



**State of Utah
Department of Natural Resources
Division of Wildlife Resources**

**Utah Division of Wildlife Resources Colorado River Cutthroat Trout Conservation
Strategy**



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Introduction

Colorado River Cutthroat Trout (CRCT) historically occupied large portions of the Colorado River drainage in Utah, Colorado, Wyoming, New Mexico, and Arizona. Non-native fish introductions have greatly restricted the range of CRCT (11% of historic range; Hirsch et al. 2013) and the subspecies is now primarily found in isolated headwater lakes and streams. This range reduction has prompted petitions for listing under the Endangered Species Act, but to date, listing has been prevented due to the extensive conservation actions taken by various agencies. One such action was the formation of the Colorado River Cutthroat Trout Conservation Team, which completed a Rangewide Conservation Agreement and Strategy in 2006 (CRCT Conservation Team 2006). This agreement helps coordinate conservation actions among federal, state, and non-government partners and outlines general goals and objectives for the conservation of CRCT.

The CRCT Conservation Agreement and Strategy provides broad goals and objectives but does not include strategies that should be utilized to conserve the subspecies. As a result, numerous conservation measures have been taken and these measures have often varied among partners and end-goals for these conservation measures have not been considered. The Utah Division of Wildlife Resources (UDWR) is a member of the CRCT Conservation Team. As an agency, the UDWR has restored CRCT to hundreds of miles of stream. Additional high quality restoration opportunities are dwindling in Utah and the UDWR would like to change emphasis from population restoration to increasing population resiliency.

The UDWR feels that the CRCT Conservation Agreement and Strategy provides a comprehensive approach to the conservation of CRCT. This document describes the specific strategies that the UDWR plans on employing to meet the conservation goals outlined within the Agreement. This document makes Utah the first state to outline specific actions that will be undertaken with a completion timeline. This document provides a strategy that the UDWR and partner agencies can follow when initiating CRCT conservation actions in Utah.

Document Vision, Need, Purpose, and Objectives

This document is the product of discussions with Utah's CRCT conservation team. These discussions led to the creation of the following Vision, Need, and Purpose statements:

Vision Statement: To assure that CRCT will persist and remain viable through the 21st century within Utah.

Need Statement: The goals and objectives in the Rangewide strategy are broad. There is a need to develop a specific plan on how to address the Rangewide goals within Utah.

Purpose Statement: The purpose of the Utah CRCT strategy is to identify specific strategies and projects for addressing the goals and objectives laid out within the Rangewide Strategy.

The objective of this document is to describe the specific strategies and projects that will be initiated in Utah to meet the goals of the Rangewide Agreement and Strategy. A second objective is to provide a timeline for the completion of conservation actions in Utah.

Table 1: Summary of the current status of CRCT in Utah. Numbers outside parentheses represent populations in Utah and number in parentheses are the total number in the hydrologic unit. Conservation abbreviated as Cons, populations abbreviated as pops, peripheral abbreviated as peri, persistent abbreviated as persist, and metapopulations abbreviated as metapops.

GMU	HUC 8	# of Cons Pops	Km Habitat Occupied by Cons Pops	# of Adfluvial Pops	Peri Pops	Persist Pops	Stronghold Pops (# of pops.)	Meta pops (# of pops.)	
Delores	Upper Delores (14030002)	1 (11)	4.9 (67.2)	0	1	0 (1)	0	0	
	Lower Delores (14030004)	0 ¹	0	0	0	0	0	0	
Lower Colorado	Fremont (1407003)	5	44.6	1	5	2	0	0	
	Escalante (1407005)	17	42.3	0	17	0	0	0	
Lower Green	Lower Green-Diamond (16060001)	0	0	0	0	0	0	0	
	Ashley-Brush (14060002)	4	95.3	2	0	1	0	1	
	Duchesne (14060003)	13	147.4	3	0	7	0	0	
	Strawberry (14060004)	5	126.7	1	0	4	1	1	
	Willow (14060005)	6	83.4	0	0	5	1	0	
	Lower Green-Desolation Canyon (14060006)	1	61.9	0	0	1	0	1	
	Price (14060007)	3	148.7	0	0	3	0	1	
	San Rafael (14060009)	6	148	3	0	1	0	1	
	Upper Green	Upper Green-Flaming Gorge (14040106)	17 (20)	290.1 (374.5)	2	0	10	1 (2)	2 (3)
		Blacks Fork (14040107)	6 (12)	185.3 (219.9)	2	0	5 (6)	1	1
	Totals	84 (103)	1378.6 (1559.9)	14	23	39 (41)	2 (3)	3 (4)	

¹ There are 5 populations with high introgression rates within GMU in Utah

Introduction to the Utah CRCT Strategy

Utah has among the most secure CRCT populations. The number of occupied stream miles is second to Colorado and CRCT occupy 2-3 times more historical habitat in Utah than any other state (Hirsch et al. 2013). In addition, the average occupied patch length in Utah is greater than any other state (Hirsch et al. 2013). A summary of the status of CRCT within Utah is presented in Table 1.

For management purposes, CRCT are divided into Geographic Management Units (GMU) based on major watershed boundaries and then further divided by HUC 8 within GMU's. Because of distance and habitat (e.g., thermal and physical barriers) there is little connectivity between GMU's and within HUC 8s.

For the purposes of this document, populations are classified as follows:

Conservation Population: Based on unique conservation population ID's within the Rangewide CRCT Database; generally any population that has >90% genetic purity, exhibits a fluvial or adfluvial life history, or is on the periphery of the range of CRCT.

Peripheral Population: Any population that is at the edge of the range of CRCT. All conservation populations in the Lower Colorado and Dolores GMU's are considered peripheral because they are generally isolated and not interconnected to other populations.

Persistent Population: Any population that meets or exceeds the persistence length criteria (Hilderbrand and Kershner 2000) of 9.3 km.

Stronghold Population: Any population with 27.8-49.9 km of stream habitat

Metapopulation: Any population with > 50.0 km of stream habitat

This plan frames Utah's restoration of CRCT within the 3-R framework (Schafer and Stein 2000). The three R's are representation, resiliency, and redundancy, defined as follows:

1. **Representation:** It is the goal to ensure that all life history forms of CRCT are represented in Utah and that conservation practices do not lead to the exclusion of life history forms that were present historically. To achieve this goal, both resident and adfluvial life-histories should be represented in GMU's where they were present historically.
2. **Resiliency:** It is recognized that larger populations with more intact habitat are better able to survive large disturbances and rapid environmental change than smaller populations. It is the UDWR's top priority to restore populations with more habitat than the persistence length criteria (9.3 km) recommended by Hilderbrand and Kershner (2000). It is acknowledged that few CRCT populations in southern Utah meet the persistence length criterion and that populations in these areas have evolved to cope with limited habitat.
3. **Redundancy:** The goal is to establish replicate populations within each GMU because the presence of multiple populations allows some populations to be lost without jeopardizing the subspecies.

This plan attempts to strike a balance among the 3-R's. The goal is to provide representation of all life history forms within a HUC 8 (when multiple forms were present historically) with replication of each life

history form so there is redundancy. The UDWR attempts to restore populations that meet the persistence length criterion but acknowledge that is not always possible and target greater redundancy when the persistence length criterion is not possible. Regardless, it is recognized that the number of populations restored is sometimes restricted by the total amount of habitat available and political constraints. Some GMU's straddle state boundaries and better quality and higher quantities of habitat may be available in other states. In these situations the UDWR will collaborate with other states to ensure that agencies are working collaboratively towards conserving CRCT.

There are four CRCT GMU's that either entirely or partially fall in the UDWR's jurisdiction. The UDWR's general goals for each GMU are as follows:

1. Dolores: The majority of the habitat and the best quality habitat is in Colorado. This GMU has the strongest green lineage populations with one of the strongest populations being Beaver Creek, within Utah. Beaver Creek is also the only Dolores GMU population in the state. The ultimate goal is to replicate the population in Utah. The UDWR will spend 2020 exploring options, two of which are Hang Dog and Twomile Creeks. The watershed above Buckeye Reservoir (Colorado) is also an option. The UDWR will use brook trout surrogates to begin disease certification of Beaver Creek in 2020. Colorado Parks and Wildlife and the UDWR are working collaboratively to begin certification of Disappointment Creek (Colorado) as another source. Due to habitat limitations, it is not likely that any populations meeting the persistence length criterion will be established in Utah and increasing redundancy is a primary goal.
2. Lower Colorado: This GMU resides solely in Utah and only two of the HUC 8's within the GMU have CRCT habitat. Past restoration efforts in the GMU have been hampered by political opposition. There are a few opportunities to establish populations that meet the persistence length criterion but those opportunities are limited. CRCT in this GMU, however, have adapted to and persist in small, isolated populations. The goals within this GMU are to establish two additional conservation populations with both meeting the persistence length criterion. This will double the number of populations that meet the persistence length criterion within the GMU. Work in the North Creek drainage began in 2019 and will continue for the next several years. Work in both Oak Creek and Calf Creek is being considered. Although the public may resist both of these projects, both will be pursued in 2020 and the project with the least resistance will be selected and completed in the future.
3. Lower Green: This GMU resides solely in Utah. There is good population redundancy within the GMU and several populations that meet the persistence length criterion including stronghold populations and metapopulations. Goals within this GMU should be to increase resiliency by establishing additional populations that meet the persistence length criterion. NEPA was completed for several projects in the wilderness area and treatments in Oweep, Garfield, and Fall Creeks will be completed over the next 10 years. There are additional restoration opportunities in this GMU and after 2030 some additional projects that require minimal planning and execution effort may be considered.
4. Upper Green: Much of this GMU lies in Wyoming and there is good habitat in both states. There is good redundancy within this GMU. Goals within this GMU should be to increase resiliency by establishing additional populations that meet the persistence length criterion. The only projects

that should be completed in this GMU should be where NEPA has already been completed (Sheep Creek/Carter Creek and West Fork Smiths Fork).

Utah Colorado River Cutthroat Trout Conservation Strategy

The Rangewide Goal of the Conservation Strategy for Colorado River Cutthroat Trout is: “To assure the long-term viability of CRCT throughout their historic range. Areas that currently support CRCT will be maintained, while other areas will be managed for increased abundance. New populations will be established where ecologically and economically feasible, while the genetic diversity of the species is maintained. The cooperators envision a future where threats to wild CRCT are either eliminated or reduced to the greatest extent possible.”

Under this goal, the Rangewide Conservation Strategy has seven objectives. Utah’s statewide plan assigns strategies for each Rangewide objective. Utah’s strategies are as follows:

Rangewide Objective 1: Identify and characterize all CRCT core and conservation populations

- Identify all waters with CRCT populations and monitor known populations to detect changes. Complete genetic analyses on known or potential CRCT populations.
 - Utah Strategy 1.1: The UDWR has already sampled all waters that are suspected to contain CRCT. UDWR regions will continue to survey potential new populations when we become aware of these populations.
 - Utah Strategy 1.2: We have characterized the genetics of all known populations with the exception of a few streams in the headwaters of the West Fork Blacks Fork and the West Fork Smiths Fork. Genetic analyses on these populations will be completed by the UDWR Northern Region prior to any restoration work within these drainages.
 - Utah Strategy 1.3: The Statewide CRCT team under the lead of the coldwater sportfish coordinator will develop a monitoring plan by the end of CY2020 that will help characterize and detect changes in known populations. This plan will allow us to detect changes in population numbers, habitat quality, and genetic composition.
 - Utah Strategy 1.4: In addition to genetic monitoring, the UDWR regions will submit genetic samples for analysis when questions arise about past results (e.g., inconsistent with other findings in a region) or when confirmation is desired ahead of performing conservation actions.

Rangewide Objective 2: Secure and enhance conservation populations

- Secure and if possible enhance all known and suspected genetically pure CRCT populations. These efforts might include, but are not limited to:
 - Restricting introduction of non-native fish species
 - Utah Strategy 2.1: The UDWR will not introduce any diploid Rainbow Trout, Bonneville Cutthroat Trout, or Yellowstone Cutthroat Trout into any CRCT conservation populations. Any Rainbow Trout introductions into watersheds that contain CRCT conservation populations will only occur after thorough evaluation of sportfish management benefit and will come from hatchery lots

that test 100% triploid with a 60 fish sample. Introductions will only occur in areas that are separated by barriers from CRCT conservation populations. Introductions of non-native cutthroat trout subspecies will not occur outside the native range. Introductions of Brook Trout, Brown Trout, Lake Trout, Tiger Trout, and Splake may occur in CRCT conservation populations after evaluation of the sportfish benefit and only sterile variants will be used. Stocking of these species will be discontinued if they are shown or suspected to be detrimental to CRCT populations. The stocking of any non-native, non-salmonid species, while unlikely, will only occur after thorough evaluation of the sportfish management benefit and some species may be subject to review by the Upper Colorado River Endangered Fish Recovery Program.

- Restricting spread of disease and invasive species
 - Utah Strategy 2.2: The UDWR will restrict the spread of disease and invasive species in accordance with the State's fish health policy (Utah Code Title 4, Chapter 37, Part 5, Section 503).
- Removing non-native fish species
 - Utah Strategy 2.3: The UDWR will remove non-native fish species to complete the projects identified under Strategy 3.1. Additional non-native removal efforts will be evaluated on a case-by-case basis and will only be used to enhance existing conservation populations.
- Regulating angling and enforcing regulations
 - Utah Strategy 2.4: The UDWR has developed angling regulations that are intended to help protect CRCT and will enforce the established regulations. New regulations will be developed whenever deemed beneficial for CRCT.
- Constructing in-channel barriers
 - Utah Strategy 2.5: The UDWR will construct in-channel barriers on an as-needed basis when separation between CRCT conservation populations and non-native species is desired.
- Maintaining sources of genetically pure CRCT
 - Utah Strategy 2.6: The UDWR maintains health certified broodstocks of genetically pure CRCT at Sheep Creek Lake, Lake Canyon Lake, Duck Fork Reservoir, and Dougherty Basin Reservoir and is committed to protecting these broodstocks from disease, hybridization, over-harvest, and other threats. There is at least one health certified broodstock per GMU with at least one back-up population that can be used in case of loss of a brood population. These back-up populations are not only genetically pure, they also have a robust enough population that they will not be adversely affected by fish transfers used to repopulate primary brood populations. These back-up populations are protected by the same safeguards to disease, hybridization, and over-harvest as the primary brood populations. When possible, back-up populations are in separate watersheds which minimizes the chances of a single catastrophic event causing

Table 2: Primary and back-up CRCT brood populations for each GMU in Utah

GMU	Primary Brood Source	Back-up Brood Source
Upper Green	Mammoth Creek Hatchery (N. Slope Uintas, fin clipped to separate from S. Slope Uinta brood)	Lost Lake, N. Fk. Sheep Creek, MF Sheep Creek (after restoration)
Lower Green	Sheep Creek Lake (S. Slope Uintas, fin clipped to separate from N. Slope Uinta brood)	West Fork Duchesne River
Lower Green	Lake Canyon Lake (N. Tavaputs Brood)	Avintaquin Creek
Lower Green	Duck Fork Reservoir (S. portion of GMU)	White River
Lower Colorado	Dougherty Basin Reservoir	Pine Creek

the extinction of all genetically pure sources within a GMU. The back-up brood populations are shown in (Table 2).

- Utah Strategy 2.7: The UDWR recognizes that inbreeding can occur within our CRCT brood sources and that genetic variability can be reduced by various hatchery rearing practices. The UDWR will complete an evaluation of genetic diversity within each broodstock and the statewide CRCT team under the lead of the coldwater sportfish coordinator will draft a plan on how to manage broodstock genetics by the end of CY2020. This genetic management plan will contain information on desired gene infusion rates and optimal hatchery rearing practices.
- Remove obstacles that limit CRCT migration, where appropriate
 - Utah Strategy 2.8: The UDWR has a record of all fish barriers in the range of CRCT. This database will be enhanced by cataloging monitoring and maintenance efforts for each barrier. The statewide CRCT team under the lead of the coldwater sportfish coordinator will develop a barrier monitoring schedule/plan by the end of CY2021.
 - Utah Strategy 2.9: As part of Strategy 2.8, barriers that impede CRCT migration will be identified and either modified to allow passage or removed in waters where connectivity can be safely established among populations. The identification of barriers that can be modified/removed and a modification/removal schedule will be established as part of the plan identified in Strategy 2.8.

Table 3: Summary of CRCT restoration projects in Utah. Fish will be re-stocked after the completion of each project phase. Year fish re-stocking anticipated reflects when re-stocking will begin after the last project phase. The Beaver Creek project is still being planned and anticipated project dates will be determined once planned. Note, an expanded version of this table is available at:

https://docs.google.com/spreadsheets/d/1I9W1ovyrDBzPx-uJb_jBB4wUuNIFLxi1GUn8PaeKlc/edit?usp=sharing

First Year of On-The-Ground Work	Region	Project Name	GMU	HUC8	Anticipated Number of Phases	Year Fish Re-Stocking Anticipated
2019	SRO	North Creek	Lower Colorado	Escalante (14070005)	2	2022
2024 or 2025	SRO	Calf Creek ¹	Lower Colorado	Escalante (14070005)	1	2028
2022 or 2023	SRO	Oak Creek ¹	Lower Colorado	Oak Creek (14070003)	2	2026
2019	NERO	Sheep Creek	Upper Green	Upper Green-Flaming Gorge (14040106)	5	2030
2020	NRO	W. Fk. Smiths Fk.	Upper Green	Blacks Fork (14040107)	1	2022
2022	NERO	SS Oweep	Lower Green	Duchesne (14060003)	1	2025
2025	NERO	SS Garfield	Lower Green	Duchesne (14060003)	1	2028
2028	NERO	SS Fall	Lower Green	Duchesne (14060003)	1	2031
TBD	SERO	Beaver Creek	Dolores	Upper Dolores (14030002)		

¹Currently evaluating Oak Creek and Calf Creek projects. Only plan on completing the project best supported by the public. Only one of these projects will be completed.

Rangewide Objective 3: Restore populations

- Increase the number of stream populations by restoring CRCT within their native range. Local restoration goals and approaches will be developed to meet this objective.
 - Utah Strategy 3.1: The UDWR has developed a list of CRCT restoration projects. The locations of projects and planned completion dates are outlined in Table 3. All substantial CRCT restoration efforts will be completed by 2030. Efforts that require less planning, fewer staff, and a shorter implementation time may be considered after 2030.

A summary of the conservation status of CRCT in Utah after completion of planned projects is shown in Table 4.

- Utah Strategy 3.2: As the UDWR's CRCT restoration goals are met, additional resources (staffing time and money) will be freed up that can be invested into other activities. The UDWR will develop a plan that describes the transition from restoration to other activities such as population monitoring, barrier removal, watershed condition enhancement, or work on other UDWR projects. This planning effort will be led by the coldwater sportfish coordinator under the advice of the statewide CRCT team and will be completed by the end of CY 2021.
- Utah Strategy 3.3: Despite targeting the completion of restoration by 2035, the monitoring plan identified in Strategy 1.4 will be used to identify populations that would benefit from additional work that could include restoration (e.g., barrier fortification combined with non-native fish removal). The need for this additional restoration work will be dictated by the conservation need of the population (e.g., it has unique life-history characteristics or is in a GMU that has few populations).

Rangewide Objective 4: Secure and enhance watershed conditions

- Strive to improve watershed conditions for CRCT, including development of protocols for monitoring.
 - Utah Strategy 4.1: Develop an interagency, interdisciplinary guidebook focused on Utah-specific restoration practices after wildland fire. The goal is to describe protocols and funding mechanisms that allow the completion of restoration projects that provide benefit for all aquatic and terrestrial species. Explore whether the same or similar restoration techniques are applicable in degraded watersheds that have not experienced fire. Will be completed by the UDWR coldwater sportfish coordinator with assistance from the interdisciplinary team by the end of CY 2021.
 - Utah Strategy 4.2: Build off of Strategy 4.1 to develop aquatic habitat specific watershed monitoring protocols by the end of 2022.
 - Utah Strategy 4.3: Utilize the outcomes of Strategies 4.1 and 4.2 to begin developing projects that secure and enhance CRCT watersheds with the first projects begun FY24.

Rangewide Objective 5: Public outreach

- Develop and implement a public outreach effort specifically addressing CRCT conservation.
 - Utah Strategy 5.1: The UDWR will work with Outreach to:
 - Continue promotion of the Utah Cutthroat Slam and the WNTI Native Trout Challenge with promotions occurring during the beginning, middle, and end of each "traditional fishing season" (e.g., April-November)
 - Notify the public ahead of any rotenone treatments
 - Create a piece of outreach (press release, blog posts, social media posts, etc.) highlighting the accomplishments of each rotenone treatment or habitat improvement project

Table 4: Anticipated number of conservation, adfluvial, peripheral, persistent, stronghold, and metapopulations after completion of the activities described in Table 3. Numbers represent populations in Utah. The numbers in parentheses represent increases in numbers of populations or km of habitat once planned restoration activities are complete. Conservation abbreviated as Cons, populations abbreviated as pops, peripheral abbreviated as peri, persistent abbreviated as persist, and metapopulations abbreviated as metapops.

GMU	HUC 8	# of Cons Pops	Km Habitat Occupied by Cons Pops	# of Adfluvial Pops	Peri Pops	Persistent Pops	Stronghold Pops (# of pops)	Meta pops (# of pops)
Dolores ¹	Upper Dolores (14030002)	1	4.9	0	1	0	0	0
	Lower Dolores (14030004)	0	0	0	0	0	0	0
Lower Colorado	Fremont (1407003)	6 (+1)	58.0 (+13.4)	1 (+0)	6 (+1)	3 (+1)	0	0
	Escalante (1407005)	18 (+1)	53.2 (+10.9)	0	18 (+1)	1 (+1)	0	0
Lower Green	Lower Green-Diamond (16060001)	0	0	0	0	0	0	0
	Ashley-Brush (14060002)	4	112.3 (+17.0)	2	0	2	0	1
	Duchesne (14060003)	16 (+3)	199.4 (+52.0)	3	0	9 (+2)	1 (+1)	0
	Strawberry (14060004)	5	126.7	1	0	4	1	1
	Willow (14060005)	6	83.4	0	0	5	1	0
	Lower Green-Desolation Canyon (14060006)	1	61.9	0	0	1	0	1
	Price (14060007)	3	148.7	0	0	3	0	1
	San Rafael (14060009)	6	148	3	0	1	0	1
Upper Green	Upper Green-Flaming Gorge (14040106)	17	290.1	2	0	10	1	2 (+1)
	Blacks Fork (14040107) ²	6	185.3	2	0	5	3 (+2)	1
	Totals	89 (+5)	1594.5 (+93.3)	14 (+2)	25 (+2)	44 (+4)	7 (+3)	8 (+1)

¹ Increases in the numbers of populations within the Delores GMU are expected but actual increases won't be known until a LaSal conservation plan is finalized

²Work in Blacks Fork drainage intended to purify genetics and does not target creation of additional populations

- Create one piece of outreach annually that discusses the role of CRCT and the UDWR's CRCT restoration vision

Rangewide Objective 6: Data sharing

- Continue to build and maintain the CRCT GIS so that information can readily be shared between and among jurisdictions.
 - Utah Strategy 6.1: The UDWR will continue working with the Rangewide team to enter and maintain the CRCT GIS database

Rangewide Objective 7: Coordination

- Maximize effectiveness of CRCT conservation efforts by coordinating signatory agency efforts toward achieving a common goal.
 - Utah Strategy 7.1: The UDWR will continue to disseminate information about our planned conservation efforts and the results of past efforts with the Rangewide team. We will coordinate our efforts with the Rangewide team so we can collaboratively work towards conserving CRCT. The UDWR will continue involvement with GMU conservation teams.

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