135.61

lot 20-eyed eggs subjected to ^{or} 5°
higher than normal hatchery temp. -

120-135 - 127.46 N=100

parents had 148 x 149 scales

1936. A biometrical study of the Kamloops trout of Kootenay Lake, Salmo kamloops Jordan. Jour. Biol. Bd. Canada, 2(4): 359-377. \searrow

Demonstrates allometry

- eye diameter - 5.5% at 17.8 cm.
3.5% at 62 cm.

caudal peduncle - relatively greater in small fish

dorsal fin height - slight decrease then levels off

- no change in meristic characters w/ age

(slight in gill raker (19.2 → 19.7))

charts - pelvic rays
- vert.
- scales above

Area	N	Gill rakers	Vertebrae	scales tot. ser.	pelvic rays
② Coqui hails R.	30	18-22 (19.2)	62-65 (63.5)	111-138 (124.5)	9-11 (10.2)
① Lower Katchecon.	17	15-20 (18.1)	62-66 (63.9)	above lat. line 25-31 (27.5)	all 10
③ Moberly CK.	32	17-21 (19.4)	63-66 (64.0)	119-149 (133.2)	9-10 (9.9)
K A M L O O P S					
Riske ck.	24	18-22 (19.6)	61-65 (62.9)	122-140 (132.8)	9-10 (9.8)
Fish L.	32	17-20 (18.4)	62-64 (63.0)	27-32 (29.7)	
				123-148 (136.8)	8-10 (9.5)
				27-33 (29.9)	
Loon L.	25	17-20 (18.7)	60-64 (62.9)	124-159 (139.6)	9-10 (9.2)
Trout L.	26	18-22 (20.3)	62-65 (63.0)	27-33 (30.3)	
				133-151 (140.5)	9-10 9.9
				29-36 (31.7)	
S. g. Whitehousei Bear L.	7	18-21 (19.3)	63-65 (64.0)	29-31 (30.0)	all 9
Peachland Res. * - 12 pelvic rays.	5	17-20 (18.4)		136-160 (147.4)	9-10 9.6
				28-36 (32.2)	

198

72

119

1932
Dymond, The trout and other game fish
of B.C. - Dept. of Fisheries Ottawa

Trans. Am. Fish Soc. 1927
58: 71-77

1931 Contrib. Can. Biol. Fish. 6(16): 395-95.

1941- Canad. Nature - 3(4): 103

42

with Canad. Field Nat. 56(7): 112-2

43 5(17): 11

alpestris - 200-230 usually 218 1st row Bear 2nd row near
small lakes Kaska

- Mountain kowlopp - 150-155 - in 1st row - high alt. Selkirk Mts.

kawlopp - 1st row 135-150 - Fraser & Columbia
Kootenai - Morzie, Elk.
& upper Kootenay

steelhead - 130-135 (115-159)

Mattley, C. McC. 1937

The number of

vertebrae in trout (Salmo).
3(2): 169-176.

Jour. Biol. Bd. Canada,

- Natural populations - S. g. kamloops

	N	56	57	58	59	60	61	62	63	64	65	66	67	\bar{x}
1. Redfish Ck.	50							4	22	21	3			63.46
2. Lardeau R.	12									12				64.00
3. Paul Ck.	50							1	20	33	5	1		63.70
4. Six mi. lake, (<u>S. g. whitehousei</u>)	49							7	17	17	6	2		63.57
- Hatcheries														
Cowichan hatchery - <u>gairdnerii</u> - Cowichan R.										14	10	1		63.48
- <u>clarkii</u> - Cowichan							1	12	10	2				62.52
<u>trutta</u>		3	12	9	1									58.32
<u>salax</u> - ^{Scotland} Sweden stock		5	15	4	1									59.04
Nelson hatchery kamloops - Paul L.								4	10	8	3			63.40
<u>whitehousei</u> - 6 mi. L.								6	25 15	15 11	4 4	4		63.34
<u>whitehousei</u> Cottonwood L.								4	11	6	4		*	64.40
Lloyd's Ck. hatchery kamloops - Paul L. 1931								1	5	6	5			63.88
Paul L. 1932								2	11	9	2		*	64.56
Experiments														
Kamloops - Lardeau R. raised Nelson hatchery Killed Oct. 7								17	66	58	9			64.39
Some 25 above OCT. 7								11	36	3				63.84

all cold spring water from Lloyd's Ck. -
63-40 - colder than normal

mixture Paul Ck. (warm) &
Lloyd's Ck. (cold) water

62.54	1	14	13	11	4	3	1	2							fingerings of above
62.90	3	29	57	47	14	25	15	6	2	1	1	1	1	1	Same - 3 weeks lower tempo (ice pack) then normal
63.44		12	9	3											higher tempo whitchose - 6 m.l.
64.02	6	39	5												Kempeps - same as above - higher tempo (used in scale conts exp)

are chased out.

Bartender and Chief Steward: The skilled and suave Bob Benke,

Program: Begins at 9:30 p.m. An interlude of variegated music by departmental talent. Guitars and voices, and a rousing wower of a string band with Stompin' Sam McTinnis and the boys.

'til Midnight: Dancing and what-have-you. Music will be tastefully selected and recorded for the occasion by connoisseurs Dr. Peter Marler and Dr. Max Alfert.

Stoner Haven