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REPORT ON A COLLECTION OF NATIVE
CUTTHROAT TROUT, Salmo clarki bouvieri, FROM
EIGHTMILE CANYON, CASSIA COUNTY, IDAHO

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August, 1984

A B S T R A C T

A sample of 11 specimens from Eightmile Canyon, an isolated tributary of the Raft River drainage of the Snake River system, Cassia County, Idaho, are judged to represent a pure population of native cutthroat trout, Salmo clarki bouvieri. This is based on the spotting pattern, coloration, and meristic characters which reveal no evidence of a hybrid influence. This sample represents the first known collection of ^{pure,} native cutthroat trout from the Raft River drainage. A discussion on the natural range of variation in S. c. bouvieri and an elucidation of this taxon are given.

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INTRODUCTION

For many years considerable confusion and controversy ^{revolved around} centered on the classification of interior forms of cutthroat trout. During the past 10 years, a synthesis of information from studies on morphology, zoogeography (patterns of distribution), electrophoresis of proteins, and karyology (chromosomes), has made it clear that after an ancestral form of coastal cutthroat trout (S. c. clarki) penetrated ^{inland} ~~into~~ into the Columbia River basin, a major divergence occurred ^{separating} ~~into~~ two distinct evolutionary lines ^{of inland cutthroat trout.} One line became associated with the northern segments of the Columbia basin (Kootenay, Pend Oreille - Clark Fork, and Spokane - St. Joe river systems), and one line became associated with the Snake River division of the Columbia basin. The northern Columbia group of cutthroat trout ~~also~~ crossed the Continental Divide to become established in the upper South Saskatchewan and upper Missouri drainages in Alberta and Montana. This cutthroat trout is characterized by 66 chromosomes, small, irregular-shaped spots, and the hereditary basis to develop brilliant

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coloration (bright reds, gold, orange).

The cutthroat trout evolutionary line associated with the Snake River is characterized by 64 chromosomes, large, roundish spots, and it does not develop brilliant coloration (rose, yellow, and orange tints may be apparent in mature males but never with the intensity ^{that may be} found in the northern group of cutthroat trout). The Snake River group also crossed the Continental Divide to become established in the Yellowstone River drainage.

~~It is obvious~~ ^{There is no doubt} that these two evolutionary lines of cutthroat trout should be recognized as separate subspecies. Although the name S. c. lewisi was long used for "Yellowstone" cutthroat trout, the type locality for the name lewisi is the Missouri River near Great Falls. The native trout of the upper Missouri River is the same ^{trout found in} as the northern Columbia basin ~~cutthroat trout~~.

→ Thus, the name S. c. lewisi must be used for the cutthroat native to the northern segments of the Columbia River basin and to the South Saskatchewan and upper Missouri drainages. This trout is

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commonly called "westslope" cutthroat in Montana, and "northern Idaho" cutthroat in Idaho.

The oldest ^{available} name I ~~could~~ know of for a cutthroat trout with large round spots and ~~associated~~ ^{native} with ^{to} the Snake River system ^{is} the "Salmo purpuratus bovieri", given to the trout of Waha Lake ~~in~~ ⁱⁿ 1882. Waha Lake is near the Idaho-Washington border. It is isolated from the Snake River drainage but its native trout was obviously derived from the Snake River. Thus, the "Yellowstone" cutthroat trout, the trout native to the Snake and Yellowstone river drainages becomes S. clarki bovieri.

After the invasion of the Columbia River by rainbow trout, both S. c. lewisi and S. c. bovieri were essentially eliminated from areas below barrier falls that blocked upstream movement ^{of rainbow trout}. The cutthroat in Waha L. were protected from rainbow trout by the isolation of the lake from the Snake River. The native cutthroat in Waha Lake have been long extinct and presently there is ~~presently~~ not a single ~~site~~ locality in the Snake River ^{drainage} below Shoshone Falls known to have a native population of S. c. bovieri. A zoogeographic enigma occurs by the fact that the native cutthroat

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trout of the Salmon and Clearwater rivers, major downstream tributaries to the Snake River, is not S. c. bouvieri as would be expected, but S. c. lewisi. I can only speculate that S. c. bouvieri was the original trout native to the Salmon and Clearwater drainages but was eliminated ~~by~~ after invasion by rainbow trout. S. c. lewisi then gained access from headwater stream transfers and evolved life history and behavior strategies allowing coexistence with rainbow trout (actually the two species rarely occur together in the same habitat; S. c. lewisi is ^{typically} found in small, high elevation tributaries and rainbow trout in the medium size and large rivers).

Several years ago, graduate students and I worked ~~on~~ the puzzle at putting together the pieces of the S. c. lewisi, S. c. bouvieri puzzle. Old museum specimens were examined and many new collections were made ^{on which} to base ~~on~~ realistic descriptions of these taxa. Two theses resulted: Murphy (1974) and Roscoe (1974). In 1972, ^{these} ~~Mr. Murphy~~ ^{students} and I made ~~a~~ collecting trips to obtain collections of cutthroat trout from diverse areas of the upper Snake River drainage. The only collection from the Raft River drainage that contained specimens of

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predominantly cutthroat trout was from One Mile Creek, ~~also~~ ~~no~~ virtually on the Utah-Idaho border near Strevell, Idaho. The One Mile Creek specimens were slightly hybridized with rainbow trout as was apparent from their spotting pattern and low lateral series scale count (table 1). The Utah conservation officer at Snowville, Utah, told us he knew of no other cutthroat trout in the Raft River drainage. ~~Also, as far as I know,~~ of no museum collections from the Raft River drainage. Thus, the discovery of a pure population in Eightmile Canyon is a significant event.

VARIATION IN S. c. bouvieri AND DETERMINATION OF PURITY

As might be expected of a subspecies of such broad distribution, S. c. bouvieri exhibits considerable variation in meristic characters (table 1). There is no method by which a population can be "proven" to be S. c. bouvieri ~~without~~ with absolute certainty. All that can be demonstrated is that ~~there~~ ~~is~~ no evidence of a hybrid influence ~~was~~ ^{could} be detected. The 64 chromosome number is shared with 11 other subspecies of cutthroat trout and polymorphism (individuals with different numbers of chromosomes) ^{in populations} is not a rare event. Electrophoresis can identify

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distinctions between S. c. bouvieri, S. c. lewisi, and rainbow trout, S. gairdneri, but it is not ^{sufficiently} sensitive to clearly detect evolutionary differentiation occurring during the past 25,000-50,000 years in most cases. Thus, the question ^{concerning} ~~if~~ the ^{origin of the} Eightmile Canyon population ~~is~~ a pure native population or ~~if it is~~ ^{the result of} an ^{introduction} of Yellowstone Lake or Henry's Lake cutthroat trout would not likely be ~~later~~ answered by electrophoretic analysis.

It can be assumed that if non-native trout were ever stocked into Eightmile Canyon Creek, or had access to the creek, ~~to~~ ~~and~~ these trout would have been derived from ^{one of} three sources -- Henry's Lake cutthroat trout, Yellowstone Lake cutthroat trout, ~~or~~ and/or hatchery rainbow trout. Rainbow trout lack basibranchial teeth, have from 40-70 (average ca. 55) pyloric caeca, 25-30 scales above the lateral line, and about 125-135 scales in the lateral series. The spots on rainbow trout are small, irregular in outline and are profusely distributed over the body and on top of the head. Henry's Lake and Yellowstone Lake cutthroat trout are [✓] characterized by ^a high number of gillrakers (20-21), and numerous basibranchial teeth (average more than 20). ^{over} ↓

Hybrid influence where hybrids are fully fertile, as with rainbow x cutthroat and among cutthroat subspecies, is rarely fully intermediate between parental types. After many generations one form typically predominates in the hybrid and a slight hybrid influence may be detected in some characters but not all characters (for ex., One Mile Creek specimens exhibit an obvious rainbow trout hybrid influence^{only} in spotting and lateral scale counts).

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The diagnostic characters of the Eightmile Canyon specimens show no evidence of a hybrid influence from rainbow trout, ~~Henry's Lake~~, or Yellowstone Lake cutthroat trout, ^{in any character.} Their gillraker number is the lowest of any sample I have examined from ^{the} Snake River drainage and is most probably the result of ~~a small~~ isolation of a small population (genetic "bottleneck", genetic "drift", or ^{adaptive} selection for ~~the~~ small stream habitat). Scale counts and caecal counts are typical of bouvieri and all specimens have basibranchial teeth.

Rainbow trout typically have ¹⁰ 9 pelvic fin rays and cutthroat trout typically have 9 pelvic rays. Nine specimens of the Eightmile Canyon sample have 9 pelvic rays and two have 8.

The coloration and spotting pattern observed in color photographs are wholly typical of S. c. bouvieri.

In summary, all characters indicate that this sample was drawn from a pure population of S. c. bouvieri, ~~and as such~~ It represents the only known pure population of this subspecies in the Raft River drainage. It is likely that if similar isolated streams

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are found, other populations will be discovered.

LITERATURE CITED

Murphy, T. C. 1974. A study of Snake River cutthroat trout. M.S. thesis, Colo. ST. Univ. 73 p.

Roscoe, J. W. 1974. Systematics ~~study~~ of the westslope cutthroat trout. M.S. thesis, Colo. ST. Univ. 74 p.

Table 1. Variation in samples of *S. c. bouvieri*, upper Snake River drainage.

Locality	Gillrakers	Scales above l.l. and lat. series	Pyloric caeca	Basibranchial teeth
Eightmile Canyon, Cassia R. drainage, Cassia Co., ID N=11 1984	17-19 (17.8)	37-44 (39.8) 158-182 (171.5)	35-48 (40.3)	2-7 (4.2)
Onemile Crk., R. (hybrids) N=11 1972	16-21 (18.7)	36-43 (39.4) 138-163 (146)	36-53 (42)	0-12 (6.1)
Mink Crk., Portneuf drainage near Pocatello N=9 1893	19-21 (19.8)	39-46 (41.4) 149-171 (163)	37-51 (42)	5-16 (10.1)
Goose Crk., Elko Co., Nev. N=39 1962	18-21 (19.6)	36-43 (38.7) 143-177 (161)	33-50 (39.5)	1-17 (5.3)
10 samples from Snake R. drainage, Wyo., above Palisades Res. 1960's-1970's (Range of mean values)	19.0-20.5	41-47 162-181	27-48	4-15
between p. 6-7				