

Greenback Cutthroat Trout (*Oncorhynchus clarkii stomias*)

DATA: Greenback Cutthroat Recovery Plan 1998; Greenback Cutthroat Trout: A Technical Status Assessment (USFS) 2009; Greenback Cutthroat Trout Genetics and Meristics Studies Facilitated Expert Panel Workshop (2014)

Partners: CPW, USFWS, USFS, BLM, NPS, TU

Background: Our understanding and knowledge of the distribution and status of cutthroat trout in Colorado has changed dramatically in the past decade.

Historically, greenback cutthroat trout (GBCT) were thought to occupy the South Platte and Arkansas River basins in eastern Colorado. Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*) were believed to occupy high elevation streams and lakes in western Colorado -- with the Continental Divide serving as a geographic barrier separating the two subspecies. A third subspecies, the Rio Grande cutthroat trout (*Oncorhynchus clarkii virginalis*), was found exclusively in the Rio Grande River basin.

Concerted research efforts starting in 2003 have since further clarified the native distribution of these fish culminating in 2012 with a study that combined an extensive search of remaining stocking histories combined with molecular analysis of museum specimens collected up to 150 years ago and extant populations (Metcalf et al. 2012). This research concluded that GBCT were native only to the South Platte River basin, and surprisingly, that only a single population remained. This population in Bear Creek near Colorado Springs appears to have been founded from stock collected in the South Platte River basin in the late 1800's. These fish have survived as an isolated self-sustaining pure population of GBCT above a natural waterfall in just four miles of habitat for over 130 years.

Based on Metcalf's (2012) findings, and a more recent study that demonstrated Bear Creek fish are visually distinct from other cutthroat trout (Bestgen et al. 2013), current GBCT recovery efforts are now focused on replicating the Bear Creek GBCT in hatcheries and re-establishing populations within their native South Platte River basin.

The information in this Status Report assumes that the Bear Creek cutthroats are the only true remaining representatives of GBCT and generalizes that these fish have habitat and life history requirements similar to Colorado River cutthroat trout and other closely related cutthroat trout subspecies.

Greenback Cutthroat Trout Status

Review: The greenback cutthroat trout was listed as an endangered species on March 11, 1967 (32 FR 4001). It was downlisted to threatened on April 18, 1978, as conservation efforts conducted by state and federal agencies had restored the species to the point where it was no longer deemed endangered (43 FR 16343 16345). The downlisting allowed for "take" of greenback cutthroat trout in accordance with state laws in Colorado.

Sportfishing Status of Greenback

Cutthroat Trout: The downlisting of greenback trout in 1978 allowed Colorado Parks and Wildlife to selectively establish sportfishing opportunities and regulate methods of angling, possession limits, and seasons. It also allowed for certain waters to be closed to fishing. Currently, there are

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only two known populations of greenback trout; Bear Creek is closed to all fishing and Zimmerman Lake is open for catch and release fishing with flies and lures only. As additional GBCT populations are established, it is hoped that more catch and release opportunities will be available to the angling public.

Greenback Cutthroat Trout Distribution:

Although it appears that GBCT were historically found only in the colder waters of the South Platte River basin, the lone remaining population on which to base the recovery effort is currently found in Bear Creek in the Arkansas River basin. The Bear Creek GBCT have been successfully reared in several hatcheries and have been stocked in Zimmerman Lake in the headwaters of the South Platte River basin. Additional stockings are planned in the near future, with the focus being on re-establishing populations in their native range.

Greenback Cutthroat Trout Habitat

Requirements: The habitat requirements of GBCT are similar to other cutthroat trout species. GBCT evolved in high elevation streams and in general require water temperatures below 24° C (77° F) with adequate flow and shading to maintain pools that provide refuge during low water. Like other trout species, GBCT require coarse gravel substrate for spawning and thrive in streams with adequate pools and cover in the form of overhanging vegetation and undercut banks.

Concerns, Issues, or Obstacles Relative to the Conservation and Improvement of the

Status of Greenback Cutthroat Trout:

Historic GBCT habitat in the South Platte River basin has been greatly altered as a result of human activities and water withdrawals. A significant portion of GBCT historic habitat is no longer suitable due to water diversions, incompatible management on private lands, inability to exclude non-native salmonids, and other anthropogenic alterations. Additionally, competition and predation from other non-native trout species, and hybridization with introduced cutthroat and rainbow trout led to the loss of all but one remaining historical population. New concerns for GBCT include the risk of catastrophic wildfire, aquatic invasive species, disease, and climate change.

Habitat Concerns

GBCT in Bear Creek have been affected primarily by sedimentation due to erosion from roads and trails in the drainage. Excess sedimentation results in reduced quality and quantity of spawning and rearing areas; altered stream flow volume and temperature; and loss of productivity and food supply (e.g., stream dwelling insects). Outside of Bear Creek, potential reintroduction sites will be prioritized to identify sites which meet the habitat needs of GBCT and thus provide the best opportunity for establishment of self-sustaining populations.

Introduced Species Concerns

Although hybridization with rainbow and other cutthroat trout contributed significantly to the decline of GBCT, the Bear Creek population has remained pure and has been successfully propagated in

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hatcheries. Reintroduction sites will exclude non-native salmonids and other fish species which will allow new GBCT populations to establish and grow in the absence of competitors and hybridization concerns.

Aquatic Invasive Species

The Bear Creek GBCT population has not been impacted by whirling disease, other salmonid pathogens, or invasive species and reintroduction sites will be carefully screened to ensure that they are free from disease and nuisance species prior to reintroduction. Like similar cutthroat subspecies, GBCT are susceptible to whirling disease but at the current time it does not appear to be a significant threat.

Genetic Concerns

The primary genetic concern for GBCT moving forward is the loss of genetic diversity due to the small population size and extended isolation experienced by the sole remaining population in Bear Creek. Hatchery-reared GBCT have shown high rates of deformities, although this is not exhibited in wild fish in Bear Creek. Current propagation efforts are attempting to maximize the remaining genetic diversity by mixing wild gametes with hatchery gametes and developing a protocol that tracks donor eggs and milt in order to create as much genetic diversity as possible moving forward. It is anticipated that natural selection in re-introduced populations will result in fewer deformities and healthier populations over time.

Over-Utilization Concerns

As the native trout in the densely populated South Platte River basin, the GBCT was exposed to significant unregulated harvest in the late 1800's and early 1900's. Since its listing in 1967, harvest has been tightly regulated and over-utilization concerns have been reduced. The Bear Creek population and all additional populations established from the Bear Creek stock will be subject to strict regulations that either prohibit fishing or limit it to catch and release only.

Opportunities to Improve the Status of Greenback Cutthroat Trout

The current Recovery Plan for GBCT was completed in 1998 and is out of date. A new Recovery Plan needs to be written, and will be initiated as the genetic and taxonomic determination for cutthroat subspecies is resolved. In the interim, recovery goals and objectives for GBCT will be guided by a Recovery Outline which is currently being drafted. In the short term (next 5 years), recovery actions will focus on establishing additional wild populations in the native range, improving genetic diversity in hatchery stocks, and protecting existing habitat. Longer term objectives include the following actions:

- Monitoring of re-introduced populations to determine population size, age class distribution, recruitment success, incidence of deformities, and likelihood of self-sustainability
- Population manipulations including removal of non-native fish and construction of barriers to provide

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- additional locations where populations can be re-established
- Continuation of policies prohibiting stocking of non-native trout into waters containing replicate GBCT populations, or within the drainage upstream of those populations.
 - Maintenance of appropriate fishing regulations and property closures
 - Protection of GBCT populations from disease and over-utilization
 - Attempting to establish inter-connected meta-populations of GBCT, to improve genetic diversity and increase ability to withstand stochastic events
 - Developing and implement a public outreach effort specifically addressing GBCT conservation
 - Maximizing effectiveness of GBCT conservation efforts by coordinating signatory agency efforts

Population and Habitat Manipulations

In order to establish new self-sustaining GBCT populations in the South Platte River Basin, it may be necessary to chemically remove fish from potential re-introduction sites. A population will be considered “established” when it is self-sustaining, capable of persisting under the range of variation in habitat conditions that occur in the restoration stream, and when the population is protected from immigration of non-native trout.

Key actions include:

- Develop a list of suitable re-introduction waters in the South Platte River basin
- Develop a secondary list of suitable waters outside of the South Platte River basin to serve as refugia sites
- Re-establish populations with pure GBCT in renovated streams and lakes or in streams and lakes that are fishless
- Finalize GBCT broodstock management plan
- Where necessary, maintain or build barriers to prevent non-native fish from invading GBCT waters
- Continue efforts to improve instream and riparian habitat in Bear Creek
- Manage human impacts through appropriate regulations and control of public access

Regulatory Mechanisms to Enhance GBCT Status

Maintaining the opportunity for catch and release fishing for GBCT is important in order to maintain public support for ongoing recovery efforts. Working with state and federal partners to implement and enforce appropriate regulations to prevent disease, water quality impairment, and habitat loss are critical to the long term health of GBCT.

Key actions include:

- Maintain or enhance regulatory actions to prevent degradation or destruction of habitat
- Enforce regulatory mechanisms that prevent impacts associated with recreational angling
- Enhance and maintain regulatory mechanisms that prevent diseases or

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illegal introduction of nuisance species

- Where possible, secure instream flow protection for GBCT streams

Highest Priority Strategies and Actions for Greenback Cutthroat Trout Protection and Delisting:

1. Re-establish pure GBCT in South Platte River basin locations
 - Rock Creek
 - Herman Gulch
 - George and Cornelius Creeks
 - Square Top Lakes & Duck Creek
2. Update GBCT Recovery Plan to incorporate new information
3. Implement and improve broodstock management plan to ensure an ongoing source of healthy GBCT for reintroduction efforts
4. Expand list of reintroduction sites both within and outside of the South Platte River basin
5. Monitor populations to determine current status
 - Bear Creek
 - Zimmerman Lake

WNTI Completed Projects or Ongoing Projects:

- Bear Creek Habitat Improvement and Protection (2010) - \$36,178
- Bear Creek Habitat Improvement and Protection – Phase 2 (2011) - \$11,150
- Bear Creek Sediment Mitigation – Phase 1 (2013) - \$50,000

References:

- Bestgen, K. R., K. B. Rogers, and R. Granger. 2013. Phenotype predicts genotype for lineages of native cutthroat trout in the Southern Rocky Mountains. Final Report to U. S. Fish and Wildlife Service, Colorado Field Office, Denver Federal Center (MS 65412), Denver, CO. Larval Fish Laboratory Contribution 177.
- Metcalf, J.L., S.L. Lovell, C.M. Kennedy, K.B. Rogers, D. McDonald, J. Epp, K. Keepers, A. Cooper, J.J. Austin, and A.P. Martin. 2012. Historical stocking data and 19th century DNA reveal human-induced changes to native diversity and distribution of cutthroat trout. *Molecular Ecology* 21:5194-5207.