Commission's duplicating contractors, Qualex International, Portals II, 445 12th Street, SW., Room CY–B402, Washington, DC 20554, telephone 202–863–2893, or via e-mail *qualexint@aol.com*

Provisions of the Regulatory Flexibility Act of 1980 do not apply to this proceeding.

Members of the public should note that from the time a Notice of Proposed Rule Making is issued until the matter is no longer subject to Commission consideration or court review, all *ex parte* contacts are prohibited in Commission proceedings, such as this one, which involve channel allotments. See 47 CFR § 1.1204(b) for rules governing permissible *ex parte* contacts.

For information regarding proper filing procedures for comments, see 47 CFR §§ 1.415 and 1.420.

List of Subjects in 47 CFR Part 73

Radio broadcasting.

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend 47 CFR Part 73 as follows:

PART 73—RADIO BROADCAST SERVICES

1. The authority citation for Part 73 continues to read as follows:

Authority: 47 U.S.C. 154, 303, 334 and 336.

§ 73.202 [Amended]

2. Section 73.202(b), the Table of FM Allotments under California, is amended by adding Channel 300A and removing Channel 241A at Boonville.

Federal Communications Commission.

John A. Karousos,

Assistant Chief, Audio Division, Office of Broadcast License Policy, Media Bureau.

[FR Doc. 02–14675 Filed 6–10–02; 8:45 am]

BILLING CODE 6712–01–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

Endangered and Threatened Wildlife and Plants; Candidate Status Review for Rio Grande Cutthroat Trout

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of candidate status review.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service) announce the results of the candidate status review for the Rio Grande cutthroat trout (*Onchorhynchus clarki virginalis*) under the Endangered Species Act of 1973, as amended. After a review of all available scientific and commercial information, we have determined that listing of the Rio Grande cutthroat trout is not warranted at this time.

DATES: The finding announced in this document was made on June 3, 2002.

ADDRESSES: You may submit comments regarding this notice to the Supervisor, U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, 2105 Osuna Road NE, Albuquerque, New Mexico 87113. Written comments and materials received in response to this notice will be available for public inspection, by appointment, during normal business hours at the New Mexico Field Office.

FOR FURTHER INFORMATION CONTACT: Joy E. Nicholopoulos, Field Supervisor, U.S. Fish and Wildlife Service, 2105 Osuna Road NE, Albuquerque, New Mexico 87113. (505) 346–2525 ext 106.

SUPPLEMENTARY INFORMATION:

Background

On February 25, 1998, we received a petition from Kieran Suckling, of the Southwest Center for Biological Diversity requesting that the Service add the Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*) to the list of threatened and endangered species. The petition addressed the range-wide distribution of the Rio Grande cutthroat trout that includes populations in Colorado and New Mexico. Section 4(b)(3)(B) of the Endangered Species Act (Act) requires that we make a finding on whether a petition to list, delist or reclassify a species presents substantial scientific or commercial information indicating that the petitioned action is—(a) not warranted; (b) warranted; or (c) warranted but precluded by listing proposals of higher priority. We subsequently published a notice of a 90-day finding in the **Federal Register** (63 FR 49062) on September 14, 1998. In the 90-day finding we concluded that the petition did not present substantial information indicating that listing of the Rio Grande cutthroat trout may be warranted.

On June 9, 1999, a complaint was filed by the Southwest Center for Biological Diversity challenging the September 14, 1998, 90-day petition finding as violating the Act and the Administrative Procedures Act. While the litigation was pending, we received information (particularly related to the presence of whirling disease in hatchery fish in the wild) that led us to believe that further review of the status of the species was warranted. On November 8, 2001, a settlement agreement executed by both parties (the Service and the Southwest Center for Biological Diversity) was filed with the court. The settlement stipulates that we will initiate a candidate status review for the Rio Grande cutthroat trout. The settlement also stipulates that on or before June 3, 2002, we will make a determination concerning the results of this review and, shortly thereafter, we will publish our determination in the **Federal Register**. The agreement also states that we will not vacate our previous determination in the interim.

Biogeography and Taxonomy

The Rio Grande cutthroat trout (RGCT) is a subspecies of cutthroat trout, endemic to the Rio Grande, Pecos, and possibly the Canadian River Basins in New Mexico and Colorado. The first specimens that were collected for scientific purposes came from Ute Creek in Costilla County, Colorado. Girard described these fish as *Salar virginalis* in 1856 (Behnke 1967). Cutthroat trout are distinguished by the red to orange slashes in the throat folds beneath the lower jaw. Rio Grande cutthroat trout have irregular shaped spots that are concentrated behind the dorsal fin (largest fin on the back), smaller less numerous spots located primarily above the lateral line anterior to the dorsal fin, and basibranchial (located on the floor of the gill chamber) teeth that are minute or absent. Rio Grande cutthroat trout are light rose to red-orange on the sides and pink or yellow-orange on the belly.

The historical distribution of RGCT is not known with certainty. In general, it is assumed that RGCT occupied all streams capable of supporting trout in the Rio Grande and Pecos basins (Stumpff and Cooper 1996). It is unclear if RGCT were also present in the Canadian River Basin. The Pecos River is a tributary of the Rio Grande, so a historic connection between RGCT in the two basins is possible. The Canadian River, tributary to the Mississippi River, has no connection with the Rio Grande. It is possible that through headwater capture (a tributary from one watershed joins with a tributary from another), there may have been natural migration of fish between the Pecos and Canadian headwater streams. However, because trout were moved and stocked frequently beginning in the 1800s, the difficulties in correctly identifying fish, and errors in locality records make it difficult to know if early reports of trout from the Canadian River headwaters were indeed RGCT. Genetic testing of RGCT from the three basins using molecular methods has not yet clarified the situation, but research continues on this subject (pers. comm., Yvette Paroz, New Mexico Department of Game and Fish (NMDGF), 2002). Biologists have suggested that RGCT may have occurred in Texas (Garrett and Matlock 1991) and Mexico (Behnke 1967). Currently, the southern most distribution of RGCT occurs in Animas Creek, Sierra County, New Mexico, and Indian Creek on the Mescalero Apache Indian Reservation in Otero County, New Mexico.

Life History

Because the RGCT has not been studied intensively, less is known specifically about their habitat requirements or life history characteristics than is known for several other subspecies of cutthroat trout. As is true of other subspecies of cutthroat trout, it is found in clear, cold streams. Unlike some subspecies of cutthroat trout, such as the Bonneville (*O. c. utah*) and Yellowstone (*O. c. bouvieri*), RGCT did not originally inhabit large lake systems. However, they have been introduced into coldwater lakes and reservoirs. They spawn as high flows from snowmelt recede, typically from the middle of May to the middle of June in New Mexico (NMDGF 2002). Spawning is probably keyed to day length, water temperature, elevation, and runoff (Stumpff 1998, Sublette *et al.* 1990). The size of mature females ranges from 10.7–26 centimeters (4.21–10.27 inches (in)) (Stumpff 1998). Number of eggs per female varies greatly depending on the size and age of the fish. Stumpff (1998) reported that average egg production from 93 females spawned from Rio Puerco, New Mexico, was less than 100 eggs per female; however, these fish may have been collected after the peak of the spawn. From efforts to develop RGCT broodstock, fish from several streams were collected and spawned from 1994 to 1997. The average number of eggs per female from these collections was 175 (Stumpff 1998). The mean number of eggs taken from 12 RGCT from Indian Creek (Tularosa Basin) was 311 with the range between 232–454 (Cowley 1993). Sublette *et al.* (1990) state that females produce between 200–4,500 eggs; however, this figure applies to all cutthroat subspecies and is not specific to RGCT.

It is unknown if RGCT spawn every year or if some portion of the population spawns every other year as has been recorded for westslope cutthroat trout (*O. c. lewisi*) (McIntyre and Rieman 1995). Likewise, while it is assumed that females mature at age 3, they may not spawn until age 4 or 5 as seen in westslope cutthroat trout (McIntyre and Rieman 1995). Sex ratio is also unknown, but a ratio skewed towards more females might be expected (Cowley 1993). Although Yellowstone (Gresswell 1995), Colorado River (*O. c. pleuriticus*) (Young 1995), Bonneville (Service 2001), and westslope (Bjornn and Mallet 1964, McIntyre and Riemand 1995) cutthroat subspecies are known to have a migratory life history phase, it is not known if RGCT currently have, or once had, a migratory form when there were fluvial (flowing water) connections among watersheds.

Most cutthroat trout are opportunistic feeders, eating both aquatic invertebrates and terrestrial insects that fall into the water (Sublette *et al.* 1990). RGCT evolved with Rio Grande chub (*Gila pandora*), longnose dace (*Rhinichthys cataractae*) (all basins); Rio Grande sucker (*Catastomus plebius*) (Rio Grande Basin); white sucker (*C. commersoni*) and creek chub (*Semotilus atromaculatus*) (Pecos and Canadian Basins), and the southern redbelly dace (*Phoxinus erythrogaster*) (Canadian River Basin) (Rinne 1995). Many of these fish have either been extirpated from streams with RGCT or are greatly reduced in number. It is not known if they once were an important component of RGCT diet. Other species of cutthroat trout become more piscivorous (fish eating) as they mature (Sublette *et al.* 1990, Moyle 1976), and cutthroat trout living in lakes will prey heavily on other species of fish (Echo 1954). It is possible that native cyprinids (i.e., chubs, minnows, and dace) and catastomids may have once been important prey items for RGCT.

Growth of cutthroat trout varies with water temperature and availability of food. Slowest growth is seen in high-elevation streams where temperatures are cold and productivity is typically low. Most populations of RGCT are found in high-elevation streams and under these conditions growth may be relatively slow, and time to maturity may take longer than is seen in subspecies that inhabit lower elevation streams. Based on 471 fish from 3 streams, Cowley (1993) estimated the following age/size classes: age 0, 30–64 millimeters (mm), (1.0–2.5 in); age 1, 65–114 mm (2.5–4.5 in); age 2, 115–149 mm (4.5–5.9 in); age 3, 150–174 mm (5.9–6.9 in); age 4, 175–205 mm (6.9–8.0 in); and age 5, over 205 mm (8.0 in). At Seven Springs Hatchery, eggs hatched in 32 days at 10 degrees Celcius (°C), 50 degrees Fahrenheit (°F) (NMDGF 2002).

Typical of trout, RGCT require four types of habitat for survival: spawning habitat, nursery or rearing habitat, adult habitat, and overwintering habitat. Spawning habitat consists of clean gravel (little or no fine sediment present) that ranges between 6 to 40 mm (0.24–1.6 in) (NMDGF 2002). Nursery habitat is usually at the stream margins where water velocity is low and water temperature is slightly warmer. Harig and Fausch (in press) have found that water temperature may play a critical role in the life history of the young of the year cutthroat. Streams with cold temperatures (less than 7.8°C (46°F) mean daily temperature for July) may not have successful recruitment or reproduction in most years. The cold temperatures can delay spawning and prolong egg incubation. Fry (recently hatched fish) emerge later in the summer and may not have sufficient time to grow and gain metabolic reserves to be able to overwinter. Overwintering habitat in the form of large deep pools that do not freeze is also necessary for survival. Lack of large pools may be a limiting factor in headwater streams (Harig and Fausch in press).

Analysis

It has been estimated that there are 106 populations of RGCT in New Mexico (NMDGF 2002) and 161 in Colorado (Alves *et al.* 2002) in both streams and lakes. All of these populations contribute in some way to the overall security of the range-wide population. However, many of these populations are hybrids, some populations have an extremely low number of individuals, and some have been invaded by nonnative salmonids that either hybridize or compete with RGCT. These factors can make individual RGCT populations more vulnerable to extinction and limit the likelihood of their long-term persistence. Conservation actions can remove or reduce these threats. Because ecological factors affecting persistence vary among populations, we decided to use criteria to categorize populations based on vulnerability to threats that affect long-term persistence. The populations deemed most likely to persist are considered ‘‘core’’ populations. Criteria were established for purity, population stability, and security from invasion by nonnative salmonids. We recognize that our criteria are conservative, and that population estimates are not precise. For these reasons we also evaluate non-core populations (discussed in the conclusion) that do not meet all of the core criteria but are important components of the range-wide population.

Genetic Purity

For the purposes of this review we considered ''pure'' to mean that there was less than 1 percent introgression (genetic mixing) with either rainbow or another subspecies of cutthroat trout. Allendorf *et al.* (2001) suggest that conservation efforts should focus on maintaining and expanding remaining pure populations, and we have decided to follow this guidance for RGCT. To meet our criteria, testing for purity had to include either allozymes (forms of an enzyme) or nuclear DNA (genetic coding molecule in cell nucleus). We did not include populations that were tested only with meristics (counts of body parts). Although a meristic evaluation is a good first step to determine purity, individuals can look pure and still have a significant level of introgression. We also did not include the results from mitochondrial DNA (mtDNA). Because mtDNA is passed on only from the mother to her offspring, it can only detect hybridization when the mother is a rainbow trout or another subspecies of cutthroat trout and the father is RGCT; however, it cannot detect hybridization when the mother was RGCT and the father was another species. For this reason we have not included populations that were only tested with meristics and mtDNA or mtDNA only.

The exclusion of populations with evidence of greater than 1 percent introgression does not imply that these populations may not be important to the species conservation or that they should be eliminated from stream systems. They provide recreational opportunities for anglers; in some watersheds they may act as a buffer between pure populations and downstream areas where nonnatives are present, and in some streams hybrids may still contain genes unique to a watershed. There is a minimum of 30 pure, remnant populations of RGCT widely distributed range-wide. It is likely that the gene pool of the hybrid populations is represented in one of the many pure, remnant populations. In terms of restoration, only pure populations are used for translocation into renovated streams or for use as broodstock in hatcheries. For these reasons we view pure populations as particularly important to the status of the RGCT.

We identified a total of 82 populations (remnant and transplants) in New Mexico and Colorado that are genetically pure. An additional 13 populations have been identified as pure by NMDGF and Colorado Department of Wildlife (CDOW) based on meristics or a combination of meristics and mtDNA. Genetics testing is in progress on 12 populations in New Mexico, and 31 more populations are scheduled for testing through 2005 (NMDGF 2002). Once additional genetic testing is completed, it is likely that several more pure populations will be identified.

Population Stability

For the long-term persistence of a population, sufficient population size is needed to prevent inbreeding depression (genetic defects caused by mating of closely related family members) and maintain genetic variation (Franklin 1980). Large populations also have been suggested to be less susceptible to both demographic events (random changes in the population structure, e.g., uneven male/female ratios), and environmental random events (random changes in the fishes' surroundings) that can eliminate small populations. The expected time to extinction decreases as population size decreases (Rieman *et al.* 1993). Habitat size (length of stream) and habitat quality affect the potential size of the population: the larger the fragment, the more likely the population will be large and able to resist chance extinctions (Gilpin and Soulé 1986). Smaller stream fragments can have less diverse habitats and a lack of refugia (areas where individuals can survive through environmentally challenging periods) that can lead to greater population fluctuations through time (Rieman and McIntyre 1995). As long as birth rate equals or exceeds death rate, small populations may persist; however, smaller isolated populations may be more vulnerable to detrimental effects of genetic change and detrimental effects of demographic and environmental change.

Dr. David Cowley (New Mexico State University) developed a model to determine population viability for RGCT in New Mexico (NMDGF 2002). The model incorporates habitat size, population size, reproductive success, a probability of extinction of less than 10 percent over 100 years, and a probability that long-term net effective population size (N_e) of 500 is greater than 90 percent. For the purposes of this review, we consider elements in the model and work done on other populations of salmonids to evaluate the likelihood of long-term population persistence. Three factors were considered: population number, biomass (weight of fish per unit area), and stream length. Of these factors, population number is considered to be the most important for viability and has been discussed most often in the literature.

Franklin (1980) proposed some general rules for effective population sizes to maintain a genetically viable population. Franklin's ''50/500'' rule is still used as a starting point by which to judge the viability of populations. This rule suggests that a short-term N_e size of 50 will prevent an unacceptable rate of inbreeding, and a long-term N_e size of 500 will maintain overall genetic variability. The N_e size refers to an ideal population of breeding adults produced by the random union of an equal number of male and female gametes randomly drawn from the previous generation. The population size (N) needed to meet the effective population varies according the percent of individuals that are capable of breeding, the number of animals that actually breed, sex ratio, and other factors. Typically, N_e/N ratios vary from 10 to 33 percent giving long term population sizes of 2,000 to 5,000 (Thompson 1991). Population sizes between 2,000 and 5,000 have been suggested as appropriate for the long-term persistence of other fish populations (Nelson and Soulé 1987, Reiman and McIntyre 1993, Hilderbrand and Kershner 2000), based on both genetic and demographic consideration.

For this analysis we consider 2,500 total fish in a population to be a number that will ensure long-term persistence (*i.e.,* reduce the risks associated with small population size alone). Although larger populations are most likely incrementally ''safer,'' in the absence of specific work on RGCT, we determined that 2,500 individuals is a reasonable number that falls within the range suggested for other salmonids. Although there are examples of persistence of much smaller populations of RGCT (100–500 individuals), these fish evolved in connected systems and we have no assurance at this time that they can persist (*i.e.,* survive as a species for 100–500 years). We do not know if isolated populations of RGCT can be sustained for long periods (100 years) in small stream fragments; however, managers have documented the persistence of small RGCT populations for at least 30 years (Interagency meeting on RGCT, pers. comm. 2002). There are 11 pure populations in New Mexico and 10 in Colorado that have more than 500 and less than 2,500 individuals and 15 populations in both States with less than 500 individuals.

Biomass of fish and stream length are related to population size. Both of these factors have been used as alternative methods to judge the viability of inland trout populations (Service 1998, Hilderbrand and Kershner 2000). In the greenback cutthroat recovery plan, one recovery goal is that populations have a biomass of 22 kilograms/hectare (kg/ha), 20 pounds/acre (ac) (lb/ac) (Service 1998). All the RGCT populations with 2,500 fish or more have a biomass greater than 22 kg/ha (20 lb/ac). The lowest biomass in the populations with 2,500 or more individuals is 29 kg/ha (26 lb/ac). Seventeen of 22 populations of RGCT with 2,500 fish or more have a biomass of 50 kg/ha (44.6 lb/ac) or more. Biomass is not considered a limiting factor in these pure populations.

Having sufficient stream length is another factor that can play a role in the survival of cutthroat trout populations (Hilderbrand and Kershner 2000, Harig and Fausch in press). Fish density is high for RGCT populations with over 2,500 individuals, suggesting that the stream length of 8 kilometers (km) (4.9 miles (mi)) suggested by Hilderbrand and Kershner (2000) is probably sufficient for most of the streams. Only one stream reach with a population of more than 2,500 fish is of a length shorter than is recommended. However, fish density is high (0.7 fish/meter, 0.21 fish/foot), and we deduce from this that the habitat is of high quality and sufficient to support a strong population.

We identified 22 pure populations with 2,500 or more fish, but there may be slightly more or slightly fewer. An inherent problem with using population size as a criterion for the status review is that populations fluctuate naturally from year to year. Survey sites might not represent the entire stream; a limited number of surveys have been conducted on each stream (0–4); survey methods vary; survey efficiency varies with crew experience and stream conditions (deep water, complex habitats such as beaver ponds, and low water conductivity decrease electrofishing efficiency); and surveys have not been conducted recently on some streams. Around every population estimate are upper and lower confidence intervals that may be large or small. It is possible that more populations should be included in the pure, secure, and stable category because they have slightly less than the 2,500 fish criterion employed here. Riley and Fausch (1992) found that two- and three-pass removal methods underestimate total abundance because of decreasing catchability of fish with each pass (electrofishing a set length of stream). Nearly all the survey results are from two- or three-pass methods, so it is possible that of the populations that did not meet the 2,500 fish criterion, some actually have 2,500 fish or more. It is possible that with new survey data the streams in the stable group could change with some dropping down below 2,500 fish and with others being added. Twelve populations in New Mexico that have tested pure have no population information available. It is possible that five of these, which are in longer stream segments (8 to 18 km [5.0 to 11.2 mi] long), would meet the 2,500 fish criterion.

Population Security

A population of RGCT is not considered secure if nonnative salmonids are present. The presence of rainbow trout in RGCT populations is unacceptable because of hybridization. Because brook trout (*Salvelinus fontinalis*) and brown trout (*Salmo trutta*) are fall spawners (RGCT spawn in spring), they do not hybridize with RGCT. However, they are competitors for food and space, and there have been both historic and recent examples of population extirpation due to nonnative introductions. In some limited situations, co-existence of RGCT and brook or brown trout may occur, especially in high-gradient or high-elevation streams that may favor cutthroat trout. However, not enough is known about the competitive interactions between these fish to know what factors tip the scale in favor of the nonnatives over RGCT. Preliminary evidence from Peterson and Fausch (2001) indicate that brook trout have the most impact on young of the year Colorado River cutthroat trout. Competitive interactions between RGCT and brook or brown trout have not yet been studied. Where nonnatives are present, active management must occur to remove them on a regular basis or the nonnative trout will gradually replace RGCT. For the purposes of this review, the emphasis is on self-sustaining pure populations of RGCT. Brook and brown trout are present in several pure populations of RGCT. While these populations are less secure than the populations without nonnatives, removal of the nonnatives by State agency personnel on a regular basis can lead to stable RGCT populations. These populations are important to the overall status of the subspecies.

Inextricably linked to the presence of nonnatives is the presence of a barrier. Barriers prevent nonnatives from migrating into habitat occupied by RGCT. They also prevent the upstream migration of RGCT, limiting gene flow among populations. Until more watersheds with connecting tributaries are restored, having secure barriers to prevent invasion of nonnatives is essential for protecting existing populations. Once large watersheds are restored, upstream barriers could be breached to allow for free passage of RGCT upstream and downstream. For this status review, populations had to be protected by a barrier to be considered secure with no nonnative trout above the barrier. We identified 13 populations that are pure (confirmed by appropriate genetic testing), have over 2,500 fish, are secured by a barrier, and do not coexist with nonnatives (see Table 1 below).

TABLE 1.—STREAMS WITH PURE, STABLE, AND SECURE POPULATIONS OF RIO GRANDE CUTTHROAT TROUT, THEIR WATERSHEDS, AND LAND STATUS

Watershed	Stream	Ownership
Colorado		
Saguache	Cross	Rio Grande NF/private.
San Luis	Medano Cr	Rio Grande NF/NPS.
Alamosa/Trinchera	San Francisco Cr	private/Rio Grande NF.
New Mexico		
Canones Cr	Canones Cr	Santa Fe NF.
El Rito Cr	El Rito Cr	Carson NF.
Red River	Bitter Cr	Carson NF.
Red River	Columbine Cr	Carson NF.
Rio Cebolla	Rio Cebolla	Santa Fe NF.
Rio Puerco West	Rio Puerco (west)	Santa Fe NF.

TABLE 1.—STREAMS WITH PURE, STABLE, AND SECURE POPULATIONS OF RIO GRANDE CUTTHROAT TROUT, THEIR WATERSHEDS, AND LAND STATUS—Continued

Watershed	Stream	Ownership
San Cristobal	San Cristobal	Carson NF.
Pecos River	Jacks	Santa Fe NF.
Rio Chamita	Powderhouse	Carson NF.
Rio Pueblo	Policarpio	Carson NF.
Tested pure with meristics and mtDNA or meristics only		
Colorado		
Alamosa/Trinchera	Cat Cr	Rio Grande NF.
Alamosa/Trinchera	Jaroso Cr	private.
Alamosa/Trinchera	Torcido	private.
Conejos	Osier	Rio Grande NF.
Conejos	Cascade Cr	Rio Grande NF.

NF = National Forest, NPS = National Park Service. Five streams have not been tested using allozymes or nuclear DNA, however, it is highly likely that they will test pure based on their isolation from nonnative trout.

Analysis of Factors Affecting the Populations

Section 4 of the Act and regulations (50 CFR 424) promulgated to implement the listing provisions of the Act set forth the procedures for adding species to the Federal lists. A species may be determined to be threatened or endangered due to one or more of the five factors discussed below.

A. The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

The historic range of RGCT has been greatly reduced over the last 150 years. Many populations have been lost or impacted by water diversions, dams, habitat degradation, changes in hydrology, hybridization with rainbow trout, or competition with brown or brook trout. Quantifying the exact magnitude of loss in either number of fish or habitat is difficult because there are no baseline data. Stumpff and Cooper (1996) estimated the loss in habitat (stream miles) to be about 91 percent in New Mexico. Harig and Fausch (1998) suggest that native cutthroat (greenback and RGCT) have been reduced to less than one percent of their historic habitat. Because RGCT are now restricted to headwater and first and second order streams that are narrow and small compared to larger second, third, and fourth order streams they once occupied, the absolute loss of habitat is greater than stream miles might indicate and includes the loss of diversity of habitat found in larger stream systems. As a consequence of the habitat loss, RGCT populations that were once connected are now fragmented.

The constriction and fragmentation of RGCT habitat most likely began gradually about 1350 A.D. and accelerated in the late 1800s. Agriculture in the Rio Grande Valley began about 1350 A.D. and water diversions for the irrigation of crops started at that time (Crawford *et al.* 1993). Diversion of water from tributaries of the Rio Grande probably represents the first interruptions in RGCT habitat. Following Spanish colonization in 1598, human influence increased as more land was cleared and more acequias (irrigation canals) were built to divert water into fields. The greatest contraction in RGCT habitat most likely occurred between 1880 and 1973. In 1880, the maximum number of acres in the middle Rio Grande Valley were under cultivation, and grazing pressure was intense with over 2 million sheep and 200,000 cattle, horses, and mules (Crawford *et al.* 1993). In addition, it is likely that RGCT were sought for subsistence during this time. In the early 1900s, numerous water supply and flood control dams were built in the Rio Grande headwaters (Crawford *et al.* 1993). Rainbow, brook, and brown trout were introduced at the turn of the century (Sublette *et al.* 1990). The livestock industry grew through the mid-1930s and livestock numbers increased far beyond the carrying capacity of the range and had a widespread negative impact on riparian systems (Meehan and Platts 1978). In addition, timber harvest and an associated increase in roads led to increased levels of sedimentation in the streams. As a result of these multiple impacts, reduction of RGCT habitat occurred range-wide, affecting essentially every watershed.

Habitat fragmentation reduces the total area of habitat available, reduces habitat complexity, and isolates the fragments (Saunders *et al.* 1991, Rieman and McIntyre 1993, Rieman and McIntyre 1995, Burkey 1995). Originally, many watersheds supporting RGCT would have been connected creating an interconnected network. For example, in Colorado, the Trinchera, Conejos, Culebra, Costilla, and Alamosa Rivers would all have been connected through the upper Rio Grande, forming a vast network of streams. Each of these watersheds is now isolated from one another, and RGCT are restricted to fragments of streams. Compared to the lower elevation, larger order streams, the high-elevation streams that RGCT are now restricted to may represent relatively poor habitat. Water temperatures are colder, productivity is lower, length of time for young-of-the-year development is shorter, and amount of habitat available is less. For some isolated populations, fragmentation may lead to a negative growth rate and extinction over time (Terborgh and Winter 1980).

Burkey (1995) suggests that fragmentation accelerates extinction, especially when dispersal among fragments is not possible, as is the case with some RGCT populations. Isolated populations are vulnerable to extinction through demographic change (random changes in the population structure, e.g., uneven male/female ratios), environmental change (random changes in the fishes' surroundings) and catastrophes (e.g., fires and massive flooding), loss of genetic heterozygosity (genetic diversity) and fixation of rare detrimental alleles (inherited forms of a genetic trait), and human disturbance (Burkey 1995). It has been suggested that spatial and temporal complexity is needed so that the expression of complex life histories (*i.e.,* migratory and sedentary forms) can be maintained (Rieman *et al.* 1993, Dunham *et al.* 1997, Harig and Fausch in press). In fragmented habitats, fish are unable to migrate or if they do migrate downstream past a barrier, they are lost from the population. It is possible that migratory behavior is a hedge against catastrophes. Individuals that have migrated away from a stream segment escape death during the catastrophic event and are then available to recolonize the open habitat once it becomes suitable again (Rieman and McIntyre 1993). In streams subject to a variety of natural extreme events (drought, fire, flooding) such as the streams in New Mexico, having a variety of life histories may have been an evolutionarily advantageous adaptation. Currently, fish migrating from isolated streams are lost from the population, and, if a population is extirpated, recolonization is not possible except through specific management activities such as stocking. Over time, this can lead to the loss of migratory behavior as the genes responsible for the behavior are non-advantageous and are essentially selected against.

Watershed scale projects have been initiated on both private and National Forest lands and are in various phases of implementation. Three projects are briefly summarized. A joint project between Vermejo Park Ranch and the States of Colorado and New Mexico to restore the Costilla Creek watershed is in progress. A Memorandum of Understanding was signed by all parties in 2001 and an Environmental Assessment was completed. Restoration is scheduled for July 2002. The restoration will remove brook trout, brown trout, and introgressed cutthroat trout and reintroduce pure RGCT into 4 tributaries and 4 small lakes, totaling 22 km (13.6 miles) of stream and 9.5 ha (23.5 acres) of lake. A draft environmental assessment has been completed on Animas Creek on the Ladder Ranch, Sierra County, New Mexico, in cooperation with the Gila National Forest. The restoration portion of the project is scheduled to occur in October 2002. Approximately 48 km (29.8 miles) of stream will be restored. A Watershed Restoration Action Strategy for the Comanche Creek watershed has been written, and a work plan has been submitted and approved by the New Mexico Environment Department. Six partners will work together to improve habitat conditions on Comanche Creek, a watershed with over 70 km of streams and pure RGCT in the upper tributaries. Recovery of this watershed will be a substantial gain for RGCT, especially if the pure populations expand downstream.

The recent establishment of the Valles Caldera National Preserve presents the opportunity to restore the headwaters of the East Fork Jemez and San Antonia Rivers with RGCT. With the Santa Fe National Forest managing the land downstream of the Valles Caldera, there is the opportunity to connect the two river systems together and restore over 112 km (69.6 miles) of stream. Initial contacts have been made and both parties are interested in pursuing this large-scale restoration project. The Rio Santa Barbara watershed (Camino Real Ranger District, Carson National Forest) is another site with excellent potential to reconnect multiple populations (West Fork, Middle Fork, and East Forks of Rio Santa Barbara, Jicarita, and Indian Creeks). In 1999, a barrier was built on East Fork and the barrier on the Middle Fork Rio Santa Barbara was improved. Brown trout were removed from above the barriers from 1998 to 2000. While some progress has been made, we note that a significant amount of planning and on the ground activities remain to be done. We recognize that these projects may not come to fruition, and we are not relying on them as part of this status review. However, we mentioned them here to recognize that the States and Federal agencies are looking for opportunities to conserve the RGCT in areas where it historically occurred.

Habitat fragmentation is a threat that can be alleviated by management activities. Currently there are five pure, stable, and secure populations that are connected to at least one other tributary. Six other large, pure, connected populations exist but nonnatives are present. State and Forest Service personnel remove nonnatives from these streams during population surveys and as part of ongoing management actions.

The Service determines that fragmentation is not a threat to the persistence of these 13 populations now or in the foreseeable future. All the 13 pure, stable, and secure populations have over 2,500 fish, which provide sufficient numbers to prevent an unacceptable rate of inbreeding and to maintain genetic variability in these populations. Recognizing this, population sizes between 2,000 and 5,000 have been suggested as appropriate for the long-term persistence of other fish populations (Nelson and Soulé 1987, Reiman and McIntyre 1993, Hilderbrand and Kershner 2000), based on both genetic and demographic consideration. Additionally, the length of these streams (mean equals 12.4 km (7.7 mi)) is sufficient to provide diverse habitats to meet all the life history requirements of the fish. This statement is supported by the high fish density (mean equals 0.5 fish/m (0.15 fish/ft)) present in these core streams. Another potential threat from fragmentation is related to catastrophic events. However, if a catastrophic event (e.g., fire, drought) results in the extirpation of one or more of these 13 populations, the States and Federal agencies have the capability to replace the population with hatchery fish or fish transplanted from another pure population.

Habitat Condition

Rio Grande cutthroat habitat has been degraded by many activities. Impacts have been caused by livestock grazing and timber harvest (with associated roads). Mining has impacted specific sites. Livestock grazing practices on public land in New Mexico have improved. Changing livestock stocking levels and improved management practices have occurred and will continue to occur following current management direction (James Webb, Rio Grande National Forest, *in litt.* 1994). Restoration of riparian areas and maintaining healthy habitat is a priority for the Forest Supervisors and Regional Foresters (Leonard Atencio, Santa Fe National Forest, *in litt.* 2002, Peter Clark, Rio Grande National Forest *in litt.* 2002). Although recovery of these habitats can be slow, the continued commitment of managers to restore watersheds will continue to improve RGCT habitat over time.

Timber harvest and associated road building have also led to the deterioration of RGCT habitat. However, timber harvest in the National Forests has declined appreciably in the last 15 years. As an example, in New Mexico, from 1987 to 1990 the amount of timber cut averaged 146,722 million board feet (MBF). From 1991 to 2001 the average has been 35,740 (MBF) (Paul Fink, USDA Forest Service, *in litt.* 2002). Few new roads are built in conjunction with timber harvest as the existing infrastructure can be used (Paul Fink, USDA Forest Service, pers. comm. 2002). Roads are being decommissioned and obliterated on all the forests, reducing their contribution to sedimentation of streams. For example in Region 3 of the USDA Forest Service, in 1999, 2000, and 2001, 528, 375, and 332 miles of roads, respectively, were decommissioned (Mike Noland, USDA Forest Service, *in litt.* 2002). Many of the current pure, stable, and secure populations occur at elevations where timber harvest has not occurred and therefore, have not been affected. As management activities proceed to expand populations to lower elevations, restoration will continue to improve habitat condition in those areas, such as is planned on Comanche Creek (discussed above).

Habitat condition in streams with pure, stable, and secure populations was assessed by CDOW, NMDGF, or Forest Service biologists depending on which agency was most familiar with a particular stream. Condition was rated either as 0, no habitat problems; 0–1 which usually indicated that headwater reaches were in good condition and lower reaches had problems in discrete areas; 1, some problems identified (sedimentation, lack of pools, warm water temperature, heavy metals, etc.); and 2, pervasive problems related to RGCT habitat were identified. In most instances, sedimentation and problems related to livestock grazing were identified as primary sources of habitat degradation. While streams that are rated with a ''1'' have some level of habitat degradation that probably prevents populations from reaching maximum reproductive capability, the degradation is not judged to be a threat to the existence of any of the populations. In most instances, stream habitat condition was rated between the range of 0 to 1, with very few streams rated as 2. Based on the outcome of these assessments for each stream, it is the opinion of the agencies responsible that habitat problems are typically localized and can be or are being addressed through management practices (Interagency meeting on RGCT, pers. comm. 2002).

Based on the information provided to us by agency personnel (Interagency meeting on RGCT, pers. comm. 2002), discussed in the paragraph above, as well as the information stated above on timber harvest and livestock grazing, the Service determines that habitat condition is not a threat to the 13 pure, stable, and secure populations or to the populations with 500 to 2,500 fish. Although habitat condition may prevent maximum reproductive potential in some populations, habitat condition is not judged a threat to the existence of any of the populations. In addition, as evidenced by the number of roads being decommissioned, lower levels of timber harvest and associated road building, and changes in livestock management practices, sedimentation from these sources is most likely declining. Over time we expect RGCT trout habitat to improve.

Fish Barriers

Barriers are essential to separate RGCT from nonnative salmonids. However, to be effective barriers must be checked frequently and be maintained. Flood events can either blow a man-made barrier out, change the channel morphology permanently, or provide a temporary channel around the barrier that fish can use for upstream migration. Older gabion barriers (rocks in a wire basket) and culverts appear to be the most vulnerable structures. Changes in water velocity (either an increase or decrease depending on the situation) can change an impassable barrier into one that can be passed. These structures should be checked on a regular basis. Regardless of the structure, reaches above barriers need to be checked regularly because nonnatives are sometimes found upstream of barriers with no evidence of impairment to the barrier. This can be caused by an incomplete removal of nonnatives during stream restoration or illegal transplantation of nonnative trout. The only solution to the latter situation is the education of the public and gaining their widespread support for RGCT. Education and outreach efforts are discussed below under ''Public sentiment.''

Both Colorado and New Mexico have conducted barrier inventories (see factor D. for further information on past activities). New Mexico will assess the status of 8 barriers in 2003, 13 in 2004, and 13 in 2005 (NMDFG 2002). The Forest Service also assesses barriers as part of its stream surveys. With the increase in numbers of Forest Service fisheries biologists and technicians that has occurred in the last few years, miles of stream inventory have increased. For example, on the Carson National Forest a full time Fisheries Biologist and two technicians have been added to the staff (Fact sheet received from Carson National Forest, *in litt.* 2002). They completed 50 miles of stream surveys in 2001. In 2000, the Santa Fe National Forest hired a full time fisheries biologist. In 2001, they employed 2 temporary fisheries biologists, 8 fisheries technicians, and 7 interns. In 2001, 105 miles of stream were surveyed (Ferrel 2001). A similar level of staffing is expected for the field season of 2002, and it is anticipated that approximately 150 miles of streams will be surveyed (James Simino, Santa Fe National Forest, pers. comm. 2002). For these reasons, the Service determines that barrier failure is not a threat to the 13 pure, stable, and secure populations.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

There is no commercial fishing for RGCT. Because of fishing regulations in New Mexico and Colorado, recreational angling is not considered a threat to the species. Many of the streams with RGCT are ''catch and release.'' Those that are not have a 2 (New Mexico) or 4 (Colorado) fish limit. Many of the streams with pure populations of RGCT are remote and angling pressure is light (Interagency meeting on RGCT, pers. comm. 2002).

Overutilization for scientific purposes is not considered a threat to RGCT. Because of advancements in molecular technology, a small clipping from a fin provides sufficient material to perform molecular analysis of genetic purity. To test for whirling disease, usually 60 fish are collected and these fish must be sacrificed. To minimize the collection of RGCT, nonnative salmonids are collected preferentially over RGCT or sample sites are selected below a barrier that protects a population of RGCT. In some situations fewer RGCT will be collected and sacrificed for testing.

Overutilization of a population can occur when it is used repeatedly as a source of fish for translocations. Managers must carefully assess the status of a population before it is used as a source of fish or eggs for broodstock or transplantation of adults to other streams. Reducing a population to low levels can make it very susceptible to other impacts, such as the introduction of nonnatives as has occurred on West Indian Creek in Colorado (Alves *et al.* 2002). When collecting fish for translocation, care must be taken in deciding how many, of what age class, and from where fish are taken. The broodstock management plan developed by Cowley (1993) for NMDGF addresses these issues and provides criteria regarding the selection of founder populations. With proper management, depletion of the 13 core populations is not a threat.

The Service determines that overutilization for recreational and scientific purposes is not a threat to the 13 pure, stable, and secure populations for the reasons stated above. Overutilization for commercial or educational reasons has not been identified as a threat.

C. Disease or Predation

Whirling disease (WD) was first detected in Pennsylvania in 1956, being transmitted here from fish brought from Europe (Thompson *et al.* 1995). *Myxobolus cerebralis* is a parasite that penetrates through the skin or digestive tract of young fish and migrates to the spinal cartilage where it multiplies very rapidly, putting pressure on the organ of equilibrium. This causes the fish to swim erratically (whirl), and have difficulty feeding and avoiding predators. In severe infections, the disease can cause high rates of mortality in young-of-the-year fish. Water temperature, fish species and age, and dose of exposure are critical factors influencing whether infection will occur and its severity (Hedrick *et al.* 1999). Fish that survive until the cartilage hardens to bone can live a normal life span, but have skeletal deformities. Once a fish reaches three to four inches in length, cartilage forms into bone and the fish is no longer susceptible to effects from whirling disease. Fish can reproduce without passing the parasite to their offspring; however, when an infected fish dies, many thousands to millions of the parasite spores are released to the water.

The spores can withstand freezing, desiccation, passage through the gut of mallard ducks, and can survive in a stream for many years (El-Matbouli and Hoffmann 1991). Eventually, the spore must be ingested by its alternate host, the common aquatic worm, *Tubifex tubifex*. After about 3.5 months in the gut of the worms, the spores transform into a Triactinomyon (TAM). The TAM's leave the worm and attach to the fish or they are ingested when the fish eats the worm. Either method can lead to infection. It is likely that the parasite will continue to spread to more and more streams because the spores are easily transported by animals and humans.

Salmonids native to the United States did not evolve with WD. Consequently, most native species have little or no natural resistance. Colorado River cutthroat trout and rainbow trout are very susceptible to the disease with 85 percent mortality within 4 months of exposure to ambient levels of infectivity in the Colorado River (Thompson *et al.* 1999). Percent survival of RGCT in this research was less than one percent (Thompson *et al.* 1999). Even though the cutthroat trout had lower spore concentrations than did the rainbow trout, they often showed more overt signs of the disease and died at a faster rate. Brown trout, native to Europe, become infected by *M. cerebralis*, but rarely suffer clinical disease. At the study site on the Colorado River, brown trout thrive whereas there has been little recruitment to age 1 of rainbow trout since 1992 (Thompson *et al.* 1999). Yellowstone cutthroat trout have also been shown to be very susceptible to WD (Hiner and Moffitt 2001).

Whirling disease was first detected in New Mexico in 1988 in rainbow trout imported into private ponds in the Moreno Valley in northern New Mexico. The first case of WD in wild trout that could not be directly linked to importation or transportation of fish was detected in autumn of 1999 in the Pecos River. The Cebolla, San Juan, Cimarron, Red and Canones Rivers are also infected. Three of seven State hatcheries also tested positive (Seven Springs, Lisboa Springs, and Parkview). The *M. cerebralis* was accidentally introduced in Colorado in the 1980s through imported trout from a private hatchery. The parasite has been confirmed in three drainages that support RGCT: South Fork Rio Grande, Rio Grande, and the Conejos. Eight of Colorado's State hatcheries have tested positive for WD.

In New Mexico all WD positive fish are destroyed. Seven Springs fish hatchery has been renovated and is no longer WD positive. There is an ongoing program to test more drainages for WD. In Colorado, a policy implemented in spring 1995 prevents the stocking of trout from hatcheries testing positive into waters where WD has not been found, including wilderness areas and streams where native trout may be restored, and no WD positive fish are to be stocked in habitats that are capable of supporting self-reproducing salmonid populations in Colorado after 2003. Trout from positive hatcheries will be stocked into waters where the parasite has been found to minimize the risk of contaminating other watersheds. Only trout from hatcheries testing negative can be stocked into waters where the parasite has not been found.

Although WD is a potential threat to RGCT, high infection rates will probably only occur where water temperatures are relatively warm and where *T. tubifex* is abundant. *T. tubifex* is the secondary host for the parasite; when *T. tubifex* numbers are low, the number of TAMs produced will be low, and consequently, the infection rate of RGCT will be low. *T. tubifiex* is a ubiquitous aquatic oligochaete (worm); however, it is most abundant in degraded aquatic habitats, particularly in areas with high sedimentation, warm water temperatures, and low dissolved oxygen. In clear coldwater streams, as is typical of RGCT habitat, it is present but seldom abundant. *T. tubifex* is likely to be most abundant in beaver ponds, and populations of RGCT below beaver ponds may be at risk (Hiner and Moffitt 2001). In addition, infection rate is low at temperatures less than 10°C (50°F) (Thompson et al. 1999). At the time when the young fish are most susceptible (spring and early summer), the populations in high-elevation streams are probably partially protected by low water temperatures.

One threat to the RGCT is the introduction of WD infected fish into waters inhabited by the RGCT. Both States currently have web sites, brochures, and information in their fishing regulations regarding WD and what anglers can do to prevent its spread. In addition, both States have regulations regarding the stocking of fish by private landowners that are designed to eliminate the importation of WD positive fish. It states clearly in the fishing regulations that it is illegal to stock fish in public waters without prior permission from a State agency. Public education and compliance are two important elements in keeping imported fish disease free and not having nonnatives stocked in locations where they can enter RGCT streams.

The Service determines that WD is not a threat to the 13 pure, stable, and secure populations because these populations are located in high-elevation, headwater streams that typically have cold water and low levels of sedimentation limiting *T. tubifex* populations and infection rates from TAMs. Although RGCT is susceptible to infection there has not been a documented loss or decline in population number due to WD in a wild RGCT population. The States are testing all their hatchery fish before stocking, are in the process of documenting which streams in their States are WD positive, and are educating the public about how to prevent the spread of WD. With these efforts the spread of WD should be slowed and any problems in wild populations should be quickly detected.

D. The Inadequacy of Existing Regulatory Mechanisms

The NMDGF and the CDOW have authority and responsibility for the management of RGCT on all Federal, State, and private land within their respective States. The State agencies' capabilities include the regulation of fishing, law enforcement, research, and conservation and educational activities relating to RGCT. Policies regarding the stocking of nonnative fish (no nonnatives are stocked in RGCT populations) and minimization of exposure to WD and other diseases are in place in both Colorado and New Mexico. Additionally, New Mexico has a broodstock management plan in place.

New Mexico has an approved management plan currently being implemented that will ''facilitate long range cooperative, interagency conservation of Rio Grande cutthroat trout.'' From 1999 to 2001, population inventory was completed on 18 streams, barrier evaluations were completed on 14 streams, and genetic samples were taken from fish in 17 streams. The plan has schedules for fiscal years 2003 to 2005 for population inventory and monitoring, collection and analysis of genetic material, assessing barriers, habitat inventory, inventory of unexplored streams, testing for and mapping WD, and maintaining a database of all the information. For example, 17 streams are scheduled for inventory and monitoring in 2003, the genetic purity of 8 populations will be analyzed, and barriers on 8 streams will be surveyed. A budget for all activities from 2003–2005 is also developed.

Rio Grande cutthroat trout is designated as a species of special concern by the State of Colorado. Colorado is both implementing and revising a previous management plan. Consistent with their direction to monitor populations, protect habitat and populations, and detect genetic contamination, 58 populations were monitored and 20 populations were analyzed using molecular techniques from 1998 to 2001. From 1999 to 2001, nonnative trout were removed from 3 streams and one lake, two barriers were maintained and one new barrier was installed. An inventory of barriers on RGCT streams in Colorado has been developed. Approximately 10,000 brochures on RGCT conservation have been distributed.

A range-wide conservation agreement that will facilitate cooperation and coordination among State and Federal agencies and other interested parties is in final draft and is expected to be finalized before the end of 2002. The agreement's goal is to assure the long-term persistence of the subspecies, preserve its genetic integrity, and to provide adequate numbers and populations. We applaud the efforts of the States to establish this multi-party agreement, and we believe that it will serve to better the status of the RGCT overall. We mentioned the draft plan in this finding to recognize that the States and Federal agencies have taken steps to draft such a plan. However, we are not relying on it as part of this status review because it is not finalized and would require us to speculate as to the final outcome of the plan.

The Forest Service, the landowner with the majority of pure RGCT populations, is also implementing special management for the RGCT. RGCT is a Management Indicator Species (MIS, species which have been identified as a representative for a group of species with special habitat requirements) on the Santa Fe and Carson National Forests, and is proposed as an MIS on the Rio Grande National Forest. All resident trout are MISs on the Gila National Forest. Management Indicator Species act as proxies for fulfilling the National Forest Management Act viability requirement. Habitat objectives are established for maintaining the viability of the MIS. The RGCT is also listed on the Regional Forester's Sensitive Species List. Sensitive species must receive special management emphasis to ensure their viability and to preclude trends towards endangerment. Forest Service objectives for sensitive species are to develop and implement management practices to ensure that the species does not become threatened or endangered, maintain viable populations, and develop and implement management objectives. The Forest Service also assesses barriers as part of its stream surveys (see discussion above in factor A. ''Fish Barriers'' above).

Based on the discussion above, both the States and the National Forests have adequate regulatory mechanisms to protect and enhance RGCT populations and habitat.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Fire

Wildfires are a natural disturbance in forested watersheds. Historically, fires occurred every 4–5 years (Swetman 1990), and burned the understory leaving open stands of older trees. Fire suppression has resulted in large increases in fuel loads and understory density. As a result, under the proper conditions, wildfires today can spread rapidly and burn intensely. In the Southwest, the fire season (May to June) is followed by the monsoon season (July to August). Consequently, denuded watersheds can be hit by heavy precipitation leading to floods and ash flows in streams. Although fish often survive the fire, the ash/slurry floods that occur after a fire can eliminate populations of fish from a stream (Rinne, 1996, Brown *et al.* 2001). In addition to ash, fire retardant slurry deposited on the fire may wash into streams and kill fish (Buhl and Hamilton 2000). Although the return interval for stand replacing fire is much greater in the Rocky Mountains (200 + years) (Ruediger et al. 2000), a fire of this magnitude could affect fish populations in several watersheds as it did in the greater Yellowstone ecosystem (Bozek and Young 1994). Because the return interval is shorter, fire is a more frequent threat to populations in New Mexico. There appears to be an association between severe droughts and large fire years (Swetnam and Baisan 1994). Because fire is unpredictable, it is hard to assess how great the risk of fire is to individual RGCT populations. Because several trout populations in New Mexico have been impacted in the last 10 years by fire, it is logical to assume that a few isolated RGCT populations could be lost to the effects of fire in the foreseeable future.

Catastrophic fire can also provide the opportunity to reclaim streams that were invaded by nonnatives. This situation has occurred on the Santa Fe National Forest where fish populations were eliminated from the Cow Creek watershed by the Viveash Fire in 2000. Once the habitat recovers, approximately 25 stream miles will be repatriated with RGCT (Ferrel 2002). The Dome Fire in the Jemez Mountains extirpated the fish residing in Capulin Canyon. In partnership with Bandalier National Monument, the Santa Fe National Forest is developing plans to repatriate RGCT in approximately 10 miles of perennial stream (Ferrel 2002). Fire risk can be reduced through fuels reduction and prescribed burns. The National Forests in New Mexico have active programs to improve forest health. As an example, 69,965 ac have been treated, improving watershed conditions associated with 62 stream miles, and an additional 145,575 ac are planned for treatment to improve conditions associated with an additional 79.5 stream miles (Ferrel 2002). Over the next 10 to 20 years it is possible that a small number of RGCT populations will be lost to fire; however, we do not believe that such a loss will affect the long-term persistence of the RGCT because the populations are widely distributed and loss of RGCT populations that contain nonnatives provides an opportunity to reestablish pure RGCT populations.

The Service cannot determine if fire is a threat to the 13 pure, stable, and secure populations. Fire is unpredictable and we have no way of determining where or with what intensity a fire may burn because so many variables are involved. New Mexico is in the midst of a drought and fire can be a threat. Because the populations are spread out across the landscape and are not grouped together, the chances of more than one population being affected is reduced. As mentioned above, if catastrophic fire does occur, it provides an opportunity to reintroduce pure RGCT trout into streams that had been dominated by nonnative trout and expand the range of RGCT.

Electrofishing

The standard method to collect population information on stream trout is electrofishing. In addition, short of complete stream renovation, electrofishing is the primary method used to remove brook and brown trout from RGCT streams. Although there is a continuing need for additional data on the existing RGCT populations, it should also be recognized that electrofishing could have a negative effect on fish. Kocovsky *et al.* (1997) found that 44 percent of X-rayed fish showed evidence of spinal injury in a stream that had been electrofished for 8 years even though the fish showed no external sign of injury. It has also been shown that in a laboratory setting electroshocking can have a negative impact on salmonid eggs (Cho *et al.* 2001). Nielsen (1998) warns that the accumulated effects of electrofishing may be significant especially in small populations. Although some fish may be killed or injured by electrofishing, it is not known if these impacts affect RGCT populations over time. However, managers need to be aware of the potential dangers of electrofishing and begin exploring alternative methods such as trapping or visual observation as a means by which to evaluate populations.

Currently electrofishing is the primary tool to conduct population surveys, and to detect and remove nonnative trout in RGCT streams. It is expected that electrofishing in RGCT streams will continue until alternative census methods are adopted. Electrofishing will also continue to be the primary method for removing nonnatives, as no other expedient method exists. Snorkeling surveys are being used by the Forest Service as part of their stream inventories. While these inventories can detect nonnative adults, it is very difficult to distinguish between young trout species.

The Service determines that electrofishing is not a threat to the 13 pure, stable, and secure populations. Although individual fish may be injured, no research indicates that electrofishing is detrimental to populations as a whole. Electrofishing is a necessary tool at this time to control nonnative trout and to monitor population size.

Hatcheries

It is likely that future management of RGCT will depend in part on the use of hatchery-reared fish. Although hatcheries can produce many fish in a short period of time, the use of hatchery fish is not without risks (Busack and Currens 1995). Transmission of disease has been discussed (see above discussion on WD) and is a threat that must be managed. Maintenance of a ‘‘wild’’ broodstock is difficult, but if hatchery-reared RGCT are to survive in the wild, care must be taken so that broodstock does not become domesticated. Inbreeding can also pose a problem (Cowley 1993). Planning is essential in the selection of fish used as broodstock. Fish used as broodstock must be genetically pure. Streams that are used as sources for broodstock should be rotated so that the source population is not depleted and also so that the hatchery broodstock is infused with new genes. However, stocks from the Rio Grande, Pecos, and Canadian Basins should not be mixed until the population genetics of the fish has been clarified. New Mexico has a broodstock management plan designed specifically for RGCT that addresses these issues (Cowley 1993). Having been implemented in the field over the last several years, the feasibility and difficulties of various aspects of the plan have been tested. The Plan is currently under revision, and it could serve as a range-wide protocol.

Currently New Mexico has about 16,500 captive RGCT. Although Seven Springs Hatchery was to be in full RGCT production by 1998, infection by WD, subsequent disinfection and renovation of the hatchery, and difficulties in rearing RGCT have delayed full production. However, production from Seven Springs should increase over the next few years.

In Colorado, Haypress Lake contains wild broodstock, and captive populations are reared at Poudre Rearing Unit and at the Fishery Research Hatchery in Fort Collins. Colorado planted 33,400 RGCT into 6 waters in 1999, 66,600 into 40 waters in 2000, and 152,700 into 77 waters in 2001.

The Service determines that hatchery management is not a threat to the 13 pure, stable, and secure populations. Hatchery-reared fish are not planted into pure, stable RGCT populations so there is no risk of disease transmission into these populations. Hatchery equipment is sterilized before being used in the field to prevent disease transmission. If the criteria suggested by Cowley (1993) are implemented, a wild population would be used for spawning purposes only once, insuring that the source population is not depleted or compromised.

Public Sentiment

Several stream renovation projects are planned in the upcoming years. One obstacle that must be recognized is public resistance to the use of piscicides such as antimycin. Antimycin is an antibiotic that is an effective fish toxicant. It can be neutralized at stations outside the treatment area. The public must be educated and support range expansion of RGCT, or restoration efforts could be undermined. The ‘‘Respect the Rio’’ program on the Santa Fe National Forest is a particularly good example of an outreach effort to educate the public and gain support for stream restoration. In 2000, the Santa Fe National Forest was awarded a grant to begin this program, and an education coordinator was hired in 2002. Nearly 1,000 students and over 200 adults have heard presentations relating to native fish and respect for the land. The Respect the Rio program has three mascots: RGCT, Rio Grande chub, and Rio Grande sucker (Ferrel 2002). The Carson and Rio Grande National Forests also sponsor activities (e.g., Fish Fiesta) to educate and raise public awareness about RGCT. Both State management plans include education and outreach elements. Public support is essential for the success of future projects, and the States of New Mexico and Colorado recognize the importance of education and outreach in achieving their conservation goals for the RGCT. For this reason, the Service determines that public sentiment is not a threat to the 13 pure, stable, and secure populations.

Finding

There are 13 confirmed pure populations of RGCT with populations over 2,500 fish, that are secured by barriers and do not have nonnative competitors. There are an additional five populations in Colorado that are considered pure by CDOW based on meristics and/or mtDNA that have over 2,500 fish, are protected by a barrier, and have no nonnatives but have not yet been tested by allozymes or nuclear DNA (Torcido, Jaroso, Osier, Cat, and Cascade Creeks) (Table 1). Once these populations have been tested using allozymes or nuclear DNA, it is very likely that some or all will be part of the core group of secure populations, bringing the total to as many as 18. Biomass values for these populations range from 37 to 160 kg/ha (33 to 142 lb/acre). Stream length on Osier and Cascade Creeks is less than ideal; however, as in the case of Policarpio Creek, New Mexico, fish density in the two streams is high (0.89 and 0.5 fish/m (0.27 and 0.15 fish/foot), respectively), indicating suitable habitat conditions. In New Mexico, there are 12 populations that are in the process of being tested and an additional 12 populations that have tested pure but for which there is inadequate information to judge the status of the populations. Five of these creeks (Rio Frijoles, Chihuahuenos, Polvadera, Rio de Truchas, and Tienditas) are between 8 and 18 km (5.0 and 11.2 miles) long and have the potential to be secure populations (see Table 2 below).

TABLE 2.—STREAMS THAT DID NOT MEET ALL THE CORE CRITERIA BUT ARE IMPORTANT COMPONENTS OF RANGE-WIDE RGCT STATUS AND ARE LIKELY TO PERSIST INTO THE FORESEEABLE FUTURE.

Watershed	Stream name	Ownership
Tested pure, large populations (5,000–15,000), brook or brown trout present:		
Colorado		
Alamosa/Trinchera	Sangre de Cristo	private.
Alamosa/Trinchera	Placer	private.
New Mexico		
Rio de las Vacas	Rio de las Vacas	Santa Fe NF.
Rio de las Vacas	Rito Café	Santa Fe NF.
Comanche Creek	Comanche Creek	Carson NF.
Tested pure, no population information, stream length 8–18 km:		
New Mexico		
Rio Frijoles	Rio Frijoles	Santa Fe NF.
Canones	Chihuahuenos	Santa Fe NF.
Rio Quemado	Rio de Truchas	Carson NF.
Rio de Fernando de Taos	Tienditas	Carson NF.
Canones	SF Polvadera	Santa Fe NF.

NF = National Forest. Not shown are the 21 streams with pure populations with between 500–2,500 RGCT (discussed below).

Additionally, some large populations of pure RGCT have recently been invaded by nonnatives, either because of barrier failure or illegal transplantation. In Colorado, low numbers of brook trout have been found in Sangre de Cristo Creek (with tributary Wagon Creek); however, population size (over 9,000 RGCT), biomass, and stream length are excellent. The same situation exists in the Placer Creek watershed where there are four linked tributaries (total of over 11,000 RGCT). In New Mexico, Rio de las Vacas and its tributaries, Rio de las Perchas and Rio Anastacio (total of over 15,000 RGCT); Rito Café (5,000 RGCT); and Comanche Creek (5,000 RGCT) are all strong RGCT populations that have either brook trout or brown trout present (Table 2). Brown trout were found in Rio de las Vacas in 2001. Electrofishing removal and surveys are scheduled for 2002 and the existing barrier will be improved by the Forest Service. These populations are important components of the range-wide population. Agency personnel are aware of the undesirability of nonnatives in RGCT streams and remove nonnatives both during the course of regular stream surveys and as on-going programs in selected streams.

In addition, there are 11 pure populations in New Mexico and 10 in Colorado (21 total) that have more than 500 and less than 2,500 fish and 15 pure populations in both States with less than 500 individuals. While these populations may be at greater long-term risk of extinction compared to large populations, they continue to persist. In the future these populations may be expanded downstream, and they may serve as repositories of unique genetic material. As such they also are important components of the range-wide population and provide additional security for the overall status of the subspecies.

In the context of the Act, the term ''threatened species'' means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The term ''endangered species'' means any species that is in danger of extinction throughout all or a significant portion of its range. The Act does not indicate threshold levels of historic population size at which (as the population of a species declines) listing as either ''threatened or endangered'' becomes warranted. Instead, the principal considerations in the determination of whether or not a species warrants listing as a threatened or endangered species under the Act are the threats that currently confront the species and the likelihood that the species will persist in the ''foreseeable future.'' Specific threats discussed in detail above in our five factor analysis include nonnative salmonids that either hybridize or compete with RGCT, habitat fragmentation, livestock grazing, timber harvest, overutilization, disease (e.g., whirling disease), inadequacy of existing regulatory mechanisms, fire, electrofishing, and opposition to the use of fish poisons (e.g., piscicides). We have determined that the 13 core populations are not threatened by any of the identified threats alone or in combination.

Our finding is also based upon the other large populations of RGCT identified in Tables 1 and 2, as well as the 21 other populations discussed above. We find that these populations are likely to persist into the future because of the large numbers of individuals within these populations and the threats are adequately addressed by the ongoing management actions of the States and Federal agencies to remove nonnatives (brook and brown trout), test for genetic purity, conduct stream surveys, maintain barriers, conduct public education and outreach, and test for WD.

At different times in discussing the ongoing management actions by the State or Federal government we have included a discussion of actions that are projected to occur over the next few years. We described the future conservation actions that agencies indicate they will be undertaking, but we have not relied on these future actions for purposes of determining the current status of the species or the adequacy of current management actions to alleviate threats to the RGCT.

After reviewing the best scientific and commercial information available (1998 status review, available literature, information supplied to us by State and Federal agencies, and other unpublished documents and maps), for all of the reasons discussed herein, we find that the RGCT is not endangered and is not likely to become endangered within the foreseeable future throughout all or a significant portion of its range and that listing as threatened or endangered is not warranted at this time.

References Cited

A complete list of all references cited in this notice is available from the New Mexico Ecological Services Field Office (see **ADDRESSES** section).

Authority

The authority for this action is the Endangered Species Act (16 U.S.C. 1531 *et seq.*).

Dated: June 3, 2002.

Steve Williams,

Director, Fish and Wildlife Service.

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