



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

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### Memorandum

To: Area Manager, Bureau of Reclamation, Albuquerque Area Office, Albuquerque, New Mexico

From: Field Supervisor, Fish and Wildlife Service, New Mexico Ecological Services Field Office, Albuquerque, New Mexico

Subject: Biological Opinion on the effects to Rio Grande silvery minnow during Reclamation's and the Pueblo of Sandia's proposed construction activities to create two habitat restoration sites along the east bank of the Rio Grande in the Angostura Reach between River Mile 196 and River Mile 195, in Sandoval County, NM, during 2016 to 2019

Thank you for the February 26, 2016, Biological Assessment (BA; Shuck et al. 2016) for the Pueblo of Sandia Habitat Restoration Project (Pueblo of Sandia HR Project) from River Mile 196 to River Mile 195, in Sandoval County, New Mexico (Figures 1-3). The U.S. Bureau of Reclamation (Reclamation) is partnering with the Pueblo of Sandia on the proposed action to enhance riparian and aquatic habitat at two sites along the Rio Grande during 2016 through April 2019. Attached below is the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO), which analyzes the effects of the proposed action on endangered Rio Grande silvery minnow (*Hybognathus amarus*, silvery minnow).

Reclamation requested formal consultation on the proposed action for this species. The Service has prepared this BO on the effects of the Pueblo of Sandia HR Project to that species in accordance with section 7(a)(2) of the Endangered Species Act, as amended (ESA; 16 U.S.C. 1531, et seq.). This BO is based on information submitted in the BA; conversations and communications between Reclamation, the Pueblo of Sandia, SWCA Environmental Consultants (SWCA), and the Service; and other sources of information available to the Service. A complete administrative record of this consultation is on file at the Service's New Mexico Ecological Services Field Office (NMESFO).

In December 2015, Reclamation decided to prioritize and conclude this ESA consultation on the Pueblo of Sandia Habitat Restoration Project. The proposed action and its effects to federally

listed species are similar to other habitat restoration projects and other actions conducted by Reclamation (USBR 2014, 2015; Pueblo of Sandia 2008; SWCA 2008a,b; 2010a,b; McMillan et al. 2016; Golder Associates 2012), as well as other related actions including those conducted by others (U.S. Army Corps of Engineers (USACE 2007, 2012a,b,c)) and other related BOs issued by the Service (U.S. Fish and Wildlife Service (USFWS) 2003a; 2009a,b,c; 2010a,b; 2011a,b; 2012; 2013a,b,c; 2014a; 2015). This BO incorporates all the information cited above and within it by reference as well as any references cited therein. Therefore, the Service has abbreviated the narrative extent of this BO's sections on the proposed action, status of the species, environmental baseline, cumulative effects, and conservation recommendations, and their associated analyses by depending upon cited information incorporated into this BO. The result is that this BO largely focuses on the effects of the proposed action and on reasonable and prudent measures.

The Service concurs with Reclamation that the proposed action “may affect, is not likely to adversely affect,” endangered southwestern willow flycatcher (*Empidonax traillii extimus*) (flycatcher), flycatcher critical habitat, threatened yellow-billed cuckoo (*Coccyzus americanus*; cuckoo), or cuckoo proposed critical habitat based on the rationales provided in the BA. Reclamation found that the proposed action “may affect, is likely to adversely affect” the silvery minnow. Reclamation also found that the proposed action would have “no effect” on silvery minnow critical habitat, New Mexico meadow jumping mouse (*Zapus hudsonius luteus*; mouse), or proposed mouse critical habitat (BA).

The Service reviewed the proposed action (the Pueblo of Sandia Habitat Restoration Project) with its associated construction activities, including various conservation measures designed to offset environmental impacts. The proposed action is expected to increase the amount of native riparian vegetation, which could benefit migrating cuckoos and flycatchers. The proposed action will also result in the creation or enhancement of inundated floodplains that will benefit silvery minnows by increasing the amount and diversity of habitat, increase lateral connectivity, and increase the amount of aquatic habitat with reduced velocities during the spring.

During construction activities, the proposed action will cause some silvery minnows to flee the physical disturbance, noise, vibration, and alterations in water quality during earthwork conducted on or along the shoreline. Therefore, the proposed construction activities will harass silvery minnows and may temporarily impair their natural feeding or sheltering activities or their ability to engage in such behaviors (50 CFR 17.3). Outside of the active construction period, harassment and harm may occur as a result of potential stranding in restored features after peak flows recede, as well as a small level of risk of mortality due to entrapment in the side channel. Therefore, the Service concurs that the proposed action “may affect, is likely to adversely affect” silvery minnows.

However, the proposed action is not likely to jeopardize the continued existence of the silvery minnow, because the number of silvery minnows expected to be affected in relation to the population abundance is small (Dudley et al. 2015).

Thank you for working with the Service to address project concerns and partnering with the Pueblo of Sandia to enhance and create these habitat projects. If you have any questions regarding this BO, please contact David Campbell, Large River Recovery and Restoration

Program Branch Chief, at the letterhead address, by email, at david\_campbell@fws.gov, or by telephone at (505) 761-4745.

Wally Murphy

cc:

Pueblo of Sandia

Administrative Record for Consultation Number 02ENNM00-2016-F-0383.

# BIOLOGICAL OPINION

## I. DESCRIPTION OF THE PROPOSED ACTION

The Pueblo of Sandia BA (Shuck et al. 2016) describes the proposed action for the Pueblo of Sandia HR Project in detail and it is incorporated here by reference. In partnership with Reclamation, the Pueblo of Sandia proposes to create and/or improve a total of up to 5.2 acres of silvery minnow habitat on the banks of the Rio Grande at two individual sites at River Miles (RM) 196 and 195, in Sandoval County, New Mexico (Figures 4 and 5). The goal of the proposed action is to increase the area of inundation at discharges of 1,500 cubic feet per second (cfs) and greater as measured at the U.S. Geological Survey (USGS) Gage 08329928 near Alameda, New Mexico. Woody riparian vegetation such as Goodding's willow (*Salix gooddingii*), coyote willow (*S. exigua*), and Rio Grande cottonwood (*Populus deltoides* spp. *wislizenii*) may become established at these sites through passive restoration and would benefit migratory birds, including providing feeding habitat for the Western Yellow-billed cuckoo (*Coccyzus americanus*; cuckoo). Since there is no suitable flycatcher or cuckoo habitat in the project area that would be removed, Reclamation and the Pueblo of Sandia do not propose to plant or otherwise install riparian habitat. Natural recruitment and regeneration is expected to improve habitat. Construction will begin in March 2016 and will be completed by April 15, 2019, though no work will be conducted in any year from April 15 to August 15, or through September 1, when cuckoos are present, in any year.

As a result of river management activities over the past 50 years, the Rio Grande in the Angostura Reach, particularly near the project area, has continued to degrade, separating the river channel from its associated riparian floodplain, which has reduced the areas of inundation and overbanking even at modest flows (Parametrix 2008; Isaacson 2009; Gunning 2010; USACE 2007, 2012a,b, 2013; Shah-Fairbank et al. 2011; USFWS 2013).

The proposed action (i.e., the final designs for sites RM 196 and RM 195) will result in enhancement of low-velocity aquatic habitat by approximately 5.2 acres (or more) starting at flows of 1,500 cfs (Table 1). All features will be constructed to slope into the river to facilitate silvery minnow movement onto these sites as well as to reduce the likelihood of silvery minnow entrapment during recession. The permanence of these two sites providing the physical features of silvery minnow habitat over time is unknown but monitoring was described in the BA.

The proposed action involves earthwork and construction of shallow depressions in the landscape. Soil and vegetation will be removed from each of the sites using heavy equipment (such as dozers, belly scrapers, excavators, backhoes, or trucks). Reclamation and the Pueblo of Sandia propose that any increase in the amount of site inundation by flooding (as occurs during other actions – see Reclamation 2015) and the presence of nearby native vegetation to the project sites will encourage growth of native vegetation on and around the edges of those sites.

Spoils from the earthwork will either be deposited into the main channel of the Rio Grande, on the levee road or along the levee at the upland spoils area (BA, Figures 4-5; Table 1). Silt fences will be installed in the river to minimize temporary water quality degradation in the area of the spoils that are placed in the river channel. Access roads and the staging area will be mowed or

trimmed of vegetation within approximately 20 feet across or in height. After earthwork is completed, access roads and the staging area will not be revegetated because they are existing features and will be used for future projects in the bosque. In the BA, Reclamation identified various actions, such as pumping from the Rio Grande, which they may be needed in case of an emergency. However, for the proposed action, water used for dust abatement will *only* be pumped from areas outside the river floodway, especially during critical months of May and June.

Table 1. Site Name, acreage of habitat enhanced at 1,500 cfs, total cubic feet of spoil, spoil placed in the river for habitat, spoil placed on or along the levee road, and wetted impact for the Pueblo of Sandia Habitat Restoration Project. [cfs = cubic feet per second]

Site Name (last row is a summary)	Acres of habitat enhanced at 1,500 cfs	Cubic feet of spoil (total)	Spoil placed in river for habitat(ft <sup>3</sup> )	Spoil placed on levee road or upland spoils area along levee(ft <sup>3</sup> )	Approximate wetted impact area of work along the shoreline and spoils into the river (acres)*
RM196	3.3	9,205	4,240	4,965	1.1
RM195	2.1	8,869	8,869	0	0.9
Summary	5.2 acres	18,074 ft <sup>3</sup>	13,109 ft <sup>3</sup>	4,965 ft <sup>3</sup>	2.0 acres
* - These values include 10% buffer.					

**Action Area**

The Service refers to the Angostura Reach as the channel and floodplain of the MRG between the Angostura Diversion Dam and Isleta Diversion Dam (USFWS 2013) and between the levees and high ground to the east. The proposed action would take place within the Angostura Reach.

The Action Area includes all areas that will be affected directly or indirectly by the proposed action (50 CFR 402.02). The Service finds that the Action Area includes those areas of disturbance associated with the proposed action at both RM 196 and RM 195 as described in the BA, including areas of earthwork at the two sites, the staging area, access roads and haul routes, areas where vegetation would be mowed or removed, fill material or sediment disposal areas, as well as areas where noise, disturbance, or water quality changes would occur (adjacent to the construction sites or downstream into a zone of mixing (dilution), as identified by the wetted impact acreage) or associated with the installation of the silt fences.

## II. STATUS OF THE SPECIES

The proposed Pueblo of Sandia Habitat Restoration Project action may adversely affect endangered silvery minnow (USFWS 1994) in the Action Area. The Service (USFWS 1994, 2003a,b, 2010, 2011, 2012, 2013a, 2013b, 2014a, 2014b, 2015) and Reclamation (USBR 2015) have both provided updates on the status of the silvery minnow including its description, life history, genetics, demography, habitat, distribution, threats of extinction, goals for recovery, and the physical and biological features of its critical habitat, which are incorporated here by reference, including citations therein.

An updated status of the species specific to the Angostura Reach, which is broader than but encompasses the Action Area, is provided below. This updated status of the species informs our effects analysis because it provides data on the abundance of the species during the period in which the proposed activities occur (from September 1 through April 15). The Service assumes that the abundance of silvery minnows affected by the proposed Pueblo of Sandia Habitat Restoration Project activities will be similar to the abundance of the silvery minnows found by silvery minnow population monitoring surveys conducted in the Angostura Reach (Dudley et al. 2015, Dudley and Platania 2015, Austring 2015).

### *Status of the Silvery Minnow and Abundance in the Angostura Reach and Action Area*

All life stages of silvery minnow currently inhabit the Angostura Reach. Standard surveys of silvery minnows are routinely conducted at five discrete locations within the Angostura Reach during long term monitoring (Dudley et al. 2015, Dudley and Platania 2015). Long-term, standardized monitoring of silvery minnows in the MRG began in 1993 and has continued annually, except for portions of 1998, 2009, and 2013 (Dudley et al. 2015). Long-term monitoring of silvery minnows has recorded substantial fluctuations within one year (orders of magnitude increases and decreases) in the overall (MRG) population densities (which is an index of abundance for the silvery minnow population; Figure 6). Silvery minnow abundance is correlated with hydrologic conditions, particularly the magnitude, duration and timing of spring runoff (Dudley et al. 2015). During spring runoff, inundated habitat in the floodplain is increased and, when sustained, provides additional areas for spawning adults, eggs, and larvae to nurse (grow, feed, shelter), such that annual silvery minnow abundance is observed to subsequently increase. There is also a negative relationship between low flow volumes and the distribution of silvery minnows (probability of occurrence of silvery minnow during sampling; that is, less water results in fewer occurrences of fish found during surveys). Thus, prolonged high flows during spring are most predictive of increased silvery minnow abundance and prolonged low flows during summer are most predictive of decreased silvery minnow occurrence at sites sampled over the 22-year study period (Dudley et al. 2015).

Dudley et al. (2015) also show that silvery minnows tend to exhibit a heterogeneous spatial distribution (i.e., they may shoal or swim in an aggregation) most likely indicative of different micro- and macro-habitat conditions (e.g., such as temperature, or velocities) throughout habitat in the river reach. Additionally, as silvery minnows move within and between locations in the Angostura Reach, there is the potential for fish to move into or near one of these sites while work is conducted. Although habitat conditions (e.g., substrate, velocity, depth, fish community, etc.)

at each of the Pueblo of Sandia Habitat Restoration Project sites may differ from habitat conditions at the standardized survey sites, the Service assumes that silvery minnows occupy these sites at densities similar to those at the long-term survey sites. Therefore, for the period between September 2009 and December 2015, the Service summarized in Table 2 (Hobbs and Lusk 2016) the available data on silvery minnow densities in the Angostura Reach collected during long term population monitoring (Dudley et al. 2015) and augmentation monitoring (Austring 2015) by month (for those months occurring during the proposed Pueblo of Sandia Habitat Restoration Project action from September through March).

Table 2. Estimated monthly densities of silvery minnows (RGSM/100m<sup>2</sup>) during standard surveys in the Angostura Reach, with average and 75th percentile RGSM densities, across all 9 survey sites, for the period between September 2009 and December 2015 (excluding non-construction months of April, May, June, July, and August) [“na” – data unavailable].

Data Source	RGSM / 100m <sup>2</sup> in Sept.	RGSM / 100m <sup>2</sup> in Oct.	RGSM / 100m <sup>2</sup> in Nov.	RGSM / 100m <sup>2</sup> in Dec.	RGSM / 100m <sup>2</sup> in Jan.	RGSM / 100m <sup>2</sup> in Feb.	RGSM / 100m <sup>2</sup> in Mar.	Average RGSM / 100m <sup>2</sup> from Sept to March
Dudley et al. 2009	3.9	6.0	5.3	5.8	na	na	na	5.2
NMFWCO 2009	15.3	na	0.3	1.4	2.1	0.0	3.5	3.8
Dudley et al. 2010	0.6	0.7	0.4	0.3	na	0.2	na	0.4
NMFWCO 2010	0.9	na	2.5	0.0	2.1	4.2	2.2	2.0
Dudley et al. 2011	0.6	1.3	na	0.6	na	0.2	na	0.7
NMFWCO 2011	0.0	3.1	0.0	2.1	0.0	0.1	0.0	0.8
Dudley et al. 2012	0.2	0.0	na	na	na	0.0	na	0.1
NMFWCO 2012	na	na	na	na	na	na	na	na
Dudley et al. 2013	na	0.0	na	na	na	na	na	0.0
NMFWCO 2013	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0
Dudley et al. 2014	na	0.0	0.4	2.8	na	na	na	1.0
NMFWCO 2014	0.0	1.0	0.0	0.2	0.0	0.0	0.0	0.2
Dudley et al. 2015	1.1	0.0	na	0.5	na	0.6	na	0.6
NMFWCO 2015	na	na	na	na	0.0	na	na	0.0
Monthly Average	2.3	1.2	1.1	1.4	0.7	0.6	1.2	1.2
Monthly 75th%ile	1.8	1.7	2.0	2.3	2.1	0.4	2.9	<b>1.9</b>

For the purposes of this BO, the Service has used the average of the monthly 75<sup>th</sup> percentile silvery minnow densities (expressed as “catch-per-unit effort” (CPUE) or number of RGSM per 100 square meters (RGSM/100m<sup>2</sup>)) from the last seven years of monitoring efforts in the Angostura Reach (Table 2). That is, we used a density of 1.9 RGSM/100m<sup>2</sup> as representative of silvery minnow abundance within the Pueblo of Sandia Habitat Restoration Project Action Area (Table 2; Hobbs and Lusk 2016). This density of 1.9 RGSM/100m<sup>2</sup> will be used to conservatively represent the status of the species for the duration of the proposed action across three years, despite population fluctuation. The Service has used this density of silvery minnows multiplied by the area of impact to determine the number of silvery minnows that are likely to be adversely affected by proposed action and in the Incidental Take Statement below.

#### *Status of Silvery Minnow Critical Habitat in the Angostura Reach*

Within the Angostura Reach, the Angostura Diversion Dam to the Isleta Diversion Dam is designated silvery minnow critical habitat, with the exception of the lands of the Pueblos of Santo Domingo, Santa Ana, Sandia, and Isleta (USFWS 2003b). The critical habitat designation defines the lateral extent (width) as those areas bounded by existing levees or, in areas without levees, 300 feet (ft) (91.4 meters (m)) of riparian zone adjacent to each side of the bank full stage of the middle Rio Grande. The Service (USFWS 2003b) found that the riparian zone adjacent to the river channel provided an important function for the protection and maintenance of the primary constituent elements and was essential to the conservation of the species. However, the Pueblo of Sandia and thus the Action Area is not included in the designation of silvery minnow critical habitat (USFWS 2003b).

### **III. ENVIRONMENTAL BASELINE**

Under section 7(a)(2) of the ESA, when considering the effects of the proposed action on federally listed species, the Service is required to take into consideration the environmental baseline. Regulations implementing the ESA (50 FR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the Action Area; the anticipated impacts of all proposed Federal actions in the Action Area that have already undergone formal or early section 7 consultation; and the impact of State and private actions that are contemporaneous with the consultation in process. The environmental baseline defines the effects of these activities in the Action Area on the current status of the species and its habitat to provide a platform to assess the effects of the action now under consultation. The Service (USFWS 2003a,b, 2010a,b, 2010a,b; 2011a,b; 2012; 2013a,b,c; 2014a; 2015), the U.S. Army Corps of Engineers (USACE 2007, 2012a,b,c)), others (Crawford et al. 1993; Dudley et al. 2015; Geosystems Analysis 2015; Gunning 2010; Parametrix 2008; Posner 2011; Shah-Fairbank et al. 2011; Tetra Tech 2014), and Reclamation (Smith and Massong 2002; USBR 2003; Massong 2005; Varyu 2013; Makar 2015; USBR 2015; McMillan et al. 2016) have described the environmental baseline, which encompasses the Action Area, and these are incorporated here by reference, as they inform the baseline, effects analyses, and the jeopardy analysis in this BO.

#### *Summary of the Environmental Baseline of Aquatic Habitat in the Action Area*



The remaining wild population of silvery minnow is restricted to approximately seven percent of its historical range in the Rio Grande (USFWS 2010a). Several conditions in the environmental baseline have contributed to the current status of the silvery minnow and its habitat in the Action Area, and are believed to affect the survival and recovery of silvery minnows in the wild. Many of these activities are broader than the Action Area but have effects that extend into the Action Area. These include past and present projects that affect Rio Grande streamflow and riparian habitat such as water management, flood regulation, channelization, diversions for agriculture and drinking water, climate change, land use changes, pollution, nonnative species invasion, ground water drainage, drought, salinization, and trans-basin diversions of water. The reduction in the magnitude, frequency, duration, and timing of flooding (particularly overbank inundation of the floodplain during high spring flows) has disrupted the functional integrity of aquatic and riparian habitats in the Rio Grande and reduced the abundance of silvery minnow. Additionally, except for 2008, every year since 1996 has exhibited at least one drying event that has desiccated the river channel and negatively affected silvery minnow distribution, including documented mortality. Silvery minnows in the MRG are unable to expand their distribution because poor habitat quality, diversion dams, and reservoirs restrict significant movement (USFWS 2010a).

Augmentation of silvery minnows with captive-reared fish has been ongoing, and monitoring and evaluation of these fish provide information regarding the survival and movement of individuals, including those affected by river desiccation (Archdeacon 2014; Archdeacon et al. 2015). Habitat conservation and restoration, captive propagation and augmentation, genetics management, salvage and relocation, and research activities have been ongoing to reduce the risk of extirpation of silvery minnow in the wild.

#### **IV. EFFECTS OF THE ACTION**

Regulations implementing the ESA (50 FR 402.02) define the *effects of the action* as the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, which will be added to the environmental baseline. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification; interdependent actions are those that have no independent utility apart from the action under consideration. The species that is likely to be adversely affected by the proposed action is the silvery minnow.

##### ***Effects on Silvery Minnow***

###### ***Beneficial Effects of the Habitat Enhancement***

The proposed action is anticipated to have beneficial effects on silvery minnows in the long-term by increasing the amount and frequency of floodplain inundation (Shuck et al. 2016). The amount of floodplain inundation at the RM196 site without the proposed action is limited to the lower end of the side channel where a backwater has continued to function since this area was initially restored in 2010 (SWCA 2010b). The upper part of the side channel was closed off by sediment and the entire feature currently only inundates at exceptionally high flows such as in

September 2013. After completion of the proposed action, the amount of inundation at both sites will total 5.2 acres (when flows at the Alameda Gage (08329928) are at 1,500 cfs). At higher flows, the benefits are expected to be greater and to vary with time.

Adult silvery minnows use habitat with slow velocities (Bovee et al. 2008). When flows inundate the floodplain, low velocity conditions also promote silvery minnow egg retention in the floodplain and foster conditions that can produce larval silvery minnow food and cover and promote higher survival (Porter and Massong 2004). At the Alameda Gage (Gage 08329928), during the runoff season (May-June), the percent exceedance (from 2003 to 2013; Bui 2014) for flows approximately 750 cfs was 53 percent; for flows approximately 1,250 cfs was 45 percent; for flows approximately 1,750 cfs was 42 percent; for flows approximately 2,250 cfs was 37 percent; and for flows approximately 2,750 cfs was 30 percent. For high flows, there was a negligible chance of flow at or above approximately 7,250 cfs from this historical record. This analysis suggests that these sites should be inundated between 40 to 60 percent of the time when high flows (historically) occur during spring runoff.

#### *Effects of Mechanical Activities, Noise, and Water Quality Alterations*

During the Pueblo of Sandia Habitat Restoration Project, major construction activities will begin to the east of the river, but may affect those silvery minnows that remain in the area immediately proximate in the Rio Grande. The Service expects silvery minnows will be directly harassed by human activities, heavy equipment operations, and any ancillary activities described in the BA. Short-term adverse effects on silvery minnows may occur due to physical disturbance of the water column and bed substrate during the earthwork along the shoreline and during removal of berms, installation and removal of silt fences, and other activities. Avoidance behavior, or fleeing from the disturbance, represents a disruption in normal behaviors and an expenditure of energy that an individual silvery minnow would not have experienced in the absence of the proposed action. However, this form of harassment is expected to be short in duration, with pre-exposure behaviors to resume after fleeing the disturbance.

Heavy equipment operations will generate noise and vibration. There is no information provided in the BA on the amounts of noise or the vibration frequencies of actions taken near the Rio Grande channel. Therefore, the Service has assumed noise levels associated with the proposed action could range from 54 decibels equivalent (dBeq) to perhaps 78 dBeq (based on Nedwell et al. 2007 and Popper et al. 2014). Ambient noise levels in the Action Area are likely to be lower than observed in urbanized areas. The level at which fish can detect noise from construction activities sound depends upon the level of ambient noise. The Service has assumed that ambient noise near the Rio Grande could have characteristic noise similar to other rural or unpopulated areas (perhaps 35 dBeq on average, with peak noise perhaps as high as 55 dBeq). There are several factors used to estimate the conductance of noise over distance in air and its transfer to the water column (Nedwell et al. 2007). The Service has assumed that construction activities nearest the channel could generate noise levels over 65 dBeq and that would enter the water column and would startle silvery minnows from their normal feeding and sheltering behaviors.

Using Nedwell et al. (2007), and injury guidelines developed by Popper et al. (2014), the Service has determined that silvery minnows would likely have behavioral effects (that is, startle and

briefly flee) associated with noise within its hearing and vibrational frequencies, when noise levels increased 5 to 30 dBeq above ambient noise levels in water column (> 15 to 60 dBeq). Longer term behavioral avoidance and physical injury can occur when noise becomes unbearably loud (> 90 dBeq) within silvery minnow acoustic habitat, but those high levels of noise are not anticipated with the proposed action. Therefore, while harassment of silvery minnows is anticipated to occur, perhaps up to 5 to 15 meters into the water column (that is, approximately 10 percent of the linear areas associated with heavy equipment use near 510 meters of the shoreline; Figures 4-5), the Service does not anticipate any mortality or direct injuries due to noise attributable to the proposed action.

Where there is a pathway of exposure, sediment disturbance during construction activities may affect water quality, causing localized increases in turbidity and suspended sediments and alterations in the oxygen saturation caused by oxygen demand in sediments and in other materials when released into the water column. Effects from excess suspended sediments and reduced oxygen saturation on a variety of fish species have included alarm reactions, abandonment of cover, avoidance responses, reduced feeding rates, increased respiration, gill damage, physiological stress, reduced growth, increased susceptibility to disease and other stressors, or mortality (Davis 1975; Fillos and Molof 1972; Kreutzberger et al. 1980; Wang 1980; Walker and Snodgrass 1986; Kramer 1987; Veenstra and Nolen 1991; Caldwell and Doyle 1995; Newcombe and Jensen 1996; BCME 1997; Buhl 2010, 2011).

In addition, indirect effects from sediment mobilization are possible, including potential smothering of silvery minnow prey such as algae and aquatic invertebrates, or oxygen stress, which can result in depressed rates of growth and reduced physiological function of some silvery minnows. Under unusual conditions, low oxygen saturation may also cause a wide range of additional chronic effects and behavior responses in fish (Downing and Merckens 1957; Kramer 1987; Breitburg 1992), which are averse to silvery minnow (Lusk et al. 2012; USFWS 2011, 2013). However, it is not known what sublethal effects, if any, occur to silvery minnows as a result of exposures to increased turbidity, suspended sediments, and lower oxygen saturation associated with activities at these two sites other than harassment. The Service expects silvery minnows to flee any water quality alterations that occur until those conditions return to baseline levels.

Those silvery minnows that are startled and flee the noise, vibrations, and water quality alterations associated with the proposed construction activities would be adversely affected. The Service assumed, as described in the BA, that the impact area plus an additional 10 percent (BA Table 5.3) could be affected by mechanical disturbance, noise, and water quality alterations when such activities occurred along or near the shoreline. However, the BA describes activities across different sites for differing numbers of days in which activities, noise, or water quality alterations would occur. Therefore, the Service estimated the number of silvery minnows adversely affected by multiplying the area of earthwork, by the number of days the impact would occur for each site and the density of silvery minnows for the proposed action (Table 3). The total number of silvery minnows that would be adversely affected by mechanical activities, noise and water quality alterations numbered 436 using the assumptions stated above and in Table 3. These silvery minnows are those incidentally taken by harassment only. The next section deals with the number of silvery minnows taken by harassment and mortality.

Table 3. Areas and days of impact, assumed density of silvery minnows used, and number of silvery minnows affected by disturbance, noise, and water quality alterations for proposed action.

Site Name	Approximate wetted impact area of work along the shoreline and spoils into the river (in acres)	Approximate wetted impact area of work along the shoreline and spoils into the river (in square meters)	Days of Impact	Density of Silvery Minnows per 100 m <sup>2</sup> (see Table 2)	Number of silvery minnows affected per site
RM196	1.1	4,452	3.5	1.9	297
RM195	0.9	3,643	2.0	1.9	139
summary	2.0	8,095	5.5	1.9	436

*Effects of Side Channel Enhancement*

Indirect effects on silvery minnows may also result from the proposed action. Beyond the construction period, harassment and mortality of silvery minnows may occur due to potential stranding of fish in restored features. For example, high flows may deposit sediment in or near restored features resulting in isolated pools containing silvery minnows, particularly in the side channel. The Service expects silvery minnows may become stranded in these isolated pools and die. Entrapment has also been noted to occur in other types of restored features on an infrequent basis. The Service expects the majority of risk for entrapment of silvery minnows as flows recede will occur in the side channel. Thus, the Service assumes the calculation of incidental take for entrapment in the side channel will encompass all entrapment-related take in the side channel and the other features in the proposed action. In addition to the potential entrapment of juveniles and adults, during and immediately following the silvery minnow spawning period, there is potential for silvery minnow eggs and larvae to be entrained and stranded; however, the Service expects an unquantifiable amount of silvery minnow eggs and larvae will be taken in the form of harassment and mortality due to indirect effects from stranding. Reclamation and the Pueblo of Sandia will construct all features to drain back to the river when water levels drop; however, the Service cannot discount the probability that some entrapment mortality may occur as an indirect effect of the proposed action. Given a total impact area of 1.5 acres (6,070 m<sup>2</sup>) for the side channel, divided by three as the entire area is not expected to become an isolated pool, the Service expects take of 39 silvery minnows (juveniles and adults) in the form of harassment and mortality due to indirect effects from stranding (1.9 RGSM/100m<sup>2</sup> times 2,023 m<sup>2</sup>). Any minnows that are located alive in isolated pools, seined, and relocated to the main river channel as part of the proposed entrapment monitoring protocol would serve to minimize the adverse effects on silvery minnows by the proposed action. These minnows, in addition to those described in the previous section, are also those incidentally taken.

### *Summary of Effects to Silvery Minnows*

The proposed action will result in the creation or enhancement of inundated floodplains that will have beneficial effects to silvery minnow by increasing the amount and diversity of habitat, increasing lateral connectivity, and increasing the amount of aquatic habitat with reduced velocities during spring. However, during construction activities, the proposed action would harass silvery minnows by physical disturbance, noise, vibration, and alterations in water quality during earthwork conducted on or along the shoreline. Outside of the construction period, the proposed action may cause mortality to silvery minnows in the form of stranding in the restored features.

The Service has defined take by harassment as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering (see 50 CFR 17.3). The Service estimated no more than 436 juvenile or adult silvery minnows would be harassed by the proposed action. Given the timeframe for construction, the Service does not expect any eggs or larval silvery minnows will be harassed or otherwise taken during construction.

The Service has also defined take by harm as an act which actually kills or injures wildlife (see 50 CFR 17.3). Harassment and mortality of silvery minnows may occur due to potential stranding of fish in the side channel. As stated previously, high flows may deposit sediment in or near restored features resulting in isolated pools containing silvery minnows, particularly in the side channel. The Service expects take of 39 silvery minnows (juveniles and adults) in the form of harassment and mortality due to stranding. The Service also expects an unquantifiable number of silvery minnow eggs and larvae will be taken in the form of harassment and mortality due to indirect effects from stranding.

The degree to which these restored habitats will provide the physical features of silvery minnow habitat, over time, is uncertain. How the long term condition of the physical features in these inundated floodplain habitats may affect the quantity (area and depth of inundation) and qualities of water (e.g., temperature, oxygen saturation) are uncertain and monitoring of these physical features in these habitats was limited. The Service agrees with the conclusion that the Pueblo of Sandia Habitat Restoration Project “may affect, is likely to adversely affect” silvery minnows.

## **V. CUMULATIVE EFFECTS**

Cumulative effects are those effects of future State or private activities, not involving Federal activities, which are reasonably certain to occur within the Action Area of the Federal action subject to consultation (50 FR 402.02). Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur within the Action Area considered in this BO. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. The Service (USFWS 2003a, 2010, 2011, 2013, 2014, 2016) and Reclamation (USBR 2015) have described cumulative effects, which are incorporated here by reference, along with a

summary of the cumulative effects below, which inform the jeopardy analysis for the proposed Pueblo of Sandia Habitat Restoration Project.

Based on Ellis (2015), the Service expects that cumulative human activities will continue to affect silvery minnow habitat, the quality, availability, and timing of its prey, its predator and competitor relationships, the incidence of disease, the conditions that exceed its physiological tolerances, or that alter its rates of metabolic and biochemical processes, to continue to occur either individually or in combination, in the Action Area and to affect the status of the species in the Angostura Reach. The Service considered these cumulative impacts as well as the effects of climate change and determined that cumulative effects would not be measurable at the scale of the Pueblo of Sandia Habitat Restoration Project activities (about eight months to 3 years). These cumulative effects will continue to reduce the quality and quantity of the silvery minnow's habitat and continue to threaten its survival and recovery.

## **VI. CONCLUSION**

After reviewing the status of the silvery minnow, the analysis of effects of the proposed action, along with the environmental baseline, it is the Service's opinion that the proposed Pueblo of Sandia Habitat Restoration Project action does not jeopardize the continued existence of the silvery minnow. The Service expects the amount and type of take of silvery minnows by the proposed action is unlikely to appreciably diminish its abundance in the Angostura Reach, nor for the species as a whole in the MRG.

## **INCIDENTAL TAKE STATEMENT**

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by Reclamation so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. Reclamation has a continuing duty to regulate the activity covered by this Incidental Take Statement. If Reclamation fails to assume and implement the terms and conditions or fails to require adherence to the terms and conditions of this Incidental Take Statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental

take, Reclamation must report the progress of the proposed action and its impact on the species to the Service (annually) as specified in this Incidental Take Statement (50 CFR §402.14(i)(3)).

### **Amount or Extent of Take Anticipated**

The Service has developed this Incidental Take Statement based on the premise that the Pueblo of Sandia Habitat Restoration Project action will be implemented as proposed in the BA. Take of silvery minnows is expected in the form of harassment and mortality due to the proposed habitat restoration activities, and is restricted to the action as proposed. If actual incidental take meets or exceeds the predicted level, Reclamation must reinitiate consultation.

The Service estimated that as many as 436 juvenile and adult silvery minnows would be harassed and up to 39 harassed and killed by the proposed action. Should any silvery minnows, eggs, or larvae be documented as having been killed by the proposed action, Reclamation must report these findings to the Service. If scientific evidence is provided to the Service that indicates that actual incidental take of harassed or killed silvery minnows exceeds the above amounts for the duration of the proposed action, then Reclamation must contact the Service and reinitiate formal consultation.

The Service bases the estimates of silvery minnows harassed on the best available information on a high (75<sup>th</sup> percentile) density expected to be encountered during any year during the implementation of the proposed action in the Action Area. The Service notes that this represents a best estimate of the extent of take of silvery minnows that is likely during the proposed action. Project specific monitoring of silvery minnows near the areas of impact associated with construction activities along or near the shoreline was not proposed in the BA. However, Reclamation has an active silvery minnow population monitoring program for the MRG and Angostura Reach, including survey sites near the Action Area (Dudley et al. 2015). Based on the summary of relevant population monitoring results (Dudley et al. 2009, 2010, 2011, 2012, 2013, 2014, 2015; and see Table 2), the likelihood of higher densities of silvery minnows should be quite rare. Additionally, using the survey methods for population monitoring, estimated densities are significant when the differences in silvery minnow population abundance, by year, are large (Dudley et al. 2015). Therefore, as densities of silvery minnows were most often at or below 6.0 silvery minnows/100m<sup>2</sup> in the Action Area (Table 2; Hobbs and Lusk 2016), then incidental take will be exceeded if the estimated densities of silvery minnow reported by the silvery minnow population monitoring program (Dudley et al. 2015) in the Angostura Reach are greater than 6.0 fish/100m<sup>2</sup> only. Therefore, population monitoring program results should be monitored frequently, and if the Angostura Reach silvery minnow density is equal to or greater than 6.0 fish/100m<sup>2</sup>, then incidental take may be exceeded and consultation must be reinitiated.

Any adverse effects to silvery minnow associated with the entrapment monitoring protocol, including those from seining and relocating silvery minnow to the main river channel, are the intended purpose of those activities, and this take is attributed to the applicable ESA section 10(a)(1)(A) permit. Therefore, this aspect of the proposed action is not considered incidental take and is not covered by Reclamation's incidental take statement for the Pueblo of Sandia HR Project.

## **Effect of Take**

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the silvery minnow. The Pueblo of Sandia Habitat Restoration Project may affect, is likely to adversely affect, silvery minnow by harassment and mortality. Incidental take will result from harassment of minnows during construction activities and mortality of any individuals that may become stranded in restoration features (e.g., ephemeral channels) after peak flows recede.

## **Reasonable and Prudent Measures**

The following reasonable and prudent measures are necessary and appropriate to minimize incidental takes of silvery minnows from the proposed action:

1. Minimize take of silvery minnows and reduce impacts to their habitat.
2. If native vegetation has not established within three years, then the Sandia Habitat Restoration site will be actively planted with native vegetation.

Minimizing the extent and duration during construction or other activities near or along the shoreline may reduce the adverse effects to silvery minnows from disturbance, noise, vibration, and water quality alterations. Constructing features to drain back into the river as waters recede may reduce the number of silvery minnows harmed as a result of stranding.

## **Terms and Conditions**

Compliance with the following terms and conditions must be achieved in order to be exempt from the prohibitions of section 9 of the ESA. These terms and conditions implement the Reasonable and Prudent Measures described above. These terms and conditions are non-discretionary. Reclamation has already begun to implement these measures into the project.

To implement RPM 1 Reclamation shall:

- a. To the extent practicable, minimize the area and duration of construction activities near or along the shoreline of the MRG in the Action Area.
- b. Ensure that conservation measures described in this biological opinion are implemented, including those pertaining to equipment and operations, staging and access, water quality, dust abatement, and others.
- c. To the extent practicable, reasonable, and prudent, reduce the impact of spoil placement in silvery minnow habitat in the Action Area:
  - i. Actively seek alternatives for spoil disposal outside the floodway.
  - ii. Where alternatives for spoil placement or usage are infeasible, seek to minimize the impacts of spoil placement through design considerations.
- d. Routinely review the Rio Grande Silvery Minnow Population Monitoring Program reports (e.g., Dudley et al. 2015) during the construction phases only to



determine if the estimated densities of silvery minnows in the Angostura Reach are above 6.0 fish/100m<sup>2</sup>.

- e. Report to the Service findings of injured or dead silvery minnows, including eggs.
- f. Implement the project-specified monitoring, including entrapment monitoring, as proposed and report results annually to the Service.

For all RPMs, Reclamation shall monitor the implementation of the RPMs and their associated terms and conditions, and provide a report of their status of implementation to the Service's New Mexico Ecological Services Field Office annually, no later than January 30<sup>th</sup>, for any proposed action activities conducted during the previous calendar year, until the proposed project activities, including restoration success, are complete. Report to the Service's New Mexico Ecological Services Field Office the discovery of any silvery minnow mortalities associated with the proposed action. Ensure that the Service receives electronic copies of all reports and plans related to implementation of these RPMs and terms and conditions, including but not limited to, species monitoring or survey results, and any habitat and water quality monitoring activities or formal Adaptive Management Plans involving these sites. In years where no project activities occur, the annual report may be abbreviated. These annual reports should reference Consultation # 02ENNM00-2016-F-0383 and be sent to the email address nmesfo@fws.gov or by mail to the New Mexico Ecological Services Field Office, 2105 Osuna Road NE, Albuquerque, New Mexico 87113.

### **CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service (USFWS 2011, 2012, 2014) provided conservation recommendations in previous BOs incorporated here by reference. In addition, the following conservation measure is provided:

- Use a formal Adaptive Management process to determine which methods and techniques are most effective at creating optimal habitat conditions for listed species and also that seek to minimize (or constrain) costs.

### **RE-INITIATION NOTICE**

This concludes formal consultation on the action described in Reclamation's BA (Shuck et al. 2016). As provided in 50 CFR § 402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this BO; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this BO; or (4) a new species is listed or critical habitat designated that may be affected by the

action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease.

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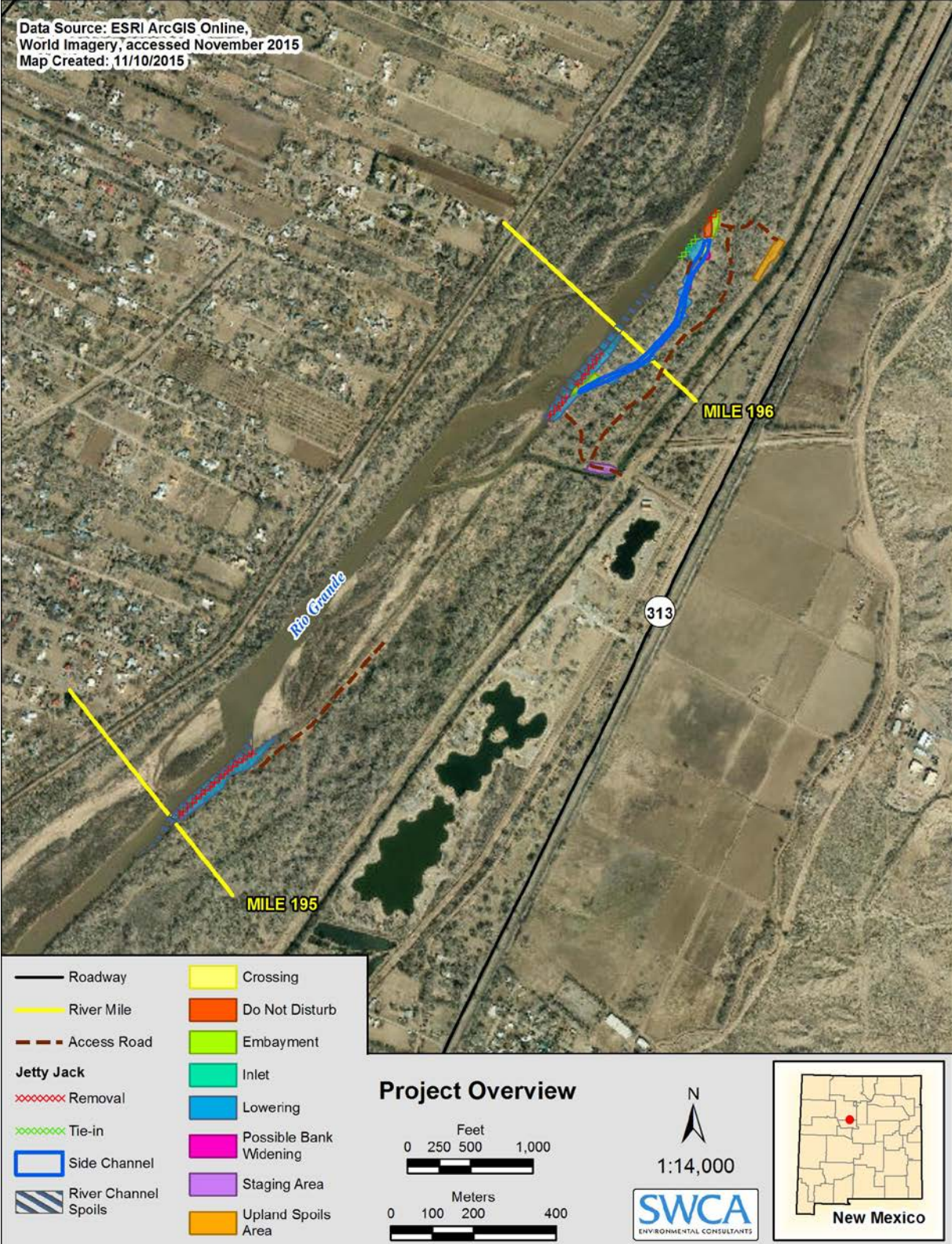
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**Figure 1. Project overview of Sandia habitat restoration sites.**



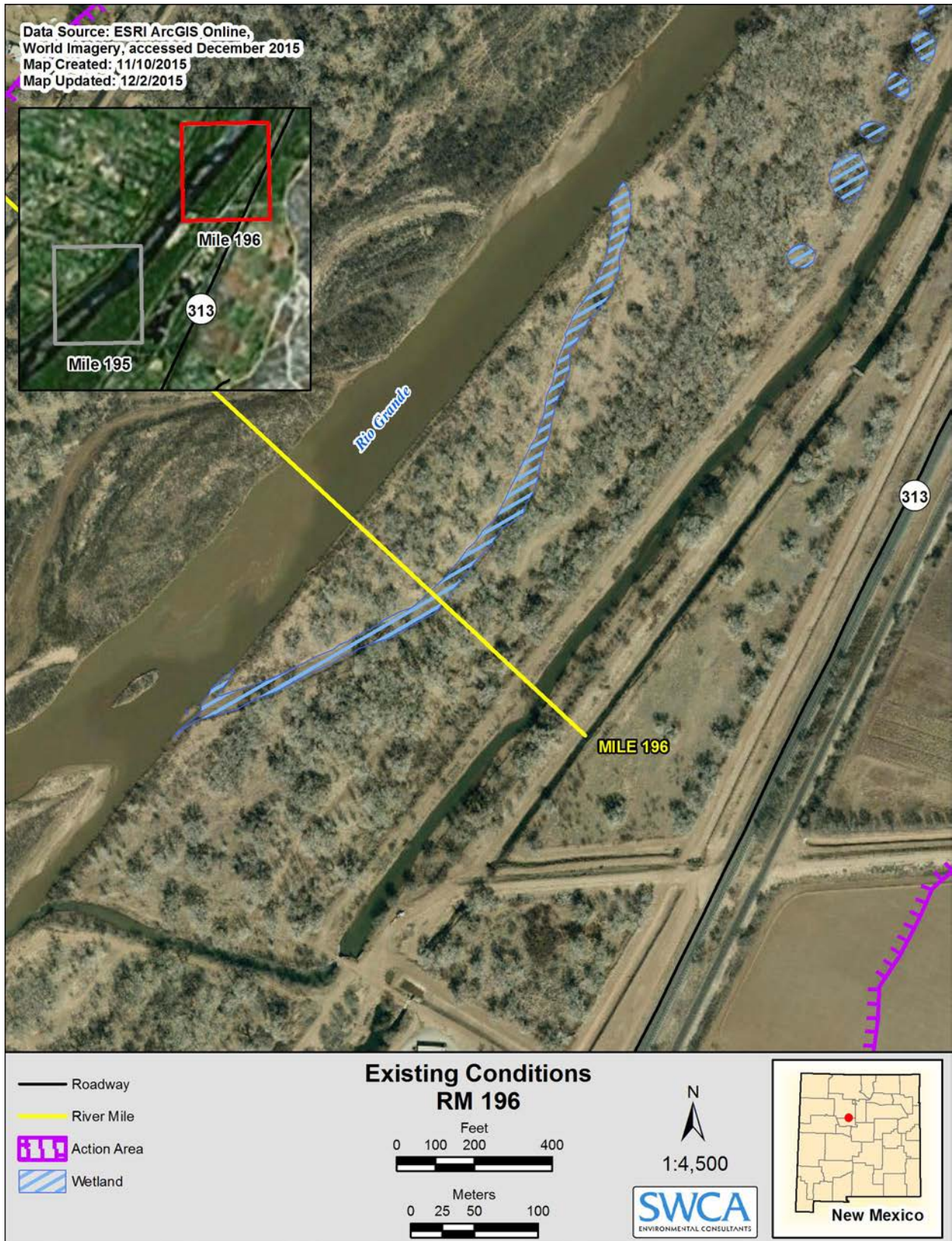


Figure 2. Existing conditions at RM 196.





Figure 3. Existing conditions at RM 195.



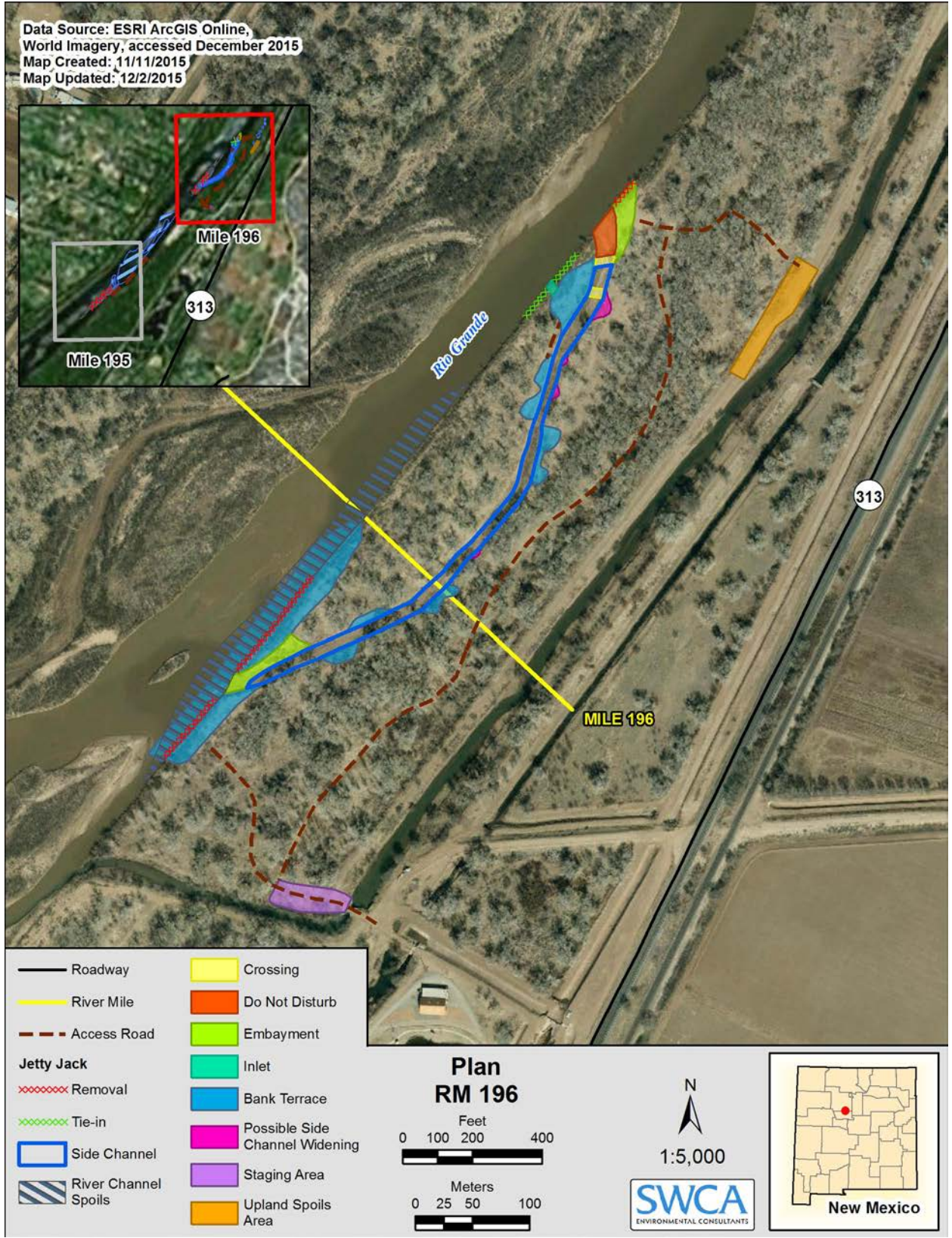


Figure 4. Plan view of project components for the RM 196 site.



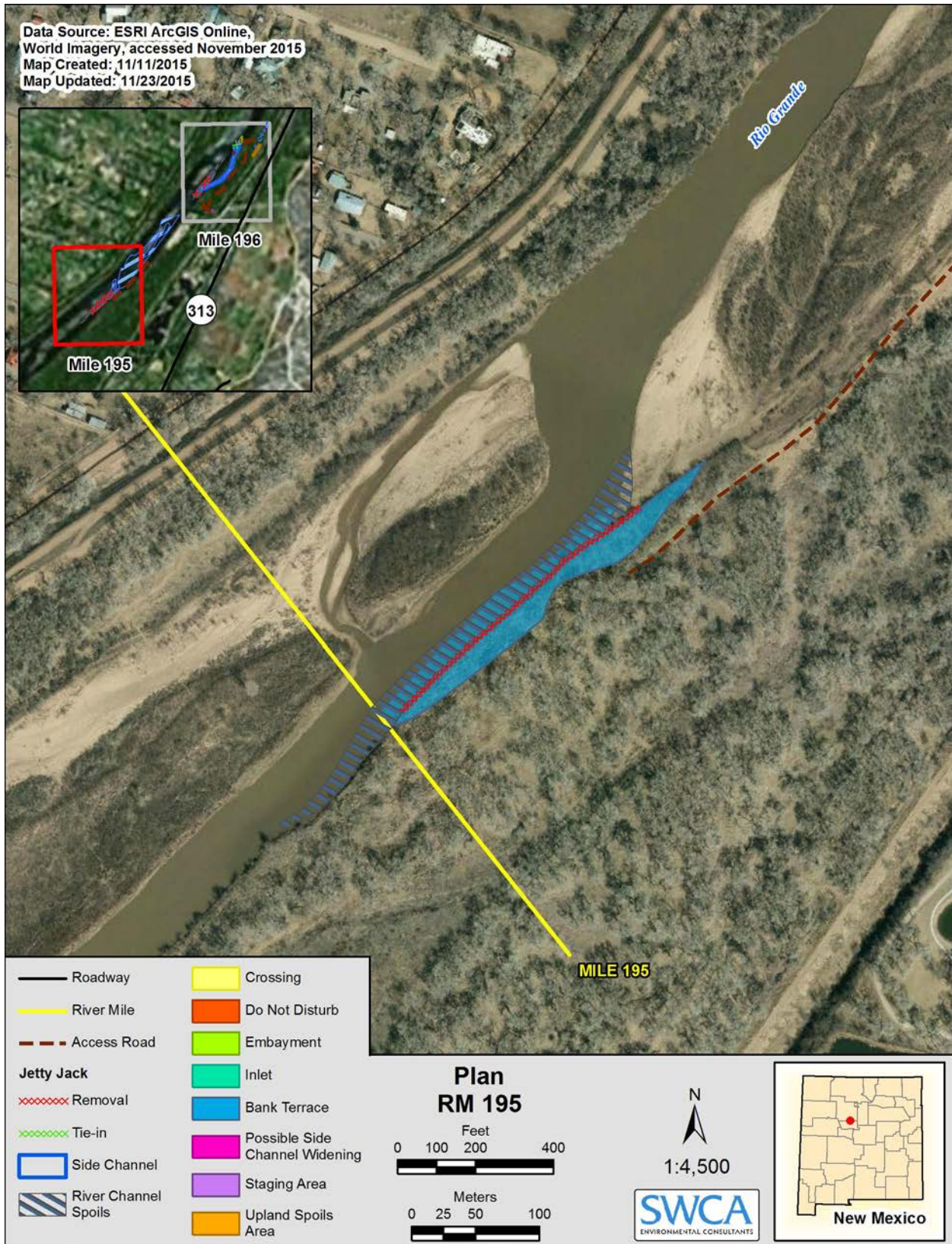
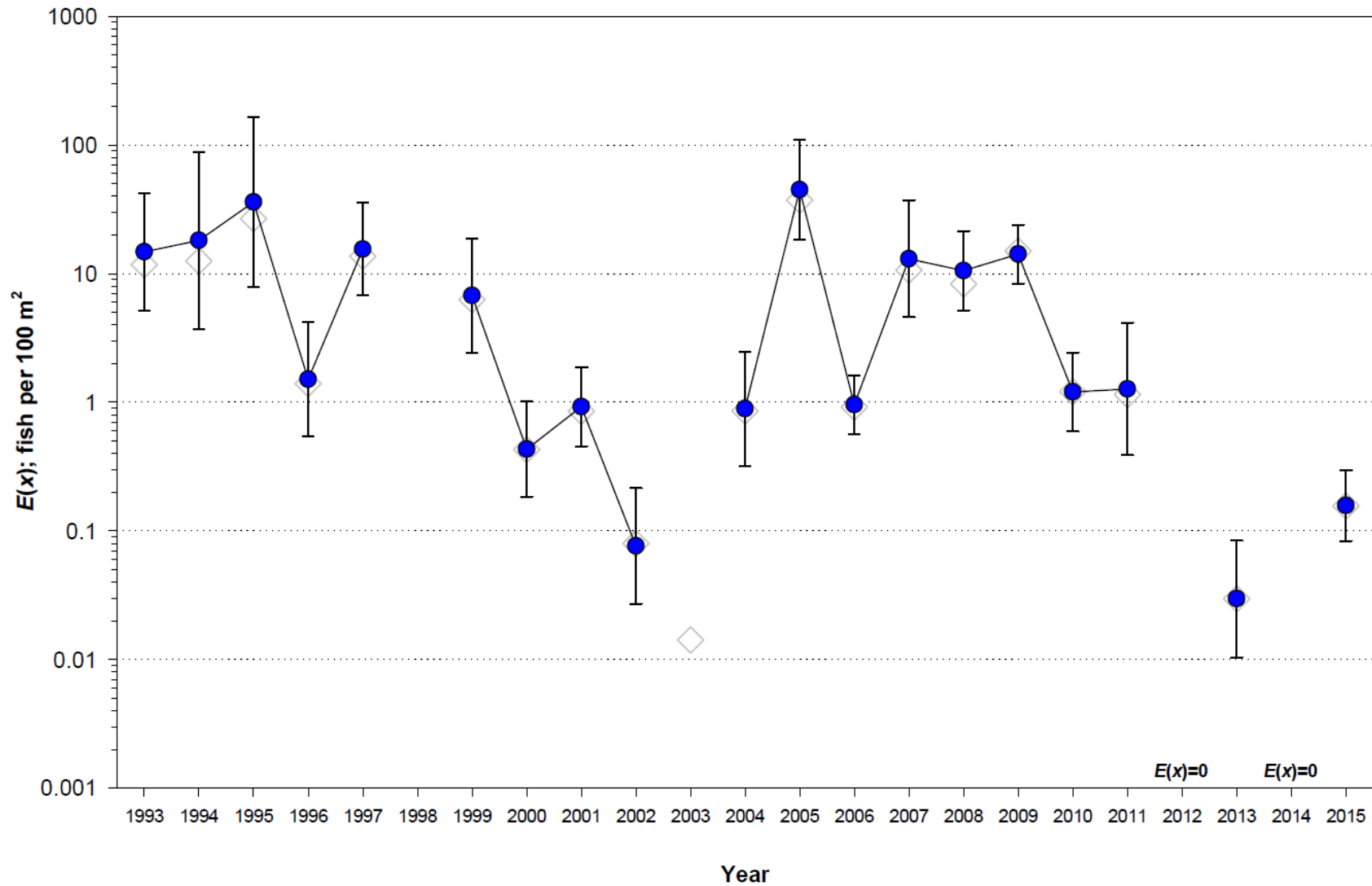


Figure 5. Plan view of project components for the RM 195 site.



**Figure 6. Yearly silvery minnow mixture model estimates of density ( $E(x)$ ), using October sampling-site data (1993-2015). Solid circles indicate modeled estimates and bars represent 95% confidence intervals. Dotted horizontal lines represent orders of magnitude. Gray diamonds indicated simple estimated of mean densities using the method of moments. (Dudley et al. 2015).**