

Total of <del>988</del> <sup>838</sup> bones and bone	<sup>259</sup> <del>719</del> <sup>976</sup> fragments	976
<u>719</u>	unidentifiable	719
247		
91	identified to family	91
<u>166</u>	Identified to species	166
<u>287</u>	identified to <u>G. robusta</u>	
38	" " <u>P. lucius</u>	
10	" " <u>C. discobolus</u>	
<u>137</u>	" " <u>C. letipinnis</u>	
166		

After re-examining those bones attributable to the genus Gila I felt that it was not possible to distinguish successfully from elegans and robusta. Therefore if there are bones of elegans in the sample they exist clouded under the heading bones identified to the genus Gila. That knocks down to 4 instead of 5 the number of species found in the bone collection. The best preserved bony elements referable to Gila were the pharyngeal arches. But what I found in my reference specimens of elegans and robusta the differences if any were very minimal. Frankly, I don't see how Miller (1955) distinguishes between elegans and robusta on pharyngeal arches. Perhaps he can now after having over 20 wire casts to analyze the genus. Ugen's dissertation on the genus Gila might have been of some



use but I didn't get it through interlibrary loan. (Maybe I should have).

## Literature

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① Delunke (in press)

⑥ Jones & Jennings 77

Tsepkin 78

⑦ Miller 55, 65

⑧ Minckley & Alger 68

11 Rostlund 52

② Carlson et al 79 - or Prewitt?

⑦ Mc Ads 77

⑤ H & S. 75

③ Eastman - 77

13 Witt Uyeno

④ Fallett



## Methods

For comparative purposes each species that was thought to occur in the bone remains was cleared using KOH and the bones thereby gained used for comparative identifications. This list of species was shortened when some fish were ruled out based on <sup>present</sup> known distributions and ecological requirements. X-rays of each species ~~was~~ were <sup>also</sup> utilized. ~~also~~

When sizes of fish could be inferred from the bones, simple relative proportions were set-up and manipulated.

## Discussion

### Family Cyprinidae

#### Gila robusta (Beard and Girard)

The following bones of the roundtail chub were determined: pharyngeal bones, hyomandibular, pelvic girdle, opercle, quadrate.

The remains are referred to *G. robusta* mainly on the basis of the long and slender inferior rami of the pharyngeal bones. The other chubs that have ~~or~~ once lived in the Yampa River have the inferior rami of the pharyngeal arch short and thickened.

Roundtail chubs live in deep pools or channels throughout their range, avoiding small creeks or

intermediate  
multit. zone  
- distrib. -  
most generalized habitat  
- present str. - good.



6  
one hand and extremely turbulent waters on the other.

Gila elegans

- tentative name!  
- what bones used?

Any identifications of this species are considered tentative at best because of the close affinities with G. robusta. Perhaps distinguishing between the two based on osteology is virtually impossible and that the bones should be referred to the genus Gila only.

The long tail was once distributed throughout the Colorado River basin. Common in the Green and Yupa Rivers in the 1960's, it is virtually nonexistent there today. The long tail has experienced the most abrupt decline of any of the fishes native to the main streams of the Colorado River system.

This species' importance as a prime food source may be minimal because of its supposed bony texture (Miller, 1955).



## Abstract

Four  
Five species of fishes, Ptychocheilus lucius, Gila robusta,  
~~Gila elegans~~, Catostomus discobolus, and Catostomus latipinnis  
representing two families (Cyprinidae and Catostomidae)  
were identified from an archaeological site at the  
confluence of Williams Fork with the Yampa River  
about 12 km downstream of Craig, Moffat County,  
Colorado (Colorado State University SITE SMF 436,  
ca. 450-500 AD). Discussion of the ecological requirements  
for each species is given. Four of the five species  
still persist in the Yampa River; one of these  
fishes is endangered.

## Introduction

Very little has been done on Quaternary fishes;  
even less has been done on Quaternary fishes of  
the Colorado River Basin. Of interest to this report  
are two reports of fish bones from archaeological digs  
on the lower Colorado River Basin. Miller (1958)  
identified approximately 100 bones out of 375 fish  
bones and bone fragments from a dig on the  
lower Colorado River south of Willow Beach. This  
site was determined as in existence from 750 to  
1100 AD. The identifiable bones indicated two families,  
the Catostomidae (suckers) and Cyprinidae (minnows). The  
Colorado squaw fish (P. lucius) was one of the most  
important food fishes. Miller found the following



bones to be fairly diagnostic for the species level: opercle, neural complex, tripus, pelvic girdle, frontal, hyomandibular, and maxillary. The squalfish was the most highly prized of the native fishes by both white men and aborigines. Rostlund (1952) minimizes the importance of the genus Ptychocheilus as food for the Indians. The three other species of the genus occur in the Sacramento and Columbia Rivers and in certain coastal streams of Oregon where excellent food fishes are available in quantity. In those regions Ptychocheilus probably was used little for food. In much of the Colorado River however, there are none of these edible fishes and here Ptychocheilus assumed an importance as food (Miller, 1955). Miller established by using simple proportions that the squalfish were from 4-5 1/2 feet in length.

60-5014  
 Largest N. Am. cyprinid

Syrphium  
 in Chel. was  
 with white form  
 Potamon - Alaskan  
 n ~ 1872 n  
 now - n  
 with many  
 with many  
 with many  
 with many

306  
 1530  
 5.5 ft  
 150 AD

Minkley and Alger (1968) described fish bones from an Indian site on the upper Verde River near Perkinsville, Yavapai County, Arizona. Five kinds of fishes were found represented in 129 bones and bone fragment. A total of 194 pieces were recovered therefore, 65 were fragmented, non-diagnostic or otherwise unidentifiable. The site was determined to have been inhabited between 1300 and 1400 AD. The roundtail chub (G. robusta) and the Colorado squalfish were among the fishes found at the site. Roundtail chub were identified from a number of bones



but probably most diagnostic were the pharyngeal bones. ~~and~~ The ident. function of squamfish was based on six thoracic vertebrae.

In this present study approximately 200 bones were diagnostic to either the species or family level out of a total of 993 fish bones and bone fragments. These fish bones were identified from an archaeological site at the confluence of Williams Fork with the Yuge River about 12 km downstream of Craig, Moffat County, Colorado. Three fishes of the Cyprinidae were identified; Ptychocheilus lucius, Gila robusta, Gila elegans. Two fishes of the Catostomidae were also identified; Catostomus discobolus and Catostomus latipinnis. To my knowledge, this is the first study on fish bones in this area of Colorado.

No evidence of any sort as to the method of capture of these fish was found. If canals were in use it is possible that many fishes were harvested by simply blocking and drying a channel. Other possibilities include herding the fish into shallow backwater areas or bow and arrow. Also the bones show no evidence of ever being cooked, i.e. they were not charred. But the fish were undoubtedly used for food. Rostlund (1952) indicates that some aborigines dried fish and later boiled them in water.

From an ichthyological viewpoint, the fish bones



from the Yampa River could be of paramount importance in deducing past <sup>species</sup> relationships and climatic history. On the premise that habitat preferences and ecological tolerances of living species in the Upper Colorado River Basin have not changed significantly during the Pleistocene where morphology has similarly shown little or no evolution fossils or in this case archaeological remains may provide information on past climates and paleo ecology. However in the present study, although the premise is probably true, very little or no climate change has occurred in the last 2000 yrs. The main purpose of this study was to find out what species occurred at this time in the Yampa River and to try and infer from the data something about age and growth, size, and possibly relative abundance of the indigenous fauna since for the most part this fauna is either threatened or endangered today. In addition the study might shed light into the past history of the basin and some correlations might be drawn with present distributions.



Maps of potential use in Rostlund (1952)

Map 33 (pg 291) - shows that fish nets of no apparent use to natives in Colorado

Map 34 (pg 292) - shows no apparent use of fish weirs and traps in our study area of Colorado - potential exists though for nonindian tribes

Map 35 (pg 293) - no apparent use of fish spears but potential exists for nonindian tribes

Map 40 (pg 298) - possibility of bow and arrow use

Map 43 (pg 301) - apparently no fish were dried or smoked but how do we account for the fact the bones were not charred unless the fish were eaten raw!

Map 44 (pg 302) - Rostlund calls the study area the Gila-Colorado Province.

Map 45 (pg 303) - Shows Average annual prod. in lbs/average square mile of territory less than 50.



Map 46 - shows that this province is a region in which fish contributed very little to yearly diet, either from scarcity of fish as in arid basins or high mountains, or because fish though present were usually neglected and caught only as emergency food when other supplies failed.



- highly diagnostic for squamfish was hyomandibular pharyngeal arch and teeth (?) and vertebrae (when large) also the cleithrum and sometimes the opercle series.
- Gila robusta - most bones identified to a particular bony element were diagnostic. Long and slender inferior ramus of pharyngeal bones diagnostic according to Miller (1955) but in my mind I question this based on my reference specimens. Both Gila + Ptychocheilus have a long and slender inferior ramus - the main difference I found was the phalange out process where the arch makes its angle. The vertebral centra were sometimes diagnostic when the neural and haemal spines were present. According to Miller (1955) Gila robusta has an intermediate angle of neural and haemal spines to the centra of the caudal vertebrae.



## Summary of length/weight & age/growth

Using proportions on the largest bones identified as belonging to the squatfish the largest squatfish were represented by two large precaudal vertebrae. These fish were 745 + 706 mm and both could be aged to between 7-8 yrs old. Our largest fish are considerably smaller than those described by Miller (1955). His were 4-5½ ft. long. Maybe the efficiency of getting large squatfish was reduced. ↗

Although I lost my specific measurements on proportions for Gilo robusta I do now that those the lengths were considerably large even larger than the average robusta today. It would appear that robusta were attaining a much larger size during this time period.

I couldn't find my length/weight relationship for present day squatfish. If you have one these lengths could be plugged into the formula to get an approximate weight for these large squatfish.

As far as the suckers go - most of the suckers represented in the bones were quite small - not typical of the size that latipinna and discobulus reach today. The suckers were in the size range from 6-10!"



Again maybe the efficiency of capture went down with increased size as with the squawfish but I'm at a loss to explain the capture of the larger robusta. - I should qualify this by saying although large robusta were taken the majority were in a small size range considerably less than 20 inches.



With regards to vertebral centra — for the most part it was difficult to go beyond distinguishing cyprinids from catostomids. But sometimes I was able to go down to species especially with Gila robusta + C. latipinnis.



Doc,

Left for C. Springs - but back 24<sup>th</sup> of May. This paper not quite done. Also some work with bones not done. Could you see if the Anthro. people could ~~take~~<sup>leave</sup> us have the bones for while longer (at no expense to them) so I could work out size proportions and age & growth. Would eventually like to send this work off as a note to some journal. This is definitely not my best work - my heart just wasn't into anything much after passing my orals.

Thanks

David

Colo R. endemism

- development
- present status

- end
- trends

size from temp  
no. of bones  
date

size

- relative abundance
- age-growth.



in many of the smaller tributary streams of the system (McAde 1977).

The following bones were diagnostic: hyomandibular, quadrate, pelvic girdle, opercle, subopercle

Cotostomus discobolus Cope

The indigenous bluehead sucker has a more extensive range than the flannelmouth sucker. Bluehead appear to be more discriminate in their selection of habitat than the flannelmouth and consequently are more restricted in distribution (McAde 1977).

C. discobolus is polymorphic throughout the Colorado River basin, with the most obvious morphological difference occurring in the depth of the caudal peduncles, ~~and believed to inhabit~~ ~~swift~~ ~~deep sections of~~ forms with narrow caudal peduncles are believed to inhabit swift deep streams of the main rivers while forms with thick caudal peduncles occur in the headwater streams of the Colorado River system.



The sizes of fishes during aboriginal times are poorly known. Such information, however is of value to both ichthyologists and fishery biologists. In order to determine the length and weight of fishes during aboriginal times a skeletal structure must be preserved relatively intact and it must be possible to relate the size of this structure to the size of the same structure and to the length and weight of present day fishes.



Ptychocheilus lucius ~~Cuv~~ Girard

Bones referred to this species are represented by: opercle, pelvic girdle, quadrate, hyomandibular, precaudal vertebrae, subopercle, interopercle,

This species known locally as Colorado squaw fish, Colorado salmon, or simply as salmon, is one of the largest minnows in the world. According to Ellis (1914) it attains a length of 5 ft. and a weight of nearly 100 lbs. The squawfish is said to have been the most highly prized of the native fishes of the lower Colorado (Dill, 1944).

Long-lived and once the top carnivore of the system, the squawfish is an efficient predator. It is generally found in the large strongly flowing rivers of the Colorado system.

Family Catostomidae  
Catostomus latipinnis

The flannelmouth sucker is the most abundant large fish found in the upper Colorado basin (McAda, 1977). Stalacher and Holder (1975) state that the flannelmouth sucker composes the largest percentage of total fish biomass in the upper system.

The flannelmouth sucker is not as specific in its selection for large river habitat as the other large native fishes, and is found



Greenback - OFFICE MEMO

D & he call

TO:

Date

- Wyoming

FROM:

Charles Hallack 1873. The Fishing Tourist.

SUBJECT:

Harper & Bros. N.Y. 239p.

REMARKS:

p. 217-11 - In vicinity of Sherman on UP RR  
- 550 mi. W. Omaha, Trout fishing equal to any  
on the road. Dale Ck., trib. Cache-la-Poudre R.  
and other streams in immediate neighborhood abound in  
Trout of finest quality, weighing from 1/4 to 2 lbs. - even the  
finest rivulets teem with them. L. Come and Medicine  
Bow R. to west abound with trout  
- Maggie Ck. near Cortin NV - abounds w/ trout

wrong /



The roots of protein taxonomy and karyology were established more than 60 years ago; however, no dramatic changes in the accepted classification of animals have resulted from the information provided by these disciplines.

Typically, conclusions based on biochemical systematic studies, merely support and verify the ~~systems~~ evolutionary relationships derived from traditional systematic studies.

A casual observer would be justified to inquire why such a seemingly inordinate investment amount of time, money and talent should be made ~~to~~ for <sup>phylogenetic</sup> studies <sup>to</sup> <sup>substantiate</sup> previous work <sup>it only</sup> <sup>adds</sup> <sup>verification</sup> <sup>to</sup> <sup>previous</sup> <sup>work</sup>

Of course, the implications of some of the studies on evolutionary trends of DNA content, stability <sup>or mutability</sup> of certain <sup>segments</sup> portions of genomes, <sup>and</sup> <sup>others</sup> <sup>on protein</sup> <sup>polymorphism</sup> <sup>allow</sup> <sup>recognition</sup> <sup>of</sup> <sup>micro-spatial</sup> <sup>units</sup> <sup>of</sup> <sup>the</sup> go far are

broadly applicable to <sup>basic</sup> <sup>concepts</sup> of biology far beyond purely systematic studies. <sup>However, my</sup> <sup>entirety</sup> <sup>is</sup> <sup>for</sup> <sup>why</sup> <sup>the</sup> <sup>future</sup> <sup>potential</sup>

The infusion of new ideas, talents, and points of view from the fields of biochemistry and cytogenetics into systematics has added <sup>an</sup> <sup>exciting</sup> <sup>new</sup> intellectual dimension to <sup>the</sup> classical studies. <sup>There</sup> <sup>are</sup> <sup>real</sup> <sup>potential</sup> <sup>for</sup> <sup>solving</sup> <sup>problems</sup> <sup>not</sup> <sup>amenable</sup> <sup>to</sup> <sup>classical</sup> studies. <sup>The</sup> <sup>problem</sup> <sup>now</sup> <sup>is</sup> <sup>how</sup> <sup>to</sup>

<sup>and</sup> <sup>this</sup> <sup>report</sup> <sup>will</sup> <sup>illustrate</sup> <sup>some</sup> <sup>actual</sup> <sup>problems</sup> <sup>of</sup> <sup>Schmidhaer</sup>



Evolutionary Points of View (2)

- the biochemist & cytogen - may not consider themselves a systematists

make an integration of all the potentially useful information, bridging communication gaps between classical workers and - - -

- (type to demonstrate of ex. illustration precise even and details of molecular data where classical tax. has bogged down

- Basically, there are two points of view on the way biochemists & traditional systematists differ in emphasis

but based on all the data

conceive of evolution, the role of natural selection, phylogenies and classification of animals. (Wilson 68)

The classical systematist views observes adaptive complexes, such as when investigating a lacustrine versus a fluvial species of a genus, the general morphology, feeding apparatus, dentition, mouth part, gill rakes, these features used in differentiation and classification, the direct product of natural selection produced under divergent environment - the s.s.

may admit and pay lip service to the DNA basis and protein primary structure which is the ultimate source of the characters he studies and but he has only a dim and obscure view of the basic genetic nature of the DNA primary protein structure, & importance of evolution

the other hand, the biochemist may admit evolution is based on natural selection is the driving force of evolution, but it is somehow, evolutionary history, adaptive complex, cytogenetics, molecular biology, quite remote from the electrophoretic mobility, of the proteins, the amino acid sequence, and base sequence of the DNA he may



Basic questions need to be asked - by t.s.  
are you achieving nat. classification - <sup>pertinent</sup> questions  
or phylogeny are clusters <sup>represent</sup> natural monophyletic  
evolutionary groups? How valid is your evidence?  
- Bioch. - How much of genome sampled & studied  
what evolutionary level is def. significant for  
(intra spec. generic etc.)?



3

be observing. The <sup>more directed</sup> ~~emphasis~~ <sup>collected</sup> by the T.S. is on whole integrated adaptive complex of characters → the whole phenotype as a reflection of the total genome - whereas the biol. views the result of a very minute segment - albeit much closer to the <sup>practical</sup> genome - more impressed w/ randomness (genetic & macro mutation) - which better - close to for every. Old conflict - <sup>not applicable here</sup> because - use everything )

So what is needed is a comprehensive view of the "big picture" and integration of views, concepts to an extent allowing intelligent evaluation of data.  
- P.T. <sup>B. Dijk</sup> emphasis on polymorphism & rapidly changing proteins - or at high <sup>low</sup> <sup>switch</sup> class &

- What we classify - whole phenotype -

- look to future - primary structure - amino acid seq.

- techniques - micro complement fixation

- isologies (homologies)

- caution

- what proteins most useful reflect rapid & conserved evol. rate.



(4)

role of T.S.

- protein clocks  
- constant rate -

- what data is  
useful for classification  
- close to  
genome?  
- close to  
phenotype  
- Simpson

- purpose of paper - ex. (illustrations)

- not argue  
or debate  
here's how



(4)

## Distribution

In <sup>historical times</sup> the original range of the Salmo clarki extended from southern Alaska to northern California in coastal streams ~~and~~ (coastal subspecies) and <sup>several subspecies of interior cutthroat</sup> from the South Saskatchewan River, <sup>Alberta, Canada</sup> southward in the Columbia river basin and upper Missouri, the Great Basin, ~~the~~ upper Colorado River <sup>above and beyond headwaters of the</sup> Arkansas and South Platte rivers, <sup>in</sup> Colorado and the <sup>up</sup> Rio Grande <sup>system</sup> at least as far south as southern New Mexico and perhaps into Texas <sup>and</sup> Mexico. Unlike the rainbow trout, the cutthroat trout has not been widely established outside its native range; in fact, the original distribution has been markedly reduced due to deterioration of habitat <sup>hybridization</sup> and replacement by <sup>introduced</sup> exotic species.

> Some subsp. of interior cutthroat have virtually <sup>been</sup> <sup>extinct</sup> <sup>in</sup> <sup>pure</sup> <sup>form</sup>

## Brief History of Propagation

The cutthroat trout was ~~not~~ first propagated in federal fish hatcheries in 1890 when the Leadville, <sup>Colo.</sup> Station commenced operations and hatched <sup>12,000</sup> eggs from the greenback trout, Salmo clarki stonias (Cope) <sup>taken from</sup> nearby Twin Lakes. It is evident, however, from the list of <sup>trout</sup> fish cultn establishments compiled by Stone (1874) that various subspecies







and Madison River, Montana

1900 - Spearfish, S. Dak. station completed and received 100,000 E.B.S. eggs from Leadville.

and 1902, ~~over~~ 12,000,000 eggs from Yellowstone L.

Black Hill streams originally barren, soon turning w/ B.S. trout. - after 1902 - Yellowstone became major source of cult. eggs <sup>in fed. hatcheries</sup>

38,000,000 in 1935 also coastal

S.C.C. and habitat for Pyramid L. S.C.C.

headwaters - States except for Yellowstone

all stocks mixed > - - -

Presently Recently fed. hatchery - at Jackson

prop a striking undescribed subsp of fine white

Snake R. trout - Cr

Cutthroat never as popular w/ fish cult.

as S. gairdneri because more diff. to raise - due to more narrow environmental tolerance. Its

major position today is a perpetuation of the "native" trout of western states

and its relative success in cold, high mountain lakes. However certain instances

such as Pyramid L. and Walker L. Nev.,

Henry's L. Idaho. cutthroat clearly the superior trout and such words - sub.

Snake R. = Humboldt indicate real potential

various State & Federal stocks used local water but again mixed -

Dredges statement cutthroat - better

However most stocks not pure - Colo. Idaho Rio Grande hope more emulated.



## General Life History Notes

- As stated above, all inclusive statement on life history can not be made for the whole cutthroat species, but certain generalized phenomena can

Habitat: In both streams and lakes and with coastal cutthroat marine water - Some groups such as the Lakontan cutthroat t. s.c.h. is highly specialized as a lacustrine predator although except for a few remnant lakes in the Lakontan basin which pre last glacial period, must have been forced to live in streams. on other hand most other <sup>interior</sup> cutthroat trout were mainly fluvial forms at least for part several thousands of years, but they rarely ~~adfluvial~~ <sup>part</sup> adfluvial when introduced into high mtn. lakes, if no competition from E. b. t. ~~and~~ a. The cutthroat trout in coastal waters coexists with rainbow trout, however have evolved ecologies and behavior allowing partitioning of environment. - but in interior water where rainbow not native they ~~coexist~~ both sp. exist <sup>hybridized</sup> in same river system only by ecological separation. In Rocky Mtn typical <sup>stream</sup> cutthroat may be found in headwater lakes and tributaries <sup>near</sup> ~~over~~ or above 10,000 ft el. east. bk., brown trout between 7,500 - 9,500 - and rainbows below - 50 - little sympatry



Comprehension

Precise laboratory physiology experiment not  
not in all cases but field observations  
indicate the S. clarki physiology geared to  
operate at lower temperature than S. gairdneri. and needs  
pure water.

on main water tank  
when water temp  
warms Feb. - July

Spawning: Restricted to flowing water in spring, but typically slightly later - but  
depending on age as S. g.: but typically slightly later - but  
broadly overlapping so hybrids. Restricted  
to clear, cold flowing water over suitable gravel for  
nest construction.

spawn  
no 2-4 yrs repeat - incubation -

may  
skip yr.  
- typically

general life history, similar to rainbow trout. info  
see Cope -  
Ruseffell  
(Federation)

- Present & future  
- rare & endangered  
sp. - preserving important  
2. biol. heritage



Walker Bass  
 Mt. Shavano Nat. Sealed S. letnica  
 S 39-6877

7.6,000  
 - 50,000 - 2 in  
 - Arkansas R. - below headgate  
 Conamico

Account of selected subspecies.

S. c. c. clarki Richardson.

Turquoise L.  
 Dunham

letter info from S. J. Coli  
 Pyramid L. . . Nev.

- dist.  
 - ecol. notes

6-7 in. + → 1 1/2 yrs 25 in + 7 lb.

- Cope  
 - Sumner

800 lbs. - return of <sup>over</sup> 14,000 lbs.

Calif. Blue BK.  
 (California)

high quality trophy fishes  
 Haenan L.  
 Summit L.

- age - growth  
 Size

very predaceous - Tui chub

- proportion  
 stone base

difficult to rear

- survive <sup>- solid</sup> waters high dissolved solids  
 (Walker L. 1956 - 6,890)  
 P.P.M.

- mykiss

- perconatus

- common names  
 coast - B.S. - native

syn. T = hoensis  
 evermanni  
 - this part  
 coastal & interior  
 mt.

S. c. lewis

harvest.

think of yellowstone

S. c. humboldtensis

stress Pyramid L.  
 and genetic strains  
 - the outlying rambas  
 - Haenan L. stock  
 not pure  
 - not largest with.

Mont. W. Slope  
 - not same as  
 Yellowstone  
 - worthy gold  
 in right direction  
 but - not named

26 in  
 new Lewis  
 good description of yr in  
 for "Bill of Merri"  
 in mss

26 - 600

- great variation  
 Col. →

- specialized to river  
 - alkaline waters

Colo.  
 K. G.  
 little dif  
 between lake  
 and p. after  
 - excret  
 humboldti

- humboldtensis  
 great potential

sneke b.

pleuriticus  
 ut 26

virginianus  
 Colo. project.



\* - Jordan - mykiss - gairdnerii - gibber  
intergrading  
- 10 es straits or  
- etc

— Land 1913 T, A. E. S.

Exhibited trout an annual meet.

- ① Cutthroat w/ fine spots from the lake of Charles Mason in headwaters of Rio Grande
- ② large spotted cutthroat from waters high in mtns. - never leave this environment
- N. Platte c Cheyenne R. no trout orig.
- Rainbows first in Denver Hatch. 1886
- Colo. first took B.S. eggs fm. Twin L. thru 8-10 lakes around state - in almost every part of state, now take 10-15 mil. eggs annually.
- "A Look Back" - C. F. G.

Denver Hatch. Dec. 1881 - 100,000 E.B.S from Plymouth Mass. - 1886 - 300,000 E.B.S, 20,000 Rainb.  
10,000 lake, 8000 l. l. salmon hatched.

- Pierce's Rept. - (not before 1855-56) - Twin Lakes trout, yellow in color w/ yellow flesh, to 10 lbs. - spawned before ice out prob. Mar. Apr. - nowhere <sup>else</sup> except Twin L.
- (Wittgen's stocking records for Gunnison) - or Rept. 1880<sup>etc.</sup> rainbows to Col.?

\* - 1872 Repto: Calif. Acad. Soc. - Utah Trout prob  
+ list of trout fish cult. (Georgetown Col.)



Thus. - Greenbacks, Colo. Riv., Snake R.,  
(Twin L. & others) (Sweetwater  
(Grand Mesa  
& others) (Henry's L.)

Upper Missouri, Kaintan's, Yellow fin (Twin L.)  
(Madison R.) (S. Utah at Springville ??)

then Yellowstone L. fish used + mixtures of  
rainbow hybrids & of above +

Leadville - used Twin L., Rock Crk., L. Crk.  
Sweetwater L., Black L., Freeman L., Grand  
Mesa Lakes.

Bozeman - <sup>mainly,</sup> Henry's L., Madison R.  
~~Kaintan~~

Spearfish - Yellowstone & local Black Hills introduction

then all hatcheries exchanged. & used Kaintans

Miller & Alcorn "New source of <sup>B.S.</sup> Yellowstone trout - Springville  
Utah, which receives stock from Yellowstone."



## Summary of Cutthroat Propagation

- 1890 Headville hatched 12,000 from Twin Lakes  
(Nat. Mus. spec. coll. 1889 show rainbow hybrids)  
1014 brood fish taken from Twin Lake & 32 fm. Rock Ck.
- \* 1000 adults and yearlings distributed in  
Yellowstone Park (East Fork Gardiner R.) - Where  
from? - 1890 Headville shipped trout to Nebraska, S. Dak.,  
& Colo. - no mention of Montana. - The single stocking  
of B.S. trout in Yellowstone Park is only citation  
of B.S. trout stocking in 1889-90 - and Headville wa  
only hatchery handling B.S.
- 1892 - Yellowfin trout at Headville  
Black L. - 121,000 eggs (Courtesy Jones of Denver)
- 1893 - Sweetwater L. 18,000 eggs (also used by  
Colo.)
- 1895 - B.S., Yellowfins, rainbows taken fm. Twin L.
- 1898 - Freeman L. Headville supplies Colo.  
Idaho, Mont., Wash., S. Dak., Neb.  
- Bozeman - Madison R. & Henry L. stocks used.
- 1899 - Freeman L. - Grand Mead Lakes 1,727,000



1900 - Spearfish S. Dak. - opens w/ 100,000 B.S. eggs  
from headville

(1901)  
1902 - Spearfish takes 5200,000 eggs at Yellowstone L.  
382,000 fry dist. Black Hill. - Fish dist. -

in 1901 (ending June 30 1901) - B.S. Trout. (Prob. mainly  
(x 1900)

Grand Mesa fry - Sweetwater L., Gypsum,  
Eagle R. ... - widespread stockings mont. &  
S. Dak. (prob. mainly Madison R. & Henry's L.

but perhaps headville fish also.

- Lakontan cuts → One.

by 1903 water of Black Hills supplying  
Spearfish hatchery (most fr. Yellowstone however)

After 1905 - <sup>- more or less</sup> main source of B.S. eggs in fed.  
hatch. fr. Yellowstone L.

Headville still trying to find good coll.  
stream for rainbows & cuts (tried Centas Res.)

in 1929 Repts - Leadville taking B.S. yellowfish,  
& rainbow eggs fr. Grand Mesa Lakes.

- Nev. cuts at Boyeman

(Pyramid h. - headville, Saratoga, Springville  
headville - B.S. eggs Continental Res.

Creede - Yellowstone eggs

1935 - 38,000,000 eggs fr. Yellowstone

Yellowfish  
\* 1929



### Cutthroat Stocks propagated by federal hatcheries

1889-91  
rept.

1890: Leadville 12,000 black spotted - Twin lakes.  
 of these 1014 for breeders (32 from Rock Crk.)  
 100 sent to Wytheville (58 brook trout  
 from Rock Crk.)  
 → \* p. 50 - 1000 adult <sup>& yearlings</sup> black spotted sent distributed to  
 Yellowstone Park

for 1892

At Leadville July 1, 1891

	eggs
black spotted - 1,631	37,244
yellow fin	5,379

Northville Mich. 1000 7 mo. B.S. from Leadville  
 → Trap in Lake Crk. about 1 mi. from hatchery  
 Fork 543 6-8 in. trout for the hatchery -  
 egg coll. May 10 - June 6 - 120,300 eggs  
 from 218 stock fish + 5,100 eggs from  
 Twin lakes in May, In same lake from  
 June 24-29 - thru courtesy Colo. Fish Com.  
 96,000 eggs taken - Courtesy of A. H. Jones of  
 Denver, 121,000 eggs from Black L. in June.  
 Incubate in 20-30 days.

rept.  
1893

- Wytheville - ♀ <sup>ripen</sup> 4-6 weeks later than ♂  
 "Leadville" not feasible to try to keep brood  
 stock in hatchery ponds - must rely on wild stock  
 Twin lakes 118,600 eggs \* Sweetwater L. 18,000



\* Sweetwater L. also used by Colo. G. & F.

1893 - p. 115-116 - "brook trout superior to all others  
for Colo. waters, native varieties not being excepted"  
- problems in spawning - propagating B.S.  
trout at Northville Mich. & Wytheville Va.  
♂ & ♀ don't ripen together - eggs low viability  
fry weak - don't feed.

for 1894 (yellow fins - 2 yrs. old fish dying so 700  
remaining planted in Lower lake.

1895 - No B.S., T. at Wytheville or Northville

\* - Trap built at Twin lakes to get B.S.,  
Yellowfin & rainbows - Only got:  
26,500                      13,500                      43,100

1896 - 7,700 fingerling yellowfin planted in  
Evergreen & Twin lakes - 21,200 eggs taken  
207,000 B.S. eggs from Twin Lakes.  
6000 yearlings sent to applicants in Colo. & Wyo.

1898 - 124,900 fry <sup>B.S.</sup> & 29,500 eggs from Freeman Lake  
Total 289,600 eggs & 164,650 fry at Leadville  
- 270,000 fingerlings planted - Colo., Idaho,  
Montana, Wash., S. Dak. Neb.  
\* Boreman Mont. now in operation - eggs from  
upper Madison R. & Henry's L.



## II Cutthroat propagation

- 1899 - Eggs of B.S. from Freeman h. & Grand Mesa lakes. (1,727,000) <sup>(18,500)</sup> - Gratifying because all efforts in past years to find good collecting site of blackspotted eggs were fruitless.  
Bozemann 615,000 Henry 2.
- 1900 - again Freeman & Grand Mesa - \* Spearfish S. Dak. hatch. opened - 100,000 B.S. eggs from Leadville.  
Bozemann sent fry to Mont., Ore., Idaho, Wash. (Henry 2.)
- 1901 \* - Spearfish Station - Plans for taking eggs from Yellowstone L.
- 1902 - Spearfish. 1,200,000 eggs at coll. sta. at Yellowstone Park. - 382,000 fry dist. in waters of Black Hills. Bozemann - eggs shipped to Belquin. - other Mont. Idaho, Ore., Wash. Clackamas Ore. 10,000 cutthroat from Verdi Nev. planted in Ore.
- 1904 - \* Waters of Black Hills once no trout now as supplementary source for Spearfish hatching



• Bulk of Spearfish production from the sub station at Yellowstone. - 25,000 eggs fr. Leadville to Wales.

1905 - Spearfish sent 400,000 B.S. eggs to Bozeman.

1906 - " " 656,000 " " - ?

1907 - " " 730,000 " " to other stations

1908 - " " 504,000 " " . . . . .

10,000 eggs to France.

1909 - " " 1,400,000

\* 1912 - Colo. black spotted grown at Piney L. p. 19  
p. 38 - Roaring Crk. 9,000. Rio Bonito 8,000

1915 - Saratoga Wyo. partial completion.

1915 - 1914 - 12,561,935 eggs from Yellowstone

1920 - Yellowstone eggs - sent to Bozeman, & Mont., Wyo., Idaho, Ore., & Wash. - \* 200,000 to Glacial Nat. Park.

\* - Leadville attempt to develop new field station for collecting rainbow & cutt eggs at Antero Res. - 2 workers drowned.

1921 - Yellowstone eggs. → 1,209,000 Leadville

→ 1,236,61000 Bozeman

→ 200,000 Saratoga

1922 - Yellowstone - 200,000 eggs → headville -

? 263,000 egg from Fish L. near Soda Butte.

Leadville B.S. to Colo. & N. Mex.



1924 - Yellowstone eggs → Leadville  
→ Bozeman  
→ Glacier Park  
→ Saratoga  
→ Springville Utah

Yellowstone took 26,776,000 eggs

1926 - Yellowstone eggs. Clackamas Ore, Leadville, Seattle,  
Holden Vt., Saratoga

Bozeman B.S. eggs fm. Georgetown Mont. → N. Mex.

Leadville 356,000 Yellowstone eggs. → Colo. & N. Mex.

1927 - ? Mystic L. substation p. 715 - B.S. eggs  
transferred here & dist. to neighbouring waters.

\* 1929 - \* p. 763 - B.S. eggs from Nev. accelerated  
diēt. of this sp. in Rock Mtn. section

Bozeman eggs fm. Yellowstone, Mont. <sup>①</sup> Comm.,  
& Nevada <sup>②</sup>. 23,000,000 eggs fm. Yellowstone

\* p. 817 - yellowfin, rainbow, & B.S. eggs taken  
from Grand Mesa Lakes.

\* 1931 - Pyramid L. Nev. → Leadville  
→ Saratoga  
→ Springville Utah

Leadville B.S. eggs fm. Continental Res., Colo.

1933 - Yellowstone - many stations & Creede

1934 - 28,000,000 eggs fm. Yellowstone.

1935 - 38,000,000 -

1937 - Saratoga & Yellowstone dist. all B.S. eggs  
including Eagles Nest. N. Mex.



U.S. Commission of Fish and Fisheries  
Commissioner's Report 1889-91

page 47

July 1, 1889, plans and specifications for a fish hatchery were prepared and proposals for its erection were invited. Mr. L. G. Hunt of Pueblo, with a bid of \$12,672 was the low bidder. Oct 14, 1889, formal contract for the construction was made. It was not completed till October 1890 and final acceptance of the structure occurred in Nov.

8,000 brook trout taken from Evergreen Lake & held in ponds till ready to spawn. From these 568,000 eggs were obtained & placed in troughs in a temporary hatchery.

page 48

1889-90

The period of active fish-cultural operations extended from November, 1889, to June 30, 1890, the collection of eggs being 568,000 of the brook trout previously referred to, and 12,000 of the black-spotted trout. In addition to these there were 25,000 brook trout eggs and 20,000 Loch Leven trout eggs forwarded from the Northville Station.

There were collected from Twin Lakes, 1014 black-spotted trout for breeding purposes, and from Rock Creek, 32; 100 of these were forwarded to Wytheville Station. From Rock Creek there were collected 58 brook trout.



## Commissioner's Report 1889-91 (con)

page 48

1890-91

On June 30, 1891 in addition to others, there were the following fish on hand: 149 brook trout, 1,000 black-spotted trout and 5 rainbow trout; all breeders; of yearlings 19,000 brook trout, 700 black-spotted trout. Of the black-spotted trout there were also 800 fry and 50,000 eggs.

page 80

Black spotted trout - 1,000 adults and yearlings were distributed to Yellowstone National Park, 1889-90.

## U.S. Commission of Fish and Fisheries

Commissioner's Report ~~1889-91~~ 1892

page XV; 19,000 Black spotted trout distributed July 1, 1891 to June 30, 1892.

" XL; There remain of this species 200 two-year old fish, the survivors of the fish produced from the consignment of 5,000 eggs received from headville Station July 29, 1890 by Wytheville Virginia Station.

page LV fish + eggs on hand at headville Station July 1, 1891

Species	Yearlings + Fingerlings	Fry	Eggs
Black-spotted trout	1,631		37,244
Yellow Finned "			5,379

pg XLV Northville, Michigan Station; Feb 5, 1892, 1000 seven month old B.S.T. received from headville Station



## COMMISSIONER'S REPORT 1892 (CON)

Leadville Station, Colo; Black-spotted trout; On August 11, 1891, a trap was placed in Lake Creek, about 1 mile from the hatchery, and kept there until the last of September. During this time 543 fish, of an average length of 6 to 8 inches were caught and transferred to the station. The collection of eggs was commenced in May. From May 10 to June 6, 120,300 eggs were secured from 218 stock fish, an average of 550 eggs to each fish. The greatest take of eggs on one day was 36,500 on May 24. In May 5,100 eggs were secured from Twin Lakes; of these, <sup>about</sup> 40 per cent hatched. From the same waters, through the courtesy of the Colorado Fish Commission, 96,000 eggs were taken between June 24 and 29, 75 per cent of which were good. Through the kindness of Gen. A. H. Jones of Denver, 121,000 eggs were obtained at Black Lake in the early part of June. Of these about 50 per cent were good. The time of incubation of the eggs of this trout is from twenty to thirty days.

U.S. Commission of Fish and Fisheries

Commissioner's Report 1893.

page 99 Wytheville Station:

B.S.T.; The brood fish on hand, 31 months old, spawned in March, the first eggs being taken early.



## Commissioner's Report 1893 (con)

in the month. These eggs were not sufficiently fertilized and were without effect. The females were four to six weeks later than the males in maturing. An attempt was made to increase the brood stock, and in July 1892, fish of that year were forwarded from Leadville, Colorado. The number sent was 15,000 but only 1,500 reached their destination alive, on account of sickness of the messenger in charge. Food supplied the young fish consisted of beef liver, from cold storage at Roanoke, Va. + from Wash. DC. The older fish are fed on mush composed of common flour or shorts + liver, the proportion of the latter being  $\frac{1}{4}$  of the whole.

pg. 105

## Northville, Michigan Station

BST. In addition to the 940 already on hand, there were received in February from Leadville Station, 2,287 fish of the hatching of 1892.

pg. 115 Leadville Station

BST - 77,100 lost while undergoing rearing.

Fish on hand at Leadville 1893

Kind	Eggs	Fry	Yearling	Years 0-2	Brood Stock
Black-spotted trout	144,983	9,168	321	733	938
yellow-finned "	---	1,755	1,314	---	---



## Commissioner's Report 1893 (con)

Leadville Station.

pg 115 ; 46,500 BST furnished for distribution in 1893.

Materials collected & forwarded to the World's Fair, Chicago consisted of black-spotted & yellow finned trout, showing development up to six years.

BST; The results with this species in small breeding ponds have not been satisfactory. Out of 4,000 adults captured and confined at the station during the four preceding years, but 800 were this year surviving, and it is believed that the only source of dependence for eggs will be on wild fish in open streams & lakes of this region, the most inviting field ~~between~~ being Twin Lakes. Eggs collected amounted to 118,600 ~~and~~ all at the station except 18,000 from Sweetwater Lake. Attempted collections at the latter place were in conjunction with the State fish commissioners of Colorado. The first eggs of the season were taken May 25, collections for that month amounting to nearly 35,000, and in June about 83,000.



Commissioner's Report 1893 (con)  
page 115-116  
Brook trout

Observations at this station point to the superiority of the brook trout over all others for Colorado waters, native varieties not being expected. Eggs for these fish were obtained from three sources, the ponds of the station, Uneva Lake and the private ponds of Dr. John Law. The collections were satisfactory in number, but inferior in quality.

Commissioner's Report 1894  
United States Commission of Fish and Fisheries

page 14

Leadville furnished 11,100 Black Spotted Trout for propagation.

Northville Station, Michigan  
page 42

The number of this species on hand April 1 was 927 of those coming 3 years old, and 1,400 of those coming 2 years old. The 3-year-old fish were in excellent condition, but only 62,500 eggs were taken and for some unknown reason these did not do well, as only about 20 per cent of very weak fry were produced, and nearly all of them died before they commenced to take food readily. Toward the close of the season nearly all the 2 and 3 year old fish died. This was caused by handling them while taking spawn during the very warm weather in May, and partially by the same disease which attacked the brook trout.

Wytheville Station, Va.  
page 37

From 135 black spotted trout at the station there were collected 12,000 eggs but owing to the lack of milt only 500 were saved. The propagation of this species has been tried at the station the past two seasons, but without success. The sexes do not mature together, the male having passed out of season when the female comes in.



## Commissioner's Report 1894 (Con)

Leadville Station

page 47-48

Brook Trout: The first eggs were taken October 16; began hatching January 1, and feeding February 14. Between November 1 and 10 there were taken at Wellington Lake 789,200 eggs. On November 4 there were taken at Uneva Lake 24,800 eggs from 5 females. These eggs began hatching January 29, and on May 25 there were on hand 17,000 fish of 68 per cent. June 30, 8,500 were delivered to Searl and Lazenby. Between December 5 and June 11, 1894 there were distributed 23,000 fry and 35,900 yearlings, mostly to Colorado waters.

Black Spotted Trout: There were 74,800 eggs taken from stock fish, but they were very poor. It is thought that these fish can not be successfully kept in small ponds. From October 20 to December 6 there were 10,100 yearlings distributed to various parties for planting in Colorado waters, and 1,000 to Ernest Barthold, of Sheridan, S. Dak., for waters of that State.

Yellow Finned Trout: In December, the 2-year old fish on had began to die rapidly, and to save them the 700 that remained were planted in Lower Lake.

Black Spotted Trout: There were 5,000 eggs on hand, 13,500 fry hatched in 1894 and 424 fry hatched in 1891.

## United States Commission of Fish and Fisheries

Commissioner's Report 1895

page 26

Central Station, Washington; The station received 12 ~~B.S.T.~~ Black Spotted Trout to be distributed.

page 29

Wytheville Station: The station ~~still~~ had on hand no B.S.T.

page 33

Northville Station: The station had on hand no BST.

page 42-44

Leadville Station: During the year 400 feet of 6 inch wood pipe was laid from the large spring and connected with a 3-inch pipe to the hatchery thereby increasing the water supply to 90 gallons per minute.



Commissioner's Report 1895 con.

page 42-44.

Brook Trout: During the summer arrangements were made with the owners of Wellington, Uneva and Aspen lakes for the collection of trout eggs on shares, the owners to get one-half of the fry resulting and the Fish Commission to pay all expenses. The first eggs were taken at Uneva Lake and at Wellington on November 8. 100,000 eyed eggs were shipped to Northville and 358,000 fry were hatched. The advantage of spring water over creek water was clearly demonstrated this season, the eggs from Uneva and Wellington lakes hatching in from 72 to 73 days, whereas in previous years when creek water was used the eggs were frequently in the troughs from 140 to 160 days.

During the month of May 254,000 brook trout fry were delivered to the owners of Wellington, Uneva, and Aspen lakes and 230,000 brook and 30,000 rainbow trout fry were distributed to applicants in Colorado and the balance was retained for the fall distribution.

Native and rainbow trout: A substantial trap having been built at Twin Lakes, it was hoped that a large collection of eggs of the black spotted, yellow-finned, and rainbow trouts would be secured. Very few fish were taken, however, either by the State or the Station trap, probably because of the very cold and rough weather prevailing during the spawning season. The total egg collections were 62,600 black spotted (43,100 from Twin Lakes and 19,500 from the station fish), 26,5000 yellow-finned from Twin Lakes and 13,500 rainbows. At the close of the year the stock of eggs and fish were as follows:

Black Spotted Trout- 36,580 eggs and 40 adults.

Yellow-finned trout- 11,300 eggs.

United States Commission of Fish and Fisheries  
Commissioner's Report 1896

page 48, page 13

Wytheville Va. Station: Distributed 17 adult Black Spotted Trout to Atlanta because the fish had been held at the station for a number of years without producing eggs.



Commissioner's Report 1896 cont.

pages 63-65.

Leadville Station: Water was increased for the station.

Brook trout: Eggs were collected from Wellington lake, Uneva, Gales, Nasts, Twin Lakes and others from the station and Evergreen Lakes.

Native trout: From the 11,300 eggs of the yellow-finned trout on hand at the beginning of the fiscal year, 7,700<sup>fingerlings</sup> were planted in Evergreen and Twin Lakes in October. The following spring the first eggs were taken on May 12, at Twin Lakes, and the collection for the season amounted to 21,200.

The collection of black-spotted trout eggs commenced at Twin Lakes on May 14 and continued until June 24, the total number secured being only 207,000

At the beginning of the fiscal year there were on hand 36,580 black-spotted trout eggs; 10,000 of these were shipped to the Michigan Commission and arrived in excellent <sup>shape</sup> for the conditions at the time. From the balance, 6,000 yearlings were reared and distributed in the month of October to applicants in Colorado and Wyoming and 5,600 were deposited in Evergreen and Twin Lakes.

1897 Report MISSING

United States Commission of Fish and Fisheries  
Commissioner's Report 1898

page LXXXVIII

Leadville, Station: The usual arrangements were made for the collection of brook trout eggs. They were distributed to many of the stations of the commission. No collections of yellow-fin trout eggs were made **this season** and all the fry on hand at the beginning of the year were planted during the fall. There were also at the station 289,600 black-spotted trout eggs and 164,680 fry. Of these, 124,900 fry and 29,500 eggs were the result of collections made at Freeman Lake. In the fall 270,000 of the 273,000 fingerlings available for distribution were planted in the waters of Colorado, Idaho, Montana, Washington, South Dakota, and Nebraska. The remainder were placed in one of the small ponds at the station, but all except 400 escaped into Rock Creek.



Commissioner's Report 1898 cont.

page XCI

Bozeman Station, Montana: Station is now in operation. Arrangements were made to establish auxiliary stations for the collection of black-spotted trout in the Upper Madison River, Montana and at Henry Lake across the Continental Divide, in Idaho. An investigation of the streams in the vicinity of Deer Lodge, in the Big Blackfoot Valley, was also made, and an abundance of trout was found. During the calendar year of 1898 150,000 fish were hatched.

page CXIV

Details of distribution of Leadville and Bozeman Stations.

United States Commission of Fish and Fisheries

Commissioner's Report 1899

page XVI Summary of distributions

page XXXVIII

Dr, James Henshall, superintendent of the Bozeman station reported that during the past year a number of steelhead and eastern brook trout have been taken, in Bridger Creek, which is a natural trout stream.

page LXXXIX

Leadville Station: At the beginning of the year there were on hand 340,000 brook trout, 3,000 rainbow trout, 153,000 black spotted trout eggs, and 4,900 rainbow trout eggs.

Steps were taken early in the spring to again undertake the collection of black-spotted trout eggs at Freeman Lake, and also at the Grand Mesa Lakes. Only 18,500 were secured at the former point, but the take at Grand Mesa Lakes amounted to 1,727,000. By June 30 143,000 had been transferred to the station and 1,584,000 were in troughs at the lakes waiting for the eye-spots to develop. The results were exceedingly gratifying, as all efforts in past years to find a good collecting field for black-spotted trout eggs had proved fruitless



#11

Commissioner's Report 1899 cont.

pages XCI-XCII

Bozeman Station, Montana: Arrangements were made the following winter for collecting black-spotted trout eggs at Henry Lak and grayling eggs at Red Rock. The Henry Lake Station was opened April 3 and operated under the direction of Mr. Jarvis. From the 407 ripe trout captured in the lake and in Howard and Meadow Creeks 615,000 eggs were secured, the fish taken averaging 1,500 eggs each and thos from Meadow Creek 2,400. At the close of the year the following were on hand; Black Spotted Trout 584,000 eggs.

United States Commission of Fish and Fisheries

Commisioner's Report 1900

page 81

Leadville Station: From the 1,735,000 black-spotted trout eggs on hand in July 870,980 fry were hatched. The eggs collected at Grand Mesa Lake turned out very badly, about 50 per cent being lost in incubation. This was attributed principally to the fact that they were eyed at the lake on trays with such large mesh t at they were liable to fall through; consequently it was necessary to cover the trays with mosquito netting, which collected a great deal of sediment. Arrangements were again made this year to collect eggs of the black-spotted trout at Grand Mesa Lake and 16,000 at Freeman Lake, or a total to the close of the year of 1,873,400

page 81-82.

Spearfish Station, South Dakota: Hatchery completed. A consignment of 100,000 black-spotted trout eggs, shipped from the Leadville station in July hatched the following month with a loss of 18,240.

page 83-85

Bozeman Station: The Black Spotted Trout eggs on hand at the first of the year were hatched in July and the fry resulting from them were distributed in the states of Montana, Oregon, Idaho and Washington. The season at Henry Lake was a month in advance.



#12

Commissioner's Report 1900 cont.

page 84 cont.

During June 923,000 Black Spotted Trout were transferred to Bozeman and 120,000 were hatched and distributed in Henry Lake and vicinity.

United States Commission of Fish and Fisheries

Commissioner's Report 1901

page 70

Leadville Station: The collection of ~~BSF~~ Black Spotted Trout eggs continued into July but at the beginning of the year there were 1,881,300 on hand. ~~they~~ They finished hatching in August with a loss of 11.5% There was only a 25% loss on the entire collection of eggs obtained from Grand Mesa Lakes

page 72

Spearfish Station: Nearly all of the streams ~~in~~ entering the lake are full of Salmo Mykiss and it is recommended that the commission cooperate with the ~~commanding~~ commanding officer in erecting a building at or near West Thumb for the collection and hatching of black-spotted trout eggs, as it is believed that 5,000,000 could be taken each season.

page 73-74

Bozeman Station: During the winter the usual arrangements were made for collecting eggs of the native trout at Henry Lake, Idaho and the former place did not result as successfully as before as only 730,000 eggs were taken as against 1,440,000 in the season of 1900.

page 92

Details of distribution: 20,000 adults and yearlings at Lone Pine Lakes, Fort Collins; also 10,000 adults and yearlings at Trout Lake, Fort Collins.

United States Commission Of Fish and Fisheries

Commissioner's Report 1902

page 67

Leadville Station: At the beginning of the year there were on the hatching trays 1,317,800 black spotted trout eggs.



#13

Commissioner's Report 1902 cont.

page 67

Leadville Station: The distribution of fish was made in the fall when 847,000 were planted for the Commission and 560,000 for the owner of Grand Mesa Lake.

page 68

Spearfish Station: On the first of July there were on hand 1,200,000 black spotted trout eggs at the collecting station in the Yellowstone Park. As soon as the eggs were properly eyed they were sent to Spearfish to be hatched and 382,000 fry were distributed to applicants in the waters of the Black Hills

page 69-70

Bozeman Station: The work at the auxiliary station was in charge of Jarvis who took the BST eggs at Henry Lake Idaho. Besides being shipped to Bozeman some eggs were shipped to Belgium. 262,000 BST fry and fingerlings were sent to Montana, Idaho, Oregon, and Washington.

page 77

Clackamas Station, Oregon: During May 10,000 cut-throat eggs were received from Verdi Nev. and the fry hatched from them were planted in water in Oregon.

United States Commission of Fish and Fisheries

Commissioner's Report 1903

page 47

Details of Distribution: 25,000 fingerlings and yearlings in Laramie County, Trail Creek.



#14

Report of the Bureau of Fisheries 1904

page 29

The waters in the Black Hills of South Dakota were originally devoid of trout, but they now afford a source for the collection of eggs and contribute to the output of the Spearfish station, though the bulk of the black-spotted trout produced at this station is derived from eggs taken at a subsidiary station in Yellowstone Park. The waters of Colorado furnish another illustration of the successful acclimatization of fish, in the fact that the eastern brook trout has become so firmly established there that it is now possible to collect more eggs of this from the natural streams and ponds at the subsidiaries connected with the Leadville station than are collected from any station in the east, where the fish is native.

The propagation of the eastern brook, black-spotted, and rainbow trout was conducted on the same lines as heretofore, the output exceeding that of past years. IN this connection the stations at Leadville, Colorado, and Spearfish, S. Dak. are worthy of special mention, the product of each being far in excess of that of any previous year.

page 50

Details of Distribution: Cache La Poudre River-40,000 fingerlings, yearlings, and adults. Lawn Lake, Loveland-20,000 fingerlings, yearlings, and adults.

page 52

Wales received 25,000 eggs.

page 3

Black spotted trout were also called by the following names: Yellowstone ~~Lake Trout~~ Lake Trout, Cut-throat Trout, Colorado-River Trout, Arkansas River Trout, and Green-backed Trout.

Report of The Commissioner of Fisheries 1905 and special papers

page 10 Leadville distributed 10,000 eggs to other stations

page 11

From Spearfish to Bozeman, 400,000 blackspotted trout eggs were transferred.



#15

Report of the Commissioner of Fisheries 1906 and Special Papers

page 16 Spearfish transferred 656,000 blackspotted trout eggs

page 30 25,000 fry distributed to Dowdy Lake, 15,000 fry distributed to the North Fork of Cache La Poudre River

Report of the Commissioner of Fisheries 1907 and Special Papers

page 16 Spearfish distributed 730,000 black-spotted eggs to other stations

Report of the Commissioner of Fisheries 1908 and special papers

page 16 Spearfish distributed 504,000 black-spotted eggs to other stations

page 18 10,000 black spotted trout eggs were shipped to France.

page 32 Details of Distribution around Fort Collins: Cache La Poudre River-30,000 fry, Creedmore Lake-20,000 fry, Lone Pine Creek-30,000 fry

Report of the Commissioner of Fisheries 1909 and special papers

page 15 Spearfish distributed 1,400,000 blackspotted trout eggs

page 32 Details of distribution Fort Collins: Buckhorn Creek-10,000, Cache La Poudre River-25,000.

1910-1911 Reports MISSING

Report of the Commissioner of Fisheries 1912 and special papers

page 19 Colorado Black Spotted Trout grown at Piney Lake

page 38 Details of Distribution Fort Collins: Cache La Poudre River-35,500, Deadmans Creek-9,900, Lone Pine Creek-15,000, Roaring Creek-9,000

page 41 Details of Distribution New Mexico: Rio Bonito-8,000

1913, 1914 Reports MISSING

Report of the Commissioner of Fisheries 1915 with Appendixes

page 7 One new station has been added to the service by the partial completion of the hatchery at Saratoga, Wyo., which will soon be in condition for the propagation of fish on a small scale



#16

Report of the Commissioner of Fisheries 1915 with Appendixes cont.

page 23 It is impossible to present any analysis or comparison of the Yellowstone Park work by fiscal, owing to the fact that the spawning season of the blackspotted trout occurs in June and July. The take of eggs of this species in the park for the calendar year 1914 was 12,561,935.

page 43 Details of Distribution Fort Collins: Big South Ponds River-10,000  
Deadman Creek-6,000, Laramie River-10,000, Nun Creek-6,000

Report of the Commissioner of Fisheries 1916 with Appendixes-~~cont.~~

page 8 The only new permanent hatchery opened in 1916 was the one at Saratoga, wyo which has begun operations under favorable auspices and gives promise of great usefulness.

page 24 The only material falling off in the operations of the trout stations occurred in Yellowstone Park, where the important work addressed to the black spotted trout was curtailed by peculiar physical conditions that affected spawning. In the summer of 1915 the water states in Yellowstone Lake and tributary streams were from 2 to 3 feet below normal, and while thousands of spawning fish made their appearance in the lake only a small proportion entered the streams in which traps for their capture had been installed. As a result the egg collections were less than half those of the preceding year. In the spring of 1916, at the time when the spawning of the blackspotted trout usually begins, floods and washouts were frequent.



# 17

Report of the Commissioner of Fisheries 1918 with Appendixes

page 11 Yellowstone Park 3,065,000 fry and eggs distributed in July-June

Report of the Commissioner of Fisheries 1919 with Appendixes

page 6 Black spotted trout also redthroat trout

page 8 Yellowstone Park: 212,000 fry and eggs distributed

Report of the Commissioner of Fisheries 1920 with Appendixes

page 40

At the hatchery on Yellowstone Lake, in Yellowstone National Park, some of the eggs of the blackspotted trout taken from wild fish are incubated and the resulting young are deposited in park water while limited consignments of eyed eggs are made to the Bozeman hatchery and to the fish commissions of the States of Montana, Wyoming, Idaho, Oregon, and Washington. During the season of 1920, which involves the end of the fiscal year 1920 and the beginning of the fiscal year 1921, about 6,500,000 eggs were taken. In the summer of 1919 the Commissioner made a personal inspection of the fish-cultural work in the park and made arrangements for extending and augmenting the hatching operations in view of the very heavy drain on the fish life occasioned by the greatly increased number of anglers now resorting to the park. The superintendent of the park has extended every facility for making the hatchery effective and for enabling the Bureau to maintain and improve the supply of fish in the park waters. 200,000 blackspotted trout eggs were hatched in the Glacier National Park and were obtained from Yellowstone National Park.

page 41

The work of the Leadville hatchery and its field stations in Colorado was quite successful, especially as regards the propagation of eastern brook trout. In an attempt to develop a new field station for collecting eggs of rainbow and blackspotted trouts at Antero Reservoir, two apprentice fish-culturists detailed to make investigations and locate spawning grounds were mysteriously drowned.



# 18

Report of the Commissioner of Fisheries 1921 with Appendixes

page 18 The work in the Yellowstone National Park was of a satisfactory nature, and upward of 2,000,000 young blackspotted trout were returned to its waters during the season. The Glacier National Park hatchery was well stocked with eggs shipped from other hatcheries and produced therefrom an output of over 2,000,000 fry and fingerlings of brook trout, blackspotted trout, etc.

\*\*\*\* An article of the fishes of Yellowstone Park occurs in this volume.

Report of the Commissioner of Fisheries 1922 with Appendixes cont.

page 52 Bozeman Station: Received 1,236,4000 black-spotted eggs from Yellowstone

page 53 Leadville Station: Received 1,209,000 blackspotted eggs from Yellowstone

page 54 Saratoga Station: Received 200,000 blackspotted eggs from Yellowstone

Report of the Commissioner of Fisheries 1922 with Appendixes

page 62 200,000 eggs transferred from Yellowstone National Park to Leadville

Yellowstone National Park Substation: The fish cultural work which involves a portion of two fiscal years opened at Fish Lake, near Soda Butte and the collections of black-spotted trout eggs at this point amounted to 263,500. The spawning season of the blackspotted trout on Yellowstone Lake began on June 9 and the results of the seasons efforts were the most satisfactory in a long period of years.



#19

Report of the Commissioner of Fisheries 1922 Cont.

page 59

Bozeman Station: The black-spotted trout were taken from Yellowstone National Park and from the Montana Fish and Game Commission.

page 62

Leadville Station: 200,000 black-spotted trout eggs were obtained from Yellowstone Park. Fish from the Leadville station were distributed in Colorado and New Mexico.

1923 Report MISSING

Report of the Commissioner of Fisheries 1924

page 376 Eggs were transferred from the Yellowstone Station to Bozeman Mont, Glacier Park, Mont., Leadville, Colorado, Saratoga, Wyo., and Springfield Utah.

page 411

Bozeman Station: Incidental to the work with the rainbow trout, a few black-spotted trout were taken in the traps and from them 6,000 eggs were collected.

page 412

Yellowstone National Park Station: Of the 26,776,000 black-spotted trout eggs collected in July approximately 50 per cent were incubated in the bureau's hatchery located near the Lake Hotel. The most prolific egg-collecting fields are various streams located along the eastern shores of Yellowstone Lake, the principal ones being Pelican, Cub, Columbine, Clear, and Chipmunks Creek. The mountain streams in the vicinity of Pinedale Wyo., were investigated during September with the view of a suitable site for the collection of black-spotted trout eggs. A promising field was located, but as no funds were available for the purpose it was impossible to do anything toward its development during the year.

1925 Report MISSING

Report of the Commissioner of Fisheries 1926 with Appendixes

page 339 Yellowstone Park distributed black spotted eggs to Clackamas, Oregon,

Leadville, Seattle, Holden Vermont, and Saratoga Wyoming.

page 360

Bozeman Station: Blackspotted trout eggs collected at Georgetown, Mont. and some were shipped to the New Mexico Fish and Game Department



# 20

Report of the Commissioner of Fisheries 1926 con.

page 361 Leadville Station: From 356,000 Black-spotted trout eggs received from the Yellowstone Park during the summer of 1925, 326,5000 No. 1 fingerling fish were produced and distributed in waters of Colorado and New Mexico.

Report of the Commissioner of Fisheries 1927

page 715 Mystic Lake substation: It was deemed expedient to handle only black-spotted trout at this point and the hatching equipment was utilized for incubating 275,000 eggs transferred here. During the early part of the year 248,000 fry of this species were planted in neighboring waters.

page 717 Springville Station: The only lot of native black-spotted trout handled consisted of 175,000 fry which were on hand at the beginning of the year and were distributed at the close of the year.

part I missing  
Report of the Commissioner of Fisheries 1928

~~page~~

Report of the Commissioner of Fisheries 1929

page 763 Acquisition of early blackspotted trout eggs from Nevada has accelerated distribution of this species in the Rocky Mountain section.

page 781 For several years the bureau has received reports that black-spotted trout were spawning in February and March in Glacier National Park. Accordingly, in March the foreman of the Bozeman station investigated the situation in Logging Lake. Ripe males and females with nature eggs were found in the lake under thick ice and it was demonstrated that this unusual aberration in the spawning habits of the species actually exists. Inasmuch as eggs of this species in this latitude are generally taken not later than May or June, it is obvious that an egg supply from such early spawners would be of material benefit. Since weather conditions require the planting of the fish in the early fall in high altitudes, the collection of eggs in February of March would permit the distribution of goodsized fingerlings in place of fish that are little more than advanced fry. Efforts will be made to develop

(57)



Report of the Commissioner of Fisheries 1929 con.

Logging Lake as a source of eggs.

page 794 Bozeman Station: In July 1928 eyed black-spotted trout eggs were received from the Montana commission and 505,000 were derived from the bureau's station in the Yellowstone Park. In May additional early black-spotted trout eggs were received through exchange with the Nevada Fisheries authorities. The securing of these early taken rainbow and black-spotted trout eggs has proved a distinct advantage, as it has made possible an early distribution of large fingerling fish.

page 796 Creede substation: The site for the new substation at Creede was surveyed during the year. When completed which will be some time during the fiscal year 1930 this substation will be equipped for the propagation of brook, rainbow and black-spotted trout on an extensive scale.

page 796 Yellowstone Station: 23,000,000 eggs of the black-spotted trout collected

page 815: This species ~~is~~ (Golden Trout) was in 1906 brought to the attention of Theodore Roosevelt who immediately got in touch with the bureau with the view of propagating the species. One of the distribution cars was ordered to Nevada and arrangements were made with employees of the Baird Calif. station to make a collection of adult fish. Considerable trouble was experienced in transporting the fish. Finally a carload of golden trout was assembled and sent to Leadville Colorado and Bozeman Montana. The fish were propagated to some extent but the fry inadvertently became mixed with the fry of rainbow trout and for various reasons the matter of propagating this species was neglected until within recent years. The shipment of 9,000 golden trout was delivered to the United States Forest Service and planted in high altitude waters.

page 817 Reports were made that yellowfin, rainbow and black-spotted trout eggs were taken from Grand Mesa Lakes.



# 22

Report of the Commissioner 1929 con.

page 818 The bureau maintains a hatchery in Yellowstone Park which is concerned ~~with~~ with the propagation of species indigenous to the waters of the park, and close cooperation exists between the bureau's representative and the park authorities. Similar relations also exist with the authorities of the Glacier National Park, where large plants of trout are made each year.

1930 Report MISSING

Report of the Commissioner of Fisheries 1931 with Appendixes

page 641 Pyramid Lake Nevada ~~trans~~ transferred blackspotted trout eggs to Leadville, Saratoga, and Springville Utah.

page 651 Leadville collected blackspotted eggs from Continental Reservoir, Colorado.

page 652 Pyramid Lake Nevada is inhabited by a strain of unusually large black spotted trout which spawn earlier in the spring than do most of the other strains. for some years the State of Nevada collected eggs in these fields but the lake is on an Indian reservation and work met with much opposition from the Indians.

page 669 Bozeman Station: Reports of spawning golden trout in the Gallatin Forest arouse hope that the bureau may soon be able to collect its own stock of eggs from these fish.

page 671 Yellowstone Station: The collection of black-spotted trout eggs for the season numbered 15,389,000. Of this total 1,654,000 were collected from fish in Yellowstone Lake caught by trap nets.

Report of the Commissioner of Fisheries 1932

page 542 Yellowstone Park distributed black spotted trout eggs to Birdsview, Wash, Quilcene, Wash, Salmon Idaho, Leadville, Quinault, Wash., and Puget Sound Stations.

page 556 Crystal Lake Station is now in operation. Yellowstone Park Station collected 17,500,000 eggs of the black spotted trout during the spring.



# 23

Report of the Commissioner of Fisheries 1933 with appendixes

page 459 Yellowstone Park distributed eggs of the Black spotted trout to the following stations: Birdsvew, Wash., Clackamas, Ore., Blacier Park, Mont., Leadville, Creede, Bpurbon, Mo., Saratoga, Crawford, Nebr., and Springville Nebr.

page 474 Jackson Hole Wyo established a new rearing pond.

Report of the Commissioner of Fisheries 1934 with appendixes

page 394 Yellowstone Park again supplied many stations with black-spotted trout eggs.

page 406 " " hatchery exceeded all previous records for collection of blackspotted trout eggs with a total of 28,000,000 eggs.

Report of the Commissioner of Fisheries 1935 with appendixes

page 409 Saratoga and Yellowstone provided fish for distribution into other stations.

page 419 Yellowstone Park Station collected 38,000,000 black spotted trout eggs.

Report of the Commissioner of Fisheries 1936 with Appendixes

page 358 Saratoga and Yellowstone again distributed blackspotted trout eggs to other stations.

page 370 Egg collections were less due to high waters.

Report of the Commissioner of Fisheries 1937 with Appendixes

page 472 Saratoga and Yellowstone again distributed all of the black spotted trout eggs: which included Eagles Nest N.M.



Records of Stocking and shipment of Rainbow, Brook and cutthroat trout eggs and fish in Colorado waters by the Federal agencies from 1882 to

55 lines

1882	15,000	Rainbow trout eggs
1886	5,000	" " "
1890	20,000	" " "
	126,881	Brook trout fry
1891	43,000	" " Adult and yearling
1892	13,000	Black-spotted trout Adult and yearling
	22,750	Brook trout Adult and yearling
1894	11,000	Rainbow trout fry
	475	" " Adult and yearling
	10,100	Black-spotted trout Adult + yearling
	700	Yellow-finned trout " " "
	23,000	Brook trout fry
	26,200	" " Adult and yearling
1895	30,000	Rainbow trout fry
	570	" " adult and yearling
	229,500	Brook trout fry
	37,450	" " adult and yearling
1896	5,900	Rainbow trout fry
	4,530	" " adult and yearling
	8,600	Black-spotted trout fry
	7,700	Yellow-finned trout fry
	250,500	Brook trout fry
	19,800	" " Adult and yearling



1897.	14,000	Rainbow trout fry
	42,200	Black-spotted trout fry
	288,700	Brook trout fry
	53,200	" " adult and yearling
	7,930	Yellow-finned trout fry.
1898	7,000	Rainbow trout fry
	199,000	Black-spotted trout fry
	561,000	Brook trout fry
	91,600	" " adult and yearling
	7,500	Yellow finned trout fry
1899	500,000	Brook trout fry
	216,300	" " adult and yearling
	63,000	Black-spotted trout adult and yearling
1900	8,500	Rainbow trout adult and yearling
	445,000	Black-spotted trout adult and yearling
	236,000	Brook trout fry
	30,000	" " adult and yearling
1901	17,000	Rainbow trout fry
	1,170,000	Black-spotted trout adult and yearling
	585,000	Brook trout fry
	308,000	" " adult + yearling



daily

1902	160,000	Rainbow trout	fry
	5,200	"	" adult and yearling
	20,000	Black-spotted trout	eggs
	765,000	"	" " adult and yearling
	745,000	Brook trout	fry
	85,500	"	" adult and yearling
1903	26,000	Rainbow trout	fry
	1,900	"	" ad + yearling
	1,651,900	Black-spotted trout	adult and yearling
	1,520,200	Brook trout	fry
	295,700	"	" ad. and yearling



Table 2. Federal stocking of Brook trout in waters related to study areas, by year and number planted.

Date	Water	Number	Size	Author
1895	Boulder Creek and tributaries	19,500	Fry	(Ravenel, 1896) ✓
1896	North Boulder Creek	10,000	Fry	(Ibid., 1898) ✓
1897	Cache la Poudre River	5,000	Mixed	(Ibid., 1898) ✓
1898	Cache la Poudre River	100,000	Fry	(Ibid., 1899)
1899	Cache la Poudre River	15,000	Mixed	(Bowers, 1900) ✓
1902	Cache la Poudre River	10,000	Fry	<sup>Titcomb,</sup> (Ibid., 1904) ✓
1902	Cache la Poudre River	3,000	Adult	(Ibid., 1904) ✓
1902	North Boulder Creek	10,000	Fry	(Ibid., 1904) ✓



Table 1. Federal stocking of cutthroat trout in waters related to study areas, by year and number planted.

Date	Water	Number	Size	Author
1902	Boulder Creek	45,000	Adult	<sup>Titcomb</sup> ( <del>Bowers</del> , 1904) ✓
1906	North Boulder Creek	40,000	Fry	<sup>Bowers</sup> ( <del>Ibid.</del> , 1907) ✓
1907	Boulder and St. Vrain creeks	40,000	Fry	(Ibid., 1907) ✓
1910	Cache la Poudre River	30,700	Fry	(Ibid., 1911) ✓
1912	Cache la Poudre River	35,500	Mixed	(Ibid., 1913) ✓
1912	Roaring Creek	9,000	Mixed	(Ibid., 1913) ✓
1912	North Boulder Creek	6,000	Mixed	(Ibid., 1913) ✓
1913	Cache la Poudre River	12,000	Mixed	(Johnson, 1915) ✓
1914	Goose Lake, North Boulder Cr.	5,000	Fingerling	(Ibid., 1915) ✓
1915	North Boulder Creek	8,000	Mixed	(Ibid., 1916) ✓



79 Colorado Fish Commissioner Reports:

- 1. Sisty, W. E. 1884. Work of Distribution, ~~1884~~ Colorado Fish Commissioner Biennial Report for the term ending December 31, 1884. 7p.

Trout placed in state waters 170,000 eggs recieved, 90% stocked.  
 Carp are doing well distributed 1,500 young in 1884.

2.

- 2. Land, Gordon. 1892. Work of distribution, 1891-1892. Colorado Fish Commissioner Biennial report for years 1891 and 1892: 9-12.

1892:

May 14: In Boulder Creek, 5 cans Brook trout, 2 cans Rainbow trout

May 19: In Boulder canyon, 5 cans Brook trout 1 can Rainbow trout

June 28: In N. Boulder, above ~~1 1/2~~ Boulder City 6 cans (?)

July 20: Headwaters of Poudre R. 5 cans Brook trout, 1 can California Trout (Rainbow ?)

1892 total out put of black-spotted trout 500,000 of which 100,000 were stocked from the Denver Hatchery.

is this  
Sisty  
rainbow  
in Poudre

- 3. Callicotte, W; R. 1894. Distribution of trout to public waters 1893-1894. Colorado State Fish Commissioner and Game Warden, Biennial Report 1893 & 1894: 22-23.

Upper Boulder Creek, Brook trout	10,000
North Fork Brook trout	10,000

- 4. Land, Gordon. 1897. Fish culture. Colorado State Fish Commissioner Biennial Report for the years 1895-1896: 6-9.

1895:

July 9, Boulder, for No. Boulder Creek, 150 yearling California trout, 500 fry Calif. trout, 500 Brook trout fry. (Calif. trout = Rainbow ????)

July 22, So. Poudre (lakes), 300 yearling Rainbow trout

1896:

June 1: Upper Boulder Creek 5 cans California trout fry  
 June 27: No. Boulder Creek 6 cans California trout fry



- 1884  
1.a. Baird, Spencer F. Report of the commissioner. U. S. Commission of Fish and Fisheries Report for 1881: xiii-lxix.

Stocking:  
Carp 20 Adult

- b. Smiley, Charles W. 1884. A statistical review of the propagation and distribution to public waters of young fish, by the United States Fish Commission, from its organization in 1871 to the close of 1880. U. S. Commission of Fish and Fisheries Report for 1881: 825-915.

Sent to Colorado State:

<u>Salmo quinnat:</u>	EGGS	Silver or California Salmon
1874... 250,000	Stocked in Green Lakes,	Georgetown, 11,450 fish
1874...	" Clear Lake,	" 11,450 fish
1875... 240,000	Stocked in Green Lake,	Georgetown, 200,000 fish
1876... 390,000	" " " " "	, 250,000 fish

total recieved: 565,000 eggs  
hatched 272,900 fish

2. Stone, Livingston. 1884. Report of operations at the trout-breeding station of the United States Fish Commission on the McCloud River, California, during the year 1882. U. S. Commission of Fish and Fisheries Report for 1882: 851-855.

*find to color?*  
Salmo irideus eggs sent to Colorado in 1882:  
5,000 to Peter Walsh, Denver  
10,000 to W. E. Sisty, Denver (Colorado Fish Commissioner)

3. *McDonald, Marshall.* 1886. Report of the Commissioner. U. S. Commission of Fish and Fisheries Report for 1884: ix-lvii.

Stocking:  
Carp... 680 adult

4. Stone, Livingston. 1889. Report of operations at the U. S. salmon and trout stations on the McCloud River, California for the years 1885-1887. U. S. Commission of Fish and Fisheries Report for 1886: 737-745.

Rainbow trout eggs sent to Colorado in 1886:  
March 24... 5,000 eggs sent to R. Kroeck, Denver, Colorado

5. McDonald, Marshall. 1892. Report of the commissioner. U. S. Commission of Fish and Fisheries Report for 1888: ix-cxxviii.

Act of congress approved March 2, 1889, appropriated \$15,000 for the purpose of erecting a hatchery in Colorado.

*Leadville?*



6. McDonald, Marshall. 1893. Report of the commissioner. U. S. Commission of Fish and Fisheries Report for ~~1889~~: 1-96.

1889-1891:

Stocked in Colorado: 1890			
Species	eggs	fry	Ad. & yearling
Rainbow trout	20,000	-----	---
Carp	-----	---	150
Brook trout	-----	126,881	-----

1891

Rainbow trout	-----	-----	-----
Carp	---	---	5,255
Brook trout	(20,000 eggs sent to Leadville for Hatching)	---	43,000

Leadville hatching station in operation and mainly dealing in Brook trout.

7. McDonald, Marshall. 1894. Report of the Commissioner. U. S. Commission of Fish and Fisheries Report for 1892: vii-lxxxvii.

Stocked in Colorado: 1892

Species	eggs	fry	Ad & yearling
Carp	---	---	1,485
Rainbow trout (none)			
Black-spotted trout	---	---	13,000
Brook trout	---	---	22,750

South Boulder Creek, Griffin County, Colo. 4,000 AD. & Yearling Brook  
 Platte River, Grant, Colo. 1,500 Brook AD. & Yearling  
 Slaghts, Colo. 1,500 "  
 Estabrook, Colo 1,500 "  
 Pine Grove " 1,500 "  
 Dome Rock, " 1,500 "

8. Bean, Tarleton H. 1896. Report on the propagation and distribution of food-fishes. U. S. Commission of Fish and Fisheries Report for 1894: 20-80.

Stocked in Colorado: 1894

Species	eggs	fry	Ad. & yearling
Carp	-----	-----	30
Rainbow trout	---	11,000	475
Black-spotted trout	---	---	10,100
Yellow-finned trout	---	---	700
Brook trout	---	23,000	26,200

Upper Boulder Creek, near Central City 2,000 Ad. & yearling (Black-spotted  
 Mammoth Creek " " " " " "  
 South Boulder Creek, " " " 2,000 " Brook trout



9. Ravenel, W. de C. 1896. Report on the propagation and distribution of food-fishes. U. S. Commission of Fish and Fisheries Report for 1895: 6-72.

Stocked in Colorado 1895:

Species	eggs	fry	Ad. & yearling
Rainbow trout	---	30,000	570
Brook trout	---	229,500	37,450

\* Boulder Creek and tributaries, Colo., 19,500 Brook trout fry

10. Ravenel, W. de C. 1898. Report on the propagation and distribution of food-fishes. U. S. Commission of Fish and Fisheries Report for 1896: 11-92.

Stocked in Colorado 1896:

Species	eggs	fry	Ad. & yearling
Rainbow trout	--	5,900	4,530
Black-spotted trout	---	8,600	-----
Yellow-finned trout	---	7,700	-----
Brook trout	---	250,500	19,800

\* No. Boulder Creek, Near Central City 10,000 Brook trout fry

\* So. " " " " " " " " " "

11. Ravenel, W. de C. 1898. Report on the propagation and distribution of food-fishes. U. S. Commission of Fish and Fisheries Report for 1897: xviii-xc.

Stocked in Colorado 1897:

Species	eggs	fry	Ad. & yearling
Rainbow trout		14,000	---
Black-spotted trout		42,200	---
Brook trout		288,700	53,200
Yellow-finned trout		7,930	----

\* Cache la Poudre Creek, Ft. Collins, Colo. 5,000 Brook Ad. & yearling

12. Ravenel, W. de C. 1899. Report on the propagation and distribution of food-fishes. U. S. Commission of Fish and Fisheries Report for 1898: xxxi-cxxii.

Stocked in Colorado 1898:

Species	fry	Ad. & yearling
Rainbow trout	7,000	-----
Black-spotted trout	199,000	-----
Brook trout	561,000	91,600
Yellow-finned trout	7,500	----

- Mammoth Lake, Creek, Middle and So. Boulder Creek, Central City  
Black-spotted trout 20,000 fry

- Fall River, Idaho Springs 3,000 Black-spotted fry

St. Mary Lake, " " 5,000 " " "

\* So. Boulder & Mammoth Creeks, Central City, 20,000 Ad. & Yearling Brook

\* Cache la Poudre Creek, Ft. Collins, 40,000 Brook trout fry

\* Middle Boulder Creek, Central City 3,333 fry & 1/2 ling. Brook trout



13. Bowers, George M. 1900. Report of the Commissioner. U. S. Commission of Fish and Fisheries Report for 1899: vii-xxxiii.

Stocking in Colorado 1899:

species	fry	Adult & yearling
Brook trout	500,000	216,300
Black-spotted trout	---	63,000
Grayling	20,000	---

Ravenel, W. de C. Report on the prop. and dist. of food-fishes. p. xxxv-cxviii.

Brook trout:

- \* Range & Boulder Lakes, Blackhawk, 5,000 fing & fry
- \* Cache la Poudre River, Ft. Collins, 15,000 fing. & fry
- \* Mammoth and Boulder Creeks, Central City, 10,000 fing. & fry

Black-spotted trout:

- \* Mountain streams in vicinity of Central City 15,000 Ad. & yearling
- No. Fork of So. Platte 15,000 " "

14. Bowers, George M. 1901. Report of the commissioner. U. S. Commission of Fish and Fisheries Report for 1900: 5-24.

Stocking in Colorado 1900:

Species	fry	ad. & yearling
Rainbow trout		8,500
Black-spotted trout		445,000
Brook trout	236,000	30,000
Grayling	20,500	---

- a. Ravenel, W. de C. 1901. Report on the propagation and distribution of food-fishes. U. S. Commission of Fish and Fisheries Report for 1900: 25-118.

Black-spotted trout:

- \* Mammoth Creek, Lake, So. Boulder Creek, Jenny Lind Creek, Central City, 20,000 adult & yearling

15. Bowers, George M. 1902. Report of the commissioner. U. S. Commission of ~~Food-fishes~~ Fish and Fisheries Report for 1901: 1-20.

Colorado stocking in 1901:

Species	fry	adult & yearling
Steelhead trout		47,800
Rainbow trout	17,000	---
Black-spotted trout	---	1,170,000
Brook trout	585,000	308,000

- a. Ravenel, W. de C. 1902. Report on the propagation and distribution of food-fishes. U. S. Commission of Fish and Fisheries Report for 1901: 21-110.

Black-spotted trout:

- \* St. Vrain River and tributaries, Lyons, Colo. ADULTS 150,000
- W. Fork of No. St. Vrain " " 10,000
- Middle fork No. " " 30,000
- Cabin Creek " " 10,000
- Fox Creek " " 10,000
- Rock Creek " " 10,000
- So. Boulder Creek, Central City 50,000



16. Bowers, George M. 190<sup>4</sup>2. Report of the commissioner. U. S. Commission of Fish and Fisheries Report for 1902: 1-21.

## Stocked in Colorado 1902:

Species	eggs	fry	ad. & yearling
Landlocked salmon	5,000	---	---
Steelhead trout	10,000	---	---
Rainbow trout	---	160,000	5,200
Black-spotted trout	20,000	---	765,000
Brook trout	---	745,000	85,500
Grayling	--	100,000	---

- a. Titcomb, Hohn W. 190<sup>4</sup>. Report on the propagation and distribution of food-fishes. U. S. Commission of Fish and Fisheries Report for 1902: 22-110.

Black-spotted trout	fry	adult
- St. Vrain R. & tribs., Lyons,	---	65,000
* Boulder Creek, Blackhawk,	---	45,000
Brook trout		
* Cache la Poudre R., Ft. Collins	10,000	3,000
* No. Boulder Cr., Boulder	10,000	
St. Vrain Cr. Lyons,	50,000	
? Silver Lake, Idaho Springs	5,000	

17. Bowers, George M. 190<sup>5</sup>. Report of the commissioner. U. S. Commission of Fish and Fisheries Report for 1903: 1-28.

## Stocked in Colorado:

Species	fry	Ad. & Yearling
Landlocked salmon		4,500
Steelhead trout		29,000
Rainbow trout	26,000	1,900
Black-spotted trout	---	1,651,900
Brook trout	1,520,200	295,700
Grayling	40,000	----

- a. Titcomb, John W. 190<sup>5</sup>. Report on the propagation and distribution of food-fishes. U. S. Commission of Fish and Fisheries Report for 1903: 29-74.

Blackspotted trout :	fry	Fing., AD. & yearling
St. Vrain River, Lyons, Colo.		75,000
Brook trout:		
* Beaver Creek, Ward, Colo	---	10,000
* No. & So. St. Vrain, Lyons,	65,000	---
Middle St. Vrain, Lyons,	15,000	---



Bowers, George M. 1906. The propagation and distribution of food fishes in 1905, Bureau of Fisheries Document 602, p. 1-64. In U. S. Commissioner of Fisheries Report for the Fiscal Year 1905.

Stocked in Colorado:	
<u>Blackspotted trout</u>	Fing. year. & adult
Lyons, St. Vrain River	..... 250,000

Bowers, George M. 1907. The distribution of food fishes during the fiscal year 1906, Bureau of Fisheries Document 613, p. 1-78. In U.S. Commissioner of Fisheries Rept. for the Fiscal Year 1906.

Stocked	Fry
<u>Blackspotted trout</u>	
Boulder, No. Boulder Creek	40,000
Troutdale Pond	15,000
Fort Collins, No. Fork Cache la Poudre	15,000
Loveland, Fall River	60,000
Lyons, Fern Lake	20,000
St. Vrain R.	100,000

Bowers, George M. 1907. The distribution of fish and fish eggs during the fiscal year 1907, Bureau of Fisheries Document 630, p. 1-78. In Commissioner of Fisheries Report for the Fiscal Year 1907.

Stocked in Colorado	Fry
<u>Blackspotted trout</u>	
Boulder, Boulder and St. Vrain Creeks	40,000
Lyons, St. Vrain River	85,000

Bowers, George M. 1909. The distribution of fish and fish eggs during the fiscal year 1908, Bureau of Fisheries Document 644, p. 1-93. In Commissioner of Fisheries Report for the Fiscal Year 1908.

Stocked:	Fry
Blackspotted trout:	
Fort Collins, Cache la Poudre R. No. fork	30,000
Larimer County " " " " " "	<del>23,000</del> 12,000
Rollinsville, Los Lagas Lake	10,000
Fort Collins, No, Fork Cache la Poudre Upper	45,000
Estes Park Protective Association	266,560 Eggs

Brook trout:	fing. year, adult
Ward, Overland Lake	1,500

\*\*\*

no stocking of interest took place in 1909

Bowers, George M. 1911. The distribution of fish and fish eggs during the fiscal year 1910, Bureau of Fisheries Document 740, p. 1-112. In Commissioner of Fisheries Report for the Fiscal Year 1910.

Stocked:	
Blackspotted trout	
Colorado Fish commissioner	225,000 eggs
Fort Collins, Cache la Poudre R.	30,700 fry
Pine Creek	31,010 fry



Bowers, George M. 1913. The distribution of fish and fish eggs during the fiscal year 1912, ~~77~~ Bureau of Fisheries Document 770, p. 1-108. In Commissioner of Fisheries Report for the Fiscal Year 1912.

Stocking

Colorado Fish commissioner 1911 (200,000 eggs Blackspotted)  
 " 1912 (25,000 eggs Brook)  
 " 1912 (25,000 eggs Grayling)  
 " 1912 (50,000 eggs Rainbow)

Blackspotted trout:		Fing. Year., Adult
--	Fort Collins, Cache la Poudre	35,500
****	Roaring Creek	9,000
	Boulder, Middle Boulder Cr.	13,500
***	No. Boulder Cr.	6,000
	So. Boulder Cr.	7,500

Rainbow trout		Fing., year., Adult
	Fort Collins, No. Cache la Poudre	4,000
	So. Cache la Poudre	4,000
	Cache la poudre	4,000

Johnson Robert S. 1914. The distribution of fish and fish eggs during the fiscal year 1913, Bureau of Fisheries Document 794, p. 1-122. In Commissioner of Fisheries Report for the Fiscal Year 1913.

Stocked:

Colorado Fish commission	(2,000,000 Blackspotted eggs)
Fort Collins, Cache La Poudre R.	12,000 Fing., year., Ad., Blackspotted
Boulder, Middle boulder Cr.	22,000 Brook fing., year, ad.

Johnson, Robert S. 1915. The distribution of fish and fish eggs during the fiscal year 1914, Bureau of Fisheries Document 808, p. 1-114. In Commissioner of Fisheries Report for the Fiscal Year 1914.

Stocked Blackspotted trout :

Boulder, Goose Lake	5,000 fingerlings
State fish commissioner	(600,000 eggs)

Rainbow trout

Boulder, Middle boulder Cr.	300 fing year Ad.
No. Boulder Creek	300 " " "
So. " "	300 " " "



Johnson Robert S. 1916. The distribution of fish and fish eggs during the fiscal year 1915, Bureau of Fisheries Document 828, p. 1-138. In U. S. Commissioner of Fisheries Report for the Fiscal Year 1915.

Stocked:

		Fing, Year, Ad.
	Blackspotted trout:	
	Boulder, Middle Boulder Cr.	16,000
***	North " "	8,000
	Middle " "	16,000
	State Fish Commissioner (200,000 eggs) &	200,000
***	Fort Collins, Big South Ponds, River	10,000
	Deadman Creek	6,000
	Laramie R.	10,000
	Nun Cr.	66,000 —
	Loveland, <u>Ypsilou Lake</u>	8,000
	Fox Cr.	6,000
???	Green Lake	6,000

O'Malley, Henry. 1917. The distribution of fish and fish eggs during the fiscal year 1916, Bureau of Fisheries document 837, p. 1-111. In U. S. Commissioner of Fisheries Report for ~~1916~~ the Fiscal Year 1916.

Stocked:

State fish Commissioner (160,000 Blackspotted trout eggs)

O'Malley, Henry. 1918. The distribution of fish and fish eggs during the fiscal year 1917, Bureau of Fisheries Document 846, p. 1-99. In U. S. Commissioner of Fisheries Report for the Fiscal Year 1917.

Stocked:

Blackspotted trout	
Fort Collins	Fry
Bennet Cr. —————	20,000
Joe Wright Cr. -	40,000
Little So Poudre R.	80,000
McIntyre Cr.	20,000
Sheep Cr. —	10,000
Trap Lake —	15,000
Walsenburg	
Huerfano R.	10,000 Fing, Year, Ad.

Fox River Bond



O'Malley, Henry. 1919. The distribution of fish and fish eggs during the fiscal year 1918, Bureau of Fisheries document 863, p. 1-82. In U. S. Commissioner of Fisheries Report for the Fiscal Year 1918.

Stocked:

Rainbow trout	Fing, Year, Ad.
Ft. Collins, Cache la Poudre R.	3,500
Blackspotted	
Walsenburg, Huerfano	5,000

Leach, Glen, C. 1920. Distribution of fish and fish eggs during the fiscal year 1919, Bureau of Fisheries Document 878, p. 1-76. In U. S. Commissioner of Fisheries Report for the Fiscal Year 1919.

::NO STOCKING OF INTEREST::



RECEIVED  
BSF & W-REG. 2

JUN 15 1965

F M S  
COLORADO COOP.

June 14, 1965

E. A. Benson  
Project Power Manager  
Bureau of Reclamation  
Montrose, Colorado

Dear Mr. Benson:

This is referenced to the June 9, 1965 meeting in the Bureau of Reclamation offices, Montrose, Colorado concerning the utilization of a helicopter for the removal of an endangered species of fish, the Green-Back Trout. As indicated, the fish are located in the Forest Canyon Area of Rocky Mountain National Park, Estes Park, Colorado. As discussed, air passage for personnel and equipment in and out of the proposed collection site, as well as, the delivery of the captured fishes to the Leadville National Fish Hatchery, Leadville, Colorado will be required. The latter can be most advantageously effected on the helicopters return trip to Montrose, Colorado. A bureau biologist will accompany the pilot and fish to the hatchery in an effort to deter any fish sickness that might occur enroute.

Tentative scheduling for the collection trip is as follows:

- June 28th - Final arrangements and equipment preparation by all personnel in the Estes Park area. Possibly the helicopter and pilot will desire to be in the vicinity on this date. The Park Service will be asked to arrange transportation for the pilot to overnight accommodations.
- June 29th - Entrance by air of personnel and equipment to the collection area.
- June 30th - Fish collection by electrofishing methods.
- July 1st - Departure from the collection area of personnel and equipment, delivery of the fish to the Leadville Hatchery.

The approximated cost for the helicopter services of \$500.00 will be chargeable through reimbursement procedures. Appropriate cost accounting symbols for the Springville Field Office, Bureau of Sport Fisheries and Wildlife, Branch of Fishery Management Services from which the costs will be absorbed are; Station 1110 - Activity 0120 - Cost Code 10.

Please be advised that the interest and consideration shown by you and your staff is greatly appreciated.

cc: Regional Director  
Att: Jack E. Hemphill  
Dr. Robert E. Vincent ✓  
Mr. Neal Guse

Sincerely yours,

*Philip B. Sumner*  
Fishery Management Biologist  
Bureau of Sport Fisheries & Wild.  
Branch of Fishery Mgmt. Services  
Springville, Utah



## Forest Canyon Stocking

1922 Fish - Comm. Rept.

Colo. 349,000 Bl. spt. Trout distributed in  
1922 (table p. 84) -

p. 107 - National Park Service now actively  
engaged in intensive fish culture in cooperation  
w/ Bur. Hatcheries in Yellowstone & Glacial Park.

- Table p. 15 - Leadville w/ <sup>(output)</sup> 348,000 Bl. spt. trout  
Leadville (17) - got eggs of B.S. only from Yellowstone  
L. (200,000 eggs B.S. transferred from Yellowstone  
Park to Leadville) - where other 148,000 come from.

- All federal cuts - (B.S.) propagated 1922  
came from Yellowstone L. except. Bozeman  
took 168,000 Glacial Park + 425,000 Meadow Lk. Mont.

- 1923 - Leadville output of 671,000 fry & fingerlings  
from Yellowstone Park - in Colo. Ariz. & N. Mex.

\* Glacial Nat. Park. 1923 Rept. -

p. 60 (Propagation) - "An interesting & important  
feature of the work in the region was the planting  
of eyed black spotted trout eggs in the almost  
inaccessible waters in that part of the Park  
lying along the crest of the Continental Divide  
and the Canadian border. More than 1 million

eggs planted in headwaters of numerous lakes &  
streams. - Among waters stocked: St. Mary R. &  
tributaries Hidden L.; L. Ellen, Wilson, Grinnel & Belle  
R., Lee, Margaret & Glenora Lks., numerous small streams,

1,332,000  
eggs from Yellowstone  
sent to Glacial  
Park.

1,389,700 eggs  
taken in Glacial  
Park.



# Outdoor Empire.....

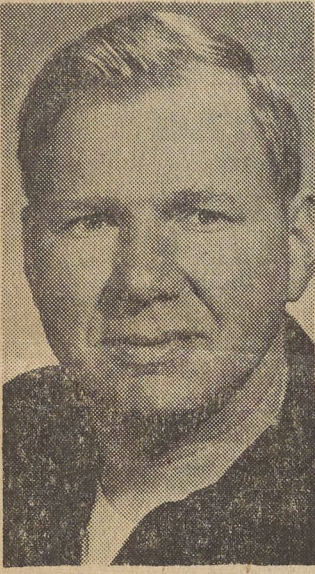


## Ancient Trout Species Found

By Bob Saile

HUNDREDS OF centuries before the white man ever set foot in the territory that is now Colorado, a beautiful fish with a dark-spotted, greenish-golden body and red slash marks under its jaw was the only trout that swam in the pure waters of the region. Later, man was to give him three commonly used names: Greenback trout, cutthroat trout and, technically, *Salmo clarki stomias*.

This once ubiquitous trout was found throughout three major river drainages in Colorado—the Colorado, the Arkansas and the Rio Grande. Today, modern versions of the



ROBERT BEHNKE

cutthroat are found in a relatively few redoubts in the high country, his range usurped by the coming of people and his trout cousins.

The rainbow trout was brought here from the Pacific Coast about 1880, the eastern brook trout from the East Coast about the same time, and the brown trout from Europe in about 1890.

*Salmo clarki stomias* didn't compete well with humans and other trout. The cutthroats that Colorado has in 1970 are mostly imported versions—beautiful fish, but not the original greenback.

It is, therefore, a minor miracle of nature that a population of apparently pure greenbacks has been discovered in a tiny mountain stream no more than 40 miles from the smog-shrouded spires of downtown Denver.

Robert J. Behnke, an assistant professor of fishery biology at Colorado State University, has scientifically identified the fragile inhabitants of this stream as original cutthroats. The stream, which has no name, is near Nederland, Colo., not far from a highway. It's a tributary of North Boulder Creek and lies in Roosevelt National Forest.

### Trout Examined at CSU

Acting on a tip, Behnke and an assistant, Gary Wernsman, went to the stream in September of last year and collected several trout by electro-fishing.

Back at Fort Collins, Behnke, assistant unit leader of the Colorado Cooperative Fishery Unit at CSU, painstakingly examined the trout. It's impossible to identify accurately a trout as a native greenback by simply looking at it. One of the keys to identification is the number of vertebral segments in the fish's bone structure.

The counts from the specimens ranged from 59 to 61 segments. This is a characteristic of a greenback—counts on subspecies of cutthroats are typically 61 to 62; counts on rainbow trout are typically 63 to 64.

"This creek is so small you'd hardly notice it," Behnke said. "The stream runs right through a culvert beside a



GREENBACK TROUT—A COLORADO NATIVE

Forest Service road, and I guess it's so small nobody bothers to fish it."

How does he account for the existence of these lonely throwbacks to history?

"Well, there are no lakes or ponds at the head of this stream, and that's probably the reason it has never been stocked with other trout," said Behnke. "Another reason there are no other kinds of trout in it is the fact that the stream drops 500 feet in a distance of a half-mile before joining North Boulder Creek. No other fish can get upstream."

### Some Greenbacks Transplanted

A few days ago, Behnke cooperated with biologists of the National Park Service in an effort to transplant some of the stream's greenbacks to a small stream in Rocky Mountain National Park.

About 50 of the cutthroats were placed in a tank and driven to the Stanley Hotel at Estes Park, where a helicopter hired by the Park Service picked them up and ferried them to a small tributary in the Big Thompson River drainage, in the northwestern section of the park. There were no other trout in this unnamed stream, which can be reached overland only by several miles of trail.

The helicopter landed and the trout were planted by hand.

The cutthroat project, Behnke said, is part of the Park Service's commitment to perpetuating and re-establishing indigenous species of plants and animals in the country's national parks.

Previous efforts have been made to re-establish greenbacks in Black Hollow Creek, a tributary of the Poudre River in Larimer County. The first try, in a cooperative effort with the Forest Service and other agencies, was in 1968, when 10 greenbacks from Albion Creek (another North Boulder Creek tributary) were transplanted to Black Hollow Creek. (Behnke believes the Albion Creek greenbacks by now are extinct.)

Two surveys of Black Hollow Creek in 1969 failed to turn up any sign of the transplants or evidence of reproduction. Last April, 52 greenbacks were taken from the small stream near Nederland to be stocked in Black Hollow, but they died from a fungi disease before they could be transplanted.

In June, 42 more greenbacks from the Nederland area stream were transplanted to Black Hollow Creek. The results of that transplant aren't known yet.

Behnke knows of two other spots on the Eastern Slope where almost pure greenbacks exist. One is in Rocky Mountain National Park and the other is on the North Boulder Creek drainage.

He says the greenback is his "sentimental favorite" of all fish. "It's a beautiful fish," he said, "and I guess I have a sympathy for the underdog."



# PIRING

## Hearts of Fo

there are two seniors, five freshmen (given special eligi-

man and his staff have taken

ght it a new, simpler offense

more grit than proficiency.

out back here for the time

the back of his head. "We

forward now."

what it means to Wichita lies

iving coaches and players. It

man in the locker room just

ke every ounce of strength

layers. Later he said it took

up.

ograms from his pocket and

layers one from the parents

ohnson, who perished in the

u must continue—that's what

u, and so is Ron."

Then Seaman, in his first g

asked his players for a silent p

teammates before he led them i

Before Wichita took the fie

Plain, Kan., who suffered seri

the crash, hobbled to the cente

for the toss of the coin. A sym

about 40,000 cheered.

Arkansas Coach Frank Bro

would try to be as much of

"This is the type of game you

cipline. We will play it by ear."

Many Arkansas fans also

Wichita's comeback efforts. Co

day night to the Wichita funds

\$250,000 in expenses facing th

tragedy.

Defensive Coach Fred Conti

men who were going against A

games as high school gridders.

## Win String to Seven

in the NBA Midwest Division and dropped the SuperSonics, now 3-3, into a three-way tie with San Francisco and Los Angeles for the lead in the Pacific Division.

Virginia cruised to its sixth victory—and consigned Memphis to its third defeat in four games—on the strength of George Carter's 26 points and 24 by Charlie Scott. Jimmy Jones, who tied Wendell Ladner for Memphis scoring honors with 18, became the seventh ABA player to pass the 5,000-point career mark.

In another development, the New York Nets of the ABA announced that superforward Rick Barry, who reinjured his right foot last Friday, will be sidelined for about five weeks with what physicians called a "fatigue fracture."

### Royals Top Hawks

ATLANTA			CINCINNATI					
G	F	T	G	F	T			
Bridges	6	0-2	12	Varsdle	6	6-10	18	
Hudson	10	8-12	28	Paulk	6	1-2	13	
Bellamy	5	3-11	13	Imhoff	2	0-1	4	
Mazzard	8	2-2	18	Archbl	9	4-5	22	
Harvich	4	8-9	16	VanLier	2	2-4	6	
Chmbrs	1	2-3	4	Green	11	8-11	30	
Davis	4	1-3	9	Lacey	9	0-1	18	
Chrstrn	1	2-2	4	Arnzen	2	3-4	7	
White	1	0-0	2	Barr	2	2-3	6	
Valley	0	1-1	1	Hyder	1	0-0	2	
<b>Totals</b>	<b>40</b>	<b>27-45</b>	<b>107</b>	<b>Totals</b>	<b>50</b>	<b>26-41</b>	<b>126</b>	
Atlanta						27	28	26-107
Cincinnati						32	37	28-126

Fouled out—None  
Total fouls—Atlanta 32, Cincinnati 32.  
A—2,278  
am110ped Oct. 26

### Pistons Rip Sonics

SEATTLE			DETROIT					
G	F	T	G	F	T			
Black	5	0-0	10	Bing	16	3-3	35	
Clemens	2	1-2	5	Dischngr	8	2-2	16	
Cross	3	3-7	9	Driscoll	4	2-2	10	
Herd	0	2-2	2	Hewitt	3	2-3	8	
Kojis	5	5-5	15	Komives	6	0-0	12	
Meschry	3	2-3	8	Lanier	6	1-2	13	
Smith	6	7-9	19	Marlatt	1	1-1	3	
Woydar	2	2-2	6	Mix	5	1-2	11	
Thorn	4	1-3	9	Moore	3	0-0	6	
Wilkins	4	4-5	12	Mueller	0	0-0	0	
Winfield	7	2-6	16	Quick	4	1-2	9	
				Walker	6	5-5	17	
<b>Totals</b>	<b>41</b>	<b>29-44</b>	<b>111</b>	<b>Totals</b>	<b>62</b>	<b>18-22</b>	<b>142</b>	
Seattle						24	24	30-111
Detroit						39	36	36-142

Fouled out—None.  
Total fouls—Seattle 22, Detroit 30.  
Attendance—2,835.

### Squires Rap Pros

VIRGINIA			MEMPHIS					
G	F	T	G	F	T			
Moe	6	0-1	12	Govan	5	2-2	12	
Carter	9	8-10	26	Ladner	8	2-3	18	
R.Scott	10	0-1	20	Cueto	0	0-0	0	
Johnson	3	1-1	7	W.Jones	3	0-0	6	
Card	2	1-1	5	Raymnd	6	4-5	16	
Eakins	5	0-1	10	Davis	3	0-0	6	
Brown	2	5-5	9	J.Jones	4	10-13	18	
C.Scott	8	5-6	24	S.Jones	3	1-2	7	
Taylor	1	1-2	3	Warren	2	0-0	4	
Barrett	2	0-0	4	Swift	6	4-4	16	
<b>Totals</b>	<b>48</b>	<b>21-28</b>	<b>128</b>	<b>Totals</b>	<b>40</b>	<b>23-29</b>	<b>103</b>	
Virginia						28	32	37-120
Memphis						26	26	29-103

Three-point goals—C. Scott.  
Fouled out—Virginia, C. Scott, Barrett.  
Total fouls—Virginia 27, Memphis 27.  
A—1,189.  
am1147pes Oct 26

## Denver Host To Memphis Five Tonight

CONTINUED

Keye had a ligament operation during the off-season after missing most of the 1969-70 playoffs and is still hampered by the knee.

The Pros (last year's New Orleans' Bucs) feature the Jones boys, Steve, Jimmy, Wilbert and Billy. The latter, who averaged 56.3 per cent accuracy in field-goal attempts during his career at Louisiana State College, was signed to the Memphis team by its coach and general manager, Babe McCarthy. The six-foot-8 Jones, 21, is a native of Dyersburg, Tenn., and grew up in Pineville, La.

McCarthy's team is 1-3 with successive losses to tough Virginia and the Rockets (2-4) could stay ahead of the Pros in the Western Division with a victory Tuesday.—RALPH MOORE

## Pro Basketball Standings

NBA				
EASTERN CONFERENCE				
ATLANTIC DIVISION				
	W	L	Pct.	GB
New York	5	2	.712	..
Philadelphia	5	2	.712	..
Boston	3	4	.429	2
Buffalo	1	3	.250	2 1/2
CENTRAL DIVISION				
	W	L	Pct.	GB
Baltimore	4	2	.667	..
Atlanta	1	4	.200	2 1/2
Cincinnati	1	5	.167	2
Cleveland	0	7	.000	4 1/2
WESTERN CONFERENCE				
MIDWEST DIVISION				
	W	L	Pct.	GB
Detroit	8	0	1.000	..
Milwaukee	3	1	.750	3
Chicago	3	2	.600	3 1/2
Phoenix	3	3	.500	4
PACIFIC DIVISION				
	W	L	Pct.	GB
Seattle	3	3	.500	..
San Francisco	3	3	.500	..
Los Angeles	3	3	.500	..
San Diego	4	4	.500	1
Portland	2	4	.333	1

MONDAY'S RESULTS  
Cincinnati 126, Atlanta 107.  
Detroit 142, Seattle 111.  
Only games scheduled.

TUESDAY'S GAMES  
San Diego at Milwaukee.  
Seattle at New York.  
Buffalo at Portland.  
Only games scheduled.

ABA				
WEST DIVISION				
	W	L	Pct.	GB
Utah	3	0	1.000	..
Indiana	6	2	.750	..
DENVER	2	4	.333	3
Memphis	1	3	.250	3
Texas	0	3	.000	3 1/2
EAST DIVISION				
	W	L	Pct.	GB
Virginia	6	0	1.000	..
Florida	4	2	.667	2
New York	4	3	.571	2 1/2
Kentucky	3	4	.429	3 1/2
Pittsburgh	2	5	.286	4 1/2
Carolina	0	5	.000	5 1/2

MONDAY'S RESULTS  
Virginia 120, Memphis 103.  
TUESDAY'S GAMES  
Memphis at DENVER.  
New York vs. Texas at Fort Worth.  
Virginia at Pittsburgh.

Vega & Mark  
are ready  
for you