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Chapter 3

Rio Grande Cutthroat Trout

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Introduction

The Rio Grande cutthroat trout was once widespread in the upper Rio Grande and Canadian River basins of northern New Mexico and south-central Colorado and in the headwaters of the Pecos River, New Mexico (Sublette et al. 1990; Behnke 1992). It may have occurred as far south as Chihuahua, Mexico (Behnke 1992). Currently, it is restricted primarily to headwater tributaries within its native range. Its southernmost distribution is Indian Creek in the Lincoln National Forest and Animas Creek in the Gila National Forest, southern New Mexico. It ranges north to headwater tributaries of the Rio Grande in the Rio Grande and San Juan National Forests in southwestern Colorado. There are few lake and introduced populations (Colorado Division of Wildlife 1992; Stumpff 1992).

Life History Characteristics

Other than general statements for the species and cursory observations (Sublette et al. 1990), virtually no information is available on the life history of Rio Grande cutthroat trout. Fish spawn in streams from March through July, depending on water temperature (Sublette et al. 1990). Egg production by females is size-dependent and ranges from 200 to 4,500. In colder waters growth is slow, and age at maturity may be 4 years.

Habitat Relations

Specific information on the habitat requirements for spawning, rearing, cover, and feeding for the Rio Grande cutthroat trout are not available. Limited habitat evaluation has been conducted using the General Aquatic Wildlife System in the Santa Fe and Carson National Forests; however, none of this information is available in reports.

Biotic Interactions

The Rio Grande cutthroat trout evolved with minnow and sucker species in middle to upper elevation (2,000–3,000 m mean sea level) montane streams. These species included the Rio Grande chub and longnose dace in streams in the Rio Grande and Pecos and Canadian river drainages (Sublette et al. 1990). In addition, the Rio Grande sucker was in the Rio Grande drainage, the white sucker and creek chub were in the Pecos and Canadian river drainages, and the southern redbelly dace occurred in the Canadian River drainage. Young-of-the-year and juveniles of these species may serve as prey for adult cutthroat trout.

Non-piscine predators undoubtedly include garter snakes, great blue and other herons, and raccoons. Nevertheless, they are probably unimportant sources of mortality relative to angling or interactions with non-native salmonids. No data are available on the effects of natural predation.

The subspecies is an opportunistic feeder and terrestrial insects may constitute much of the diet in summer. Similar to other salmonids, aquatic macroinvertebrates are undoubtedly a major component of the diet (Sublette et al. 1990). Individuals become more piscivorous as they grow (McAfee 1966; Baxter and Simon 1970). Disease and parasite information is unavailable for wild fish.

Reasons for Concern

No precise data are available on the loss of stream kilometers that once served as habitat for the Rio Grande cutthroat trout, but the distribution of this

subspecies may have declined to 5–7% of its historical range (Stumpff 1992). Because most stocks are now isolated in headwater habitats, gene flow among populations is virtually nonexistent. In addition, poor winter habitat, stream intermittency and deteriorating water quality resulting from drought, and the potential effects of the aftermath of wildfire (see Propst et al. 1992) increase the probability of loss of populations of Rio Grande cutthroat trout.

Causes of the Decline

As with many western native fish species, introduction of nonnative fishes and habitat alteration are primarily responsible for its reduction in range and abundance (Stork 1975; Propst 1976; Sublette et al. 1990; Rinne and Minckley 1991; Behnke 1992).

Probably the greatest threat to the Rio Grande cutthroat trout has been the introduction of nonnative salmonids, principally rainbow trout, brook trout, and brown trout (Behnke and Zarn 1976; Sublette et al. 1990; Behnke 1992). Of these, rainbow trout, also a spring spawner, readily hybridizes with cutthroat trout. The other two salmonid species appear to compete with the Rio Grande cutthroat trout for food and space (cf. Rinne et al. 1981). Although extensive effort has focused on the effect of hybridization with rainbow trout, the nature and extent of the effects of competition with and predation by other introduced salmonids are unstudied.

An apparently lesser effect is that of habitat degradation and loss. In the opinion of several authors (Behnke and Zarn 1976; Sublette et al. 1990; Behnke 1992), livestock grazing on National Forest lands is believed to have had a major effect on the habitat of Rio Grande cutthroat trout. Effects include trampling of streambanks and removal of streamside vegetation (Sublette et al. 1990). Both undercut banks and streambank vegetation serve as resting and hiding cover for trout (Boussu 1954; Meehan 1991). Loss of streamside vegetation facilitates elevation of stream temperatures in summer (Brown and Krygier 1970) and development of anchor ice in winter. Nevertheless, neither the effects or extent of grazing on habitat of Rio Grande cutthroat trout have been specifically studied. Timber harvesting may also affect cutthroat trout habitat through loss of streamside vegetation and large woody material, but this too remains undocumented.

Irrigation diversion accompanying the immigration of early settlers into northern New Mexico resulted in the loss of streams that very likely provided historical Rio Grande cutthroat trout habitat (Sublette et al. 1990). Dewatering effects on cutthroat trout populations likewise have not been the topic of research.

Behnke (1992) suggested that the ease of capture by angling of Rio Grande cutthroat trout relative to that of brown trout resulted in brown trout predominating in the Rio Chiquito near Taos, New Mexico. More detailed information on the effects of angling on Rio Grande cutthroat trout is lacking.

Current Management

The Rio Grande cutthroat trout is considered a sensitive species and a management indicator species by the USDA Forest Service (Stefferud 1988). The American Fisheries Society lists the subspecies as "protected" (Johnson 1987) and of "special concern" (Williams et al. 1989). Stefferud (1988) has provided the most recent review and description of this subspecies' management. In New Mexico it is considered a sport species and is subject to State Game Commission regulations. The Game and Fish Department has the basic mission to "preserve the natural diversity and distribution patterns of the State's native ichthyofauna" (New Mexico Game and Fish Department 1987). The state has the dual objectives of providing fishing for this subspecies and yet not diminishing it to the point of special regulations. The state's program is coordinated with the Forest Service's land and resource management plans (U.S. Forest Service 1986,1987). The Forests, through best management practices, monitor water quality in cutthroat trout streams to meet state water quality standards. Also, a broodstock program was initiated by the New Mexico Game and Fish Department in 1987. Both the New Mexico Game and Fish Department and the Colorado Division of Wildlife have draft management plans for this cutthroat trout subspecies (Colorado Division of Wildlife 1992; Stumpff 1992).

Another key component of managing this subspecies is restoration of populations into selected streams. During stream surveys, efforts are made to locate natural barriers or sites suitable for construction of artificial barriers. Removing nonnative salmonids and installing barriers to prevent upstream movement of nonnative trout are vital to maintaining and increasing the range and abundance of this native trout.

After completing a survey of 39 streams in northern New Mexico in summer 1976, Propst (1976) made

a plea for additional inventory surveys to locate new populations of Rio Grande cutthroat trout. This survey and subsequent extensive inventories conducted through the joint efforts of the New Mexico Game and Fish Department and the USDA Forest Service in the mid–1970's and 1980's resulted in a data base depicting the current distribution of Rio Grande cutthroat trout in northern New Mexico.

Three different methodologies have been used to define the purity of populations of Rio Grande cutthroat trout: morphometrics and meristics, electrophoresis, and mtDNA analysis. The first method was used most extensively in earlier (1970–1980) taxonomic analyses (Propst and McInnis 1975; Propst 1976; Behnke 1980). More recent reports to the New Mexico Game and Fish Department (Hartman et al., no date; Moore et al., no date; Riddle and Yates 1990; Davis and Yates 1992) have relied on genetic techniques to evaluate the purity of populations. Based on these analyses, 62 populations of pure or relatively pure Rio Grande cutthroat trout are now known from New Mexico (Stumpff 1992). All but seven of these populations occur on National Forests.

Parallel surveys for Rio Grande cutthroat trout were conducted by the Colorado Division of Wildlife from 1982 to 1987 (Colorado Division of Wildlife 1992). Thirty-nine populations have been identified in Colorado waters; only five are lake populations. Thirty-six of the 39 populations are listed as genetic purity "A" based on morphometric analyses (Behnke 1980).

Estimated population densities for selected cutthroat trout populations in 8 streams in New Mexico varied from 334 to 6,087 fish/ha (mean 1,776 fish/ha); biomasses ranged from 4.3 to 101 kg/ha (mean 22 kg/ha). In contrast, biomasses in the streams in Colorado varied from 3 to 150 kg/ha (mean 35.9 kg/ha; Stumpff 1992).

Research Needs

Streams have been extensively surveyed to locate populations of Rio Grande cutthroat trout and to determine their genetic purity. A priority should be to continue these efforts. It is critical to know the size and location of the resource before it can be managed or researched.

The basic life history attributes of the subspecies should also be determined. Spawning, rearing, feeding, and resting (cover) habitat requirements need to be delineated and the relations between the subspecies and its habitat need to be investigated. Corollary to this work should be the study of land management on these habitats. Finally, research needs to be conducted on how introduced salmonids (principally brown trout and rainbow trout) limit Rio Grande cutthroat trout populations. In addition, interactions of the Rio Grande cutthroat trout with the other members of the fish community should be investigated.

Research should be closely meshed and integrated with management plans in both states. The studies mentioned above will facilitate management activities to restore this rare native trout to its former range and abundance. Furthermore, researchers should be opportunistic and proactive in synchronizing research with the activities of the game and fish departments of both states and the National Forests. Great effort should be made to conduct this research in the concept of "ecosystem management," or the newly adopted "ecology-based multiple use management" in Region 3.

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