

Greenback Cutthroat Trout (*Oncorhynchus clarki stomias*)

Data: Greenback Cutthroat Trout Recovery Plan-1998; Greenback Conservation strategy – 2007;

Partners: CO, FWS, FS, BLM, NPS, TU

Status of the Greenback Cutthroat Trout:

In 1889, David Starr Jordan reported greenback cutthroat trout (GBC) “abundant in the Park Range and in mountain streams generally” of the South Platte drainage, and “very common in all the upper tributaries of the Arkansas River and in Twin Lakes”. In addition, he reported the presence of non-native trout species, and the impacts of development on trout: “This is certain, that if the present conditions go on the trout in the lower courses of all the streams will be exterminated, and there will be trout only in the mountain lakes and in the mountain meadows, to which agriculture can not extend”. As a result of habitat alteration, non-native fish and unregulated harvest, the greenback was extirpated from most of its range by the early 1900’s, and Greene (1937) considered the species extinct. Two small populations of pure greenbacks were documented by 1969, representing 4.6 km of habitat and less than 2,000 greenbacks. Following the discovery of isolated populations, the greenback was listed as an endangered species under the 1973 Endangered Species Act. To facilitate recovery, the FWS published a final determination changing the status of GBC to Threatened in 1978 (43 FR 75, 16343), and the greenback was designated as the official Colorado State Fish in 1994. In December 2005, the U.S. Fish and Wildlife Service announced a 5-year review of greenback cutthroat trout status, with this review currently underway. The Greenback Recovery Team adopted the Inland Cutthroat Trout Protocol (ICP), with a workshop on the historic and current distribution held in January 2007.

The initial Greenback Cutthroat Trout Recovery Plan was approved in 1977, with revised plans approved in 1988 and 1998.

Sportfishing Status of the Greenback Cutthroat Trout:

Although listed as a Threatened Species, The State of Colorado, the FWS and the NPS allow some form of sport fishing on most of the recovery and research populations under a 4d rule (50 CFR 17.44 f). The first post-listing sport fisheries for greenbacks opened in 1982, and since that time, over 40 restoration sites have been opened to some form of angling. Populations that are considered to be genetically important, yet open to angling have special regulations requiring catch-and-release, limited harvest, and terminal tackle restrictions to maintain trout populations and prevent over-utilization. Many GBC populations tend to lie in remote headwater drainages with difficult access, which has served to minimize angling pressure. However, Colorado and the NPS have closed some cutthroat waters to protect spawning populations and wild broodstocks. In addition, Task 4 of the current recovery plan calls for documenting angler response to a variety of angling regulations and habitats (including low elevation fisheries), prior to delisting. Greenbacks are opportunistic feeders, and are easily caught over a wide range of angling techniques. However, the use of catch-and-release regulations appears very effective in maintaining backcountry and even road-side populations. Angler support for the GBC conservation management program is strong in Colorado, and is considered an important asset to conservation and management programs.

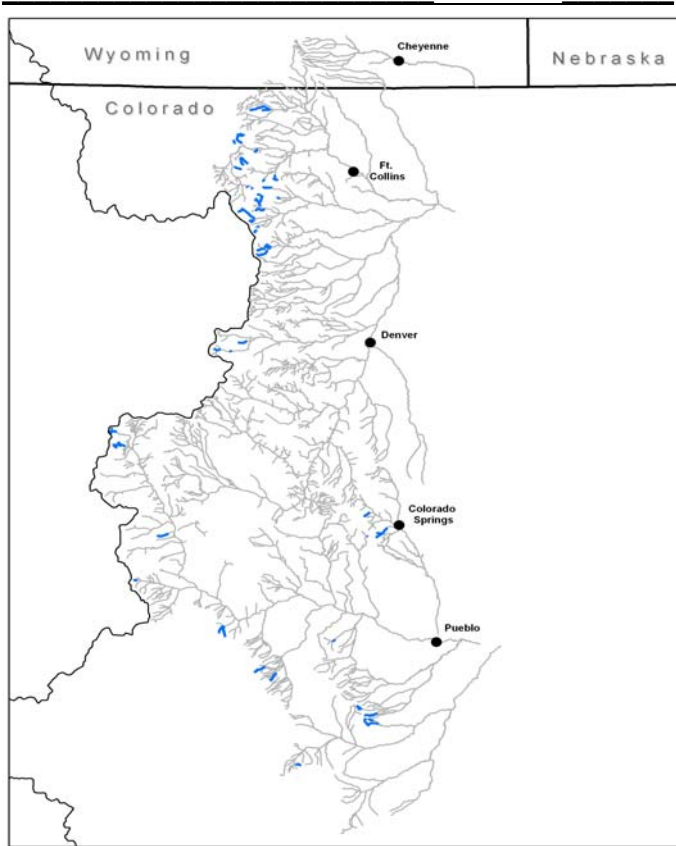
Distribution of Greenback Cutthroat Trout:

The Greenback and Rio Grande cutthroat trout represent the easternmost limits of native cutthroat trout distribution within the United

Greenback Cutthroat Trout (*Oncorhynchus clarki stomias*)

States. The species is native to the headwaters of the South Platte and Arkansas River drainages, and may have extended as far east as present day Greeley, Colorado during the mid-1800's. Based upon the data from the Greenback Cutthroat Trout Range-wide Database (2007), the majority (60%) of the estimated 10,416 km of historic habitat occurred within the South Platte drainage. The 2007 database also estimated that 94% of the historic habitat was found within Colorado, but greenbacks appeared to have occupied 606 km of the South Platte drainage within Wyoming. In addition to streams, greenbacks were also reported by Jordan (1889) to be native to Twin Lakes (400 ha), near the headwaters of the Arkansas River drainage within Colorado.

Figure 1. Historic Range and Current Distribution of the Greenback Cutthroat Trout



Much of the historic range of GBC is located along the Colorado and Wyoming Front Range in which the land uses include large urban areas, long-term agriculture, mining and water development. As predicted by Jordan (1889), although greenbacks probably extended as far east as Greeley, Colorado, current populations are limited to mostly remote mountain lakes and streams. Based upon the data from the ICP protocol (2007), 228 km of stream and 167 ha of lakes currently contain populations of greenbacks that conform to the meristics of historic greenback populations (please see the map on this page for distribution of current populations (dark blue) within the historic range (gray) of the species). Although the majority of current populations are found on public lands (FS, NPS, FWS, BLM, state), 20 km (9%) of stream and 49 ha (29%) of lake habitat is currently located on private land.

Habitat Requirements of the Greenback Cutthroat Trout

Suitable habitat for self-sustaining salmonid populations must contain sufficient physical complexity to meet the requirements of all life-history stages. In this regard, the habitat requirements of greenbacks are similar to those of other salmonids confined to fresh waters, with greenbacks appearing to establish reproducing restoration populations in all habitats that previously supported reproducing populations of rainbow, cutthroat and brook trout (Coleman 2007).

Physical and Thermal Requirements: Accounts from the 1800's describe greenbacks occupying habitats from approximately 1,400 to slightly over 3,000 meters in elevation. Currently, the lower elevations of the historic range has been greatly altered with limited restoration potential, and it appears that cold temperatures currently limit consistent reproduction in like habitats above 3,400 meters in elevation.

Greenback Cutthroat Trout (*Oncorhynchus clarki stomias*)

Spawning requirements : Due to a need for YOY to establish themselves prior to winter, the current recovery plan suggests that sites selected for restoration have adequate spawning habitat and temperatures of 5-8°C by early July. Alpine lake populations utilize both inlet and outlet spawning habitat, and in one instance, appear to use shoreline habitat for spawning in the absence of inlet/outlet streams.

Water Quality Requirements: Studies show that larval greenbacks are more sensitive to low pH than eggs and embryos, with 5.0 a threshold pH for larvae in the absence of aluminum. Limited experiments indicate that greenback LC50's were similar to rainbow trout, but greenbacks were often slightly more sensitive.

Food and Feeding Requirements: Studies have indicated that greenbacks are opportunistic feeders over a wide range of prey organisms, but a large portion of the diet can be terrestrial insects. One study (McGrath) found that greenbacks consumed more prey items, and an overall greater variety of prey, than brook trout of similar size where both species were present.

Concerns, Issues, or Obstacles relative to the Conservation and Improvement of the status of Greenback Cutthroat Trout:

Population Viability Concerns:

Recovery efforts for the greenback cutthroat have focused on protecting historic populations, establishing new populations and locating additional historic populations. In the past, genetic techniques were not available to differentiate between the cutthroat subspecies in Colorado. New genetic research being conducted at the University of Colorado and in other labs may allow subspecies/populations to be identified using new molecular genetic techniques. Based on the potential for new information, management agencies are being cautious with greenback related activities until a thorough review of the new

research findings can occur.

Habitat Concerns

As with other cutthroat subspecies, the distribution and numbers of GCT declined due to human-induced influences such as urbanization, agriculture, logging, livestock grazing, road-building, mining and water development. However, these impacts are especially significant for GBC, due to the species limited historic range and the majority of the species' historic range occurring within some highly developed areas within Colorado's Front Range. As a result historic prairie and foothill GCT habitat has been largely degraded and fragmented.

Introduced Species Concerns

The introduction and subsequent spread of non-native trout with their resultant adverse impacts is considered by many fisheries scientists to be the major threat to GCT. Many of the historic habitats of GCT have been extensively colonized by introduced (stocked), non-native fishes. Among these nonnative species are brook trout, rainbow trout, and brown trout. Brook trout are considered to be the most significant competitor with GBC in stream habitats, leading to the elimination of GCT in most stream and many lake habitats. In addition, the ease with which the greenback trout can hybridize with introduced rainbow and other subspecies of cutthroat trout, demonstrates the concern for separating pure GCT populations from other non-native recreation trout species.

Disease and Invasive Species Concerns

Cutthroat trout are susceptible to common salmonid diseases, including whirling disease, which is caused by the myxosporidian *Myxobolus cerebralis* (*Mc*). In one study, greenback produced 15.6 times less *Mc* spores

Greenback Cutthroat Trout (*Oncorhynchus clarki stomias*)

after 6 months than rainbows, but greenback weighed 45% less than the infected rainbows. Mortalities were 26%-32% for greenbacks, compared to 3%-4% for infected rainbows. Little is known about other diseases and parasites of this subspecies, except it can contract bacterial kidney disease. Wild populations have been observed with common parasites such as *Gyrodactylus*, *Gossatella*, *Hexamita* and *Crepidostomum*.

Testing has found no state or federally controlled obligate bacterial or viral diseases associated with historic GBC populations. Transmission of diseases to wild cutthroat trout populations through hatchery-based fish stocking is also recognized as a potential, but low-level concern. Colorado has statewide policies and regulations that address fish health status, disease certification for stocked fish, and stocking protocols which are designed to reduce disease concerns.

In Colorado, the presence of New Zealand Mud Snails presents an opportunity for this invasive to be spread to native trout waters. However the concern is low due to the elevation and temperature of most current GCT habitats.

Climate Change Concerns

Warming temperatures and habitat succession may provide some future opportunities for establishing reproducing GBC populations in lake and stream habitats that are currently limited by temperature (CSU, 2001). However, alpine lakes above 3,400 meters in elevation may not contain adequate habitat required for all life stages. In addition, detrimental impacts of climate change could include reduced stream flows throughout the species range and increased risk of wildfires.

Opportunities for Improvement of the Status of Greenback Cutthroat Trout:

The goal of the Recovery Plan for Greenback cutthroat trout is to restore the Greenback trout to non-threatened status within its native range.

The de-listing goal is at least 20 stable reproducing populations occupying at least 50 hectares (124 acres) of lakes and ponds; and 50 kilometers (31 miles) of stream. At least 5 of the stable populations should occur within the Arkansas Basin (GCT Recovery Plan, 1998). If there are no dramatic changes in taxonomy, the current 228 km of stream and 167 ha of lakes, exceed the current km and ha objectives.

The Recovery Plan also identified seven specific objectives:

- Maintain existing populations of greenbacks
- Establish or document 20 stable populations of greenbacks
- Establish captive and wild brood stocks within Colorado
- Conduct research on greenback angling programs and hatchery programs
- Conduct greenback information and education programs
- Promote partnerships and expand efforts to obtain non-agency funding
- Prepare a long-term greenback management Plan and cooperative agreement

Typically the potential actions for improving the status of GCT fall within three categories:

- Monitor conservation populations
- Secure, enhance and expand conservation populations
- Recreation, regulatory and outreach activities to enhance recovery

Monitor Conservation Populations

At present, there are multiple State, Federal, and private conservation efforts that are working on monitoring habitat, population and taxonomic issues.

Greenback Cutthroat Trout (*Oncorhynchus clarki stomias*)

Key actions include:

Continue to survey for historic GBC populations
Monitor known GBC populations for trends in habitat and population status
Conduct taxonomic/genetic testing to determine purity of stocks and any impacts of inbreeding
Based upon monitoring program, update status of populations/rangewide database (ICP)

Secure, Enhance and Expand Conservation Populations

For over 30 years, efforts have been directed towards securing existing populations, enhancing small populations and expanding GBC populations.

Key actions include:

Expand small, isolated populations where possible, and maintain or enhance high quality habitats to prevent extirpation due to small population size or stochastic events and protect distinct life-history traits
Population manipulation (non-native removal, re-introduction, spawn taking, etc.)
Restrict introduction of non-native fish species
Restrict spread of disease and invasive species, construct/maintain in-channel barriers
Create metapopulations where possible
Maintain sources of genetically pure GBC
Identify suitable new habitats for re-introduction
Conduct research on conservation issues (taxonomy, barriers, etc.)

Recreation, Regulatory and Outreach Activities to Enhance Recovery

The greenback is the Colorado State Fish with recreational fishing opportunities available since 1982. Maintaining the sportfish status and outreach activities will continue to be important components of the recovery program. In addition, working with others to maintain appropriate regulations for angler use, prevention of disease, water quality impairment, and habitat disturbance are important considerations.

Key Actions include:

Maintain appropriate angling regulations, assess angler use and support for GBC angling opportunities
Work with agencies and partnerships to maintain appropriate in-stream flows and water quality standards
Enhance and maintain regulatory mechanisms that prevent diseases or illegal introduction of nuisance species
Conduct public outreach programs to increase public support for recovery efforts
Complete the long-term management plan and conservation agreement
Continue a cooperative interagency/NGO work environment
Include greenbacks in watchable wildlife programs

Highest Priority Objectives for the Greenback Cutthroat Trout include:

1. Complete genetics work on the relatedness of Colorado River, Rio Grande and greenback cutthroat trout.
2. Establish additional stable populations in the Arkansas and South Platte River basins.
3. Establishing methods to estimate fish populations in backcountry/wilderness lakes.

Greenback Cutthroat Trout (*Oncorhynchus clarki stomias*)

4. Maintain and update the rangewide database (ICP) system.
5. Prepare and sign a cooperative long-term conservation and management plan and agreement between state, federal and private interests to guide management of the greenback cutthroat after de-listing.

Estimated Cost of recovery: \$634,000 (1998)

References

1. Behnke, R. 2002. Trout and Salmon of North America.
2. Greenback Cutthroat Trout recovery Plan. U.S. Fish and Wildlife Service, 1998. 69 pp.
3. Greenback Cutthroat Trout Conservation Strategy. 2007. (Unpublished)
4. Bulletin of the United States Fish commission, Vol. IX for 1889. 502 pp.
5. Coleman, 2007. Life History and Ecology of the Greenback Cutthroat Trout. 15 pp.