Name: Greenback cutthroat trout
Salmo clarki stomias

Date Prepared: February, 1973

Order: Salmoniformes

Family: Salmonidae

STATUS: ENDANGERED (OUTLOOK HOPEFUL)

I. Taxonomy

A. Distinguishing characters. There are no published descriptions that are adequate to diagnose *Salmo clarki stomias* and distinguish it from other subspecies of cutthroat trout. Examination of old museum specimens and recent collections revealed that although no single character can positively identify the greenback cutthroat trout, the following characters are useful for evaluating relative purity of a population. Spots on body large, round or oblong; largest, most prominent spots in area posterior to line drawn from origin of dorsal fin to origin of anal fin. Spots on *S. c. stomias*, typically larger than in other subspecies. Spots generally absent from head; occasionally on anal fin. Coloration may be brilliant, almost gaudy, particularly on males during the breeding period. Colors on sides of body vary from dull brass to bright golden yellow with pink or red hues extending around lateral line, but not in an distinct band as in rainbow trout. Ventral region cream to orange or red. Orange or red often suffusing lower fins. Cutthroat mark usually crimson, sometimes orange. Most diagnostic meristic characters are numbers of scales, vertebrae and pyloric caeca. Typically the scale counts of *S. c. stomias* made a series counted two rows above the lateral line (lateral line series) and above the lateral line (origin of dorsal fin to lateral line) more numerous than in other subspecies of *S. clarki*.

Mean values for the lateral series count range from 185 to 215 and 44-55 above the lateral line. The numbers of vertebrae typically are 59-62 and pyloric caeca, 25-40; both counts slightly lower than in most other subspecies of S. clarki. Basibranchial teeth present, typically 3-15. Posterior gillrakers on first arch better developed than in most other subspecies.

B. Acceptance by taxonomists (validity of subspecies and taxonomic problems). The name stomias is based on two specimens collected by a Dr. Hammond on a U. S. Army expedition from Fort Riley, Kansas, to Fort Bridger, Wyoming, and return in 1856. The specimens were labeled only "Fort Riley Kansas," the shipping point. E. D. Cope described a new species Salmo stomias, on these specimens in 1872. D. S. Jordan (1891) recognized that the type specimens of stomias did not come from Fort Riley, Kansas and Jordan used the name stomias for the cutthroat trout indigenous to the headwaters of the South Platte and Arkansas river basins of Colorado and Jordan's procedure has been followed to the present. Although the name stomias could have been based on trout from the Green River, Wyoming (Fort Bridger) it is unlikely the exact source will ever by known and the name stomias will continue in its present useage.

With the advent of more modern systematic concepts, all of the varieties of cutthroat trouts have been considered as a single species, Salmo clarki, with many of the formerly recognized species, such as stomias considered as a subspecies.

Although critical, in-depth taxonomic comparisons have never been published to verify or cast doubt on the validity of the subspecies, the data accumulated by the Colorado Cooperative Fishery Unit, confirms that the cutthroat trout native to the South Platte and Arkansas river

basins is a relatively well differentiated form (see diagnosis in above section) and deserves subspecific recognition. Its closest affinities are with the Colorado River cutthroat trout, S. c. pleuriticus, from which it was evidently derived.

C. Current Activities: A problem in better defining the characteristics of S. c. stomias results from the paucity of old museum specimens and the extreme rareness of pure populations. Thus, we can only roughly estimate the natural range of variability of the diagnostic characters. There is no authoratative method to determine if a population with slightly abberant characters is within the natural range of variability or due to slight hybridization with introduced rainbow trout or other subspecies of cutthroat trout. Continued search for pure populations is the best hope for better defining the taxonomic attributes of S. c. stomias. A graduate student thesis by Colorado Cooperative Fishery Unit student, Gary Wernsman, will include all of the data available as of February, 1973 on the greenback cutthroat trout.

II. Range and Distribution

A. Historical: In headwaters of South Platte and Arkansas river basins. Permanent populations were restricted to the mountains and foothills area. The warm, turbid conditons in the South Platte and Arkansas rivers in the plains was not salmonid habitat. Trout were not native to the North Platte River drainage of Colorado and Wyoming.

B. Present: The extirpation of the greenback cutthroat trout proceeded so rapidly after the coming of the white man to Colorado, that this subspecies was commonly assumed to be extinct in its pure form by the 1930's. In 1969 the only population ideally conforming to the diagnostic characters of S. c. stomias (established from ancient museum specimens), was found in a tiny stream, locally called Como Creek, tributary to North Boulder Creek in Roosevelt National Forest, Boulder County,

Colorado. Other populations that appear to be virtually pure S. c. stomias, but probably with a slight influence of Yellowstone cutthroat trout (and possibly rainbow trout) occur in the very headwaters of the Big Thompson River in Forest Canyon of Rocky Mountain National Park and in Island Lake, a reservoir in the City of Boulder's watershed in the headwaters of North Boulder Creek. In the Arkansas River drainage the only population found closely approximating the characteristics of S. c. stomias occurs in the very headwaters of South Huerfano Creek, Huerfano County, Colorado. A small population of trout very typical of S. c. stomias in their spotting pattern, coloration and scale counts, but with slightly higher than expected vertebrae number. is found in a short section of the very headwaters of the Little South Poudre River above a barrier in Larimer County, Colorado.

A pure population persisted in Albion Creek in the City of Boulder's watershed until 1969 when the last 10 specimens were removed and transplanted into Black Hollow Creek a tributary of the Poudre River, Larimer County, Colorado. A barrier was erected on Black Hollow Creek and all of the fish eradicated in 1967. Additional transplants of S. c. stomias from Como Creek into Black Hollow Creek in 1970 has established a self-reproducing population. Another transplant from Como Creek was carried out in 1970 into a barren, isolated tributary of the Big Thompson River in Rocky Mountain National Park. The success of this transplant is not known.

A successful transplant was made outside the native range in 1967 with trout from Forest Canyon (Big Thompson River) to Florence Creek, on the Uinta Indian Reservation, Utah (Green River basin). A

transplant from Forest Canyon into Fay Lake in Rocky Mountain Park in 1959 failed to establish a population in Fay Lake, but a population has been established in Caddis Lake, below Fay Lake from fish migrating downstream.

C. Ownership: The habitats containing pure S. c. stomias in Como Creek and Black Hollow Creek are on Roosevelt National Forest lands with the exception of a few hundred yards of the head of Como Creek which is on the grounds of the Arctic and Alpine Research Institute of the University of Colorado. The habitat in Como Creek covers less than one mile of stream before a precipitous drop to North Boulder Creek. Black Hollow Creek, above the barrier contains about two miles of potential trout habitat.

The virtually pure but more dubious populations of S. c. stomias are on lands of the following agencies: Forest Canyon and Caddis Lake, Rocky Mountain National Park; Island Lake, City of Boulder, Colorado; head of Little South Poudre River, Roosevelt National Forest to Rocky Mountain National Park boundary; South Huerfano Creek, private ranch surrounded by San Isabela National Forest lands.

D. Competition for other uses (threatening factors). Fortunately, all of the habitats of the present populations with the possible exception of South Huerfano Creek appear to be relatively safe from competing uses. The public agencies give special recognition to the habitats. A threat would occur from introduction of other trouts which is a possibility from a well meaning fisherman. This possibility is considered remote in view of the size and location of these habitats. The greatest potential danger would be the destruction of the barrier dam on Black Hollow Creek. An abundant rainbow trout population occurs

below tha dam and hybridization would certainly follow any impairment of the barrier.

III. Life History and Ecology

A. Relative abundance. The pure population in Como Creek probably consists of approximately 100 adult fish. When the introduced population expands to its maximum limits in Black Hollow Creek, about 200-300 adult fish may be expected. Of the other populations, the most abundant one is in Island Lake, (40 surface acres) where approximately 5000-7000 adult trout (8-12 inches) are present (Nelson, MS. 1972).

B. Habitat description: There is nothing unique about greenback trout habitat except that the optimum conditions of oxygen, temperature, water purity etc. appear to be more extreme than with other trouts such as brown trout or rainbow trout. That is, the greenback cutthroat trout is less tolerant of adverse conditions.

The most significant factor limiting the distribution of the greenback cutthroat is introduced non-native trouts. Hybridization occurs with other subspecies of cutthroat trout and with rainbow trout. The eastern brook trout has had a particularly devastating effect by replacing the greenback trout in virtually all of the small tributary streams. For future re-introductions, only waters completely barren of other fishes will have any chance of successfully establishing the greenback cutthroat trout.

C. Food and Feeding: There is no detailed data available on the feeding habits of greenback trout, but from the bits of information available (Bulkley, MS. 1959; Jordan, 1891; Juday, 1907; Nelson MS.1972) and personal observations it appears that the greenback cutthroat trout

is eclectic and opportunistic in its feeding utilizing a variety of invertebrate foods depending on their availability. Jordan (1891) wrote that the greenback trout was not as predaceous as other cutthroat trout. This was based on his observations at Twin Lakes and at a private trout hatchery were greenbacks were maintained. There may be some truth to this observation because the greenback was never noted for its large size. Specimens of more than a pound evidently were rare.

D. Reproduction: Although no detailed data is available on reproduction there is no reason to suspect that S. c. stomias has any basically different spawning requirements than other subspecies of S. clarki. Spawning occurs in flowing water in late spring or early summer, depending on water temperature. Nelson (MS. 1972) reported the spawning run from Island Lake peaked during the first two weeks of July, 1971 (elevation 10,500 feet). The fecundity of 7 females from Island Lake, averaging 273 mm and 185 g. averaged 299 eggs.

E. Interdependence and competition with other animal species. Historically the greenback trout coexisted, at least at lower elevations with a variety of fish species indigenous to the South Platte and Arkansas river systems such as longnose sucker Catostomus catostomus, white sucker, C. commersoni, longnose dace, Rhinichthyes cataractae and creek chub, Semotilus atromaculatus. Sculpins of the genus Cottus, mountain sucker subgenus Pantosteus and Rocky Mountain whitefish, Prosopium williamsoni, typically associated with other subspecies of cutthroat trout were absent from the native range of S. c. stomias. The drastic decline and virtual disappearance of the greenback trout was due to introductions of non-native trouts and subsequent hybridization and displacement. The presence of introduced

trouts are the most significant limiting factor to expanding the present distribution of greenback trout.

IV. Research Needs (management recommendations). Two major objectives are: (1) to increase the abundance of greenback trout by introductions into new waters that are presently barren of fish or where all fishes are eliminated and (2): To find additional sources of pure greenback trout. The first objective is enthusiastically endorsed by Roosevelt National Forest and Rocky Mountain National Park biologists. Potential transplant sites are currently being considered. The second objective is doubtful. The east slope streams of the Arkansas and South Platte drainages have been relatively well covered. The area is large however, and there is always the possibility that another site similar to the Como Creek situation will be found.

It is not recommended that a brood stock be developed in a hatchery. Adults from Albion Creek and from Forest Canyon were formerly held at the Leadville National Fish Hatchery with this goal in mind. These trout were extremely difficult to maintain. The Albion Creek trout all perished and the males and females from Forest Canyon did not ripen at the same time. If a brood stock could be developed under hatchery conditions, artificial selection for domestication would be unavoidable.

V. Authorities: Robert Behnke, Colorado Cooperative Fishery Unit, Colorado State University, Fort Collins, Colorado 80521. Taxonomy, distribution.

James Mullen, U.S. Bureau of Sport Fisheries and Wildlife, Vernal, Utah. Mr. Mullen handles fisheries investigations for Rocky Mountain National Park and would be involved with plans for greenback restoration.

Wesley Nelson, Colorado Division of Wildlife, Research Laboratory, Fort

Collins, Colorado 80521. Biology, reproduction and artificial propagation of Island Lake population.

VI. Annotated Bibliography

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