

8. Composite Effect of Proposed Water Management and Maintenance

The type of lotic and riparian habitats that develop on the MRG are dependent on the interrelationship between the flow of water, the movement of sediment, and the variable character and composition of the channel boundaries over both time and space. These habitats are temporarily and spatially dynamic. The channel boundaries are influenced by the sediment erosion and depositional patterns present in the channel's bed forms, plan form patterns, and its cross section shape. Vegetation establishment and its life stage development process also effects the channels boundaries and morphology. The complexities of the fluvial and riparian processes are confounded by ongoing natural and anthropogenic actions. The river's morphology and habitat respond to these actions with varying physical and biological feedback relationships. Anthropogenic and natural occurrences in the environment have effects that interact with the proposed Water Management and Maintenance Actions to shape the river. Examples of these may include fires and runoff from upland areas, water management actions in Colorado, invasive species, and natural climate oscillations.

Since flow magnitude, frequency, and duration and sediment supply are important drivers of the morphological changes on the MRG, it is important to look at the effects of the proposed actions on these drivers. The water management actions, as described in the Part I – Water Management report for the Joint Biological Assessment of Bureau of Reclamation and Non-Federal Water Management and Maintenance Activities on the Middle Rio Grande have some effect on flow magnitude, flow duration, and a limited effect on sediment supply. The effects are primarily from the initial storage of water and the timing of the release of the stored water from El Vado Reservoir and diversion of water from the river and the flood control actions of the Corps at Cochiti Reservoir. The maintenance actions, as described in the Part II- Maintenance report for the Joint Biological Assessment of Bureau of Reclamation and Non-Federal Water Management and Maintenance Activities on the Middle Rio Grande may influence the sediment supply in a particular reach, especially if activities are designed to destabilize established vegetation in the active river corridor. The amount of influence is dependent on whether the river flow mobilizes the sediment in these destabilized areas. Assuming the river mobilizes sediment, particles may be transported as either wash or bed material load. Only the bed material load (typically particles greater than 0.0625 mm in size) has an influence on the character and composition of the channel boundaries, bed form habitats, and its pattern. The maintenance activities described in this BA do not directly affect the flow magnitude and duration. The flow magnitude and duration are driven by seasonal precipitation (spring snowmelt runoff and monsoonal thunderstorm events) and operational

factors. Maintenance activities, as described, provide for the effective safe passage of flows through the system.

The interactions between water operation and maintenance actions are ancillary compared to the very complex relationships that form the current habitat types on the MRG. These complex relationships make the quantification of the effects of these interactions difficult. The most significant effect of maintenance, including river maintenance, LFCC maintenance, drain maintenance, and MRGCD maintenance, on water management is the ability to decrease water losses between the river reaches. Water management scenarios describing future conditions assume that the baseline flow conveyance losses and gains are constant, and these are predicated on the ability to continue to perform maintenance activities. Another significant effect of the maintenance is to maintain the resiliency of the overall system to pass peak flows with minimal impacts to water delivery and riverside infrastructure.

The effects of water management on maintenance are more complicated. The lack of channel resetting flows is driven primarily by the current dry hydrological cycles, while other continuing trends are influenced, to a limited degree, by water management actions for hydrologic connectivity measures. The constant low flow conditions promote the continuation of some of the observed major current geomorphic trends on the MRG (e.g., channel narrowing) due to vegetation encroachment. The lack of channel resetting events discourages natural disturbances that may promote greater diversity in the channel boundary habitat through establishing variable vegetation age classes and the availability of bed substrates that can shift and move with the river flows, creating variable depth and velocity habitats.

Flood control via reservoir operations on the river reduces the magnitude and duration of the peak flows at the highest flow levels to protect public safety. During high flow periods, additional river and MRGCD maintenance activities may occur to protect infrastructure from damage caused by channel erosion or flooding. The MRG system and its function can be impaired if either localized or reach scale problem areas develop that necessitate flood control regulation. These types of problem areas may result from the lack of maintenance, reach channel instabilities, or public infrastructure threatened by its close proximity to the river. These problem areas significantly limit the ability of the channel to self-regulate or reset itself.

The proposed water management also may have some potential for temporarily storing early spring runoff flows for later timed release to enhance a spring runoff hydrograph during low flow years near the mean annual peak flow but this is limited due to the small relative volume from the Rio Chama. Deviation actions from the Corps may have a greater potential to benefit the river, especially if the magnitude and duration are sufficient to rework the channel. This initially may result in an increase in the amount of river maintenance activity, especially

emergency work, but may result in less river maintenance work over the long term if the channel resetting events occurred with enough frequency to avoid establishing well armored channel boundaries.

The release of stored water during nonflood periods, both for irrigation and to keep the river wet, provides more water in the river system during dry periods. These stored flow releases promote the encroachment of vegetation and limit its desiccation in the active channel. This effectively armors the channel banks and narrows the active channel width. In reaches where the sediment transport capacity is greater than the sediment supply, the channel response may include channel deepening and/or velocity increasing. This would tend to decrease the variability along the channel boundaries and also may cause a decrease in the amount of overbanking flows for flood flows. This process also may encourage bend migration by selectively armoring bars and islands through establishing woody vegetation, leaving the historical flood plain bank less hydraulically rough and, thus, more susceptible to erosion compared to the other surfaces.

In reaches where the sediment transport capacity is less than the sediment supply, the channel response may include the continued reduction of sediment transport capacity, potentially leading to sediment accumulation (aggradation) and, in some areas, sediment plugs. This also would tend to decrease the variability along the channel boundaries and also may cause an increase in the amount of overbanking flows for flood flows.

River maintenance activities, a subset of the proposed maintenance actions, historically have focused on symptoms of the observed geomorphic trends on the MRG. The objective of the proposed river maintenance action of using reach strategies is to address the causes of the observed geomorphic trends. The intention is that this effort will have a long-term effect of creating a more ecologically viable option that minimizes the amount of required river maintenance in the future because it is working better with the current understanding of the MRG.

While the effect of water management activities on river habitat conditions is continuous and is present throughout the action area, specific maintenance actions have sporadic temporal effects that may be localized or have reach-wide effects depending on the scope of the project. Long term effects for the species and their habitat are generally negligible though, it is difficult to predict the magnitude of the effect these maintenance measures have due to the complexity of the interactions of actions on the river, the river responses, and also the variability in the amount and frequency of maintenance work. Typically, maintenance activities to protect infrastructure and maintain drains and diversions have only local effect to habitats. The main short-term effect of maintenance activities is the direct disturbance of species and their habitat during construction, with negligible long-term effects on species and their habitats.

Based on the information and analysis of effects presented in this biological assessment, the following determinations were made for the silvery minnow, Southwestern willow flycatcher, Pecos sunflower, and interior least tern.

8.1 Rio Grande Silvery Minnow

The Composite Proposed Action comprised of Reclamation and non-Federal water management and maintenance actions of the Middle Rio Grande Project **are likely to adversely affect the silvery minnow**. The proposed actions are also **likely to adversely modify designated critical habitat for the silvery minnow**.

The most significant direct effects to silvery minnow include increased drying and disturbance due to construction activities. Indirect effects include modification of habitat by water operations and maintenance activities. Critical habitat is affected by the decrease in wetted habitat and increase in the number of low flow days, which has impacts on habitat quality and quantity as well as water quality. Less significant is the small decrease in the magnitude and duration of spring high flows that could affect annual recruitment of silvery minnow. Maintenance activities will be designed with a priority to avoid direct impacts to silvery minnow and critical habitat. The formation of the RIP is anticipated to facilitate actions that will be needed to mitigate for these actions and improve the status of the silvery minnow. The RIP will identify specific management activities, monitoring, and research that will be used to evaluate and improve management decisions and will allow for flexible water management while also moving toward the recovery of the species.

8.2 Southwestern Willow Flycatcher

The Composite Proposed Action comprised of Reclamation and non-Federal water management and maintenance actions of the Middle Rio Grande Project **are likely to adversely affect the willow flycatcher**. The proposed actions **are also likely to adversely modify designated critical habitat for the willow flycatcher**.

Specific effects to flycatchers include the decrease in available water for established riparian vegetation and a small decrease in the amount of overbank flooding that would occur without the action. Long-term effects include establishing new vegetation within the current channel width that may benefit birds in the short term but may have long-term negative effects if this vegetation causes the flood plain to become disconnected from the river. Maintenance activities will be designed with a priority to avoid direct impacts to flycatchers and suitable habitat. The RIP will identify specific management activities, monitoring, and research that will be used to evaluate and improve management

decisions and will allow flexible water management while also moving toward the recovery of the species.

8.3 Pecos Sunflower

The Composite Proposed Action comprised of Reclamation and non-Federal water management and maintenance actions of the Middle Rio Grande Project are **beneficial to the Pecos sunflower on La Joya Wildlife Management Area** due to delivery of water through the irrigation system on which they depend. The newly established Rhodes population of Pecos sunflower is not likely to be adversely affected due to the small magnitude of the changes to overbank flows high enough to inundate this population. Maintenance activities will be designed with a priority to avoid direct impacts to Pecos sunflower.

8.4 Interior Least Tern

The Composite Proposed Action comprised of Reclamation and non-Federal water management and maintenance actions of the Middle Rio Grande Project of the Middle Rio Grande Project will have no effect on the interior least tern.

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