

## **2004 ANNUAL REPORT**

**Middle Rio Grande Endangered Species Collaborative Program**

*<http://mrgesacp.fws.gov>*



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## Introduction

The Middle Rio Grande Endangered Species Collaborative Program (Program) is a partnership created to protect and improve the status of listed species in the Middle Rio Grande (MRG) of New Mexico while simultaneously protecting existing and future water uses in this area.

Congress appropriated nearly \$7 million in fiscal year 2004 for Program activities. The State of New Mexico provided more than \$2 million for Program supported projects in 2004. Program signatories and other non-signatory participants contributed in-kind services that included, land, access to land, personnel services and voluntary fish salvage efforts. The Collaborative Program is grateful for all federal and non-federal support.

Signatories to the Program are:

Alliance for the Rio Grande Heritage	New Mexico Interstate Stream Commission
Assessment Payers Association of the MRGCD	New Mexico State University
Bureau of Indian Affairs	Pueblo of Isleta
Bureau of Reclamation	Pueblo of Sandia
City of Albuquerque	Rio Grande Restoration
Middle Rio Grande Conservancy District	Rio Grande Water Rights Association
National Association of Industrial and Office Properties	U.S. Army Corps of Engineers
New Mexico Attorney General	U.S. Fish and Wildlife Service
New Mexico Department of Agriculture	U.S.D.A. Forest Service—Rocky Mountain Station
New Mexico Department of Game and Fish	University of New Mexico
New Mexico Environment Department	

The following pages outline a few of the numerous projects that are either ongoing or were completed in 2004. Although this report does not include all of the activities either started or completed in 2004, these projects demonstrate the significance of multiple private, tribal, local, state, and federal contributions towards achieving the goal of a healthy river system, including recovery of the endangered Rio Grande silvery minnow (silvery minnow) and the southwestern willow flycatcher (flycatcher).

## 2004 Technical Achievements

### MINNOW POPULATION MANAGEMENT

*It is rare to see an endangered species. Tanks containing silvery minnows at the City of Albuquerque's refugium draw interest from many (Photo courtesy of USFWS).*



### Minnow Breeding and Augmentation

In 2003, a \$1.7 million state-of-the-art facility was built for the breeding and rearing of silvery minnows in captivity. As a second phase of construction 12 new outdoor holding tanks, lab space, and netting for predator control were added in 2003, and additional lab space will be added in 2005. The Collaborative Program is funding phase two at a cost of \$640,000. The City of Albuquerque Biological Park provided the land and is providing staff to manage and operate the refugium with support from the New Mexico Interstate Stream Commission (NMISC).

In March 2004, the Naturalized Refugium was drained and 3,145 fish were counted. Of these, 978 were from the June 2003 Refugium spawn, demonstrating that silvery minnow can spawn, recruit and survive the winter at the site. In 2004, captive spawns at the Refugium produced 197,000 eggs with an additional 150,000 eggs produced by hormone-induced spawns.

The Program is supporting breeding and augmentation of silvery minnow through a cooperative effort between the City of Albuquerque Biological Park, the Dexter National Fish Hatchery and Technology Center (NFHTC) located in Southeastern New Mexico and the New Mexico State University (NMSU) A-Mountain Propagation Facility located in Las Cruces, NM. Spawning activities at NFHTC produced 30,000 larvae and an additional 300,000 fertilized eggs were produced from the NMSU facility and transferred to NFHTC for hatching and rearing. NFHTC also maintains a brood stock of 15,000 two and three year class silvery minnows that serve as captive brood stock of wild origin for future spawning and augmentation.

In November 2004, 59,267 young silvery minnows from the Refugium and NFHTC were marked with a color-coded tag and released in the MRG. Another 60,000 silvery minnows are being maintained at NFHTC for a March 2005 release. In sum, silvery minnow breeding is progressing quite well.

*Silvery minnows are released into the river to supplement wild populations (Photo courtesy of Jason Remshardt).*



## 2004 Technical Achievements



*Minnows were marked with a colored dye and released into the Rio Grande (Photo courtesy of USFWS).*

### **Silvery Minnow Population Augmentation Effort**

The ultimate goal of the Program augmentation effort is to re-establish self-sustaining populations of silvery minnow in the river. To meet this goal, studies are underway to:

- 1) evaluate stocking efforts and provide a better understanding of propagation methods and,
- 2) evaluate monitoring efforts.

Since June of 2002, biologists have released nearly a quarter of a million hatchery raised silvery minnows into the Middle Rio Grande. The first release in 2004, occurred in January and included 48,513 minnows raised from eggs that were salvaged in May of 2003 along the San Acacia reach and reared at DNFHT. The second release occurred in April 2004 and included 66,644 minnows. The April release represented groups of fish salvaged as eggs from the river and eggs produced from artificial spawning activities at the City of Albuquerque's Biological Park refugium and the DNFHT. Each batch of fish released to the river are marked with colored dye to aid in tracking of fish populations.

Monthly monitoring in the MRG by the U. S. Fish and Wildlife Service (USFWS) Fisheries Resource office indicate that stocking efforts are showing some success. The USFWS Fisheries Resource office recorded 450 silvery minnows collected from June 2003 to May 2004, including 99 that were positively identified as previously released fish. Of the 99 marked minnows that were recaptured, the majority (52) were recaptured from a single release. Subsequent to the April 2004 release, 3,977 silvery minnows were collected of which 296 were identified as previously released fish.

## 2004 Technical Achievements

### HABITAT RESTORATION

#### Long-Term Planning

The Program's Habitat Restoration Subcommittee, through the NMISC and its contractor TetraTech Inc., completed a long-term habitat restoration plan. The plan provides a framework to implement and integrate actions needed to address both water and endangered species management issues in the MRG. The plan also addresses habitat improvement elements identified in the U.S. Fish and Wildlife Service's Biological Opinion to avoid jeopardy for the silvery minnow and the flycatcher. It will guide habitat restoration activities by providing a framework for soliciting, reviewing and implementing habitat restoration proposals that create long-term, self-sustaining habitat for the silvery minnow and flycatcher. The plan also provides a technical resource for the development and assessment of the Program restoration activities.



*Dr. Thomas A. Wesche supervising the construction of perennial pools (Photo courtesy of Sterling Grogan).*

#### Perennial Pools

The Middle Rio Grande Conservancy District (MRGCD) is managing the effort to design, install and evaluate three cottonwood snag habitat improvement structures along the MRG Albuquerque reach. The snags provide needed woody debris to enhance habitat structure, complexity, cover and food for the silvery minnow. Preliminary results show that: 1) the snags continue to maintain their structural integrity; 2) hydraulic performance is satisfactory but further evaluation under higher flows is needed; 3) the habitat provided is similar to that known to be used by silvery minnow; and, 4) colonization by aquatic macroinvertebrates has occurred.



*Snags are added that encourage scouring of river substrate to create pools used by silvery minnow (Photo courtesy of Sterling Grogan).*

## 2004 Technical Achievements

### Pueblo of Sandia Bosque Restoration

The Pueblo has completed phase two of a three phase habitat restoration project funded in part by the Collaborative Program. This project focuses on the eradication of invasive species followed by the planting of native grasses and trees. The project's goal is to create diverse habitat for native plants and animals while reducing hazardous vegetative fuels that could contribute to catastrophic fires and threaten habitat as well as Pueblo residences. The Pueblo has initiated a phase three feasibility study that focuses on silvery minnow habitat restoration. Clean water and habitat have always been a valued part of Pueblo culture and are monitored in conjunction with developing projects to ensure that these values remain intact.

*Clearing bosque invasive species, post-clearing of bosque invasive species, and replanting of cottonwoods (Photos courtesy of Alex Puglisi).*



### Pueblo of Santa Ana Restoration

The Pueblo of Santa Ana recently completed two projects partially funded by the Collaborative Program. The first project integrated new flycatcher habitat with ongoing Pueblo ecosystem restoration efforts.

The Pueblo created ten acres of flycatcher habitat through the planting of willows and by providing connections to the river to encourage flooding during high water periods. Additionally, portions of the old riverbank were graded to expand swale areas and create terraces for willow and other native shrubs. The Pueblo also removed exotic shrub species and established a buffer of diverse native plant communities around the willow swales.

The Pueblo's second project facilitated the implementation of the Conservation Water Agreement, enhanced the Pueblos's sediment management in the MRG, and supported the development and implementation of a safe harbor agreement with the USFWS for the benefit of the silvery minnow, flycatcher, and bald eagle.



## 2004 Technical Achievements

### RESEARCH AND MONITORING

#### Evaluation of Sediment Bars

The NMISC is completing a study of the size, shape, and distribution of sediment bars in the MRG. Sediment bars are an integral part of a river and a study of the dynamics and spatial distribution of bars can provide a surrogate for a full hydraulic and sediment transport study. Understanding the interaction between the flows in the river and the sediments that form the channel are critical in evaluating the design and performance of habitat improvement projects, and to assure that various projects do not adversely affect one another.

#### Vegetation Mapping

The Bureau of Reclamation (Reclamation) enlisted contractors to conduct vegetation mapping between January 2002 and January 2004. By using recent aerial photographs as basemaps and assigning species codes to designated plant community types, field crews completed vegetation classifications along specified portions of the MRG. Coordinates were recorded and converted into a Geographical Information System (GIS) spatial coverage.

#### Population Monitoring Efforts

The University of New Mexico (UNM) conducted monitoring of silvery minnow populations between January-September 2004 (one per month) at 20 sites throughout the MRG. Silvery minnow appeared to spawn multiple times during 2004 based on high numbers of fish observed in May (517) and June (411) that included young-of-year fish. The abundance of silvery minnow remained elevated above 2003 levels during most of the summer. Population monitoring efforts from September to November 2004 will be used to assess the relative success of recruitment in 2004 compared to previous years (1993-2003). Abundance of silvery minnow during September was highest in the Albuquerque reach (63), though fish were collected in the Isleta (15) and San Acacia reaches (35) as well. August through September remained a difficult time to monitor silvery minnow due to low flows and a drying river in the Isleta and San Acacia reaches. Although preliminary assessment of the population during 2004 indicates that there was an increase in the abundance of silvery minnow compared to 2003, a more complete data set gathered between October and November will provide greater confidence in the strength and spatial extent of the potential upward trend.



## 2004 Technical Achievements

*Through constant monitoring, of the drying river, the silvery minnows are captured by seining and moved to deeper parts of the river (Photo courtesy of Rob Dudley).*

### Silvery Minnow Rescue and Salvage

USFWS salvage operations collected approximately 13,000 silvery minnows during 2004, mostly young-of-year, in the MRG downstream of Isleta and San Acacia diversion dams as the river channel was drying. Of these, approximately 92.5% were transported alive and released in the Albuquerque reach where consistent river flow existed. Twenty-seven (27) species of fish were documented to exist in portions of the river that were mostly dry seven months earlier.

Observations by field biologists during the salvage suggested that during periods of extreme water scarcity, silvery minnows appear to seek out habitats that are cooler and deeper, including pools and an array of habitats in association with overhead cover, irrigation drain return flows, and shallow groundwater. These findings will be used to promote habitat improvements and address seasonal intermittent flows in these reaches.

*The Rio Grande Silvery Minnow is a stout minnow with moderately small eyes and a small, slightly oblique mouth. Adults may reach up to four inches in total length (Photo courtesy of USFWS).*

### Egg Entrainment

Silvery minnow eggs are semi-buoyant and float downstream with the current. Crews are used to salvage minnow eggs from MRGCD diversion canals at the river diversions during the spawn. In 2004, 10 eggs were collected at diversion dams. It appears that more eggs were retained upstream during the spawn suggesting a reduction in the numbers that were collected at structures and transported. Studies are underway that will examine egg retention, dispersion and travel rates in the upcoming year.



## 2004 Technical Achievements

### Genetics Studies

UNM researchers studied the genetic effects of artificial propagation and captive rearing of silvery minnows by determining levels of genetic diversity. The aim of this study was to determine how well different methods of supportive breeding reflected the genetic variation present in the wild population. Seven generations of wild silvery minnow, five stocks of captive spawned and reared fish and five stocks of captive reared wild-caught eggs were examined. Three principle findings resulted from this study. First, there were two drastic reductions in the wild population's genetic diversity that corresponded to major declines in abundance of the silvery minnow. Second, a supportive breeding program that relies on captive rearing of wild-caught eggs better reflects levels of genetic diversity than one that relies on captive spawning. And third, the combination of communal spawning, small brood stock sizes and unequal sex ratios resulted in a loss of diversity and a loss of progeny from captive spawning when compared to wild silvery minnow or stocks reared from wild-caught eggs. All of the above findings are being taken into account in the population management efforts.

### Water Quality Assessment

The USFWS completed their initial report, that included a literature search of existing water quality information within the MRG and a summary of water quality data collected during the first year (2002-2003) of the proposed four-year study.

New hydrologic and biologic data were collected at 11 sites within the MRG main stem; two sites were located in wastewater treatment plant outfalls, and one site was located in an irrigation return drain/ riverside drain. Data collected included: 1) water and sediment samples for the purpose of chemical analyses, 2) physical properties measurements of Rio Grande embayments that included water temperature, pH, specific conductance, dissolved oxygen, and turbidity, 3) physical properties measurements taken along cross-sectional surface-water channel transects, 4) physical properties measurements taken in surface water at random and discretionary seine haul locations, and 5) continuous 24-hour measurements of physical properties were made along transects. Additionally, changes in dissolved oxygen over time, as measured by the continuous-monitoring probes were used to determine the relative productivity of aquatic flora for each site and chemical and health analyses were conducted on fish collected through this study.

*Joel Lusk with the U.S. Fish and Wildlife Service installs a continuous water-quality monitoring device (Photo courtesy of Cyndie Abeyta).*



## 2004 Technical Achievements

*Data logger being programmed at Bosque del Apache (Photo courtesy of Julie Coonrod).*

### **Bosque Soil Evaporation Monitoring and Modeling**

A UNM project addressed water depletions and hydrology in the MRG that will assist decision makers in developing bosque restoration strategies. The study: 1) quantified and evaluated losses from evaporation and evapotranspiration; 2) developed an empirical predictive model for soil water evaporation; and, 3) developed an integrated GIS-based model for estimating soil water evaporation under different river conditions. In 2003-2004, five field sites were selected based on soil type, water table depth as well as different combinations of sun/shade and cleared/mulched conditions. Instrumentation arrays were located at each field site to measure soil water content, temperature, and suction between the water table and the ground surface. This project involved monitoring soil water evaporation as a function of different conditions relative to the distance to the water table, soil type, climatic conditions, river staging, shading, and surface mulch. Preliminary results indicate that water loss from unshaded soils where the groundwater table is shallow can approach that of a vegetated site.

### **Regulation of Water Flux from the Ground to the Atmosphere in Riparian Habitats**

UNM and NMSU are studying riparian evapotranspiration (ET) with partial funding from the Program. The results indicate plant water use is influenced by climate, groundwater level, and plant species. In this UNM study, salt cedar (*Tamarix chinensis*) responded to groundwater decline with increased ET as greater soil volumes were exploited by rapidly growing root systems. Cottonwood (*Populus deltoids*) showed an increase in chlorosis, a disease marked by yellowing or blanching of the leaves, as groundwater declined. When the water table dropped below six feet, crown die back and loss of leaf area were observed. ET increased with greater loss of leaf area regardless of species composition. Some reduction in ET was observed with increase in leaf area due to shading of lower canopy leaves. On a daily basis, local atmospheric conditions such as temperature and wind-speed were most related to extremes in ET. Both hydrologic and atmospheric constraints upon riparian ET are mediated through vegetation composition, local topographic features, and plant response to stress.

*ET Tower located in the bosque (Photo courtesy of James Cleverly).*



## 2004 Technical Achievements

### WATER OPERATIONS AND MANAGEMENT

#### Modeling

In a cooperative project between the NMISC and the Middle Rio Grande Conservancy District (MRGCD) initial modeling efforts have been completed that will lead to improved irrigation-system efficiencies. One project includes a Decision-Support Model that will facilitate system operations through better planning and water management. The model allows the needs of irrigators to be met while decreasing river water diversions primarily by using managed, rotational water deliveries. The decrease in MRGCD water diversion requirements would lead to a longer irrigation season during drier years, and thus decrease supplemental flow requirements. Associated with this Decision-Support Model development is a Program-initiated project for constructing and operating several new gates within the MRGCD to ensure accurate and efficient water deliveries. Separate funding by the New Mexico Water Trust Board provided for a series of automated gates within the MRGCD system.

*New metering gate, installed at the heading of the Belen High Line Canal, is equipped with an automatic controller and FM telemetry (Photo courtesy of David Gensler, MRGCD).*



The Utton Transboundary Resources Center, affiliated with the University of New Mexico School of Law, has been working with the Program to develop reservoir storage scenarios to minimize the need for additional supplemental water for endangered species. If consensus is reached on potential scenarios, they will be modeled using the Upper Rio Grande Water Operations Model (URGWOM) to identify potential water management improvements that will meet the needs of water users and the delivery requirements of the Rio Grande Compact. This effort will identify where significant water savings could occur and target long-term strategies for future Program-funded efforts.

#### More Efficient Farms

In 2004, the Program initiated a project to evaluate on-farm irrigation efficiency. Information gathered will be used to estimate on-farm efficiency under current conditions and practices, and examine the potential for increased efficiency through additional conservation measures. A newsletter will summarize information about the on-farm efficiency studies and include useful information on conservation management practices that individual irrigators within MRGCD can adopt with the realization that more supplemental water will benefit silvery minnow. The newsletter will be distributed to approximately 12,000 irrigators within the MRGCD, with another 1,000 copies supplied for distribution by Natural Resources Conservation Service offices.



## Keys to Program Success

The Program has matured greatly this past year by focusing efforts on developing a strong planning foundation for conducting its business in the most effective expeditious manner. The addition of professional staff has allowed the Program to address several existing administrative deficiencies.

### RECOVERY GOALS AND SPECIES MONITORING

Among the fundamental issues slowing Program success was the need for clear recovery goals and objectives for the silvery minnow in the MRG. Additionally, debate over how to sample minnow populations dominated some Program discussions and limited progress towards developing long-term monitoring programs to measure recovery success. To address these issues, the Program convened an advisory panel of five distinguished experts in the fields of fish ecology, statistics, ecological modeling, and hydrology to provide objective guidance that would promote long-term conservation and recovery for the silvery minnow in the MRG. The advisory panel will provide guidance on establishing sampling protocols and measurable recovery criteria for the silvery minnow in the MRG, and will provide recommendations on establishing long-term monitoring, predictive models or other tools for the purposes of evaluating Program management activities and measuring recovery success. The advisory panel met with the Program in December 2004 for a three-day workshop in Albuquerque and addressed the need to establish measurable recovery criteria that will encourage the development of focused and cost-effective implementation plans that support long-term species recovery. Their report is expected in early 2005.

### STRATEGIC PLANNING

Defining the scope and constructing a long-term plan to meet the goals of the Program has been difficult given the competing interests within the MRG and uncertainties of the species needs. To address these issues, Program signatories convened in Taos for a two-day workshop during September. Twenty-eight Program members representing 15 signatories attended. The workshop resulted in a draft of the first long-term plan identifying Program activities in order of priority. As part of the strategic planning effort the Program anticipates finalizing the Program Document (governance and organization), the Cooperative Agreement, and the Long Term Plan in early 2005. These documents will support the development of the Programmatic NEPA process and passage of the Authorizing Legislation.

## Keys to Program Success

### ORGANIZATION AND ADMINISTRATION

#### Staffing

The lack of full-time staff to ensure the Program's success was considered a critical element that needed to be addressed. In April 2004, the Program hired Pete David to serve as Program Manager to facilitate the administrative and technical functions of the Program and serve as a liaison with Program members, elected officials and the public. A search for a Program Assistant began in the fall of 2004.

*Non-federal Program signatories and the Program Manager met with Senator Domenici in Washington to discuss the Program's future direction (Photo courtesy of Janet Jarrat).*



#### Restructuring

The Program is currently reviewing its organizational structure in conjunction with the development of the Long Term Plan, Program Document, and draft Authorizing Legislation. Any structural changes will strive to improve communication among technical staff, and facilitate the development of focused request for proposals and timely review of submitted proposals.

#### Contracting

The Program pursues scientifically based solutions to address technical needs of the MRG and its' associated species. Projects such as those highlighted in this report that will benefit endangered species and their habitats along the MRG corridor are funded annually through a competitive process. Reclamation has been appropriated Program funding from Congress to provide contracting support to the Program. The Program meets with Reclamation contract staff to develop effective working relationships and ensure that contract deadlines are met. The status of all contracts and their required product deliverables are tracked in a Program database. Future requests for proposals will be more focused on specific Program priorities resulting in more timely solicitations and contract awards.

*The opening ceremonies for the Silvery Minnow Refugium at the City of Albuquerque Biological Park attracted media interested in hearing the story of minnow recovery efforts (Photo courtesy of the USFWS).*





## Keys to Program Success

### INFORMATION TECHNOLOGY

A Program goal in place since its inception has been to increase the Program's visibility and provide public access to information and studies about the Program. In 2004, the creation of a Program website (<http://mrgesacp.fws.gov/index.cfm>) was developed that demonstrates how federal and non-federal funds are being used to restore the MRG ecosystem and support species recovery. This website is accessible to the public and is continuously updated.

In 2004, the Program initiated development of a database that eventually will be linked to the website. This database will provide location maps of all projects being conducted in the MRG. Each project will be linked to a description highlighting the project objectives, funding, accomplishments, and completion date. Additionally, the database will house the numerous technical reports being generated by contractors and agencies funded by the Program.

In summary, 2004 saw a number of administrative and programmatic efforts which are moving the Collaborative Program towards achievement of its goals and objectives.



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