CONSERVATION AGREEMENT AND STRATEGY

FOR

COLORADO RIVER CUTTHROAT TROUT
(*Oncorhynchus clarki pleuriticus*)

in the

State of Utah

Publication Number 97-20

March 1997

STATE OF UTAH
NATURAL RESOURCES
Division of Wildlife Resources

CONSERVATION AGREEMENT AND STRATEGY
FOR
COLORADO RIVER CUTTHROAT TROUT
(*Oncorhynchus clarki pleuriticus*)

in the State of Utah

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An Equal Opportunity Employer

John Kimball
Director

March 1997

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CONSERVATION AGREEMENT

FOR

COLORADO RIVER CUTTHROAT TROUT

in the

State of Utah

CONSERVATION AGREEMENT

This Conservation Agreement (Agreement) has been developed to expedite implementation of conservation measures for Colorado River cutthroat trout (CRCT) in Utah as a collaborative and cooperative effort among resource agencies. Threats that warrant CRCT listing as a sensitive species by state and federal agencies and as threatened or endangered under the Endangered Species Act of 1973, as amended, will be eliminated or reduced through implementation of this Agreement and the attached Conservation Strategy (Strategy)(Attachment B).

GOAL:
Ensure the long-term conservation of CRCT within its historic range in Utah.

OBJECTIVES:
The following two objectives will be required to attain the goal of this strategy:

1) Restore and maintain 52 conservation populations of CRCT throughout 537 stream miles including a sufficient number of metapopulations among all Geographic Management Units (GMU).
2) To eliminate or reduce threats to CRCT and its habitat to the greatest extent possible.

These objectives will be reached through implementation of the Strategy. Upon signing, the signatories agree to remove BCT from all lists that require federal and state regulatory administration. The sensitive species list of the USDA Forest Service is a tracking and monitoring list, not a regulatory administration list. As such, the species would remain on the USDA Forest Service"sensitive species" list to be reviewed every 5 years after signing of the agreement. However, the status of BCT will be evaluated annually to assess program progress and amendments will be added to address newly identified BCT recovery issues and to ensure program effectiveness. Failure to implement the BCT Agreement and Strategy, however, will result in replacement of BCT onto appropriate lists.

The CRCT is a subspecies of the cutthroat trout complex native to the upper Colorado River drainage (Martinez 1988; Behnke 1992). Historically, CRCT occupied drainages of the Colorado River in Wyoming, Colorado, Utah, Arizona and New Mexico. Currently, CRCT are restricted to headwater drainages of the Colorado River above the Grand Canyon. The current distribution extends north into Wyoming, east into Colorado and is bordered on the west by the Fremont River in Utah and on the south by the San Juan River in Utah. However, recent findings of CRCT in the Escalante River drainage in Utah suggest a wider distribution for this subspecies (Behnke 1992). Due to past and present human activities, such as water development projects, agricultural activities, energy development, mining, overfishing and the introduction of nonnative species, the ecosystem and the demographics of the CRCT have been altered (Binns 1977; Behnke 1992).

I. OTHER SPECIES INVOLVED

The primary focus of this agreement is the conservation and enhancement of CRCT and the ecosystems in Utah upon which they depend; however, other species occurring within or adjacent to CRCT habitat may also benefit. Some of these species include bluehead sucker (*Pantosteus discobolus*), roundtail chub (*Gila robusta*), the Southwest Willow Flycatcher, several riparian dependent bat species (Yuma, long-eared, long-legged, big free-tailed and spotted myotis), Ute Lady's tresses (*Spiranthes diluvialis*), alcove bog-orchid (*Habernaria zothecina*), mottled sculpin (*Cottus bairdi*), and the boreal toad (*Bufo boreas*). Using an ecosystem approach, the CRCT Agreement could reduce or possibly eliminate threats for several of these species in Utah, which could preclude their need for federal listing pursuant to the ESA.

II. INVOLVED PARTIES

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Separate Memorandum(a) of Understanding and Cooperative Agreements will be developed with additional parties and supporting entities (Attachment A) as necessary to ensure implementation of specific conservation measures. In addition, interested County Governments will be given an opportunity to review and provide input on specific actions.

III. AUTHORITY

* The signatory parties hereto enter into this Conservation Agreement and the attached Conservation Strategy under federal and state law, as applicable, including, but not limited to Section 2(c)(2) of the Endangered Species Act of 1973, as amended, which states that "the policy of Congress is that Federal agencies shall cooperate with State and local agencies to resolve water resource issues in concert with conservation of endangered species."

* All parties to this Agreement recognize that they each have specific statutory responsibilities that cannot be delegated, particularly with respect to the management and conservation of wildlife, its habitat and the management, development and allocation of water resources. Nothing in this Agreement or the Strategy is intended to abrogate any of the parties' respective responsibilities.

* This Agreement is subject to and is intended to be consistent with all applicable Federal and State laws and interstate compacts.

* This instrument in no way restricts the parties involved from participating in similar activities with other public or private agencies, organizations or individuals.

* Modifications within the scope of this instrument shall be made by the issuance of a bilaterally-executed modification prior to any changes being performed.

IV. STATUS AND DISTRIBUTION OF THE COLORADO RIVER CUTTHROAT TROUT

Robert Rush Miller included CRCT on his list of threatened freshwater fish of the United States in 1972 (Trotter 1987). In 1979, the American Fisheries Society (AFS) listed CRCT as "threatened" throughout its range because of present or potential destruction of habitat and because of hybridization and competition with nonnative species. Until February 28, 1996, CRCT was considered a candidate species for federal listing (Notice of Review 1982; 47 FR 58454 for CRCT). The USDA Forest Service considers CRCT as a sensitive species in Regions 2 and 4, the BLM State Director of Utah designated CRCT as a “sensitive species” in August of 1996, and the states of Colorado, Utah and Wyoming have designated CRCT as a species with special status or as sensitive.

The Regional Forester for the Intermountain Region of the U.S. Forest Service (USFS) (R4) has designated the CRCT as “sensitive”. This administrative designation is defined in the Forest Service Manual 2670.5 as follows: “Sensitive Species. Those plant and animal species identified by a Regional Forester for which population viability is a concern as evidenced by: a. Significant

current or predicted downward trends in population numbers or density. b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution." Twelve criteria are used in this Region in designating species as sensitive. These are: (1) relative abundance of the species within the range, (2) recruitment potential as to life history strategy, (3) population trend over the past 10 years, (4) distribution across the region, (5) plant communities inhabited, (6) unique habitat or special features upon which the species depends, (7) ability of a species to disperse or relocate, (8) the species specialization for reproduction and feeding, (9) hybridization potential, (10) ability for habitat to recover, (11) potential for habitat to be impacted by human activity, and (12) habitat trend. The status of CRCT was evaluated in the late 1980's against these criteria and was determined to warrant regional designation as sensitive. The designation of the CRCT as sensitive by the USFS will be evaluated every 5 years after the signing of this agreement.

Forest Service Manual Direction encourages line officers to manage for and maintain viable populations of native and desirable nonnative species (FSM 2602, 1b). When a species is designated as sensitive, decision makers must review and analyze the impacts of proposed management activities on the species and their habitat. This analysis is done in a "biological evaluation" (BE). The BE is part of the project file upon which a decision maker bases their decision and allows the decision maker to understand the potential impacts on individual species of concern. While the BE does not establish standards or guidelines, it may include recommended mitigation measures. The decision maker is not forced into or required to make any particular decision based on the BE. This designation as sensitive is designed to increase awareness of population viability concerns, and therefore encourage decisions which will not contribute to those concerns and which may prevent a species from becoming a federally threatened or endangered species.

To encourage proactive management of this species and to alleviate local concerns about the effects of reintroductions on current activities, the U.S. Forest Service has agreed to not treat as 'sensitive' any CRCT population established through transplanting onto National Forest System land in Utah, proceeding from the date of signing of the Agreement. However, the U.S. Forest Service will continue to treat as 'sensitive' any remnant CRCT population found on National Forest System land.

The precarious status of remnant CRCT populations prompted the states of Utah, Colorado and Wyoming and the USFS and Bureau of Land Management (BLM) to initiate management actions as early as 1976. Surveys to locate additional populations and habitat enhancement projects were initiated in some areas administered by BLM and the FS. Recently, new populations were discovered in the Escalante drainage in Utah. Although its range is greatly reduced from its historical condition, data suggests that several of the remaining populations in Utah have been stable for the last twenty years.

Presently, a total of 25 known CRCT populations occupy approximately 121.3 stream miles among three isolated geographic regions of Utah: the northeastern includes the Uinta Mountain drainages and the northern Tavaputs Plateau; the southeast includes the La Sal and Blue Mountain drainages and the southern Tavaputs Plateau; and the southern area includes the

Escalante and Fremont river drainages. These populations, as well as numerous additional CRCT populations, are continuing to be analyzed for purity.

V. PROBLEMS FACING THE SPECIES

The success of any conservation or recovery program depends on eliminating or reducing the impact of activities that threaten the species existence. The following list is a compilation of threats as perceived by the CRBCT (Colorado River Basin Conservation Team). For consistency, the general format is based on the five criteria considered for federal listing of a species in Section 4(a)(1) of the Endangered Species Act of 1973, as amended. The Conservation Strategy provides a detailed review of problems and threats to the species that signatories to this agreement will address with management actions.

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

B. Over utilization for commercial, recreational, scientific, or educational purposes.

C. Disease, predation, competition and hybridization

D. The inadequacy of existing regulatory mechanisms

E. Other natural (e.g. drought) or human induced (e.g. socio-political) factors affecting its continued existence.

VI. CONSERVATION ACTIONS

To meet the goal and objectives of this Agreement, the following conservation actions, as defined and detailed in the Strategy, must be implemented:

1) Collect baseline CRCT population, life history and habitat data.
2) Determine and maintain genetic integrity.
3) Enhance and maintain habitat.
4) Selectively control nonnative species.
5) Expand and protect CRCT populations and range through introduction or reintroduction from either transplanted (wildstock) or broodstock CRCT.
6) Monitor populations and habitat.
7) Develop a mitigation protocol for proposed water development and future habitat alteration, where needed.

In addition, four general administrative actions, as outlined below, will be implemented.

Coordinating Conservation Activities

* Administration of the conservation agreement is conducted by the CRBCT in coordination with

other involved states. The team consists of a designated representative from each signatory to this Agreement and may include technical and legal advisors and other members as deemed necessary by the signatories.

* Because the areas of concern covered by this Agreement are located in Utah, and because the State of Utah presently has primary jurisdiction over CRCT within the State, the designated team leader will be the Utah Department of Natural Resources, Division of Wildlife Resources representative.

* Authority of CRBCT shall be limited to making recommendations for the conservation of CRCT to the Director of the Utah Division of Wildlife Resources. The Director will provide copies of comments to the signatories and to other interested parties upon request.

* The CRBCT will meet annually to develop yearly conservation schedules, review budgets, and review and revise the Strategy as required.

* Modifications within the scope of this instrument shall be made by the issuance of a bilaterally executed modification prior to any changes being preformed.

* The CRBCT will meet on a semiannual basis to report on progress and effectiveness of the Conservation Strategy implementation.

* CRBCT meetings will be open to the public. Minutes of the meetings and progress reports will be distributed to the CRBCT, the technical advisory team and to other interested parties upon request.

Implementing Conservation Schedule

* A total of 10 years is anticipated for completion of all actions identified and specified in the Conservation Strategy. Nevertheless, the parties agree that significant actions to benefit CRCT will be implemented within the first five (5) years. Actions will be determined by the CRBCT.

* Conservation actions will be scheduled and reviewed on an annual basis by the signatory agencies based on recommendations from the team. Activities that will be conducted during the first year of implementation are listed in Table 1. The Strategy is a flexible document and will be revised annually.

* As leader of the CRBCT, the Utah Division of Wildlife Resources, Department of Natural Resources will coordinate conservation activities and monitor conservation actions conducted by participants of this Agreement to determine if all actions are in accordance with the Conservation Strategy and annual schedule.

Funding Conservation Actions

* Expenditures to implement this Agreement may exceed $2,000,000 (Table 2). It is projected

that expansion of habitat and population actions will require the greatest expense during the first five years of the agreement.

* Funding for the Conservation Agreement will be provided by a variety of sources. Federal, State and local sources will need to provide or secure funding to initiate procedures of the Conservation Agreement and Strategy.

- Federal sources may include, but are not limited to, the USFS, USFWS, BLM, Land and Water Conservation funds and the Natural Resource Conservation Service.

- State funding sources may include, but are not limited to, direct appropriation of funds by the legislature, Community Impact Boards, Water Resources Revolving funds, State Department of Agriculture (ARD), and State Resource Management Agencies.

- Local sources of funding may be provided by water districts, Native American affiliations, cities and towns, counties, local irrigation companies, and other supporting entities.

* In-kind contributions in the form of personnel, field equipment, supplies etc., will be provided by participating agencies (Table 3). In addition, each agency will have specific tasks, responsibilities and proposed actions/commitments related to their in-kind contributions.

* It is understood that all funds expended in accordance with this Agreement are subject to approval by the appropriate local, state or Federal appropriations. This instrument is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between the parties to this instrument will be handled in accordance with applicable laws, regulations, and procedures, including those for Government procurement and printing. Such endeavors will be outlined in separate agreements that shall be made in writing by representatives of the parties and shall be independently authorized by appropriate statutory authority. This instrument does not provide such authority. Specifically, this instrument does not establish authority for noncompetitive awards to the cooperator of any contract or other agreement. Any contract or agreement for training or other services must fully comply with all applicable requirements for competition.

Conservation Progress Assessment

* A semiannual assessment of progress towards implementing actions identified in this agreement will be provided to the Director, Utah Division of Wildlife Resources by CRBCT. This assessment will be based on updates and evaluations by CRBCT members. The Director will provide copies of this assessment to the signatories of this document.

* An annual assessment of conservation accomplishments identified in Table 1 and subsequent yearly schedules will be made by the CRBCT. This assessment will determine the effectiveness of this agreement and whether revisions are warranted. It will be provided to the Director of the Utah Division of Wildlife Resources by CRBCT. The Director will provide copies of this

assessment to the signatories of this document.

* If threats to the survival of the CRCT become known that are not or cannot be resolved through this or any Conservation Agreement, the Utah Division of Wildlife Resources will immediately notify all signatories.

VII. DURATION OF AGREEMENT

The initial term of this Agreement shall be 5 years. Prior to the end of each 5 year period, a thorough analysis of actions implemented for the species will be conducted by the CRBCT. If all signatories agree that sufficient progress has been made towards the conservation and recovery of the CRCT this Agreement shall be extended for an additional five (5) years. Any party may withdraw from this Agreement on sixty (60) days written notice to the other parties.

VIII. NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) COMPLIANCE

Signing of this agreement is covered under authorities outlined in section III listed above. We anticipate that any survey, collection or non-land disturbing research activities conducted through the Conservation Agreement will not entail significant Federal actions under the NEPA and will be given a categorical exclusion designation. However, each signatory agency holds the responsibility to review planned actions for their area of concern to ensure conformance with existing land use plans and to conduct any necessary NEPA procedures for those actions within their area.

IX. FEDERAL AGENCY COMPLIANCE

* During the performance of this agreement, the participants agree to abide by the terms of Executive Order 11246 on non-discrimination and will not discriminate against any person because of race, color, religion, sex or national origin.

* No member or delegate to Congress or resident Commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

X. SIGNATORIES

Utah Department of Natural Resources
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Signed copies of this document may be obtained upon request from the Salt Lake Office of the Utah Division of Wildlife Resources

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Michael C. Weland Date
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Table 1: Conservation Actions to be Implemented in Calendar Year 1996

Management Unit	Date	Lead	Action
Salt Lake Office	1996-7	UDWR	- Refine definition of metapopulation - Determine number of metapopulations to be established among GMU's.
Northeastern			
- North slope Uinta	8/96	UDWR	- Survey and collect fish samples for genetic analysis on the Middle Fork of Sheep Creek.
	8/96	UDWR	- Conduct disease certification on Sheep Creek Lake.
	8/96	UDWR	- Survey and collect fish samples for genetic analysis on the South Fork of Brownie Creek.
	8/96	UDWR	- Survey and collect genetic samples in the Henry's Fork drainage, the West, Middle and East Forks of Beaver Creek
	ongoing	UDWR	- Pursue development of lentic brood source for stocking North Slope Uintas
- South slope Uinta	6/96	UDWR	- Conduct disease certification on the West Fork of the Duchesne River.
		UDWR	- Transfer 500+ CRCT from the Duchesne River to Sheep Creek Lake.
- North Tavaputs Plateau	6/96	UDWR	- Conduct disease certification on Avintaquin Creek.
		UDWR	- Transfer approximately 200 CRCT from Avintaquin Creek to Meadow Creek.
	1996	UDWR	- Survey Bitter Creek for whirling disease.

Management Unit	Date	Lead	Action
Southeastern			
- South Tavaputs Plateau	7/96	UDWR	- electrofish Tabbyune, Kyune, Minnie Maud and Range Creeks.
	1996	UDWR	- genetic analysis of any CRCT found above.
	7/96	UDWR	- evaluate CRCT habitat in the aforementioned streams to determine their suitability as reintroduction sites.
- East Manti Mountain	5/96	UDWR	- electrofish Crandell Creek.
	1996	UDWR	- evaluate feasibility of purchasing Spinners Res.
- La Sal Mountains	5/96	UDWR	- determine effectiveness of fish barrier on Deer Springs Creek.
	8/96	UDWR	- estimate population in Beaver Creek.
	1996	UDWR	- genetic analysis of Beaver Creek CRCT.
	8/96	UDWR	- electrofish Geyeser Creek and determine its suitability as reintroduction site.
- Blue Mountains			- no activity planned for 1996
Southern			
- Fremont River	1996	UDWR	- Reintroduce CRCT into upper UM Creek.
	1996	UDWR	- Evaluate and/or modify barriers on Right Fork UM Creek.
	1996	UDWR	- Make final modifications on barrier on lower UM Creek.
	1996	UDWR	- Evaluate renovation success on 28 miles of UM Creek and tributaries.
	1996	UDWR	- Evaluate presence of whirling disease in control fish from UM Creek.
- Escalante River	1996	UDWR	- Complete disease sampling for certification on Boulder Creek and/or selected broodstock lake.
	1996	UDWR	- Survey broodstock lake to evaluate suitability for CRCT program.
	1996	UDWR	- Transplant CRCT into broodstock lake.
	1996	UDWR	- Make recommendations to Wildlife Board for special 1997 fishing regulations for broodstock lake.

* Actions implemented upon signing of the Colorado River Cutthroat Trout Conservation Agreement

Table 2. Estimated Costs for Implementing the Colorado River Cutthroat Trout Conservation Agreement over 10 year period.

Conservation Agreement Actions	Estimated Costs($)
Population and Life History: - Northeastern Management Unit - Southeast Management Unit - Southern Management Unit	$500,000
Habitat Maintenance, enhancement and expansion: - Northeastern Management Unit - Southeast Management Unit - Southern Management Unit	$250,000
Population Genetics Management: - Northeastern Management Unit - Southeast Management Unit - Southern Management Unit	$400,000
Non-Native Fish Control: - Northeastern Management Unit - Southeast Management Unit - Southern Management Unit	$150,000
Population and Habitat Monitoring: - Northeastern Management Unit - Southeast Management Unit - Southern Management Unit	$750,000
Administration: - Northeastern Management Unit - Southeast Management Unit - Southern Management Unit	$100,000

Table 3: Estimated agency in-kind contributions, actions, and responsibilities for implementation of the Colorado River Cutthroat Trout Conservation Agreement.

Agency	Brief Description of Tasks and Responsibilities *
Utah Department of Natural Resources, Utah Division of Wildlife Resources	Serve as CRBCT team leader (e.g.: oversee administrative responsibilities of agencies, reports, meetings etc.). Consult on water protection issues. Assist in obtaining and/or securing water rights and land within CRCT habitat. Assist in funding range-wide enhancement projects. Plan and implement eradication/control projects of non-indigenous species. Serve as lead agency for population and habitat enhancements, re-introductions and monitoring projects in Utah.
U.S. Forest Service	Cooperate and assist in state-wide habitat enhancement, re-introduction, non-indigenous species control, and monitoring projects. Assist state in obtaining and/or securing water rights and land within CRCT habitat. Assist in funding state-wide enhancement projects on National Forest System lands where appropriate in accordance with NEPA regulation.
U.S. Fish and Wildlife Service	Advise and assist implementation of conservation agreement in regard to existing laws (e.g.: ESA, NEPA regulations etc.). Cooperate and assist in eradication/control projects of non-indigenous species, cooperate and assist in range-wide habitat enhancement and population monitoring projects. Assist in funding range-wide enhancement projects.
Bureau of Land Management	Cooperate and assist in range-wide habitat enhancement and population monitoring projects. Assist in funding range-wide enhancement projects. Cooperate and assist in eradication/control projects of non-indigenous species, cooperate and assist in range-wide habitat enhancement and population monitoring projects.
U.S. Bureau of Reclamation	Advise and assist in implementation of conservation agreement. Cooperate and assist in habitat enhancement, re-introduction, non-indigenous species control and monitoring projects. Assist in funding statewide enhancement projects.
CUP Mitigation Commission	Advise and assist in implementation of conservation agreement. Cooperate and assist in habitat enhancement, re-introduction, non-indigenous species control and monitoring projects. Assist in funding statewide enhancement projects.

* All agencies will participate in, and provide technical and administrative assistance to the CRBCT

Attachment A

Supporting Entities

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CONSERVATION AND SPORTFISHING MANAGEMENT STRATEGY

FOR

COLORADO RIVER CUTTHROAT TROUT

in the

State of Utah

INTRODUCTION

As stated in the Colorado River cutthroat trout (CRCT) Conservation Agreement (Agreement), implementation of specific conservation actions detailed in this Conservation and Sportfishing Management Strategy (Strategy) will eliminate threats that warrant listing of CRCT as a sensitive species by state and federal agencies, and as threatened or endangered under the Endangered Species Act of 1973, as amended.

The primary purpose of this document is to describe the specific technical procedures and strategies required to provide for the long-term conservation of CRCT in Utah. A second purpose is to outline information on how CRCT will be used in sportfishing programs in Utah. Some actions implemented pursuant to this Strategy may reduce or eliminate threats and improve habitat for related aquatic and terrestrial sensitive species as well.

Populations of CRCT in Utah will be managed under one of two concepts: 1) conservation or 2) sportfishing recreation. These concepts are described as follows:

1) ***Conservation:*** Individual CRCT populations designated under this concept will be managed to ensure the continued existence of CRCT in Utah. The intent of this approach is to preserve the genetic integrity of geographic genotypes and to maintain rare alleles within specific populations. Conservation also entails preserving ecosystem processes that existed historically. Therefore, habitat management is an important component of the management of conservation populations. Enough populations should be established to minimize impacts of habitat degradation or detrimental natural events to the overall population in Utah.

2) ***Sportfishing recreation:*** Sportfishing populations will be managed to meet public demand and routine sportfish management objectives. Management of sportfishing populations may involve suitable nonnative species to compliment native sportfishing opportunities. Sportfishing populations will be designated for waters where: 1) other nonnative salmonid species occur, 2) the potential for self-sustaining CRCT populations is inadequate or 3) hybridization cannot be prevented. The presence of sportfishing populations should not jeopardize conservation populations in the vicinity.

Throughout this document, both management concepts have been outlined and discussed so that all components of CRCT management in Utah can be understood in concert. CRCT sportfishing management activities may enhance CRCT conservation activities and likewise, CRCT conservation populations may fulfill elements of CRCT sport fisheries development.

In this Strategy, conservation and sportfish management is presented at state-wide and specific geographic scales. First, **Statewide Management** describes a general overview of status, distribution, threats, goals, objectives, and actions. Then, **Management within Geographic Units** details specific status, distribution, threats, goals, objectives, and actions within three Geographical Management Units (GMU). GMU's include: Northeastern, Southeastern and Southern (Figure 1). In these sections, management is prioritized with respect to specific drainages or areas.

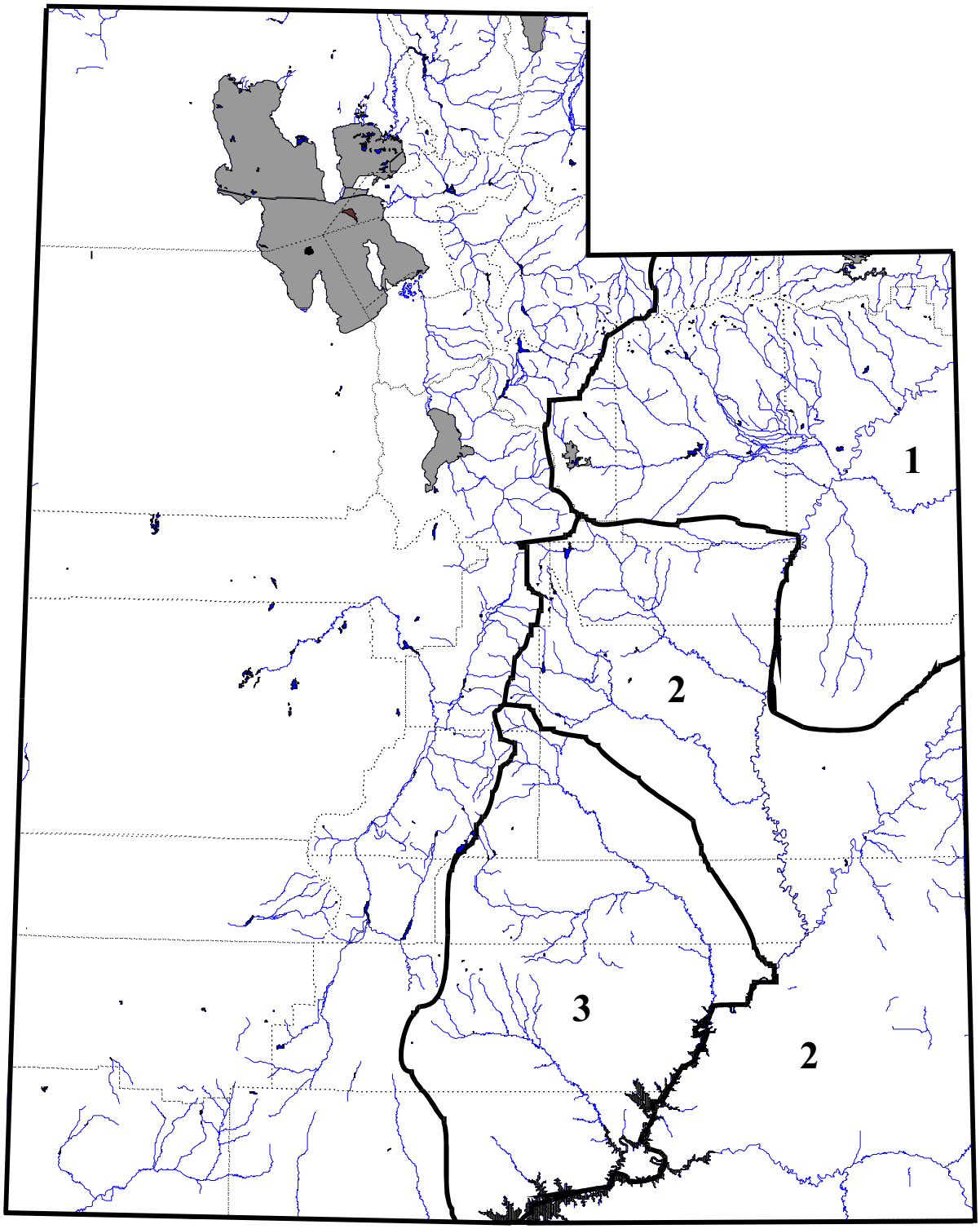

Figure 1. Geographic Management Units designated for CRCT conservation within the State of Utah. 1 = Northeastern Management Unit; 2 = Southeastern Management Unit; 3 = Southern Management Unit.

DEFINITIONS

For the purposes of the Agreement and Strategy, the following terms are defined:

Conservation Population - A reproducing and recruiting group of CRCT, geographically isolated that is managed to sustain the existence of the CRCT subspecies. Conservation populations are managed with the intention of preserving genetic integrity within specific populations and within geographic units. Populations should be further defined within geographic units by a quantifiable criterion based on the life history of the subspecies. This criterion may vary among geographic units.

Demographic Stochasticity - Random variation in demographic processes (birth, death and growth rates) that affect individual and population survival. These changes are strictly a result of population dynamics, not environmental change. Populations are known to inherently fluctuate regardless of environmental changes. For very small populations, periods of negative growth may lead to extinction.

Environmental Stochasticity - Random variation in environmental processes (fire, flood and food availability) that affect individual and population survival.

Genetically Pure - Considered to be without hybridization with other salmonid species and subspecies based on the best known genetic techniques and information at the time of testing. Purity ratings are subject to change as techniques for genetic analysis are improved or new techniques are developed.

Geographic Management Unit (GMU) - A distinct area within Utah defined by historic CRCT range and geographic boundaries. Three GMUs have been identified within CRCT range in Utah.

Historic Range - The area that CRCT is perceived to have inhabited at the time of modern exploration and settlement of Utah (approximately 1850).

Hybrid - Considered to be cross bred with other salmonids, commonly rainbow trout or other cutthroat subspecies. Varying degrees of hybridization occur among populations; hence some hybridized populations may offer genetic and ecological value to the CRCT conservation efforts.

Introduction - Release of CRCT into historically unoccupied sites for promoting conservation or sportfishing purposes.

Metapopulation - a collection of localized populations that are geographically distinct yet are genetically interconnected through natural movement of individuals among conservation populations.

Nonnative - A fish that historically did not occur in a specific area or habitat.

Phenotype - the physical manifestation of the interaction of an organism's genetic information with its environment which results in a unique physical, physiological or behavioral trait (e.g.

spotting patterns or coloration of cutthroat trout).

Potentially Pure - Considered as possibly pure based on preliminary morphological examination, location of capture site and/or anecdotal information. This purity rating is assigned to populations that either have not been analyzed in the past or that have mixed purity results and will change as purity analysis is conducted.

Reintroduction - Release of CRCT into historically occupied sites for the purpose of reestablishing populations.

Remnant - Any population that has naturally persisted modern development and that naturally occurs within historically occupied streams or locales. Remnant populations do not include populations that have been introduced or reintroduced through transplanting or stocking.

Sportfishing Population - A group of CRCT that is managed to provide sportfishing opportunities and with the intention of meeting a public recreational demand. These populations are maintained in addition to conservation populations and may be managed in concert with other sportfish objectives.

Transplant - Removal of CRCT individuals from a naturally occurring population and subsequent release of these individuals into other waters.

BACKGROUND

CUTTHROAT TROUT

Cutthroat trout (*Oncorhynchus clarki)* are widely distributed from southern Alaska to northern California and inland in the Columbia River, Missouri River, Southern Rocky Mountains, and the Great Basin drainages. This species comprises fourteen subspecies (Behnke 1992), three of which are native to Utah. Cutthroat trout have intrinsic value as part of the native wildlife community (Behnke and Zarn 1976; Duff 1988) as well as value as sportfish (Duff 1988; Trotter 1987; Berg and Hepworth 1993).

Cutthroat trout have been protected in Utah since 1853 (Rawley 1985). The management and protection of this species has been elevated with increased conservation awareness and increased sportfish demand. Traditionally, cutthroat trout management actions included the use of fishing regulations and stocking programs. In the early 1970's, management efforts began focusing on the ecology and conservation of cutthroat trout subspecies. Conservation efforts not only compliment sportfishing efforts but, in light of added pressures of habitat loss and nonnative fish introductions, are necessary to sustain cutthroat trout subspecies in Utah.

Cutthroat trout are the only trout native to Utah, and they historically occurred within all major drainages in the state. Each of the three isolated drainages in Utah historically contained different native subspecies of *O. clarki*; however, the range and numbers of populations have since been dramatically reduced. Experts attribute the decline and/or loss of cutthroat trout subspecies to impacts from interactions with nonnative fish, such as hybridization and predation, and to habitat loss and degradation caused through a variety of land use practices and water development (Behnke and Zarn 1976; Binns 1977; Martinez 1988).

The three cutthroat trout subspecies native to Utah are: Bonneville cutthroat *(Oncorhynchus clarki utah)* (BCT), Colorado River cutthroat *(O.c. pleuriticus)*, and the Yellowstone cutthroat trout *(O.c. bouvieri)* (YCT). Since the time that cutthroat trout were first documented in Utah (mid-1800's), BCT occurred in headwater streams and lakes within the Bonneville Basin, and CRCT occurred in headwater streams and lakes of the Colorado River drainage. Although reduced in range and numbers, pure populations of the BCT and CRCT still exist within limited parts of their historic range. YCT historically occurred in the Raft River drainage (a small portion of the Snake River drainage) of northwest Utah. Recent surveys, however, did not reveal any pure populations of YCT.

Until February 28, 1996, BCT and CRCT were considered candidate species for federal listing (Notice of Review 1980; 45 FR 19857 for CRCT and Notice of Review 1982; 47 FR 58454 for CRCT). BCT and CRCT are currently considered species of special concern by the state of Utah. YCT is afforded no special status in Utah.

CRCT SYSTEMATICS

The taxonomy of the cutthroat trout remains unclear. Physical characteristics used for identification are not always discrete, because of its wide distribution, the geographic variation within its distribution and the isolation of some populations. Several taxonomic views have been proposed and debated. Behnke (1992) offers the most recent and perhaps most comprehensive review of the taxonomy and distribution of all subspecies of cutthroat trout.

The major lineage of CRCT was associated with the Columbia River Basin. As coastal cutthroat trout moved inland into Idaho, Wyoming and Utah, they invaded the Colorado River system through several routes. The CRCT subspecies descended into the Green River system from a Yellowstone cutthroat trout ancestor that existed in the Snake River drainage. Behnke (1992) suggests that this transfer probably occurred in the last preglacial period (about 70,000 years ago) as indicated by coloration differences between Yellowstone and Colorado River cutthroat subspecies.

CRCT evolved and dispersed extensively throughout the cold post-glacial system of the Colorado and Green rivers. Since that time, waters have warmed and populations have retreated to headwater streams throughout the Colorado River Basin from Wyoming and Colorado through Utah to northern parts of Arizona above the Grand Canyon (Trotter 1987). Although CRCT may be currently isolated by the thermal barriers of warm, higher order drainages of the Colorado River system (Behnke and Zarn 1976), CRCT probably accessed headwater drainages in geographically distant areas during periods of seasonal cooling (Young 1995).

The cutthroat trout then further diversified across the continental divide into the South Platte and Arkansas Rivers and into the Rio Grande River drainage. Behnke (1992) identifies CRCT as an ancestor to greenback cutthroat trout (*O.c. stomias*) and Rio Grande cutthroat trout (*O.c. virginalis*).

CRCT are one of the most brightly colored of all subspecies. Mature males develop brilliant red, orange, and golden-yellow colors similar to greenback cutthroat trout. CRCT may have red banded ventral regions and golden yellow lower sides. Spotting pattern is variable among geographic regions (Behnke 1992). CRCT from the upper Green River headwaters in Wyoming characteristically have pronounced and rounded, small to moderate-sized spots. CRCT from the Yampa River drainage exhibit larger spots similar to the greenback cutthroat trout (Trotter 1987; Behnke 1992).

CRCT, along with Greenback cutthroat trout, consistently have the highest scale counts of all subspecies of cutthroat trout. Lateral-series scales average 170 to over 200 scales and more than 43 above the lateral line. Sixty to 63 vertebrae are typical; gill rakers number from 17 to 21 (average 19), and pyloric caeca number from 25 to 45 (average 30 to 40) (Binns 1977; Trotter 1987; Martinez 1988; Behnke 1992).

LIFE HISTORY

Populations of CRCT may be lake resident, fluvial or adfluvial, and life history characteristics vary somewhat among these strategies. CRCT appear to be slower growing than other subspecies with few fish over 200 mm probably because of the short growing season typical of the high elevation, headwater environments. However, CRCT transplanted to lower elevation ponds grew to nearly 400 mm in 2 years and were commonly larger than 250 mm in tributaries of the Green River in Wyoming, especially where fish were associated with beaver ponds (Young 1995). Lacustrine populations of CRCT averaged 325 mm at age 3.

Spawning for CRCT usually begins when spring floods begin to recede in late spring and early summer and may be possibly cued by water temperature change. Fecundity varies with individual size and location as well as with life history strategy. Snyder and Tanner (1960) found average fecundity of 16 females (mean length 290 mm) to be 667 eggs. Water temperature, elevation and climatic variation determines the time of fry emergence. Emergence usually occurs in late summer. Maturity is thought to be reached at approximately 3 years of age for lotic populations.
Habitat requirements for CRCT are poorly understood, and results of habitat studies have been conflicting. Typical of most cutthroat species, CRCT spawn over gravel substrates with good water circulation. More coarse woody debris, greater depth and lower velocities have been found to be positively associated with CRCT presence; however, these conditions were not readily available within many streams containing CRCT. Most conclusions on habitat requirements are confounded by small population size and restricted habitat areas common to rare species (Young 1995).

CRCT do not appear to compete well with introduced salmonids, possibly because they did not evolve with other salmonids. Also, differences in life history traits may give introduced trout an advantage over native CRCT. For example, because brook trout spawn in the fall and fry emerge in early spring, young brook trout are significantly larger than young CRCT, which emerge in fall. Therefore, brook trout are larger than CRCT going into their first winter season (Griffith 1972). Furthermore, brook trout mature earlier and can thereby produce a greater number of offspring in their lifetime (Griffith 1988; De Staso and Rahel 1994). In addition, behavioral differences may give brook trout a feeding advantage over CRCT where the species are sympatric (Griffith 1972).

Diets of subadult CRCT comprise mainly macroinvertebrates and plankton. Adults can be piscivorous and eat a greater proportion of large macroinvertebrates and terrestrial insects than subadults.

STATE-WIDE MANAGEMENT

CONSERVATION

The primary goal of CRCT cutthroat trout management in Utah is to conserve populations within significant portions of their historic range to ensure their continued existence. Actions to conserve these populations will be based on principles of conservation biology (Soule' and Wilcox 1980). Generally, important factors for the long-term conservation of species include: metapopulation dynamics, conservation genetics and habitat preservation.

Metapopulations and Genetic Integrity:
Although individual populations should be managed and protected, some degree of interconnectedness among populations is needed to maintain genetic exchange and stabilize population dynamics over time (Wilcox and Murphy 1984, Hanski and Gilpin 1991). In fact, metapopulation persistence depends on the temporal and spatial dynamics of local populations connected through unobstructed migratory corridors (Wilcox and Murphy 1984; e.g. Gilpin and Hanski 1991).

Metapopulations stabilize local population dynamics in several ways: 1) migration of individuals allows genetic exchange among local populations thereby increasing genetic heterogeneity (Simberloff and Abele 1976; Leary et al. 1991); 2) large, interconnected populations are less vulnerable to losses incurred through environmental and demographic stochasticity (Roff 1974; Wilcox and Murphy 1984); 3) large, interconnected populations are more resistant to changes in deterministic variables that dictate population stability, such as birth and survival rates (e.g. Connell and Sousa 1983; Rieman and McIntyre 1993). In addition, loss of one species from a community can precipitate extinction of coexisting species, if they are strongly interdependent (Terbough 1976; Gilbert 1980).

Managing for genetic integrity within CRCT populations requires understanding the genetic basis of variation in phenotypes of traits that are ecologically and evolutionarily important (e.g. behavior, morphology, physiology) (Allendorf 1995). Geneticists have generally focused on describing molecular variation because of its simplicity in interpreting a genetic basis. Nevertheless, this genetic variation underlies the adaptive phenotypic variation which is the object of preservation in all conservation efforts. As such, genetic information is essential component in making sound conservation decisions.

In the Colorado River basin within Utah, some potential exists for restoration and/or enhancement of genetically pure metapopulations. CRCT conservation management will focus on restoring and/or preserving ecosystem processes in these areas to ensure a persistent and more natural evolutionary and ecological future for CRCT in Utah.

Status and Distribution:
Presently, a total of 25 known CRCT populations occupy approximately 121.3 stream miles within three isolated geographic regions of Utah: the northeastern includes the Uinta Mountain drainages and the northern Tavaputs Plateau; the southeast includes the La Sal and Blue

Mountain drainages and the southern Tavaputs Plateau; and the southern area includes the Escalante and Fremont river drainages. These and numerous additional cutthroat trout populations are awaiting genetic and meristic analysis to determine subspecies purity.

At the time of settlement of Utah, CRCT was the only trout found in the Colorado River basin. Early settlers reported numerous and large (up to 20 lbs.) CRCT in upper river segments. Trotter (1987) reviewed historical accounts of abundant cutthroat trout throughout headwater streams in Wyoming and Colorado during settlement of Utah in the mid-1800's. Historic CRCT distribution in Utah is speculated to be widespread in headwater streams; however, documentation is rare (Behnke 1992).

The introduction of nonnative salmonids was concurrent with settlement of Utah. Although CRCT are considered to be hardier than other salmonid species at high elevations and during drought conditions, it is speculated that hybridization and competition from extensive introductions of rainbow, nonnative cutthroat and brook trout gradually lead to the replacement of CRCT by these species (Trotter 1987). In addition, fishing pressure, habitat degradation, water depletion and water quality degradation probably contributed to a decrease in numbers of CRCT.

Binns (1977) suggested that, in 1977, CRCT occupied less than 1% of their historical habitat. To assess the current status of the CRCT and to manage for its recovery, purity rating systems were developed which discern pure strains of CRCT from hybridized strains (Binns 1977; Martinez 1988). The purity of several populations has been evaluated through electrophoresis (Leary 1990; Leary et al. 1993) and through mitochondrial DNA (Shiozawa et al. 1993, 1994). However, most evaluations to date have been based on morphology and meristics (Young 1995). Martinez (1988) identified 33 populations in Colorado. Trapper's Lake, near the headwaters of the White River in Colorado, contained the largest pure population of CRCT; however, recent hybridization with rainbow and introduced cutthroat trout has been discovered in Trapper's Lake (Martinez 1988). Binns identified 40 stream and 2 lake populations in Wyoming, only 8 of which were considered genetically pure.

Most of these populations are restricted to small, fragmented headwater drainages. Although isolated populations are important as refugia, some degree of interconnectedness among populations (metapopulation structure) is required to maintain genetic exchange and stabilize population dynamics (Wilcox and Murphy 1984, Hanski and Gilpin 1991). Conservation of CRCT in Utah depends on protection of ecosystems that support refugia and metapopulations. In the Colorado River basin, limited areas retain the potential for metapopulation persistence which requires unobstructed migratory corridors among several CRCT populations.

Robert Rush Miller included CRCT on his list of threatened freshwater fish of the United States in 1972 (Trotter 1987). In 1979 and 1989, the American Fisheries Society (AFS) listed CRCT as "threatened" throughout its range because of present or potential destruction of habitat and because of hybridization and competition with nonnative species (Williams et al. 1989). The USDA Forest Service considers CRCT as a sensitive species in Regions 2 and 4, and Colorado, Utah and Wyoming have designated CRCT as a species with special status or as sensitive. Additionally, CRCT was considered a category 2 candidate species for Federal listing until

February 28, 1996 when category 2 and 3 species were removed from the candidate list.

In addition to protective legislation, the U.S. Forest Service, BLM, USFWS, and the State of Utah have initiated stream improvement projects, population and habitat surveys, brood stock development and reintroductions over the past decade. These efforts allowed managers to expand known CRCT range since the 1970's. As a result, the status of CRCT does not appear to have declined further in the last twenty years. However, individual populations have been lost and threats to CRCT persistence remain in portions of the state. Through the CRCT Agreement and Strategy, federal, state and local agencies have initiated a concerted effort and commitment towards improving the status of CRCT in Utah.

Problems facing the species:

The following list of threats to CRCT in the State of Utah is based on the five criteria considered for federal listing. Under each of these criteria, specific activities threatening the persistence of CRCT populations are described. Threats unique or extreme to drainages are discussed within individual GMUs.

1) The present or potential destruction, modification, or curtailment of habitat or range (HABITAT DEGRADATION).

Poorly managed water development, livestock grazing, energy development, and mining are considered primary threats to CRCT habitat. Poorly planned timber management and associated road building can also degrade CRCT habitat.

a) Water development or diversion of stream flows which altered natural flow patterns has been a major cause of habitat loss for cutthroat trout in the past. Water development has altered historic flow timing, duration and magnitude or completely dewatered stream segments.

b) Past and some current livestock grazing practices adversely impact CRCT and its habitat. Poor grazing practices can alter sediment transport regimes and streambank stability and can change water quality, substrate composition and channel structure. Specific ramifications include loss of pool habitat, reduced instream cover, increased water temperature, and loss of quality substrate required for spawning and food production.

c) To date, energy development and mining activities have had effects in some areas, and impacts have been localized. Potential threats include mine tailing leaching, especially during spring runoff, road building with associated sedimentation and migration corridor blockage, and water depletions for dust control, maintenance activities, and fossil fuel exploration.

d) One of the greatest state-wide threats to the persistence of CRCT is range or habitat fragmentation. Fragmentation threatens CRCT persistence by preventing genetic exchange among populations. The resultant inbreeding and small population sizes decrease genetic heterogeneity and increase risks of loss incurred from environmental forces or population fluctuations (Simberloff and Abele 1976; Leary et al. 1991; Roff

1974; Wilcox and Murphy 1984). Simply stated, small populations go extinct sooner than large populations in periods of negative growth (e.g., Connell and Sousa 1983; Rieman and McIntyre 1993). Furthermore, loss of one species from a community can precipitate extinction of coexisting species, if they are strongly interdependent (Terbough 1976; Gilbert 1980).

2) Disease, predation, competition and hybridization (DETRIMENTAL INTERACTIONS)

a) The recent introduction of whirling disease into Utah river systems poses the greatest disease threat. The parasites plestophera and epitheliocystis have been found as well. CRCT may be more vulnerable to disease and parasites when their habitat is degraded.

b) Predation is a potential threat (especially to early life stages) where other predaceous salmonids occupy the same area as CRCT.

c) Several studies suggest that introduced salmonids will competitively replace native cutthroat species (Griffith 1988; e.g. Kershner 1995). However, the extent to which competition is a threat has not been thoroughly assessed.

d) Because both native (Behnke 1992) and nonnative (Duff 1988) salmonids have been stocked throughout Utah, hybridization poses a significant threat to the genetic integrity of CRCT populations. CRCT can hybridize with rainbow trout and other cutthroat subspecies in some situations. Hybridization with nonnative fish leads to an eventual swamping of the native CRCT genotype. Hybridization among cutthroat trout subspecies can result in the loss of the characteristic subspecies' phenotypes (Kershner 1995).

3) Overharvesting for commercial, recreational, scientific, or educational purposes (OVERUTILIZATION).

Overfishing is a potential threat in highly accessible areas where CRCT are found. Unrestricted angling can effectively displace cutthroat trout populations where they coexist with other salmonids, because cutthroat trout are generally easier to catch (Behnke 1992). Binns (1981) also noted that CRCT were easy to catch but that catchability was variable. Overharvesting by sportfish anglers is an existing threat in some highly accessible areas; however, the state of Utah currently enforces angling restrictions in portions of CRCT range to protect this subspecies. This threat is presently not considered excessive in the state of Utah, but fishing impacts should be assessed to ensure adequate protection of CRCT.

4) Inadequate regulatory mechanisms (INADEQUATE REGULATION).

Although management has improved, and the onset of CRCT conservation has lead to CRCT angling regulation, inadequate regulatory mechanisms probably contributed to the decline of CRCT populations historically and remains a threat in some areas.

5) Other natural or human induced factors affecting the continued existence of CRCT (OTHER FACTORS)

a) Natural climatic events such as flood, fire and drought may threaten specific populations of CRCT; however, these forces only pose threats as long as CRCT range remains fragmented and populations are small. Small, isolated populations are more susceptible to catastrophic loss and impacts from demographic stochasticity.

b) One of the most imposing threats to the persistence of CRCT at this time is the socio-political pressure associated with managing a species recognized as sensitive by state and federal agencies. Existing or potential sensitive recognition has endowed CRCT with a perceived status which elicits public and governmental resistance to CRCT management. This socio-political pressure can block conservation efforts at the state level.

Goal:
Ensure the longterm conservation of CRCT within its historic range in Utah.

Objectives:
Current CRCT populations are mainly restricted to headwaters (1st order streams) which often reflect habitat refugia rather than habitat preference; therefore, objectives to meet the goal of this program will be based on historically occupied miles of stream categorized by stream order. This format ensures that conservation actions are not limited to headwater streams and that all historical stream and watershed types are represented in future conservation efforts. Waters will be categorized from 1st order (headwaters) to 5th and higher order streams and lakes (lentic environments) and stream mileage will be determined and summarized by stream order from 1:100,000 scaled maps of drainages. Until historic stream miles by stream order are summarized, goals are summarized by major drainages within GMU's.

The following two objectives will be required to attain the goal of this strategy:

1) Restore and maintain 52 conservation populations of CRCT throughout 537 stream miles including a sufficient number of metapopulations among all Geographic Management Units (GMU).

   By GMU, the state-wide conservation objectives proposed are to:
   a) Maintain 33 populations and 432 occupied stream miles in the Northeastern GMU.
   b) Maintain 11 populations and 70 occupied stream miles in the Southeastern GMU.
   c) Maintain 8 populations and 35 occupied stream miles and in the Southern GMU.

2) To eliminate or minimize threats to CRCT and its habitat to the greatest extent possible.

Actions:
The following section outlines a general list of actions that eliminate or reduce threats to CRCT persistence. Each general action includes a list of specific actions which may be implemented. Actions will be prioritized and implemented within GMUs, because the potential for CRCT restoration varies among GMUs.

1) Determine baseline CRCT population, life history and habitat data (ADDITIONAL SURVEYS).

a) Locate and assess additional CRCT populations and confirm known population status.

b) Analyze habitat fragmentation to determine the degree of connectedness required for metapopulation persistence.

c) Identify additional CRCT habitat and life-history requirements and conditions through surveys and studies of hydrologic, hydraulic, biologic and watershed features.
   i) flow quantity, timing, and duration;
   ii) riffle to pool ratios and substrate size and composition;
   iii) sympatry and macroinvertebrate community composition and ecology and
   iv) water quality, riparian condition and instream cover (percent coarse woody debris and percent undercut bank).

d) Determine the number of individuals and habitat requirements needed to maintain a conservation population.

2) Determine and maintain genetic integrity (GENETIC ANALYSIS).

a) Improve and refine identification techniques for CRCT. In addition to using traditional meristic approaches, protein electrophoresis, mitochondrial DNA, nuclear DNA, and other appropriate genetic techniques will be employed.

b) Conduct genetic surveys of CRCT populations within GMUs. Confirm status of known pure and determine status of potentially pure CRCT populations.

c) Establish introduction, reintroduction and transplant protocols based on criteria of maximizing genetic integrity among GMU's (minimizing mixing of types) and maximizing genetic variability within populations. (Also see 5-a and 5-c)

3) Enhance and maintain habitat (HABITAT ENHANCEMENT).

a) Enhance and/or restore connectedness and oppurtunities for migration to disjunct populations where possible. Migratory corridors should retain some degree of their natural physical and biological condition to enable migration and gene flow.

b) Enhance and/or restore habitat conditions in designated waters throughout the range of CRCT. Actions may include bank stabilization and runoff control structures, road closure and restoration or road relocation, riparian fencing and sustainable grazing practices.

c) Maintain and restore where possible natural hydrologic characteristics such as flow quantity, timing and duration to maintain active channel and floodplain features (e.g. riparian vegetation, undercut bank, bed structure and sediment transport regimes). This action includes securing instream flow needs through water acquisition or regulation.

4) Selectively control nonnative species (NONNATIVE CONTROL).

a) Determine where detrimental interactions, such as hybridization, competition and disease, occur between CRCT and sympatric nonnative species.

b) Control or modify stocking, introductions, spread of nonnative aquatic species and spread of disease where appropriate.

c) Eradicate or control detrimental nonnative fish where feasible. Targeted species may include brook trout, rainbow trout, brown trout and some hybrid populations. This action includes construction of fish barriers to prevent nonnative fish movement where presence of nonnative species preclude reestablishment of migratory corridors. This action also includes the limited use of piscicides (i.e. rotenone) to remove competing or hybridizing nonnative salmonids with intent to restore and maintain CRCT populations in drainages within their natural range. Standard procedure for chemical stream treatment will include investigation of the feasibility and effectiveness of post-treatment macroinvertebrate community restoration.

5) Expand CRCT populations and distribution through introduction or reintroduction from either transplanted or broodstock CRCT (REINTRODUCTION).

a) Establish protocols and criteria for introduction and reintroduction of CRCT based on conservation objectives or sportfishing objectives (See 2-c).

b) Identify and develop brood stock sources including identification of wild sources, disease certification, rearing facilities, and protocols for taking wild fish and eggs.

c) Restore CRCT populations into appropriate streams/lakes. Where feasible, identify areas to restore CRCT metapopulations (See 2-c).

d) Establish a CRCT hatchery program within the state hatchery program that will be responsible for cultivation of CCT to be used in introduction, reintroduction and stocking programs for conservation and sportfishing populations.

6) Monitor Populations and Habitat (MONITORING).

a) Develop and implement CRCT population and habitat monitoring protocol to determine program effectiveness. Parties responsible (as designated by the CRBCT) for administering and conducting monitoring are described in Table 3 of the Agreement.

b) Evaluate conditions of populations and habitats using baseline data (See 1-a).

7) Develop a mitigation protocol for proposed water development and future habitat alteration, where needed.

SPORTFISHING

This strategy encourages the promotion and use of CRCT as a sportfish within the State of Utah. Currently, a stocking protocol is being established in the State of Utah in which future CRCT stocking will gradually replace stocking of nonnative salmonids (i.e. rainbow trout) into appropriate waters within the historic range of CRCT in Utah. This transition will occur as CRCT brood sources become available and as artificial CRCT culturing becomes feasible and effective within the state hatchery program for purposes of stocking (i.e. adequate numbers are reared and survival in the wild can be expected). The effectiveness of CRCT as a sportfish will be evaluated by UDWR. Upon this determination, CRCT will be utilized where appropriate. The currently known exceptions to replacing nonnative salmonid stocking with CRCT stocking is in waters that receive high fishing pressure where supplemental stocking of rainbow and other trout may be deemed necessary to meet public sportfishing demands. Such exceptions will occur only if the demands do not conflict with meeting CRCT Conservation goals and objectives. Areas that are currently expected to be exceptions under this criterion are considered geographically limited urban or near-urban streams and reservoirs with good public access and high use impacts.

As noted in the description of conceptual management of sportfishing populations, CRCT will be managed first for conservation and long-term protection of the CRCT in Utah and second as a sportfish. Goals and objectives described in this section will be implemented to supplement Conservation management, not to replace these. Achievement of Sportfishing goals and objectives will not conflict with Conservation management. Any quantitative Sportfishing objectives identified in this section are in addition to, and not conflicting with, the priority of meeting Conservation objectives.

At this early stage in program implementation, most Sportfishing objectives are pending completion of Conservation objectives. In the future, we expect that Sportfishing objectives will increase as the sportfish popularity of CRCT increases and as CRCT status improves to a naturally viable level. As areas become identified for stocking of CRCT for supplemental sportfishing purposes, waters will be specifically identified within this program.

Goal:
Utilize CRCT in routine management of sportfish recreation.

Objectives:

1) The sportfishing objectives for the Northeastern GMU are to maintain 35 populations within 323 stream miles of occupied CRCT habitat.

   a) Maintain 10 populations and 89 occupied stream miles in the North Slope Uinta subunit.
   b) Maintain 13 populations and 138 occupied stream miles in the South Slope Uinta subunit.
   c) Maintain 12 populations and 96 occupied stream miles in the North Tavaputs Plateau subunit.

2. In the Southeastern GMU, no quantitative Sportfish objectives are currently proposed but may be determined after Conservation objectives are met.

3. In the Southern GMU, no quantitative Sportfish objectives are currently proposed but may be determined after Conservation objectives are met.

Actions:

Actions implemented for the purpose of meeting Sportfishing objectives may be, but are not limited to, actions described for meeting Conservation objectives. Sportfish populations may be managed without constraint within the State sportfishing program unless (1) activities or consequences of activities to manage sportfishing populations conflict with Conservation goals and objectives or (2) threats to long-term CRCT persistence within its natural range in Utah are perpetuated or increased by sportfishing actions or consequences of these.

GMU CONSERVATION AND MANAGEMENT

NORTHEASTERN MANAGEMENT UNIT

Unit Description:
This GMU comprises three subunits: North Slope Uintas, South Slope Uintas and North Tavaputs Plateau. The Uinta Mountains, located in northeastern Utah, range in elevation from approximately 7,000 ft. to a maximum elevation of 13,525 ft. Most of the Uinta lakes range in elevation from 9,000 to 11,500 ft. in elevation. The mountains are an average of 45 miles wide and 160 miles long. The region is primarily composed of a series of quartzite and sandstone/shale beds. The Uinta Mountains have been extensively glaciated in alpine areas, and most lakes are formed through glacial erosion and deposition. The region has over 1,000 alpine lakes. These lakes and their tributaries are under snow and ice 8 to 9 months of the year, thereby affording a relatively short growing season for trout. The pH of most lakes ranges from 6.6 to 7.5 (slightly acidic). Most are oligotrophic and maintain cold year round temperatures from snowmelt.

The Tavaputs Plateau geology is primarily composed of sandstone and shale. Lower elevation vegetation includes: numerous grasses and browse, pinion pine and juniper, willows, Ponderosa Pine, Douglas Fir and aspen. Higher elevation vegetation is predominately aspen and spruce/fir with grass and sage meadows. The Tavaputs Plateau has few lakes; however, streams range in elevation from 6800 to 9190 ft. Grazing in this area has caused considerable erosion which leads to high silt loads and severe headcutting in the drainages during runoff periods. The North Tavaputs Plateau comprises three main drainages: the Strawberry River drainage; the Willow Creek drainage; and the Bitter Creek drainage.

Current Status and Distribution:
The North and South Slope of the Uinta Mountains is a stronghold of naturally propagating CRCT populations. CRCT samples from 41 streams and several lakes have been examined for purity. On the North Tavaputs Plateau, however, recovery efforts have been minimal to date. Currently, 20 genetically pure populations of CRCT occupy 111.8 stream miles and 61 potentially pure populations of CRCT are awaiting genetic analysis in the Northeastern GMU (Table 4).

Table 4: Status of CRCT within Northeastern GMU. OSM = occupied stream miles. 'pure' = genetically pure; 'potentially pure' = awaiting genetic analysis. ? = status unknown. sa = surface acres of lentic water. (See Definitions)

a) North Slope Uinta Mountains

State Water ID #	Reach	CRCT Status	OSM
IICJ	Henry's Fork	potentially pure	
IICJ010	-Birch Cr.	hybrid	0
IICJ030	-Burnt Fork	pure	10.6
IICJ040B	-Beaver Cr.	potentially pure	0
IICJ050	-Dahlgreen Cr.	pure	8
IICK	-Black's Fork (E.Fk & Little E.Fk)	potentially pure	
IICK020	-Gilbert Cr.	pure	1
II536C	-Beaver Meadow Res.	potentially pure	
IICK010K	-West Fork Muddy Cr.	pure	4
IICK010A01	-Van Tassel Cr.	pure	1
IICK020B	-West Fork Smith's Fork	pure	10
IICI	Sheep Cr.		
IICI050	-North Fork	potentially pure	9.9
IICI050A	-Middle Fork	potentially pure	2
IICI030	-South Fork	pure	2.6
	-Mann Cr.	potentially pure	1.6
II056/7	-Anson Lakes	hybrid	0
II058H	-Daggett Lake		0
IICI030A	-Daggett Cr.	potentially pure	2.5
IICH	Carter Cr.		
IICH060	-West Fork	hybrid	3
IICH070A	-East Fork	hybrid	2
II067B/8	-Lamb Lakes	hybrid	0
IICH050	-Beaver Cr.	potentially pure	2
IICH050A	-Weyman Cr.	potentially pure	1
II09	Green River		
	(below Flaming Gorge Dam)		
IIBW	-Gorge Cr.	suspected hybrid	0
IIBU	-Davenport Cr.	suspected hybrid	0
IIBT	-Jackson Cr.	suspected hybrid	0
IIBR	-Tolivers Cr.	potentially pure	-
IIBP	-Willow Cr.	hybrid	0
IIBN	-Pot Cr.	potentially pure	-
IIBW010	-Kettle Cr.	potentially pure	-
IIBJ010A01	-Reader Cr.	potentially pure	8.7
IIBM010/020	-Diamond Gulch	potentially pure	-
IIBM	-Jones Hole Cr.	hybrid	-
	-Ely Cr.	potentially pure	-
IIBJ010A	-Bassett Springs	potentially pure	-
IIBQ	-Sears Cr.	pure	1
IIBO	-Crouse Cr.	potentially pure	0

	Green River		
	(Flaming Gorge Reservoir)		
IICH03001	-Elk Cr.	potentially pure	
IICH040	-Deep Cr.	hybrid	
IICH030A	-Little Elk Cr.	potentially pure	
IICH020	-Burnt Cr.	potentially pure	4.3
IICH010	-Cub Cr.	potentially pure	
IICG	-Eagle Cr.	potentially pure	
IICF	-Skull Cr.	potentially pure	
IICB	-Allen Cr.	hybrid	
IICA	-Bear Cr.	potentially pure	
IIBY020	-Francis Cr.	potentially pure	
IIBY	-Cart Cr.	hybrid	

b) South Slope Uinta Mountains

State Water ID #	Reach	CRCT Status	OSM
	Currant Cr.		
IIBE060F01H01	-Race Track Cr.	pure	3.1
IIBE060F0104	-Currant Cr. HW	pure	3.1
IIBE060F01K101	-Right Hand Fork	potentially pure	4.3
IIBE060F01K01	-Pass Cr.	potentially pure	3.7
IIBE060F01J01	-Low Pass Cr.	potentially pure	4.3
	-Jones Cabin Cr.		3.1
IIBE060F01B	-Water Hollow Cr.	Bear Lake BCT	0
IIBE060F01E	-Layout Cr.	potentially pure	0.5
IIBE	Duchesne River		
IIBE150	-West Fork	pure	18.6
IIBE150I	-Little West Fork	potentially pure	5.6
IIBE150F	-Vat Cr.	potentially pure	0.5
IIBE150A	-Wolf Cr.	hybrid	0
IIBE160	-North Fork	pure	1
IIBE15002	-Duchesne River HW	potentially pure	2
IIBE100	Rock Cr.		
	-Rock Cr. headwaters	potentially pure	0
IIBE100H	-Cabin Cr.	potentially pure	0
IIBE100G	-South Fork	hybrid	0
IIBE100B	-Macafee Basin	potentially pure	
	-Lower Rock Cr.	hybrid	0
II173BA	-King Lake	hybrid	
II156	-Grandaddy Lake	potentially pure	0
II138	-Docs Lake		
IIBE020	Lake Fork River		
	-Oweep Confl. HW	potentially pure	
IIBE020H	-Oweep Cr.	potentially pure	
	-Midwaters of Left Fk	potentially pure	
IIBE020D	-Brown Duck Cr.	potentially pure	
IIBE020C	-Fish Cr.	potentially pure	
II245	-Toquer Lake	potentially pure	

IIBE010A II161	Dry Gulch -Crow Basin -Heller Lake	 hybrid 	
IIBE020B IIBE020B IIBE020B05 IIBE020B04 IIBE020B02	Yellowstone River -Yellowstone R. HW -Milk Cr. -Garfield Cr. -Swift Cr. -King Lake	 pure potentially pure potentially pure suspected hybrid hybrid	 4
IIBE010 IIBE010I0101 IIBE01005 IIBE010G0101 IIBE010G01 IIBE010F01	Uinta River -Uinta River HW -Gilbert Cr. -North Fork -Carrot Cr. -Atwood Cr. -Krebs Cr. -Rock Cr.	 hybrid hybrid hybrid potentially pure potentially pure potentially pure potentially pure	 3 0 0 1
IIBE010C IIBE010C06 IIBE010C0501 IIBE010C0301 IIBE010C04 II146A 11211A	Whiterocks River -Whiterocks R. HW -Reader Cr. -East Fork -West Fork -Johnson Cr. -lower canyon drainage -Figure Eight Lake -headwater lakes -Reader Lakes	 pure pure potentially pure potentially pure hybrid potentially pure pure suspected hybrid suspected hybrid	 4 5 3.7 2 0 3.6 ac 0 0
IIBH IIBH070 IIBH060 IIBH04001 IIBH010B	Ashley Cr. -North Fork -South Fork -Cow Hollow -Browne Cr. -middle canyon	 hybrid potentially pure hybrid potentially pure potentially pure	 1
IIBH010C II719 II587A	Dry Fork Cr. -headwaters -Blanchett Park -Dead Man Lake -Fish Lake -Left Fork	 pure pure hybrid hybrid potentially pure	 4 3
IIBJ IIBJ010 IIBJ08001 IIBJ10001	Brush Cr. -headwaters -Little Brush -Big Brush -Government Cr. -Anderson Cr.	 potentially pure hybrid suspected hybrid potentially pure potentially pure	 0 0 0

c) North Tavaputs Plateau

State Water ID #	Reach	CRCT Status	OSM
IIBE060	Strawberry River		
IIBE060K	-Willow Cr.	hybrid	
IIBE060H	-Timber Canyon Cr.	pure	12.4
IIBE060G	-Avintaquin Cr.	pure	11.8
IIBE060G07A1	-Mill Hollow	potentially pure	
IIBE060G04	-South Avintaquin	potentially pure	
IIBB	Willow Cr.		
	-headwaters	hybrid	
IIBB060	-East Willow Cr.	hybrid	
	-Little Cr.	hybrid	
IIBB060A	-She Canyon Cr.	hybrid	
	-Fish Cr.	hybrid	
IIBB050	-West Willow Cr.	hybrid	
	-Clear Cr.	hybrid	
	-Ten Mile Cr.	hybrid	
	-Meadow Cr.	hybrid	
	-Kelly Canyon	hybrid	
	-Main Canyon	hybrid	
IIBD01B	-Sweetwater Cr.		
IIBC010A	Bitter Cr.		
	-headwaters	hybrid	
	(above Brewer Rock)		
	-midwaters (below swamp)	hybrid	0

Threats:

1) ***Habitat Degradation:*** Within the subunits of the North and South Slopes of the Uinta Mountains and the North Tavaputs Plateau, the greatest threat to CRCT is fragmented range and population isolation. In some cases, populations are necessarily isolated to prevent invasion of nonnative salmonids from downstream reaches.

   Habitat degradation on the North and South Slope subunits can be attributed to poor grazing practices and recreational pressure in some riparian areas. These pressures result in eroded stream banks, high sediment loads, poor spawning substrates, loss of pool habitat and elevated water temperatures.

   Water development in the form of irrigation diversions, flow depletions and dams also threaten CRCT on the North and South Slope of the Uinta Mountains. Water development in the Uinta Mountains began with white settlement in the late 1800's. Some streams have been completely dewatered or diverted. A few reservoirs also exist. Dams and diversions change the natural stream hydrology that not only maintains stream channel integrity but also provides physical and chemical cues for certain life history stages of CRCT.

2) ***Detrimental Interactions:*** CRCT populations hybridize and eventually are displaced or genetically swamped by the stocked rainbow trout in some areas. To prevent

hybridization, barriers are constructed; however, these also act to fragment the range of CRCT and isolate small populations.

Also, Brook trout may eventually displace CRCT through competition.

Another potential threat from the nonnative fish is the spread of disease and parasites. Whirling disease has been a particular concern in Utah since its recent introduction.

3) ***Inadequate Regulation:*** Federal restrictions on angling and fish management in wilderness areas may pose a threat to CRCT by hindering recovery efforts.

Conservation Objectives:
The conservation objectives for the Northeastern GMU are to maintain 33 populations within 432 stream miles of occupied CRCT habitat.

By drainage, the unit objectives proposed are to:
1) Maintain 8 populations and 194 occupied stream miles in the North Slope Uinta subunit.
2) Maintain 15 populations and 166 occupied stream miles in the South Slope Uinta subunit.
3) Maintain 10 populations and 72 occupied stream miles in the North Tavaputs Plateau subunit.

Sportfishing Objectives:
The sportfishing objectives for the Northeastern GMU are to maintain 35 populations within 323 stream miles of occupied CRCT habitat.
1) Maintain 10 populations and 89 occupied stream miles in the North Slope Uinta subunit.
2) Maintain 13 populations and 138 occupied stream miles in the South Slope Uinta subunit.
3) Maintain 12 populations and 96 occupied stream miles in the North Tavaputs Plateau subunit.

Actions:
1) ***Additional surveys:*** The first action towards recovery of CRCT in the Northeastern GMU will be population and habitat surveys. To understand recovery needs for CRCT in this region, managers must know the range and purity of CRCT and the condition of available habitat.

2) ***Nonnative control:*** To eliminate or minimize threats from nonnative salmonids, fish stocking protocols will be modified to include a criterion of prioritizing recovery of CRCT. Brook trout, arctic grayling and other selected nonnative species may continue to be stocked into some Uinta Mountain streams. However, specified stream miles, types and systems will be preserved for CRCT recovery. Eradication of nonnative and/or diseased native species will also be conducted according to their designation in CRCT introduction and reintroduction efforts.

3) ***Habitat enhancement:*** Proposed water development projects will be assessed and approved before implementation. If CRCT populations or habitat is negatively affected, mitigation plans will be developed for CRCT habitat or population enhancement to ameliorate or compensate impacts.

In addition to baseline habitat surveys, a monitoring protocol will be developed and initiated. Areas identified with degraded habitat can be targeted for enhancement projects and modified land use practices. Highly degraded areas can be fenced or restricted from public use. Enforcement of existing regulation (Clean Water Act, Section 404 and State Permit GP 40 to Alter a Natural Stream) will prevent further habitat degradation.

A cooperative agreement will be developed with local governing agencies in an effort to increase effectiveness and efficiency of CRCT recovery in federally, locally and privately administered waters. This agreement should include the Forest Service, BLM and local governments or other interested parties.

Table 5 summarizes the conservation actions and Table 6 summarizes the sportfishing actions planned for the North, South Slope Uinta and the North Tavaputs Plateau subunits of the Northeastern GMU. Conservation actions are the minimum required actions necessary to preserve and maintain CRCT within parts of its natural range. These tables present temporally sequential actions, from left to right, to be implemented in the year stated.

Table 5: **Conservation actions** for the Northeastern GMU.
a) North Slope Uinta Mountains

Reach	Additional Surveys	Genetic Analysis	Habitat Enhancement	Nonnative Control	Reintroduction	Monitoring
Henry's Fork						
-Burnt Fork			2004	2004	2005	2006
-Black's Fork	2004	2002	2004	2004	2005	2006
-Gilbert Cr.	2004		2004	2000	2001	2002
-Birch Cr.						
-Beaver Cr.	1998	1996	2008	2008	2009	2010
-Beaver Meadow Reservoir	1998	1996	2008	2008	2009	2010
Sheep Cr.						
-North Fork			2003	2003	2004	2005
-Middle Fork	1996	1996	2003			2004
-South Fork			2003	2003	2003	2004
-Mann Cr.		1996		2005	2006	2007
-Anson Lakes			2000	2010	2011	2012
-Daggett Lake					2005	2006
-Daggett Cr.		1998	2000	2010	2011	2012
Carter Cr.						
-West Fork				1999	2000	2001
-East Fork				1999	2000	2001
-Lamb Lakes	1999			2001	2002	2003
-Beaver Cr.	1998	1999	2010	2010	2010	2011
-Weyman Cr.	2000	2000	2010		2010	2011

Green River (below Flaming Gorge Dam)						
-Gorge Cr.	2002					
-Davenport Cr.	2003					
-Jackson Cr.	2002					
-Tolivers Cr.	2002					
-Willow Cr.	2004					
-Pot Cr.	2003					
-Kettle Cr.	2003					
-Reader Cr.	2002					
-Diamond Gulch	2002					
-Jones Hole Cr.	2004					
-Ely Cr.	1999					
-Bassett Springs	2003					
-Sears Cr.	1997				1998	1997
-Crouse Cr.	1997				2002	2005
Green River (Flaming Gorge Reservoir)						
-Elk Cr.	1997	1997		2004	2005	2008
-Deep Cr.	1997					
-Little Elk Cr.	1997	1997		2004	2004	2007
-Burnt Fork	2002					
-Cub Cr.	1997	1997				
-Eagle Cr.	1997	1997				
-Scull Cr.	1997	1997				
-Allen Cr.	1997	1997		2005	2006	2009
-Bear Cr.	2003					
-Francis Cr.	2004					
-Cart Cr.	2000					

b) South Slope Uinta Mountains.

Reach	Additional Surveys	Genetic Analysis	Habitat Enhancement	Nonnative Control	Reintroduction	Monitoring
Currant Cr.						
-Race Track Cr.	2003					1996
-Currant Cr. headwaters	2004					1996
-Right Hand Fork	2005	1996				1996
-Pass Cr.	2003					
-Low Pass Cr.	2004					
-Jones Cabin Cr.	2003					1996
-Water Hollow Cr.	1997					
-Layout Cr.	1997					
Duchesne River						
-West Fork	2000					
-Little West Fork	1997	1997				2007
-Vat Cr.	1997	1997				
-Wolf Cr.				2005	2006	2009
-North Fork						
-Duchesne River headwaters	2004					
Rock Cr.						
-Rock Cr. headwaters	1999					
-Cabin Cr.	2000					
-South Fork						
-Macafee Basin	1998					
-Lower Rock Cr.	1996					
-King Lake				2001	2002	2005
-Grandaddy Lake	1997	1997		2002	2003	2006
-Docs Lake	1997					

Lake Fork River						
-Oweep Confl. headwaters	1999	1999		2009	2010	2012
-Oweep Cr.	1999	1999		2009	2010	2012
-Midwaters of Left Fork	1999	1999		2009	2010	2012
-Brown Duck Cr.	1999	1999		2009	2010	2012
-Fish Cr.	1998	1998		2008	2009	2011
-Toquer Lake	1998	1998		2008	2009	2011
Dry Gulch						
-Crow Basin	1998	1998		2008	2009	2011
-Heller Lake	1998	1998		2008	2009	2011
Yellowstone River						
-Yellowstone R. headwaters						
-Milk Cr.	1999	1999				
-Garfield Cr.	1999	1999				
-Swift Cr.	1999	1999				
-King Lake						
					2000	2003
Uinta River						
-Uinta River headwaters						
-Gilbert Cr.				2003	2004	2008
-North Fork						
-Carrot Cr.	1996	1996				
-Atwood Cr.	1999	1999				
-Krebs Cr.	2004	2004				
-Rock Cr.	1999,2009			2010	2011	2013

Whiterocks River						
-Whiterocks R. headwaters	2004			1997	1996	1998
-Reader Cr.					1996	2008
-East Fork	2000	2000				
-West Fork	2000	2000				
-Johnson Cr.				2003	2004	2006
-lower canyon drainage				2003	2004	2008
-Figure Eight Lake	2000					
-headwater lakes						
-Reader Lakes	2003					
Ashley Cr.						
-North Fork	2000			2003	2004	2008
-South Fork						
-Cow Hollow Cr.	1995					1996
-Brownie Cr.	1996	1996				
-midwater canyon drainages						
Dry Fork Cr.						
-headwaters				2003	2004	2009
-Blanchett Park						1997
-Dead Man Lake	1995			2004	2005	2009
-Fish Lake	1995			2010	2011	2012
-Left Fork						
Brush Cr.						
-headwaters	2002	2002				
-Little Brush				2005	2006	2010
-Big Brush				2005	2006	2010
-Government Cr.	2001	2001				
-Anderson Cr.	2001	2001		2005	2006	2010

c) North Tavaputs Plateau.

Reach	Additional Surveys	Genetic Analysis	Habitat Enhancement	Nonnative Control	Reintroduction	Monitoring
Strawberry River						
-Willow Cr.	2003					
-Timber Canyon Cr.	2003					
-Avintaquin Cr.	2003					
-Mill Hollow	1995	1996				
-South Avintaquin	2004	2004				
Willow Cr.						
-East Willow Cr.					1999	2001
-Little Cr.					1998	2000
-She Cr.					2000	2002
-Fish Cr.	1998				2001	2003
-West Willow Cr.					2002	2004
-Clear Cr.						
-Ten Mile Cr.	2004					
-Meadow Cr.						1998
-Kelly Canyon	1997				2003	2007
-Main Canyon						
-Sweet Water	1998					
Bitter Cr.						
-headwaters (above Brewer Rock)				1999	2000	2004
-midwaters (below swamp)				1999	2000	2004

Table 6: **Sportfishing actions** for the Northeastern GMU.

Reach	Additional Surveys	Genetic Analysis	Habitat Enhancement	Nonnative Control	Reintroduction	Monitoring
Subunit: North Slope Uintas						
Carter Cr.						
-West Fork	2004				2005	2008
-Lamb Lakes	2004				2005	2008
Subunit: South Slope Uintas						
Lake Fork River						
-Headwaters of Oweep Cr.	1999					
-Oweep Cr.	1999					
-midwater/Left Fork R.	1999					
-Brown Duck Cr.	1999					
-Fish Cr.	1998					
-Toquer Lake	1998					
Dry Fork						
-Crow Basin	2003				2004	2007
-Heller Lake	2003				2004	2007

SOUTHEASTERN MANAGEMENT UNIT

Unit Description:

The Southeastern Management Unit lies within the Colorado Plateau and has an extremely dry climate. This management unit encompasses the southern portion of the Colorado and Green River drainages within Utah bordered by the Book Cliffs on the north except the Fremont and Escalante drainages. The high elevation and dry climate limits good trout habitat to mountain streams at elevations above 4,000 feet in subalpine and alpine ecozones. Early biological surveys and anecdotal reports suggest that Colorado River Cutthroat inhabited many streams throughout headwater streams in this management unit. The Southeastern Management Unit can be divided into four discrete subunits defined by distinct mountain ranges with suitable trout habitat: the south Tavaputs, East Manti Mountain, the La Sal Mountains, and the Abajo Mountains.

The South Tavaputs Plateau is bordered by the southern drainage of the Tavaputs Plateau and extends east from Willow Creek (near Castle Gate) to the Colorado State border and includes portions of Carbon, Emery and Grand counties. The South Tavaputs management unit has relatively few streams that can support self-sustaining trout populations. However, the remote nature of this area makes it an important conservation area. Most of this land lies within the Bureau of Land Management's Grand Resource Area.

East Manti Mountain subunit is defined by the western divide of Manti Mountain and includes parts of Carbon, Emery and Sanpete counties. This subunit, located on the Wasatch Plateau, supports the greatest amount of trout habitat in the Southeastern Management Unit. The hydrology is characterized by high peak flows caused by snowmelt events and low to ephemeral fall and winter base flows. Most of the land lies within the Manti-LaSal National Forest.

The LaSal subunit is defined by the LaSal mountains, located in Grand and San Juan counties. Most of this land lies on the Manti LaSal National Forest; however, several large tracts of land are privately owned. Although the low precipitation and steep grade of these mountains limits the number of inhabitable streams, several support self-sustaining cutthroat trout populations. Many of these streams are remote with limited access.

The Abajo subunit is defined by the Abajo Mountains in San Juan county. The number of streams on this mountain is also limited by the dry climate. In addition, watercourses on the Abajo Mountains are highly developed. Most of the land is located on the Manti-La Sal National Forest.

Current Status and Distribution:

No Colorado River cutthroat populations have been identified in the South Tavaputs, East Manti Mountain or Abajo subunits. The LaSal subunit contains the what is currently considered a genetically pure population within 2.5 stream miles, however this assessment is based on preliminary genetic analysis and should be examined further (Table 7).

Table 7: Status of CRCT within Southeastern GMU. OSM = occupied stream miles. 'pure' = genetically pure; 'potentially pure' = awaiting genetic analysis. ? = status unknown. sa = surface acres of lentic water. (See Definitions)

State Water ID #	Reach	CRCT Status	OSM
	South Tavaputs		
IIAK190	- White River		
	- Tabbyune Cr.		
IIAK17001	- Kyune Cr.		
IIAK130	- Willow Cr.		
IIAK120	- Grassy Trail		
	- Minnie Maud		
IIBA040	- Range Cr.		
IIAO	- Rock Canyon Cr.		
IIAK020	- Diamond Canyon Cr.		
IBV020	- Cottonwood Cr.		
IBV	- Nash Wash		
IBR	- Nine Mile Ck		
IIBA	- Granite Cr.		
IAZ080			
	East Manti Mtn.		
IIAK100B	- Bob Wright Cr.		
IIAK100B02	- 2nd Water Cr.		
IIAK100A	- Gordon Cr.		
IIAI130N	- Nuck Woodard Cr.		
IIAK150	- Crandall Cr.		
IIAI130M04	- Rolfson Cr.		
IIAI130M06	- Spring Cr.		
IBG	- Indian Cr.		
	- Big Bear Cr.		
IIAI120G02	- Little Bear Cr.		
IIAI130D	- Fish Cr.(Muddy)		
II478	- Rolfson Res.		
I480	- Spinners Res.		
	La Sal Mountains		
	- Deer Springs Cr.		
IBQ070	- La Sal Cr.		
IBQ050B	- Geyser Cr.	hybrid	
IBQ050A	- Taylor Cr.		
	- Mill Cr.		
IBQ070	- Beaver Cr.	pure	2.5
	Abajo Mountains		
	- Indian Cr.	hybrid	

Threats:

1) **Habitat Degradation:** The greatest threat to the persistence of naturally reproducing CRCT populations is the limited, fragmented range and population isolation. The only known pure CRCT population in this GMU is restricted to one small stream.

   Also, few streams have good quality habitat. Therefore, relocation potential is limited.

Habitat degradation mainly can be attributed to water development for irrigation and poor grazing practices.

Water development, such as irrigation diversions, flow depletions and dams also threaten streams in the Southeastern GMU. Some streams have been completely dewatered or diverted.

2) **Detrimental interactions:** Nonnative salmonids do exist in most of the potential reintroduction sites.

Another potential threat is the spread of disease and parasites. Whirling disease has been a particular concern in Utah since its recent introduction.

3) **Inadequate Regulation:** The Wilderness Study Area restrictions may prevent implementation of habitat improvement projects that will be necessary to ensure optimal introduction efforts in the South Tavaputs Plateau.

4) **Other Factors:** The sale of state lands for recreational property and timber sales poses a threat to stream habitat in the LaSal Mountains. The impacts associated with road construction and urban development could greatly degrade stream habitat as well. Also, private ponds are a source of nonnative fish.

Conservation Objectives:
The conservation objectives for the Southeastern GMU are to maintain 11 populations within 70 stream miles of occupied CRCT habitat.

By drainage, the unit objectives proposed are to:

1) Maintain 4 populations and 40 occupied stream miles in the South Tavaputs Plateau subunit.
2) Maintain 3 populations and 15 occupied stream miles in the East Manti Mountain subunit.
3) Maintain 2 populations and 21 occupied stream miles in the LaSal Mountain subunit.
4) Maintain 2 populations and 5 occupied stream miles in the Abajo Mountains subunit.

Sportfishing Objectives:
Sportfishing objectives will be determined after Conservation objectives are met.

Actions:

1) **Additional surveys:** Population and habitat surveys are needed in some areas in which little information of CRCT is known.

2) **Genetic analysis:** CRCT samples from some streams on the South Tavaputs Plateau require genetic analysis. Genetic analysis for some populations in the LaSal subunit need to be repeated to ensure their validity.

3) **Habitat Enhancement:** Streams that have experienced poor land use practices or high

recreational use will require some stream improvement work before reintroductions can occur.

4) **Nonnative Control:** Nonnative trout species will be removed from proposed introduction sites before any CRCT are transplanted.

5) **Reintroduction:** Development of a broodstock source is necessary in the Southeastern GMU so that streams in this GMU can be introduced with local CRCT. On the South Tavaputs Plateau, CRCT may be transplanted from the North Tavaputs in the Northeastern GMU.

   Spinner Reservoir has recently become available for purchase. Feasibility of purchasing Spinner Reservoir and developing a CRCT broodstock will be investigated.

Table 8 summarizes the conservation actions planned for the Southeastern GMU. Conservation actions are the minimum required actions necessary to preserve and maintain CRCT within parts of its natural range. These tables present temporally sequential actions, from left to right, to be implemented in the year stated.

Table 8: **Conservation actions** for the Southeastern GMU.

Reach	Additional Surveys	Genetic Analysis	Habitat Enhancement	Nonnative Control	Reintroduction	Monitoring
South Tavaputs						
- White River	2001		1997	2009-2010	2011-2015	2016
- Tabbyune Cr.	1997	1996		1997	1998-1999	2000
- Kyune Cr.	1997	1996		1997	1998-1999	2000
- Willow Cr.	2001		1997	2009-2010	2011-2014	2015
- Grassy Trail	1997		1998	2004	2005-2007	2008
- Minnie Maud	1997	1996		2013-2014	2015-2017	2018
- Range Cr.	1997	1996	1997	2000	2001-2003	2004
- Rock Cr.	1997		1998	2000	2001-2003	2004
- Diamond Cr.	1998		1997		2007-2010	2011
- Cottonwood Cr.	1998		1997		2007-2010	2011
- Nash Wash	1998		1998		2007-2010	2011
- Nine Mile	1996				2007-2010	2011
- Granite Cr.	1998			2003	2004-2006	2007
East Manti Mtn.						
- Bob Wright Cr.	1999			2004-2005	2006-2009	2010
- 2nd Water Cr.	1999			2004-2005	2006-2009	2010
- Gordon Cr.	1999		1997	2004-2005	2006-2009	2010
- Nuck Woodard Cr.	1997			1998	1999-2000	2001
- Crandall Cr.	1996		1998	2013	2014-2015	2016
- Rolfson Cr.	1997			1999	2000-2002	2003
- Spring Cr.	2000			2001	2002	2003
- Indian Cr.	2000		1998	2011-2012	2013-2017	2018
- Big Bear Cr.	2000			2008	2009-2011	2012
- Little Bear Cr.	2000			2008	2009-2011	2012
- Fish Cr.(Muddy)	2000			2013-2014	2015-2018	2019
- Rolfson Res.	1997		1997	1999	2000-2004	2005
- Spinners Res.	1997		1996	2002	2003-2007	2008

La Sal Mountains						
- Deer Springs Cr.	1996		1997	1998	1999	2000
- La Sal Cr.			1997	1998-1999	2000-2003	2004
- Geyser Cr.	1996			2006-2007	2008-2010	2011
- Taylor Cr.	2001		1997	2006-2007	2008-2010	2011
- Mill Cr.	2001		1997	2002-2003	2004-2006	2007
- Beaver Cr.	1996	1996	1996			1997
Abajo Mountains						
- Indian Cr.	2000			2001-2002	2003-2005	2006

SOUTHERN MANAGEMENT UNIT

Subunit Description:

This GMU contains two main drainages: the Fremont and the Escalante rivers. The headwaters of the Fremont River begin in the high elevation mountains and alpine forests surrounding Fish Lake. The mainstem of the Fremont River continues downstream flowing between Thousand Lake Mountain and Boulder Mountain. This drainage is characterized by numerous small alpine lakes in headwater areas. The hydrology is typical of western streams with spring flood peaks dictated by snowmelt and low base flows in late summer through winter. Major tributaries of the Fremont River include: Sevenmile Creek, UM Creek, Pine Creek, Fish Creek, Pleasant Creek and Oak Creek. Fish Lake and the upper Fremont River once contained an abundant population of native cutthroat trout. CRCT are commonly restricted to areas above 6,000 feet in elevation.

The Escalante River flows from the southwest side of the Boulder Mountain (Aquarius Plateau). The climate is characteristic of high elevation deserts and alpine forests; however, the topography of the area includes a network of glacial lakes and high gradient streams. The top of the Aquarius Plateau at approximately 11,000 feet elevation drains through high gradient streams of the aspen/fir communities to low gradient streams in sandstone canyons of the Colorado Plateau to form the Escalante River. The seasonal hydrology of streams in the Escalante River drainage is similar to that of the Fremont River drainage. Major tributaries of the Escalante River include: North Creek, Pine Creek, Death Hollow, Calf Creek, Boulder Creek and Deer Creek.

Current Status and Distribution:

Currently, 4 pure populations occupy 7 stream miles in this GMU (Table 9). The Fremont River drainage has only one currently known pure population of CRCT in Sand Creek which were transplanted from genetically pure CRCT taken from the West Fork of Boulder Creek (Escalante River drainage) in 1995. Until recent years, CRCT were not known to occur naturally in the Escalante River drainage; however, relatively recent UDWR surveys identified genetically pure CRCT in the East and West Forks of Boulder Creek. In 1993, CRCT from the East and West Forks of Boulder Creek were reintroduced into Durphey Creek, a west fork tributary of Boulder Creek.

Table 9: Status of CRCT within Southern GMU. OSM = occupied stream miles. 'pure' = genetically pure; 'potentially pure' = awaiting genetic analysis. ? = status unknown. sa = surface acres of lentic water. (See Definitions)

State Water ID #	Reach	CRCT Status	OSM
	Drainage: Fremont		
IAZ130MO1	- Sand Cr.	pure (transplant)	3
IAZ130Z	- UM Cr.	planned reintroduction	0
	Drainage: Escalante		
IAJ110C	- East Boulder Cr.	pure (remnant)	0.5
IAJ110D	- West Boulder Cr.	pure (remnant)	3
IAJ110D01	- Durphey Cr.	pure (transplant)	0.5

Threats:

1) ***Habitat Degradation:*** Water development projects (depletions, migration barriers), livestock grazing, timber harvest and road construction are potential threats which could modify or further impact CRCT habitat. At present, state and federal laws, policies, regulations and plans prevent indiscriminate actions and provide some protection for CRCT habitat. However, CRCT habitat conditions should be monitored for future habitat impacts.

   Catastrophic events, such as fires and floods, are a threat to small, isolated CRCT populations. These situations may cause fragmented habitat. Also, small populations potentially are subject to random events. The impact of such threats decrease as the number of populations, number of fish, habitat complexity and range increase.

2) **Over utilization:** The threat of over-harvesting CRCT from fishing pressure is not acute at this time because most streams either have large areas that are not likely to be over-fished, or the streams are remote enough that over-fishing is not a factor. Although over-fishing is currently not considered a substantial threat, increased popularity of fishing and access in this area should caution future assessment of this threat. Future conservation of CRCT should consider this a potential threat in the Southern GMU.

3) ***Detrimental Interactions:*** Whirling disease was found in the Fremont River drainage in 1991. This disease poses a potential threat to the success of future reintroductions. The threat of disease is reduced by established procedures and protocols (e.g. disease certifications) which protects populations and requires approvals for transplanting live fish. Also, barriers have been constructed to prevent natural fish movement from spreading the disease into uncontaminated areas.

   Predation, competition and hybridization do not pose a serious threat to most existing CRCT populations because they are currently geographically isolated. However, these threats will need to be considered and properly eliminated as new populations are restored in historic habitat that presently contains nonnative species.

4) ***Other Factors:*** Another threat to the conservation of CRCT in the Southern GMU is the socio-political pressure of dealing with federally threatened or endangered species. Although CRCT is not listed as threatened or endangered by the U.S. Fish and Wildlife Service, CRCT have been reviewed for listing (Notice of Review 1982) and is recognized as sensitive by the U.S. Forest Service and a species of special concern by the State of Utah. The special status of CRCT has created public resistance to some management actions because of fears of future listing under the ESA. Resistance from the public and local governments can prevent necessary conservation actions that would prevent such listing.

Conservation Objectives:

The conservation objectives for the Southern Unit are to maintain 8 populations within 35 stream miles of occupied CRCT habitat.

By drainage, the unit objectives proposed are to:
1) Maintain 4 populations and 15 occupied stream miles in the Escalante River subunit.
2) Maintain 4 populations and 20 occupied stream miles in the Fremont River subunit.

Sportfishing Objectives:
1) Expand sport fishery management of CRCT by incorporating native trout into routine sport fishery management programs. Plans will include development of a wild broodstock to provide fish for both conservation and sportfish needs, and to reduce stocking of nonnative cutthroat trout in sport fishery programs.

2) Expand other conservation populations of CRCT beyond the conservation goals when and where opportunities arise in conjunction with improved sportfishing opportunities.

3) Initiate habitat improvements as submitted by the U.S. Forest Service and BLM, with the concurrence of the CRCT Conservation Team. Habitat improvements will be determined by monitoring established reference sites on CRCT streams and by standard USFS R1/R4 habitat surveys. Water quality, livestock grazing, timber harvesting and vehicle impacts as well as recreation and angling impacts will be assessed on a regular basis.

4) Conduct routine maintenance of fenced exclosure, other fencing, instream structures, road crossings, culverts and fish barriers. Most will be checked and maintained annually.

Actions:
1) **Reintroduction:** The ongoing program of expanding populations by reintroduction into historic habitat will continue. This includes renovation projects and construction of migration barriers to remove the threat of nonnative fish introductions. Populations are being introduced into fourth order drainages with first, second, and third order tributaries.

   A wild broodstock of Southern CRCT is planned to be developed and incorporated into general sport fishery management. Fish from this program will also be available for reintroduction into renovated areas. The broodstock program would reduce impacts of renovation projects by allowing native populations to be re-established in a shorter period of time than if transplants were made from remnant populations.

2) **Nonnative Control:** Disease certification will be continued to maintain a disease free source of CRCT to allow either transplants and/or creation of a wild broodstock. In addition, the program to evaluate whirling disease and its effect on native CRCT in the upper Fremont River drainage will be continued.

3) **Habitat Enhancement:** Habitat protection and/or improvement will be an ongoing program. Efforts have been made to control and limit the spread of whirling disease, including construction of fish migration barriers. USFS Management Plans currently designate the East and West Forks of Boulder Creek as 9A Riparian Management with an emphasis on maintaining healthy, viable riparian ecosystems. UM Creek which has been renovated and scheduled for reintroduction of CRCT is designated in the USFS Management Plan as a 4A Emphasis on Fish Habitat Improvement Area.

Table 10 summarizes the conservation actions planned for the Southern GMU. Conservation actions are the minimum required actions necessary to preserve and maintain CRCT within parts of its natural range. This table presents temporally sequential actions, from left to right, to be implemented when stated.

Table 10: **Conservation actions** for the Southern GMU.

Subunit	Additional Surveys	Genetic Analysis	Habitat Enhancement	Nonnative Control	Reintroduction	Monitoring
Drainage: Fremont						
- Sand Cr.						1998
- UM Cr.					1996	1998
Drainage: Escalante						
- East Boulder Cr.						1996
- West Boulder Cr.						1996
- Durphey Cr.						1996

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