

# RAISING ENDANGERED FISH IN NEW MEXICO

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The Endangered Species Act (ESA) became a hot-button issue for water managers, cities, farmers, and environmentalists in New Mexico's Middle Rio Grande (MRG, between Cochiti Dam and Elephant Butte Reservoir) not long after the Rio Grande silvery minnow and the southwestern willow flycatcher were listed as endangered in the mid-1990s. Since that time, numerous basin stakeholders have been involved in parallel paths of litigation and collaboration to address the often-conflicting needs of Rio Grande silvery minnow and people. Collaborative efforts have focused on implementing projects that prevent the extinction and improve the status of the endangered species, particularly the Rio Grande silvery minnow, because of its potential impacts to MRG water users.

The Middle Rio Grande Endangered Species Collaborative Program (MRGESCP) was established in part for this purpose. It receives federal and nonfederal funding to comply with the U.S. Fish and Wildlife Service's (FWS) biological opinion requirements (2003) for MRG water operations and to investigate and implement solutions that will promote recovery of the listed species.

This article highlights just one of several successful and innovative approaches that the New Mexico Interstate Stream Commission (ISC), the City

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## *Captive breeding and propagation augments remaining populations of the silvery minnow, maintains populations in case of catastrophic events, and provides fish for reintroduction.*

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of Albuquerque, and the Albuquerque Bernalillo County Water Utility Authority (ABCWUA), as MRGESCP participants, are engaged in: the creation of rearing and breeding facilities (refugia) for the Rio Grande silvery minnow.

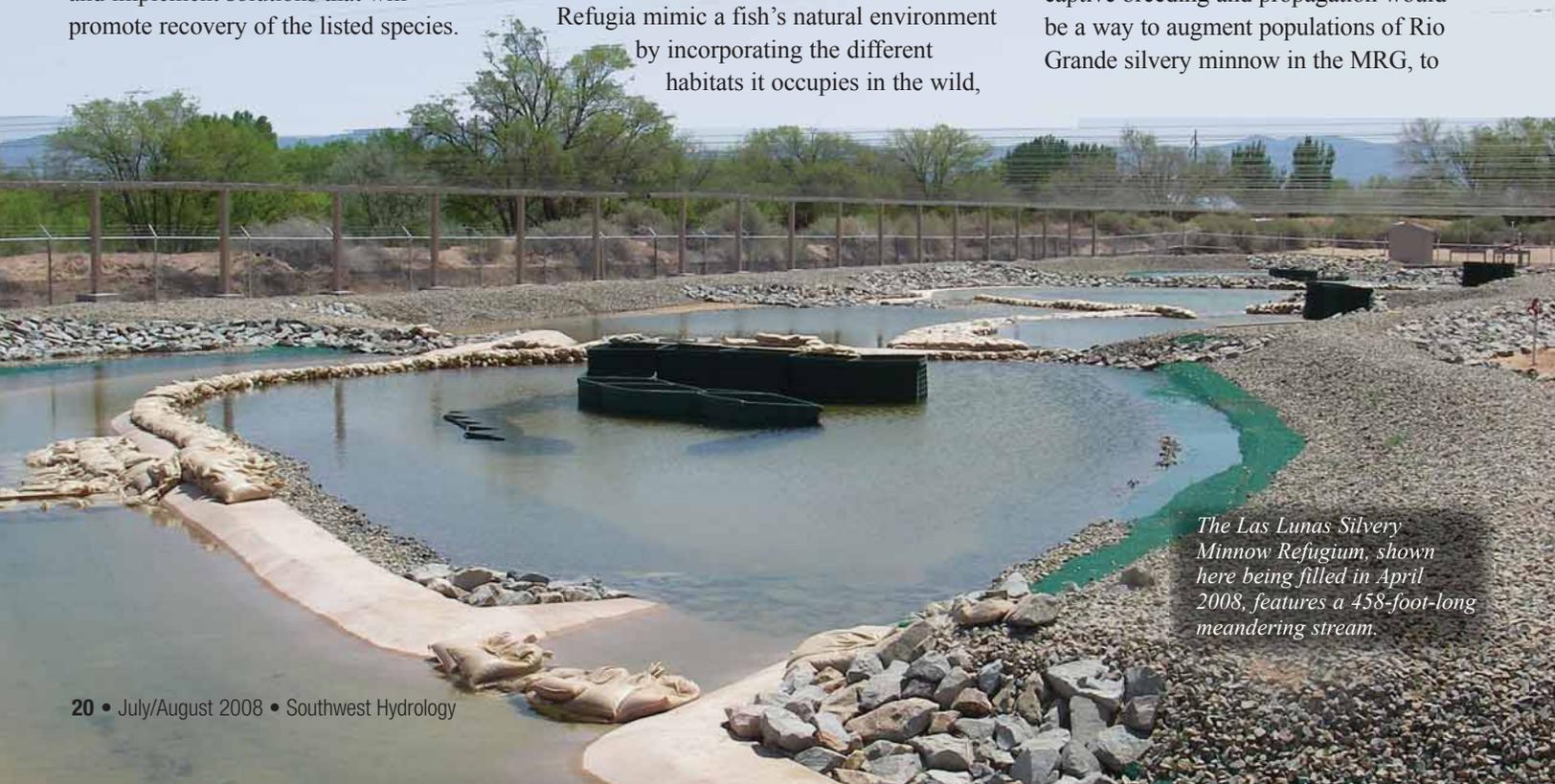
Traditional hatcheries generally raise fish in uniform, shallow raceways or ponds, habitats that the fish do not occupy when they are stocked, and fish are fed a formulated feed. These artificial habitats and culture conditions cause domestication. Refugia mimic a fish's natural environment by incorporating the different habitats it occupies in the wild,

and they are managed to produce natural food organisms. These natural culture conditions minimize domestication. In addition, compared to those spawned at hatcheries, fish spawned at refugia tend to be larger, which lessens genetic drift. Refugia are not the complete solution to ESA issues in the MRG; rather, they are one tool available to flexibly address the endangered species/water issue.

### *Help For a Vanishing Species*

The Rio Grande silvery minnow is a small fish that lives only for several years. The species was initially listed as endangered because it had been extirpated from most of its historic range and was found only in the MRG. It once ranged in the Rio Grande from Española, New Mexico, to the Gulf of Mexico, and in the Pecos River from Santa Rosa, New Mexico, to its confluence with the Rio Grande.

Because of prolonged and severe droughts that occur periodically in the southwestern United States and because of the drastic reduction in the range of the Rio Grande silvery minnow, ISC and the City of Albuquerque advocated with FWS that captive breeding and propagation would be a way to augment populations of Rio Grande silvery minnow in the MRG, to



*The Las Lunas Silvery Minnow Refugium, shown here being filled in April 2008, features a 458-foot-long meandering stream.*

maintain refugial populations in case of catastrophic events, and to provide fish for reintroduction efforts outside the MRG. Refugia help to protect New Mexico water users from incurring drastic changes in their current water supply while achieving these goals and other long-term recovery efforts.

The BioPark Refugium, designed by FishPro of Santa Fe, New Mexico, was completed in 2003 and is run by Albuquerque's BioPark staff. It includes an indoor hatchery, outdoor tanks, and the unique refugium. The refugium resembles a racecourse where water can be circulated at various flows, and has numerous features such as backwaters, deep pools, and shallow shelves that mimic habitat on the Rio Grande (see photo). A number of important research studies are conducted there, including a project that is modeling fish passage.

Since 2002, over one million fish have been released to the MRG from the BioPark facilities and from the FWS Dexter National Fish Hatchery and Technology Center. Rio Grande silvery minnow trend data for the MRG show increases in fish numbers; FWS has attributed a portion of the increase to these augmentation efforts. Based in part on the early success of the BioPark Refugia and the Dexter facility, FWS's 2003 biological opinion concluded that two additional refugia were warranted.

### Second Refugium Constructed

Today, two refugia exist: the BioPark Refugium and Los Lunas Silvery Minnow Refugium (LLSMR), recently constructed by the ISC and located in the Village of Los Lunas, twenty miles south of Albuquerque. These two facilities each cost approximately \$2 million to design and construct, primarily using State of New Mexico and City of Albuquerque funds. A third facility is being built by the U.S. Bureau of Reclamation in the bosque of southern Albuquerque. All of the facilities are or will be operated under permits issued by FWS.

LLSMR, also designed by FishPro and ISC, is a state-of-the-art facility whose main feature is the outdoor refugium. The design benefits from lessons learned

at the BioPark Refugium and features a 458-foot-long meandering stream with water recycled using a sump and pump system. The refugium contains features that are preferred habitat by the Rio Grande silvery minnow such as shallow sandy shelves, quiet pools, and backwaters, and has dynamic stream flow with hydraulics. One unique feature is the ability to simulate spring runoff and thereby promote natural spawning by increasing flow velocities and raising the river level to inundate overbank areas.

LLSMR utilizes groundwater as its primary water source. The total water-surface area of the stream and ponds is 0.28 acres, and water volume in this area will be about 0.49 acre-feet or 158,000 gallons. The outdoor refugium contains an impermeable rubber liner to eliminate seepage loss. Most of the water used to raise fish is recycled, and water discharged from the facility can either be recharged to the regional aquifer (approximately 50 feet below ground surface) or delivered to the Los Lunas sewer system. Estimated

depletions, primarily evaporative losses, are two acre-feet per year.

Perhaps the most important contribution of these refugia will be to provide fish for reintroduction efforts in previously occupied river stretches, such as is being attempted at Big Bend National Park in Texas. Any reintroduction efforts will occur as experimental populations not subject to incidental take under ESA.

In encouraging this original approach to fish culture, ISC, City of Albuquerque, and ABCWUA hope to further the Rio Grande silvery minnow's recovery in concert with providing sustainable water use within the MRG.

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### Reference.....

Fish and Wildlife Service (FWS), 2003. *Biological and conference opinions on the effects of actions associated with the programmatic biological assessment of the Bureau of Reclamation's Water and River Maintenance Operations, Army Corps of Engineer's Flood Control Operations, and Related Non-Federal actions on the Middle Rio Grande. Region 2, U.S. Fish and Wildlife Service, Albuquerque, NM.*



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## Isotope Analysis

D/H    <sup>13</sup>C/<sup>12</sup>C    <sup>15</sup>N/<sup>14</sup>N    <sup>18</sup>O/<sup>16</sup>O    <sup>34</sup>S/<sup>32</sup>S

**<sup>13</sup>C/<sup>12</sup>C of Chlorinated Solvents in Groundwater and Soils**

<sup>15</sup>N/<sup>14</sup>N of NO<sub>3</sub>, NH<sub>3</sub>; D/H + <sup>18</sup>O/<sup>16</sup>O in Groundwater

D/H, <sup>13</sup>C/<sup>12</sup>C, <sup>14</sup>C of Crude, Petroleum Fuels & Gases

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