

**ANNUAL REPORT FOR THE CITY OF ALBUQUERQUE'S
RIO BRAVO NORTH AND RIO BRAVO SOUTH
HABITAT RESTORATION PROJECTS: 2007 and 2008**

Grant Agreement Numbers:
03-FG-40-2091, 04-FG-40-2255

Prepared for

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1. INTRODUCTION

The City of Albuquerque (City) has conducted two habitat restoration projects under federal grants 03-FG-40-2091 and 04-FG-40-2255. The projects were conducted within the Rio Bravo Subreach of the Middle Rio Grande (MRG) to create and improve habitat for the Rio Grande silvery minnow (*Hybognathus amarus*; silvery minnow) and the southwestern willow flycatcher (*Empidonax traillii extimus*; flycatcher). The long-term goal of the projects were to

1. Promote egg retention, larval rearing, young-of-year, and over-wintering habitat for the silvery minnow and
2. Thin non-native vegetation and create habitat for the benefit of the flycatcher.

The objective of these restoration projects was to increase measurable habitat complexity that supports various life stages of the silvery minnow and willow flycatcher by facilitating migration of the river during various flows and to create more useable riparian vegetation.

2. METHODS

The project involved the implementation of various habitat restoration/rehabilitation techniques to restore riverine and riparian habitat for the benefit of the silvery minnow and the flycatcher within the MRG. Specific rehabilitation and restoration activities occurred within the river floodway at three locations within the Rio Bravo Subreach: the Rio Bravo North (RBN), Rio Bravo South (RBS) point bar, and South Diversion Channel (SDC) island (Figure 1). Site-specific project restoration techniques were implemented for the benefit of both species and the riverine ecosystem as a whole.

- **The RBS point bar and SDC island portion of the Project started on April 9, 2007, and was completed on April 26, 2007.**
- **Construction of the RBN features started the week of April 2, 2008, and was completed on May 1, 2008. A second phase of the project was completed in February 2009.**

Approximately 32 acres at the RBN site, 20.3 acres at the RBS point bar, and 6.5 acres at the SDC island were modified. As the projects' goal was mitigation, the spoil was placed within the affected areas where construction took place. At the sites, spoil was spread out adjacent to the modified areas or used as fill material. During the course of the Project, one proposed channel at the RBN site and two proposed channels were eliminated at the RBS point bar because they were already functioning as potential habitat for the silvery minnow.

The RBN site covers 31.5 acres on the east side of the channel, approximately 0.5 mile north of the Rio Bravo Bridge (Figure 2). The site was characterized by mixed native and non-native riparian vegetation. However, the majority of the area was cleared of non-native vegetation and is now an open Rio Grande cottonwood (*Populus deltoides*) bosque with scattered New Mexico olive (*Forestiera pubescens*) and black willow (*Salix nigra*). The bankline vegetation within the project area was left undisturbed and remains characterized by a cottonwood canopy with an understory dominated by Russian olive (*Elaeagnus angustifolia*) and saltcedar (*Tamarix*



Figure 1. Rio Bravo Subreach and Project sites.

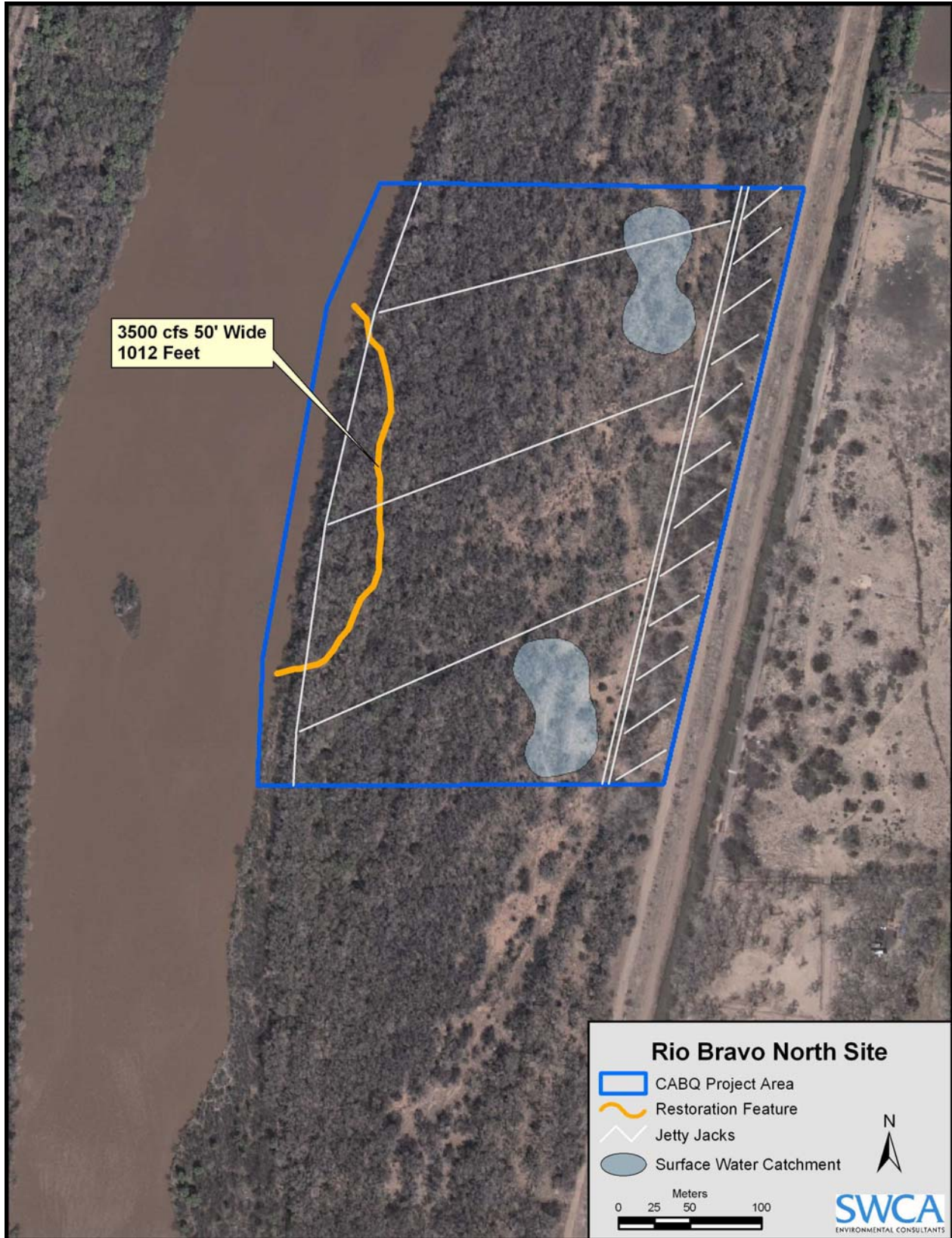


Figure 2. Proposed RBN restoration features.

ramosissima). Within the bosque, three depressions approximately 0.75 acre each were excavated to function as surface water catchments that will encourage the recruitment of native vegetation for the benefit of flycatcher. In addition, 340 units of jetty jacks were removed from this location to improve access in the event of wildfire. A proposed channel was eliminated at the RBN site due to potential depletions issues. Twenty (20) acres of the RBN site was subsequently retreated in areas where initial removal of non-native vegetation resulted in some resprouting. Revegetation with native trees, shrubs, and grasses was substantial: 40 cottonwoods, 250 black willows, New Mexico olive, golden currant, peachleaf willow, and native bosque grass mix were planted in and around the swales.

The RBS site, on the west side of the Rio Grande and approximately 0.6 mile south of the Rio Bravo Boulevard Bridge, consists of a 20.3-acre point bar with intermittent stands of native willow (*Salix* sp.) and non-native vegetation (Figure 3). The bar was modified to create low-, mid-, and high-flow habitat to support multiple life stages of the silvery minnow. Techniques included constructing ephemeral channels and bankline scours (scallops). Four 0.25-acre scallops were excavated on the east side of the bar to create low-velocity habitat for the silvery minnow. Although three channels were proposed, one channel was excavated the length of the bar and was designed to function at 500 cubic feet per second (cfs) in the mainstem. The combined area of the four scallops was approximately 1 acre, and the length of the side channel was approximately 1,117 linear feet.

At the time of construction, the water level in the river was approximately 1,000 cfs, and as such the design features were changed to function at 1,000 cfs. The variety of inundation levels would provide habitat for the silvery minnow at multiple discharge levels in the mainstem of the MRG. The development of ephemeral and low-flow channels and scallops at this location also created seasonal open water habitat that would benefit breeding and migrating flycatchers.

Non-native vegetation removed from the bar, and all native vegetation outside the Project footprint would be left intact. Large woody debris would be used to armor select constructed features to minimize erosion and encourage the development of additional mesohabitat for the benefit of the silvery minnow.

The final locality is a 6.5-acre island immediately adjacent to the outfall of the SDC (Figure 4). Techniques applied on the SDC island included constructing low- and high-flow ephemeral channels and bankline scallops for the benefit of the silvery minnow. Non-native vegetation was removed from the modification areas on the island. Two 0.25-acre scallops were excavated to act as low-velocity habitat for the species. Two channels—one 500 linear feet long designed for inundation at 500 cfs and the other 752 linear feet long to be inundated at 2,500 cfs—were excavated through the island to increase low-velocity habitat for the silvery minnow and increase native vegetation recruitment for the benefit of the flycatcher.

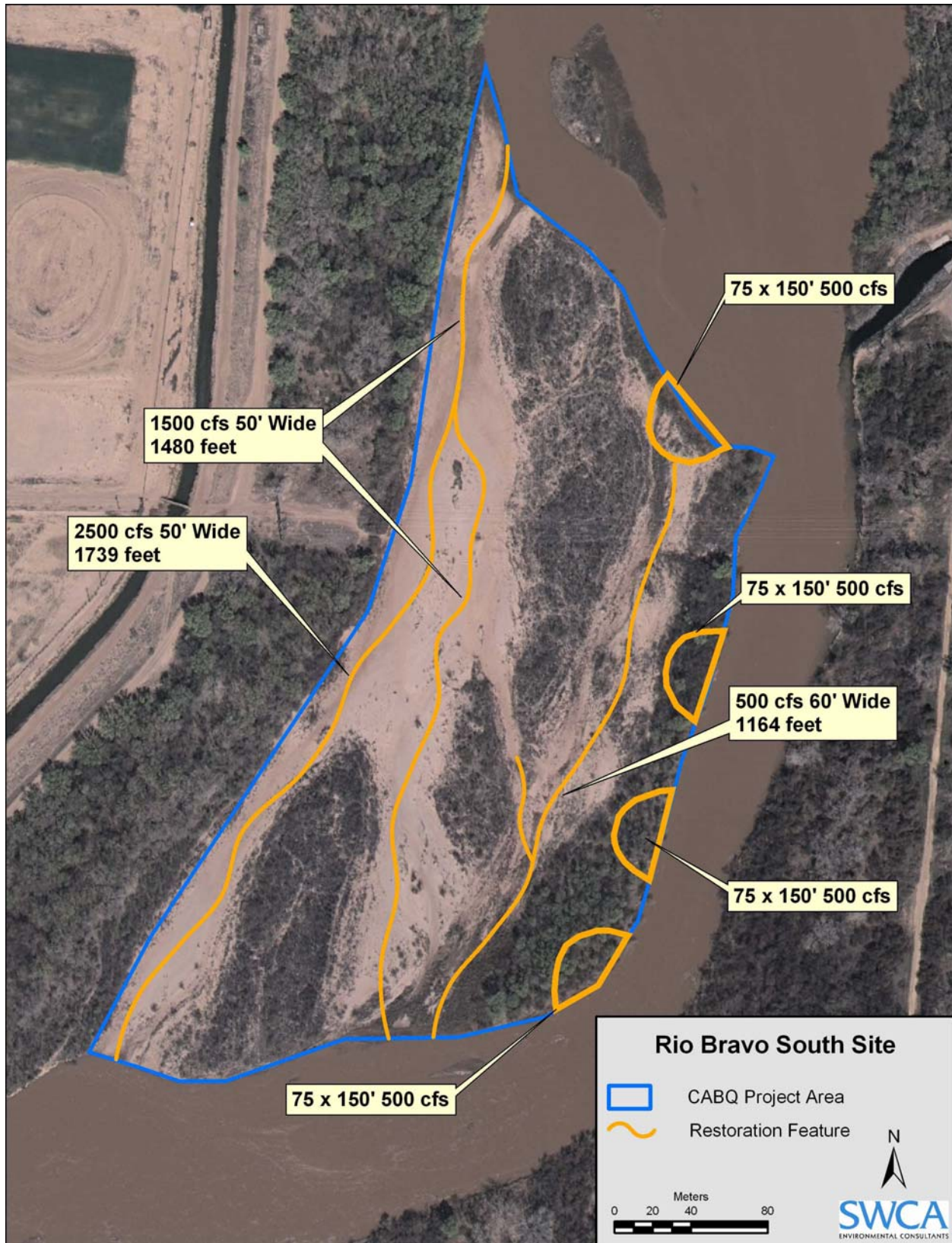


Figure 3. Proposed RBS point bar restoration features.

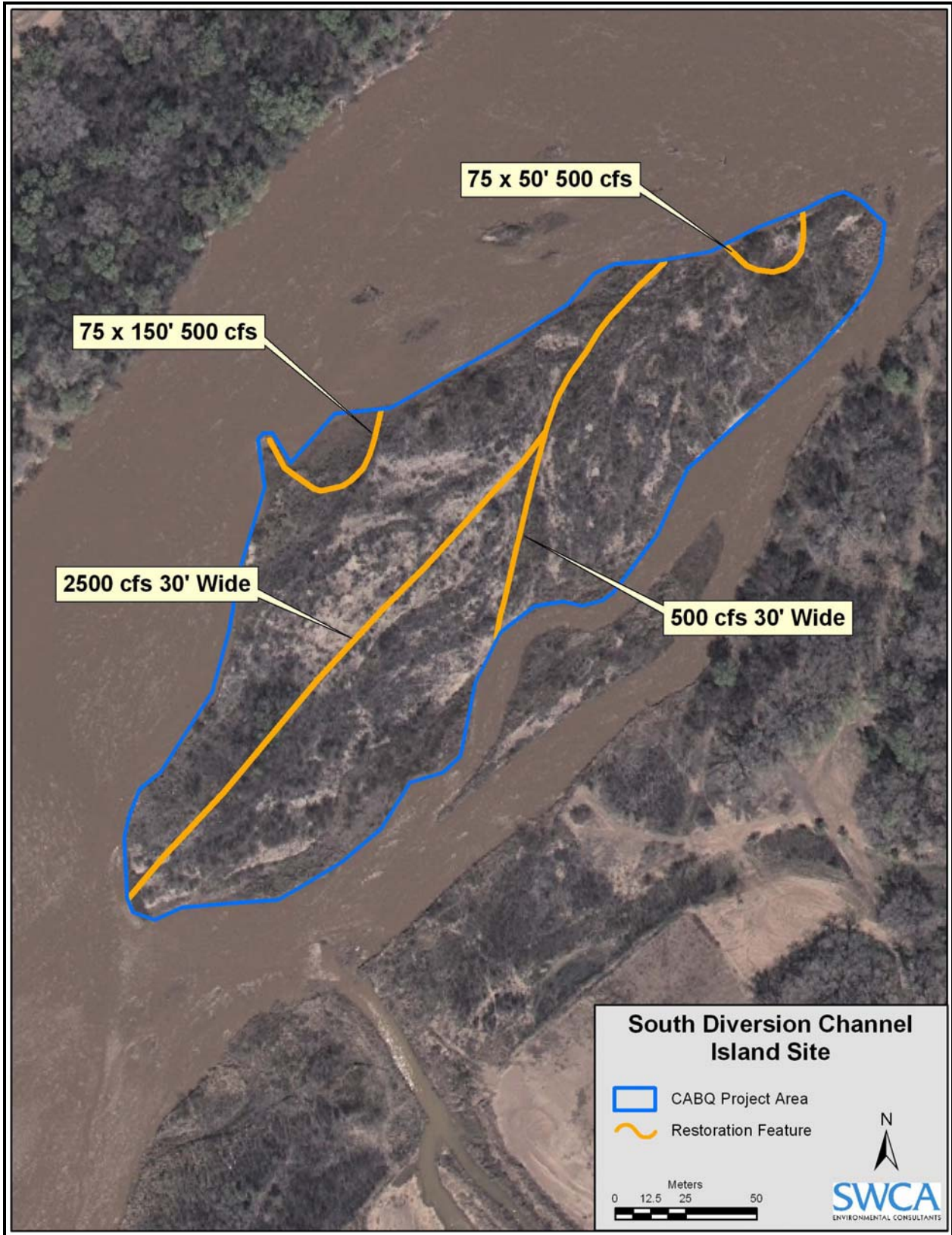


Figure 4. SDC island restoration features.

A primary objective of the projects involves monitoring and recording the recolonization of vegetative communities and any geomorphic changes that would occur at habitat restoration sites for the benefit of the silvery minnow and the flycatcher. Vegetative communities have been disturbed during construction, and it is important to understand species composition and community types following disturbance. The reshaping of the habitat restoration sites to create mesohabitat features would be monitored and recorded as well. Monitoring objectives are summarized in Table 1.

Table 1. Monitoring Objectives

Objective	Monitoring Level	Monitoring Activity	Type of Survey
Regenerating native riparian species	Effectiveness	Vegetation	Vegetation class, composition, and structure surveys
Preventing and monitoring the diffusion of invasive deciduous species	Implementation and Effectiveness	Vegetation	Removal of invasive species during construction; vegetation surveys and monitoring
Creating silvery minnow nursery habitat	Implementation and Effectiveness	Fisheries	Nursery habitat surveys
Increasing silvery minnow habitat	Implementation and Effectiveness	Fisheries and Geomorphic	Topographical survey; mesohabitat survey; fisheries survey
Creating low-velocity habitats	Implementation and Effectiveness	Geomorphic	Topographical survey; mesohabitat survey; depth and substrate

3. CONSTRUCTION MONITORING

Each site was surveyed in early October 2006 to assess the condition of the site for vegetation, wetlands, and geomorphology. The changes in vegetation were monitored using a modified Hink and Ohmart (1984) classification system to code the vegetation based on height, structural class, and the dominant overstory and understory species.

The RBN site was modified to create two willow swales (**Error! Reference source not found.**) to function as surface water catchments to encourage the recruitment of native vegetation for the benefit of flycatcher. The two depressions are about 1.3 acres, approximately 4 to 6 feet deep, and 10 to 20 feet wide. The slope of the swales was feathered to a 3:1 ratio and was modified to function at approximately 2 feet below the 3,900 cfs. In addition, 200 jetty jacks were removed to improve access in the event of wildfire. Vegetation around the swales had previously been grubbed by the City. Spoil material from the swales was spread out uniformly around the modified areas. The construction started the week of April 2, 2008, and was completed May 1, 2008.

A second phase of the RBN project involved construction of a third shallow depression, removal of an additional 140 jetties, retreating 20 acres of bosque that had been initially treated by removing non-native vegetation, and planting 40 cottonwoods, 250 black willows, and 4,000 sedges and rushes. The second phase was constructed during February 2009.

The RBS site was modified to create one channel and four scallops (**Error! Reference source not found.**) in which inundation would occur at 500 cfs to help support various life stages of the silvery minnow. Changes were made to the initial schematics of the channel to avoid young Rio Grande cottonwoods (*Populus deltoides*) and coyote willows (*Salix exigua*) and also to narrow the width of the channel to approximately 30 feet. In the original design, inundation was to occur at 500 cfs on the scallops and the channel, but since the water level (>1,000 cfs) when the work was completed was higher than the survey grade, the scallops were cut to 1,000 cfs. Vegetation around the scallops had previously been grubbed by the City. Spoil material from the scallops and channel was spread out uniformly around the modified areas on the point bar. The work was carried out from April 10 to April 24, 2007, beginning with clearing the island, constructing the bankline scallops, and finishing with excavating the the channel.

The SDC island site was modified to create two 500-cfs scallops and two channels in which inundation would occur at 500 and 2,500 cfs to help support various life stages of the silvery minnow (**Error! Reference source not found.**). Changes were made to the initial schematics of the two channels to avoid young cottonwoods and coyote willows and also to narrow the width of the channel to approximately 30 feet. Vegetation along the channels was grubbed prior to surveys, and non-native vegetation within 50 feet of the excavator was removed. Spoil material from the scallops and channels was spread out around the modified areas on the island. The work was conducted from April 20 to 26, 2007, with the excavator first grubbing the vegetation, then cutting the channels and scallops.

The amount of estimated soil volume (combined cut and fill) for each site based on preliminary field surveys and the actual cut and fill for each site based on pre-construction surveys is presented in Table 2. Estimated cut and fill numbers were in the 404 permit application (2005 00708), but some modifications were eliminated or renamed between submittal of the permit application and construction. The City estimated 12,439 cubic yards of disturbed soil would be affected during the Project.

Table 2. Estimated Soil Volume in Cubic Yards for each Site

Site	Estimated	Cut	Fill
RBN			
Willow swale #1	963	960	3
Willow swale #2	963	960	3
RBN Total	1,926	1,920	6
RBS Point Bar			
East Channel	3,470	3,470	0
Scallop #1	681	680	1
Scallop #2	870	870	0
Scallop #3	1,170	1,170	0
Scallop #4	1,224	1,220	4
RBS Total	7,415	7,410	5
SDC Island			
Channel #1	2,360	2,360	0
Channel #2	1,954	1,950	4
Scallop #1	350	350	0
Scallop #2	360	360	0
SDC Island Total	5,024	5,020	4
Total for All Sites	14,365	14,350	15

Table 3. Disturbed Soil Volumes in Cubic Yards for each Restoration Technique

Restoration Technique	Acres Treated (Approx.)	As built – cut (Actual)	As built – fill (Actual)	Locations		
				RBN	RBS Point Bar	SDC Island
Willow swales	1.3	–	–	2	0	0
Scallops	1.5	–	–	0	4	2
Ephemeral channels	1.6	–	–	0	1	2
Total	3.1	–	–	2	5	4

Starting April 15, 2007, surveys for migratory birds, nests, and eggs were conducted daily prior to construction. Nine species of migratory birds were observed during construction activities at the Rio Bravo Subreach. In all occurrences, individuals were flying by sites or were perched/nesting on banks or islands near construction activities and were not disturbed. In each case, no action was needed, as construction did not have an adverse affect. Five nests were observed on the RBS point bar and SDC island. All nests were determined to be not active and at least one year old. No eggs were observed during construction activities.

4. EFFECTIVENESS MONITORING

The City and SWCA conducted pre-construction surveys for vegetation, wetlands, and geomorphic surveys in 2005 and 2006. In 2007 SWCA conducted fisheries effectiveness monitoring after the completion of habitat restoration construction. Starting in summer/fall 2009, the City contracted SWCA to conduct fisheries, vegetation, wetlands, and geomorphology effectiveness monitoring on an annual basis for two years for the completion of Year One riverine and riparian monitoring activities. The City, SWCA, and the University of New Mexico Bosque Ecological Monitoring Project (BEMP) are working together and coordinating Project data and information. The City will use BEMP groundwater data and vegetation transects methodology for Project monitoring.

5. CONCLUSION

The Collaborative Program habitat restoration projects resulted in long-term positive changes to all three project areas, affecting a total of 58.3 acres. Construction activity was carried out in several stages from April 2007 through February 2009 (in each of federal fiscal years 2007, 2008, and 2009). Photographs of the restoration sites before construction are found in **Error! Reference source not found.** through **Error! Reference source not found.** and after construction in **Error! Reference source not found.** through **Error! Reference source not found.**

Starting in summer/fall 2009, the City contracted SWCA to conduct fisheries, vegetation, wetlands, and geomorphology effectiveness monitoring on an annual basis for two years for the completion of Year One riverine and riparian monitoring activities. The City, SWCA, and the BEMP are currently working together and coordinating Project data and information. The City will use BEMP groundwater data and vegetation transects methodology for Project monitoring.

Effectiveness monitoring will continue for two years, with vegetation monitoring occurring twice a year and geomorphic monitoring occurring in summer 2009 and after runoff in 2010. Wetland delineations will be conducted on a yearly basis beginning in 2009. Egg, fish, and nursery habitat monitoring occurred in spring 2009 and will continue in 2010.

REFERENCES

Hink, V.C. and R.D. Ohmart. 1984. Middle Rio Grande Biological Survey. U.S. Army Engineer Corps of Engineers, Albuquerque District, Albuquerque, New Mexico. Contract No. DACW47-81-C-0015, Arizona State University, Tempe. 193 pp.