

## Chapter 3 Affected Environment and Environmental Consequences

### 3.1 Introduction

This section serves as an update of selected resources in the Program area and the associated environmental consequences resulting from the Proposed Action. Resources and related topics included in this chapter include hydrology and hydraulics, water resources and net depletions, fish and wildlife and threatened, endangered and special status species, environmental justice and Indian Trust Assets. Information contained in the 2001 PEA is incorporated by reference and will not be described in this document if the status of the resources has not changed over time. Also, included is a table of environmental consequences of the no action alternative and the various components of the proposed action alternative.

### 3.2 Description of Relevant Affected Resources and the Associated Environmental Consequences

#### 3.2.1 Hydrology and Hydraulics

The Upper Rio Grande Water Operations Model (URGWOM) was originally used to evaluate the impacts on reservoir drawdown and river discharge for SJ-C contractor leases of 5,000 acre-feet, 25,000 acre-feet, and 70,000 acre-feet during dry, average, and wet probability inflows. The modeling methodology and results are described in detail in the 2001 PEA.

In general, the model runs predicted that the addition of supplemental water to the river system reduces the probability that intermittency and drying will occur below San Acacia, and the probability of drying is lowest when the greatest volume (70,000 acre-feet) of supplemental water is added to the system. The model runs showed that there is still some chance that the river could go dry below San Acacia even in wet years with as much as 70,000 acre-feet of leased water available for release. Conversely, the modeling indicated that the river could also maintain continuous flow during a dry runoff year depending on summer monsoonal activity and other hydrologic factors. Overall, the modeling results predict that the Supplemental Water Program can reduce the likelihood of the river going dry in several different types of runoff years.

Historic operations since 2001 have confirmed the river discharge predictions obtained through the initial modeling. River drying is most likely to occur during dry runoff years with poor monsoon seasons, and is least likely to occur during relatively wet runoff years with average to above average summer monsoons. As predicted by the model, the Supplemental Water Program has decreased the occurrence of river intermittency, and decreased the duration of river drying when intermittency has occurred.

The Supplemental Leasing Program likely results in slightly lower storage levels in Heron Reservoir, although there are no impacts on Heron Reservoir that are outside of the operational parameters envisioned during the authorization of the SJ-C Project. All water is leased from the existing annual allocations of SJ-C contractors that make up the 96,200 acre-feet annual firm yield of the SJ-C Project. Since full utilization of Heron's firm yield would result in annual delivery of the full 96,200 acre-feet allocation, reservoir drawdown is no greater than will be experienced once all contractors are taking delivery of their annual allocations. The potential

impact would be the result of a contractor's annual allocation not reverting back to the firm yield pool in Heron if the contractor were not able to obtain storage space in a downstream pool or find another party to lease and utilize their annual allocation.

With the City of Albuquerque's diversion project nearing completion, and the Cities of Santa Fe and Española moving toward direct diversion of their SJ-C allocation, it is likely that the SJ-C Project will soon experience full annual delivery of the 96,200 acre-feet firm yield with or without Reclamation's Supplemental Leasing Program. Some SJ-C contractors that have historically leased some or all of their annual allocations to Reclamation are being approached by other parties interested in negotiating leases for their annual allocations. The Supplemental Leasing Program is not anticipated to have any significant impacts to reservoir levels at El Vado, Abiquiu, or Cochiti reservoirs.

The Supplemental Water Program will provide water managers with an adaptive management tool to help compensate for the complexity and variability of the Rio Grande, allowing them to reduce the likelihood that the river will go dry. Changes in channel morphology and habitat are minimal from additional flow releases. The river transitions back and forth between single thread, homogenous cross sections (lower habitat value) and braided, highly variable cross sections (higher habitat value) downstream from Cochiti Lake. Supplemental water deliveries could potentially decrease the habitat value in the lower quality habitat reaches made up of single thread, homogenous cross sections by increasing flow depths and velocities. However, habitat values will increase in the high habitat reaches characterized by cross sections with braided, more variable flow depths and velocities. The increases in flows primarily act to keep the channel wet but can also wet side channels, backwater, sand bar, and embayment areas considered good silvery minnow habitat. Another concern regarding low flow augmentation is that riparian vegetation will become established on bar and depositional features, thereby narrowing the channel. Wetted areas maintained by the Supplemental Water Program primarily are those that are frequently inundated. Therefore, any vegetation establishing itself in these frequently inundated areas are exposed to sediment scouring and deposition, and it is unlikely that they will become established.

Another potential consequence of water leasing and delivery waivers is the effect on irrigation operations from the change in timing water deliveries. Reclamation will coordinate with the MRGCD and local irrigators to ensure that changes in delivery operations will account for irrigation deliveries. Supplemental Water Program deliveries will assist in providing more flow at Isleta and San Acacia Diversion Dams, which will ultimately allow for both diversion and passing water at the dams.

Therefore, the implementation of the Action Alternative will likely result in less drying of the river and beneficial impacts to the RGSM and the SWWF will occur. Without the implementation of water conservation measures, there may be more groundwater seepage, which would result in less conveyance of water through the various reaches of the Rio Grande system. In addition, with the No Action Alternative, it is extremely likely that the Rio Grande will dry in reaches that provide habitat for the RGSM. No additional water would be available to keep the river continuously wet. However, there would be no reservoir drawdown from delivering water that was previously stored upstream. Also, without pumping from the LFCC, there is a much greater risk of river drying in the San Acacia reach of the river.

### 3.2.2 Water Resources and Net Water Depletions

The Rio Grande Compact, in effect, limits the amount of surface water that can be depleted in the MRG based upon the natural flow of the river measured at the Otowi gage (Rio Grande Compact 1939). In addition, the New Mexico State Engineer has determined the MRG is presently fully appropriated. Therefore, any increase in water use in one sector of use must be offset by a reduction in use in another sector such that senior water rights or the ability of the state of New Mexico to meet its downstream delivery obligations are not impaired. The New Mexico State Water Plan (Office of the State Engineer/Interstate Stream Commission 2003) requires that new projects will not result in increases in net water depletions or that any increases in net water depletions are offset by purchased or leased water rights.

The No Action Alternative would result in no change in water resources or net water depletions as the Program would not be continued. The Proposed Action is not expected to have any impact on net water depletions to native Rio Grande waters. Any impact on native Rio Grande water depletions as a result of the pumping and conveyance of water from the LFCC to the Rio Grande is addressed through Reclamation's permanent pumping permit issued by the New Mexico Office of the State Engineer.

### 3.2.3 Biological Resources

#### Fisheries

The Middle Rio Grande is a high gradient, warm water river. The river is characterized by warm summer water temperature, low velocity, high turbidity, shallow water with large exposed area, and small particle substrate. Eleven of the original 24 native fish species in the Middle Rio Grande have been completely extirpated from the river; two are presumed extinct, and one, the RGSM, is a federal and state listed endangered species. Seventeen nonnative fish species are found in the river and include robust populations of common carp, mosquitofish, and channel catfish. A combination of factors is responsible for the loss of half the native fish community in the Middle Rio Grande, including modification of river discharge patterns, channel dewatering resulting from irrigation, channel incision leading to habitat degradation, the presence of instream barriers to migratory fish movement, entrainment of fish into less suitable habitat in irrigation canals and the LFCC at diversion dams, changes in water quality, and possible competition and predation by nonnative species. Aquatic habitats in reaches of the Rio Grande below San Acacia Diversion Dam are thought to be more representative of native conditions than habitats elsewhere in the Middle Rio Grande, though substantial habitat degradation has occurred. High spring runoff and summer thunderstorms cause large variability in discharge. Part of the river can dry during the summer and the habitat can become fragmented and intermittent. The most severe impact to riverine fish habitat from San Acacia Diversion Dam to the headwaters of Elephant Butte Reservoir is channel dewatering.

The LFCC contains a diverse assemblage of fish species. Recent surveys (2001-2004) of the LFCC have collected seventeen species. A single RGSM was observed in 2001 in the Tiffany reach of the LFCC, and may have moved upstream from the confluence with the Rio Grande. The LFCC is not believed to provide suitable habitat for long-term survival and recruitment of this species. Sampling following the LFCC experimental diversion operations in 2003 and 2004

did not observe any silvery minnows in the upper nine miles of the LFCC. Changes in scheduling experimental operations to avoid the prime spawning appear to have excluded RGSM from entrainment.

The No Action alternative is likely to result in increased river drying and adverse effects to long reaches of the MRG as documented in the 2003 BA and BiOp, which would negatively impact fisheries. By contrast the Proposed Action will result in less drying of river reaches especially south of the San Acacia Dam, which would positively impact the fisheries resource.

### 3.2.4 Threatened, Endangered and Special Status Species

The RGSM and the SWWF are discussed in this subsection and information concerning these species described in the Programmatic Biological Assessment (BA) of the Bureau of Reclamation's Water and River Maintenance Operations, Army Corps of Engineers' Flood Control Operation and Non-Federal Actions on the Middle Rio Grande, New Mexico, March 1, 2003 – February 28, 2013 and the associated 2003 BiOp are incorporated by reference. Updated information from the 2001 PEA concerning these two species is summarized in this subsection as well as the other listed species.

#### Rio Grande Silvery Minnow (*Hybognathus Amarus*)

The RGSM, *Hybognathus amarus*, was listed as an endangered species in 1994 (Fish and Wildlife Service 1994). The RGSM was formerly one of the most widespread and abundant species in the Rio Grande basin in New Mexico, Texas, and Mexico. Currently, the RGSM occupies a 280 km (174 mi) reach of the Rio Grande in New Mexico, from Cochiti Dam to the headwaters of Elephant Butte Reservoir (Bestgen and Platania 1991, Dudley et al. 2005a,b). Critical habitat for this species was designated on February 19, 2003 (Fish and Wildlife Service 2003) for the Rio Grande immediately downstream of Cochiti Dam, to the Power Lines Crossing at the top of the Elephant Butte pool.

The decline of the RGSM has been attributed to dewatering of portions of the Middle Rio Grande below Cochiti Dam through water-regulation activities, the construction of main stem dams, the introduction of non-native competitor/predator species, and degradation of water quality (Fish and Wildlife Service 1999, 2006). Recent studies (Porter and Massong 2004, 2005) have linked successful spawning and recruitment with channel morphology and spring hydrograph. Habitat degradation following the closure of Cochiti Dam and intermittency in populated reaches are major factors in the decline of the RGSM (Platania and Altenbach 1998; Porter and Massong 2004; Dudley et al. 2005a).

The RGSM has been collected in shallow water (<20 cm) characterized by low velocities (<10 cm/sec) over a silt or sandy substrate. These conditions are typical of pools, backwaters, and secondary channels (Dudley and Platania 1997). Spawning occurs in May-June coinciding with spring runoff with individual females producing up to 3,000 semi-buoyant, non-adhesive eggs (Platania, 1995; Platania and Altenbach, 1996). Egg hatching time is temperature dependent but rapid, and generally occurs in 24-48 hours (Platania 2000). Successful hatching and recruitment are correlated with the availability of inundated floodplain habitat. Lower spring flows result in higher numbers of drifting eggs and reduced recruitment. Suitable spawning conditions with high

larval and juvenile survival are key to species survival. Survival of young fish depends on the availability of shallow, low velocity nursery habitats.

Population monitoring from 1999 through 2005 showed declining abundance of silvery minnows associated with years of poor spring runoff and floodplain connectivity. Spike flow releases in 2002 and 2003 resulted in high numbers of drifting eggs and declining populations. Increased spring runoff in 2004 and 2005 inundated floodplain habitat resulting in fewer eggs in the drift, significantly increased recruitment and fall silvery minnow populations (~40-50x from the previous year) based on October fish community surveys (Dudley et al. 2005a, b; Platania and Dudley 2003, 2004, 2005)."

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

The SWWF has been a federally-listed endangered subspecies since 1995 and is also classified by the State of New Mexico as endangered. The SWWF is an obligate riparian species occurring in habitats adjacent to rivers, streams, or other wetlands, characterized by dense growths of willows, seepwillow, arrowweed, saltcedar, or other similar species. This habitat is often associated with a scattered overstory of cottonwood.

In New Mexico, the species has occurred in the Rio Grande, Rio Chama, Zuni, San Francisco, Pecos, and Gila River drainages. Available habitat and overall numbers of Willow Flycatchers have declined statewide. Its decline has been largely attributed to the hydrological and ecological changes which have affected the composition and extent of floodplain riparian vegetation along the Middle Rio Grande; introduction of exotic species, such as saltcedar, which have decreased the availability of dense willow stands and associated habitat; fragmentation of forested breeding habitat; and rapid deforestation in tropical areas. In addition, brood parasitism by Brown-headed Cowbirds has been implicated in their decline.

Surveys and nest monitoring have been conducted since 1994 within the Rio Grande Basin during the May to August breeding season. In recent years, breeding pairs have been found within the Middle Rio Grande above Elephant Butte Reservoir, in the San Marcial and Tiffany areas, and between Española and Velerde, New Mexico. Most breeding territories have been found in young and mid-aged riparian vegetation dominated by dense growths of willow at least 10 feet high. Within these willow patches, nests occasionally have been found on saltcedar plants, especially in older, taller willow patches where an understory of saltcedar provides suitable nesting substrate (Moore and Ahlers 2005, Moore 2005).

Bald Eagle (*Haliaeetus leucocephalus*)

The Bald Eagle is federally- and state-listed as threatened. This species prey mostly on fish and waterfowl and are therefore attracted to waterbodies where there are concentrations of fish and wintering waterfowl. Eagles arrive about mid-November and depart around mid-March. In the Middle Rio Grande, most Bald Eagles use ponds at Bosque del Apache National Wildlife Refuge and the shoreline of Elephant Butte and Caballo reservoirs (R. Doster, pers. comm.). Bald Eagles occasionally use cottonwood trees in the riparian zone for perches and night roosts. The closest known breeding territory to the project area is west of Caballo Reservoir.

Interior Least Tern (*Sterna antillarum athalassos*)

This subspecies is federally- and state-listed as endangered. The Least Tern nests in open sandy areas, such as river sandbars and alkali flats. The major portion of the population resides in the Mississippi River basin, although breeding is known to occur at Bitter Lake National Wildlife Refuge, near Roswell, New Mexico, and Brantley Lake, near Carlsbad, New Mexico. Occasional migrant Least Terns have been observed at Bosque del Apache National Wildlife Refuge. Sandbars on the Rio Grande are probably unsuitable for nesting because of fluctuating water levels and periodic flash flows.

Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)

This subspecies is under consideration for listing under the ESA because of serious declines throughout the west. The magnitude of threats to the Western Yellow-billed Cuckoo has been determined to be high and the threats are ongoing and considered imminent (USFWS 2005). Despite the magnitude of threats facing this species, the Service maintains that listing is precluded by other, higher-priority species. Suitable breeding habitat exists within the project area and detections of cuckoos are made regularly during the course of Willow Flycatcher surveys (Moore and Ahlers 2005) and other field work, however population levels have not yet been quantified.

Loggerhead Shrike (*Lanius ludovicianus*)

This species is a former federal candidate species and is currently considered a Species of Conservation Concern by the USFWS (USFWS 2002). Its habitat is comprised by desert, grasslands, agricultural fields, and/or open woodlands.

Neotropic Cormorant (*Phalacrocorax brasilianus*)

The State of New Mexico list the Neotropic Cormorant as threatened. The species is found at Bosque del Apache National Wildlife Refuge and other wetlands within the project area, such as the delta of Elephant Butte Reservoir. The species appears to be in decline as nesting colonies have not been observed in recent years (S. Williams, pers. comm.)

Bell's Vireo (*Vireo bellii*)

This species is listed by the State of New Mexico as threatened and is considered a Species of Conservation Concern by the USFWS (USFWS 2002). Its habitat requirements overlap, to some extent, those of the SWWF, nesting in dense, periodically flooded stands of willows and other riparian shrubs. However, unlike the Willow Flycatcher, its territories include adjacent open stands of upland desert shrub, mesquite, and dry saltcedar. Bell's Vireos are relatively mainly found in the San Marcial area of the Middle Rio Grande Project area (R. Doster, pers. comm.).

As noted in the environmental consequences discussion for Fisheries, the No Action alternative is likely to result in increased river drying and adverse effects to long reaches of the MRG as documented in the 2003 BA and BiOp which would negatively impact the RGSM, SWWF, western Yellow-billed Cuckoo as well as the other special status species and their associated

habitat. Conversely, with the availability of increased flows of water and the flexibility of releases of this water from water leasing, waiver requests, water agreements, and LFCC pumping, the habitat available to the above species should be enhanced as well as the survivorship of these species in the MRG. Impacts to the RGSM in the LFCC are considered to be minimal as the RGSM is not commonly found in the channel. All O&M activities would be carefully mitigated with silt curtains and other applicable BMPs to mitigate for any adverse impacts to the RGSM. No long term impacts are anticipated to the Bald Eagle, if the Program were implemented. The Proposed Action may affect but is not likely to adversely impact the Bald Eagle due to work associated with the LFCC pumping O&M activities during the winter period.

### 3.2.5 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (1994)*, directs federal agencies (as well as State agencies receiving federal funds) to assess the effects of their actions on minority and/or low-income populations within their region of influence. The order requires agencies to develop strategies to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations.

The U.S. Environmental Protection Agency (EPA) published the *Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses (1998)*, which indicates that a minority population exists when either:

- The minority population of the affected area is greater than fifty percent of the affected area's general population, or
- The minority population percentage of the affected area is meaningfully greater than the population percentage in the general population or other appropriate unit of geographic analysis.

An environmental justice screening analysis must determine whether any significant impacts of the Proposed Action (if any) would disproportionately adversely affect local low-income and/or minority populations. If a disproportionate impact is determined, mitigation measures must be implemented to reduce the adversity of the impact to a less-than-significant level. According to the federal guidelines, the environmental justice screening analysis assesses whether "the potentially affected community includes minority and/or low income populations." The guidelines indicate that a minority population exists when the minority population is 50 percent or more of the affected area's total population. The 50 percent threshold is also used to determine the presence of low-income populations in the study area.

For the purposes of this analysis, the area affected is defined as the Middle Rio Grande basin in the state of New Mexico. As reported in the 2004 U.S. Census, none of the jurisdictions in the affected area have low-income populations of greater than 50 per cent, however some of the counties in the project area have Hispanic/Latino populations that are over 50 per cent of their population. As was determined in the 2001 PEA, no disproportionate adverse effects on minority or low-income populations would result from the Proposed Action since only willing lessors would enter into water leases and no economic losses to farmers or an impairment of the

amount of irrigation water is expected from the Proposed Action. No adverse effects on minority or low-income populations are anticipated as a result of the No Action alternative.

### **3.2.6 Indian Trust Assets**

Indian Trust Assets (ITAs) are legal interests in assets held in trust by the United States Government for Indian tribes or for Indian individuals. Some examples of ITAs are lands, minerals, water rights, hunting and fishing rights, titles, and money. ITAs cannot be sold, leased, or alienated without the express approval of the United States government. The United States has a trust responsibility to protect and maintain rights reserved by or granted to Indian tribes or individuals by treaties, statutes, Executive Orders, and rights further interpreted by the courts. This trust responsibility requires that all Federal agencies take all actions reasonably necessary to protect such trust assets.

As noted in the 2001 PEA, the Program could potentially affect ITAs, which include allocated and contracted SJ-C water and impairment of the Rio Grande and general environmental quality. However, as previously described, the effects of the Proposed Action are beneficial to the environment, which results primarily from increased streamflow. Potentially, the release and management of leased water for RGSM could increase river flows through Pueblo lands. Therefore, the Program is not expected to impair the use, access or the value of any ITAs.

With the No Action alternative, no impacts to ITAs would occur.

### **3.2.7 Irretrievable Commitment of Resources**

The implementation of the Project will result in the commitment of resources such as fossil fuels, construction materials, and labor. In addition, Federal funds will be expended for the water leasing program, operations associated with the O& M activities for the LFCC pumping operations, and the implementation of water conservation measures.

### **3.2.8 Cumulative Impacts**

The National Environmental Policy Act (NEPA) defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (42 U.S.C. 4331-4335). Cumulative environmental impacts associated with the following projects have been evaluated for the following projects relative to the Proposed Action.

#### Middle Rio Grande Endangered Species Act Collaborative Program

The Middle Rio Grande Endangered Species Act Collaborative Program has solicited and funded multiple habitat restoration projects, RGSM augmentation projects, water acquisition planning, and various science research projects. RGSM augmentation funded by the Collaborative Program should provide positive interactions with the various elements of the Program, and the various habitat restoration projects should also experience some positive cumulative impacts to the RGSM and SWWF as well as their associated habitats as a result of the Proposed Action.



Upper Rio Grande Water Operations ( URGWOPS) Environmental Impact Statement

Currently, the USACE, the ISC, and the Bureau of Reclamation are signatories of a MOA to develop integrated water operations rules for several dams on the Rio Grande upstream of the project area (URGWOPS 1999). As previously noted, all activities would be fully coordinated and be consistent with the implementation of rules implemented from the URGWOPS study.

**3.2.9 Summary of Effects to Each Resource**

As documented in the table below, positive impacts or no impacts would result from the proposed action; the no action alternative will have adverse impacts on some resources due to river drying and no impact on the other resources analyzed. The overall effects of the continuation of the Program (Proposed Action) and the discontinuation of the Program (No Action) are summarized in Table 3-2.

Table 3.1 Environmental Consequences of Proposed Action and No Action Alternatives

Environmental Resources	Proposed Action	No Action
Hydrology and Hydraulics	No impacts to reservoir levels on the MRG with the exception of Heron Reservoir; adaptive management may result in less river drying	More drying of river is anticipated; no impacts to any MRG reservoirs
Water Resources and Net Depletions	No change in water resources and net depletions	No change in water resources and net depletions
Biological Resources	Positive impact on fisheries due to lower likelihood of river drying	Adverse impact to fisheries and wildlife due to increased river drying
Threatened, Endangered, and Special Status Species	Positive impacts to the RGSM, SWWF and Western Yellow-billed Cuckoo are anticipated. LFCC operations may affect but not likely to adversely affect the bald eagle	Adverse impacts to the RGSM, SWWF and Western Yellow-billed Cuckoo are anticipated due to increased river drying; no impacts to the bald eagle are anticipated
Environmental Justice	No adverse effects are anticipated	No change in existing conditions
Indian Trust Assets	No impairment of ITAs are anticipated	No change to any existing ITAs

