RECLAMATION

Managing Water in the West

Joint Biological Assessment

Bureau of Reclamation and Non-Federal Water Management and Maintenance Activities on the Middle Rio Grande, New Mexico

Part III – Water Management: State of New Mexico

Middle Rio Grande Project, New Mexico
San Juan-Chama Project, New Mexico
Upper Colorado Region

U.S. Department of the Interior
Bureau of Reclamation

September 2012 (Amended January 2013)

Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Joint Biological Assessment

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Part III – Water Management: State of New Mexico

Middle Rio Grande Project, New Mexico
San Juan-Chama Project, New Mexico
Upper Colorado Region

Submitted to the U.S. Fish and Wildlife Service

Rio Grande Silvery Minnow	**Southwestern Willow Flycatcher**
Pecos Sunflower	**Interior Least Tern**

U.S. Department of the Interior
Bureau of Reclamation

September 2012 (Amended January 2013)

Reclamation makes the following amendment to Part III, chapter 6, sections 1 and 2 of its Biological Assessment (BA). In its initial submittal; Reclamation stated that the Middle Rio Grande Recovery Implementation Program (RIP) would be included as the conservation measure serving as the means for ESA compliance. In this amended BA, Reclamation provides that the Middle Rio Grande Endangered Species Collaborative Program (Collaborative Program) will serve as the means for including non-Federal actions in its Section 7 consultation, and that conservation measures proposed by Reclamation, MRGCD, the State and the Authority, together with the conservation actions currently taken by and through the Collaborative Program will serve to offset the adverse impacts of the proposed actions described in this BA. Inclusion of proposed non-Federal actions is also supported through the involvement of non-Federal entities in Reclamation's annual river maintenance work. References to the RIP and the associated Cooperative Agreement apply to the expected future inclusion of the RIP as the conservation measure in the effects analysis of the Biological Opinion during the formal consultation process.

STATE OF NEW MEXICO, INTERSTATE STREAM COMMISSION
AND
OFFICE OF THE STATE ENGINEER

PROPOSED ACTIONS AND CONSERVATION MEASURES IN THE RIO GRANDE BASIN UPSTREAM OF ELEPHANT BUTTE RESERVOIR

SUPPLEMENT TO JULY 2012 JOINT BIOLOGICAL ASSESSMENT, BUREAU OF RECLAMATION AND NON-FEDERAL WATER MANAGEMENT AND MAINTENANCE ACTIVITIES ON THE MIDDLE RIO GRANDE, NEW MEXICO; PART I – WATER MANAGEMENT, MIDDLE RIO GRANDE PROJECT, NEW MEXICO, UPPER COLORADO REGION

Draft Submitted: August 15, 2012
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Conservation Measures Submitted: September 14, 2012

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1. Introduction

This supplement is provided by the State of New Mexico, Interstate Stream Commission, Office of the State Engineer and New Mexico Attorney General's Office (State) pursuant to US Bureau of Reclamation's (Reclamation) request for information to supplement its July 31, 2012 Joint Biological Assessment, Bureau of Reclamation and Non-Federal Water Management and Maintenance Activities on the Middle Rio Grande, New Mexico; Part I – Water Management, Middle Rio Grande Project, New Mexico, Upper Colorado Region (Reclamation MRG BA). This supplemental information reflects substantial coordination with Reclamation, and includes updated baseline information, a description of additional actions to be included as part of the Proposed Action under consultation, and an analysis of hydrologic and species effects. We request that it be forwarded to the Service as a supplement to the Reclamation MRG BA.

In developing this document, for the reasons articulated below, the State has not included water related actions of the Middle Rio Grande Conservancy District (MRGCD), the six Middle Rio Grande Pueblos, the Albuquerque Bernalillo County Water Utility Authority (ABCWUA), and Buckman Direct Diversion Project (BDD). The Middle Rio Grande Conservancy District and six Middle Rio Grande Pueblos are not included in this supplement because they are separately seeking coverage for their and their members' specific water related actions. Further, the State understands that the water related actions of the ABCWUA and BDD are covered by their respective existing biological opinions. The State is supportive of the efforts of the MRGCD, six MRG Pueblos, ABCWUA, and BDD.

By requesting this coverage and proposing conservation measures, the State does not concede that the water-related actions described herein adversely affect the listed species nor that requirements of the ESA necessarily apply to all of the described actions.

2. Background and Baseline Information

Under New Mexico law, water rights are established by the beneficial use of water. Many water rights were established prior to State Engineer jurisdiction. Rights established under State Engineer jurisdiction are only established through the permitting process. Except for small domestic, livestock, and temporary water uses, the State Engineer conditions all permits in the Rio Grande Basin (which extends from the Colorado state line to the headwaters of Elephant Butte Reservoir) to require full offset of the maximum diversion amount. State water policy and guidelines for the region are designed and applied in order to protect existing water rights and to preserve compliance with the Rio Grande Compact by ensuring that delivery of Rio Grande water into Elephant Butte Reservoir, and the flows of the Rio Grande at the Otowi gage, are not diminished.

For the above reasons, the State baseline information in this document is not directly comparable to the baseline information in Reclamation's July 31, 2012 Joint Biological Assessment. This document summarizes information for 60 plus years of water administration in the basin while Reclamation uses the previous 10 years as baseline for much of its analysis. Therefore, the

effects of many activities are not comparable.

2.1 The Rio Grande Compact

The 1938 Rio Grande Compact (53 Stat. 785) (Compact) is both a Federal and State law that poses significant restrictions on water management, most specifically reservoir management, in the Middle Rio Grande (MRG). The Compact apportions the native waters of the Rio Grande among the states of Colorado, New Mexico, and Texas, and is administered by the Rio Grande Compact Commission. For purposes of the Compact, "New Mexico" is the reach between the state line with Colorado and Elephant Butte Dam , which is roughly equivalent to the area encompassed by the Middle Rio Grande Endangered Species Collaborative Program (Program). For purposes of this document, the Upper Rio Grande (URG) is defined as the reach from the Colorado-New Mexico state line to Otowi gage including the Rio Chama, and the Middle Rio Grande (MRG) is defined as the reach from Otowi gage to Elephant Butte Reservoir. New Mexico has an explicit but variable annual delivery requirement to the State of Texas at Elephant Butte Dam. New Mexico's depletion entitlement for the MRG is based upon the recorded annual native Rio Grande flow at the Otowi gage. For New Mexico, the explicit annual allocation requires that a minimum of 57% of the annual native Rio Grande flow at Otowi be delivered to Elephant Butte Dam. The allocation to Texas excludes tributary inflows between the Otowi gage and Elephant Butte Dam. Tributary inflows in this reach are highly variable and, generally, unpredictable but these inflows may be fully consumed by New Mexico.

The Compact does not require the State of Colorado or New Mexico to deliver the exact amount of water scheduled annually each and every year, but allows for the accumulation of over-deliveries (credit) and under-deliveries (debit). It is up to each state to decide how its water is used. In New Mexico, any new use of water has to be approved by the State Engineer and must be balanced by reduction of an existing use unless it is an imported source of water, such as San Juan-Chama (SJC) Project water. Approval of new uses is required because the Compact puts an upper limit on basin-wide water depletions.

Regardless of how wet a period may be, New Mexico's depletions between the Otowi gage and Elephant Butte Dam are capped at 405,000 acre-feet per year (AF/year) plus the local tributary inflows. In wet years (anything above about 1 million acre-feet at the Otowi gage), the higher flows must be passed through the MRG and delivered to Elephant Butte, and associated carriage losses must be made up from New Mexico's allocation. In very wet years, these carriage losses can deplete a large portion of New Mexico's annual allocation. For this reason, wet years are more likely than dry years to result in a Compact debit. In many cases, debits accrued in wet years must be made up for in dry or average years.

Several Compact restrictions affect reservoir operations in post-Compact reservoirs (reservoirs upstream of Elephant Butte that were constructed after 1929) and associated surface water management. All the reservoirs operated by the U.S. Army Corps of Engineers (USACE) and Reclamation are subject to these restrictions. However, Reclamation's Heron Reservoir and Nambe Falls Reservoir are excluded from these restrictions because they only store imported trans-basin SJC Project water.

Under Article VI of the Compact, New Mexico remains in compliance with the Compact if its accrued debit is less than 200,000 AF. If New Mexico is in debit status and is holding native Rio Grande water in storage in a post-1929 reservoir, New Mexico must retain the water in storage to the extent of its accrued debit. If and when a spill occurs from Elephant Butte Reservoir, the accrued credits for Colorado or New Mexico, or both, are reduced in proportion to their respective credits by the amount of the actual spill. Colorado or New Mexico may release accrued credits in part, or in full, in advance of an actual spill. Following a spill, all accrued debits for Colorado or New Mexico, or both, are cancelled.

Under Article VII of the Compact, whenever Usable Water in Rio Grande Project storage at Elephant Butte and Caballo reservoirs is less than 400,000 AF, New Mexico and Colorado may not increase the storage of native Rio Grande Basin water in upstream reservoirs constructed after 1929. Usable water is defined as water in Elephant Butte and Caballo reservoirs that is available for release to the Rio Grande Project. In New Mexico, the primary impacts of Article VII storage prohibitions are experienced at El Vado and Nichols and McClure reservoirs. Article VII also provides that, upon acceptance by Texas, New Mexico may relinquish all or part of its accrued credits so that New Mexico may store, at any time, an equivalent amount of water in post-1929 upstream reservoirs when storage restrictions are in effect. Additionally, for the City of Santa Fe, during times that Article VII is in effect, it may elect to store native water when otherwise prohibited and release a like amount of SJC Project water (an exchange) to the Rio Grande.

Article XVI of the Compact states, "Nothing in this Compact shall be construed as affecting the obligations of the United States of America to Mexico under existing treaties, or to the Indian Tribes, or as impairing the rights of the Indian Tribes." SJC Project water is imported trans-basin water, is accounted as such, and is not subject to the Rio Grande Compact.

2.2 Credit Water Relinquishment

Since signing the Emergency Drought Water Agreement (EDWA) in 2003, the State has made relinquishment credit available as follows: 91,000 AF for Reclamation to use in its Supplemental Water Program; 171,000 AF for the MRGCD for irrigation purposes; and 8,500 AF to the City of Santa Fe for municipal and industrial uses. As a result of implementing the EDWA, a total of 192,750 AF of relinquishment water was stored on the Rio Chama during the snowmelt runoff periods of 2003 to 2011 and the remainder, some 77,700 AF was available for storage in 2012 and beyond. All of this water was stored during periods when it would otherwise not have been allowed because the Article VII storage restrictions were in effect. All 192,750 AF of water stored pursuant to the EDWA and subsequent releases are described in some detail in Chapters 2 and 5 of Reclamation's Joint Biological Assessment.

The water stored and made available pursuant to the EDWA has been released during low natural flow periods enabling the MRGCD to meet irrigation demand and to help meet the 2003 Biological Opinion (BiOp) Albuquerque gage flow targets for a longer time period. Consequently, during those time periods, Reclamation did not have to release stored water to meet the Albuquerque gage flow targets. Reclamation has also used water allotted to it under the EDWA to meet 2003 BiOp flow targets at other times. Provided the right circumstances are

present, the State would likely continue to propose relinquishments in the future. However, New Mexico's ability to relinquish accrued credit water depends on its Compact credit status and the constraints of the Compact.

2.3 State Administration of Water Rights

The State Engineer (SE) administers surface water and groundwater sources conjunctively in the waters of the Rio Grande Basin to prevent impairment to valid existing water rights by regulating depletions, thereby maintaining the overall hydrologic system balance. The SE executes his statutory duties in accordance with State law, adjudications, and court orders.

Under New Mexico law, water rights are established by beneficial use of water. Many water rights were so established prior to SE jurisdiction (1907 for surface water rights, 1931 and subsequent basin declaration date for groundwater rights). Rights established under State Engineer jurisdiction follow a permitting process.

Administration is a term that encompasses numerous actions by the SE in oversight of the exercise of existing water rights, the permitting process for changes in water use, and enforcement of New Mexico water law in the case of illegal water use. Examples of administration include:

1) Enforcement of offset requirements associated with permits (discussed in detail below).
2) Enforcement of diversion limits associated with permits, licenses and adjudications of the court.
3) Enforcement against waste of water and illegal water use.
4) Facilitation of the development of Alternative Administration and enforcement of Alternative Administrative conditions. Alternative Administration is based upon agreements by water right owning parties that resolve water disputes under conditions of shortage without the necessity for priority administration and curtailment of junior water rights. Examples of Alternative Administration in the MRG and URG include:

    a. The alternative administration program on the Rio Chama, in which diversions by the Rio Chama acequias downstream of Abiquiu Reservoir in excess of their very senior right to native water are repaid by exchange to MRGCD through purchase of SJC Project water.
    b. An alternative administration mechanism that has been developed for the Taos Valley as part of the Abeyta Adjudication, in which 1) the Taos Pueblo has agreed to limit exercise of its senior irrigation water rights until junior Acequia rights are retired, and 2) it has been agreed that major groundwater users can deal with their tributary impacts by making offsets directly to the Rio Grande, while contributing to a tributary mitigation system involving augmentation wells and a recharge project for the Buffalo Pastures wetland.
    c. An alternative administration on the Jemez River that is based on an agreement adopted on July 2, 1996 between the United States, the Pueblo of Jemez, the Pueblo of Zia, and the Jemez River Basin Water Users Association. Under this agreement, a priority call may be made by the Pueblos of Jemez and Zia during

5) Granting of licenses for pre-basin declared water rights limited to the historic legal maximum diversion amount.
6) Evaluating and acting upon applications to appropriate water (and thus obtain water rights) and/or modify water use associated with existing water rights.
    a. The Office of the State Engineer (OSE) does not accept applications to develop new water rights in most of the Rio Grande Basin. Surface water has been considered fully appropriated since 1907, and any additional groundwater use in the hydrologically connected aquifers of the Rio Grande must be fully offset (as described in more detail below).
    b. Applications accepted by the OSE are evaluated, as per Statute, and in accordance with applicable OSE rules, guidelines and policies (such as the 2006 Surface Water Transfer Requirement to Offset Effects on the Rio Grande, the 2009 Return Flow and Discharge Credit, and the 2011 Depletion Offsetting for Habitat Restoration Projects within the Middle Rio Grande Project policies). The OSE evaluates the potential for impairment of other water rights, and whether granting the application would be contrary to conservation within the State or detrimental to the public welfare of the State.
    c. If the State Engineer approves an application, conditions are applied to ensure water use does not exceed the legal extent of the water rights, and to ensure full offset of impacts to the Rio Grande (as described in more detail below).

Further, in the Rio Grande Basin, the following specific constraints related to protection of the flows of the Rio Grande are generally applied in approval of such applications:

a) In order to maintain compliance with the Rio Grande Compact, depletions to the Rio Grande above the Otowi gage must be maintained at or below pre-Compact levels (1929).
b) Water rights are not transferable from above Otowi gage to below Otowi gage, or vice versa.
c) There can be no net increase of impact to the Rio Grande stream system (including tributaries). All surface-water impacts occurring at a new location as the result of a transfer must be offset by a decrease in surface-water depletion at the move-from location. Exceptions to the offset requirement apply to small domestic, livestock and temporary-use wells approved under NMSA 1978 §§ 72-12-1 *et. seq.*
d) Water rights are not transferable from above Elephant Butte Dam to below Elephant Butte Dam, or vice versa.

2.4 Surface Water

Most surface water uses in the MRG and URG were initiated prior to enactment of the March 17, 1907 Surface Water Code. These uses were not established through any permitting process. Exceptions include diversions of permitted MRGCD rights, diversions of Bosque del Apache rights, and diversions of contracted San Juan Chama Project Water.

2.5 Groundwater

The State Engineer first declared jurisdiction over a large corridor along the main stem of the MRG and URG in 1956. The State Engineer expanded this jurisdictional area to most of the outlying areas of the MRG and URG during the 1960's, 1970's and 1980's. Groundwater rights established by beneficial use prior to 1956, and later in the extended areas (i.e., established prior to the declaration of the groundwater basins), are referred to as "pre-basin" groundwater rights. In general, there are no offset requirements associated with the exercise of pre-basin rights.

Groundwater rights established after a basin was declared require a permit from the State Engineer. In addition, the transfer or other significant modification of a water right also requires a permit from the State Engineer. As specified in statute, the State Engineer shall grant applications if he finds that the proposed activity would not impair existing water rights, would not be contrary to conservation of water within the State and would not be detrimental to the public welfare of the State.

2.6 Permitted Groundwater Pumping Offset Programs (Offset Program)

The State Engineer calculates groundwater pumping impacts to the Rio Grande by means of numerical models or by an analytical technique (Glover-Balmer method). Groundwater in the MRG and URG is pumped primarily from deep basin-fill aquifers that are in hydrologic connection with the Rio Grande. In general, all groundwater pumping from these aquifers will eventually be felt as impacts to the Rio Grande, but this may take hundreds of years.

In addition, in issuing groundwater permits, the State Engineer requires that impacts to tributaries to the Rio Grande are offset (this includes numerous streams, including the Rio Chama, the tributaries to the Rio Chama, and the numerous Rio Grande tributaries located in the Taos, Pojoaque, Espanola and other valleys). In general, depletions to a tributary stream must be offset on the affected tributary itself in order to prevent impairment of existing water rights associated with the tributary. In some cases an alternative method for offset and mitigation can be developed such as has occurred in the Taos Valley as part of the Abeyta Settlement, which allows tributary impacts to be offset on the Rio Grande, as long as mitigation is provided to the acequias on the tributaries.

Originally, the State Engineer issued permits that required offsets to be obtained and applied at the time when the surface water impacts were calculated to occur. Since the adoption of the Middle Rio Grande Administrative Area (MRGAA; Turney, 2000) Guidelines in 2000, groundwater users in that area are required to obtain offsets up front. That is, permits in the MRGAA are conditioned to require that the maximum permitted diversion be limited to the amount of valid surface rights transferred, plus the amount returned directly to the river. Surface water rights obtained in excess of currently calculated impacts may be leased back for use on the farm in the interim until the impacts are calculated to reach the Rio Grande. Similar conditions are also applied to permits throughout the Rio Grande Underground Water Basin, from the Colorado state line to Elephant Butte. The result of these offset requirements is that groundwater right owners must provide offsets to the Rio Grande equal to the total groundwater diversion amount, which is the maximum surface water impact that could be created by their diversions.

Offsets to stream depletions are accomplished by a combination of the three mechanisms described below:

1) Transfer of valid surface water rights
    a. Only valid pre-1907 water rights may be used for this purpose. In the MRG this is determined by a rigorous historical land use evaluation process.
    b. In cases where surface water used for irrigation is transferred to a different use, only a fraction of the actual diversion may be transferred to offset the groundwater use—the part generally corresponding to the calculated consumptive irrigation requirement. The carriage-water component of the diversion is not transferrable, and remains in the surface water system.
    c. The OSE routinely provides the MRGCD with geospatial data that identifies all those lands from which pre-1907 surface water rights have been severed.
2) Actual return flow of surface water to the Rio Grande, pursuant to an OSE approved return flow plan.
3) The OSE "Letter Water Program" for the release and/or storage by exchange of SJC Project water under contract by the permitted groundwater rights owners, to offset their impacts.

Each of these mechanisms is described in more detail below.

2.7 Transfer of Pre-1907 Water Rights

The primary water rights that the OSE accepts for offset purposes are valid pre-1907 surface water rights. The State Engineer has a rigorous historical-use evaluation process to determine valid pre-1907 surface-water rights in the MRG. This is necessary because some lands are irrigated with relatively junior rights associated with the creation of the MRGCD. Such rights are not acceptable for offset of groundwater-pumping impacts on surface water, and thus need to be distinguished from pre-1907 rights. Another class of water right that may be deemed acceptable for offset purposes are pre-basin groundwater rights established before the Rio Grande Compact was adopted in 1939.

When water rights are transferred from one use to another in the MRG, only a portion of the water right is allowed to be transferred. For irrigation rights, this transferrable portion of the water right is the consumptive irrigation requirement of 2.1 acre-feet per acre. An estimated total of 7.5 acre-feet per acre (2.1 acre-feet per acre divided by an estimated MRGCD project efficiency of 0.28) must be diverted from the river to supply irrigated move-from lands with the transferrable portion of the water right. When MRGCD is using natural river flow to meet irrigation demand, and transfers have occurred, less water needs to be diverted to meet irrigation demand, and the river and MRGCD benefit by the amount of conveyance water that is left in the river as a result of the transfers.

2.8 Actual Return Flow

Certain OSE groundwater permits allow permitted users to use return flow to the Rio Grande to offset their river impact pursuant to an OSE approved return flow plan (Sizemore, 2009). Return flow offsets the effect on the river resulting from groundwater pumping. While the exact number varies from year to year, approximately 67,000 acre-feet of diverted water is directly returned annually to the river in the MRG between the Otowi gage and Elephant Butte Dam. Approximately, 58,000 AF of that return flow is returned by the ABCWUA. In general, such return flows are composed of municipal wastewater, and the return flows are used to offset the impacts of groundwater pumping on surface water supplies. Return flows associated with municipal water use occur on a year-round basis.

2.9 The Letter Water Program

The OSE accepts SJC Project water to offset the hydrologic impacts of groundwater pumping on the water supply of the Middle Valley water users and to offset impacts on the State's delivery of water to Elephant Butte Reservoir under the Rio Grande Compact.

Offsets to the middle valley water users take the form of an exchange of SJC Project water in reservoir storage from a SJC Project contractor to the MRGCD. MRGCD is the only entity that diverts surface water from the Rio Grande in the middle valley for irrigation purposes and it supplies the water to its constituents and others (such as the La Joya Acequia). This additional SJC Project water gives the MRGCD the ability to release sufficient water to overcome the impacts associated with the groundwater pumping.

Offsets to the State's delivery of water to Elephant Butte are generally accomplished through the State's release of the SJC Project offset water ("Letter Water") during the winter (normally November or December) when no river diversions are occurring. That is to ensure that the vast majority of the released SJC Project water is physically delivered to Elephant Butte Reservoir before the end of a particular calendar year.

The OSE provides Reclamation with letters describing, for each groundwater pumper with SJC Project water that needs or chooses to release SJC Project water for offset purposes, the volume of SJC Project water that must be released by Reclamation or provided to MRGCD, and a deadline to do so. The impacts are described by the OSE as cumulative effects on Elephant Butte Reservoir (and therefore to New Mexico's deliveries under the Compact) and cumulative effects on the Rio Grande in the MRG due to impacts above and/or below the Otowi gage.

In addition, on occasion, SJC Project water is stored by exchange in Nichols and McClure Reservoirs by the City of Santa Fe. In such instances, Santa Fe stores water in Nichols and McClure reservoirs when they otherwise would be prohibited from doing so (such as when Article VII of the Compact is in effect). After the storage operations are complete, the amount of water stored is accounted and the SE sends a letter to Reclamation directing the release of the same amount of SJC Project water to the Rio Grande. Additionally, on occasion andusually during the winter months, the ABCWUA or City of Santa Fe, after coordination with the State and Reclamation, release some of their SJC Project water from upstream reservoirs and deliver it

to Elephant Butte Reservoir.

Water operations associated with the Letter Water Program are described by Reclamation in its July 2012 Joint Biological Assessment and are included in the Upper Rio Grande Water Operations Model (URGWOM) simulations used to inform water deliveries for development of the Joint Biological Assessment.

3. Action Area

The action area is defined as all areas to be affected directly or indirectly by the State actions and not merely the immediate area involved in the actions. The action area for the State's actions covers the Rio Grande Basin from the New Mexico state line with Colorado to the full pool of Elephant Butte Reservoir (Figure 1). This BA supplement covers the effects of actions proposed by the State on the Rio Grande silvery minnow, southwestern willow flycatcher, and Pecos sunflower within the Middle Rio Grande riparian area and not localized effects to other species that may exist in upstream tributary area. We are not seeking coverage for local effects to other federally listed or candidate species that may occur outside of the Middle Rio Grande

The action area is divided into two major sections:

Upper Rio Grande

This section covers the Rio Grande basin and its tributaries from the New Mexico state line to the Otowi gage.

Middle Rio Grande

This section covers the Rio Grande basin and its tributaries from the Otowi gage to the full pool of Elephant Butte Reservoir.

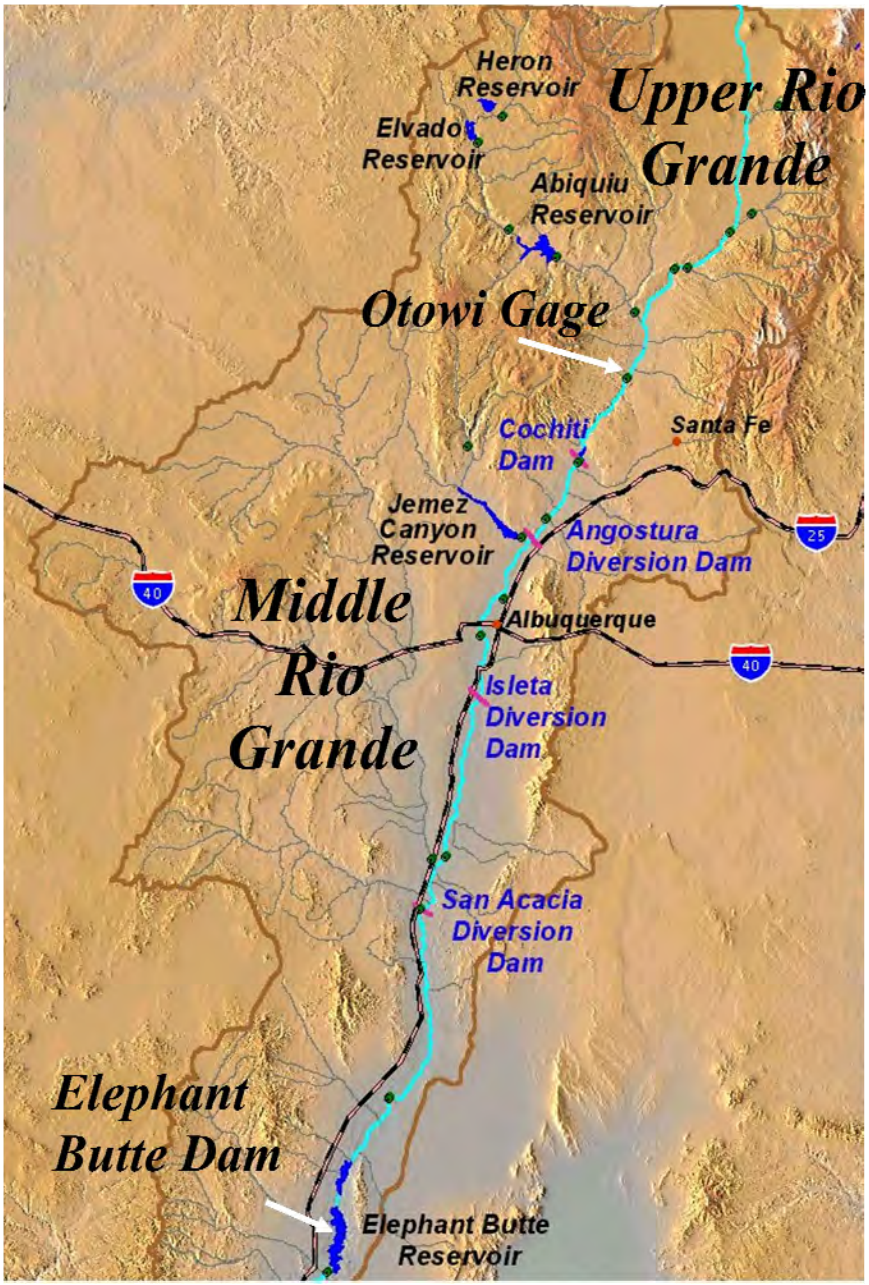


Figure-1: State Action Area: Upper Rio Grande and Middle Rio Grande

4. Description of the Proposed Actions

The New Mexico Interstate Stream Commission (ISC) and the New Mexico Office of the State Engineer (OSE) and the Office of the Attorney General (AGO) (collectively, the State) conduct State water-related actions described below and seek Endangered Species Act (ESA) coverage for the effects of all lawful actions within the outlined parameters in the action area. The proposed state actions are as follows:

4.1 Discretionary Actions Related to Administration of the Rio Grande Compact

Actions:

The ISC is charged with the administration of all interstate stream compacts to which the State is a party, including the Rio Grande Compact of 1938 (Compact). The ISC proposes to continue its compact related activities. The ISC proposes to continue to administer relinquishment of accrued compact credits and associated storage in post-1929 reservoirs.

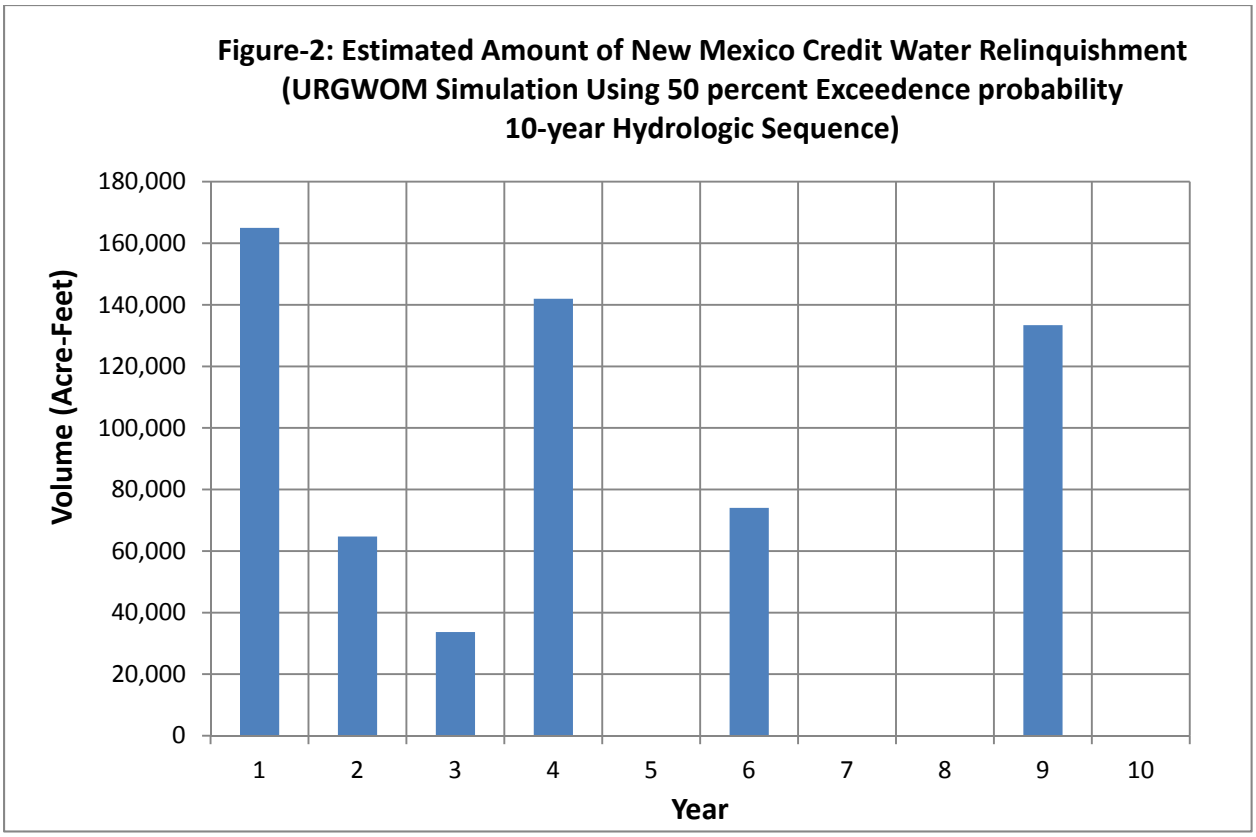
Hydrologic Effects:

Analysis of the URGWOM simulations used in development of the Reclamation and USACE current Biological Assessments indicates that relinquishment of New Mexico accrued credit water, and the related ability to store relinquishment water upstream during the snowmelt runoff and release it later, allows an extended MRG irrigation season and provides storage water to help Reclamation and the USACE meet their 2003 Biological Opinion (2003 BiOp, U.S. Fish and Wildlife) flow targets. Article VII of the Compact restricts storage of native Rio Grande water in reservoirs upstream of Elephant Butte Reservoir constructed after 1929 when there are less than 400,000 acre feet (AF) of Usable Water in Rio Grande Project Storage in Elephant Butte and Caballo Reservoirs. During the period covered by the 2003 BiOp, New Mexico relinquished credit water several times and Reclamation's draft Biological Assessment includes language, primarily in Chapters 2 and 5, that summarizes the effects of the relinquishments completed since 2003. If the relinquishments had not occurred, Reclamation and the USACE would have had a more difficult time meeting the flow targets of the 2003 BiOp and may not have been able to do so under some circumstances.

The URGWOM model simulations demonstrate that the frequency and the amount of credit water available for relinquishment depends on the hydrologic sequence simulated. Using the 50-percent exceedence probability 10-year hydrologic sequence (Roach, J. D, 2009) model run, the state would be able to propose to relinquish credit water about 50% of the time and in significant amounts (Figure 2). However, given the history of relinquishments since signing the compact, that scenario likely overestimates the frequency and volume of future relinquishments. Relinquishments would provide water for storage to meet MRG demands when otherwise prohibited by the Compact.

The storage of the relinquishment water during the spring snowmelt runoff will reduce the volume of water entering the middle valley during the snowmelt runoff period and can reduce the peak flow in the middle valley if the storage results in the USACE releasing less than the safe

channel release from Abiquiu Reservoir (1,800 cubic feet per second (cfs)). On the other hand, the 192,750 AF of relinquishment water stored during the snowmelt runoff of the past nine years has been released when natural flows are low thus helping to meet irrigation demands and ESA flow targets.



Therefore, the effects of the State's proposed actions in administering the Compact are, on the whole, positive as measured by the ability to make relinquishment water available in upstream storage for release to benefit municipal and irrigation needs and to meet flow targets when native water storage would otherwise not be available to do so.

4.2 Discretionary Actions to Administer Surface and Groundwater Resources in the Middle Rio Grande

Actions:

The SE proposes to continue to administer MRG surface water and groundwater resources to maintain the MRG hydrologic system balance by executing his statutory duties with respect to transfers of valid existing surface water rights and compliance with existing state water declarations, permits, licenses and the adjudications of the courts. Significantly, executing these statutory duties will ensure that impacts to the surface water flow of the MRG attributable to diversions by groundwater appropriators are offset to keep the river whole. The following offset mechanisms are employed for this purpose:

- Transfer of valid existing surface water rights, established prior to the March 17, 1907 Water Code, acquired by groundwater rights owners to comply with offset requirements. In the MRG, the transferrable portion of these water rights consists of 2.1 acre-feet per acre, out of an approximate total diversion amount of 7.5 acre-feet per acre associated with these surface water rights.

- Return flows to the river, pursuant to OSE approved return flow plans, to comply with offset requirements.

- State Engineer Letter Water Program for the release and/or storage by exchange of San Juan Chama (SJC) Project water.

The following list enumerates actions that the SE proposes to continue performing with respect to water rights administration in the MRG:

- Continue to evaluate applications submitted by water rights owners to transfer or otherwise modify valid water rights in accordance with the 2000 OSE MRGAA Guidelines for Review of Water Rights Applications.

- Continue to issue permits as required by New Mexico State Statutes, conditioned as necessary to ensure that there is no impairment to existing water rights, the exercise of which are not contrary to conservation or detrimental to the public welfare of the state, while ensuring that the MRG is kept whole through the offset mechanisms described above.

- Continue to administer compliance of existing water rights with declarations, permits, licenses, State water law, and the adjudications of the courts. Specifically, the SE proposes to continue administering existing water rights permits to ensure that the Rio Grande is kept whole through the offset mechanisms required by permit, licenses, and adjudications including those described above.

- For the 20,000 AF of additional transfers or other discretionary permits proposed and analyzed herein, we assume a similar distribution and effect on the river some thirty years after the 2013 MRG BiOp is finalized

Hydrologic Effects:

In the MRG, the three components of the offset program outlined above result in replacement of permitted groundwater pumping impacts to the river on a real-time basis whenever MRGCD is releasing from storage. The OSE evaluates groundwater pumping annually to ensure compliance with the permit and its conditions. The three components are summarized below:

Transfer of Senior Water Rights

The total volume of senior water rights transferred to date to offset the effects of permitted groundwater pumping on the river system is about 19,620 AF . This includes senior water rights

transferred since the State Engineer's declaration of the Rio Grande Underground Water Basin on November 29, 1956 to offset the effects of permitted groundwater pumping on the river system or, in the instance of the BDD, needed for diversion and consumption. Five thousand AF of that number is held by the ABCWUA and 3,125 AF by the BDD, both of which have coverage under their existing BO's and are, therefore, not described further herein. The remainder is 11,495 AF (approximately 340 AF from the Cochiti Division; 1,770 AF from the Albuquerque Division; 6,585 AF from the Belen Division; and 2,800 AF from the Socorro Division). These 11,495 AF per year of senior consumptive use rights have been transferred from agricultural use in the MRGCD to municipal and industrial uses. About one-third of these transferred senior water rights are currently needed for offset requirements (OSE water rights files). The remaining portion of transferred senior rights is for offset of future impacts.

When the purpose of use is changed from irrigation to another use in the MRG, only the consumptive irrigation requirement (CIR) of the water right is transferred. The CIR portion of the water right in the MRG is 2.1 AF per acre or about one-third of the amount that would normally be diverted from the river (about 7.5 AF per acre) to irrigate those move-from lands. Therefore, for existing transfers that are being used for offset (not being leased back) when the natural flow is greater than MRGCD demand, MRGCD needs to divert less water to meet the demand. As a result, the river flow would increase by the amount of conveyance water that is left in the river as a result of the transfers.

Since 2003, most specifically due to irrigation improvements, MRGCD has reduced its annual river diversions by about 40 percent. As a result, MRGCD is using less natural river flow to meet its irrigation demand, and is leaving water in storage when the natural flows are sufficient to meet its demands. At times when MRGCD is releasing stored water to meet irrigation demand, less water needs to be released to meet demand, which means MRGCD can extend its delivery time period and, indirectly, help meet the Albuquerque gage flow target of the 2003 Biological Opinion.

In general, during spring runoff or when MRGCD is releasing stored water, transfer of a senior water right has a *de minimus* effect on river flow. During the winter months the river flow is continuous, however transfers may have a small impact on river flows due to continuing groundwater pumping at the move-to location. During summer months, transfers have an impact during periods of low river flows or during periods when MRGCD has no stored water to release. Using the OSE determined volume of senior water rights transferred from each MRGCD division since November 29, 1956, the impact of senior water rights transfers from the Belen and Socorro Divisions to the Albuquerque reach would result in a reduction of about 13 cfs of the flow near Albuquerque. This reduction of the flow is small in comparison to average annual flow at the Central gage, and is within the margin of error for most flow measurements. This reduction of the flow assumes that all the consumptive rights are currently needed for offset and ignores the benefits of the non-transferable portion of the right staying in the river system. During low flow time periods, MRGCD routinely diverts almost all of the water required for its Belen and Socorro Divisions at the Isleta Diversion Dam. Thus, transfers of senior surface-water rights from these divisions upstream into the Albuquerque division have no impact on the river below the Isleta Diversion Dam during those time periods. In the biological effects analysis, we assume that the 20,000 acre-feet of additional water rights transfers and permits for which ESA

coverage is requested herein will have a similar distribution and effect on the river as calculated above for the water rights transferred to date. Because we have assumed that the groundwater pumping impacts the river immediately, this assumption should still be valid thirty years after the 2013 MRG BiOp is finalized.

In summary, the impact of water rights transfers(excluding the ABCWUA and BDD) on river flow varies in relation to the amount of flow in the river and whether the transfer is to an upstream or downstream point of diversion. In general, during periods of higher flow such as during winter months and the spring runoff, transfer of a senior water right for offset of historic and ongoing pumping impacts at either an upstream or downstream point of diversion has a *de minimus* effect on river flow. During lower natural flow periods when MRGCD is releasing water from storage, transfer of a senior water right for offset to either an upstream or downstream point of diversion most likely will have a small, positive, impact on the river due to retention of irrigation system conveyance flows resulting from the transfers remaining in reservoir storage. During low flow periods when MRGCD has no stored water to release, transfer of a senior water right for offset to either an upstream or downstream point of diversion will have a small, negative, impact on the river. Therefore, the overall hydrologic effects of the State action of permitting transfers of senior water rights is minimal as measured by the effects on the river flow.

The OSE routinely provides the MRGCD with geospatial data that identifies all those lands from which pre-1907 surface water rights have been severed and coordinates with the MRGCD to monitor the status of lands from which senior consumptive use rights have been transferred.

Return Flow Component

SE groundwater permits allow permitted users to use return flow to offset their river impact pursuant to an approved return flow plan. Offset credit for return flow can only be obtained by application and permit based on a return flow plan acceptable to the OSE (see baseline section). Return flow occurs simultaneously with diversions throughout the course of the year. Therefore, return flows provide a real time offset of the effect of groundwater pumping on the river. Currently about 67,000 AFY of water is returned directly into the river between the Otowi gage and Elephant Butte Dam. Of this quantity about 58,000 AFY consists of ABCWUA direct returns. Because the ABCWUA has its own existing biological opinion for all its water management activities, ABCWUA actions are not evaluated as part of the state actions and not included in the state's hydrologic effect analysis. In certain instances, return flows exceed required offsets such that the river flow is augmented because groundwater pumping impacts are less than the return flows. The hydrologic effects of the State action approving return flow plans are in the whole neutral, as measured by the effects on the river and may even have some positive effects due to the augmentation.

The Letter Water Program

For each groundwater pumper that has SJC Project water in storage for use as an offset, the SE periodically provides Reclamation with letters requesting release or exchange of stored SJC Project water by certain dates to offset a portion of the permitted pumping impact. The impacts

are quantified by the OSE as cumulative effects on Elephant Butte Reservoir (and therefore to New Mexico's deliveries under the Compact) and cumulative effects on the Rio Grande due to impacts in the MRG below the Otowi gage.

Impacts that occur during the irrigation season when MRGCD is releasing stored water to meet demand are considered effects on the MRG and are replenished by exchange of the SJC Project water in storage to MRGCD, which holds that water for release when needed to meet demand. As such, it provides a near real-time offset of the groundwater pumping effects on the river system except during times when MRGCD is not releasing water from storage. These conditions have occurred for portions of three irrigation seasons in the last ten years and not at all in the twenty preceding years. When it has occurred, it's been during the months of September and October. The maximum amount of SJC Project water that been exchanged to MRGCD (excluding by the ABCWUA) was about 350 AF in 2007. Assuming a total 350 AF reduction in flow during September and October would equate to a reduction of the flow of about 1.5 cfs during that period.

Impacts that occur during the months of November through March are considered effects on Elephant Butte Reservoir (and therefore to New Mexico's delivery under the Rio Grande Compact). The maximum amount needed for offset (again excluding the ABCWUA) was 870 AF in 2005. This SJC Project water is generally released to the Rio Grande in the winter for delivery to Elephant Butte Reservoir While there is some flexibility in when the water is delivered to Elephant Butte, it cannot be depleted in the middle valley.

In general, the amount of the letter water currently utilized in the Offset Program (excluding ABCWUA) has an insignificant effect on river flows as measured at Central gage. Letter water, including the SJC Project water that is stored by exchange in Nichols and McClure Reservoirs by the City of Santa Fe, has little or no effect on the river flow during spring runoff, when MRGCD is releasing stored water, or during winter months. During summer months, letter water can have a small impact at low river flows, especially when MRGCD has no stored water to release. Therefore, the hydrologic effects of the State letter water component of the MRG offset program are limited to certain periods and overall are minimal, as measured by the effects on the river flow.

Water operations associated with the Letter Water Program are also described by Reclamation in its draft Biological Assessment and are included in the URGWOM model simulations used in development of the draft Biological Assessment.

In summary, the hydrologic effects of the State's proposed actions in administering surface and groundwater resources in the MRG are on the whole minimal or neutral, as measured by the effects on the river.

4.3 Non-Discretionary State Actions to Administer Surface and Groundwater Resources in the Middle Rio Grande

Actions:

The SE will continue to administer MRG surface water and groundwater resources within the allowable limits in the following manner:

- The SE will continue to issue permits for small domestic, livestock and temporary uses as required under New Mexico Statute 72-12-1, in accordance with the OSE 2006 Rules and Regulations Governing the Use of Public Underground Waters for Household and Other Domestic Use.

- The SE will continue to limit the exercise of all pre-basin groundwater rights (rights established prior to State Engineer jurisdiction, which was 1956 for the Rio Grande corridor) so as not to exceed their historic legal maximum beneficial use amount, when such rights come under SE permit or license.

Hydrologic Effects:

The OSE is required by statute to grant permits for domestic wells. The current SE policy is to grant permits up to 1 acre-foot per year for watering livestock, irrigation of trees, lawn or garden, or for household or domestic use. The total estimated diversion amount of domestic and livestock uses is about 18,300 AFY (OSE Water Use Report, 2005) distributed as follows: 2,425 AFY in Santa Fe County; 2,880 AFY in Sandoval County; 6,415 AFY in Bernalillo County; 4,835 AFY in Valencia County; and 1,715 AFY in Socorro County. Assuming about 50 percent of total domestic well diversions return to the hydrologic system, the total impact on the river is a reduction of flow of about 9,150 AFY or about 12.6 cfs at the headwaters of Elephant Butte Reservoir. The expected impact at the Central gage is a reduction of flow of about 5,860 AFY or 8.0 cfs. This calculated amount is small and will not have any impact on the spring runoff; however, it may have minimal impact on the river during dry periods when MRGCD is not releasing water from storage. For the purposes of this effort, the OSE assumes it will issue a similar number of domestic well permits over the next 20 to 30 years (we have intentionally overestimated the number of domestic permits to be issued) and the effects of those wells will be distributed similar to the current distribution. The hydrologic effects of domestic well uses in the MRG are in the whole minimal, as measured by the effects on the river.

The SE limits the pre-basin groundwater pumpers (including municipal and industrial uses) to the historic legal maximum amount. Pre-basin water rights have not yet been determined through adjudication, but can be estimated based on pre-1956 water use simulated in the USGS groundwater model of the Albuquerque Basin (McAda and Barroll, 2002). Total pre-basin groundwater pumping in the MRG (exclusive of 18,000 AF for ABCWUA) is about 15,000 AF. About 50 percent of this pumping is returned directly to the river, so the net impact of pre-basin pumping (exclusive of that by ABCWUA) on the river is about 7,500 AFY or about 10.4 cfs. This amount is small and has been impacting the system for over 50 years prior to Reclamation's baseline information.

4.4 Discretionary State Actions to Administer Surface and Groundwater Resources in the Upper Rio Grande

Actions:

The SE proposes to continue to administer URG surface water and groundwater resources to maintain the status quo of the URG hydrologic system balance (1929 conditions) by executing his statutory duties with respect to transfers of valid existing surface water rights and compliance with valid existing state water declarations, permit, licenses and court adjudication. Executing these statutory duties will ensure that effects to the native flow of the Rio Grande at Otowi gage are kept at or below the 1929 conditions in the following manner:

- The SE proposes to continue to evaluate applications submitted by water rights owners to change valid water rights in accordance with SE policy and guidelines.

- The SE proposes to continue to issue permits as required by New Mexico State statutes, conditioned as necessary to ensure that there is no impairment to existing water rights, the application is not contrary to conservation or detrimental to the public welfare of the state, and that the Rio Grande is kept whole through the offset mechanisms described above (See Discretionary State Actions To Administer Surface and Groundwater Resources In the Middle Rio Grande).

- The SE proposes to continue to administer compliance of existing water rights with declarations, permits, licenses, State water law, and the adjudications of the courts. Specifically, the SE proposes to continue administering existing water rights permits and to conduct alternative administration to ensure that the Rio Grande is kept whole through the offset mechanisms required by permit, licenses, and adjudications including those described above (See Discretionary State Actions To Administer Surface and Groundwater Resources In the Middle Rio Grande), to conduct water rights administration, including alternative administration, as described in Section 2.3.

Hydrologic Effects:

In the URG the SE conjunctively manages surface water and groundwater to keep total human depletions at or below the 1929 conditions. All depletions occurring as a result of transfer at the move-to location must be offset by a decrease in depletion at the move-from location, return flow, or releases of SJC Project Water. In addition, the SE conducts alternative administration or water rights administration on the Rio Chama below Abiquiu Reservoir, when necessary, as required within the federal court adjudication. Therefore, the hydrologic effects of the State actions in the URG are in the whole neutral, as measured by the effects on the river at Otowi gage. The four components are summarized below:

Transfer of Senior Water Rights

When purpose of use is changed from irrigation to another use in the URG, only a portion of the water right is transferred. The transferrable portion is about one-third of the amount that would

normally be diverted from the river to irrigate those move-from lands. Therefore, less surface water needs to be diverted to meet irrigation demand and the impact on river flow at the Otowi gage is neutral. Therefore, the hydrologic effects of the State's proposed actions in administering surface and groundwater resources in the URG are on the whole neutral, as measured by the effects on the river.

Return Flow Component

OSE groundwater permits allow permitted users to use return flow to offset their river impact pursuant to an approved return flow plan. Currently, about 1,000 AF of water is returned directly into the river between the state line with Colorado and Otowi gage. In certain instances, return flows exceed required offsets such that the river flow is augmented because groundwater pumping impacts are less than the return flows. The hydrologic effects of the State action approving return flow plans are in the whole neutral, as measured by the effects on the river.

The Letter Water Program

For each groundwater pumper utilizing SJC Project water in storage as offset, the OSE periodically provides Reclamation with letters requesting release or exchange of that storage by certain dates. This is done in order to keep total depletion above Otowi gage at or below 1929 conditions. In recent years letter water releases to offset URG stream depletion averaged about 300 AF per year. The hydrologic effects of the State action administering the letter water program are in the whole neutral, as measured by the effects on the river as measured at Otowi gage.

Water operations associated with the Letter Water Program are described by Reclamation in its draft Biological Assessment and are included in the URGWOM model simulations used in development of the draft Biological Assessment.

Alternative Administration

The SE proposes to continue administering existing water rights permits and to conduct alternative administration to ensure that the Rio Grande is kept whole through the offset mechanisms required by permit, licenses, and adjudications. Alternative Administration is based upon agreements by water right owning parties that resolve water disputes under conditions of shortage without the necessity for priority administration and curtailment of junior water rights; e.g., Rio Chama and Taos Valley. This activity serves to resolve conflicts especially during low flows and helps to balance water administration and management with available water volume.

4.5 Non-Discretionary State Actions to Administer Surface and Groundwater Resources in the Upper Rio Grande

Actions:

- The SE will continue to issue permits for small domestic, livestock and temporary uses as required under NMSA 1978, 72-12-1, in accordance the OSE 2006 Rules and

Regulations Governing the Use of Public Underground Waters for Household and Other Domestic Use.

- The SE will continue to limit the exercise of all pre-basin groundwater rights (rights established prior to State Engineer jurisdiction, which was 1956 for the Rio Grande corridor) so as not to exceed their historic legal maximum beneficial use amount, when such rights come under SE permit or license.

Hydrologic Effects:

The SE is required by statute to grant permits for domestic wells. The current State Engineer policy is to grant permits up to 1 acre-foot per year for watering livestock, irrigation of trees lawn or garden, or for household or domestic use. In the Nambe, Tesuque, Pojoaque Basin, requirements for domestic wells are more restrictive. The total estimated diversion amount of domestic use is about 4,400 AFY (OSE Water Use Report, 2005) distributed as follows: 1,480 AFY in Taos County; 2,320 in Rio Arriba County; and 600 AFY in Santa Fe County. Assuming about 50 percent of total domestic well diversions are returned to the hydrologic system, the impact on the river is about 2,200 AFY or about 3.0 cfs. The expected impact at Otowi gage is a reduction of flow of about 2,200 AFY or 3.0 cfs. This amount is insignificant and will not have any impact on the spring runoff at Central gage, however, it may have minimal impact on the river flow during dry periods and when MRGCD is not releasing water from storage. The SE is expected to issue a similar number of domestic well permits for the next 20 to 30 years (we have intentionally overestimated the number of domestic permits to be issued). The hydrologic effects of the domestic well uses are in the whole minimal, as measured by the effects on the river.

The SE limits the pre-basin groundwater pumpers (including municipal and industrial uses) to the historic legal maximum amount. We currently do not have an estimate of total pre-basin groundwater diversions in the URG. For the purpose of this analysis, based on historical water use estimates (Sorenson, 1982 Water Use By Categories in NM in 1980) with adjustments, we assume the impact of the pre-basin pumping is a reduction of the river flow at the Otowi gage of about 5 cfs. The hydrologic effects of the pre-basin pumpers are in the whole minimal, as measured by the effects on the river.

4.6 River Maintenance Actions

Actions:

The ISC proposes to continue to fund projects to control impacts and maintain river conveyance efficiency. The State proposes to continue to contribute funding to actions described in the Bureau of Reclamation Biological Assessment river maintenance activities section. The full description of the MRG river maintenance program, including State actions, is described in Reclamation's draft Biological Assessment Part 2.

Hydrologic Effects:

See Reclamation's Biological Assessment Part II.

4.7 Other Legal Existing Non-Federal Non-Pueblo Water Related Actions

The State proposes to include an additional 10 cfs of impact on the Rio Grande at Albuquerque in its proposed action to account for potential legal existing non-federal, non-Pueblo, water related activities that are not specifically described herein and/or the individual volumes estimated above for existing non-federal, non-Pueblo water related activities are low. This is a continuation of the State effort to seek broad coverage for existing legal users of water. The State recognizes that we may currently not have information about some uses (and thus would have under-estimated the effects of an individual category of actions) or may have inadvertently missed a legal existing action that is a sub-action of one of the above listing of categories.

Hydrologic Effects:

This is a placeholder for an additional 10 cfs of impact on the river flow from existing legal non-federal, non-Pueblo uses analyzed as if the effect occurs in the Albuquerque reach.

5. Cumulative Effects

The State does not anticipate reasonably foreseeable additional future State (excluding federal) or private actions in the action area, aside from those actions described herein.

6. Consultation Coverage

1. **Action by Action analysis**

We request that the actions described in this BA supplement be included as part of the Proposed Action in Reclamation's formal Section 7 consultation. It is anticipated that these actions will be able to rely on the RIP as the means for ESA compliance, provided the RIP as addressed in the BO adequately minimizes the effects of the actions, the proponent of the action has signed the Cooperative Agreement (CA) with the Service if not already a signatory to the CA, and the RIP is maintaining sufficient progress toward recovery.

2. **Future Actions analyzed by Category**

It is requested that future actions within the seven categories of actions addressed in this BA supplement be included as part of the Proposed Action in Reclamation's formal Section 7 consultation. It is anticipated that specific future actions within these categories will be able to rely on the RIP as their means for ESA compliance, provided the RIP as addressed in the BO adequately minimizes the effects of the actions, the proponent of the action signs the CA with the Service if not already a signatory to the CA, and the RIP is maintaining sufficient progress toward recovery. Federal action agencies may choose to request and obtain confirmation from the Service of coverage for such individual actions upon submission of documentation establishing that the action is within a category covered by the BO and that the proponent of the

action is a signatory to the CA.

7. Proposed Conservation Measures

The State proposes the activities identified in this Section to the State Supplement for inclusion as conservation measures in Reclamation's July 31, 2012 Joint Biological Assessment (July 31, 2012 BA) for water management and maintenance activities in the Rio Grande Basin (U.S. Bureau of Reclamation 2012). These conservation measures are intended to minimize or avoid effects to listed species or critical habitat that may occur through the actions proposed by the State. It is expected that Reclamation will include these conservation measures with those offered by other stakeholders (including Reclamation) in its July 31, 2012 BA to the Service for consideration by the Service in determining whether the overall proposed action is likely to jeopardize the continued existence of the listed species. The State will continue to utilize its authority to support objectives that alleviate jeopardy and to recover listed species in a manner not inconsistent with existing and future water uses, and consistent with State laws.

The following activities address and offset the effects of the actions proposed by the State for coverage in the current consultation. These conservation measures are responsive to two specific MRG flow regimes: (1) when there is a potential reduction in spring peak flow that may otherwise affect RGSM spawning and/or egg incubation and rearing of larvae, and (2) when there is a potential reduction in summer flow that could lead to reduced habitat diversity, river intermittency, or drying. Contingent on continuing authority, the availability of funding and/or water, and continuation or renewal of existing agreements, the State will endeavor to fulfill the following environmental commitments:

1. Work with the Rio Grande Compact Commission to secure approval for Army Corps of Engineers (ACOE) deviations from normal operations at its Flood Control Reservoirs to improve flow management for spawning;
2. Subject to availability, provide up to 60 acre-feet per deviation of senior consumptive use rights from the Strategic Water Reserve (N.M. Stat. § 72-14-3.3) to Reclamation and/or the ACOE for offsets of spawning-related depletions resulting from Cochiti Reservoir deviations for up to ten years unless able to extend;
3. Work cooperatively with other Program partners to maintain existing overbank habitat constructed by the State since 2006 in the Albuquerque and Isleta reaches for a period of at least 10 years from the date of construction, which will result in habitat availability at a greater range of flows in which spawning, egg incubation, and larval rearing can occur;
4. Continue to contribute depletion offsets for the State's existing habitat restoration projects within the Albuquerque and Isleta reaches;
5. Continue the habitat restoration depletion offset program for the ACOE MRG Floodway Projects in accordance with existing agreements between the ISC and ACOE; specifically, the Route 66 Project and Albuquerque Restoration Project;
6. Provide up to 2,000 acre-feet per event (not to exceed a total of 6,000 acre-feet) of currently unallocated Rio Grande Compact relinquishment credit for storage in El

Vado Reservoir under State Engineer Permit 1690 for later release at low flow rates when MRGCD is not otherwise releasing stored water. The low flow rate releases would be made to provide real time offsets.

In addition, the following activities address the highly variable nature of MRG hydrology, including prolonged drought, so as not to lose gains made for the species. Contingent on continuing authority, continuation or renewal of existing agreements, and the availability of funding and/or water, the State will endeavor to fulfill the following environmental enhancements:

1. Continuation of existing agreements for the management and operation of the Los Lunas Silvery Minnow Refugium; and
2. Lease senior consumptive use rights from the Strategic Water Reserve (N.M. Stat. § 72-14-3.3) to Reclamation and/or the ACOE for offsets of overbanking depletions resulting from ACOE Flood Control Reservoir deviations. ;

8. Species Effects

The following is an assessment of the effects of the State's actions on the federally listed species: Rio Grande silvery minnow (*Hybognathus amarus*; silvery minnow), Southwestern willow flycatcher (*Empidonax traillii extimus*; flycatcher), Pecos sunflower (*Helianthus paradoxus*, sunflower), and Interior least tern (*Sternula antillarum athalassos*, tern). A determination of the effect of each identified category of actions was made according to Section 7(c)(1) of ESA and the interpretations and implementing regulations provided in 50 CFR 402.12. In determining if a given action is likely to adversely affect a species, consideration was given to the potential effect of the action on life history functions (e.g., survival, reproduction, recruitment) at the population level and on the primary constituent elements of critical habitat. All determinations include direct and indirect effects. Three levels of effects were considered:

- Not likely to affect: there is no potential effect of the action on listed or proposed species, or on designated or proposed critical habitat;
- May affect, but not likely to adversely affect: there is a small potential effect of the action on listed or proposed species, or on designated or proposed critical habitat; this effect is not sufficient to adversely impact the species or it may be beneficial to the species; and
- Likely to adversely affect; there is a potential effect of the action on listed or proposed species, or on designated or proposed critical habitat such that the species is negatively impacted.

Rio Grande Silvery Minnow

Summary of Effects on the Rio Grande Silvery Minnow

In summary, the majority of the State's proposed actions may affect but are not likely to adversely affect the species and its critical habitat, and some actions are likely to directly or indirectly benefit the silvery minnow and its critical habitat (Table 1). Discretionary and non-discretionary actions related to administration of the Rio Grande Compact and surface water and groundwater resources generally help to provide water during low natural flow periods, to offset groundwater depletions, and to maintain flow during conveyance. These actions all help to provide more reliable river flows and help reduce the frequency, duration, and magnitude of drying events. Providing more continuous and reliable flow in the MRG benefits all life stages of the silvery minnow and its critical habitat in all seasons.

Table 1. Summary of effects of the State's actions on the Rio Grande silvery minnow.

Action Category	Summary of Effects	Summary of Determinations
1. Discretionary Actions Related to Administration of the Rio Grande Compact	These actions allow for storage of water during the spring snowmelt peak when it would otherwise not be allowed to meet water needs at other times of the year. This action reduces spring flows to some extent but helps to provide water at other times that benefits various life stages. During low flow periods, this reduces the frequency, duration, and length of river drying.	These actions may affect, but are not likely to adversely affect the Rio Grande silvery minnow and its critical habitat. Providing relinquishment water during low natural flow periods is likely to benefit the species.
2. Discretionary Actions To Administer Surface and Groundwater Resources In the Middle Rio Grande	These actions offset flow depletions from ground water pumping which will likely benefit the silvery minnow. In some instances, senior surface water rights transfers from south of the Albuquerque reach may result in a small amount of depletion in the Albuquerque reach that may affect habitat only in that reach during extremely low flows. The letter water program provides a near real-time offset of groundwater pumping, except during times when MRGCD is not releasing water from storage.	These actions may affect, but are not likely to adversely affect the Rio Grande silvery minnow and its critical habitat. Offsetting ground water depletions helps to maintain flow in the river, especially during low-flow periods.
3. Non-Discretionary State Actions To Administer Surface and Groundwater Resources In the Middle Rio Grande	These actions result in flow reductions in the MRG during low flow conditions. Such low flow periods happen only when MRGCD is not releasing water from storage.	These actions are likely to adversely affect the Rio Grande silvery minnow and its critical habitat because of small depletions at low flow conditions that occur only when MRGCD is not releasing water from storage.
4. Discretionary State Actions To Administer Surface and Groundwater Resources In the Upper Rio Grande	These actions have a minimal effect at the Otowi gage, which is upstream of critical habitat and occupied habitat of the silvery minnow.	These actions are not likely to affect the Rio Grande silvery minnow and its critical habitat because these result in minimal flow reductions at the Otowi gage that are too small to measure in occupied and critical habitat that is located further downstream.
5. Non-Discretionary State Actions To Administer Surface and Groundwater Resources in the Upper Rio Grande	These actions have a minimal effect at the Otowi gage, which is upstream of critical habitat and occupied habitat of the silvery minnow.	These actions are not likely to affect the Rio Grande silvery minnow and its critical habitat because these result in minimal flow reductions at the Otowi gage that are too small to measure in occupied and critical habitat that is located further downstream.

Effects on the Rio Grande Silvery Minnow by Action Category

1. Discretionary Actions Related to Administration of the Rio Grande Compact

The effects of the State's proposed discretionary actions in administering the Compact are as a whole positive as measured by the ability to make relinquishment water available in upstream storage for release to benefit irrigation needs in the middle valley, City of Santa Fe needs for storage in Nichols and McClure reservoirs, and to meet flow targets of the 2003 BiOp when native water storage would otherwise not be available to do so. Water stored and released during low natural flow periods provides higher flow in the MRG that benefits the silvery minnow by maintaining habitat for all life stages during summer (Table 2). Low flow periods are particularly critical to the species as the river may become intermittent or dry in some portions of the lower MRG leaving fish stranded in isolated and drying pools of water. Providing water during low flow events reduces the frequency, extent, and duration of drying events and increases survival of fish in river reaches that might otherwise become intermittent or dry. The silvery minnow is short-lived with a longevity of 2-4 years, and all ages of fish participate in spawning (including fish reaching one year of age), so maintaining river habitat annually, especially during dry periods sustains the reproductive stock of the population and enables self-sustainability.

Helping to maintain flow during low flow periods also helps to protect the primary constituent elements of critical habitat, including space for individual and population growth; food, water quantity and quality; cover or shelter; sites for breeding, reproduction, or rearing of offspring; and habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species. Continuous summer flow helps to maintain habitat, including water depth, temperature, and quality, as well as food production.

The storage of the relinquished water during the spring snowmelt runoff normally will have little impact on the peak flow of the MRG. The magnitude of reduction will depend on the release from Abiquiu Reservoir at the time storage occurs and the current snowmelt runoff flow reaching the Rio Grande from other parts of the basin. Under normal circumstances, the magnitude of flow reduction will be small and a snowmelt runoff peak will still occur in the MRG that stimulates the silvery minnow to spawn and provides suitable conditions for incubation of eggs and rearing of young. In years of low spring runoff, flow reduction may be measurable and may reduce spawning and nursery habitat. The effect of peak flow reduction will likely vary longitudinally as recent research has found that the flow to habitat relationship is different for the Albuquerque, Isleta, and San Acacia reaches. The reduction in peak flows is likely to adversely affect spawning and may only minimally affect conditions for incubation of eggs and rearing of young if the reduction occurs at a narrow flow range in which shallow-water habitats are affected.

In summary, the State's discretionary actions related to administration of the Rio Grande Compact can reduce spring peak flows but help to provide continuous summer flow that reduces the frequency, duration, and length of river drying. Overall, these actions may affect, but are not likely to adversely affect the Rio Grande silvery minnow and its critical

habitat. Providing relinquishment water during low natural flow periods is likely to benefit the species.

Table 2. Direct and indirect effects of discretionary actions related to administration of the Rio Grande Compact on life history and primary constituent elements (PCEs) of critical habitat for the Rio Grande silvery minnow.

2a. Life History					
Season	Spawning	Eggs	Larval	Juvenile	Adult
Spring (April-June)	• Reduction in peak flow may affect spawning and may only minimally affect conditions for incubation of eggs and rearing of young if the reduction occurs at a narrow flow range in which shallow-water habitats are affected; these actions are likely to adversely affect spawning, and egg and larval life stages of the silvery minnow.			• Reduction in peak flow is not expected to be of a magnitude that will affect habitat of juvenile and adult life stages; these actions may affect, but are not likely to adversely affect juvenile and adult life stages of the silvery minnow.	
Summer (June-September)	• There may be a small amount of spawning that takes place in summer; these actions are not likely to adversely affect spawning, and egg and larval life stages of the silvery minnow.			• Water stored and released during low natural flow periods provides continuous flow in the MRG that benefits the silvery minnow by maintaining habitat for all life stages; these actions are likely to benefit the silvery minnow.	
Fall (September-November)	• Spawning, egg incubation, and larval rearing of silvery minnow normally do not take place in fall and winter.				
Winter (December-March)					
2b. Critical Habitat Primary Constituent Elements					
Element	Spawning	Eggs	Larval	Juvenile	Adult
A hydrologic regime that provides sufficient flowing water with low to moderate currents capable of forming and maintaining a diversity of aquatic habitats.	• Water stored and released during low natural flow periods helps to provide sufficient flowing water and maintaining a diversity of aquatic habitats; these actions will help provide continuous flows which will likely benefit the silvery minnow.				
Presence of a diversity of habitats for all life history stages	• Water stored and released during low natural flow periods provides continuous flow in the MRG that benefits the silvery minnow by maintaining habitat for all life stages; these actions are likely to help maintain in channel flow and habitat diversity which will likely benefit the silvery minnow.				
Sufficient flows from early spring (March) to early summer (June) to trigger spawning	• Reduction in peak flow is not expected to affect a spawning trigger for silvery minnow; these actions may affect, but are not likely to adversely affect spawning of the silvery minnow.				
Flows in the summer (June) through fall (October) that do not increase prolonged periods of low or no flow	• There may be a small amount of spawning that takes place in summer; these actions are not likely to affect spawning, and egg and larval life stages of the silvery minnow.			• Water stored and released during low natural flow periods provides continuous flow in the MRG that benefits the silvery minnow by maintaining habitat for all life stages; these actions are likely to benefit the silvery minnow.	
Constant winter	• Spawning, egg incubation, and larval rearing of			• Water stored and released during low	

Flow	silvery minnow normally do not take place in winter.	natural flow periods provides persistent habitat over winter, especially in deepened pools and around instream woody debris; these actions are likely to benefit the silvery minnow.
River reach length	• Water stored and released during low natural flow periods helps to maintain river reach length by reducing the frequency, duration, and length of river drying; these actions are likely to benefit the silvery minnow. • Reduced peak flow is not likely to affect river length, except possibly for a minor increase in sinuosity, which could increase habitat diversity; these actions are likely to benefit the silvery minnow.	
Habitat "Quality" in each reach and refugial habitats	• Water stored and released during low natural flow periods helps to maintain river flow and habitat that is likely to benefit the silvery minnow. • Reduced peak flow in low flow periods could reduce or increase habitat diversity and quality depending on magnitude of river flow; these actions may affect, but are not likely to adversely affect spawning and incubation of the silvery minnow.	
Substrates size	• The effect of reduced peak flow on sediment transport is expected to be minimal, and may affect, but is not likely to adversely affect the silvery minnow.	
Temp >1˚ - <30˚C. DO > 5 mg/L pH (6.6-9.0)	• Water stored and released during low natural flow periods helps to maintain river flow and circulation that benefits water quality; these actions are likely to benefit the silvery minnow. • The effect of reduced peak flow on water temperature, DO and pH is expected to be minimal, and may affect, but is not likely to adversely affect the silvery minnow.	
Other Contaminants	• Water stored and released during low natural flow periods helps to maintain river flow and should help with dilution of contaminants by maintaining river flow and circulation; these actions are likely to benefit the silvery minnow. • The effect of reduced peak flow on water contaminants is expected to be minimal, and may affect, but is not likely to adversely affect the silvery minnow.	

2. Discretionary Actions to Administer Surface and Groundwater Resources in the Middle Rio Grande

The three components of the offset program in the MRG include return flow, the letter water program, and transfer of senior water rights. These replace permitted groundwater pumping impacts to the river on a real-time basis whenever MRGCD is releasing water from storage. These components offset flow depletions and help to maintain balanced river flows that protect silvery minnow habitat year-around. These components are not likely to adversely affect the silvery minnow and may have a small benefit by reducing flow depletions (Table 3).

Of about 67,000 AF per year of water returned directly into the river between the Otowi gage and Elephant Butte Dam, only about 9,000 AF is included in the state's hydrologic effect analysis. The hydrologic effects of the State action approving return flow plans are as a whole neutral, as measured by the effects on the river and may even have positive impacts due to the flow augmentation. The letter water program provides a near real-time offset of the groundwater pumping effects on the river system, except during times when MRGCD is not releasing water from storage. These conditions have occurred about three times in the last ten years and not at all in the twenty preceding years. When they have occurred, it's been during the months of September and October. In general, the amount of the letter water has an insignificant effect on river flows as measured at the Central gage (1.5 cfs in September and October). Letter water has no effect on the river flow during spring runoff, or when MRGCD is releasing stored water or during winter months. During summer months, letter water has a small impact at low river flows

or when MRGCD has no stored water to release. The letter water program is likely to have little effect on the silvery minnow and its critical habitat.

In general, during spring runoff or when MRGCD is releasing stored water, transfer of a senior water right has a *de minimus* effect on river flow. During the winter months the river flow is continuous, however, transfers may have a small impact on river flows due to continuing pumping at the move-to location. During summer months, transfers have an impact during periods of low river flows or during periods when MRGCD has no stored water to release. The impact of senior water rights transfers from the belen and Socorro Divisions to the Albuquerque reach would result in a reduction of about 13 cfs of the flow at the Central gage. This flow reduction is small in comparison to average annual flow at the Central gage, and is within the margin of error for flow measurement. In years of extremely low flow, this reduction could affect habitat and the silvery minnow in the Albuquerque reach. However, the amount of reduction is so small that it would not affect the Isleta and San Acacia reaches.

Letter water, including the SJC Project water that is stored by exchange in Nichols and McClure Reservoirs by the City of Santa Fe, has little or no effect on the river flow during spring runoff, or when MRGCD is releasing stored water or during winter months. This would have minimal impact on silvery minnow spawning and egg and larval habitat, as well as juvenile and adult life stages. During summer months, letter water can have a small impact at low river flows or when MRGCD has no stored water to release. This impact would also likely be minimal and could affect silvery minnow habitat primarily in those times when MRGCD is not releasing stored water. Therefore, the hydrologic effects of the State letter water component of the MRG offset program excluding ABCWUA are limited to certain periods and overall are minimal, as measured by the effects on the river flow. This form of letter water may affect, but is not likely to adversely affect the silvery minnow.

Depletions that occur during the irrigation season when MRGCD is releasing stored water to meet demand are considered effects on the MRG, and are replenished by exchange of the SJC Project water in storage to MRGCD, which holds that water for release when needed to meet demand. As such, it provides a quasi real-time offset of the groundwater pumping effects on the river system. Depletions that occur outside of the irrigation season are considered effects on Elephant Butte Reservoir. The required amount of SJC Project water is generally released to the Rio Grande in the winter for delivery to Elephant Butte Reservoir.

While there is some flexibility in when the water is delivered to Elephant Butte, it cannot be depleted in the middle valley and so there is no effect to the silvery minnow from this activity.

Offsetting depletions also helps to maintain the primary constituent elements of critical habitat, including space, food, habitat, and water quality. Continuous summer flow helps to maintain habitat, including water depth, temperature, and quality. Continuous flow also helps to maintain food production.

In summary, the State's discretionary actions to administer surface and groundwater resources in the Middle Rio Grande offset flow depletions from ground water pumping which will likely benefit the silvery minnow, although the senior water rights transfers may

result in a small amount of depletion in the Albuquerque reach that may affect habitat only in that reach during extremely low flows. The letter water program provides a near real-time offset of the groundwater pumping effects on the river system, except during times when MRGCD is not releasing water from storage. Overall, these actions may affect, but are not likely to adversely affect the Rio Grande silvery minnow and its critical habitat.

Table 3. Direct and indirect effects of discretionary actions to administer surface and groundwater resources in the middle Rio Grande on life history and PCEs of critical habitat for silvery minnow.

3a. Life History					
Season	Spawning	Eggs	Larval	Juvenile	Adult
Spring (April-June)	• This offset program replaces permitted groundwater pumping impacts to the river on a real-time basis that help to maintain river flow; these actions may affect, but are not likely to adversely affect the spawning, egg and larval stages of the silvery minnow.			• This program offsets effects of groundwater pumping but will have little effect on spring flows; these actions may affect, but are not likely to adversely affect the juvenile and adult life stages of the silvery minnow.	
Summer (June-September)	• There may be a small amount of spawning that takes place in summer; these actions may affect, but are not likely to adversely affect spawning, egg, and larval life stages of the silvery minnow. • The letter water component provides a near real-time offset of the groundwater pumping, except during times when MRGCD is not releasing water from storage; these actions are likely to adversely affect the silvery minnow when MRGCD is not releasing water (occurred 3 times in last 30 years only in September and October).			• This offset program will reduce the frequency and extent of river drying in summer, depending on annual hydrology; this may benefit the juvenile and adult stages of silvery minnow. • Senior water rights transfers may result in a small amount of depletion in the Albuquerque reach; these actions are likely to adversely affect juvenile and adult habitat during extremely low flows.	
Fall (September-November)	• Spawning, egg incubation, and larval rearing of silvery minnow normally do not take place in fall and winter.			• This offset program is likely to benefit the juvenile and adult stages of silvery minnow in fall and winter.	
Winter (December-March)					
3b. Critical Habitat Primary Constituent Elements					
Element	Spawning	Eggs	Larval	Juvenile	Adult
A hydrologic regime that provides sufficient flowing water with low to moderate currents capable of forming and maintaining a diversity of aquatic habitats.	• This offset program replaces permitted groundwater pumping impacts to the river on a real-time basis that helps to maintain river flow and habitat diversity; this will likely to benefit the silvery minnow. • This letter water component will offset groundwater pumping except during times when MRGCD is not releasing water from storage; these actions are likely to adversely affect aquatic habitats.				
Presence of a diversity of habitats for all life history stages	• This offset program replaces permitted groundwater pumping impacts to the river on a real-time basis that helps to maintain river flow and habitat diversity for all life stages; this will likely to benefit the silvery minnow.				
Sufficient flows from early spring (March) to early summer (June) to trigger spawning	• The offset program is not expected to affect a spawning trigger for silvery minnow; this action will not affect the silvery minnow.				
Flows in the summer (June)	• There may be a small amount of spawning that takes place in summer; this is not likely to affect			• Water stored and released during low natural flow periods provides continuous flow in the	

through fall (October) that do not increase prolonged periods of low or no flow	spawning, and egg and larval life stages of the silvery minnow.	MRG that benefits the silvery minnow by maintaining habitat for all life stages; these actions are likely to benefit the silvery minnow. • Senior water rights transfers may result in a small amount of depletion in the Albuquerque reach; these actions are likely to adversely affect juvenile and adult habitat during extremely low flows.
Constant winter Flow	• Spawning, egg incubation, and larval rearing of silvery minnow normally do not take place in winter.	• Offsetting groundwater depletions during low natural flow periods provides persistent habitat over winter, especially in deepened pools and around instream woody debris; these actions are likely to benefit the silvery minnow.
River reach length	• Offsetting groundwater depletions helps to maintain river reach length by reducing the frequency, duration, and length of river drying; these actions are likely to benefit the silvery minnow.	
Habitat "Quality" in each reach and refugial habitats	• Offsetting groundwater depletions helps to maintain river flow and habitat that is likely to benefit the silvery minnow.	
Substrates size	• The effect of groundwater depletion offsets on sediment transport is expected to be minimal, and may affect, but is not likely to adversely affect the silvery minnow.	
Temp >1˚ - <30˚C.	• Offsetting groundwater depletions helps to maintain river flow and should help water quality by maintaining river flow and circulation; these actions are likely to benefit the silvery minnow.	
DO > 5 mg/L		
pH (6.6-9.0)		
Other Contaminants	• Offsetting groundwater depletions helps to maintain river flow and should help with dilution of contaminants by maintaining river flow and circulation; these actions are likely to benefit the silvery minnow.	

3. Non-Discretionary State Actions to Administer Surface and Groundwater Resources in the Middle Rio Grande

In general, about 50 percent of total domestic well diversions return to the hydrologic system, therefore, the total impact on the river is a reduction of flow of about 9,150 AFY or about 12.6 cfs at the headwaters of Elephant Butte Reservoir. The expected impact at the Central gage is a reduction of flow of about 5,860 AFY or 8.0 cfs. This amount is insignificant and not measurable on the spring runoff. However, it may have minimal impact on the river during dry periods and on the silvery minnow when MRGCD is not releasing water from storage (Table 4).

The SE limits the pre-basin groundwater pumpers (including municipal and industrial uses) to the historic legal maximum amount. Total pre-basin groundwater pumping in the MRG (exclusive of 18,000 AF for ABCWUA) is about 15,000 AF. About 50 percent of this pumping is returned directly to the river, so the net impact of pre-basin pumping (exclusive of that by ABCWUA) on the river is about 7,500 AFY or about 10.4 cfs. This amount is insignificant and will not have any impact on the spring runoff; however, it may have minimal impact on the river during dry periods when MRGCD is not releasing water from storage. The hydrologic effects of the pre-basin pumpers in the MRG are in the whole minimal, as measured by the effects on the river.

In summary, the State's non-discretionary actions to administer surface and groundwater

resources in the Middle Rio Grande result in flow reductions that during low flow conditions are likely to adversely affect the Rio Grande silvery minnow and its critical habitat. This condition happens only when MRGCD is not releasing water from storage. These conditions have occurred about three times in the last ten years and not at all in the twenty preceding years. When they have occurred, it's been during the months of September and October.

Table 4. Direct and indirect effects of non-discretionary state actions to administer surface and groundwater resources in the middle Rio Grande on life history and PCEs of critical habitat for silvery minnow.

4a. Life History					
Season	Spawning	Eggs	Larval	Juvenile	Adult
Spring (April-June)	• Reductions in flow of about 12.6 cfs in lower MRG and 8.0 cfs at Central Bridge are insignificant in spring runoff and will not affect spawning or egg and larval life stages. • The net impact of pre-1956 pumping on the river is about 10.4 cfs which is insignificant in spring runoff and will not affect spawning or egg and larval life stages. • These actions may affect, but are not likely to adversely affect spawning, and egg and larval life stages of the silvery minnow.			• Reductions in flow of about 12.6 cfs in lower MRG and 8.0 cfs at Central Bridge are insignificant in spring runoff and will not affect juvenile and adult life stages. • The net impact of pre-1956 pumping on the river is about 10.4 cfs which is insignificant in spring runoff and will not affect juvenile and adult life stages. • These actions may affect, but are not likely to adversely affect juvenile and adult life stages of the silvery minnow.	
Summer (June-September)	• There may be a small amount of spawning that takes place in summer; these actions are not expected to affect spawning, egg, and larval life stages of the silvery minnow.			• Reductions in flow of about 12.6 cfs in lower MRG and 8.0 cfs at Central Bridge in summer are likely to adversely affect juvenile and adult life stages. • The net impact of pre-1956 pumping on the river is about 10.4 cfs in summer is likely to adversely affect juvenile and adult life stages. • These actions are likely to adversely affect juvenile and adult life stages of the silvery minnow in summer.	
Fall (September-November) Winter (December-March)	• Spawning, egg incubation, and larval rearing of silvery minnow normally do not take place in fall and winter.			• Reductions in flow of about 12.6 cfs in lower MRG and 8.0 cfs at Central Bridge in fall and winter may affect juvenile and adult life stages. • The net impact of pre-1956 pumping on the river is about 10.4 cfs in fall and winter may affect juvenile and adult life stages. • These actions are likely to adversely affect juvenile and adult life stages of the silvery minnow in fall and winter.	
4b. Critical Habitat Primary Constituent Elements					
Element	Spawning	Eggs	Larval	Juvenile	Adult
A hydrologic regime that provides sufficient flowing water with low to moderate currents capable of forming and maintaining a diversity of aquatic	• Reductions in flow of about 12.6 cfs in lower MRG and 8.0 cfs at Central Bridge in summer are likely to adversely affect diversity of aquatic habitats for all life stages. • The net impact of pre-1956 pumping on the river is about 10.4 cfs in summer is likely to adversely affect diversity of aquatic habitats for all life stages. • These actions are likely to adversely affect diversity of aquatic habitats for all life stages.				

habitats.		
Presence of a diversity of habitats for all life history stages	• Reductions in flow of about 12.6 cfs in lower MRG and 8.0 cfs at Central Bridge in summer is likely to adversely affect diversity of aquatic habitats for all life stages. • The net impact of pre-1956 pumping on the river is about 10.4 cfs in summer is likely to adversely affect diversity of aquatic habitats for all life stages. • These actions are likely to adversely affect diversity of aquatic habitats for all life stages.	
Sufficient flows from early spring (March) to early summer (June) to trigger spawning	• The net impact of groundwater pumping on the river is insignificant in spring runoff and will not affect spawning or egg and larval life stages; these actions may affect, but are not likely to adversely affect spawning of the silvery minnow.	
Flows in the summer (June) through fall (October) that do not increase prolonged periods of low or no flow	• There may be a small amount of spawning that takes place in summer; these actions are not likely to affect spawning, and egg and larval life stages of the silvery minnow.	• Reductions in flow from groundwater pumping may prolong periods of low or no flow by a small amount; these actions are likely to adversely affect the silvery minnow.
Constant winter Flow	• Spawning, egg incubation, and larval rearing of silvery minnow normally do not take place in winter.	• Reductions in flow of about 12.6 cfs in lower MRG and 8.0 cfs at Central Bridge in fall and winter may have a small reduction on flow in winter, but these actions are not likely to adversely affect this element of critical habitat.
River reach length	• Reductions in flows are not likely to affect river length, except possibly for a minor increase in sinuosity, which could increase habitat diversity; these actions are likely to benefit the silvery minnow.	
Habitat "Quality" in each reach and refugial habitats.	• Reductions in flows could reduce or increase habitat diversity and quality depending on magnitude of river flow; these actions may affect, but are not likely to adversely affect spawning and incubation of the silvery minnow.	
Substrates size	• The effect of flow reductions on sediment transport is expected to be minimal, and may affect, but is not likely to adversely affect the silvery minnow.	
Temp >1˚ - <30˚C.		
DO > 5 mg/L		
pH (6.6-9.0)		
Other Contaminants		

4. Discretionary State Actions to Administer Surface and Groundwater Resources in the Upper Rio Grande

In the URG the SE conjunctively manages surface water and groundwater to keep total depletion at or below the 1929 conditions. All depletions occurring as a result of transfer at the move-to location must be offset by a decrease in depletion at the move-from location, return flow, or releases of SJC Water. Therefore, the hydrologic effects of the State action approving transfers in the URG are in the whole neutral, as measured by the effects on the river at Otowi gage. The three components of the offset program in the MRG include the return flow component, the letter water program, and transfer of senior water rights. These components are not likely to adversely affect the silvery minnow and may have a small benefit by reducing flow depletions (Table 5).

The SE proposes to continue administering existing water rights permits and to conduct alternative administration to ensure that the Rio Grande is kept whole through the offset mechanisms required by permit, licenses, and adjudications. Alternative Administration is based upon agreements by water right owning parties that resolve water disputes under

conditions of shortage without the necessity for priority administration and curtailment of junior water rights; e.g., Rio Chama, and Taos Valley. This activity serves to resolve conflicts especially during low flows and helps to balance water administration and management with available water volume. This activity is not likely to affect the silvery minnow and, by averting water challenges during low flow periods, may benefit the silvery minnow.

In summary, the State's discretionary actions to administer surface and groundwater resources in the Upper Rio Grande are not likely to affect the Rio Grande silvery minnow and its critical habitat. These actions include activities upstream of the Otowi gage that will have only minimal effects to the silvery minnow in occupied habitat that is further downstream.

Table 5. Direct and indirect effects of discretionary actions to administer surface and groundwater resources in the upper Rio Grande on life history and PCEs of critical habitat for silvery minnow.

5a. Life History					
Season	Spawning	Eggs	Larval	Juvenile	Adult
Spring (April-June)	• This offset program replaces permitted groundwater pumping impacts to the river on a real-time basis, but these offsets will have little effect on spring flows; these actions may affect, but are not likely to adversely affect the spawning, egg and larval stages of the silvery minnow.			• This program offsets effects of groundwater pumping but will have little effect on spring flows; these actions may affect, but are not likely to adversely affect the juvenile and adult life stages of the silvery minnow.	
Summer (June-September)	• There may be a small amount of spawning that takes place in summer; these actions may affect, but are not likely to adversely affect spawning, egg, and larval life stages of the silvery minnow.			• This offset program will reduce the frequency and extent of river drying in summer, depending on annual hydrology; these actions reduce summer depletions that may benefit the juvenile and adult stages of silvery minnow.	
Fall (September-November)	• Spawning, egg incubation, and larval rearing of silvery minnow normally do not take place in fall and winter.			• This offset program is likely to benefit the juvenile and adult stages of silvery minnow in fall and winter.	
Winter (December-March)					
5b. Critical Habitat Primary Constituent Elements					
Element	Spawning	Eggs	Larval	Juvenile	Adult
A hydrologic regime that provides sufficient flowing water with low to moderate currents capable of forming and maintaining a diversity of aquatic habitats.	• This offset program will reduce the frequency and extent of river drying in summer, depending on annual hydrology, and will help to maintain diversity of aquatic habitats; these actions reduce summer depletions and are likely to benefit all life stages of silvery minnow.				
Presence of a diversity of habitats for all life history stages	• This offset program will reduce the frequency and extent of river drying in summer, depending on annual hydrology, and will help to maintain diversity of aquatic habitats; these actions reduce summer depletions and are likely to benefit all life stages of silvery minnow.				
Sufficient flows from early spring (March) to early summer (June) to trigger	• This offset program replaces permitted groundwater pumping impacts to the river on a real-time basis, but these offsets will have little effect on spring flows; these actions may affect, but are not likely to adversely affect spawning of the silvery minnow.				

spawning		
Flows in the summer (June) through fall (October) that do not increase prolonged periods of low or no flow	• There may be a small amount of spawning that takes place in summer; these actions are not likely to affect spawning, and egg and larval life stages of the silvery minnow.	• This offset program is likely to benefit the juvenile and adult stages of silvery minnow in summer and fall.
Constant winter Flow	• Spawning, egg incubation, and larval rearing of silvery minnow normally do not take place in winter.	• Offsetting groundwater depletions during low natural flow periods provides persistent habitat over winter, especially in deepened pools and around instream woody debris; these actions are likely to benefit the silvery minnow.
River reach length	• Offsetting groundwater depletions helps to maintain river reach length by reducing the frequency, duration, and length of river drying; these actions are likely to benefit the silvery minnow.	
Habitat "Quality" in each reach and refugial habitats	• Offsetting groundwater depletions helps to maintain river flow and habitat that is likely to benefit the silvery minnow.	
Substrates size	• The effect of groundwater depletion offsets on sediment transport is expected to be minimal, and may affect, but is not likely to adversely affect the silvery minnow.	
Temp >1˚ - <30˚C.	• Offsetting groundwater depletions helps to maintain river flow and should help water quality by maintaining river flow and circulation; these actions are likely to benefit the silvery minnow.	
DO > 5 mg/L		
pH (6.6-9.0)		
Other Contaminants	• Offsetting groundwater depletions helps to maintain river flow and should help with dilution of contaminants by maintaining river flow and circulation; these actions are likely to benefit the silvery minnow.	

5. Non-Discretionary State Actions to Administer Surface and Groundwater Resources in the Upper Rio Grande.

The maximum estimated impact of domestic and livestock wells at the Otowi gage is a reduction of flow of about 2,200 AFY or 3 cfs. This amount is insignificant and will not have any impact on the spring runoff at Central gage, however, it may have minimal impact on the river flow during dry periods and MRGCD is not releasing water from storage. The SE is expected to issue a similar number of domestic well permits for the next 20 to 30 years. The hydrologic effects of the domestic well uses are in the whole minimal, as measured by the effects on the river.

The SE limits the pre-basin groundwater pumpers (including municipal and industrial uses) to the historic legal maximum amount. The impact of the pre-basin pumping in the URG is a reduction of the river flow at the Otowi gage of about 3,600 AFY or about 5 cfs. This amount is small and will not have any impact on the spring runoff at Central gage; however, it may have minimal impact on the river flow during dry periods when MRGCD is not releasing water from storage (Table 6).

In summary, the State's non-discretionary actions to administer surface and groundwater resources in the Upper Rio Grande are not likely to affect the Rio Grande silvery minnow and its critical habitat. These actions include activities upstream of the Otowi gage that will have only minimal effects to the silvery minnow in occupied habitat and critical habitat

that are located further downstream.

Table 6. Direct and indirect effects of non-discretionary state actions to administer surface and groundwater resources in the middle Rio Grande on life history and PCEs of critical habitat for silvery minnow.

6a. Life History					
Season	Spawning	Eggs	Larval	Juvenile	Adult
Spring (April-June)	• Reductions in flow of about 3 cfs at the Otowi gage occur in the URG and are insignificant in spring runoff and will not affect spawning or egg and larval life stages. • The net impact of pre-1956 pumping on the river is about 5 cfs at the Otowi gage in the URG and is insignificant in spring runoff and will not affect spawning or egg and larval life stages. • These actions occur upstream of occupied and critical habitat and are not likely to affect spawning, and egg and larval life stages of the silvery minnow.			• Reductions in flow of about 3 cfs at the Otowi gage occur in the URG and are insignificant in spring runoff and will not affect juvenile and adult life stages. • The net impact of pre-1956 pumping on the river is about 5 cfs at the Otowi gage in the URG and is insignificant in spring runoff and will not affect juvenile and adult life stages. • These actions occur upstream of occupied and critical habitat and are not likely to affect juvenile and adult life stages of the silvery minnow.	
Summer (June-September)	• There may be a small amount of spawning that takes place in summer. • These actions are not expected to affect spawning, egg, and larval life stages of the silvery minnow.			• Reductions in flow of about 3 cfs at the Otowi gage occur in the URG and are insignificant to summer flows and will not affect juvenile and adult life stages. • The net impact of pre-1956 pumping on the river is about 5 cfs at the Otowi gage in the URG and is insignificant to summer flows and will not affect juvenile and adult life stages. • These actions occur upstream of occupied and critical habitat and are not likely to affect juvenile and adult life stages of the silvery minnow.	
Fall (September-November) Winter (December-March)	• Spawning, egg incubation, and larval rearing of silvery minnow normally do not take place in fall and winter.			• Reductions in flow of about 3 cfs at the Otowi gage occur in the URG in fall and winter and will not affect juvenile and adult life stages. • The net impact of pre-1956 pumping on the river is about 5 cfs at the Otowi gage in the URG and in fall and winter will not affect juvenile and adult life stages. • These actions occur upstream of occupied and critical habitat and are not likely to affect juvenile and adult life stages of the silvery minnow.	
6b. Critical Habitat Primary Constituent Elements					
Element	Spawning	Eggs	Larval	Juvenile	Adult
A hydrologic regime that provides sufficient flowing water with low to moderate currents capable of forming and maintaining a	• Reductions in flow at the Otowi gage are well upstream of critical habitat for the silvery minnow; these actions are not likely to affect flows within critical habitat of the silvery minnow.				

diversity of aquatic habitats.		
Presence of a diversity of habitats for all life history stages	• Reductions in flow at the Otowi gage are well upstream of critical habitat for the silvery minnow; these actions are not likely to affect habitat diversity for the silvery minnow.	
Sufficient flows from early spring (March) to early summer (June) to trigger spawning	• Reductions in flow at the Otowi gage are well upstream of critical habitat for the silvery minnow; these actions are not likely to affect spawning of the silvery minnow.	
Flows in the summer (June) through fall (October) that do not increase prolonged periods of low or no flow	• There may be a small amount of spawning that takes place in summer; these actions are not likely to affect spawning, and egg and larval life stages of the silvery minnow.	• Reductions in flow at the Otowi gage are will upstream of critical habitat for the silvery minnow; these actions are not likely to affect summer flows in critical habitat.
Constant winter Flow	• Spawning, egg incubation, and larval rearing of silvery minnow normally do not take place in winter.	• Reductions in flow of about 3.0 cfs at the Otowi gage in fall and winter will not affect winter flows in occupied critical habitat.
River reach length	• Reductions in flows at the Otowi gage are not likely to affect occupied critical habitat.	
Habitat "Quality" in each reach and refugial habitats.		
Substrates size		
Temp >1˚ - <30˚C.		
DO > 5 mg/L		
pH (6.6-9.0)		
Other Contaminants		

6. Summary Effects of State Water Related Actions on the Rio Grande Silvery Minnow

Summary effects, in the context of a biological assessment, are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02).

- Municipal and industrial uses of water in the MRG are increasing and because no new water is available, entities seeking water must acquire it from other users and transfer it to the proposed new uses.
- Estimates of the total amount of land currently irrigated within the MRGCD are between 50,000 and 65,000 acres, and the claims to the water are likely much greater than the actual amount of wet water, particularly during drought. However, since only the consumptive use portion of the valid senior water right is allowed to be transferred, approximately two-thirds of the water currently needed to irrigate farms will remain in the system.
- The cumulative effects of the components of the OSE Offset Program to offset the depletive effect of groundwater pumping to date have been minimal and are expected to be so in the future. Because return flows currently offset the vast majority of

groundwater pumping impacts, the majority of offset is made contemporaneous with the impact of groundwater pumping on the river. If the OSE had not conjunctively managed water resources and surface water offsets were not required, there would be less water in the river system which would have a negative impact on the species.

- In summary, the effects of the actions proposed by the State on the Rio Grande silvery minnow are described in the analysis presented above. These effects equal about 32.9 cfs of depletions in the MRG, plus an estimated 10 cfs of additional depletion from other existing actions that may have been taking place for many years prior to the defined action and whose effects are likely to continue into the future. These depletions are the worst possible case scenario, based on generally conservative assumptions, as they are not likely to occur simultaneously or at the same location. The State also proposes to continue a number of permitting activities that would result, and have been analyzed herein, in an additional 30 cfs of effect on the river in 20 to 30 years time. These depletions may affect, but are not likely to adversely affect the silvery minnow when they occur at high and medium flow periods. However, these depletions are likely to adversely affect the silvery minnow if they occur under low flow conditions when MRGCD is not operating and may lead to river intermittency or drying. The 32.9 cfs depletion in the MRG is computed as the sum of: senior water rights transfers to date = 13 cfs; letter water program = 1.5 cfs; domestic wells and livestock use = 8 cfs; and pre-basin groundwater pumping = 10.4 cfs.

Southwestern Willow Flycatcher

<u>Summary of Effects on the Southwestern Willow Flycatcher</u>

In summary, the State's proposed actions are either likely to have negligible or slightly beneficial effects on the willow flycatcher and its critical habitat (Table 7). The State's actions are not likely to adversely affect the species and its critical habitat. Discretionary and non-discretionary actions related to administration of the Rio Grande Compact and surface water and groundwater resources generally help to provide water during low natural flow periods, to offset groundwater depletions, and to maintain flow during conveyance. These actions all help to provide more reliable river flows and help reduce the frequency, duration, and magnitude of drying events. These actions help to maintain water in the river that helps to sustain the overall river ecosystem and riparian areas used by the flycatchers for nesting, feeding, and stopover.

Table 7. Summary of effects of the State's actions on the southwestern willow flycatcher.

Action Category	Not Likely to Affect	Summary of Effects Determinations
1. Discretionary Actions Related to Administration of the Rio Grande Compact	These actions relinquish water from the spring peak to meet water needs at other times of the year. This reduces spring peak flows but help to provide continuous year-around that helps to maintain riparian habitat used by the willow flycatcher.	These actions may affect, but are not likely to adversely affect the southwestern willow flycatcher and its critical habitat. Providing relinquishment water during low natural flow periods is likely to benefit the species.
2. Discretionary	These actions offset flow depletions from ground	These actions may affect, but are not likely to

Actions To Administer Surface and Groundwater Resources In the Middle Rio Grande	water pumping which will likely benefit the willow flycatcher. The senior water rights transfers may result in a small amount of depletion in the Albuquerque reach that may affect habitat only in that reach during extremely low flows. The letter water program provides a near real-time offset of the groundwater pumping effects on the river system, except during times when MRGCD is not releasing water from storage.	adversely affect the southwestern willow flycatcher and its critical habitat. Offsetting ground water depletions helps to maintain flow in the river that helps to maintain riparian habitat.
3. Non-Discretionary State Actions To Administer Surface and Groundwater Resources In the Middle Rio Grande	These actions result in flow reductions in the MRG during low flow conditions. This happens only when MRGCD is not releasing water from storage.	These actions may affect, but are not likely to adversely affect the southwestern willow flycatcher and its critical habitat. Small depletions are not likely to affect the species or its riparian habitat.
4. Discretionary State Actions To Administer Surface and Groundwater Resources In the Upper Rio Grande	These actions have a minimal effect at the Otowi gage, which is upstream of critical habitat and occupied habitat of the willow flycatcher.	These actions are not likely to affect the southwestern willow flycatcher and its critical habitat because these result in minimal flow reductions at the Otowi gage that are too small to measure in occupied and critical habitat that is located further downstream.
5. Non-Discretionary State Actions To Administer Surface and Groundwater Resources in the Upper Rio Grande	These actions have a minimal effect at the Otowi gage, which is upstream of critical habitat and occupied habitat of the willow flycatcher.	These actions are not likely to affect the southwestern willow flycatcher and its critical habitat because these result in minimal flow reductions at the Otowi gage that are too small to measure in occupied and critical habitat that is located further downstream.

Effects on the Southwestern Willow Flycatcher by Action Category

1. Discretionary Actions Related to Administration of the Rio Grande Compact

The effects of the State's proposed discretionary actions in administering the Compact are as a whole, positive as measured by the ability of making relinquishment water available in upstream storage for release to benefit municipal and irrigation needs and to meet flow targets of the 2003 BiOp when native water storage would otherwise not be available to do so. Water stored and released during low natural flow periods provides a higher frequency of continuous flow in the MRG. The willow flycatcher uses some sites of the MRG for nesting and rearing its young in spring and early summer, and there is little effect to the species at other times of the year because there are either few birds in the area or the birds of all ages are mobile and move to necessary feeding and resting sites. The storage of the relinquished water during the spring snowmelt runoff normally has minimal impact on the peak flow of the MRG. This action may reduce wetted area in riparian habitats (depending on flow magnitude). These actions may affect, but are not likely to adversely affect the willow flycatcher (Table 8).

Table 8. Direct and indirect effects of discretionary actions related to administration of the Rio Grande compact on life history and PCEs of critical habitat for the willow flycatcher.

Life History	Migration (April-June & July-September)	Arrival to Territories/ Territory Establishment/Nest Building	Egg Laying/ Incubation/ Nestling/ Fledgling

		(May-July)	(June-August)
Breeding Season (April to September)	• The proposed action would have no effect on flycatcher stopover locations during migration due to the fact that flycatchers will use habitat that is less suitable during this time and farther away from water sources.	• The proposed action may indirectly affect flycatcher habitat on a negligible level. The State's actions could provide a more reliable continuous river flow, but the effect is expected to be negligible to the species	• Flycatchers during nesting are in their territories and less likely to abandon nests if conditions dry or decline in value. • Administration of the Compact may reduce peak flows that may, in turn, reduce wetted surface area in riparian habitat. These actions may affect, but are not likely to adversely affect the willow flycatcher.
Critical Habitat PCES			
Riparian Vegetation	• Riparian habitat in a dynamic successional environment to be used for nesting, foraging, migration, dispersal and shelter. Dense tree or shrub vegetation in close proximity to open water or marsh areas. The State's actions in administering the Rio Grande Compact are, on the whole, positive as measured by the ability of making relinquished water available and these actions are expected to benefit or have negligible effect on the critical habitat of the willow flycatcher.		
Insect Prey Populations	• A variety of insect prey populations found in close proximity to riparian flood plains or moist environments. The minimal difference between the no action and the proposed action may affect, but is not likely to adversely affect the insect prey populations. It is also important to note that a dry river does not impact insect populations when ponded water and adjacent drains are present.		

2. Discretionary Actions to Administer Surface and Groundwater Resources in the Middle Rio Grande

The three components of the offset program in the MRG include return flow, the letter water program, and transfer of senior water rights. These replace permitted groundwater pumping impacts to the river on a real-time basis whenever MRGCD is releasing water from storage. These components offset flow depletions and help to maintain balanced river flows that help to maintain riparian habitat used by willow flycatchers. The actions related to surface water and groundwater offset flow depletions are not likely to adversely affect the willow flycatcher and its critical habitat, and the effect is likely to be negligible (Table 9).

Table 9. Direct and indirect effects of discretionary actions to administer surface and groundwater resources In the Middle Rio Grande on life history and PCEs of critical habitat for the willow flycatcher.

Life History	Migration (April-June & July-September)	Arrival to Territories/ Territory Establishment/Nest Building (May-July)	Egg Laying/ Incubation/ Nestling/ Fledgling (June-August)
Breeding Season (April to September)	• The proposed action would have no effect on flycatcher stopover locations during migration due to the fact that the overall hydrological effects of these actions are	• The overall hydrological effects of these actions are neutral and affects to the flycatcher and its habitat are negligible. These actions should not decrease the	• Flycatchers during nesting are in their territories and less likely to abandon nests if conditions dry or decline in value.

	neutral and that flycatchers will use habitat that is less suitable during this time and farther away from water sources.	potential for overbank flooding and overall water availability for vegetation, and it should not cause a decline in territory recruitment and canopy cover/plant health/seed establishment.	• The offset program is not likely to have a measureable effect on the willow flycatcher.
Critical Habitat PCES			
Riparian Vegetation	• Riparian habitat in a dynamic successional environment to be used for nesting, foraging, migration, dispersal and shelter. Dense tree or shrub vegetation in close proximity to open water or marsh areas. These actions are expected to have a negligible effect on the critical habitat of the willow flycatcher.		
Insect Prey Populations	• A variety of insect prey populations found in close proximity to riparian flood plains or moist environments. The minimal difference between the no action and the proposed action may affect, but are not likely to adversely affect the insect prey populations. It is also important to note that a dry river does not impact insect populations when ponded water and adjacent drains are present.		

3. Non-Discretionary State Actions to Administer Surface and Groundwater Resources in the Middle Rio Grande

Assuming 50 percent of total domestic well diversions return to the hydrologic system, the total impact on the river is a reduction of flow of about 9,150 AFY or about 12.6 cfs at the headwaters of Elephant Butte Reservoir. The expected impact at the Central gage is a reduction of flow of about 5,860 AFY or 8.0 cfs. This amount is insignificant and not measurable on the spring runoff. However, it may have minimal impact on the river during dry periods when MRGCD is not releasing water from storage.

The SE limits the pre-basin groundwater pumpers (including municipal and industrial uses) to the historic legal maximum amount. Total pre-basin groundwater pumping in the MRG (exclusive of 18,000 AF for ABCWUA) is about 15,000 AF. About 50 percent of this pumping is returned directly to the river, so the net impact of pre-basin pumping (exclusive of that by ABCWUA) on the river is about 7,500 AFY or about 10.4 cfs. This amount is insignificant and will not have any impact on the spring runoff; however, it may have minimal impact on the river during dry periods when MRGCD is not releasing water from storage. The hydrologic effects of the pre-basin pumpers in the MRG are in the whole minimal, as measured by the effects on the river. These activities have some beneficial or neutral effect on the willow flycatcher. These actions are not likely affect to adversely affect the willow flycatcher or its critical habitat (Table 10).

Table 10. Direct and indirect effects of non-discretionary state actions to administer surface and groundwater resources In the Middle Rio Grande on life history and PCEs of critical habitat for the willow flycatcher.

Life History	Migration (April-June & July-September)	Arrival to Territories/ Territory Establishment/Nest Building (May-July)	Egg Laying/ Incubation/ Nestling/ Fledgling (June-August)

• Breeding Season (April to September)	• The proposed action would have no effect on flycatcher stopover locations during migration due to the fact that flycatchers will use habitat that is less suitable during this time and farther away from water sources.	• These actions are not expected to decrease the potential of overbank flooding or decrease the overall water available for vegetation, and no decline in territory recruitment and canopy cover/plant health/seed establishment is expected.	• Flycatchers during nesting are in their territories and less likely to abandon nests if conditions dry or decline in value. • These actions are not likely to have a measureable effect on the willow flycatcher.
Critical Habitat PCES			
Riparian Vegetation	• Riparian habitat in a dynamic successional environment to be used for nesting, foraging, migration, dispersal and shelter. Dense tree or shrub vegetation in close proximity to open water or marsh areas. The State's actions , but will likely have a negligible effect on critical habitat of the willow flycatcher.		
Insect Prey Populations	• A variety of insect prey populations found in close proximity to riparian flood plains or moist environments. The minimal difference between the no action and the proposed action may affect, but is not likely to adversely affect the insect prey populations. It is also important to note that a dry river does not impact insect populations when ponded water and adjacent drains are present.		

4. Discretionary State Actions to Administer Surface and Groundwater Resources in the Upper Rio Grande

In the URG the SE conjunctively manages surface water and groundwater to keep total depletion at or below the 1929 conditions. All depletions occurring as a result of transfer at the move-to location must be offset by a decrease in depletion at the move-from location, return flow, or releases of SJC Water. Therefore, the hydrologic effects of the State action approving transfers in the URG are in the whole neutral, as measured by the effects on the river at the Otowi gage. The three components of the offset program in the MRG include the return flow component, the letter water program, and transfer of senior water rights. These components are not likely to adversely affect the willow flycatcher and may have a small benefit by reducing flow depletions (Table 11).

Table 11. Direct and indirect effects of discretionary actions to administer surface and groundwater resources In the Middle Rio Grande on life history and PCEs of critical habitat for the willow flycatcher.

Life History	Migration (April-June & July-September)	Arrival to Territories/ Territory Establishment/Nest Building (May-July)	Egg Laying/ Incubation/ Nestling/ Fledgling (June-August)
Breeding Season (April to September)	• The proposed action would have no effect on flycatcher stopover locations during migration due to the fact that the overall hydrological effects of these actions are small and occur at the Otowi gage which is further	• The overall hydrological effects of these actions are neutral and affects to the flycatcher and its habitat are negligible. These actions should not decrease the potential for overbank flooding and overall water	• Flycatchers during nesting are in their territories and less likely to abandon nests if conditions dry or decline in value. • These actions are not likely to have a

	downstream.	availability for vegetation, and it should not cause a decline in territory recruitment and canopy cover/plant health/seed establishment.	measureable effect on the willow flycatcher.
Critical Habitat PCES			
Riparian Vegetation	• Riparian habitat in a dynamic successional environment to be used for nesting, foraging, migration, dispersal and shelter. Dense tree or shrub vegetation in close proximity to open water or marsh areas. These actions have a minimal effect on flows at the Otowi gage and are expected to have a negligible effect on the critical habitat of the willow flycatcher that is located further downstream.		
Insect Prey Populations	• A variety of insect prey populations found in close proximity to riparian flood plains or moist environments. The minimal difference between the no action and the proposed action may affect, but are not likely to adversely affect the insect prey populations. It is also important to note that a dry river does not impact insect populations when ponded water and adjacent drains are present.		

5. Non-Discretionary State Actions to Administer Surface and Groundwater Resources in the Upper Rio Grande

The expected impact at Otowi gage is a reduction of flow of about 2,200 AFY or 3 cfs. This amount is insignificant and will not have any impact on the flow at Central gage and on the willow flycatcher and its critical habitat. The SE is expected to issue a similar number of domestic well permits for the next 20 to 30 years. The hydrologic effects of the domestic well uses are in the whole minimal, as measured by the effects on the river.

The SE limits the pre-basin groundwater pumpers (including municipal and industrial uses) to the historic legal maximum amount. It is estimated that the impact of the URG pre-basin pumping on the Rio Grande is 5 cfs. This impact occurs at the Otowi gage and is not likely to affect the flycatcher whose critical habitat and occupied habitat is further downstream (Table 12).

Table 12. Direct and indirect effects of discretionary actions to administer surface and groundwater resources In the Upper Rio Grande on life history and PCEs of critical habitat for the willow flycatcher.

Life History	Migration (April-June & July-September)	Arrival to Territories/ Territory Establishment/Nest Building (May-July)	Egg Laying/ Incubation/ Nestling/ Fledgling (June-August)
Breeding Season (April to September)	• The proposed action would have no effect on flycatcher stopover locations during migration due to the fact that the overall hydrological effects of these actions are small and occur at the Otowi gage which is further downstream.	• The overall hydrological effects of these actions are neutral and affects to the flycatcher and its habitat are negligible. • These actions should not decrease the potential for overbank flooding and overall water availability for vegetation, and it should not cause a decline in territory	• Flycatchers during nesting are in their territories and less likely to abandon nests if conditions dry or decline in value. • These actions are not likely to have a measureable effect on the willow flycatcher.

		recruitment and canopy cover/plant health/seed establishment.	
Critical Habitat PCES			
Riparian Vegetation	• Riparian habitat in a dynamic successional environment to be used for nesting, foraging, migration, dispersal and shelter. Dense tree or shrub vegetation in close proximity to open water or marsh areas. These actions have a minimal effect on flows at the Otowi gage and are expected to have a negligible effect on the critical habitat of the willow flycatcher that is located further downstream.		
Insect Prey Populations	• A variety of insect prey populations found in close proximity to riparian flood plains or moist environments. The minimal difference between the no action and the proposed action may affect, but are not likely to adversely affect the insect prey populations. It is also important to note that a dry river does not impact insect populations when ponded water and adjacent drains are present.		

6. Summary Effects of State Water Related Actions on the Southwestern Willow Flycatcher

Summary effects, in the context of a biological assessment, are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02).

- Current demand for water in the MRG outstrips supply. Municipal and industrial uses of water are increasing and because no new water is available, entities seeking water must acquire it from existing uses and transfer it to the proposed new uses.

- Estimates of the total amount of land currently irrigated within the MRGCD are between 50,000 and 65,000 acres, and the claims to the water are likely much greater than the actual amount of wet water, particularly during drought. . However, since only the consumptive use portion of the senior water right is allowed to be transferred, approximately two-thirds of the water currently needed to irrigate farms will remain in the system.

- The effects of all water transfers to offset the depletive effect of groundwater pumping to date have been minimal and are expected to be so in the future. Because return flows currently offset the vast majority of groundwater pumping impacts, the majority of offset is made contemporaneous with the impact of groundwater pumping on the river. If surface water rights transfers were not required, offsets would not occur for historic pumping and there would be less water in the river system which would have a negative impact on the species.

- In summary, the effects of the actions proposed by the State on the southwestern willow flycatcher are described in the analysis presented above. These effects equal about 32.9 cfs of depletions in the MRG, plus an estimated 10 cfs of additional depletion from other existing actions that have been taking place for many years prior to the defined action and whose effects are likely to continue into the future. These depletions are the worst possible case scenario, based on generally conservative assumptions, as they are not likely to occur simultaneously or at the same location. The State also proposes to

continue a number of permitting activities that would result, and have been analyzed herein, in an additional 30 cfs of effect on the river in 20 to 30 years time. These cumulative effects may affect, but are not likely to adversely affect the flycatcher. The 32.9 cfs depletion in the MRG is computed as the sum of: senior water rights transfers to date = 13 cfs; letter water program = 1.5 cfs; domestic wells and livestock use = 8 cfs; and pre-basin groundwater pumping = 10.4 cfs.

Pecos Sunflower

The main population of Pecos sunflower presently exists within the La Joya State Wildlife Area (SWA), a unit of the Ladd S. Gordon Waterfowl Complex, managed by the New Mexico Game and Fish Department. The La Joya SWA was excluded from critical habitat designation for the species because of the development of a habitat management plan that adequately protects the species. In 2010, the population was extended to a ditch (cleared of tamarisk and seeded with Pecos sunflowers) that delivers water between ponds within the La Joya SWA.

The Pecos sunflower in the MRG is limited to only the areas described above within the La Joya SWA. The State's actions have little effect on the area occupied by the Pecos sunflower and on the canals that transfer water from ponds within the La Joya SWA. The State's actions will likely have no effect or minimal effect on the Pecos sunflower.

Interior Least Tern

The Interior least tern (tern) has been observed as a 'vagrant' or 'highly unusual' species amongst the avian species detected at the Bosque del Apache NWR since 1940 (Service 1995). Historically, tern nesting has been confirmed on reservoirs in Texas and in the Pecos River, but not in the MRG. A range-wide survey completed in 2005 showed that the Rio Grande/Pecos river systems collectively made up 0.8% of the population (Lott 2006). Given the very low occurrence of the tern in the MRG and the lack of evidence for historical nesting in the MRG, the State's actions will have no effect the Interior least tern.

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