U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT
AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Oncorhynchus clarkii virginalis*

COMMON NAME: Rio Grande cutthroat trout

ANIMAL GROUP AND FAMILY: Fish, Salmonidae

LEAD REGION: Region 2

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DATE INFORMATION CURRENT AS OF: August 2024

STATUS/ACTION

_X_ Species petitioned for listing which we have determined does not warrant listing (does not meet the definition of a threatened or endangered species)

_X_ Candidate removal: Former LPN: 9

_X_ Taxon does not meet the Act's definition of "endangered species" or "threatened species" because it is not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

Petition Information:

___ Non-petitioned

_X_ Petitioned; Date petition received: 02/24/1998

90-day "substantial" finding FR publication date; citation: 09/14/1998; 63 FR 49062

12-month "warranted but precluded" finding FR publication date; citation: 05/14/2008; 73 FR 27900

FOR PETITIONED CANDIDATE SPECIES

A. Is listing warranted? No
B. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes

PREVIOUS FEDERAL ACTIONS:

The U.S. Fish and Wildlife Service (Service, we, our) was petitioned to list the Rio Grande cutthroat trout as an endangered or threatened species under the Endangered Species Act (Act) in 1998 (63 FR 49062). On September 14, 1998, we published a 90-day finding (63 FR 49062) that the petition did not present substantial information indicating that the petitioned action may be warranted. On June 9, 1999, the Southwest Center for Biological Diversity sued the Service in regard to our 90-day petition finding. While this 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 subspecies was warranted. On November 8, 2001, the Service and the Southwest Center for Biological Diversity entered into a settlement agreement stipulating that the Service would initiate a status review for the Rio Grande cutthroat trout. We found the subspecies was warranted for listing but precluded by higher priority actions on May 14, 2008, and the entity was added to our list of candidate species (73 FR 27900). After completing a Species Status Assessment (SSA; Service 2014, entire), we subsequently published a 12-month petition finding in 2014, determining that the Rio Grande cutthroat trout was not warranted for listing as endangered or threatened under the Act (79 FR 59140). The 2014 decision was challenged in court and vacated and remanded by the judge on October 31, 2020. In response to that decision, we initiated another review of the subspecies for listing as a threatened or endangered species under the Act.

ANALYTICAL FRAMEWORK

To assess the Rio Grande cutthroat trout viability, we conducted a species status assessment (SSA) using the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–311). Briefly, resiliency supports the ability of a species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years, variation in demographic rates), redundancy supports the ability of a species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of a species to adapt to both near-term and long-term changes in its physical and biological environment (for example, climate change, disease). A species with a high degree of resiliency, representation, and redundancy is better able to adapt to novel changes and to tolerate environmental stochasticity and catastrophes. In general, species viability will increase with increases in resiliency, redundancy, and representation (Smith et al. 2018, p. 306). Using these principles, we identified the Rio Grande cutthroat trout's ecological requirements for survival and reproduction at the individual, population, and subspecies levels, and described the beneficial and risk factors influencing the subspecies' viability.

We use the SSA framework to assemble the best scientific and commercial data available for the Rio Grande cutthroat trout. The SSA framework consists of three sequential stages. During the first stage, we evaluate the subspecies' needs. The next stage involves an assessment of the

historical and current condition of the subspecies' demographics and habitat characteristics, including an explanation of how the subspecies arrived at its current condition (i.e., how threats and conservation actions have influenced the subspecies). The final stage of the SSA framework involves assessing the subspecies' plausible range of future responses to positive and negative environmental and anthropogenic influences. The SSA framework uses the best available information to characterize viability as the ability of a species to sustain populations in the wild over time and is used to inform our regulatory decision.

The SSA Report does not represent a decision by the Service on whether the Rio Grande cutthroat trout should be listed as a threatened or endangered species under the Act. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. The Species Status Assessment Report for the Rio Grande Cutthroat Trout (*Oncorhynchus clarkii virginalis*) – April 2024, Version 2.11] (SSA Report) is a summary of the information we have assembled and reviewed and incorporates the best scientific and commercial data available for this subspecies. Excerpts of the SSA Report are provided in the sections below. For more detailed information, please refer to the SSA Report (Service 2024, entire).

BIOLOGICAL INFORMATION

Rio Grande cutthroat trout, a subspecies of cutthroat trout (*Oncorhynchus clarkii*), inhabit high elevation streams in New Mexico and southern Colorado. The subspecies is generally assumed to have occupied all streams capable of supporting them in the Rio Grande, Pecos, and Canadian River basins, approximately 10,696 river kilometers (km) (6,646 miles (mi)) (Alves et al. 2007, p. 9). The range of the Rio Grande cutthroat trout has been divided into five geographic management units (GMUs) that reflect the hydrologic divisions of the Rio Grande cutthroat trout's historical range by river drainage: Canadian, Rio Grande Headwaters, Lower Rio Grande, Caballo, and Pecos (Figure 1). Currently the subspecies occupies 1,197 river km (744 mi) across 119 discrete populations.

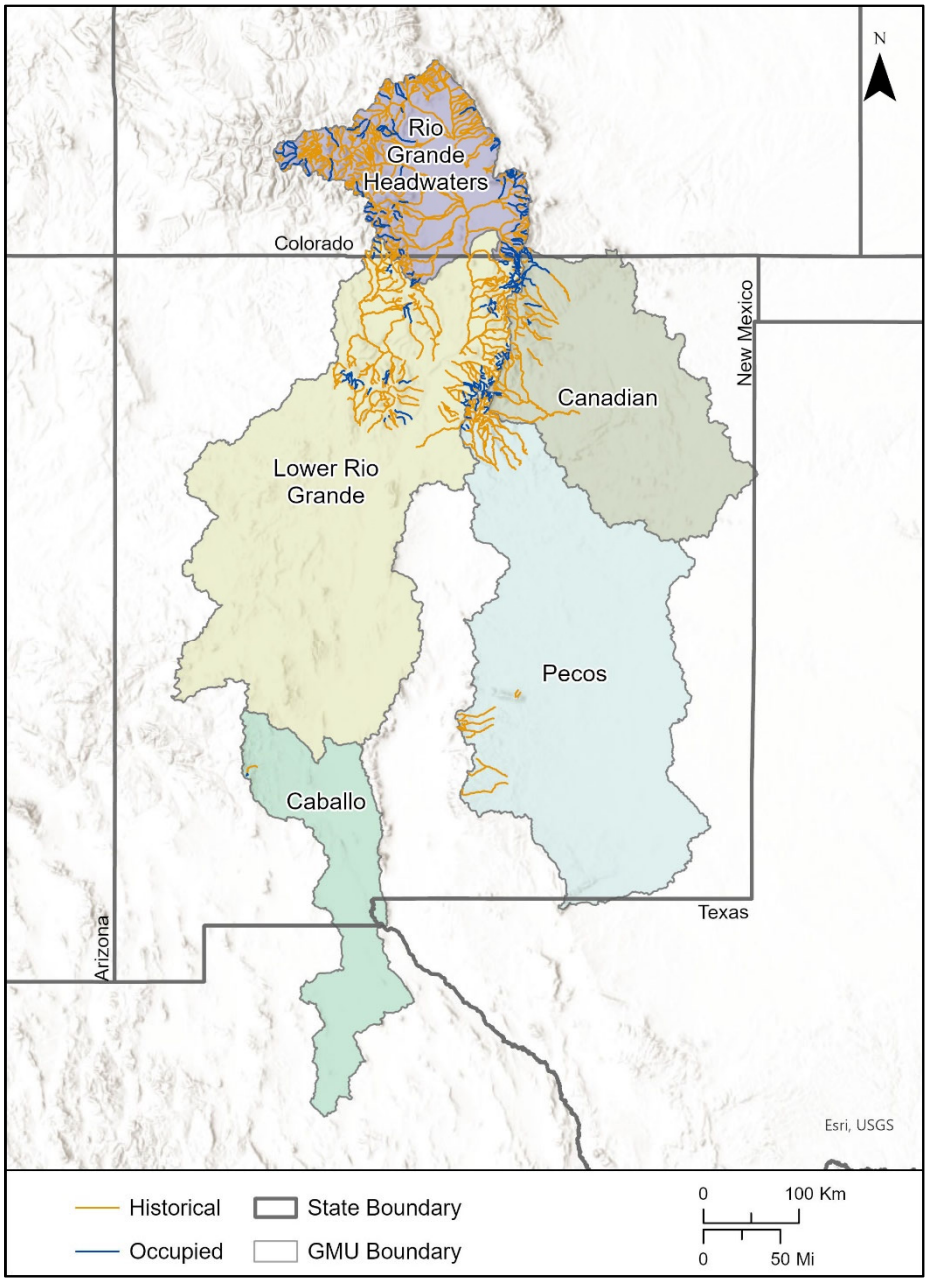

Figure 1. Historical and current distribution of Rio Grande cutthroat trout.

To maintain overall viability, populations of the Rio Grande cutthroat trout must have sufficient resiliency. Adequately resilient Rio Grande cutthroat trout populations must be of sufficient size to withstand demographic and genetic stochasticity. Larger populations have a higher effective population size, which are less vulnerable to genetic drift and inbreeding and more likely to adapt to changing environmental conditions. General guidelines for trout are that effective

population sizes above 500 have a low risk of negative genetic outcomes and retain long-term adaptive potential, and those below 50 are highly vulnerable to inbreeding depression and genetic drift (Allendorf et al. 1997, pp. 142–143; Rieman and Allendorf 2001, p. 756). Therefore, resilient populations have a sufficient effective population size to avoid adverse genetic consequences on the population.

Rio Grande cutthroat trout are found in clear, cold, high elevation streams. For populations to be sufficiently resilient, they must occupy stream reaches long enough to provide the range of habitats needed to complete their life cycle (i.e., spawning habitat, nursery habitat, adult habitat, refugial habitat) (Harig and Fausch 2002, p. 546; Young et al. 2005, p. 2406). The longer an unobstructed reach of stream, the more habitat variability is likely to be represented, which increases the likelihood of survival of various life stages (Young et al. 2005, p. 2406). In turn, higher likelihood of survival through the life stages supports a higher recruitment rate (young individuals joining the breeding population) which supports a larger population size. Spawning habitat is found in areas exposed to flowing water with clean gravel (little or no fine sediment present), ranging from 6 to 40 millimeters (mm) (0.24 and 1.6 inches (in)) in diameter (NMDGF 2002, p. 17; Budy et al. 2012, p. 437, 447), where redds (nests) are formed (Cowley 1993, p. 3). Embryonic development of cutthroat trout within eggs requires flowing water with high oxygen levels (Cowley 1993, p. 3; Budy et al. 2012, p. 437). Fry emerge after yolk absorption and at a length of about 20 mm (0.8 in) (McIntyre and Rieman 1995, p. 2). Following emergence, cutthroat trout fry move to nursery habitat, usually stream margins, backwaters, or side channels where water velocity is low and water temperature is slightly warmer (Pritchard and Cowley 2006, pp. 17–18). Water temperature is important for juvenile survival; streams with mean daily temperatures in July of less than 7.8 degrees Celsius (ºC) (46 degrees Fahrenheit (ºF)) may not have successful reproduction or recruitment (survival of individuals to sexual maturity) in most years (Harig and Fausch 2002, pp. 542, 543; Coleman and Fausch 2007a, p. 1241; Coleman and Fausch 2007b, p. 651).

As Rio Grande cutthroat trout grow, they move back into the mainstream channel. Older individuals primarily use pools with cover and riffles for foraging (Pritchard and Cowley 2006, p. 18). Deep pools that do not freeze in the winter and do not dry in the summer or during drought provide refugia. In general, ideal water temperatures for adult Rio Grande cutthroat are below 18ºC (64ºF) (Zeigler et al. 2013a, entire). Temperatures around 24ºC (75ºF) result in increased levels of mortality. Longer unobstructed stream lengths are also more likely to provide habitat during periods of drought (when deep pools provide refugia) or over winter (deep pools are less likely to freeze), and sufficient complexity (tributaries, stream networking) to allow Rio Grande cutthroat trout populations to survive after stochastic disturbances such as debris flows following wildfire. Larger dendritic systems may provide more refuge habitat during stressful environmental disturbances such as fires or floods (Nakamura et al., 2000, pp. 2849–2860). Streams longer than about 9.7 km (6 mi) are generally assumed to be long enough to encompass the habitat complexity necessary for the population to survive stochastic events (Hilderbrand and Kershner 2000, p. 515; Cowley 2007, p. 9; Peterson et al. 2013, p. 10; Roberts et al. 2013, p. 12).

Streams shorter than 2.8 km (1.7 mi) are unlikely to have enough habitat variability for a population to be able to survive stochastic events (Harig and Fausch 2002, pp. 538–539). Reaches below this threshold may support populations of Rio Grande cutthroat trout, but only if habitat is of high quality (Peterson et al. 2013, p. 10).

There are some natural events, such as wildfires and stream drying, that can be catastrophic in their impact. The Rio Grande cutthroat trout needs to have multiple resilient populations distributed throughout its historical range to provide for rangewide redundancy. Distribution across multiple GMUs, watersheds, and mountain ranges reduces the risk that a large portion of the subspecies' range will be negatively affected by a single catastrophic natural or anthropogenic event.

Maintaining representation in the form of genetic or ecological diversity is important to allow the Rio Grande cutthroat trout the ability to adapt to future environmental changes. Populations in the Canadian and Pecos GMUs are significantly differentiated genetically from those in the Rio Grande Headwaters and Lower Rio Grande GMUs (Pritchard et al. 2009, p. 1219). Due to this differentiation, the Rio Grande cutthroat trout needs to retain populations in the Canadian and Pecos GMUs to maintain the overall potential genetic and life history attributes that can buffer the subspecies' response to environmental changes over time (Moore et al. 2010, pp. 340–341; Schindler et al. 2010, p. 612). Although the GMU boundaries were not generated specifically to represent genetic differences, they encompass the historical range of the Rio Grande cutthroat trout and, therefore, display representation of the genetic diversity among populations and the ecological diversity across the subspecies' range. The GMUs serve as a proxy for geographic variation that may represent natural variation in the subspecies' genetic diversity.

For additional information on the species description, taxonomy, habitat/life history, historical and current range/distribution, please refer to pp. 15–22 of the SSA Report. For additional information on population and species needs, please refer to pp. 23–24 of the SSA Report.

FACTORS INFLUENCING THE STATUS

The Act directs us to determine whether any species is an endangered species or a threatened species because of any factors (or threats) affecting its continued existence (i.e., whether it meets the definition of a threatened species or an endangered species). We use the term "threat" to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term "threat" includes actions or conditions that have a direct impact on individuals, as well as those that affect individuals through alteration of their habitat or required resources. The term "threat" may encompass—either together or separately—the source of the action or condition, or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an "endangered species" or a "threatened species." In determining whether a species meets either definition, we must evaluate all identified threats by

considering the expected response of the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species—such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an "endangered species" or a "threatened species" only after conducting this cumulative analysis and describing the expected effect on the species.

Threats, Conservation Measures, and Existing Regulatory Mechanisms

The following discussion provides a summary of the primary threats affecting the current and future condition of the Rio Grande cutthroat trout (those having population or subspecies level impacts) and the subspecies' response to these threats. The best available scientific and commercial data indicate that the presence of nonnative species is the primary threat to the subspecies, reducing population resiliency and resulting in local extirpation. Additional threats (e.g., changing water temperatures, flood timing, land management, angling, disease) impact demographic and/or habitat factors important to maintaining population resiliency. Some threats can be of such magnitude (e.g., wildfire, stream drying) that they can be catastrophic to individual populations. We address all of these threats, conservation measures addressing these threats, and the individual and cumulative effects of all other identified threats in this assessment. For a full description of threats, the subspecies' likely responses to those threats, and other conservation measures see Chapter 4 of the SSA Report (Service 2024, pp. 25–33).

Hybridizing Nonnative Trout

The introduction of nonnative trout species, including those that hybridize and/or compete with Rio Grande cutthroat trout, has accounted for most of the loss of the subspecies from its historical range. Nonnative rainbow trout (*Oncorhynchus mykiss*) and other nonnative cutthroat trout subspecies have been introduced for recreational angling, and they are known to readily hybridize with Rio Grande cutthroat trout (Alves et al. 2008, p. 15). Hybrids can have reduced fitness, and even when fitness is not decreased, hybridization may disrupt important long-term adaptations of native populations, such as migratory patterns (Allendorf et al. 2004, p. 1203; Strait et al. 2021, pp. 821–833). In general, all hybridizing nonnative trout must be completely removed from the stream system to prevent hybridization and loss of genetic distinctiveness of Rio Grande cutthroat trout (Allendorf et al. 2004, p. 1205).

Rio Grande cutthroat trout continue to be vulnerable to the negative effects of hybridization with nonnative rainbow and cutthroat trout. Once an invasion occurs, the Rio Grande cutthroat trout population is typically extirpated. Future invasion risk can be significantly reduced through control of nonnative trout and establishment of barriers that limit their colonization. Currently 6

of the current 119 Rio Grande cutthroat trout populations (5 percent of the total) co-occur with hybridizing trout species (Table 1). Another 20 populations (17 percent) are within 10 km (7 mi) of known occurrences of hybridizing species. Fifteen of these lack a complete barrier. When nonnative trout are less than 10 km, the potential of invasion is assumed to be high (Zeigler et al. 2019, entire). There is the potential for accidental or intentional illegal introductions of rainbow trout to occur, however, we expect this to be infrequent due to regulations and public education campaigns that limit the spread of nonnative species. Also, many Rio Grande cutthroat trout populations are in remote, rugged areas that are difficult to access, thereby limiting accidental or intentional illegal introductions. Thus, nonnative trout continue to pose some risk to Rio Grande cutthroat trout populations in the future, but mainly for those near currently established nonnative trout populations. The risk of co-occurrence may increase as climate drivers decrease available habitat and increase the temperature of current streams, which may facilitate increased interaction with nonnative salmonids (Muhlfeld et al. 2014, pp. 1–5; Isaak et al. 2015, pp. 2540–2553; Young et al. 2016, p. entire). For a full description of the threat of hybridizing nonnative trout, see the SSA Report (Service 2024, pp. 25–26).

Table 1. Count of current Rio Grande cutthroat trout populations by proximity to hybridizing trout species and presence of a barrier as of 2023. “Absent” means potential hybridizing species are not present in the watershed; “Far” means potential hybridizing species are in the watershed but more than 10 km away, and “Near” means potential hybridizing species are less than 10 km away. Only “Complete” barriers provide high security from natural invasion.

Barrier Presence	Hybrid Nonnative Species Absent	Hybrid Nonnative Species Far	Hybrid Nonnative Species Near	Hybrid Nonnative Species Invaded	Total
Complete	52	3	5	0	60
None	16	10	11	5	42
Partial	10	2	4	1	17
Total	78	15	20	6	119

Competing Nonnative Trout

Other species of nonnative trout have historically been stocked throughout the range of the Rio Grande cutthroat trout. Brook trout (*Salvelinus fontinalis*) and brown trout (*Salmo trutta*) compete with Rio Grande cutthroat trout for food and space, and larger adults likely predate upon younger individuals (Dunham et al. 2002, p. 378; Fausch et al. 2006, pp. 9–10; Al-

Chokhachy and Sepulveda 2019, pp. 17–27; Huntsman et al. 2023, pp. 464–476). However, neither species will hybridize with Rio Grande cutthroat trout. While no stocking of brook or brown trout is currently ongoing in New Mexico or Colorado within areas populated by Rio Grande cutthroat trout, both species are found throughout the historical range of the Rio Grande cutthroat trout. Over time native cutthroat trout populations will diminish and may become extirpated when they co-occur with brook and brown trout (Peterson and Fausch 2003, p. 769). Extirpation is not inevitable: some populations of Rio Grande cutthroat trout have persisted despite co-occurring with nonnative competing brook and brown trout for decades. However, small and stressed populations (i.e., those experiencing stochastic variation) are more vulnerable to extirpation when they co-occur with these trout species. Unlike with hybridizing trout species, managers can implement mechanical suppression (catching and removing nonnative trout species on a regular basis) within streams where Rio Grande cutthroat trout populations are sympatric with brook and brown trout; although the efficacy of this varies among populations (Saunders et al. 2015, pp. 252–263).

Some Rio Grande cutthroat trout populations continue to face pressure from competition with nonnative brook and brown trout. As with hybridizing trout, presence of barriers and control efforts can limit the likelihood of colonization. Currently 50 populations (42 percent) co-occur with nonnative competing trout, and another 42 (35 percent) are within 10 km (7 mi) of known occurrences of these species (Table 2). Thirteen of these populations lack a complete barrier. There is also the potential for accidental or intentional illegal introductions of brook and brown trout; however, as with hybridizing trout, we expect this will be infrequent due to regulations, public education campaigns, and the relative inaccessibility of many Rio Grande cutthroat trout populations. The threat of competing nonnative trout on some populations may be exacerbated by the effects of climate change (Roberts et al. 2017, pp. 314–325). For a full description of the threat of competing nonnative trout, see the SSA Report (Service 2024, p. 26).

Table 2. Count of current Rio Grande cutthroat trout populations by proximity to competing nonnative trout species and presence of a barrier as of 2023. “Far” means competing nonnative trout are in the watershed but more than 10 km away, and “Near” means competing nonnative trout are less than 10 km away. Only “Complete” barriers provide high security from natural invasion.

Barrier Presence	Competing Nonnative Species Absent	Competing Nonnative Species Far	Competing Nonnative Species Near	Competing Nonnative Species Invaded	Total
Complete	0	14	29	17	60

None	0	9	10	23	42
Partial	0	4	3	10	17
Total	0	27	42	50	119

Disease

Whirling disease is caused by a nonnative parasite (*Myxobolus cerebralis*), which requires two separate hosts to complete its life cycle: a salmonid fish and an aquatic oligochaete worm (*Tubifex tubifex*). Spores of the parasite are released when infected fish die; these spores are ingested by the *T. tubifex* worm, where they undergo transformation in the gut to produce actinosporean triactionomyxons (TAMs), the infective spore form of the parasite. Trout are infected either by eating the worms (and TAMs) or through contact with TAMs after they have been released from the worms into the water. The myxosporean parasite became widely distributed in Colorado in the early 1990s through the stocking of millions of catchable size trout from infected hatcheries (Nehring 2007, p. 1).

Parasites damage cartilage, killing young fish or causing infected fish to swim in an uncontrolled whirling motion, making it impossible to avoid predation or feed (Hiner and Moffett 2001, p. 130). Fish mortality rates of 85 percent or more may occur within 4 months of exposure (Thompson et al. 1999, p. 312). Whirling disease was first detected in Rio Grande cutthroat trout in Sangre de Cristo Creek in 2003, and then by 2005, the populations were heavily infected (Nehring et al. 2018, p. 3). Once *M. cerebralis* is present, Rio Grande cutthroat trout can experience total loss of reproductive output (Nehring 2008, p. 2).

New Mexico Department of Game and Fish policies and regulations prohibit the stocking of any whirling disease positive fish in the State of New Mexico (Patten and Sloane 2007, p. 10). In Colorado, stocking of whirling disease-positive fish in protected habitats, which include native Rio Grande cutthroat trout waters, is prohibited (Japhet *et al*. 2007, p. 12). Additionally, Colorado has demonstrated the ability to eradicate whirling disease in repatriated streams (Nehring et al. 2018, pp. 1–16). The best available information indicates that whirling disease may have previously affected some Rio Grande cutthroat trout populations, however, it is not a current threat to the species. Only one Rio Grande cutthroat trout population is known to be currently infected by whirling disease; for the majority (102 populations), whirling disease is not present in the watershed in which the population occurs. Thus, whirling disease is not having an impact on current resiliency and unlikely to be a significant stressor for Rio Grande cutthroat populations in the future (Service 2024, pp. 28–29).

Wildfire

Historically, wildfires have been a natural disturbance within the range of the Rio Grande cutthroat trout. However, since the mid-1980s, wildfire frequency in western forests has nearly quadrupled compared to the average frequency during the period 1970–1986 (Westerling et al. 2006, p. 941). Another recent study showed an eight-fold increase in the amount of land burned in the United States at high severity during wildfires, including in the southwest, and suggested that warmer and drier fire seasons in the future will continue to contribute to high-severity wildfires where fuels remain abundant (Parks and Abatzoglou 2020, pp. 1–10). Risk of wildfires can be affected by forest management activities: fire suppression coupled with a lack of thinning or prescribed burns can enhance conditions suitable for high-intensity wildfires (Schoennagel et al. 2004, p. 669).

Rio Grande cutthroat trout may persist after a fire occurs within an occupied watershed; however, ash and debris flows following large fires in close proximity to occupied reaches may eliminate populations (Rinne 1996, p. 654; Brown et al. 2001, p. 142; Bixby et al. 2015, p. 1345). In the past, this was likely not a significant factor affecting Rio Grande cutthroat trout, as interconnected populations provided a source for repatriation of extirpated areas. However, the current fragmentation of most Rio Grande cutthroat trout populations limits recolonization after extirpation. Wildfires within the range of Rio Grande cutthroat trout have depressed or eliminated fish populations (Japhet et al. 2007, p. 20; Patten et al. 2007, pp. 33, 36; RGCT Database, unpaginated; Rust et al. 2019, p. 117636). The amount of ash flow from a fire depends on the severity of the fire, proximity to the stream habitat, stream channel morphology, timing, and amount of rainfall following the fire (Rinne 1996, p. 656; Rieman and Clayton 1997, p. 9; Dahm et al. 2015, pp. 2584–2599).

The likelihood of one or more populations being affected by wildfire depends on the location of the fire, the length of the occupied stream reach, and the extent of stream networking (Roberts et al. 2013, p. 6; Rust et al. 2019, p. 117636). For example, Polvadera Creek, in the Lower Rio Grande GMU, burned during the South Fork Fire in 2010, and ash flows following that fire nearly eliminated the local population. However, subsequent fish surveys documented young-of-year Rio Grande cutthroat trout in the headwaters of the stream (RGCT Database 2023, unpaginated), indicating suitable habitat remained and persistence of the population. The presence of stream reaches that provide refugia during and after fires plays a large role in the ability of the population to repatriate affected areas (Rieman and Clayton 1997, p. 10).

Wildfires may also provide opportunities for Rio Grande cutthroat trout restoration. Just as ash and debris flows following wildfires can eliminate Rio Grande cutthroat trout populations, they may also be detrimental to nonnative trout (Sestrich et al. 2011, pp. 136–146). This can result in extirpation and an opportunity for establishment of a Rio Grande cutthroat population free from hybridizing and competing nonnative trout. Once a stream has been confirmed to be fishless and its habitat has regained suitability, Rio Grande cutthroat trout can be repatriated to the affected

stream reach. The Las Conchas Fire in New Mexico (Lower Rio Grande GMU) resulted in the elimination of nonnative trout from five stream reaches that New Mexico Department of Game and Fish is restocking with Rio Grande cutthroat trout (NMDGF 2013, p. 3). To date, several streams have been stocked and surveys have documented the continued presence of Rio Grande cutthroat trout (Bakevich 2024, pers. comm.).

As drought frequency increases due to climate change, dry forests are more likely to burn and burn hotter than they have in the past (Glick 2006, p. 8). Wildfire risk analysis rangewide (Miller and Bassett 2013, entire) indicate that most of the watersheds supporting Rio Grande cutthroat trout populations have a high risk of burning which would result in high levels of debris flow. Some populations (14 percent) in the Rio Grande Headwaters GMU have only a moderate risk of fire and debris flow. The extent of one or more populations being affected by wildfire depends on the location of the fire, the length of the occupied stream reach, and the extent of stream networking (Roberts et al. 2013, p. 6; Rust *et al.* 2019, p. 117636). The presence of stream reaches that provide refugia during and after fires plays a large role in the ability of the population to repatriate affected areas (Rieman and Clayton 1997, p. 10). The more stream networking (i.e., the more tributary branches in the stream) exists for a population the more likely it will be to survive a severe event, such as wildfire. This is because these events can be patchy in space or limited in extent, and networked streams are more likely to have some stream reaches not affected by the fire and are more likely to have sufficient habitat diversity in the stream to provide refugia for individuals to survive (Isaak *et al.* 2012b, p. 551; Roberts *et al.* 2013, p. 1388). All but 4 populations are considered isolated with no connectivity; nevertheless, active management has routinely and successfully salvaged, rescued, and reintroduced populations of Rio Grande cutthroat trout into streams affected by wildfire (see *Conservation Measures and Existing Regulatory Mechanisms* below). Fuels management may be done on a local scale to reduce some risks; however, given that climate change will increase the likelihood of large, hot fires throughout the Southwest, we expect that the effects of wildfire will continue to result in loss of some Rio Grande cutthroat trout populations in the future (Service 2024, pp. 25–27).

Stream Drying and Fragmentation

Stream drying within Rio Grande cutthroat trout populations may occur as a result of drought or, in a few cases, water withdrawals (e.g., irrigation). As streams begin to dry, the amount of habitat available and food base for Rio Grande cutthroat trout is reduced; streams may become narrower and intermittent. Stream intermittency may cause water quality declines (increased temperature, decreased oxygen), lack of access to breeding, feeding, and sheltering areas, and stranding of fish (Lake 2000, p. 577). In the past, drying was likely not a significant factor affecting Rio Grande cutthroat trout, as interconnected populations provided a source for repatriation of extirpated areas. However, the current fragmentation experienced by most Rio Grande cutthroat trout populations prevents recolonization from nearby streams after extirpation, in most cases. Streams with drought refugia (pools or other areas that remain wetted during dry

times) within the occupied reaches increase the chances of populations surviving if stream drying occurs.

Drought frequency is expected to increase as a result of climate change due to a combination of increased summer temperatures and decreased precipitation (Nash and Gleick 1993, p. ix; Intergovernmental Panel on Climate Change (IPCC) 2007, p. 15; Ray et al. 2008, p. 37; Haak and Williams 2012, p. 388). Climate warming is projected to make droughts longer, more severe, and more widespread in the future (Williams et al. 2020, pp. 238-239). Reduced summer stream flows have already been observed throughout the range of Rio Grande cutthroat trout (Zeigler et al. 2012, p. 1050), and drought has resulted in some population extirpations (Japhet et al. 2007, pp. 42–45; Alves 2014, pers. comm.). We expect that stream drying from drought and, in some cases where locally present, water withdrawals, will continue to result in elevated risk of extirpation for populations throughout the subspecies' range (Service 2024, p. 27).

Water Temperature Changes

Stream warming due to climate change has been observed throughout salmonid habitat in the western United States, and summer high water temperatures may become a limiting factor for population growth of many species of trout (Isaak et al. 2012a, p. 514). Stream warming trends induced by climate change and other factors can cause some streams to become too warm for Rio Grande cutthroat trout populations to thrive; however, several streams that are currently colder than optimal will warm and become more suitable (Zeigler et al. 2013a, p. 1400; Zeigler et al. 2013b, pp. 6–9). Air temperatures in the last 45 years throughout the range of Rio Grande cutthroat trout have increased an average of 0.29°C (0.5°F) per decade (Zeigler et al. 2012, p. 1049). The extent to which these changes impact stream temperatures varies with elevation, slope, and aspect.

As with Colorado River cutthroat trout (*O. c. pleuriticus*) (Roberts et al. 2013, p. 13), Rio Grande cutthroat trout populations are currently restricted to higher elevations due to nonnative trout interactions, and the effects of warming temperatures are limited. No populations throughout the range of Rio Grande cutthroat trout are currently experiencing acute effects (mortality) due to high temperature; conversely, one population may be experiencing chronic effects (e.g., reduced growth) from stream temperatures that are too cold (Rogers 2013, pp. 18–21; Zeigler et al. 2013a, p. 1400; Zeigler et al. 2013b, pp. 6–9).

In the future, climate change may have variable effects on Rio Grande cutthroat trout populations (Service 2024, pp. 28–29). Some streams may experience increases in summer water temperatures, potentially putting future populations at risk from chronic and acute temperature effects. Others may experience temperature increases that make waterways more suitable and encourage population expansion.

Changes in Flood Timing and Magnitude

Changes in precipitation and air temperature expected from climate change (becoming drier and warmer) will likely lead to changes in the magnitude, frequency, timing, and duration of spring snowmelt runoff patterns (Poff et al. 2002, p. 4; Isaak et al. 2012b, p. 544). The life history of salmonids is closely tied to flow regime, runoff in particular (Fausch et al. 2001, p. 1440). An increase in magnitude of floods can scour streambeds, destroy eggs, or displace recently emerged fry downstream (Erman et al. 1988, p. 2199; Montgomery et al. 1999, p. 384). Climate warming is also causing snowmelt runoff to peak approximately 10 days earlier in the spring than 45 years ago (Clow 2010, p. 2297; Zeigler et al. 2012, p. 1050). The environmental cues for Rio Grande cutthroat trout spawning are most likely tied to increasing water temperature, increasing day length, and possibly flow, as it has been noted that they spawn when runoff from snowmelt has peaked and is beginning to decrease (Behnke 2002, p. 141; Pritchard and Cowley 2006, p. 25). Earlier runoff could disrupt spawning cues because peak flow would occur when the days are shorter in length and, therefore, water temperatures are colder (Stewart et al. 2005, p. 1137). This earlier snowmelt, which leads to less flow in the spring and summer, could either benefit Rio Grande cutthroat trout or be detrimental. The benefit could come because the young-of-year would have a longer growing season before winter. However, as discussed above, a longer season of lower flows could also lead to increased stream temperatures and increased probability of intermittency and drying.

In summary, it is difficult to project how changes in the flow regime as a result of climate change will affect Rio Grande cutthroat trout populations (Service 2024, p. 29). If the growing season is increased because of changes in flood timing and magnitude, they could benefit Rio Grande cutthroat trout by increasing recruitment rates due to a longer summer growing season. However, if spawning cues are disrupted or egg and fry survival is reduced because of large magnitude floods during spawning or rearing times, it would negatively affect populations.

Land Management

Cattle grazing, timber harvest, non-angling outdoor recreation, road building, and mining all occur within watersheds occupied by Rio Grande cutthroat trout, and all of these activities may lead to stressors that can affect the subspecies. These activities can reduce riparian vegetation (eliminating cover and potentially resulting in water temperature increases), increase sedimentation (reducing instream habitat quality), increase erosion (reducing stream stability and cover), reduce food availability (overgrazing results in a reduction of terrestrial insects, which generally represent about half the diet of trout) (Saunders and Fausch 2007, p. 1224; Saunders et al. 2012, p. 1525), and negatively affect habitat occupied by Rio Grande cutthroat trout. Locally, land management activities may still be having some effects on aquatic habitat for Rio Grande cutthroat trout. Although we do not have information on the location of some of these activities, such as grazing allotments, or intensity of effects in proximity to Rio Grande cutthroat trout populations, the intensity of grazing and other activities is generally light because most of the streams Rio Grande cutthroat trout populations currently occupy are in high elevation, remote

areas. Estimation of population persistence revealed that anthropogenic influence, including land management practices, had a negligible effect on probability of persistence for extant Rio Grande cutthroat trout populations (Zeigler et al. 2019, p. 832). For these reasons, grazing is not currently considered a threat to the Rio Grande cutthroat trout (Service 2024, pp. 29–30).

Additionally, we do not expect effects from land management to increase in the future, given the ruggedness of the landscape and the existing Conservation Agreement that includes the land management agencies within the range of the Rio Grande cutthroat trout (see *Conservation Measures and Existing Regulatory Mechanisms* below). These agencies have implemented management actions, such as habitat restoration and exclusion fencing, to reduce and mitigate the effects of land management practices, and plan to do so in the future (RGCT Conservation Team 2024, pp. 25, 42–43). Other federal statutes, such as the National Forest Management Act and National Park Service Organic Act of 1916, require federal land management agencies to conserve native species and their habitats (RGCT Conservation Team 2023, p. 5–6), providing additional safeguards for the Rio Grande cutthroat trout. Therefore, land management activities are unlikely to have measurable population-level effects in the future.

Angling

Fishing regulations in New Mexico and Colorado govern recreational angling, which is generally compatible with Rio Grande cutthroat trout conservation. For example, many of the streams with Rio Grande cutthroat trout are "catch and release." Those that are not have a two (New Mexico) or four (Colorado) daily fish limit. While even catch and release angling can have some effects on individual fish (i.e., handling stress, swallowing hooks) (Bartholomew and Bohnsack 2005, p. 140), many conservation populations of Rio Grande cutthroat trout are in very remote areas and angling pressure is light (Alves et al. 2008, p. 47). Additionally, recreational angling provides a revenue source and public support for future conservation work on Rio Grande cutthroat trout. For these reasons, we conclude that angling is not affecting and will not affect the resiliency of Rio Grande cutthroat trout populations in the future.

Conservation Measures and Existing Regulatory Mechanisms

The States of New Mexico and Colorado have long had an interest in managing populations and conducting research on the Rio Grande cutthroat trout, and they have led management efforts for many years to restore populations and improve habitat. In 2003, the first Conservation Agreement was signed (RGCT Conservation Team 2013, entire), and the Rio Grande Cutthroat Trout Conservation Team (Conservation Team) was formed. This team is comprised of representatives of the signatory bodies including State agencies, Federal agencies, Tribes, and NGOs. The Conservation Team developed a rangewide database, the Rio Grande Cutthroat Trout Database (RGCT Database), which houses data collected on populations, including management actions, surveys, and other information. The database is populated by the Conservation Team and maintained by the Wyoming Geographic Information Science Center at the University of

Wyoming. We primarily used information from the RGCT Database available in 2023 to inform our assessment, which is the most recent data available. We supplemented information from the RGCT Database with new information received from various sources, including communications with Rio Grande cutthroat trout biologists from the Conservation Team. The Conservation Agreement was renewed in 2009, 2013, and 2023 (RGCT Conservation Team 2024, entire).

In 2013, the Conservation Team developed the Rio Grande Cutthroat Trout Conservation Strategy (Conservation Strategy) (RGCT Conservation Team 2013, entire), which is a signed 10-year commitment to implement ongoing conservation actions. The development of this Conservation Strategy was directed by the Conservation Agreement and was renewed in early 2024 (RGCT Conservation Team 2024, entire). As part of the Conservation Strategy, several conservation actions are routinely undertaken to protect, restore, and re-establish Rio Grande cutthroat trout populations across the species' historical range. The Conservation Team has been successful in improving population resiliency and establishing new populations by focusing on the threat of nonnatives (i.e., barrier installation, piscicide treatment) and habitat improvement (i.e., pool creation through forcing elements and beaver dam analogs, bank stabilization, exclosure fencing). Since 2008, 12 barriers have been installed to limit potential colonization by nonnative fish species, with another 2 planned for installation by 2028. In the past 10 years, there have been 13 population restorations (11 percent of current populations), meaning nonnative trout were removed and Rio Grande cutthroat trout reintroduced. An additional four populations (3 percent of current populations) have undergone nonnative trout removal and stocking of pure Rio Grande cutthroat trout, but they have not yet exhibited recruitment and therefore currently are not considered self-sustaining populations. Multiple road culverts have been replaced to improve connectivity within and between populations. Habitat improvement projects have also increased the resiliency of existing populations, with more planned for the future. The Conservation Team has also responded to several wildfires by conducting salvage operations, removing Rio Grande cutthroat trout from degraded streams, and reintroducing them when conditions improved or relocating them into another suitable stream. These actions take place rangewide across all GMUs and have led to an increase from the 82 populations known in the Service's 2002 candidate status review to the 119 current populations, a 45 percent increase.

Also in 2013, Vermejo Park Ranch signed a Candidate Conservation Agreement with Assurances (Vermejo CCAA) with the Service and the States of Colorado and New Mexico. The goal of this project was to increase occupied stream miles by approximately 20 percent on the ranch and create a large, interconnected population of more than 75,000 individuals over 160 stream km (100 mi) (Kruse 2013, p. 2). This goal was achieved in 2022.

Additionally, hatcheries are an important management tool for Rio Grande cutthroat trout conservation. Currently, the states of Colorado and New Mexico have hatcheries producing broodstock for the Headwaters and Lower Rio Grande GMUs, which are used to establish new populations, augment current populations, and provide recreational opportunities to the public. The hatcheries produce genetically pure trout that are representative of many source populations

across the two GMUs. New Mexico Department of Game and Fish is currently developing broodstock for the Pecos GMU.

More information on past, on-going, and future conservation efforts are documented in the SSA Report (Service 2024, pp. 102–120). Overall, conservation efforts have had a significant, sustained, and positive effect on the viability of the Rio Grande cutthroat trout.

Cumulative Effects

We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA Report, we have analyzed the cumulative effects of identified threats and conservation actions on the species. To assess the current and future condition of the species, we evaluate the effects of all the relevant factors that may be influencing the species, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire species, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative-effects analysis.

ANALYSIS

To assess the current and future viability of the Rio Grande cutthroat trout, we compiled the best available scientific and commercial data, including data obtained from the RGCT Database curated by the Conservation Team, and integrated those data into a quantitative model that projected probability of persistence for each population at several time steps in the future. For the purposes of our assessment, we only included information on conservation populations. Conservation populations are those populations of Rio Grande cutthroat trout with less than 10 percent genetic introgression from nonnative trout (Utah Division of Wildlife Resources 2000, p. 4; Alves et al. 2008, p. 6). The genetic distinctiveness of Rio Grande cutthroat trout can be lost through hybridization (Allendorf et al. 2004, p. 1205), and once Rio Grande cutthroat trout populations have more than 10 percent introgression (gene mixing) with nonnative species and subspecies, that population is no longer considered a conservation population (NMDGF 2002, pp. 26–27; RGCT Conservation Team 2013, p. 6). This threshold has been set to define priorities for the Conservation Team and minimize the long-term threat of genetic introgression. All 119 populations included in this assessment meet this standard. The RGCT Database contains information on attributes such as the adult abundance, recruitment, occupied stream length, geospatial location, and presence of barriers. It also includes information on presence of nonnative trout species and whirling disease, as well as proximity to sources of these two threats. More information on the RGCT Database can be found in the SSA Report (Service 2024, pp. 33–42).

To assess the future resiliency of Rio Grande cutthroat trout populations, we used a quantitative Bayesian Belief Network model (BBN model) developed by the Conservation Team (Zeigler et al. 2019, entire) to estimate the risk of extirpation based on factors relevant to the demographic

and habitat needs of a population. These include occupied stream length, abundance, recruitment, and habitat quality, which influence the ability of a population to withstand stochastic events. The model also included stressors, such as nonnative species and wildfire, that have the potential to reduce the demographic and/or habitat factors the subspecies requires to persist, reduce resiliency, or even cause direct extirpation of populations. We used contemporary data obtained from the RGCT Database to populate information in the model such as population metrics, nonnative species presence, barrier presence, disease presence, and occupied stream length. Other input data, such as risk from wildfire and land management practices, were retained from the Zeigler et al. (2019, entire) analysis.

The condition of the subspecies was assessed at three different time frames and two different scenarios. The first time frame projects the probability of extirpation over the next 10 years starting in the year 2023, which was the most recent year for which we had data from each population. This time frame reflects risk of extirpation due to the current characteristics of each population, as well current exposure to threats and biological response to those threats. This time frame served as our near-term assessment of viability, specifically informing resiliency of each population. Our near-term assessment also used data on the distribution and characteristics of populations to inform redundancy and representation.

We also assessed future viability at 2040 and 2080 using the BBN model. As with the near-term projections, the model estimates probability of extirpation for each population over a 10-year time step, adjusted for conditions at 2040 and 2080. The starting input data for the model are based on the current characteristics of the population (i.e., 2023 data). Although the model can adjust the probability of exposure to threats over time (Zeigler et al. 2019, pp. 822–828) and can also incorporate projected changes in environmental factors due to climate change (i.e., water temperatures), the model cannot incorporate potential changes in population characteristics or exposure to threats due to conservation activities. The Rio Grande cutthroat trout is a conservation-reliant species, one that requires continued active management to sustain the species and associated habitat in its current condition (Scott et al. 2010, entire). Given the past successes (see *Conservation Measures and Existing Regulatory Mechanisms* above) and future plans of the Conservation Team, we anticipate that conservation will continue to positively affect populations over time by mitigating threats and enhancing resiliency, even as the magnitude and scope of threats changes. Accordingly, the conservation measures from the Conservation Strategy were incorporated into our analysis to reflect the future role management will play in the resiliency of Rio Grande cutthroat trout populations.

To address future conservation, we applied two plausible management actions, establishing barriers and nonnative species removal, to the Relative Concentration Pathway (RCP) 4.5 climate scenario representing a best case (i.e., upper bound) scenario. These two actions were incorporated in this scenario due to the outsized role nonnative trout play in Rio Grande cutthroat trout resiliency. Barriers and removal are two proven management actions that can reduce exposure to this threat. In this scenario, for populations that currently lack a complete

barrier, we projected that one population would receive a barrier per decade per GMU based on the rate of barriers already completed under the Conservation Strategy and the rate at which installation of barriers is expected to continue (Service 2024, pp. 44–50). For populations with a barrier but invaded by nonnative trout, we assumed five per decade would be restored (i.e., only populated by Rio Grande cutthroat trout) because the rates of implementation (i.e., barrier construction and population restoration) are similar to what has been observed since the Conservation Agreement was first developed (RGCT Conservation Team 2024, pp. 36–60). This results in the potential addition of 6 barriers rangewide by the 2040s plus another 15 (21 total) barriers rangewide by the 2080s. Twenty-one, rather than 22 barriers, are projected to be added by the 2080s because the Pecos GMU did not have enough populations for any more barriers. For populations already invaded by nonnative trout with a complete barrier in place (17 currently), we randomly selected them for potential restoration. Eight populations were randomly selected to receive restoration treatments for the 2040s projection and the remaining nine populations that are candidates for restoration received restoration treatments for the 2080s projection. By 2080, we project all these populations would be free of competing nonnative trout based on the continued rate of management actions by the Conservation Team.

Assuming management will continue into the 2080s is plausible given the history and commitment of the Conservation Team. The Conservation Agreement has been renewed until 2033 and the parties have renewed it multiple times with no indication of letting it lapse. Although the Conservation Agreement is a voluntary agreement, we anticipate it, the work of the Conservation Team, and implementation of the Conservation Strategy will continue into the future. Signatories of the Conservation Agreement all have pre-existing legal authority for land management and wildlife management across the entire range of the Rio Grande cutthroat trout. Furthermore, signatories to the plan have a track record spanning decades of active, effective, and continuous voluntary Rio Grande cutthroat trout conservation work demonstrating an enduring commitment to the conservation of this species. Through this work, the parties to the Conservation Agreement have indicated their commitment to ensure the long-term persistence of Rio Grande cutthroat trout through restoration and maintenance of quality instream habitats, ensuring that land management is compatible with functioning watershed conditions, and mitigation of threats. In other words, that agreement details how each agency will use their management authorities to conserve, protect, and manage Rio Grande cutthroat trout populations and habitat into the future. Implementation of the Agreement and Strategy will be through existing Federal and State authorities such as the Clean Water Act, National Forest Management Act, Federal Land Policy and Management Act, National Environmental Protection Act, Sikes Act of 1974, as amended, Wilderness Act of 1964, as amended, Public Rangelands Improvement Act of 1978, and the Council on Environmental Quality regulations (40 CFR Part 1501) (RGCT Conservation Team 2023, p. 2).

The second of our scenarios included the RCP8.5 climate model and assumed no change in state of populations due to future conservation (i.e., lower bound). This scenario assumes only status quo level of management to maintain the current state of each population (e.g., barrier

maintenance, nonnative suppression). This is scenario also reflects the default model used in Zeigler et al. (2019, entire) because it does not incorporate potential changes in population characteristics resulting from future conservation management activities. We used the results of this analysis to describe Rio Grande cutthroat trout viability by characterizing the status of the species in terms of its resiliency, redundancy, and representation. More details on the model can be found in the SSA Report (Service 2024, pp. 43–62).

For climate change, there are two variables in the BBN model that can be adjusted to account for future changes: annual maximum of a 30-day running average of daily average temperature and the average of the daily maximum water temperature for the warmest 7-day period. As with other variables in the model, temperatures are binned into categories based on expected responses of Rio Grande cutthroat trout to those temperatures. Probability of persistence based on exposure of a population to these thresholds were elicited by Zeigler et al. (2019, entire). For the 2040 and 2080 time steps, we projected changes in water temperatures using data available on air temperatures for RCP4.5 and RCP8.5 and inputted them into the BBN model.

The output of the BBN model is persistence probability values per population for each scenario and timeframe. We organized the results in several different formats. We binned populations into three categories reflective of extirpation risk. Based on the Conservation Strategy (2013, p. 16), the most secure populations are defined as those with a greater than 90 percent probability of persistence over ten years. Thus, we used the same threshold to designate populations in "High" condition based on the model output. We designated a "Moderate" category for populations projected to have a persistence probability between 50 and 90 percent. Based on the model, these populations are more likely to persist than not over a 10-year time frame but have an elevated risk of extirpation. The "Low" category reflects those populations for which the persistence probability is less than 50 percent.

CURRENT CONDITION AND NEAR-TERM PROJECTIONS

The Rio Grande cutthroat trout is currently distributed across 119 populations in all five GMUs, although most of the populations are isolated from each other. These populations currently occupy 1,197 river km (744 mi); this represents an 82 percent reduction from the presumed historical range. Of the currently occupied stream length, 83 percent occurs in the Rio Grande Headwaters (461 km (286 mi)) and Lower Rio Grande (528 km (328 mi)) GMUs. Most of the remainder is in the Canadian GMU (147 km (91 mi)). The Caballo GMU has only one population; however, that is the only known historical location within that GMU. Conversely, the two Rio Grande GMUs make up the majority of the current populations with 97 total populations.

The average occupied stream length among current populations is 10 km (6.3 mi), with a median of 6.3 km (3.9 mi). In the BBN model, the stream length threshold assigned the highest probability of extirpation was less than 2.8 km (1.7 mi) (Service 2024, p. 112). Currently 101

populations (85 percent) are above this threshold. The stream length threshold with the lowest probability of extirpation in the model was 7.2 km (4.8 mi), which 46 populations (39 percent) exceeded.

Rangewide, 60 populations (50 percent) have a complete barrier, 14 (12 percent) have a partial barrier, and 45 (38 percent) do not have a barrier in place. For the key threats, (i.e., competing trout species, hybridizing trout species, whirling disease), the RGCT Database categorizes populations based on their distance from those key threats. The categories are far (greater than 10 km (6 mi)), near (less than 10 km (6 mi)), absent (not present in the watershed), or invaded (co-occurring with the population). For competing nonnatives, 27 populations (23 percent) have far competing nonnatives, 42 (35 percent) have near competing nonnatives, and 50 (42 percent) are already invaded. All GMUs, aside from Caballo, had multiple populations that were invaded or had nonnatives nearby. Only the Canadian GMU lacked any populations far from nonnatives.

There are 15 populations (13 percent) far from hybridizing nonnatives, 20 (17 percent) are nearby hybridizing nonnatives, 78 (66 percent) have them absent, and 6 (5 percent) are already invaded. The Canadian (1 population), Rio Grande Headwaters (3 populations), and Lower Rio Grande (2 populations) GMUs have invaded populations. Every GMU, aside from Caballo, had at least five populations in which hybridizing nonnatives are absent from the watershed. For whirling disease, 7 populations (6 percent) are far from infected populations, 9 populations (8 percent) are near infected populations, 102 populations (86 percent) have whirling disease absent in the watershed, and 1 population (1 percent) is infected. This one population is in the Rio Grande Headwaters GMU.

These data were entered into the BBN model to estimate probability of extirpation over the next 10 years based on the current condition of each population. In the near-term 55 populations (46 percent) are projected to be in the Low persistence probability category, 48 (40 percent) in the Moderate category, and 16 (13 percent) in the High category (Figure 2). In the near-term, the distribution of the number of populations with projected persistence probabilities in each category within a GMU is similar to the distribution across the range. Each GMU is projected to have a mix of populations in the three persistence categories.

Given that this model was developed to guide on-the-ground recovery implementation efforts, we caution against strict use of predicted risks from this model for assessing conservation status, a common caveat for BBN models (Dunn et al. 2024, entire).

Were the model completely predictive, we would expect a 40 percent decline in the number of Rio Grande cutthroat trout populations in the next 10 years. However, such widespread, dramatic extirpations have not been the trend for the subspecies and are not anticipated in the future; in fact, over the past 20 years there has been a gain in the number of populations and occupied area (RGCT Conservation Team 2023, entire; Service 2024, pp. 31–38). Although

there was an 88 percent loss in populations from estimated historical levels, ongoing management and conservation efforts have been effective in stabilizing population levels since the steep decline. Thus, we conclude the BBN model likely overestimates extirpation (likely due to propagated uncertainty, the discretization of continuous variables, and the lack of feedback functions and temporal relationships in the model structure) and is more valuable for assessing relative risk and impacts of key variables (McCann et al. 2006: pp. 3057-3058).

Currently, the distribution of the Rio Grande cutthroat trout has experienced substantial reduction from the estimated historical condition, losing approximately 88 percent of its occupied stream miles (Alves et al. 2008, p. 13). This loss reflects a reduction in the redundancy for the species and its ability to withstand wide-scale catastrophic events, such as a high-severity wildfire. However, the species continues to occur across multiple independent watersheds in all 5 GMUs with 119 populations in Colorado and New Mexico. Populations are distributed across multiple mountains ranges and subbasins, making it extremely unlikely that a single catastrophic event will result in large scale extirpations.

There has likely been a decline in adaptive capacity compared to historical levels given the extensive range loss. However, resilient populations are found across the geographic breath of the historical range. We assumed that maintaining populations across all GMUs would serve as a proxy for intraspecific diversity. The GMUs were not created to necessarily reflect important differences in genetic variability in the subspecies based on geography or adaptation to specific environments, although fish in the Pecos and Canadian GMUs do exhibit some genetic differentiation from those in the Rio Grande GMUs (Pritchard *et al*. 2009, p. 1216). The population in the Caballo GMU was stocked from fish from the Lower Rio Grande GMU, so on its own provides little additional representation. Together, the Pecos and Canadian GMUs have unique genetic diversity that may be important to maintain for long-term viability. All of the GMUs have multiple populations that may contain diversity to maintain the species long-term viability. There are considerably fewer populations in the Canadian and Pecos GMUs, which means loss of even a few populations from those GMUs would result in loss of unique aspect of the subspecies' diversity in the event of a catastrophic event, such as wildfire. Also, even though novel diversity may exist in 119 extant populations, most are isolated from each other, limiting the potential for valuable genetic diversity to spread as environmental conditions change. Maintenance of hatchery broodstocks from all the GMUs, though, does provide safeguards against complete loss of this adaptive capacity.

In conclusion, although the Rio Grande cutthroat trout has experienced substantial reduction from historical condition, there are 119 remaining populations distributed across multiple independent watersheds in all 5 GMUs in Colorado and New Mexico. Since 2002, conservation efforts have resulted in the Rio Grande cutthroat trout experiencing an increase in its range of 45 percent with the addition of 37 populations. Most populations (85 percent) occupy streams lengths above the highest extirpation risk threshold. All but one population is not infected by whirling disease, and 40 percent lack any nonnative trout. Although the BBN model predicts that

only 53 percent of populations have a persistence probability greater than 50 percent, the best available information indicates this model overestimates extinction probability. Empirical evidence of trends in persistence differs greatly from these projections. Ongoing management and conservation efforts have been successful in maintaining sufficient redundancy and representation and have been effective in stabilizing population levels since the historical decline.

FUTURE CONDITION AT MID- AND LATE-CENTURY

We projected future viability of Rio Grande cutthroat trout populations at mid- and late-century using the BBN model under two different scenarios. As discussed above, the lower bound scenario incorporated projected changes in environmental conditions under RCP8.5 and no additional management. In contrast, upper bound scenario assumed conditions under RCP4.5 and management actions that would improve the prospects for populations without barriers and/or invaded by nonnative trout. We projected that 6 barriers would be added rangewide by the 2040s plus another 15 (21 total) barriers rangewide by the 2080s. Twenty-one, rather than 22 barriers, are added by the 2080s because the Pecos GMU did not have enough populations for any more barriers.

For the upper bound scenario, eight currently invaded populations were randomly selected to receive restoration treatments for the 2040s projection and the remaining 9 populations that are candidates for restoration received restoration treatments for the 2080s projection. By 2080, we would project all of these populations would be free of competing nonnative trout.

For climate change projections under both scenarios, none of the populations are expected to experience substantial changes in daily maximum water temperature for the warmest 7-day period category under either scenario and only 10 of the 119 populations experience categorical changes in maximum 30-day water temperature. Of those, only five populations are predicted to have different persistence probabilities in the same time frame depending on scenario. Each of these five populations occupy streams in the cooler water temperature categories where future warming, particularly under RCP8.5, is expected to increase persistence probability (Service 2024, pp. 45–47).

Under the upper bound scenario, 64 populations (54 percent) are projected to be in the Low condition category by the 2040s, with 49 (41 percent) in Moderate and 6 (5 percent) in High. By the 2080s, this shifts to 48 populations (40 percent) in the Low category, 69 (58 percent) in Moderate and 2 (2 percent) in High. In contrast, with the lower scenario, by the 2040s 75 populations (63 percent) are projected to be in the Low persistence category, with 39 (33 percent) in Moderate and 5 (4 percent) in High. Projections for the 2080s under the lower scenario are that 78 populations (66 percent) are in the Low category, 40 (34 percent) are Moderate, and 1 (1 percent) in High (Service 2024, p. 55–56).

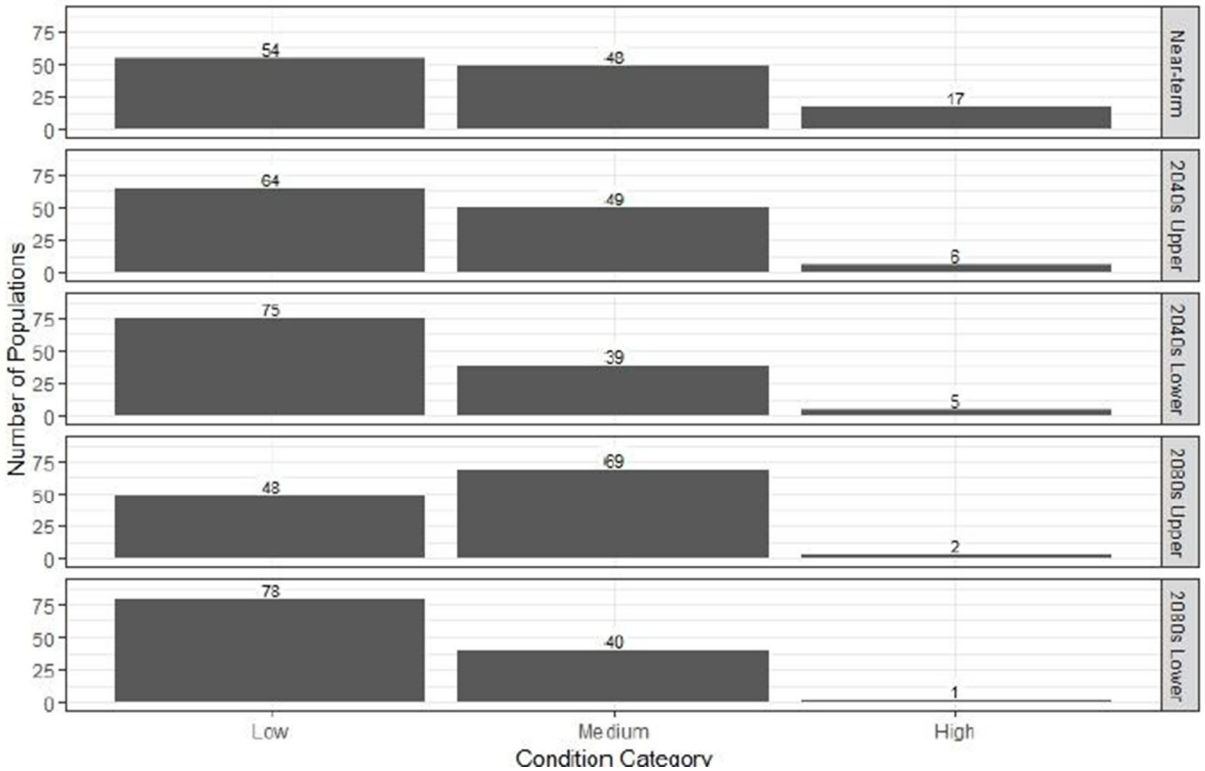

Figure 2. The rangewide number of Rio Grande cutthroat trout populations (vertical axis) projected in each condition category (horizontal axis) by scenario (labeled with text strips on the right).

The two variables with the greatest influence on persistence of a population are proximity to hybridizing non-native trout and barrier presence, as evidenced by the disparity between the two scenarios (Zeigler et al. 2019, pp. 830-832; Service 2024, p. 95). All 39 populations classified as having over a 50 percent probability to persist under the lower scenario in the 2080s have a complete barrier in place, and all but four were classified as far or absent for proximity to a hybridizing source population. Conversely, all but two of the 59 populations without a complete barrier have a high projected probability of extirpation (persistence under 50 percent) by the 2040s, with the two exceptions being populations that are absent of hybridizing nonnatives and far from competing nonnatives. The two remaining populations without a complete barrier fall under 50 percent by the 2080s. When we applied the management actions of new barriers and nonnative removal from the population, 11 populations shifted to above 50 percent persistence in the 2040s time step, which increased to 27 populations in the 2080s time step as the number of barriers in place increases over time. Thus, comparing the upper bound scenario with the projections over the next 10 years, there is the potential for overall improvement in terms of the number of populations in either Moderate or High condition (55 currently versus 71 by 2080). This is due to the potential for barrier construction and population restoration to mitigate threats to which populations are currently exposed. While the majority of these populations remained in

the Moderate category, that is primarily due to other the risk factors in the model that cumulatively reduce the final persistence probabilities (Service 2024, pp. 59–61). The effects on resiliency posed by nonnatives are expected to be lowered with continued management of the species such as piscicide treatments and new barriers, which has been shown to be successful in both protecting current and establishing new populations.

The results of the model at each time step and climate/conservation scenario reveal that all populations across the four main GMUs (the Caballo GMU is not considered a main GMU since it has only one current and historical location that has a low probability of persistence in the future) do not have a high probability of extirpation. Even under the worst-case scenario, 41 populations are likely to persist albeit with an elevated risk of extirpation. Notably, though, when conservation measures are included in the model future (i.e., upper bound scenario), the majority of populations fall into the Moderate and High categories by 2080 (69 in moderate, 2 in high).

The species is projected to occur across multiple independent watersheds in all 5 GMUs with 119 populations in Colorado and New Mexico. If populations with Low persistence probabilities were extirpated, it would further reduce the spatial extent and redundancy of the subspecies. In the near-term, each GMU is represented by a population in the High persistence category; however, even under the Upper scenario by 2040 only the Rio Grande headwaters GMU has multiple populations with High persistence and by 2080 no GMU has more than one (Pecos has zero), increasing vulnerability to a single catastrophic event.

Considering our future risk projections, populations in both the Canadian and Pecos GMUs are projected to experience reductions in resiliency, including many shifting to the lowest persistence category under the lower scenario. The conservation actions projected under the upper scenario did not have a markedly higher effect on the Pecos GMU with only one population moving from Low to Moderate in 2080, but it did have considerable influence on the persistence of the Canadian GMU with one population moving to the high category and 6 populations moving from Low to Moderate. The potential loss of these two GMUs has led the New Mexico Department of Game and Fish to development of a Pecos GMU broodstock and a focus on these two GMUs for future restoration projects (RGCT Conservation Team 2024, entire).

As with the model projections for current condition, we caution against strict use of predicted risks from this model for assessing conservation status as the model was developed for a different purpose. Nevertheless, the relative risk among populations and the importance of key threats underlying those risks are valuable insights.

FINDING

Regulatory Framework

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set

forth the procedures for determining whether a species is an "endangered species" or a "threatened species." The Act defines an endangered species as a species that is "in danger of extinction throughout all or a significant portion of its range," and a threatened species as a species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The Act requires that we determine whether any species is an "endangered species" or a "threatened species" because of any one or a combination of the following factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;
(B) Overutilization for commercial, recreational, scientific, or educational purposes;
(C) Disease or predation;
(D) The inadequacy of existing regulatory mechanisms; or
(E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

The Act does not define the term "foreseeable future," which appears in the statutory definition of "threatened species." Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis, which is further described in the 2009 Memorandum Opinion on the foreseeable future from the Department of the Interior, Office of the Solicitor (M–37021, January 16, 2009; "M-Opinion," available online at *https://www.doi.gov/sites/doi.opengov.ibmcloud.com/files/uploads/M-37021.pdf*). The foreseeable future extends as far into the future as the U.S. Fish and Wildlife Service and National Marine Fisheries Service (hereafter, the Services) can make reasonably reliable predictions about the threats to the species and the species' responses to those threats. We need not identify the foreseeable future in terms of a specific period of time. We will describe the foreseeable future on a case-by-case basis, using the best available data and taking into account considerations such as the species' life-history characteristics, threat-projection timeframes, and environmental variability. In other words, the foreseeable future is the period of time over which we can make reasonably reliable predictions. "Reliable" does not mean "certain"; it means sufficient to provide a reasonable degree of confidence in the prediction, in light of the conservation purposes of the Act.

Status Assessment

Status Throughout All of Its Range

After evaluating threats to the species and assessing the cumulative effect of the threats under the

section 4(a)(1) factors, we found that the biological status of the Rio Grande cutthroat trout has been influenced mainly by hybridization, predation, and competition with nonnative trout species (Factors C and E). Habitat loss, degradation, and fragmentation due to hydrological changes (stream drying and flooding), wildfire, and land management practices (Factor A), as well as overharvest (i.e., angling) (Factor B) and disease (Factor C), have also contributed to the current status of the subspecies. As a consequence, the subspecies has experienced an 88 percent reduction from its historical range, likely resulting in losses of redundancy and representation, and remaining populations are fragmented and isolated.

However, the recent trend (past 20 years) for the Rio Grande cutthroat trout has not been marked by decline; rather, the subspecies has experienced range expansion and an increase in the number of populations from 82 to 119, a 45 percent increase. Many populations have also experienced increases in resiliency due to habitat improvements and removal of nonnatives. This change reflects the contribution of management to the viability of the subspecies, which has largely stemmed further declines. Due to regulations and conservation partnerships, the threats posed by overharvest, disease, and habitat loss have been significantly reduced, if not eliminated, for the majority of Rio Grande cutthroat trout populations. Less than half of populations (42 percent) are currently invaded by nonnative trout. Although invaded populations have an inherently higher risk of extirpation, conservation actions, such as nonnative species control and habitat improvements, have been able mitigate and improve the resiliency of these populations.

Despite the historical reductions in range, there are 119 extant populations distributed across the breadth of the historical range and in every major GMU (Rio Grande Headwaters, Lower Rio Grande, Canadian, and Pecos) providing redundancy against catastrophic events. Wildfire, stream drying, and flooding may result in localized population declines and even extirpations, but the geographic extent of the subspecies ensures that individual events will not result in rangewide losses of populations. Furthermore, the Conservation Team has a demonstrated track record of responding to these events to protect and even expand populations in the aftermath of large-scale changes to streams. Range reductions have also likely reduced the inherent diversity (i.e., representation) of the subspecies, but major genetic lineages continue to exist, and populations occupy the breadth of its historical range, covering multiple GMUs and environmental gradients. This remaining diversity provides sufficient adaptive capacity to facilitate the Rio Grande cutthroat trout's ability to adapt to near-term changes in its environment.

In summary, the Rio Grande cutthroat trout has sufficient resiliency, redundancy, and representation to maintain near-term viability. Primary threats that resulted in past extirpations and range loss have mostly been ameliorated, mainly due to substantial conservation efforts. Recent trends have been towards more populations and range expansion. Thus, after assessing the best available information, we conclude that the Rio Grande cutthroat trout is not in danger of extinction throughout all of its range.

Therefore, we proceed with determining whether the Rio Grande cutthroat trout is likely to become endangered within the foreseeable future throughout all of its range. Threats from disease, angling, and land use practices are unlikely to be major influences on the future viability of the Rio Grande cutthroat trout, given regulations and management that will continue to mitigate them. Nonnative trout will continue to be the primary threat to the subspecies, especially for those populations that are already invaded or those lacking a barrier. Only those populations (currently 43) that are not invaded and have a complete barrier in place are at low risk of extirpation due to nonnative trout. Other threats, such as wildfire, stream drying, and flooding will continue to influence the subspecies and may worsen in scope and magnitude over time due to climate change. Even though the Rio Grande cutthroat trout can rebound following stochastic events, populations that do become extirpated are unlikely to naturally be recolonized given the fragmentation of its range.

However, conservation actions have and will continue to ameliorate these threats and provide further opportunities for population restoration and expansion. Past management actions, namely removal efforts and barrier construction, have reduced the threat from nonnative trout and improved the resiliency of existing Rio Grande cutthroat trout populations. These management actions will continue, as more barriers and population restorations are currently planned in the latest iteration of the Conservation Strategy. Given the history and the commitment of the Conservation Team, we anticipate these efforts will continue beyond the expiration of the current Conservation Agreement and into the foreseeable future. Adding barriers to populations currently lacking them significantly reduces the risk of extirpation due to nonnative trout. Further, restorations can dramatically improve the resiliency of populations currently at high risk of extirpation. In fact, the steady application of these conservation efforts has the potential to increase the number of resilient populations over the long-term (i.e., 2080s). Although nonnative trout will continue to threaten the future viability of the Rio Grande cutthroat trout, the Conservation Team has the tools, resources, and commitment to mitigate this threat and improve the resiliency and redundancy of the subspecies.

Impacts from other threats, namely stochastic/catastrophic events such as wildfires, stream drying, and flooding, can also be influenced by management actions. Forest management, habitat restoration, and improvements in connectivity can reduce the severity of these threats and/or increase the resiliency of Rio Grande cutthroat trout populations. Also, even if these events result in substantial population declines or even complete extirpation, actions such as fish salvage and stocking can preserve and even restore the populations. Although these events may continue to cause population extirpations in the future, their scale will be localized. Given that populations are projected to be distributed across multiple watersheds in the four main GMUs (Rio Grande Headwaters, Lower Rio Grande, Canadian, and Pecos), the Rio Grande cutthroat trout will have sufficient redundancy to limit the overall consequences of these events on the subspecies viability.

Changes in local environmental conditions due to climate change, namely increases in water

temperatures, are unlikely to have a substantial effect on population resiliency. Projected changes in water temperatures had little impact on extirpation risk in the BBN model. In fact, increasing water temperatures that are currently too cold increased resiliency for some populations. Increasing water temperatures can also support upstream population expansion. Thus, we conclude that increasing water temperatures are unlikely to significantly reduce the resiliency of Rio Grande cutthroat trout populations and may even enhance it.

In summary, although the Rio Grande cutthroat trout will continue to be influenced by a variety of threats in the future, conservation actions will maintain and likely improve the viability of the subspecies. The Rio Grande cutthroat trout is a conservation reliant species, and the actions necessary to maintain its viability have a demonstrated track record of success. Despite these efforts, some populations will likely be extirpated in the foreseeable future. Populations already invaded by nonnative trout or without a barrier are inherently at risk of extirpation, and catastrophic events such as wildfire and drought can cause occasional losses of populations. Considering recent populations trends and the scale of conservation efforts, though, we expect that complete loss of a population will be an uncommon occurrence. Thus, even if those populations that are at a higher risk of extirpation are lost in the future, sufficient redundancy will remain in the future in terms of number of populations and their geographic distribution such that periodic losses of populations will not elevate extinction risk for the subspecies. It is also likely that population losses will be offset by population gains due to restorations in the future, maintaining the trend observed since the development of the Conservation Agreement. Loss of populations will also likely affect future adaptive capacity, as will extensive fragmentation that limits the potential for dispersal and genetic exchange. However, in the foreseeable future resilient populations are projected to remain in each of main GMUs in the future and cover a range of environmental conditions, promoting a retention of intraspecific diversity. Furthermore, maintenance of hatchery stocks will preserve major genetic lineages into the future.

In conclusion, the Rio Grande Grade cutthroat trout will continue to maintain resilient populations across its range in sufficient number and distribution to provide redundancy and representation. After assessing the best available information, we conclude that the Rio Grande cutthroat trout is not likely to become endangered within the foreseeable future throughout all of its range.

Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. Having determined that the Rio Grande cutthroat trout is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we now consider whether it may be in danger of extinction or likely to become so in the foreseeable future in a significant portion of its range—that is, whether there is any portion of the

subspecies' range for which it is true that both (1) the portion is significant; and (2) the species is in danger of extinction now or likely to become so in the foreseeable future in that portion. Depending on the case, it might be more efficient for us to address the "significance" question or the "status" question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the subspecies' range.

In undertaking this analysis for the Rio Grande cutthroat trout, we began by identifying portions of the range where the biological status of the species may be different from its biological status elsewhere in its range. For this purpose, we considered information pertaining to the geographic distribution of (a) populations of the species, (b) the threats that the species faces, and (c) the resiliency condition of populations.

We evaluated the range of the Rio Grande cutthroat trout to determine if the species is in danger of extinction or likely to become so within the foreseeable future in any portion of its range. Because the range of a species can theoretically be divided into portions in an infinite number of ways, we focus our analysis on portions of the species' range that contribute to the conservation of the species in a biologically meaningful way. For Rio Grande cutthroat trout, we considered whether the threats or their effects on the species are greater in any portion of the species' range than in other portions such that the species is in danger of extinction now or likely to become so within the foreseeable future in that portion.

For the purposes of considering portions of Rio Grande cutthroat trout's range, we reviewed the GMUs we identified in the SSA Report. These units correspond to different watersheds and genetic lineages and function as independent clusters of populations. They are also the scale at which management actions are directed. Thus, in evaluating extinction risk, we did so at the scale of individual GMUs.

We first considered whether the species may be in danger of extinction in any one of these GMUs. As discussed in the *Status Throughout all of Its Range*, the primary current threats to the Rio Grande cutthroat trout are hybridization, predation, and competition with nonnative trout species. We examined those threats along with the effects from habitat loss, degradation, and fragmentation due to hydrological changes (stream drying and flooding), wildfire, land management practices, overharvest (i.e., angling), and disease, including cumulative effects and considered whether conservation efforts and regulatory mechanisms ameliorated any of the effects.

In general, there are no differences in exposure to primary threats across the GMUs. Each contains a mix of populations that are invaded by nonnative trout and there are no notable differences in risk posed by near-term environmental threats. This is evidenced by the results of the BBN model: the distribution of persistence probabilities in the near-term does not vary between the GMUs, with the exception of the Caballo GMU, which has a single population. The greatest difference in extinction risk across the GMUs is not due to threats or patterns of

population resiliency, but instead the number of populations that contribute to redundancy. The Caballo (1 population), Canadian (10 populations), and Pecos (11 populations) GMUs are at inherently higher risk due to the smaller number of populations they contain, which is exacerbated by threats such as nonnative trout. Mirroring the rangewide trends, these GMUs are a mix of invaded and noninvaded populations, meaning only a subset of populations are at low risk of near-term extirpation. Thus, these GMUs have inherently low redundancy that elevates their risk of extinction.

After identifying a portion of the range (Caballo, Canadian, and Pecos GMUs), where the species has a potentially different status than within the remainder of the range, we then proceed to assess whether the portion constitutes a significant portion of the range. To do so, we examined the occupied stream lengths within each GMU. Currently, the Caballo, Canadian, and Pecos GMUs contain 3, 147, and 59 km (2, 91, 37 mi), respectively, of occupied stream length. Rangewide, the Rio Grande cutthroat trout occupies 1,197 km (744 mi) of stream length, meaning combined these three GMUs constitute around 17 percent of the species' range. With the vast majority of the occupied range in the Rio Grande Headwaters and Lower Rio Grande GMUs, the remaining three GMUs, on their own or combined, do not contain a significant portion of the occupied range. Furthermore, these three GMUs do not possess unique or high-quality habitat that would promote the conservation of the subspecies. As this is not a significant portion of the Rio Grande cutthroat trout range, we determined the species is not in danger of extinction throughout a significant portion of its range.

We next considered whether the Rio Grande cutthroat trout is likely to become an endangered species within the foreseeable future throughout a significant portion of its range. Again, threats are projected to be similar across the range, with no disparities in exposure to nonnative species, wildfire, stream drying, or flooding. GMUs have a mix of populations that have barriers and some that do not, and the Conservation Team has been and is projected to perform conservation activities in all five GMUs. The most recent iteration of the Conservation Strategy places an emphasis on the Pecos and Canadian GMUs, acknowledging their more precarious status. As with the near-term, projections in the 2040s and 2080s are that each GMU will be a mix of populations with varying levels of extirpation risk.

Similar to the near-term analysis, the main difference in extinction risk for each GMU is the disparity in the number of populations, which influences redundancy. In our assessment, we did not assume that more populations would be added to a GMU via reintroduction. Therefore, the current number of populations in each GMU (1 for Caballo, 10 for Canadian, and 11 for Pecos would be the maximum number of populations present in the future. Thus, these GMUs will continue to have limited redundancy in the future and at heightened extinction risk. Looking into the future, further extirpations, would erode the number and distribution of populations in the Caballo, Canadian, and Pecos GMUs, reducing redundancy even more and increasing the risk that a single catastrophic event could result in extinction of the Rio Grande cutthroat trout from a GMU.

After identifying a portion of the range (Caballo, Canadian, and Pecos GMUs) where the subspecies will potentially have different status in the future, we then proceed with whether these areas constitute a significant portion of the range. Although we did not project the addition of more populations in our assessment that would adjust the proportion of overall subspecies range contained within each GMU, most of the ongoing major restoration projects would add populations and river miles to the Rio Grande Headwaters and Lower Rio Grande GMUs. Thus, the percentage of the occupied range for the subspecies within the Caballo, Canadian, and Pecos GMUs will not change substantially in the future. The 17 percent of the future range contained within these GMUs does not constitute a large portion of the range. Furthermore, these three GMUs will not possess unique or high-quality habitat that would promote the conservation of the subspecies.

These areas do not represent a significant portion of the range; therefore, we find that the species is not in danger of extinction now or likely to become so within the foreseeable future in any significant portion of its range. This does not conflict with the courts' holdings in *Desert Survivors* v. *Department of the Interior*, 321 F. Supp. 3d 1011, 1070-74 (N.D. Cal. 2018), and *Center for Biological Diversity* v. *Jewell*, 248 F. Supp. 3d 946, 959 (D. Ariz. 2017), because, in reaching this conclusion, we did not apply the aspects of the Final Policy on Interpretation of the Phrase "Significant Portion of Its Range" in the Endangered Species Act's Definitions of "Endangered Species" and "Threatened Species" (79 FR 37577; July 1, 2014), including the definition of "significant" that those court decisions held to be invalid.

Determination of Status
Based on the best available scientific and commercial data available, we determine that the Rio Grande cutthroat trout does not meet the definition of an endangered species or a threatened species in accordance with sections 3(6) and 3(20) of the Act. Therefore, we find that listing the Rio Grande cutthroat trout is not warranted at this time.

Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)? No

COORDINATION WITH STATES

The range of the Rio Grande cutthroat trout includes the states of Colorado and New Mexico. Throughout the development of the SSA, we coordinated with these states to solicit their knowledge and information on the species. At the beginning of the SSA development process, we sent a letter requesting relevant information on the species to Colorado Parks and Wildlife and the New Mexico Department of Game and Fish. Species experts from New Mexico and Colorado participated as technical experts in the SSA. Experts from these agencies provided technical review of the draft SSA Report.

Colorado Parks and Wildlife and the New Mexico Department of Game and Fish are signatories of the Conservation Agreement. These agencies have been active in promoting the conservation of the species through monitoring, data compilation and management, restoration of populations, habitat restoration, management of nonnative species, salvage operations, and public outreach, which is outlined in the Conservation Strategy (RGCT Conservation Team 2024, pp. 18–19).

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