

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

**SCIENTIFIC NAME:** *Pseudemys gorzugi*

**COMMON NAME(S):** Rio Grande cooter (also known as the Western river cooter)

**LEAD REGION:** Arkansas-Rio Grande-Texas-Gulf Region – Interior Region 6 (FWS Legacy Region 2 – Southwest Region)

**DATE INFORMATION CURRENT AS OF:** August 2021

**STATUS/ACTION**

**X** Species Assessment – determined either we do not have sufficient information on threats or the information on the threats does not support a proposal to list the species and, therefore, it was not elevated to Candidate status

Listed species petitioned for uplisting for which we have made a warranted-but-precluded finding or uplisting (this is part of the annual resubmitted petition finding)

Candidate that received funding for a proposed listing determination; assessment not updated

New Candidate

Continuing Candidate

Listing Priority Number Change

Former LPN:

New LPN:

**N/A** Candidate Removal; Former LPN:

(A) Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of Candidate status

(U) Taxon 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

(F) Range is no longer a U.S. territory

(I) Insufficient information exists on taxonomy, or biological vulnerability and threats, to support listing

- (M) Taxon mistakenly included in past notice of review
- (N) Taxon does not meet the Act's definition of "species"
- (X) Taxon believed to be extinct

Date when the species first became a Candidate (as currently defined): N/A

**Petition Information**

Non-petitioned

Petitioned; Date petition received: July 11, 2012

90-day substantial finding Federal Register publication date: July 1, 2015 (80 FR 37568)

12-month warranted-but-precluded finding Federal Register publication date: N/A

**FOR PETITIONED CANDIDATE SPECIES**

- a. Is listing warranted (if yes, see summary of threats below)? N/A
- b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? N/A
- c. Why is listing precluded? N/A

**PREVIOUS FEDERAL ACTIONS**

On July 11, 2012, the U.S. Fish and Wildlife Service (Service) received a petition to list 53 amphibians and reptiles, including the Rio Grande cooter, as a threatened or endangered species under the Endangered Species Act (Act) and to designate critical habitat (Adkins Giese *et al.* 2012, pp. 4, 123–127). On July 1, 2015, the Service published a substantial 90-day finding that stated the petition presented substantial scientific or commercial information indicating that listing may be warranted for 21 species, including the Rio Grande cooter (80 FR 37568).

**ANIMAL/PLANT GROUP AND FAMILY**

Reptiles; Emydidae (terrapins, pond turtles, marsh turtles)

**HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE**

United States (Texas and New Mexico) and Mexico (Coahuila, Nuevo León, and Tamaulipas).

**CURRENT STATES/TERRITORIES/COUNTRIES OF OCCURRENCE**

United States (Texas and New Mexico) and Mexico (Coahuila, Nuevo León, and Tamaulipas).

## LAND OWNERSHIP

The Rio Grande cooter occurs within the Devils River, Pecos River, Rio Grande, Río Salado, and Río San Juan basins within the Rio Grande/Río Bravo watershed of the United States and Mexico. Land ownership within the range of Rio Grande cooter is a mix of Federal, State, and local government, ejido (collectively-owned agricultural cooperative lands in Mexico), Tribal, and private lands. The predominant form of land ownership is private.

## LEAD REGION CONTACT

Susan Oetker, Classification Branch Chief, (404) 679-7050, Susan\_Oetker@fws.gov

## LEAD FIELD OFFICE CONTACT

Maritza Mallek, Fish and Wildlife Biologist, (512) 490-0057, Maritza\_Mallek@fws.gov

## BIOLOGICAL INFORMATION

The *Species Status Assessment (SSA) Report for the Rio Grande cooter (Pseudemys gorzugi) – June 2021, Version 1.0* (SSA report) is a summary of the information assembled and reviewed by the Service and it incorporates the best scientific and commercial information available for this species.

The SSA report documents the results of our comprehensive biological review of the best scientific and commercial data regarding the status of the species, including an assessment of the potential threats to the species. The SSA report does not represent a decision by the Service on whether the species should be proposed for listing as an endangered or threatened 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 following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at Docket **FWS-RX-ES-202X-XXXX** on <http://www.regulations.gov>.

### Species Description

The Rio Grande cooter is a medium-to-large freshwater turtle, with female adults ranging in size from 160–370 millimeters (mm) (6.3–14.6 inches [in]), and males ranging from 100–285 mm (3.9–11.2 in). The carapace is an elongate oval with a serrated rear margin and an intricate pattern of black and yellow curvilinear lines on a green carapace. The head, neck, legs, and tail are dark brown to black with yellow stripes. Many individuals have red coloring on the margins of the carapace, and the yellow stripes may grade into red on the feet and tail. The species is sexually dimorphic; females are larger, while males have thicker and longer tails and long,

straight foreclaws (Degenhardt *et al.* 1996, pp. 102–103; Bartlett and Bartlett 2013, pp. 63–64; Legler and Vogt 2013a, pp. 242–244; Hibbitts and Hibbitts 2016, pp. 135–136).

### Taxonomy

Rio Grande cooter was elevated to a full species (*Pseudemys gorzugi*) in 1990 (Ernst 1990, pp. 461.1–461.2). Previously, it was considered a subspecies of river cooter with no common name (*P. concinna gorzugi*) (Ward 1984, pp. 29–43). The type specimen was collected in 1952 from the Río San Diego near Jiménez, Coahuila, Mexico (Ward 1984, p. 29). For a more detailed taxonomic discussion, please refer to the SSA report (U.S. Fish and Wildlife Service 2021, pp. 14–16).

### Habitat/Life History

As a mostly aquatic species, water quality and quantity are central to Rio Grande cooter habitat needs; however, these needs vary somewhat by life stage (Figure 1). Hatchlings, juveniles, and adults all require water of adequate quality and quantity to support feeding, growth, survival, breeding, and thermoregulation (Table 1). Contaminants or other harmful constituents in water must be absent or below thresholds that cause acute or chronic toxicity to Rio Grande cooter or resources upon which they rely (U.S. Fish and Wildlife Service 2021, pp. 19–23, 60–62). In general, Rio Grande cooter are found in perennial rivers and streams and any associated spring pools, and occasionally found in intermittent streams (U.S. Fish and Wildlife Service 2021, pp. 24–53). Additionally, the upland habitat must be of sufficient quality to allow for nesting and egg development (U.S. Fish and Wildlife Service 2021, pp. 17–21). Although exact nesting habitat requirements are unknown, Rio Grande cooter are thought to nest in terrestrial riparian areas adjacent to aquatic habitats (U.S. Fish and Wildlife Service 2021, pp. 17–21). Adult females require upland habitats with soil loose enough to dig a nest in areas near water where eggs will be adequately thermoregulated and safe from inundation, predation, or other disturbances during incubation (U.S. Fish and Wildlife Service 2021, pp. 17–21).

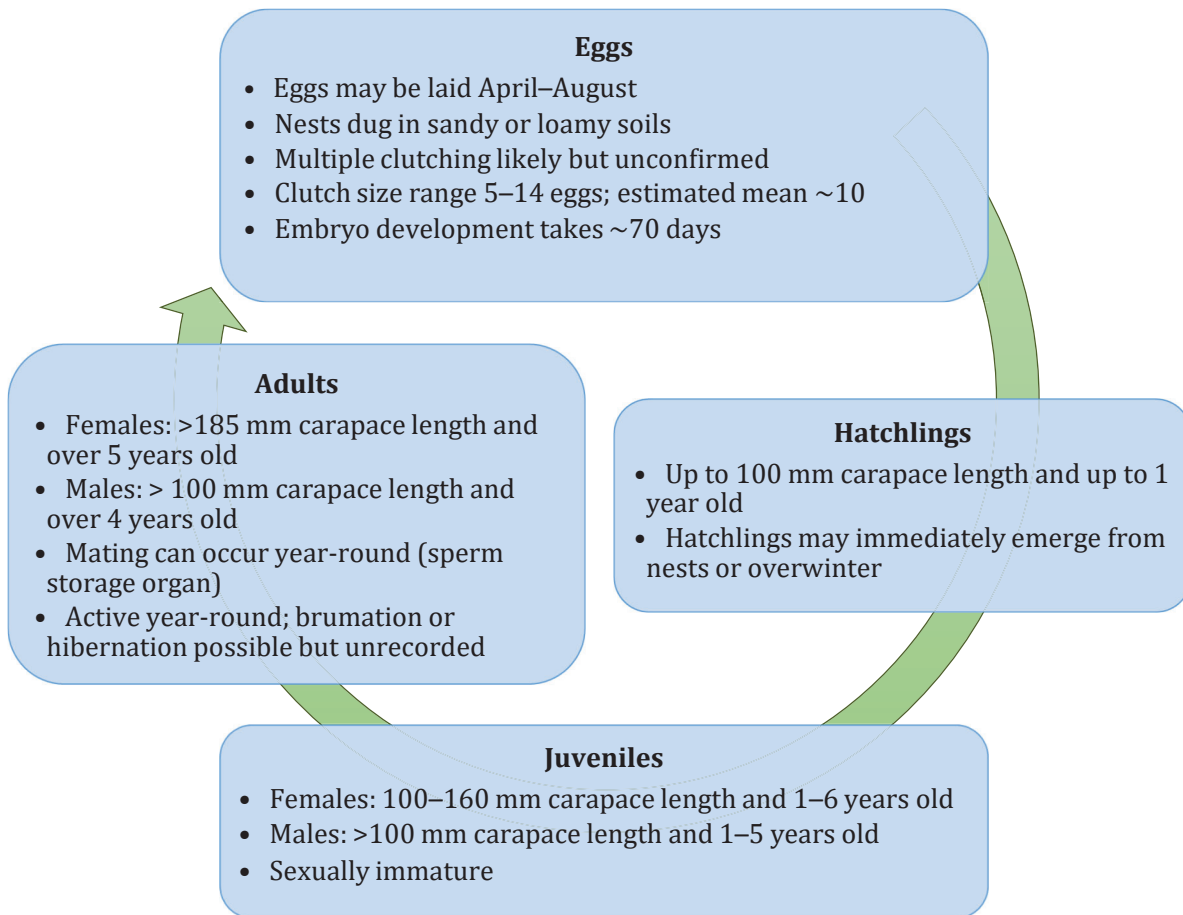


Figure 1. Rio Grande cooter life cycle diagram for the adult, juvenile, hatchling, and egg life stages. The information in this figure uses data from Rio Grande cooter studies where available; otherwise, we make inferences using information from closely related species or similarly sized freshwater turtles (U.S. Fish and Wildlife Service 2021, p. 16–21).

Table 1. Summary of individual needs by life stage (eggs, hatchling, juvenile, and adult). The resource function identified in brackets identifies whether the resource is needed for Breeding (B), Feeding (F), Dispersal or Migration (DM), Sheltering (S), or Thermoregulation (T).

Life Stage	Resources and/or circumstances needed for individuals to complete each life stage [Resource Function]	References
<b>egg</b>	<ol style="list-style-type: none"> <li>1) Approximately 70 days without inundation or predation [S]</li> <li>2) Nest cavity remains within temperature range and humidity conducive to embryo development [S]</li> </ol>	<ol style="list-style-type: none"> <li>1) (Degenhardt <i>et al.</i> 1996, p. 103; Ernst and Lovich 2009, p. 379; Pierce <i>et al.</i> 2016, p. 100.8)</li> <li>2) (Painter 1993, pp. 3–4; Degenhardt <i>et al.</i> 1996, p. 103; Legler and Vogt 2013a, p. 245; Pierce <i>et al.</i> 2016, p. 100.7)</li> </ol>
<b>hatchling</b>	<ol style="list-style-type: none"> <li>1) Loose enough soil to escape from the nest [DM]</li> <li>2) Distance from nest to water within limits of hatchling mobility that reduces vulnerability to predation while in transit [DM]</li> <li>3) If overwintering, nest cavity must persist for 4-8 months without inundation or predation, and remain within the temperature range conducive to overwintering success [S]</li> </ol>	<ol style="list-style-type: none"> <li>1) (NMDGF 1988, p. 2; Painter 1993, pp. 3–4)</li> <li>2) (Gibbons 1990, p. 10; Gibbons <i>et al.</i> 1990, p. 202; Ernst and Lovich 2009, p. 379)</li> <li>3) (Gibbons 1990, p. 10; Painter 1993, pp. 3–4; Degenhardt <i>et al.</i> 1996, p. 103; Ernst and Lovich 2009, p. 379; Legler and Vogt 2013a, p. 245; Gibbons 2013, pp. 204–209; Pierce <i>et al.</i> 2016, pp. 100.7-100.8)</li> </ol>
<b>hatchling, juvenile</b>	<ol style="list-style-type: none"> <li>1) Cover from predators in the water, such as crevices and aquatic vegetation [S]</li> </ol>	<ol style="list-style-type: none"> <li>1) (Congdon and Gibbons 1990, p. 52; Gibbons 1990, p. 10; Gibbons <i>et al.</i> 1990, p. 202; Ernst and Lovich 2009, p. 379; Pierce <i>et al.</i> 2016, p. 100.8)</li> </ol>
<b>hatchling, juvenile, adult</b>	<ol style="list-style-type: none"> <li>1) Access to food resources. Plant <i>and</i> animal availability a plus. Transition from more omnivorous to more herbivorous throughout life. [F]</li> <li>2) Water present at adequate depth for submergence, movement, and foraging. [S, T, DM, F]</li> <li>3) Water quality is sufficient to meet life history needs, such as appropriate basic water chemistry (e.g., temperature) and contaminants are absent or below levels of concern [S, F, T]</li> <li>4) Access to safe basking habitat [T]</li> <li>5) Access to refugia during low flow, low water quality, or high temp events [S, T, DM]</li> </ol>	<ol style="list-style-type: none"> <li>1) (Gibbons <i>et al.</i> 1990, p. 202; Painter 1993, p. 2; Degenhardt <i>et al.</i> 1996, p. 104; Forstner <i>et al.</i> 2004, pp. 26, 36; Pierce <i>et al.</i> 2016, pp. 100.4-100.6; Letter <i>et al.</i> 2019, p. 206)</li> <li>2) (Degenhardt <i>et al.</i> 1996, p. 103; Pierce <i>et al.</i> 2016, pp. 100.5-100.6; Seidel and Ernst 2017, pp. 68–69)</li> <li>3) (Ward 1984, p. 32; Pierce <i>et al.</i> 2016, pp. 100.7-100.8)</li> <li>4) (Degenhardt <i>et al.</i> 1996, p. 103; Forstner <i>et al.</i> 2004, pp. 14–15, 28, 59; Ernst and Lovich 2009, p. 379; Pierce <i>et al.</i> 2016, p. 100.6; Mali <i>et al.</i> 2018b, p. 10; Suriyamongkol and Mali 2019a, pp. 1–3)</li> <li>5) (Gibbons 1990, p. 10; Gibbons <i>et al.</i> 1990, pp. 202, 213; Check and Taylor 2016, pp. 345–348; Mali <i>et al.</i> 2018b, p. 10)</li> </ol>
<b>adult</b>	<ol style="list-style-type: none"> <li>1) Cover from predators in the water, such as deep pools, aquatic vegetation [S]</li> <li>2) Periodic access to mates [B, DM]</li> <li>3) Females need access to nesting locations that meet sheltering needs of eggs and hatchlings [B, DM]</li> </ol>	<ol style="list-style-type: none"> <li>1) (Gibbons <i>et al.</i> 1990, p. 202; Degenhardt <i>et al.</i> 1996, p. 103; Ernst and Lovich 2009, p. 379; Pierce <i>et al.</i> 2016, p. 100.8)</li> <li>2) (Gibbons 1990, p. 10; Gibbons <i>et al.</i> 1990, p. 202; Pearse 2001, entire; Vitt and Caldwell 2014, p. 123)</li> <li>3) (NMDGF 1988, p. 2; Gibbons <i>et al.</i> 1990, pp. 202, 207; Ernst and Lovich 2009, p. 379)</li> </ol>

### Range/Distribution

Rio Grande cooter inhabit portions of the Rio Grande/Río Bravo watershed of the U.S. and Mexico (Figure 2). Specifically, they have been found in the Pecos River basin of New Mexico and Texas, the Devils River basin of Texas, the Rio Grande basin of Texas (below the Big Bend region), Coahuila, Nuevo León, and Tamaulipas, the Río Salado basin of Coahuila, Nuevo León, and Tamaulipas, and the Río San Juan basin of Coahuila, Nuevo León, and Tamaulipas (U.S. Fish and Wildlife Service 2021, pp. 24–53). During both the historical and current periods (pre- and post-1990), Rio Grande cooter have been found in all five of these major river basins. In each of these basins, the current presence and abundance of Rio Grande cooter is patchily distributed, likely due to variation in habitat conditions (in terms of both water quantity and water quality) (Degenhardt et al. 1996, p. 103; Legler and Vogt 2013a, p. 244; Hibbitts and Hibbitts 2016, p. 137; Bogolin 2020, pp. 121–132).

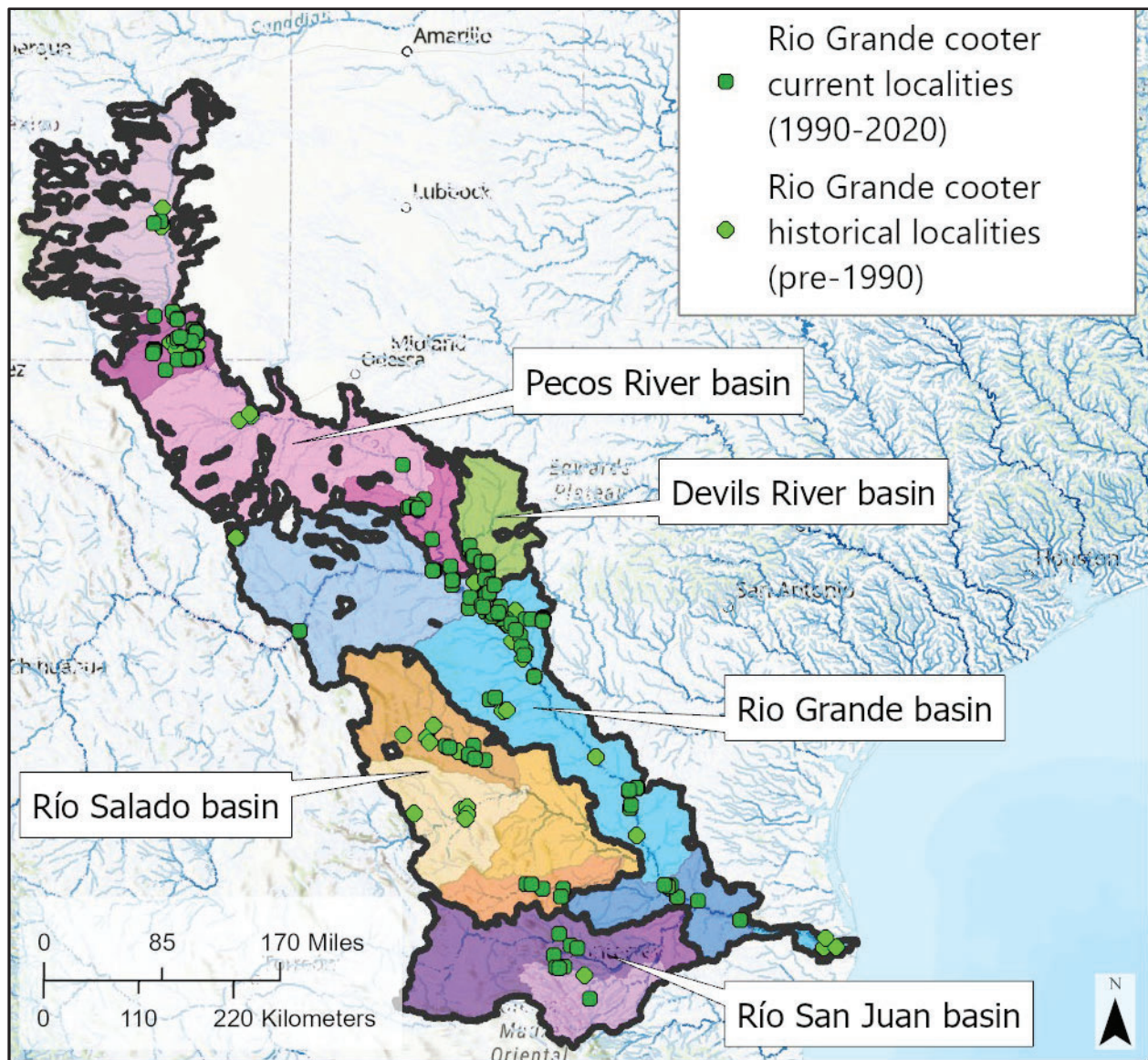


Figure 2. Historical and current range of Rio Grande cooter within the Rio Grande watershed. River basins have thick black boundaries. Population analysis units within each river basin share a color family (pink, green, blue, orange, or purple). Light green diamonds represent historical observations. Dark green squares represent recent observations. Within the river basins, Rio Grande cooter habitat includes spring pools, streams, rivers, and adjacent riparian areas.

#### Population Estimates/Status

There are no known historical surveys for Rio Grande cooter, and observations from before 1990 are few, opportunistic, and considered presence-only data (U.S. Fish and Wildlife Service 2021, pp. 24, 27, 35–53). Consequently, there are also no identified historical biological populations or abundance estimates. Since 1990, surveys specifically targeting Rio Grande cooter have been

completed in most of the range within the United States (U.S. Fish and Wildlife Service 2021, pp. 24–31). The usable information from reports associated with this fieldwork primarily consists of documented locations where Rio Grande cooter were observed. Limited data are available on abundance or population size, density, sex ratios, or age structures for small areas within a few population analysis units (e.g., Sirsi et al. 2017, p. 10; Mali et al. 2018a, p. 8). We lack long-term trend data for persistence or abundance of Rio Grande cooter within any of the population analysis units.

For Rio Grande cooter, the best available information on populations is the set of presence-only observations that we compiled from museum records, citizen science databases (e.g., iNaturalist, GBIF), grant and contract reports, field guides, journal articles, and personal communications reporting observations of the species. Using these records, we delineated 16 population analysis units based on watersheds and used dams and associated reservoirs as boundaries. Although population trends are difficult to measure given the available data, we did not observe a marked reduction in the distribution of the Rio Grande cooter between the historical and current time periods (Figure 2).

### Summary of Biological Information

Rio Grande cooter is a freshwater turtle that lives in the spring pools, streams, and rivers found in the larger Rio Grande/Río Bravo watershed below the Big Bend region of Texas. Its range spans the U.S. states of New Mexico and Texas, and the Mexican states of Coahuila, Nuevo León, and Tamaulipas. Habitat for this species is found in these freshwater systems and the riparian areas adjacent to them. Based on the best available information, the current distribution of the species is similar to its historical distribution. Although estimates of population abundance or trends are largely absent throughout the range, we used available presence-only occurrence data and information on habitat to inform our assessment of population status.

### **DISTINCT POPULATION SEGMENT (DPS)**

N/A

### **THREATS**

We define “threat” as any action or condition that is known to or is reasonably likely to negatively affect individuals of a species. This includes those 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 mere identification of “threats” is not sufficient to compel a finding that listing is warranted. Describing the negative effects of the action or condition (i.e., “threats”) in light of the exposure, timing, and scale at the individual, population, and species levels provides a clear basis upon which to make our determination. In determining whether a species meets the definition of an “endangered species” or a “threatened species,” we have considered the factors under section 4(a)(1) and assessed the cumulative effect that the threats

identified within the factors—as ameliorated or exacerbated by any existing regulatory mechanisms or conservation efforts—will have on the species now and in the foreseeable future.

The following sections include summaries of the primary threats acting on Rio Grande cooter or its habitat. Our evaluation of each threat and its expected effects on the species also takes into consideration existing regulatory mechanisms or conservation efforts. We considered stressors that impact water quality (i.e., pollution) and water quantity (i.e., modified hydrology, groundwater pumping, drought), including ongoing and future influence of climate change. We also considered the impacts from direct mortality and existing conservation efforts. For a full description of the threats and the species’ response to those threats, please see the SSA report (U.S. Fish and Wildlife Service 2021, entire).

## Influences on Viability

### *Modified Hydrology*

Water development, including the construction of retention and diversion dams, managed dam releases, diversion of surface water, and groundwater pumping, has transformed most of the habitat within the range of Rio Grande cooter (Edwards and Contreras-Balderas 1991, entire; Contreras-Balderas and Lozano-Vilano 1994, entire; Schmidt et al. 2003, entire; Hoagstrom 2003, entire; US Army Corps of Engineers 2008, entire; Hoagstrom et al. 2008, entire; Dean and Schmidt 2011, entire; Hogan 2013, entire; Garrett and Edwards 2014, entire; Miyazono et al. 2015, entire; González Escorcía 2016, entire; Cheek and Taylor 2016, entire). Water development has occurred for flood control, agricultural use, human consumption, and mining and industrial use. Unnaturally low flows are a consequence of water development activities such as dams, surface water management, surface water diversion, and groundwater pumping. Low flows reduce the total amount of available aquatic habitat and alter that habitat’s extent and structure (Rolls *et al.* 2012, p. 1167). Habitat alterations from low flows include the loss of surface and groundwater, altered flow regimes, altered river morphology, altered pathways for water movement, alteration of riparian and riverine vegetation and soils or substratum, and the conversion of free-flowing habitat to stillwater habitat (Moll and Moll 2004, p. 248; Rolls *et al.* 2012, pp. 1167–1174)

The effects of water development are a potential stressor impacting Rio Grande cooter across all life stages (U.S. Fish and Wildlife Service 2021, pp. 54–60). As a mostly aquatic species, Rio Grande cooter individual needs are linked to aquatic habitat and the associated riparian uplands. The alteration of flow regimes and reduced water quantity and quality impact Rio Grande cooter at the individual, population, and species levels. The habitat deterioration or destruction associated with these stressors negatively impacts the development and maintenance of breeding, feeding, and sheltering habitat. The impacts to Rio Grande cooter individuals from modified hydrology include increased competition for high quality food, space, and nesting habitat, reducing fitness and increasing risk of mortality; increased concentrations of toxicants in the soil and water, which may cause mortality or reduced vigor; stranding due to low flows, causing

them to become weak or die; increased vulnerability to predation, particularly for juveniles and hatchlings; the loss of or reduced access to nesting habitat, potentially reducing nesting frequency; and nest failure from inundation or desiccation (Hopkins 2000, entire; Bunn and Arthington 2002, p. 498–500; Moll and Moll 2004, pp. 24, 54, 248, 253–255; Washington 2008, p. 12; Rolls *et al.* 2012, pp. 1167–1174). The impacts to Rio Grande cooter populations from modified hydrology include reduced abundance due to less supporting habitat and direct mortality; reduced recruitment and lower reproductive rates due to less available nesting habitat and increased nest failure; loss of population connectivity, lowering genetic exchange and reducing effective population size, and; extirpation or displacement due to elimination or deterioration of suitable habitat (Bunn and Arthington 2002, pp. 497-498; Dean and Schmidt 2011, p. 3402; Edwards *et al.* 2002, pp. 124-126). Therefore, the impacts from water development ultimately influence abundance and survival of the species at all life stages, recruitment, and dispersal.

### *Pollution*

Changes to water quality are common across the landscape due to anthropogenic activities that can introduce a variety of contaminants into the environment, including industry, agriculture, construction, urban stormwater, municipal wastewater, spills or leaks of hazardous materials, and other sources (U.S. Fish and Wildlife Service 2021, pp. 60–64). The most commonly reported water quality concerns in the Rio Grande cooter’s range are contamination and pollution from municipal and industrial wastewater, irrigation return flows, and activities associated with oil and gas development (Campbell 1958, p. 4; Boyer 1986, pp. 308–311; Ashworth 1990, pp. 30–32; Contreras-Balderas and Lozano-Vilano 1994, p. 383; International Boundary & Water Commission 1994, p. 1; Hoagstrom 2003, p. 94, 2009, pp. 35–36; Návar Cháidez 2011, pp. 133–142; Hogan 2013, pp. 10–12; Arm *et al.* 2014, pp. 26–29; Onsurez 2017; Eaton 2017; Grijalva 2019, entire; Hedden 2020a). Impacts to Rio Grande cooter habitat as a result of pollution include elevated levels of salinity, increased concentrations of contaminants, and contaminated soil in nesting habitats.

Water quality is an integral component of habitats that support aquatic species, with all or some life stages dependent on the presence of water of sufficient quantity and quality to support survival, growth, and reproduction. Rio Grande cooter tolerance for specific water quality parameters (e.g., temperature, salinity) or xenobiotics (i.e., environmental pollutants) has not been explicitly tested; thus, its vulnerability to, and hence the level of threat from, various contaminants is unknown. Other freshwater turtle species respond to increases in water salinity by moving to fresher water, reducing feeding, or reducing drinking (Agha *et al.* 2018, p. 1643). The latter two responses can result in poor health or death due to starvation or dehydration (Cheek and Taylor 2016, pp. 347–348; Agha *et al.* 2018, p. 1643). Exposure to contaminants including heavy metals and pesticides is known to cause lethal and sublethal harm to reptiles such as increased metabolic rates, disrupted reproduction, decreased swimming performance, sex reversal, and impaired righting ability (Yu *et al.* 2013, pp. 555–556). Impacts to individuals can lead to population-level effects if there is increased mortality among individuals or if the sexual

structure of the population is significantly altered (Yu *et al.* 2013, pp. 555–556).

### *Climate Change*

The main impact of climate change on Rio Grande cooter has been, and is likely to continue to be, in the form of increasing pressure on the surface and ground water resources that provide or support habitat for the species (Shafer *et al.* 2014, pp. 443–445; Runkle *et al.* 2017, pp. 2–4; Kloesel *et al.* 2018, pp. 995–996, 1001–1004; Cheng *et al.* 2019, pp. 4437–4440). Impacts from reduced water availability due to climate change are not meaningfully different from those due to altered hydrology; see above sections or the SSA Report for more information. Observations from other turtle species suggest that higher future average temperatures could lead to sex ratios in egg clutches skewed toward females (Valenzuela *et al.* 2019, entire). However, we determined that there is great uncertainty in precisely how and to what extent this would play out in Rio Grande cooter populations and, accordingly, did not attempt to incorporate this into our analysis (Valenzuela *et al.* 2019, entire).

### *Direct Mortality*

Predation, shooting, fish hook ingestion, bycatch, and collection are all mechanisms that can reduce the abundance of Rio Grande cooter populations, and have the potential to impact eggs, hatchlings, juveniles, and adults. Removing adults from a population of turtles has negative effects on recruitment, population growth, and species viability (Ernst *et al.* 1994, p. xxxii; Moll and Moll 2004, pp. 175, 275; Ceballos and Fitzgerald 2004, p. 881). Population resiliency is decreased because population abundance and fecundity decrease (Moll and Moll 2004, pp. 4, 175, 229, 316–319). The life history strategy of Rio Grande cooter depends on long-lived adults who reproduce many times; the loss of adults to this stressor impairs that life history strategy (Reed and Gibbons 2003, pp. 16–19; Moll and Moll 2004, p. 4; Ceballos and Fitzgerald 2004, p. 881). Where enough individuals are removed from a population, population-level effects may result (Fitzgerald *et al.* 2004, pp. 4, 71; Ceballos and Fitzgerald 2004, p. 881; Steen and Robinson 2017, pp. 1334–1337).

The impact from these actions on Rio Grande cooter survival or abundance has not been systematically studied or quantified, nor are estimates of such impacts available for the species. We did not find any evidence of localized extirpations linked to these activities. In our analysis, we did not observe any potential populations where any of these stressors impacted individuals to a sufficient degree that population-level effects were discernable. In addition, we did not find evidence that Rio Grande cooter was threatened by any of these mechanisms in one part of its range compared to another.

### Cumulative Effects

By using the SSA framework to guide our analysis of the scientific information, as documented in the SSA report, we analyzed not only individual effects on the Rio Grande cooter, but also their potential cumulative effects. To assess the current and future condition of the Rio Grande

cooter, we undertook an iterative analysis that encompassed and incorporated the threats individually, and then accumulated and evaluated the effects of all the 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.

### Summary of Threats

We considered influences on the viability of Rio Grande cooter habitat, required resources, individuals, or populations. Specifically, the most important stressors impacting the species included modified hydrology, pollution, ongoing and future climate change impacts, and direct mortality. Increases in these stressors resulted in decreases in water quality and water quantity that have impacted, are impacting, and will continue to impact Rio Grande cooter at the individual, population, and species levels. Despite the ongoing, and in some cases, increasing impacts from these stressors, they are not likely to result in extirpation of the Rio Grande cooter either currently or in the foreseeable future.

### **CONSERVATION MEASURES PLANNED OR IMPLEMENTED**

Within the range of Rio Grande cooter, some portions of the upland, riparian, and aquatic habitat are protected from development and managed for conservation. These lands may be privately or publicly held. We are not aware of any lands managed specifically for the benefit of Rio Grande cooter, but anticipate that benefits to the Rio Grande cooter may accrue for areas where the stressors described above are less likely to occur. For example, protected areas will presumably have fewer groundwater pumping operations and fewer activities associated with oil and gas development, and some protected areas may experience less human pressure. Fewer stresses on Rio Grande cooter abundance, reproduction, and dispersal would have positive population-level effects. In New Mexico, there are two conservation agreements—the Carlsbad Water Project Biological Opinion and the Texas Hornshell Candidate Conservation Agreement (CCA) and Candidate Conservation Agreements with Assurances (CCAA)—that are focused on maintaining water quality and instream flow within Rio Grande cooter habitat in New Mexico (U.S. Fish and Wildlife Service 2017, entire; U.S. Fish and Wildlife Service et al. 2017, entire; U.S. Fish and Wildlife Service and New Mexico Commissioner of Public Lands 2017, entire; U.S. Fish and Wildlife Service and The Center of Excellence (CEHMM) 2017, entire). Within the CCA/A specifically, the Rio Grande cooter is included as a covered species. We reviewed conservation measures and regulatory mechanisms and their effect on the identified risk factors as well as the status of the species; for further discussion, see the SSA Report (U.S. Fish and Wildlife Service 2021, pp. 65–66, 69–71).

### **CURRENT CONDITIONS**

To assess the species' viability, we used the conservation biology principles of resiliency,

redundancy, and representation (collectively the “3 Rs”). Specifically, we identified the species’ ecological requirements for survival and reproduction at the individual, population, and species levels, and described the risk factors that influence Rio Grande cooter viability. To sustain populations over time, a species must have a sufficient number and distribution of healthy populations to withstand:

- 1) annual variation in its environment (Resiliency),
- 2) catastrophes (Redundancy), and
- 3) novel changes in its biological and physical environment (Representation).

To evaluate the current resiliency of Rio Grande cooter, we selected two demographic factors (occurrence and evidence of recruitment) and three habitat factors (occurrence complexity, water quantity, and water quality). We developed a basis for assigning a risk category for each metric at the population analysis unit level based on the available data and our understanding of Rio Grande cooter ecology. A full description of the resiliency metrics and risk categories for each metric can be found in the SSA report (U.S. Fish and Wildlife Service 2021, pp. 72–81).

We subdivided the range of Rio Grande cooter into 16 population analysis units based on level-12 watersheds (USGS HUCs in the United States, and HydroBASINS polygons in Mexico; see U.S. Fish and Wildlife Service 2021, p. 25), and used dams and associated reservoirs as boundaries for these units. While Rio Grande cooter may be able to negotiate around the dams and through reservoirs, they are more likely to interbreed with individuals within the same population analysis units and be subject to similar management and stressors within a unit; therefore, population analysis units may approximate biological populations. Of the 16 population analysis units evaluated across the Rio Grande cooter’s range, we determined that three of these units have a current overall condition of Low Risk, seven have a current overall condition of Moderate Risk, and six have a current overall condition of High Risk in our current resiliency analysis (Table 2). Within the population analysis units currently categorized as High Risk, meaning these populations have a limited ability to respond to stochastic events, there is no evidence that self-sustaining populations are present. Overall, given the current conditions of the population analysis units for the Rio Grande cooter, the majority of population analysis units have the ability to withstand stochastic events (e.g., disturbance).

Table 2. Current conditions analysis results by river basin and count of population analysis units in each risk category.

River Basin	Number of Low Risk Population Analysis Units	Number of Moderate Risk Population Analysis Units	Number of High Risk Population Analysis Units	Total Number of Population Analysis Units
Pecos River	1	1	2	4
Devils River	1	0	0	1
Rio Grande	1	2	1	4
Río Salado	0	2	2	4
Río San Juan	0	2	1	3
All Basins	3	7	6	16

Redundancy is the ability of a species to withstand catastrophes. Catastrophes are stochastic events that are expected to lead to population collapse regardless of population health and for which adaptation is unlikely (Mangel and Tier 1993, p. 1083). We gauge redundancy by analyzing the number and distribution of populations relative to the timing and intensity of anticipated species-relevant catastrophic events (e.g., severe drought, severe water contamination events, over-collection) that could act on an entire river basin simultaneously. Currently, the Rio Grande cooter has redundancy rangewide and at the river basin level. Within the five river basins where the species historically occurred—save the Devils River basin, which only has a single analysis unit—there are multiple population analysis units considered Low Risk or Moderate Risk (Table 2). Further, none of the major river basins is characterized by entirely High Risk population analysis units. Because Rio Grande cooter currently has redundant populations at multiple scales, there is a lower likelihood of catastrophic events having an impact across the range of the species.

Representation is the ability of Rio Grande cooter to adapt to both near-term and long-term changes in its physical and biological environments. This ability to adapt to new environments—referred to as adaptive capacity—is essential for viability, as all species need to continually adapt to changing environments (Nicotra *et al.* 2015, p. 1269). Rio Grande cooter may adapt to novel changes in their environment by moving to new, suitable environments or by altering their physical or behavioral traits to match the new environmental conditions through either plasticity or genetic change (Nicotra *et al.* 2015, p. 1270; Beever *et al.* 2016, p. 132). We assess representation by examining the breadth of genetic, phenotypic, and ecological diversity found within a species across its range and its ability to disperse and colonize new areas.

Rio Grande cooter exist as a single genetic population throughout their distribution in the United States (Bailey *et al.* 2008, pp. 408–410) and no studies have found evidence for spatial patterns in behavioral, morphological, or life history diversity. Thus, we focused on whether the species exists across a large area with diversity of environmental conditions (e.g., climatic conditions, geology, stream type) and we assumed that the risk of loss of adaptive potential can be minimized by maintaining a broad distribution of the species across its known historical range.

Current representation for Rio Grande cooter is characterized by its occurrence within all five of the historically occupied river basins, and by the fact that the resiliency analysis determined that the Overall Risk for 10 of 16 population analysis units is either Low Risk or Moderate Risk (Figure 3). Because the species is present throughout its known historical range and the majority of population analysis units are classified as moderate to low risk, Rio Grande cooter have some capacity to adapt to changing future conditions.

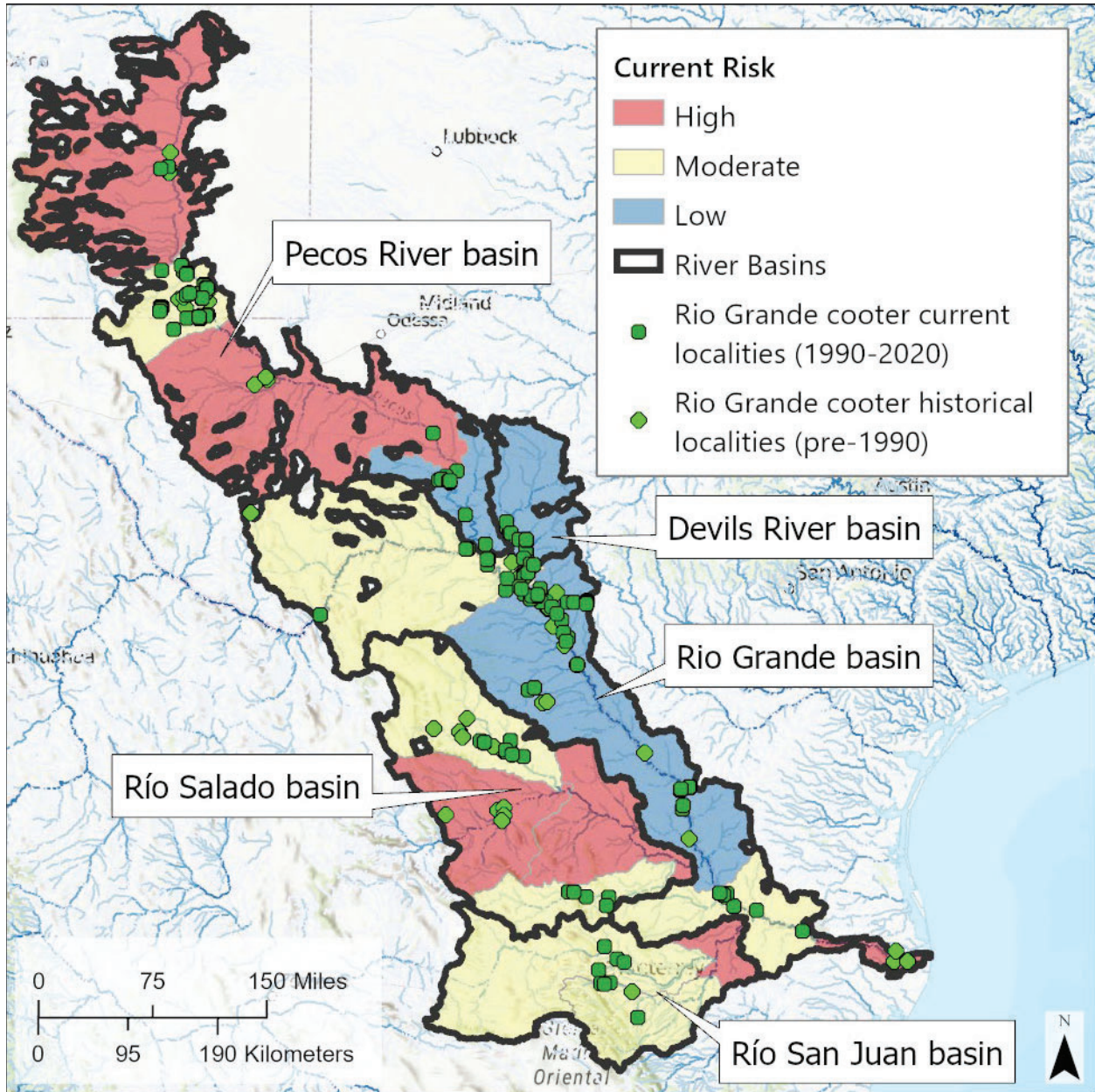


Figure 3. Rio Grande cooter population analysis units colored by current risk category assignment (red for high risk, yellow for moderate risk, and blue for low risk).

## FUTURE CONDITIONS

To project the future viability of the Rio Grande cooter, we constructed future scenarios that considered the potential changes in the magnitude and severity of stressors into the future, and how those stressors may impact the species' habitat and demographic needs. Where appropriate, we considered any existing efforts to conserve the species or its habitat and the likelihood that those efforts would continue. Similar to current condition assessments, we evaluated the species viability in terms of the 3 Rs. We constructed two plausible future scenarios and projected the response of the Rio Grande cooter to the environmental conditions only so far as the threats, and the species response to those threats, are likely. Scenario 1 corresponds to the lower limit of plausible future impacts and Scenario 2 corresponds to the upper limit of plausible impacts, given the best available data.

In Scenario 1, climate change proceeds as projected by the RCP 4.5-associated models. This scenario assumes that the regional water plans in the United States accurately project future water supply and demand through 2060, while current trends in water supply and demand continue in Mexico. The conservation measures associated with CCA/As and BOs in New Mexico are effective at maintaining instream flows and minimizing river and stream intermittency at both timesteps. Within the United States, existing trends in specific conductance continue through 2060 and trends in hazardous materials spills and leaks continue to 2040 and then stabilize through 2060. Within Mexico, current trends in overall water quality continue.

In Scenario 2, climate change proceeds as projected by the RCP 8.5-associated models. The regional water plans in the United States accurately project future water supply and demand through 2060, but underestimate water demand from mining. Current trends in water supply and demand continue in Mexico, with increased water stress in units associated with oil and gas development. The conservation measures associated with CCA/As and BOs in New Mexico fail to maintain instream flows and minimize river and stream intermittency. Within the United States, existing trends in specific conductance continue through 2060 and trends in hazardous materials spills and leaks continue to 2040 and then stabilize through 2060, with increased risks in units with oil and gas development. For population analysis units in Mexico, current trends in overall water quality continue at an elevated level.

Under Scenario 1 at 2060, the overall resiliency of Rio Grande cooter is characterized by having three population analysis units in the Low Risk category, seven in the Moderate Risk category, and six in the High Risk category (Table 3). Overall, our estimates of risk under Scenario 1 remain unchanged from the current risk designations through 2060 despite some projected declines in the condition of the species' habitat. Under Scenario 2 at 2060, the overall resiliency of Rio Grande cooter is characterized by having one population analysis unit in the Low Risk category, eight units in the Moderate Risk category, and seven in the High Risk category (Table 3). Overall, under Scenario 2, risk designations increased for three of the 16 habitat units; the others remained the same as the current conditions (Figure 4 and Table 3). In total, nine of 16 population analysis units are categorized as Low or Moderate Risk. Given the projected future conditions, the majority of populations have the ability to withstand stochastic events. Rio Grande cooter is more vulnerable to extirpation from stochastic events under Scenario 2, and

resiliency is declining, but this vulnerability is still relatively low. Further, we project that the species will continue to have redundancy within the major river basins and across the species' range (Figure 4), and maintain current levels of representation under both scenarios.

Table 3. Overall Risk categories for Rio Grande cooter population analysis units.

Population Analysis Unit	Current	Scenario 1 2040	Scenario 1 2060	Scenario 2 2040	Scenario 2 2060
Pecos River – Sumner Dam to Brantley Dam	High	High	High	High	High
Pecos River – Brantley Dam to Red Bluff Dam	Moderate	Moderate	Moderate	Moderate	Moderate
Pecos River – Red Bluff Dam to Amistad Reservoir, Toyah Segment	High	High	High	High	High
Pecos River – Red Bluff Dam to Amistad Reservoir, Edwards Segment	Low	Low	Low	Low	Moderate
Devils River – headwaters to Amistad Reservoir	Low	Low	Low	Low	Low
Rio Grande – Big Bend to Amistad Dam	Moderate	Moderate	Moderate	Moderate	Moderate
Rio Grande – Amistad Dam to Falcon Dam	Low	Low	Low	Moderate	Moderate
Rio Grande – Falcon Dam to Anzalduas Dam	Moderate	Moderate	Moderate	Moderate	Moderate
Rio Grande – Anzalduas Dam to Mouth	High	High	High	High	High
Río Sabinas – headwaters to Don Martin Reservoir	Moderate	Moderate	Moderate	Moderate	Moderate
Río Salado – headwaters to Don Martín Dam	High	High	High	High	High
Río Sabinas Hidalgo – headwaters to confluence with Río Salado	Moderate	Moderate	Moderate	Moderate	High
Río Salado – Don Martin Dam to Falcon Reservoir	High	High	High	High	High
Río Salinas – headwaters to confluence with Río San Juan	Moderate	Moderate	Moderate	Moderate	Moderate
Río San Juan – headwaters to El Cuchillo Dam	Moderate	Moderate	Moderate	Moderate	Moderate
Río San Juan – El Cuchillo Dam to Marte R Gomez Dam	High	High	High	High	High

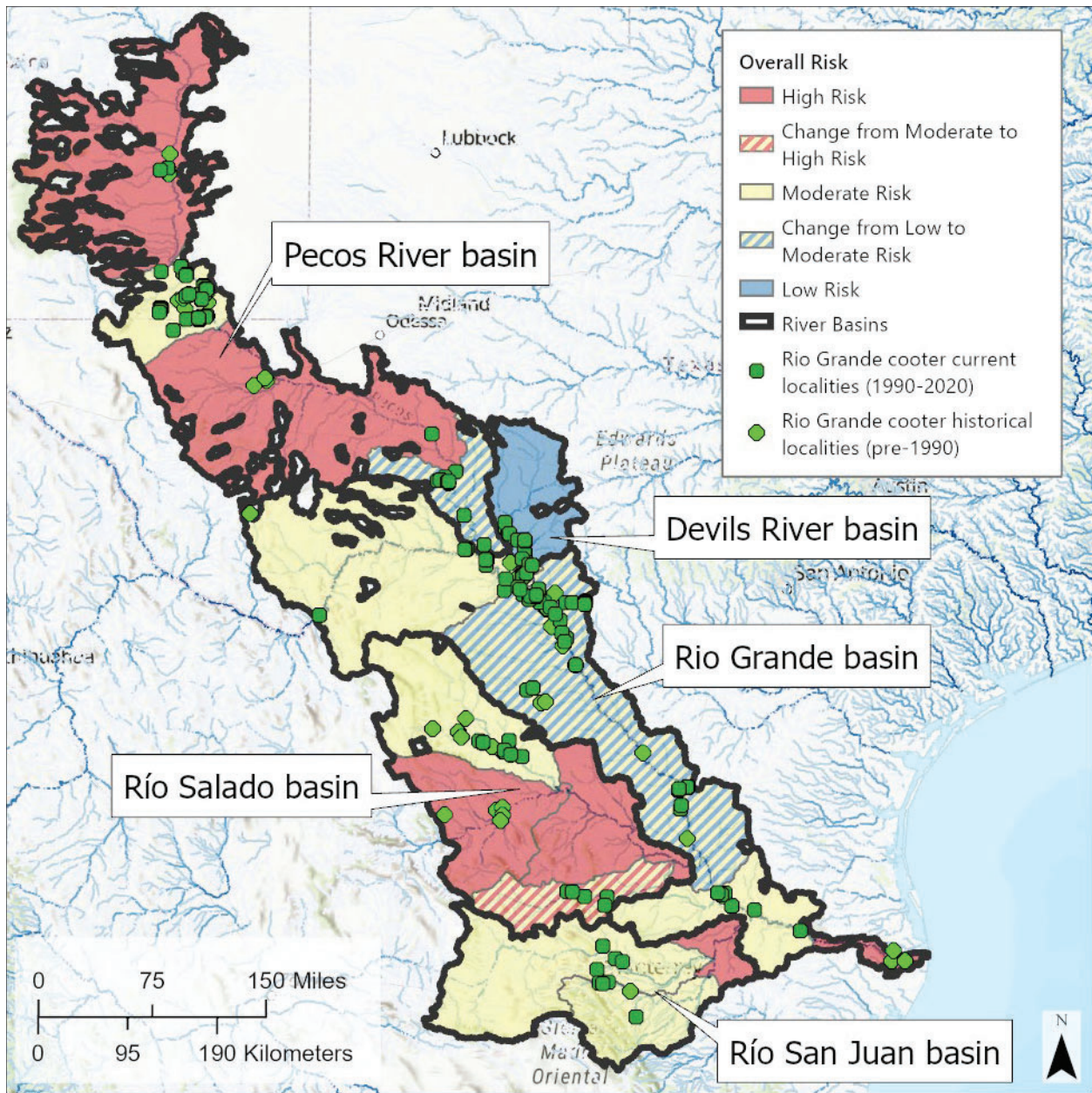


Figure 4. Rio Grande cooter population analysis units colored by risk category assignment for Scenario 2, timestep 2060 (red for High Risk, yellow for Moderate Risk, and blue for Low Risk). Population analysis units with hatching indicate an increase in risk category designation compared to the current conditions.

## FINDING

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 meets the definition of “endangered species” or “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 a species meets the definition of “endangered species” or “threatened species” because of any 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.

To make the determination on whether Rio Grande cooter warrants protection as an endangered or threatened species under the Act, we evaluated the threats using a future scenario analysis in which we predicted the effects of a range of plausible projected future threat scenarios on the species. We first evaluated whether Rio Grande cooter is in danger of extinction throughout its range (an endangered species). Then, we evaluated whether the species is likely to become in danger of extinction in throughout its range within the foreseeable future (a threatened species). Finally, we considered whether Rio Grande cooter is an endangered or threatened species throughout a significant portion of its range. A detailed discussion of the basis for this finding can be found in the Rio Grande cooter’s species status assessment and other supporting documents (U.S. Fish and Wildlife Service 2021, entire).

### *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 determined that the factors affecting Rio Grande cooter and its habitat are modified hydrology (Factor A), pollution (Factor A), ongoing and future impacts of climate change (Factors A and E), and direct mortality (Factors B and E). Furthermore, we considered the existing regulatory mechanisms (Factor D) and conservation measures and their effect on the identified threats and the status of the species. Of these, modified hydrology and pollution, through their associated impacts on water quantity and water quality, are the primary factors currently influencing Rio Grande cooter throughout the range.

We determined that the Rio Grande cooter’s current distribution does not appear to have

substantially changed from its known historical distribution despite existing within an altered system. The Rio Grande cooter has maintained multiple resilient population analysis units (10 of 16 units at Low or Moderate Risk) across all five of the major river basins throughout its known historical range, except the Devils River, which has a single analysis unit at Low Risk. Thus, the stressors affecting Rio Grande cooter and its habitat appear to have a low impact on the species viability. The SSA report describes some of the uncertainties in the species occurrence and response to threats; but, considering the available data and observed conditions, the Rio Grande cooter's current risk of extinction is low. Therefore, we conclude that the Rio Grande cooter is not in danger of extinction throughout all of its range and does not meet the definition of an endangered species.

Under the Act, a threatened species is any species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." 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. The term foreseeable future extends only so far into the future as the Services can reasonably determine that both the future threats and the species' responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. "Reliable" does not mean "certain;" it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions. A key statutory difference between a threatened and an endangered species is the timing of when the relevant threats would begin acting upon a species such that it may be in danger of extinction, either now (endangered species) or in the foreseeable future (threatened species).

In considering the foreseeable future as it relates to the status of the Rio Grande cooter, we considered the relevant risk factors (threats) to the species and whether we could draw reliable predictions about future exposure, timing, and scale of negative effects and the species' response to these effects. We considered whether we could reliably assess the risk posed by the threats to the species, recognizing that our ability to assess risk is limited by the variable quantity and quality of available data about effects to the Rio Grande cooter and its response to those effects.

The SSA's analysis of future scenarios over a 40-year timeframe encompasses the best available information for projected future changes in climate change and its effect on modified hydrology as well as pollution across Rio Grande cooter's range. This 40-year timeframe enabled us to consider the threats/stressors acting on the species and to draw reliable conclusions on the species' response to those factors. Under Scenario 1, the current levels of resiliency, redundancy, and representation are projected to be maintained. Under Scenario 2, decreased resiliency is projected for three of the 16 population analysis units. Despite a decline in condition in some population analysis units, the Rio Grande cooter is projected to maintain its distribution throughout the major river basins and range that it historically occupied, with nine of 16 population analysis units being categorized at Low or Moderate Risk. Considering the projected

changes in water demand and use, pollution, and climate change impacts under both of our future scenarios, we projected that the overall condition of most Rio Grande cooter population analysis units would not change despite some continued decline in the condition of the habitat. After assessing the best available information on the factors affecting the species' threats within our future scenarios and the species' response to those factors, we conclude that the Rio Grande cooter is likely to remain at a sufficiently low risk of extinction such that it is not in danger of extinction, or likely to become in danger of extinction within the foreseeable future, throughout all of its range. Thus, the Rio Grande cooter does not meet the definition of a threatened species under the Act.

*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 cooter 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 species' 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 species' range.

In undertaking this analysis for the Rio Grande cooter, we chose to address the status question first—we consider information pertaining to the geographic distribution of both the species and the threats that the species faces to identify any portions of the range where the species is endangered or threatened.

For Rio Grande cooter, we considered whether any threats are geographically concentrated in any portion of the species' range at a biologically meaningful scale. We examined the following threats: modified hydrology, pollution, and influences associated with climate change. Modified hydrology and pollution are the primary factors influencing the species, with climate change influencing the species through an indirect effect on both groundwater and surface water availability. Although we do not anticipate that decreased conditions as a result of these factors will result in extirpation of the species within population analysis units, there could be decreased fitness and declines in resiliency within a population analysis unit into the foreseeable future due to increased pollution and substantial decreases in flow rates. We identified that these threats could be more of an issue within the Pecos River basin from Brantley Dam downstream to its confluence with Independence Creek where future rates of oil and gas development are projected to be higher. This area includes both the Pecos River – Brantley Dam to Red Bluff Dam and the Pecos River – Red Bluff Dam to Amistad Reservoir, Toyah Segment population analysis units.

Within these units, however, most observations of Rio Grande cooter occur within the Pecos River – Brantley Dam to Red Bluff Dam unit, which currently has moderate resiliency. Although these stressors are projected to increase into the future in this unit, Rio Grande cooter resiliency is not projected to decline within this population analysis unit and the species is projected to maintain multiple population analysis units within the basin into the future. Thus, even in these units where stressors may increase into the future, there is no concentration of threats in these units acting on the Rio Grande cooter at a biologically meaningful scale.

Based on our analysis of whether there are any threats that are geographically concentrated in any portion of the Rio Grande cooter's range, we found no concentration of threats in any portion of the species' range at a biologically meaningful scale. Thus, no portion of the species' range can provide a basis for determining that the species is in danger of extinction now or likely to become so in the foreseeable future in a significant portion of its range. Accordingly, we find the species is not in danger of extinction now or likely to become so in the foreseeable future in any significant portion of its range. This is consistent with the court's holdings in *Desert Survivors v. Department of the Interior*, No. 16-cv-01165-JCS, 2018 WL 4053447 (N.D. Cal. Aug. 24, 2018), and *Center for Biological Diversity v. Jewell*, 248 F. Supp. 3d, 946, 959 (D. Ariz. 2017).

#### *Determination of Status*

Our review of the best available scientific and commercial information indicates that the Rio Grande cooter does not meet the definition of an endangered or threatened species in accordance with sections 3(6) and 3(20) of the Act. Therefore, we find that listing the Rio Grande cooter is not warranted at this time.

### **RECOMMENDED CONSERVATION MEASURES**

We request that you submit any new information concerning the status of, including threats to, the Rio Grande cooter to our Austin Ecological Services Field Office (see **ADDRESSES** section of the Federal Register Notice for the 12-month finding) whenever it becomes available. New information will help us monitor this species and encourages its conservation. If an emergency situation develops for the species, we will act to provide immediate protection.

### **COORDINATION WITH STATE AND TRIBAL PARTNERS**

All States within the range of the species were given the opportunity to provide data, participated in the SSA process and review the draft SSA report. We received information from all States within the range of the species. Biologists from each State provided feedback on our analytical framework in addition to providing review of the SSA report during peer and partner review. The feedback and comments were incorporated into the SSA report.

All Tribal partners with a potential historical or cultural interest, or treaty land overlapping the potential historical range of the Rio Grande cooter were given the opportunity to provide

information related to the species or its habitat and discuss how to incorporate Tribal information into the SSA report. We received responses from three Tribes, none of whom provided comments or information relevant to the SSA.

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**APPROVAL/CONCURRENCE**

Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: **AMY**  
**LUEDERS**  Digitally signed by AMY  
LUEDERS  
Date: 2021.10.06  
08:05:03 -06'00'

Regional Director, U.S. Fish and Wildlife Service

Concur:  Do Not Concur

Director,  
U.S. Fish and Wildlife Service

Director's Remarks: