United States Department of the Interior
FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
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Carlsbad, California 92008

In Reply Refer To:
FWS-SB-16B0182-17F0387

March 9, 2017
Sent by Email

Doug Eberhardt
Section Chief (W-3-3)
Infrastructure Section
U.S. Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, California 94105

Attention: Elizabeth Borowiec

Subject: Formal Section 7 Opinion on the Proposed Sterling Natural Resource Center, San Bernardino County, California

Dear Mr. Eberhardt:

This letter transmits our, the U.S. Fish and Wildlife Service (USFWS), biological opinion on the proposed issuance of federal funding [Clean Water State Revolving Fund (CWSRF)] by the U.S. Environmental Protection Agency (USEPA) for the construction and operation of the proposed Sterling Natural Resources Center (SNRC or Project). The USEPA has delegated the administration of the CWSRF program to states, including California, under the federal Clean Water Act (CWA), to assist in funding projects intended to improve water quality. The Division of Financial Assistance of the State Water Resources Control Board (State Water Board) administers the CWSRF program in California pursuant to 40 Code of Federal Regulations (CFR) Part 35, Subpart K. The USEPA is the lead Federal agency and the U.S. Army Corps of Engineers (USACE) is a cooperating agency for this consultation. The action of the USACE includes the issuance of a Clean Water Act Section 404 permit for City Creek and the Santa Ana River. East Valley Water District (EVWD), in cooperation with the San Bernardino Valley Municipal Water District (Valley District), is the non-Federal applicant (Valley District).

This biological opinion addresses the effects of the SNRC on the federally endangered San Bernardino kangaroo rat (*Dipodomys merriami parvus*; SBKR) and its designated critical habitat and the federally threatened Santa Ana sucker (*Catostomus santaanae*; SAS) and its designated critical habitat in accordance with Section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq*.). There are four other federally listed species in the larger Project area, four of which have designated critical habitat. You have requested our concurrence with your determination that the proposed action is not likely to adversely affect these species including the endangered Santa Ana River woolly-star (*Eriastrum densifolium* ssp. *sanctorum*; woolly-star), southwestern willow flycatcher (*Empidonax traillii extimus*; flycatcher), least Bell's vireo (*Vireo*

bellii pusillus; vireo), and the federally threatened coastal California gnatcatcher (*Polioptila californica californica*; gnatcatcher). You have also concluded that the proposed action will have no effect to the designated critical habitat of mountain yellow-legged frog [southern California DPS (*Rana muscosa*)], SAS, SBKR, or flycatcher. We concur with your determination that the proposed action is not likely to adversely affect woolly-star, vireo, flycatcher, or gnatcatcher.

Santa Ana River Woolly-star

The woolly-star is an endemic to the Santa Ana River Watershed. Historically this species ranged from the upstream reaches of the Santa Ana River alluvial fan and into the foothills of the San Bernardino Mountain Range in San Bernardino County downstream to the Santa Ana Canyon in Orange County. It is found only within open washes and early-successional scalebroom scrub on fluvial deposits where flooding and scouring occur at a frequency that allows the persistence of open shrublands (USFWS 2010a). The species occurs in the upper mainstem of the Santa Ana River, from the City of Riverside to just upstream of Seven Oaks Dam, with additional occurrences in Mill Creek, City Creek, Plunge Creek, Lytle Creek, and Cajon Creek (USFWS 2010a).

Woolly-star has been documented within the floodplain of City Creek, the San Bernardino International Airport property, and the Santa Ana River floodplain both upstream and downstream of the confluence of the Rialto channel and the Santa Ana River (ESA 2016a). In summer 2016 the City Creek rare plant survey (ESA 2016a) did not find any woolly-star plants in the footprint of the construction area or any plants within the single dry braid of the creek thalweg. The semi-perennial discharge of effluent from the Project would result in the conversion of xeric riparian and/or scalebroom scrub vegetation to riparian woodland vegetation from downstream of the outfall in City Creek (Boulder Avenue) to near Alabama Street. Where this occurs in City Creek, conversion of scrub vegetation to woodland vegetation will limit the potential of woolly-star to exist. Although this limits the potential habitat area for this species it represents an insignificant decrease in available habitat across the species' range and does not constitute an impact that would affect species' recovery.

Within the mainstem of the Santa Ana River downstream of the City Creek confluence, the species becomes less common. Downstream of the Rialto Channel in the mainstem river woolly-star exists patchily in the channelized floodplain. A decrease to the discharge of the total flow volume from Rapid Infiltration and Extraction (RIX) facility, as proposed as a Project-related action, may positively affect the distribution of woolly-star located downstream in the river floodplain by reducing the width of wetted channel and its associated riparian corridor and increasing the area of habitat suitable for woolly-star. Preconstruction surveys will be conducted to avoid any individual wooly-star that may be affected by Project activities. Given the lack of positive occurrence records in the proposed footprint of the direct impact area and proposed conservation measures that will avoid impacts to woolly-star, we concur with your determination that the proposed Project is not likely to adversely affect the species. No critical habitat for the species is present in the Project area.

Southwestern Willow Flycatcher

Flycatchers are migratory, spending the winter in locations such as southern Mexico, Central America, and probably South America, and nesting in the southwestern United States from about May to September (USFWS 2014a). Surveys conducted for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) have recorded flycatcher on the Santa Ana River in the area of indirect effect at Hidden Valley in 2007 (4 detections) and in 2015 (1 detection) (ESA 2016a). In most years one or more flycatcher territories have been documented in Prado Basin (Hoffman *et al*. 2014). The most recent flycatcher record in the area of indirect effect is of a single adult male observed just upstream of Mission Boulevard Bridge on the Santa Ana River (observation date June 18, 2016; ESA 2016b).

Upstream of the Mission Boulevard Bridge to the RIX outlet is a reach of the river that has falling groundwater (ESA 2016a). Riparian vegetation in this portion of the river is dependent on infiltrated effluent surface flow for survival during the dry season when the groundwater is below the rooting depth of most of the shallow-rooted native riparian plant species. Project effects are expected to have a permanent reduction in the total amount of riparian habitat in this reach of the river due to channel constriction from reduced surface flow. The wetted channel is expected to constrict by an estimated 8 percent resulting in an equivalent constriction of the riparian corridor and loss of up to 1.21 acres of riparian vegetation. Riparian vegetation will be lost on the outer margins of the current riparian corridor from soil drying and type conversion to scalebroom scrub vegetation. Rising groundwater near Mission Boulevard was confirmed by the U.S. Geological Survey (USGS) during RIX shutdown monitoring in 2015 (ESA 2016a). This condition, rising groundwater, is expected to persist unaffected with Project reduced discharge from RIX, continuing downstream to Prado Basin.

Of the 1.21 acres anticipated to be lost, approximately 0.5 acres of the wetted channel is expected to be lost within designated critical habitat for flycatcher, from the RIX outlet to the Riverside County line located just downstream of Riverside Avenue Bridge. Although not a precise measure of riparian vegetation, the 0.5 acres within designated critical habitat, or 1.21 acres of wetted channel anticipated being lost, is spread along a 4.2 mile river reach (RIX facility to Mission Boulevard Bridge). The portion of the riparian corridor that is expected to be lost, outer margin of riparian corridor, does not provide the ecological values important to flycatcher (i.e. large riparian canopy overhanging water or wetter soils). Mowing of the riparian corridor is conducted by Riverside County Flood Control and Water Conservation District (RCFCWCD) downstream of Riverside Avenue to below Mission Boulevard for the purposes of maintaining channel capacity (as required by the USACE manual for maintaining the levee system). This activity temporarily limits the amount of riparian habitat to 10 feet on either side of the stream corridor for the period of time it takes for the habitat to regrow (generally 2 to 5 years).

Wastewater added to City Creek will create additional riparian habitat in the Santa Ana River watershed beyond the current terminus of the riparian corridor. The amount and extent of riparian habitat created will be dependent on a variety of factors, including environmental conditions, depth to groundwater, and long-term management by San Bernardino County Flood

Control District. It is anticipated that up to 8.2 acres of riparian habitat will be created in City Creek. Since flycatcher currently use most of the lowland riparian habitats as migratory corridors, the extension of continuous riparian habitat from the San Bernardino Mountain Range to other downstream riparian habitats is considered a long-term benefit to the species.

Conservation Measure 17b.i has been included in the Project description to enhance portions of the perennial stream habitat for SAS in the mainstem of the Santa Ana River. This activity may temporarily remove riparian vegetation in ingress, egress, and work areas at six locations downstream of the RCFCWCD-maintained USACE levee system, but will be conducted in areas not occupied by flycatcher. This activity will minimize impacts to riparian vegetation in coordination with the USFWS to avoid incidental take of flycatcher.

Given the infrequent occurrence records of this species in the lowland floodplain of the Santa Ana River outside of Prado Basin, abundant suitable habitat that will remain unaffected by the Project, low potential for losses of riparian habitat to effect the species in the proposed Project impact area by reducing the potential foraging and/or nesting habitat for the species, no proposed impact to ecological function of designated critical habitat, and potential benefit to the species with the creation of riparian habitat in City Creek, we concur with your determination that the proposed Project is not likely to adversely affect flycatcher or its designated critical habitat.

Least Bell's Vireo

The vireo is an obligate riparian species during the breeding season and is characterized as preferring early successional habitat (USFWS 1998a). It is a subtropical migrant, traveling 2,000 miles annually between breeding and wintering grounds. It arrives in southern California breeding grounds in mid-March to early April, and is generally present until late September. Males establish and defend territories through counter-singing, chasing and sometimes physically confronting neighboring males. Territory size ranges from 0.5 to 7.5 acres.

The vireo population in the U.S. has increased 10-fold since its listing in 1986, from 291 to 2,968 known territories (USFWS 2006). The population has grown during each 5-year period since the original listing, although the rate of increase has slowed over the last 10 years. Most of the vireo breeding sites are located in southern California between the Tehachapi Mountains in Kern and Ventura counties south to northwestern Baja California, Mexico (USFWS 2006). Thus, despite a significant increase in overall population numbers, the population remains restricted to the southern portion of its historic range.

The overall positive population trend for vireo since its listing is primarily due to efforts to reduce threats such as loss and degradation of riparian habitat, and cowbird parasitism. The control of giant reed (*Arundo donax*) has been important in improving vireo habitat. Brood parasitism by cowbirds remains the primary threat to vireo recovery. Cowbird trapping has proven to be an effective technique for recovering vireo populations in areas it is implemented.

A recent and developing threat to vireo is the shot hole borer (*Euwallacea* sp.), an invasive ambrosia beetle that forms a symbiosis with a fungus (*Fusarium* sp.) that causes Fusarium dieback, a disease that induces branch or whole tree death (Eskalen *et al*. 2013). Molecular, morphometric, and chemical testing have found that the more common tea shot hole borer (*Euwallacea fornicatus*), native to tropical southeastern Asia and naturalized in Florida and Hawaii, is different from the newly named Polyphagous (PSHB) and Kuroshio (KSHB) shot hole borers found invading southern California woodlands (Eskalen *et al*. 2013; Chen *et al*. 2016). In 2013 there were 19 confirmed reproductive host trees species located in Los Angeles and Orange counties (Eskalen *et al*. 2013). This number has increased to 49 host species, including most native riparian trees and shrubs (Eskalen 2017). The two species have invaded new areas of southern California riparian habitats, north from coastal San Diego to Santa Barbara counties and east to western Riverside and San Bernardino counties (Eskalen 2017). Although the maximum extent of damage and result of this invasion is yet unknown, early monitoring suggests that riparian forests are especially vulnerable to Fusarium dieback with tree death observed (Boland 2016). Long-term management, monitoring, and research into control methods are needed to combat this threat to vireo and other obligate riparian species.

Vireo is relatively common in the continuous riparian corridor found along the Santa Ana River, from Rialto Channel downstream to Prado Basin. Upstream, vireo is generally restricted to patches of riparian habitat near the Santa Ana River confluence with San Timoteo Creek and further upstream near the foothills of the San Bernardino Mountain Range in City Creek. It is anticipated that up to 1.21 acres (8 percent) of wetted habitat will be permanently lost with Project related reduced discharge [6 million gallons per day (MGD)] into the Santa Ana River. Associated losses of riparian habitat are expected to be small and may be undetectable. Losses will be spread from the RIX outlet downstream to Mission Boulevard Bridge (4.2 miles) and will vary by location, depending on river depth. With flow reduction, channel constriction was modeled at between 4 and 7 percent (ESA 2016a), but we used 8 percent reduction when assessing changes to the wetted channel (see Indirect Effects section for SAS).

Conservation Measure 17b.i has been included in the Project description to enhance portions of the perennial stream habitat for SAS in the mainstem of the Santa Ana River. This activity may temporarily remove riparian vegetation in ingress, egress, and work areas at six locations downstream of the RCFCWCD-maintained USACE levee system, but will be conducted in areas not occupied by vireo. This activity will minimize to the maximum extent practicable impacts to riparian vegetation in coordination with the USFWS to avoid incidental take of vireo.

Project-induced indirect changes to riparian vegetation downstream of Riverside Avenue are not expected to reduce the ecological value of the habitat for use by vireo or reduce the amount of habitat in any specific location that may rise to the level of take of this species. Creation of riparian habitat (8.2 acres) in City Creek will more than offset any loss of riparian habitat in the mainstem of the Santa Ana River. Project impacts are expect to occur upstream and effects of reduced discharge on the amount and function of the riparian habitat is anticipated to diminish moving downstream, with measureable changes to surface flow in the stream (wetted channel) subsiding at approximately Mission Boulevard Bridge. This is approximately 1 mile upstream of

the start of the designated critical habitat for vireo in the mainstem Santa Ana River which continues downstream into Prado Basin. Designated critical habitat for vireo is located in the defined action area (described in the Action Area section below). Because we do not expect Project-related reductions in riparian habitat to cause take of individual vireo or reduce the distribution of vireo in the river, and no change in the amount or function of critical habitat is expected, we concur with your determination that the proposed Project is not likely to adversely affect the vireo or its designated critical habitat.

Coastal California Gnatcatcher

Gnatcatchers range from coastal southern California to Baja California, Mexico. The inland metapopulation, which is distributed around the Project area and east and north to the foothills of the San Bernardino Mountain Range, is relatively isolated from the coastal metapopulations. There is no suitable nesting habitat in the discharge footprint in City Creek and suitable breeding habitat (minimum of 15 – 20 percent native shrub cover) is patchily distributed downstream (ESA 2016a). The species could utilize the scalebroom scrub vegetation in City Creek for foraging and dispersal, but the lack of records and sparsity of habitat within City Creek and its confluence with Santa Ana River, indicate that gnatcatcher presence is likely ephemeral.

Discharge of effluent into City Creek is expected to result in the conversion of a narrow strip of early seral-stage scalebroom scrub vegetation to riparian vegetation. This would not reduce the available gnatcatcher foraging habitat as riparian vegetation also provides this function (foraging habitat) for the species. The nearest gnatcatcher record is approximately 2 miles to the east of City Creek within the Woolly-Star Preserve Area. Project type conversion of scalebroom scrub to riparian habitat is not expected to result in direct effects on gnatcatcher breeding habitat.

Downstream in the mainstem of the Santa Ana River there are gnatcatcher occurrence records on either side of the river near the RIX outfall in upland coastal sage scrub habitat, less than 0.5 miles from the area proposed for Project discharge reduction. These records suggest that gnatcatcher may use the river on a limited basis for foraging and dispersal. Flow reduction and non-native vegetation management in the Santa Ana River will not reduce the available amount of scalebroom scrub or native riparian habitat that gnatcatchers may be using for foraging habitat. It is anticipated that gnatcatcher foraging and/or breeding habitat (scalebroom scrub habitat) will increase as part of flow reduction from the RIX facility, benefitting the species. Designated critical habitat for gnatcatcher occurs east of the RIX facility, adjacent to the river in upland areas, and will not be affected by this Project.

Given the lack of gnatcatcher occurrence records near the Project footprint in City Creek, the lack of mature scalebroom scrub habitat (breeding habitat) that will be affected from water discharge into City Creek, and the absence of effects to designated critical habitat, we concur with your determination that the proposed Project is not likely to adversely affect the gnatcatcher, or its designated critical habitat. Additionally, the proposed conservation of scalebroom scrub to mitigate impacts to SBKR and/or woolly-star as part of the Project, as described below, may benefit the gnatcatcher.

Avoidance measures to benefit woolly-star, vireo, flycatcher, and gnatcatcher have been included in the Project description below. Beyond the identification of those measures, woolly-star, vireo, flycatcher, or gnatcatcher will not be further discussed in this document.

This biological opinion is based on information provided in the following documents and communications: biological assessment (ESA 2016a; BA) and an amendment to the BA (Valley District 2017); *Habitat Maintenance and Monitoring Plan* (ESA 2016c; HMMP) and an amendment to the HMMP (Valley District 2017); *Sterling Natural Resource Center Draft Environmental Impact Report* (ESA 2015a); Reduced Flow Model (ESA 2015b), GIS layers provided for Project features including federally listed plant and animal locations; survey reports; information provided during meetings and phone calls; site visits; email correspondence; and information in the Palm Springs Fish and Wildlife Office (PSFWO) files. The Project file for this consultation is located at the PSFWO.

CONSULTATION HISTORY

Informal discussion between the applicant and the USFWS began on March 5, 2015. We had a conference call on June 14, 2016 with USEPA, USACE, and State Water Board. We received the BA on August 8, 2016. On November 20, 2016 we received a letter from you dated November 18, 2016, requesting initiation of formal consultation. The BA had incorporated previous comments on the draft EIR and comments during many meetings and conversations between Valley District and the USFWS in regard to the Sterling Natural Resource Center proposed covered activity within the Upper Santa Ana River Habitat Conservation Plan. After further review of the BA, the USFWS and Valley District met on January 24, 2017 to discuss conservation measures included in the BA. This discussion led to an amendment of the BA (received February 6, 2017). Consultation was initiated on November 20, 2016, the date we received your request.

Santa Ana River Pipeline (removed from Project description, February 6, 2017)

On February 6, 2017 the USFWS received a document revising the BA (Valley District 2017). In this document, Valley District removed the Santa Ana River component of the Project description, which would have connected the SNRC with the discharge pipeline of the San Bernardino Water Reclamation Plant. A new pipeline segment would have been constructed along Alabama Street to the existing Santa Ana River pipeline by proceeding west from Alabama Street (along the boundary between the cities of San Bernardino and Redlands) for at least 1,000 feet and tying in near the east bank of City Creek. Associated impacts to 2.39 acres of SBKR designated critical habitat, scalebroom scrub vegetation, and up to 850 woolly-star plants near the San Bernardino International Airport Authority property and within the confluence of City Creek and the Santa Ana River were removed from the Project description.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Valley District is proposing to construct the SNRC facility in the City of Highland to treat wastewater generated in the EVWD service area for groundwater recharge in the upper Santa Ana River watershed. EVWD currently conveys its wastewater to the City of San Bernardino for secondary treatment at the San Bernardino Water Reclamation Plant (SBWRP) and tertiary treatment at the RIX facility which discharges to the Santa Ana River. The proposed Project would instead treat, recycle and reuse the wastewater for multiple beneficial uses within the upper Santa Ana River watershed. Six MGD of water would be diverted from the RIX facility and will not be discharged into the Santa Ana River. The diverted 6 MGD would be treated at the SNRC and discharged higher in the watershed either into City Creek, or into existing basins in the City of Redlands, California (Redlands Basins, operated by the City of Redlands) (Figure 1). The purpose of diverting the 6 MGD from the Rix facility for treatment at the SNRC is to provide the local community with greater control over the cost and method of wastewater treatment while producing a new supply of recycled water for local groundwater replenishment in the Bunker Hill Groundwater Basin. In addition, the proposed Project would provide an opportunity to create and/or enhance riparian and aquatic habitats in City Creek that would contribute to the regional conservation goals being developed through the Upper Santa Ana River Habitat Conservation Plan (HCP).

Project Area

The proposed Project is located within three municipalities: City of Highland, City of San Bernardino, and City of Redlands. Portions of the treated water conveyance pipelines for the City Creek and Redlands Basins alternatives would also traverse unincorporated areas within the County of San Bernardino. The SNRC would be constructed on a 14-acre parcel of land, located at North Del Rosa Drive between East 5th Street and East 6th Street in the City of Highland. The SNRC recycled water treatment facility would be located on the 8-acre parcel east of North Del Rosa Drive. Offices for the operations of the SNRC would be located in administrative buildings that would be constructed on the 6-acre parcel to the west of North Del Rosa Drive.

The SNRC would produce tertiary-treated water for reuse. A conveyance system including a pumping station and pipeline would be constructed to convey treated water from the SNRC to discharge locations in City Creek and/or the Redlands Basins.

Most of the wastewater reaching the new treatment facility would be conveyed by gravity within the existing collection system. However, some modifications would be necessary to connect the existing collection system with the new treatment plant. Two lift stations and approximately 11,000 linear feet of forcemain would be installed within city streets west of the SNRC.

Project Components

Sterling Natural Resource Center

The SNRC would be constructed on two parcels in the City of Highland. The parcel to the west of North Del Rosa Drive is owned by EVWD and would support the Administration Center.

Treatment Facility

The SNRC would provide tertiary treatment of wastewater generated within the EVWD service area. The SNRC would have a maximum capacity of 10 MGD and produce tertiary treated water in compliance with California Code of Regulations Title 22 recycled water quality requirements for unrestricted use. The plant design includes primary treatment, a membrane bio-reactor, ultraviolet light disinfection, and anaerobic solids processing with off-site solids disposal. The proposed SNRC would consist of multiple buildings, to house the process components, equipment, and offices.

Administration Center

The 6-acre parcel west of North Del Rosa Drive would be developed into the SNRC Administration Center. The Administration Center would consist of administration buildings and pavilions housing administrative offices needed for the treatment plant, surrounded by publicly accessible open space. The Administration Center would be designed to serve the community with an interpretive center with community gardens and community pavilions. It would also act as an Emergency Operations Center during emergencies.

Construction

The Project would take approximately 18 months to construct; including 18 months for the SNRC, 16 months for the conveyance facilities, 6 months for the discharge structures, and 6 months for equipping the existing Rialto wells. Excavated soils would be reused onsite to the extent feasible and otherwise deposited offsite. Approximately 21,000 cubic yards (CY) of soil would need to be hauled off site for the Treatment Facility and Administration Center. This assumes 20 CY per truck load on average, approximately 1,050 dump truck trips would be needed for removal of the excavated material. In addition, structural fill material (aggregate) would need to be hauled onto the site. An additional 1,000 truck trips may be required for aggregate deliveries.

Discharge Locations and Groundwater Recharge Areas

The treated water will be conveyed by pipelines to discharge structures at City Creek and Redlands Basins.

City Creek

To connect the SNRC to the City Creek discharge facility, approximately 38,700 linear feet of 24-inch diameter pipeline would be installed in existing city streets. The pipeline alignment runs east from the SNRC property in East 6th Street or East 5th Street heading east from the SNRC for approximately 2 miles to Central Avenue and south to the City Creek channel crossing, then north to the City Creek discharge structure. The pipeline would cross under the SR-210 freeway using trenchless construction methods and would be installed within paved street rights-of way and San Bernardino County Flood Control District (SBCFCD) right-of-way along City Creek. Within City Creek, the discharge structure would have a permanent footprint of up to 30-foot by 30-foot and be constructed of concrete with a partially buried energy dissipation structure. The facility would include flow control valves, metering, and telemetry. Construction methods may include trenchless methods under the flood control levee, daylighting within the creek channel, or trenching through the levee.

Construction zones in roadways would be approximately 20 feet wide across one or two traffic lanes. Open trenches would be between approximately 10 and 15 feet wide. The construction corridor would be 30 feet wide, which is enough to accommodate the trench and to allow for staging areas and vehicle access. Offsite construction staging areas would be identified by contractors for pipe lay-down, soil stockpiling, and equipment storage. On average, 150 feet of pipeline would be installed per day. Trenches would be backfilled at the end of each work day or temporarily closed by covering with steel trench plates.

The construction equipment needed for pipeline installations generally includes: backhoes, excavators, dump trucks, shoring equipment, steam rollers, and plate compactors. Typically, 15 to 20 workers would be required for pipeline installations. Excavated suitable soils would be reused as backfill and other disposed offsite.

Trenchless construction methods would be employed to install pipelines under sensitive drainages, highways, and creek levees. Trenchless installation could include either directional drilling or jack and bore methods. All trenchless installations would require an approximately 50-foot by 100-foot temporary construction area on each side of the crossing for installation shafts (pits), materials, and equipment. Trenchless crossings would be designed to avoid physical impacts to the flood control levee. Construction of the discharge structure is estimated to take about 2 months, with construction of one structure overlapping with pipeline installation at any given time. In general, construction activities would occur between 7:00 a.m. and 7:00 p.m., Monday through Friday.

Redlands Basins

A 24-inch diameter conveyance pipeline would be installed within Alabama Street from East 6th Street or East 5th Street for approximately 1.3 miles south to the existing City of Redlands' basins (Redlands Basins). The conveyance pipeline would cross the Santa Ana River within an existing conduit attached to the Alabama Street Bridge. Valley District owns an existing 30-inch

diameter pipe within the bridge deck, and the existing pipeline would act as a casing for the proposed 24-inch pipeline. No trenching within sensitive habitat will be necessary when crossing the Santa Ana River.

A discharge structure would be constructed at the Redlands Basins to convey flows into multiple basins. The discharge structure would be partially buried with a less than 30-foot by 30-foot permanent footprint. Alternatively, a pipeline manifold would be installed in the basin with multiple valves at a predetermined spacing that can be opened or closed at different times based on the incoming flow. The facility would include flow control valves, metering and telemetry. Construction of the discharge structure would occur between 7:00 am and 7:00 pm and is estimated to take about 2 months. The construction corridor along Alabama Street would be 30 feet wide until it connects to the discharge structure in the Redlands Basins and reduces to a 20-foot wide corridor.

Conservation Measures

General and species-specific conservation measures (CM) are listed below that are designed to avoid and minimize impacts to federally listed species and their designated critical habitats, and to offset impacts that may otherwise adversely affect a listed species. General measures are to be implemented in all areas where sensitive resources may occur (i.e., City Creek or Redlands Basins).

General Measures

CM 1. Worker Environmental Awareness Program. A Worker Environmental Awareness Program (WEAP) will be provided to work crews by a qualified biologist(s) prior to the commencement of construction activities. Each worker will receive the WEAP training prior to beginning work on the Project. Training materials and briefings will include but not be limited to, discussion of the federal and state Endangered Species Acts, the consequences of noncompliance with Project permitting requirements, identification of special-status plant and wildlife species and sensitive natural plant community habitats present in or adjacent to the work areas, a contact person in the event of the discovery of dead or injured wildlife, and review of construction-related avoidance and minimization requirements. Maps showing the location of special-status plants and wildlife, exclusion areas, or other construction limitations (i.e., limited operating periods) will be provided to the environmental monitors and work crews prior to ground disturbance.

CM 2. Limits of Disturbance. Prior to construction in or adjacent to sensitive habitat areas and under the direction of a qualified biologist, Valley District will clearly delineate the construction right-of-way (stake, flag, fence, etc.) that restricts the limits of construction to the minimum necessary to implement the Project.

CM 3. Biological Monitoring. Prior to the start of construction, Valley District will retain a USFWS-authorized biological monitor on site during the initial ground

disturbance and during construction activities to monitor habitat conditions and impacts. The biological monitor will ensure compliance with the Project description evaluated in the biological opinion, including all CMs and terms and conditions, and will have the authority to halt or suspend all activities until appropriate corrective measures have been taken. The biological monitor will report any non-compliance immediately to the USFWS. The biological monitor will be a qualified biologist/botanist with species expertise appropriate for this Project. The USFWS will approve all biological monitors before Project activities can begin.

CM 4. Construction Best Management Practices. The Contractor will implement the following Best Management Practices during construction of pipelines and discharge structures to protect any adjacent sensitive natural communities that provide habitat for special-status species.

a. The following water quality protection measures will be implemented during construction:

i. Stationary engines, such as compressors, generators, light plants, etc., will have drip pans beneath them to prevent any leakage from entering runoff or receiving waters.

ii. All construction equipment will be inspected for leaks and maintained regularly to avoid soil contamination. Leaks and smears of petroleum products will be wiped clean prior to use.

iii. Any grout waste or spills will be cleaned up immediately and disposed of off-site.

iv. Spill kits capable of containing hazardous spills will be stored on-site.

b. To prevent inadvertent entrapment of common and special-status wildlife during construction, all excavated, steep-walled holes or trenches more than 2 feet deep will be covered with tarp, plywood or similar materials at the close of each working day and will be inspected visually to confirm animals would be excluded, to prevent animals from being trapped. Ramps may be constructed of earth fill or wooden planks within deep walled trenches to allow for animals to escape, if necessary. Before such holes or trenches are backfilled, they should be thoroughly inspected for trapped animals. If trapped wildlife is observed, escape ramps or structures will be installed immediately to allow escape.

CM 5. On Site Overnight Storage. All construction pipes, culverts, or similar structures that are stored at a construction site for one or more overnight periods should be

thoroughly inspected for birds and other wildlife before the pipe is subsequently buried, capped, or otherwise used or moved.

Species-Specific Conservation Measures

San Bernardino Kangaroo Rat

CM 6. Exclusionary fencing will be erected in construction areas known to be occupied by SBKR or containing kangaroo rat sign (e.g., burrows, scat, tail drags, or dust baths) as determined by a preconstruction survey by a qualified biologist (i.e., City Creek or Redlands Basins). The fencing configuration and materials will meet the specifications found in Appendix A. An alternative fence design or material may be used upon approval of the USFWS. Proposed fence installations will be submitted to the USFWS for review and approval. No ground disturbance may occur prior to approval of the design.

a. A qualified biologist or approved biological monitor will be present on site when the fence is installed to minimize disturbance of SBKR burrows from fence installation.

b. The integrity of the fencing will be checked by a qualified biologist at the end of each work day. Any gaps greater than 0.5 inch will be repaired immediately.

c. Construction access openings will be closed and secured at the end of each work day using the at-grade fencing method.

d. The fence will remain in place for the duration of construction activities and removed at the completion of the relevant Project activity.

CM 7. A qualified biologist will initiate preconstruction trapping within each fenced construction zone the evening of the day on which the fence is installed to remove as many SBKR as possible from within each fenced area.

a. Trapping will be conducted for 5 consecutive nights or until no SBKR are captured for 2 consecutive nights.

b. Any SBKR removed from within the construction zone will be relocated outside of the fenced area to an area which is safely away from the construction activities.

c. Monthly reporting will occur during Project construction in SBKR habitat areas and include all sensitive species detected in the vicinity of the work areas, and all construction-related actions that may have directly affected SBKR.

CM 8. Handling and relocating SBKR will be conducted as follows:

a. Individual SBKR will be held for no longer than 1 hour before releasing them, and they will be relocated as quickly as possible.

b. Animals will not be held in plastic bags; they will be transferred in a clean, structurally sound, breathable container with adequate ventilation.

c. Animals will be handled and temporarily held in a manner and conditions which will prevent them from becoming stressed due to temperature extremes (either hot or cold) at any time.

CM 9. Construction within fenced areas will begin no more than 5 days after fence placement (i.e., at the conclusion of maximum number of days in which trapping is conducted); or if this is not possible, the preconstruction trapping will be extended or repeated.

CM 10. The qualified biologist or approved biological monitor will visually inspect trenches and steep-walled holes, as in Measure 4b above, before the onset of daily construction for the presence of SBKR. If SBKR are discovered, the biologist will supervise the movement or relocation of the equipment until the animal has left the area on its own or capture the animal and release it outside the exclusionary fence in suitable habitat as close as possible to where it was discovered.

CM 11. To the extent feasible, soil stockpiles in SBKR habitat will be located within the construction area inside the exclusionary fence. If soil stockpiles must be located in SBKR habitat outside the main construction area, they will be located in areas where there is no kangaroo rat sign, as determined by a qualified biologist. Exclusionary fencing will be placed around soil stockpiles outside the main construction area to minimize the potential for SBKR to access them. They will be inspected prior to daily construction for evidence of kangaroo rat sign by a qualified biologist. If sign is detected trapping and relocation of SBKR will be conducted as described above.

CM 12. Nighttime construction and night lighting will not be allowed.

CM 13. Valley District will prepare and implement a revegetation plan to replace temporarily impacted habitat in proposed impact areas (i.e., City Creek and Redlands Basins) or lands conserved as compensatory mitigation. The revegetation plan will be submitted to the USFWS a minimum of 60 days prior to commencing construction activities in native habitat. At minimum, the revegetation plan will include the following elements:

a. Relevant conditions of Project permits and this biological opinion.

b. Clear guidelines and quantifiable success criteria to measure progress toward fulfilling relevant conditions and to determine that implementation has been successfully completed.

c. Performance standards to set appropriate quantitative and qualitative measurements of coverage and diversity of the scalebroom scrub vegetation and non-native vegetation to assure that the effort is progressing toward replacement of habitat to pre-Project levels of cover and diversity, or high quality as approved by the USFWS. Within 5 years after commencing revegetation efforts, cover and diversity should have progressed toward an intermediate phase of scalebroom scrub. Both early and intermediate stages of scalebroom scrub (native perennial plant cover 30 to 50 percent) and limited non-native plant species cover (less than 10 percent) provide suitable habitat for SBKR and woolly-star.

d. Guidelines and specifications for salvage and redistribution of topsoil, vegetative debris, and organic material ("duff"), as well as other pertinent planting specifications.

e. Guidelines for controlling and monitoring invasive, non-native plants.

f. Specifications for seed application including guidance for materials and source material, rates of application, and appropriate application methods and timing specifications, and methods will be based on locally successful SBKR habitat restoration projects within the watershed.

g. Descriptions of maintenance and monitoring methods to promote successful implementation of the plan.

CM 14. All Project-related impacts to scalebroom scrub habitat in City Creek and the Redlands Basins are within the designated critical habitat for SBKR (Table 1; see section on Direct Effects to SBKR). Permanent impacts to designated critical habitat in City Creek (outlet structure, 0.02 acres; habitat type conversion, 8.2 acres) and in Redlands Basins (outlet structure, 0.02 acres), will require off-site compensation at a ratio of 3:1 acres (occupied, 4.12 acres) or a ratio of 2:1 acres (unoccupied, 4.12 acres). Temporary impacts to designated critical habitat in City Creek and Redlands Basins will be compensated at a ratio of 2:1 acres (occupied, 0.48 acre) or a ratio of 1:1 acres (unoccupied, 0.18 acres). All SBKR habitat temporarily impacted during construction will be restored in accordance with the approved revegetation plan. Compensatory mitigation of 21.74 acres may be provided through: (1) the conservation and management of scalebroom scrub habitat (at least 13.32 acres of which are occupied), (2) the purchase of equivalent credits from a Conservation Bank approved by the USFWS, or another equivalent

compensatory mitigation option approved by the PSFWO in writing prior to initiation of Project construction.

Santa Ana River Woolly-Star

CM 15. Prior to ground disturbance, a qualified botanist will conduct preconstruction surveys for woolly-star in areas of suitable habitat where disturbance will occur as a result of construction (excluding paved roads and road shoulders) using the California Department of Fish and Wildlife's [CDFW, formerly the California Department of Fish and Game (CDFG)] November 2009 guidance for *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations*, as appropriate.

CM 16. If a woolly-star plant is found occurring in a Project work area and it may be impacted by the Project, the USFWS will be notified within 3 working days of the finding. If occupied habitat cannot be avoided all work will stop in occupied areas. If it is determined that avoidance is not feasible consultation with the USFWS will be reinitiated.

Santa Ana Sucker

CM 17. The following measures will avoid, minimize, and offset Project-related impacts to SAS associated with up to 1.21 acres of permanent degradation of occupied designated critical habitat in the mainstem of the Santa Ana River from the RIX outfall downstream to approximately Mission Boulevard.

a. Valley District will prepare and implement the HMMP which will identify habitat improvement actions and methods for implementation, monitoring, and maintenance. The diversion of wastewater flow from the RIX Facility to the SNRC will not occur until Valley District's Santa Ana Sucker HMMP has been approved by the USFWS and the actions proposed in this measure have been completed or show evidence of significant progress toward successful implementation such as engineering design(s) and/or other regulatory compliance such as the California Environmental Quality Act, or consultation with the USFWS will be reinitiated.

b. The HMMP will include the measures listed below to offset direct and indirect impacts to SAS and its habitat resulting from the loss of up to 22.3 percent (6.43 MGD of 28.4 MGD calculated from the November 2014 to May 2016 discharge) discharge from the RIX outfall into the Santa Ana River. The HMMP will contain measures to increase the number of individual SAS in the Santa Ana River, increase the area of suitable and occupied habitat in this watershed, and establish two new populations in the watershed. It will be implemented by a contracted, qualified, and permitted

entity in coordination with the USFWS. The HMMP will specify goals and performance criteria for each conservation measure and include the following elements:

i. Habitat Node Creation (microhabitat enhancements) to offset the potential reduction of suitable habitat available to sucker, including the above listed habitat features, resulting from decreased flow, decreased water velocity, and decreased sand transport.

Objective: Increase the total area of suitable habitat available to sucker, including riffles, small scour pools, and exposed patches of gravel/cobble substrate by strategically placing a series of structures within the stream flow to manipulate water movement and create these microhabitat areas.

This measure is expected to enhance perennial stream habitat within at least 1.5 acres of occupied habitat along about 2.5 miles of river, as measured by the area of pools created, gravel/cobble substrates exposed, and other functional SAS habitat features created/enhanced. The creation of all 6 habitat nodes will occur prior to any water diversions. If future data suggests that impacts to the species are either greater than expected or habitat nodes cannot be created to functionally offset Project impacts, the Project will obtain technical assistance from the USFWS to develop a new or revised CM that will achieve the biological objective(s) as analyzed in this opinion, or consultation with the USFWS will be reinitiated.

The Project will implement microhabitat enhancements (habitat nodes) within ecologically valuable segments of the Santa Ana River downstream of the RIX discharge location to improve the abundance and distribution of the above mentioned SAS habitat features. Enhancements will include the use of natural materials to increase scour and pool formation. Substrate augmentation (e.g., river gravel and cobble) may also occur in the same area to enhance perennial stream habitat function. Examples may include placement of large boulders and/or large woody debris to increase velocity of flow and gravel bar patches as well as deep pool refugia areas. A minimum of six habitat nodes will be created.

One naturally occurring riffle/pool feature (natural node) in the Santa Ana River was observed to enhance the stream habitat for SAS for approximately 330 feet (100 meters, 0.25 acres). Between 2015 and 2016 the USGS Native Fishes Survey found that the relative abundance of exposed gravels increased in this area suggesting that the size of the

affected area associated with the node is subject to fluctuate based upon environmental conditions and the abundance of fine sediment in the inset channel (SAS occupied stream) (Brown and May 2016, 2017). Although all nodes will be unique in design, each will serve to replicate the scale and provide similar ecological functions as the natural node discussed above.

The nodes will be located in the Santa Ana River mainstem between the RIX outfall and River Road Bridge. To maximize habitat value and function locations should be associated with mainstem tributaries (Evan's Lake, Arroyo Tequesquite, Sunnyslope Drain, Anza Drain, Hole Creek, etc.). Locations will need to be further refined by field survey data.

Habitat nodes will be monitored annually and the survey data will be used to assess the need for corrective measures. Annual monitoring will include, at minimum, water quality, visual estimates of substrate cover types, and fish surveys. When the cumulative cover of boulder, cobble, and gravel is found to be less than 35 percent for any habitat node (mean cover measured over a 0.25 acre reach associated with a node), maintenance and/or reinstallation of nodes will be conducted to maintain a minimum of 0.25 acres of habitat enhancement for every node or a cumulative enhancement of 1.5 acres for all six nodes. All work conducted in the Santa Ana River will be done in coordination with the USFWS and CDFW.

If vegetation removal is required for ingress, egress, or other work areas associated with Habitat Node creation and maintenance it will be revegetated. Quantitative and qualitative performance standards addressing vegetation cover and diversity will be included in the HMMP. Within 3 and at most 5 years after commencing revegetation efforts, cover and diversity should have progressed toward pre-Project levels of cover and diversity, or higher quality for the benefit of vireo and SAS. It is not anticipated that maintenance work, requiring vegetation removal, will be needed more frequently than every 5 years.

ii. Aquatic Predator Control Program to offset the potential increase in non-native predator habitat (pools or other microhabitats that provide relatively deep and slow velocity water flow) resulting from reduced discharge volume.

Objective: Reduce the abundance of non-native predators in the reach of river affected by the Project so as to maximize native fish survival.

The non-native predator removal program will be focused on reducing the abundance of non-native aquatic predators immediately preceding the start of the sucker spawning season (approximately March 1). Species to be removed may include non-native fish, amphibians, and reptiles such as mosquitofish, largemouth bass, black bullhead catfish, green sunfish, red-eared slider, African clawed frog, and American bullfrog. This activity will occur at minimum of one time per year outside of the SAS spawning season (August 1 to February 28). The most recent fish and/or other surveys conducted upstream of Prado Basin in the Santa Ana River will provide the locations of where to conduct electroshocking. Electroshocking will be carried out by a USFWS-approved SAS biologist authorized to use electroshock sampling methods. Pre-spawning predator removal will occur annually prior to February 15 in areas of highest ecological value to SAS reproduction, currently from Rialto Channel downstream to approximately Mission Boulevard and in mainstem tributaries. If aquatic predators are found in abundance after pre-spawning predator removal, a second predator removal will be conducted after August 1.

iii. Exotic Weed Management Program to reduce competitive stress for native vegetation within the riparian community in order to offset the impacts associated with reduced water availability resulting from the Project.

Objective: Maintain a low abundance and cover of non-native vegetation along the Santa Ana River and in City Creek within the Project impact area (RIX outlet to Mission Boulevard and Boulder Avenue to Alabama Street, respectively), focusing on the removal of giant reed, tamarisk, and castor bean.

The exotic weed management program will be carried out by a qualified and experienced entity and will focus on controlling the non-native vegetation within the riparian corridor between the Rialto Channel and the Mission Boulevard Bridge (approximately 4.2 miles). This measure will establish and maintain weed control in one-third of the area (approximately 1.4 miles) per year, so as to complete the weeding of the entire area once every 3 years. Annual work plan meetings between the USFWS, Valley District staff, and contractor will identify areas of concern and focus work efforts on those areas. A successful program will maintain total cover of non-native riparian species to less than 25 percent and total cover of giant reed, tamarisk, and castor bean to less than 5 percent. Percent cover will be assessed relative the total area of the weeded riparian corridor for that year.

Although they are native species, cattails (*Typha* spp.) and bulrush (*Schoenoplectus* spp.) may increase in abundance over time as their preferred habitat type (slow, shallow water or marsh) is expected to increase due to Project reductions of flow. These plant species may degrade sucker habitat by further reducing water velocity and trapping fine sediment. Problem areas will be identified as part of the Riverwalk survey (see below for more on Riverwalk survey) and if certain areas have become problematic they will be managed in coordination with the USFWS and CDFW.

iv. Rialto Channel Water Temperature Management to offset the potential loss of suitable habitat downstream in the Project impact area during times of the year when habitat will be most affected from the cumulative impacts from reduced discharge and drought effects, particularly in summer and fall.

Objective: Reduce water temperatures in Rialto Channel to tolerable levels (less than 86 degrees Fahrenheit) during summer months.

In recent years the temperatures within the natural bottom reach of Rialto Channel (not concrete lined section) were found to be generally greater than 80 degrees Fahrenheit in summer and fall (USGS 2015) and often warm enough to be outside of the tolerable range for sucker (USFWS 2010b). In order to decrease the water temperature in Rialto Channel to tolerable levels for SAS relatively cool groundwater (67 – 70 degrees Fahrenheit, temperature range derived from local nearby well operators), from up to 4 wells or other water sources will be added to the flows in Rialto channel.

In order to implement this measure most effectively, two water quality monitoring stations will be established in Rialto Channel. An upstream, real-time gage will measure the water temperature at the well input location (plunge pool downstream of Agua Mansa Bridge). At 85 degrees Fahrenheit the groundwater wells will automatically turn on and release directly into the plunge pool. Another real-time gage will be installed downstream of the plunge pool Rialto Channel just before the confluence with the Santa Ana River and. Once the water temperature at this downstream gage is less than 82 degrees Fahrenheit the well input will be turned off. Initiation and cessation of well water input (discharge) will be phased over a period of time to reduce sudden changes in flow and temperature in Rialto Channel. The well input and controls will be constructed and tested prior to diversion of flows from the RIX facility to the SNRC. This program will be deemed successful if there are 5 or fewer days between June 22

and September 21 that the daily maximum water temperature exceeds 82 degrees Fahrenheit and SAS are present in the channel during the same period. Water temperature will be measured in Rialto Channel upstream of the RIX outfall. If success criteria are not met within 2 years of signing the biological opinion, the Project will obtain technical assistance from the USFWS to develop a new or revised CM that will achieve the biological objective(s) as analyzed in this opinion.

v. Upper Watershed SAS Population Establishment to offset potential losses of suitable habitat in the Project's impact area, and to offset unknown and/or cumulative impacts to the species and its habitat that may be associated with the reduction of flow to the Santa Ana River.

Objective: Increase the abundance, distribution and resilience of the sucker population in the Santa Ana River Watershed by establishing redundant populations in upper watershed tributaries.

Subject to the availability of sufficient source fish, the Project will establish two new locations of sucker within City Creek and Hemlock Creek, or another suitable unoccupied location within the former range of the species within the Santa Ana River watershed as approved by the USFWS. Both City and Hemlock creeks have been analyzed as part of the Santa Ana Sucker Translocation Plan (Dudek 2016a, 2017). Valley District has assessed the habitat availability and appropriateness for SAS in City and Hemlock creeks (Dudek 2016b). These documents show that portions of each of these streams have the necessary primary constituent elements (PCEs) to support SAS, as well as additional factors found to be important to SAS (Aspen 2016). The Translocation Plan is currently under review by the USFWS, CDFW, and U.S. Forest Service (USFS).

Prior to Project flow reduction to the Santa Ana River, at least one translocation of SAS will have occurred and Valley District will provide data indicating that the nascent population is healthy, reproducing, and appears to be successfully establishing. Successful establishment of SAS will have occurred when there are surviving and reproducing fish in at least two size classes, the population of SAS is stable or increasing in population as averaged over 5 years, and the translocated population is distributed throughout the appropriate habitat in the translocation stream[1].

[1] Based upon recent surveys conducted by the HCP (Dudek 2016b, 2017) more than 5 miles of potential SAS habitat occurs on City Creek, upstream of Highland Avenue, and approximately 1.5 miles exist on Hemlock Creek (see also RCRCD 2016).

If success criteria are not met in both translocation tributaries within 5 years of signing the biological opinion, the Project will obtain technical assistance from the USFWS to develop a new or revised CM that will achieve the biological objective(s) as analyzed in this opinion.

The HMMP will identify and further detail the goals and success criteria of SAS re-establishment and include the amount of financial assistance to be provided by Valley District for the regionally-beneficial population establishment program, including additional measures found below.

A. Valley District will contract with a USFWS-approved entity that can demonstrate the ability to re-introduce captively-bred SAS to a suitable unoccupied location with the intent of establishing a new self-sustaining population within the former range of the species on the Santa Ana River. The Contract requirements will include the following: (1) rearing and maintaining a sufficient number of breeding adults to support re-introduction of a minimum of 500 juvenile SAS into the target area per year (or alternate numbers agreed to by the USFWS); (2) annual relocations for the first 3 years, then as needed to maintain a stable population size and genetic diversity; and (3) monitoring, adaptive management, and annual reporting.

B. Valley District may reintroduce captive-bred SAS if (1) captive breeding documentation has been approved by the USFWS and CDFW and (2) the captive breeding facility has adequate numbers of appropriate sized SAS. If these conditions are not met or if additional fish are needed for translocation purposes SAS may be translocated from the Santa Ana River to the west fork of City Creek and one other historic tributary in the Santa Ana River watershed[2].

C. If, at any time, SAS are found located downstream Highland Avenue Bridge, Valley District will be responsible for relocating all SAS back upstream within the boundaries of the San Bernardino National Forest or out of locations that where their presence might affect other entities who do not have incidental take exemptions for this species. This measure will be implemented for the life of the Project or until another entity, such as the HCP, takes over this responsibility.

[2] Guidelines for take of SAS for recovery actions are addressed in the 2015 programmatic biological opinion for SAS recovery permits (USFWS 2015a).

vi. Annual Monitoring of the Santa Ana River to track the suitability and habitat for SAS following implementation of the Project and its conservation measures.

Objective: Identify any key effects to the hydrology or biology of the River that may result from reduced flow due to this Project.

The HMMP will outline a monitoring program to collect hydrology data in the segment of river between the RIX outlet and Mission Boulevard and within the habitat node creation reaches. Hydrology data will include water quality (flow velocity, temperature, and depth), visual observations of substrate, and other surface topography, and fish surveys. Annual reporting will include summaries of the non-native plant and aquatic predator removals and any adaptive management actions taken in the past year, and will be submitted to the USEPA, State Water Board, and USFWS by April 30 for review and comment. All long-term monitoring and management activities will be completed by the Project proponent per the commitments included in the HMMP and required by this biological opinion until the HCP is finalized and permitted or until incidental take associated with the Project becomes covered by another mechanism.

In order to make best use of the existing Riverwalk habitat survey dataset, (Riverwalk which has been conducted annually in the fall for the past 11 years), the Project will provide support to Riverwalk organizers, whether financial or in-kind services and develop the long-term monitoring methodology to be complementary to the Riverwalk survey data collection to provide a greater understanding of habitat availability throughout the entire system. The locations of the habitat nodes, as described above, will be added to the Riverwalk survey area as non-random transects. At least one year's worth of baseline data that captures the entire river corridor (Riverwalk points 9 to 118) will be recorded prior to a reduction in discharge flow from RIX.

ACTION AREA

The implementing regulations to section 7(a)(2) of the Act describe the action area to be all areas affected directly or indirectly by the Federal action and not merely the immediate area affected by the Project (50 CFR § 402.02). The action area is the area of potential direct or indirect effects of the proposed action and any interrelated or interdependent human activities; the direct and indirect effects of these activities include associated physical, chemical, and/or biological effects of considerable likelihood (USFWS and NMFS 1998). Indirect effects are those that are caused by the proposed action and are later in time but are still reasonably certain to occur (50 CFR §

402.02, USFWS and NMFS 1986). Analyses of the environmental baseline, effects of the action on the species and designated critical habitat, cumulative effects, and the impacts of the incidental taking, are based upon the action area as determined by the USFWS (USFWS and NMFS 1998).

We have defined the action area to include the collective Project components (SNRC, pipeline corridor along City Creek, and discharge locations) and the potential areas of direct and indirect effects to the listed species addressed in this consultation, including the Santa Ana River from Rialto Channel downstream to River Road Bridge, and the west fork of City Creek downstream to Alabama Street, excluding the reach of the creek from Highland Avenue to Boulder Avenue (approximately 3,282 acres within the Santa Ana River watershed) (Figure 1).

1. San Bernardino kangaroo rat. Direct effects to SBKR are expected in the 100 feet on either side of the centerline of the proposed 24-inch pipeline along City Creek, at the discharge structure in City Creek, at the Redlands Basins, and in the thalweg of City Creek where direct effects to SBKR may occur (approximately 58 acres). All access roads are included in the 100-foot buffer areas above. The area of indirect effects is the reach of City Creek that is expected to contain 6 to 10 MGD of discharge flow where type conversion of scalebroom scrub to riparian woodland is expected to occur (approximately 8.2 acres).

2. Santa Ana sucker: Direct effects to SAS are from the reduced river flow are expected to cause a re-sorting or redistribution of individuals as changes to water depth and flow velocity alter the stream habitat. Direct and indirect effects to SAS are expected in the Santa Ana River extending for approximately 18.5 miles; including and downstream of Rialto Channel (earthen portion starting downstream of Agua Mansa Road) to near the upstream terminus of the Prado Basin at River Road Bridge where direct beneficial effects to SAS may occur (approximately 3,132 acres). This area will be affected by the reduction in discharge from the RIX outfall and by the proposed CMs located in the mainstem of the Santa Ana River. We anticipate Project-related effects to the perennial aquatic environment (the river) to include reduced abundance of high velocity aquatic microhabitats, reduced area of exposed gravel beds, reduced area of wetted channel (channel constriction), and reduced area of riparian vegetation, as well as increased abundance of slow velocity aquatic microhabitats (marsh habitat), increased area of fine-grained sediment (sand or silt), and increased abundance of aquatic predators, once SNRC initiates wastewater diversion. This area encompasses the range of SAS upstream of Prado Basin where permanent reductions in the amount and quality of appropriate habitat of the species may occur in association with the Project. Habitat enhancement (creation of six habitat nodes, non-native vegetation removal, and non-native aquatic predator control) is also proposed in this area.

   SAS captive propagation activities will be carried out in disturbed/developed locations and existing facilities.

Direct effects to SAS are expected in City Creek extending for approximately 4.6 miles upstream of Highland Avenue Bridge in City Creek to the west Fork of City Creek (approximately 28 acres). SAS do not currently occur in City Creek but the reintroduction of the species is proposed as Conservation Measure 17b.v. The footprint for these activities will be small, not involve ground disturbance, and will only use hand-carried equipment. The entire reach of City Creek that may be occupied by SAS is included in the action area. In addition to City Creek, a second Santa Ana River tributary, presumably Hemlock Creek, will be selected for SAS reintroduction. Disturbance to this tributary will be similar to that analyzed for City Creek. Long-term monitoring of all of the current and new SAS populations (Santa Ana River, City Creek, and one other tributary) will temporarily disturb the aquatic habitat as part of the annual monitoring.

STATUS OF THE SPECIES/CRITICAL HABITAT

San Bernardino Kangaroo Rat

Listing Status

The San Bernardino kangaroo rat is a subspecies of Merriam's kangaroo rat (*Dipodomys merriami*). SBKR was emergency listed as endangered on January 27, 1998 (USFWS 1998b), and listed as endangered on September 24, 1998 (USFWS 1998c). Critical habitat for SBKR was first proposed on December 8, 2000 (USFWS 2000a), and designated on April 22, 2002 (USFWS 2002a). Critical habitat for SBKR was subsequently re-proposed on June 19, 2007, and a revised designation of the critical habitat was made final on October 17, 2008 (USFWS 2007 and USFWS 2008, respectively). Following a 2009 lawsuit challenging the 2008 critical habitat designation, the court ruled and vacated the 2008 designation and reinstated the 2002 critical habitat designation on January 8, 2011. We completed a 5-year review of the status of SBKR in August 2009 (USFWS 2009). The 5-year review recommended no change in the listing status of SBKR. Please see the 5-year review for more specific information on the subspecies description, habitat affinities, life history, status and distribution, threats, and conservation needs of SBKR across its current range (USFWS 2009). Additional information is also available in the 2002 final rule to designate critical habitat (USFWS 2002a). Both documents are available at: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A0G8

Habitat Affinities

Soil texture is a primary factor in determining species distribution in most heteromyid rodents, which include kangaroo rats and pocket mice (Brown and Harney 1993). In general, SBKR appear to prefer well-drained, sandy substrates associated with alluvial systems, where they are able to dig simple, shallow burrow systems (McKernan 1997). Soil texture and vegetation are influenced by periodic flood events within the alluvial floodplains which confine the range of this species. SBKR are most frequently found within scalebroom scrub (*Lepidospartum*

squamatum) shrub alliance (Sawyer *et al*. 2009), which contains the appropriate mix of sandy soils and low density shrub cover SBKR prefer.

Status and Distribution

The primary factor influencing the decline of SBKR is habitat loss throughout the species' range. Historically, SBKR occupied alluvial floodplains and adjacent upland habitats within the San Bernardino, Menifee, and San Jacinto Valleys of San Bernardino and Riverside Counties in California (USFWS 1998c). These areas have been under intense development pressure for the past century which has reduced the range of suitable habitat for SBKR. Currently, the Santa Ana River and its tributaries, Lytle Creek and Cajon Creek, and the San Jacinto River and its tributary, Bautista Creek support the largest areas of occupied habitat.

The largest remaining population of SBKR is thought to reside within the Santa Ana River basin. The Santa Ana River critical habitat unit encompasses approximately 8,935 acres and includes the Santa Ana River, and portions of City, Plunge, and Mill Creeks (USFWS 2002a). SBKR is known to occur within the upper reaches of the Santa Ana River from approximately 3.5 miles above the confluence of Mill Creek and the Santa Ana River to approximately 0.5 miles downstream of Tippecanoe Avenue in the city of San Bernardino. Operation of the Seven Oaks Dam has altered natural fluvial processes downstream within the Santa Ana River for flood control purposes. The USACE established the 764-acre Santa Ana River Woolly-star Preserve Area to offset impacts associated with the operation of this dam (USFWS 2002b), and its boundary was expanded to approximately 804 acres in 2009. Within the Santa Ana River floodplain, SBKR occupy habitat within a mosaic of undisturbed habitat and developed areas, often utilizing less suitable habitats such as water spreading grounds, airports, sand and aggregate mining operations, and citrus groves (USFWS 2009). A small yet dense population was recently found in marginal habitat surrounded by urban development (USFWS 2015b, 2016).

City Creek is often manipulated by the local flood control district and contains drop structures that alter flow dynamics and restrict SBKR movement within the drainage. Plunge Creek has been channelized and re-directed into a detention basin to avoid mining operations, thus this habitat is fragmented and largely isolated from other areas within the Santa Ana River population (USFWS 2009). The Santa Ana River population of SBKR, as well as the Lytle/Cajon Creek population, will be covered under the proposed Upper Santa Ana River Wash Habitat Conservation Plan (Wash Plan) and the HCP.

Threats to the Species in the Vicinity of the Action Area

Range-wide threats to the species include habitat destruction, degradation, and fragmentation resulting from urbanization, mining operations, flood control projects, groundwater recharge operations (spreading basins), bridges, recreational off-highway vehicle (OHV) use, and agriculture (USFWS 2009). These activities are associated with an increasing human population within San Bernardino and Riverside Counties, with the majority of the population living in the western portions of these counties.

In the Santa Ana River system, development of the historic floodplain, flood control facilities, water management activities (ground water recharge), surface mining and habitat loss, destruction and/or degradation pose the largest threats to SBKR and its habitat. Additionally, activities such as dumping and recreational activities continue to threaten SBKR and the ecological value of its critical habitat in the vicinity of the action area. OHV use destroys and degrades many acres of alluvial fan scrub occupied by SBKR in the Santa Ana River by directly damaging plant communities, the soil crust, and burrow systems of SBKR (USFWS 2009).

SBKR habitat in City Creek has been constrained by channelization. Channel maintenance for flood control purposes has limited and fragmented patches of suitable alluvial fan scrub in the Creek, and has eliminated most of the upland refugia habitat associated with the Creek.

Groundwater recharge occurs by percolating either imported or local water supplies into groundwater basins or within the natural channel. It is a long-standing and ongoing activity in the Santa Ana River watershed. Groundwater recharge areas are generally unsuitable for SBKR because of the periodic presence of standing water and the degradation of alluvial fan scrub (USFWS 2009). The existing Redlands Basins, located adjacent to the Santa Ana River, were created for the purpose of groundwater recharge.

Conservation Needs in the Vicinity of the Action Area

Conservation and recovery of SBKR near the action area will depend upon the same sort of actions required to conserve and recover the species across its extant range (USFWS 2002a). The natural ecosystem processes necessary to maintain a dynamic mosaic of habitats for SBKR should be maintained or improved to restore the natural fluvial regime, or alternatively management should be provided to replace natural scour, sand transport and deposition, and the associated plant community responses.

Long-term viability for all SBKR populations also depends on maintaining occupied refugia habitat adjacent to active floodplains to serve as sources of animals to recolonize river wash habitat after major flood events. Ameliorating the threats to the species' survival (such as hydrologic alteration from flood control and water management) would benefit the conservation of the SBKR in the area. In addition, the establishment and restoration of upland refugia habitat, and instituting protection and management of additional suitable habitat locations throughout its range, would help conserve this species.

In some areas, maintenance of appropriate habitat conditions may require active management to sustain SBKR over time, like periodic removal of nonnative plants, particularly annual grasses, and thinning of shrubs and overall vegetative cover. To conserve and recover SBKR, additional occupied areas should be protected and managed to increase the local abundance of animals and to secure existing populations.

Critical Habitat

Designated critical habitat for SBKR encompasses approximately 33,295 acres in San Bernardino and Riverside Counties. A detailed description of each critical habitat unit can be found within the 2002 final rule designating critical habitat (USFWS 2002a). PCEs, which have recently been renamed Physical and Biological Features, are used to designate critical habitat in accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12. The PCEs for SBKR designated critical habitat are: (1) Soil series consisting predominantly of sand, loamy sand, sandy loam, or loam; (2) Alluvial sage scrub and associated vegetation, such as coastal sage scrub and chamise chaparral, with a moderately open canopy; (3) River, creek, stream, and wash channels; alluvial fans; floodplains; floodplain benches and terraces; and historic braided channels that are subject to dynamic geomorphological and hydrological processes typical of fluvial systems within the historic range of SBKR. These areas may include a mosaic of suitable and unsuitable soils and vegetation that either (a) occur at a scale smaller than the home range of the animal, or (b) form a series of core areas and linkages between them; and (4) Upland areas proximal to floodplains with suitable habitat (e.g., floodplains that support the soils, vegetation, geomorphological, and hydrological and aeolian processes essential to this species). These areas are essential due to their geographic proximity to suitable habitat and the functions they serve during flooding events. These areas may include marginal habitats such as agricultural lands that are disced annually, out-of-production vineyards, margins of orchards, areas of active or inactive industrial or resource extraction activities, and urban/wildland interfaces (USFWS 2002a).

Long-term conservation of SBKR within each unit of critical habitat depends on the protection and management of occupied habitat on alluvial fans, washes, and associated floodplains; the protection of linkages between core areas to maintain gene flow and minimize the loss of genetic diversity (Lande 1988); the protection of upland areas adjacent to more suitable habitat that serve as refugia from lower portions of the floodplain during large scale flooding events and/or provide source populations for recolonization of the lower floodplain after the flooding has subsided; and the protection of geomorphological, hydrological, and aeolian (wind-driven) processes essential to the continued existence and conservation of suitable habitat. The location and dynamic nature of the alluvial habitat occupied by this species makes it especially vulnerable to flood control activities through the drainages in which it occurs (USFWS 2002a).

City Creek and the Redlands Basins, the two areas where the Project is expected to affect SBKR, are within Critical Habitat Unit (Santa Ana River). Both City Creek and the Redlands Basins are at risk of becoming isolated from the larger distribution of SBKR in the Santa Ana River Critical Habitat Unit by habitat fragmentation from surface mining, flood control and groundwater management activities.

<u>Santa Ana Sucker</u>

The following section summarizes information about the legal status and biology of sucker. This information is drawn from the following documents which provide more-detailed information on the range-wide status, threats, and conservation needs of this species, please refer to the final rule

on listing SAS (USFWS 2000b), the final rule designation of critical habitat for SAS (USFWS 2010b) at https://www.gpo.gov/fdsys/pkg/FR-2010-12-14/pdf/2010-30447.pdf#page=2, the *Santa Ana sucker (Catostomus santaanae) 5-Year Review: Summary and Evaluation* (USFWS 2011) at http://ecos.fws.gov/docs/five_year_review/doc3616.pdf, and the *Draft Recovery Plan for Santa Ana sucker (Catostomus santaanae)* (USFWS 2014b) at https://www.fws.gov/carlsbad/SpeciesStatusList/RP/201411xx_Draft%20RP_SASU.pdf.

Listing Status

The sucker was listed as threatened on April 12, 2000 (USFWS 2000b). In our most recent 5-Year Review we recommended no change in listing status (USFWS 2011).

Habitat Affinities

The sucker generally inhabits perennial streams that are naturally subject to periodic, severe flooding. Water-depth can range from a few inches to several feet and with currents from slight to swift; in-stream gradient is typically less than 7 degrees. The presence of coarse substrates (gravel and cobble) is important to create suitable foraging habitat for suckers and a combination of shallow riffle areas and deeper runs and pools provides optimal stream conditions for these fish.

Suckers use different substrate types as they develop through each life stage (i.e., from eggs to larval, young-of-the-year, juvenile, and adult fish) with the presence of some rock, cobble, and/or gravel being important to egg-laying and development of the algae upon which suckers feed. Suckers prefer areas with in-stream or bank-side riparian vegetation to provide shade and cover especially for larvae and juvenile fish; vegetation cover is less important for larger, adult fish when deeper pools and riffles are present. Open, unvegetated stream-reaches with shifting, sandy substrates are typically less suitable habitat for sucker as little, if any forage will develop there and water typically slows, becomes more shallow, and hence, warmer in these areas. Suckers are most abundant in unpolluted, clear water at temperatures that are typically less than 72 degrees Fahrenheit (Moyle 2002), although they tolerate water quality variables that are outside of the preferred range (e.g., wastewater-dominated river and water temperatures in excess of 86 degrees Fahrenheit).

Life History

SAS feed on algae, diatoms, and detritus scraped from rocks and other hard surfaces. Aquatic insects are also a small component of their diet (Greenfield *et al.* 1970, Haglund and Baskin 2003). The relative abundance of the SAS appears to decrease with increasing numbers of exotic fish including tilapia, green sunfish, largemouth bass, common carp, channel catfish, and others which are potential predators and competitors of the SAS (Swift 2001, Saiki 2000).

They typically spawn in the first spring following hatching. Spawning generally begins in mid-March, peaks in April, and concludes by early July, although spawning has been noted as early as February and as late as August in the Santa Ana River. Spawning takes place over gravel riffles where fertilized eggs adhere to substrate and hatch within 360 hours. Female fecundity is

linearly related to body weight and ranged from 4,423 to 16,151 eggs (Greenfield *et al.* 1970). The demersal (on the stream bottom) and adhesive eggs hatch larva approximately 7 millimeters in total length after 15 days (360 hours). At approximately 16 millimeters in size the mouth becomes subterminal (oriented down) and the larva transform to juveniles.

Status and Distribution

The listed entity of SAS is confined to three watersheds in Southern California: (1) Santa Ana River in San Bernardino, Riverside, and Orange counties; (2) San Gabriel River in Los Angeles County; and (3) Big Tujunga Creek, a tributary to the Los Angeles River in Los Angeles County (USFWS 2000b). Historically, suitable streams have been subject to periods of severe flooding as well as extended drought conditions typical of southern California weather (USFWS 2014b). At the time of listing we estimated that the historical range of the species had been reduced by at least 70 percent in each watershed and that the range and distribution of SAS was primarily limited by habitat modifications attributed to urbanization (e.g., dams, road crossings, cement-lined channels) (USFWS 2000b). The threats identified at the time of listing have not abated but have continued to increase, thereby making the species more vulnerable to extinction (USFWS 2011). The primary threat to SAS is habitat loss, degradation, and modification through hydrological modifications rangewide. Additionally, isolation by impassable barriers or unsuitable habitat limits gene flow within and between watersheds, thus increasing the vulnerability of small populations to a range of stochastic environmental and genetic factors (USFWS 2014b).

SAS was historically documented throughout the upper and lower portions of the Santa Ana River watershed, including the mainstem from near the current location of Seven Oaks Dam to approximately 14 miles below Prado Dam and multiple tributaries including upper tributaries (e.g., City Creek), and lowland tributaries (e.g., Warm Creek, Lytle Creek, Rialto Channel, Evans Lake drain, Tequesquite Arroyo, Sunnyslope Creek, Anza Park drain, and Chino Creek) (USFWS 2014b). In contrast to the species' range in the Los Angeles and San Gabriel Rivers, where the extant populations are in the upper portions of the watershed, the species is confined to the lowlands of the Santa Ana River watershed. Barriers to migration restrict the range of SAS to approximately 34 miles from South La Cadena Drive to near Imperial Highway (California State Route 90). The extent of habitat suitable for spawning in the mainstem varies from year to year but ranged from approximately 2.0 miles (measured in 2014) to 8.2 miles (measured in 2016) above Prado Dam between 2006 and 2016 (USFWS 2017). Few occurrence records since 2000 and no evidence of spawning suggest the species is doing extremely poorly downstream of Prado Dam (USFWS 2014b). The species is also known to occupy tributaries within this range, including Rialto Channel, Tequesquite Arroyo, Sunnyslope Creek, and Anza Park drain.

Threats to the Species

The final rule listing the species (USFWS 2000b) identified the following threats to SAS: habitat destruction, natural and human-induced changes in stream-flow, urban development and related land-use practices, intensive recreation, introduction of nonnative competitors and predators, and

demographics associated with small population size. The 5-year review for SAS (USFWS 2011) and the SAS recovery outline (USFWS 2012) identified the following threats to SAS: (1) modification, fragmentation, and loss of habitat attributable to (a) dams, (b) changes in water allocations, and (c) other hydrological modifications; (2) water quality degradation; (3) impacts to habitat due to recreation; (4) wildfire; and (5) potential effects of nonnative vegetation and predators. We believe the primary threat to SAS is rangewide modification, fragmentation, and loss of habitat through hydrological modifications. A detailed evaluation of all threats is included in the 2011 5-year review and in the SAS draft recovery plan (USFWS 2011, and 2014b, respectively).

Wastewater-dominated rivers, like the Santa Ana River, are subject to increased inputs of regulated contaminants including inorganics (e.g., chlorine, nitrates, ammonia, sulfides and metals), plasticizers, organochlorine insecticides, polynuclear aromatic hydrocarbons, solvents, and non-ionic detergent metabolites. Wastewater-dominated rivers are also subject to inputs of as yet unregulated "emerging" contaminants including new generation pesticides, steroids and hormones, personal care products, prescription and non-prescription drugs, antibiotics, household disinfectants, insect repellants, fire retardants and others (USFWS 2011). Additionally, chemicals that are released may be regulated or unregulated pollutants and some may have detrimental impacts on water (habitat) quality and sublethal or lethal impacts on SAS.

Conservation Needs

Since listing, surveys for SAS have been conducted in various portions of its range. Species-specific projects have also been conducted in each of the three watersheds where SAS occur. There have been studies exploring life history parameters, population dynamics and demographics, habitat assessments, environmental conditions, possible restoration sites, and potential reintroduction opportunities. These studies have been important for making decisions regarding the status of the species and the current conditions within each of the watersheds. Other activities have also occurred for the benefit of SAS, such as removal of nonnative vegetation and nonnative predators. Examples of these activities and past research are listed in the SAS draft recovery plan (USFWS 2014b). Recovery of SAS is being achieved in part through on-the-ground recovery actions, implementation of management plans, and through active cooperation with partners through sections 7 and 10 of the Act.

Critical habitat

In 2010, we designated three critical habitat units that include approximately 9,331 acres of Federal, State, local, and private land in the Santa Ana River (Unit 1; San Bernardino, Riverside, and Orange counties), the San Gabriel River (Unit 2; Los Angeles County) and Big Tujunga Creek (Unit 3; Los Angeles County) (USFWS 2010b). Individual units are each intended to independently support a population of SAS in a functioning hydrologic system that provides suitable water quality, water supply, and coarse sediments. The designation lists the following PCE’s for SAS: (1) a functioning hydrological system within the historical geographic range of SAS that experiences peaks and ebbs in the water volume (either naturally or regulated) that encompasses areas that provide or contain sources of water and coarse sediment necessary to

maintain all life stages of the species, including adults, juveniles, larvae, and eggs, in the riverine environment; (2) stream channel substrate consisting of a mosaic of loose sand, gravel, cobble, and boulder substrates in a series of riffles, runs, pools, and shallow sandy stream margins necessary to maintain various life stages of the species, including adults, juveniles, larvae, and eggs, in the riverine environment; (3) water depths greater than 1.2 inches (3 centimeters) and bottom water velocities greater than 0.01 feet per second (0.03 meters per second); (4) clear or only occasionally turbid water; (5) water temperatures less than 86 degrees Fahrenheit (30 degrees Centigrade); (6) instream habitat that includes food sources (such as zooplankton, phytoplankton, and aquatic invertebrates), and associated vegetation such as aquatic emergent vegetation and adjacent riparian vegetation to provide shading to reduce water temperature when ambient temperatures are high, shelter during periods of high water velocity, and protective cover from predators; and (7) areas within perennial stream courses that may be periodically dewatered, but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted.

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 Federal Register §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. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of State and private actions that are contemporaneous with the consultation in progress.

Climate Change

As defined by the Intergovernmental Panel on Climate Change (IPCC), the term “climate” refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements (IPCC 2013a, p. 1450). The term “climate change” thus refers to a change in the mean or variability of one or more measures of climate (for example, temperature or precipitation) that persists for an extended period, whether the change is due to natural variability or human activity (IPCC 2013a, p. 1450).

Scientific measurements spanning several decades demonstrate that changes in climate are occurring, and that the rate of change has increased since the 1950s. Examples include warming of the global climate system, and substantial increases in precipitation in some regions of the world and decreases in other regions (for these and other examples, see Solomon *et al*. 2007, pp. 35–54, 82–85; IPCC 2013b, pp. 3-29; IPCC 2014, pp. 1–32). Results of scientific analyses presented by the IPCC show that most of the observed increase in global average temperature since the mid-20th century cannot be explained by natural variability in climate and is “very likely” (defined by the IPCC as 90 percent or higher probability) due to the observed increase in greenhouse gas (GHG) concentrations in the atmosphere as a result of human activities, particularly carbon dioxide emissions from use of fossil fuels (Solomon *et al*. 2007, pp. 21–35; IPCC 2013b, pp. 11–12 and figures SPM.4 and SPM.5). Further confirmation of the role of GHGs comes from

analyses by Huber and Knutti (2011, p. 4), who concluded it is extremely likely that approximately 75 percent of global warming since 1950 has been caused by human activities.

Scientists use a variety of climate models, which include consideration of natural processes and variability, as well as various scenarios of potential levels and timing of GHG emissions, to evaluate the causes of changes already observed and to project future changes in temperature and other climate conditions (Meehl *et al*. 2007, entire; Ganguly *et al*. 2009, pp. 11555, 15558; Prinn *et al*. 2011, pp. 527, 529). All combinations of models and emissions scenarios yield very similar projections of increases in the most common measure of climate change, average global surface temperature (commonly known as global warming), until about 2030. Although projections of the magnitude and rate of warming differ after about 2030, the overall trajectory of all the projections is one of increasing global warming through the end of this century, even for the projections based on scenarios that assume that GHG emissions will stabilize or decline. Thus, there is strong scientific support for projections that warming will continue through the 21st century, and that the magnitude and rate of change will be influenced substantially by the extent of GHG emissions (Meehl *et al*. 2007, pp. 760–764, 797–811; Ganguly *et al*. 2009, pp. 15555–15558; Prinn *et al*. 2011, pp. 527, 529; IPCC 2013b, pp. 19–23). See IPCC 2013b (entire), for a summary of other global projections of climate-related changes, such as frequency of heat waves and changes in precipitation.

Various changes in climate may have direct or indirect effects on species. These effects may be positive, neutral, or negative, and they may change over time, depending on the species and other relevant considerations, such as threats in combination and interactions of climate with other variables (for example, habitat fragmentation) (IPCC 2014, pp. 4–11). Identifying likely effects often involves aspects of climate change vulnerability analysis. Vulnerability refers to the degree to which a species (or system) is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the type, magnitude, and rate of climate change and variation to which a species is exposed, its sensitivity, and its adaptive capacity (Glick *et al*. 2011, pp. 19–22; IPCC 2014, p. 5). There is no single method for conducting such analyses that applies to all situations (Glick *et al*. 2011, p. 3). We use our expert judgment and appropriate analytical approaches to weigh relevant information, including uncertainty, in our consideration of the best scientific information available regarding various aspects of climate change.

Global climate projections are informative, and, in some cases, the only or the best scientific information available for us to use. However, projected changes in climate and related impacts can vary across and within different regions of the world (IPCC 2013b, pp. 15–16). Therefore, we use “downscaled” projections when they are available and have been developed through appropriate scientific procedures, because such projections provide higher resolution information that is more relevant to spatial scales used for analyses of a given species (see Glick *et al*. 2011, pp. 58–61, for a discussion of downscaling).

We reviewed projections from Cal-Adapt, a web-based, climate adaptation planning tool provided by the California Energy Commission, which synthesizes existing downscaled climate

change scenarios and climate impact research, and presents the predictions in an interactive, graphical layout. Projections of changes in annual averages in temperature for the area of the proposed Project in the San Bernardino Basin (Inland Empire) and western foothills of the San Bernardino Mountain Range (City Creek and other potential reintroduction creeks for SAS in the Santa Ana River watershed) using the Cal-Adapt Climate tool indicate an increase in temperature. For the Inland Empire area to the western foothills of the San Bernardino Mountain Range it ranged from about 3.7–4.0 °F (2.1–2.3 °C) under the IPCC low emissions scenario (B1), to an increase in temperature ranging from 6.4–7.1 °F (3.6–4.0 °C) under the IPCC higher emissions scenario (A2) (CEC 2017). Both the B1 and A2 scenarios represent comparisons between the baseline period (1961–1990) and the end-of-century period (2070–2090).

In summary, the best available data indicate that climate change effects will add to the destruction and modification of habitat for the species addressed in this biological opinion, both currently and in the future. Although, we are unable to assess in specific quantitative terms the magnitude of the impact due to the uncertainty relative to climate change effects that will occur, the best available data indicate long-term climate change effects will continue to have an overall negative effect on the available habitat throughout the range of these species.

Species specific discussions may be found in the Species by Species Evaluations and Conclusions, Threats to the Species in the Vicinity of the Action Area.

Species by Species evaluation and conclusions

Effects of the action refer to the direct and indirect effects of an action on the species, together with the effects of other activities that are interrelated and interdependent with that action, which will be added to the environmental baseline. 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. Indirect effects are those that are caused by the proposed action, are later in time, and still reasonably certain to occur.

San Bernardino Kangaroo Rat

Status of the Species in the Action Area

A habitat assessment of the Project area (i.e., City Creek and Redlands Basins) was conducted by an SBKR biologist. A number of areas were determined to be suitable habitat. Trapping surveys were conducted in 2015 to determine presence/absence along City Creek (ESA 2015b). Subsequent to the habitat assessment, a visit was made to further characterize the amount and extent of SBKR habitat that would be affected by the Project in and around the Redlands Basins. During this visit it was agreed, that due to the combined presence of suitable alluvial soils (PCE 1), poor habitat conditions (e.g., abundant non-native grasses and disturbed soils), a positive historic record, and close proximity of the Redlands Basins to occupied habitat in the Santa Ana River all areas where ground disturbance is proposed to occur could be assumed to be occupied by SBKR at low density.

Based on a review of SBKR occurrence data, the habitat assessment, vegetation maps (BA), and aerial photographs, we estimate that SBKR inhabit City Creek and Redlands Basins area in densities ranging from unoccupied to low and that the acreage of each category is: low density, 4.6 acres, and unoccupied, 4.3 acres. McKernan (1997) categorized the relative abundance of SBKR in different habitat types as low (1 to 5 SBKR per hectare), moderate (5 to 15 SBKR per hectare), or high (20 to 30 SBKR per hectare), and attributed these differences in SBKR abundance to differences in vegetation cover and type, and to proportional variations in sand, gravel, and cobble substrate components. Using McKernan's relative abundance estimates, we expect no SBKR will be affected by the construction of the outlet structure at City Creek (0.2 acres footprint), up to 3 SBKR may be affected by the construction of the outlet structure at the Redlands Basins (0.5 acres), and a range between 5 and 21 SBKR may be affected by the discharge of up to 10 MGD of effluent into City Creek.

The potential exists for the thalweg of City Creek to become rewetted after a period of dry down. This action may harm additional SBKR not represented above. No past data exists to estimate future take for these actions but it is assumed that the conversion from scalebroom scrub to riparian habitat within the thalweg of City Creek reduces potential for reoccupation during dry periods (no discharge and no natural flow). Dry periods will allow for SBKR occupying City Creek outside of the thalweg to disperse across the channel as well as providing temporary forage habitat. SBKR reoccupying this area will be subject to harm from natural storm flows. We have analyzed the conversion of 8.2 acres of SBKR habitat in City Creek as a permanent impact to the species.

Habitat Characteristics in the Action Area

The alluvial fan of City Creek is the result of periodic deposition by flood events. The soil is composed of boulders, cobbles, sands, and fine silts, which are washed down from higher elevations in the San Bernardino Mountain Range and deposited in the alluvial fan and floodplain. Scalebroom scrub on the alluvial fan develops into pioneer, intermediate, and mature phases, depending on the magnitude and frequency of hydrologic events. In a natural system, floodwaters periodically break from the main flood channel, forming a complex pattern of braided channels and subsequently create a mosaic of vegetation phases within the floodplain. The natural processes which maintain these communities have been substantially altered due to the presence of flood control levees, infrastructural berms (pipeline protection), roads and freeways, and aggregate mines. However, fluvial processes in the City Creek continue to maintain SBKR habitat, although in a much more limited area than was present historically.

The portion of the Project containing SBKR and its critical habitat in City Creek is between the Boulder Avenue and Alabama Street bridges. The creek is narrowly constrained by mountainous terrain in its upper watershed. When it reaches the base of the mountains, at Highland Avenue Bridge, it is further constrained between earthen levees that widen moving downstream and allow for limited braiding. The creek historically formed an alluvial fan in excess of 1 mile wide before reaching the Santa Ana River. Today, much of the alluvial fan has been developed. Most of the remaining SBKR habitat is located just outside of the active channel or on small upper

terraces, from where the stream channel leaves the constrained mountainous terrain (near Highland Avenue Bridge) downstream approximately 3.5 miles to the confluence of the Santa Ana River.

The vegetation in and around the City Creek action area consists of a mixture of annual grassland and all successional stages of scalebroom scrub (i.e., pioneer, intermediate, and mature). The soils within the City Creek outlet structure are soil types indicative of alluvium deposits (Soboba Stony Loamy Sand, Soboba Gravelly Loamy Sand, and Tujunga Gravelly Loamy Sand) which are suitable for use by SBKR. SBKR are usually associated with scalebroom scrub, with the highest densities of animals typically found in the intermediate growth stage and generally low densities found in mature scalebroom scrub. However, SBKR use of mature scalebroom scrub is disproportionately important because higher terraces where mature scrub is occurs, serve as refugia during periods of heavy flooding, and thus a source of animals to repopulate previously flooded areas once the vegetation becomes re-established.

Threats to the Species in the Action Area

The proposed Project will affect SBKR in City Creek, a sub area within the Santa Ana River population. Flood control levees have altered flows and narrowed the active channel and floodplains of City Creek. This has resulted in a reduction in channel braiding and an increase channel erosion, incising, and proportion of mature scalebroom scrub within the species' distribution in City Creek. Steep embankments, rip-rap levees, drop structures, and bridge constrictions limit or preclude SBKR movement to upland areas. Vegetation senescence and changes in substrate composition in the absence of major flood events are a primary cause of habitat degradation (Burk *et al*. 2007, McKernan 1997). Additionally, within-channel flood control berms and infrastructural protection (boulder piles) preclude movement of SBKR within portions of City Creek and may have effectively fragmented the area into isolated pockets of habitat.

Some of the undeveloped land in and around the action area is dominated by nonnative annual grasses and other ruderal plant species. The spread of nonnative grasses and the reduction or elimination of natural drainage patterns has caused the areas adjacent to the active channel to become increasingly unsuitable for SBKR use and occupation over time (USFWS 2009).

Residential, commercial, and industrial development; aggregate mining, and clearing of native vegetation from undeveloped sites have gradually eliminated large areas of upland refugia habitat (i.e., mature scalebroom scrub) outside of the active floodplains. Upland areas adjacent to suitable habitat serve as refugia from lower portions of the floodplain during large storm flows. Protection of upland refugia habitat is important to the long-term survival of SBKR populations as animals occupying the uplands following a flood event provide source populations for recolonization of the lower floodplain after the flooding has subsided (USFWS 2002a).

Conservation Needs in the Action Area

Conservation and recovery of SBKR within the vicinity of the action area will depend upon the same sort of actions required to conserve and recover the subspecies within its extant range

(USFWS 2002a). Long-term conservation of SBKR within the City Creek area will require maintenance of existing fluvial dynamics and habitat connectivity, as well as protection of upland terrace habitat to provide refugia for SBKR in the event of catastrophic flooding. No current or anticipated regional planning effort is underway or proposed to address the multiple threats to SBKR or its habitat in the vicinity of the action area.

One conservation area has been established within the larger Santa Ana River population. The Woolly-Star Preserve Area is 804 acres in size, located between the mainstem of the Santa Ana River and City Creek and was established to offset impacts, reduced flooding potential, from the creation of Seven Oaks Dam. The Wash Plan is a habitat conservation plan that is nearing completion. It proposes to conserve more of the surrounding lands around the Woolly-Star Preserve Area and in the Plunge Creek watershed (tributary to the Santa Ana River) for SBKR, woolly-star, gnatcatcher, and other trust species to offset impacts from mining and water conservation (creation of new groundwater basins).

Ameliorating threats such as channel incising, non-native species, and connectivity with refugia habitats would benefit conservation of SBKR in the area. Preservation of alluvial processes, habitat restoration, protection, and management of additional areas throughout its range would also help conserve this animal.

Status of Critical Habitat in the Action Area

The SBKR habitat affected by the Project is in critical habitat Unit 1, which includes the largest remaining distribution of SBKR and supports one of three major populations of SBKR. Unit 1 encompasses approximately 13,970 acres of floodplain, upland alluvial terrace habitat and upstream areas that are essential for maintenance of fluvial processes within and between the Santa Ana River and its major tributaries; City Creek, Plunge Creek, and Mill Creek. The unit contains all of the features (PCEs) essential to SBKR life history. This unit contains habitat along all of the Santa Ana River tributaries from the point that the drainages emanate from canyons within San Bernardino National Forest (SBNF) to where the Santa Ana River is maintained as a flood control channel downstream in San Bernardino (USFWS 2002a). Numerous flood control levees and groins have altered the flow patterns and narrowed the active floodplain, which has increased the proportion of open channel and mature scalebroom scrub and decreased the area of intermediate scalebroom scrub that is preferred by SBKR. Existing and proposed out-of-stream aggregate mining operations, water conservation basins, dikes, and conveyance channels, and other development have eliminated or degraded SBKR habitat and reduced population connectivity within the upper Santa Ana River floodplain.

Flood control structures and urban development have degraded or eliminated much of the upland refugia habitat in Unit 1. Conservation of SBKR within Unit 1, including the portion of the population in the Project action area, will require maintenance of hydrologic processes that support the habitat structure required by SBKR including the development of relatively open intermediate scalebroom scrub. This habitat is typically found on benches between the active channel and mature floodplain terraces and is created by periodic flood waters breaking out of

the main channel in a complex pattern. Conservation of SBKR in Unit 1 will also require preservation and creation of upland refugia habitat (habitat above the 100-year floodplain) to ensure that animals are available to repopulate areas scoured out during heaving storms.

There is a habitat conservation planning effort that is near completion which would provide conservation and management of SBKR habitat in the Santa Ana River wash area at the confluence of the Santa Ana River, and Mill, Plunge, and Elder Creeks. Existing conservation efforts within Unit 1 are described in Conservation Needs in the Vicinity of the Action Area section above.

Past Consultations in the Action Area

The USFWS has issued the following biological opinions for actions that have occurred within the action area for this consultation. In all cases, the USFWS determined that the proposed action was not likely to jeopardize the continued existence of SBKR or destroy or adversely modify its critical habitat.

5th Street Bridge Widening

The USFWS issued a biological opinion on June 13, 2001, (FWS-SB-1162.4) to the Federal Highway Administration for the improvement of 5th Street which crosses City Creek. The action area contained SBKR habitat. Approximately 4.43 acres of occupied SBKR habitat were identified in the Project footprint, all of which was within designated critical habitat for the species. Take was exempted for all SBKR that could be killed or injured as a result of the Project. To offset permanent (0.43 acres) and temporary (4 acres) impacts to SBKR habitat, the City of Highland agreed to purchase 10 acres of conservation credits at the Cajon Creek Conservation Bank for SBKR.

Reinitiation for Improvement to State Route 210 (Formerly State Route 30)

The USFWS issued a revision to the original 1994 biological opinion (FWS-1-6-93-F-49) on July 20, 2004, (FWS-SB-3915.2) to the Federal Highway Administration for improvements to State Route 210, a portion of which crosses City Creek. The action area contained SBKR habitat at multiple locations. Approximately 29.2 acres of occupied SBKR habitat were identified in the Project footprint, all of which was within designated critical habitat for the species. Take was exempted for all SBKR that could be killed or injured as a result of the Project. To offset permanent (18.6 acres) and temporary (10.6 acres) impacts to SBKR habitat, the California Department of Transportation (CalTrans) agreed to purchase 112 acres of conservation credits at the Cajon Creek Conservation Bank for SBKR.

Boulder Street Bridge Widening

The USFWS issued a biological opinion on January 21, 2010, (FWS-SB-08B0342-09F0799) to CalTrans who assumed Federal Highway Administration's responsibilities as the non-Federal

designee for this consultation for the purpose improvements to Boulder Avenue which crosses City Creek. The action area contained SBKR habitat. Approximately 4.5 acres of occupied SBKR habitat and 4 acres of unoccupied habitat were identified in the Project footprint. The Project footprint included 4 acres within designated critical habitat for the species. Take was exempted for up to 9 SBKR that could be harmed, killed, or injured as a result of the Project. To offset permanent (1.23 acres) and temporary (4 acres) impacts to SBKR habitat, the City of Highland agreed to non-native grass removal in 6 acres of adjacent alluvial fan terrace habitat owned by San Bernardino County Flood Control District and purchase 6 acres of conservation credits at the Cajon Creek Conservation Bank for SBKR.

In sum the biological opinions listed above have authorized a relatively small amount of take within the areas that they cover. Implementation of conservation measures similar to those included in this biological opinion minimizes the associated adverse effects and impacts of the taking of SBKR and impacts to critical habitat. Because the action areas defined for these projects narrowly intersect that which is analyzed for the Project in this biological opinion, only a relatively small portion of the total take associated with these projects would coincide geographically with the Project.

Santa Ana sucker

Status of the species in the Action Area

The last record of SAS in City Creek is from 1982 (CDFW 2017). This species is believed to be extirpated from all upper Santa Ana River tributaries. Rialto Channel and Santa Ana River below their confluence provide much of the remaining SAS breeding and foraging habitat in the watershed. Upstream of the Rialto Channel, the Santa Ana River is a dry wash for several miles except during, and immediately following, storm events. The existing discharge from the RIX facility currently provides habitat (perennial stream) and is contributing to the maintenance of suitable habitat spawning and foraging habitat (USFWS 2010b). SAS are commonly found from Rialto Channel downstream to Mission Boulevard. After Mission Boulevard, the species becomes progressively scarcer with fish rarely observed downstream near Prado Basin. Despite numerous survey efforts only a few SAS have been found below Prado Dam since 2001 (USFWS 2014b). We have no information to indicate that spawning is occurring below Prado Dam.

In 2015 and 2016 the USGS conducted a Native Fishes Survey of the Santa Ana River, focusing on the upper 4 miles of the perennial stream (Brown and May 2016, 2017). These surveys provide population estimates of SAS from Rialto Channel downstream, to near Mission Boulevard. In 2015 the reach of the river from the RIX outflow to Riverside Avenue contained the largest population of SAS within the entire watershed. Over 90 percent of the 6,802 fish estimated in that survey were found in one riffle/pool complex located approximately one mile downstream from the RIX outfall. In 2016 SAS were found to be more abundant (8,971 SAS) and spread more evenly across the available habitat with 42 percent located upstream and 58 percent found downstream of Riverside Avenue. The area and distribution of SAS habitat increased from 2015 and 2016 to levels never before recorded during the Riverwalk survey

(USFWS 2017). This was in part due to the record low rainfall the region experienced in 2016, where no surface flow (storm flow) from upstream of Rialto Channel occurred between mid-January and the Riverwalk survey in October (Brown and May 2017). The absence of new sediment deposition during storm flows, and steady clear-water discharge from two wastewater treatment plants (Rialto and RIX facility) transported a majority of the fine sediment to below Mission Boulevard, exposing over 8.2 miles of fairly continuous gravel beds (USFWS 2017).

The 2015 Native Fishes Survey also found SAS commonly utilizing depths between approximately 1.1 and 2 feet (35 and 60 centimeters) and most fish were found in mean water column velocities between approximately 1.6 and 3.3 feet per second (0.5 and 1 meters per second), with minimum and maximum fish usage measured between 1 and 4 feet (30 and 120 centimeters) in depth and 0.66 and 5.2 feet per second (0.2 and 1.6 meters per second) flow velocity (Brown and May 2016). Current conditions indicate the species is generally limited by a low abundance of patchily distributed appropriate microhabitat (gravel/cobble substrate). Microhabitats with deeper areas of scour and associated structure (vegetation, woody debris, or boulder) tended to be more densely populated than other sections of stream (Brown and May 2016).

Threats to the Species in the Action Area

Downstream of the RIX outlet, threats include, introduction of nonnative competitors and aquatic predators, human-induced changes in stream-flow (periodic dewatering), OHV traffic, homeless encampments (associated water quality impacts and fishing), elevated water temperatures associated with diminished flows and effluent discharge, and demographic risks associated with small population size (USFWS 2014b).

A majority of the existing surface flow in the Santa Ana River is derived from wastewater sources. A significant threat to the Santa Ana River population of SAS is poor water quality, including perennially warm surface flow. The artificially warm aquatic environment has led to the naturalization of several warm water aquatic predators and one highly invasive algal species.

Drought conditions and reduction in surface flows due to water capture for ground water recharge and extraction for human use have reduced the duration and amount of surface flows in the upper portion of the river. Recent observations of fish deaths in the Santa Ana River have been attributed to dry down of the river when effluent from the RIX facility shuts off for facility maintenance or other reasons. The RIX facility, from January 2014 to November 2016, had 69 incidences of plant shutdowns, 35 of which lasted over an hour (RWQCB 2016). The river was monitored during 5 planned shutdowns associated with facility maintenance, between January 2015 and November 2016. During river monitoring most SAS (2,287 fish, 95 percent) were salvaged and returned to the river alive. The lack of surface water in the river and its vulnerability to dry down in the reach upstream of Riverside Avenue is currently the most critical threat to the species in the action area. The increase in SAS numbers from 2015 to 2016 was in part due to increased habitat availability but also due to fish salvage work that minimized the effect river dry downs on SAS.

Conservation Needs in the Vicinity of the Action Area

The Draft Recovery Plan for SAS (USFWS 2014b) identified the following objectives in the recovery strategy for the species, all of which are applicable the Santa Ana River population of SAS. Work with landowners and other stakeholders to: (1) Develop and implement a rangewide monitoring protocol to accurately and consistently document populations, occupied habitat, and threats, (2) Conduct research projects specifically designed to inform management actions and recovery, (3) Increase the abundance and develop a more even distribution of SAS within its current range by reducing threats to the species and its habitat, (4) Expand the range of SAS by restoring habitat (if needed), and reestablishing occurrences within its historical range.

Reducing threats from poor water quality, reduced natural and effluent flow, and extreme fluctuations in water supply will improve the status of SAS in the Santa Ana River.

The City of San Bernardino is working to reduce impacts from the dry down of portions of the Santa Ana River during RIX facility shutdowns. In January 2015 the City started providing funding to the Riverside-Corona Resource Conservation District (RCRCD) for the monitoring and salvage of native fishes, including SAS, during planned shutdowns. It is also completing a planned upgrade to its ultraviolet lighting system. This is expected to significantly reduce the number of unplanned shutdowns. The City is also constructing and/or retrofitting four groundwater wells adjacent the RIX facility to supply water to the river during future shutdown events to prevent or ameliorate the risk of dry down. Wells are planned to be completed by July 2017 (RWQCB 2016). With these measures in place the population of SAS in the action area is expected to continue to expand as this threat is reduced.

Valley District has funded the writing of the Draft Translocation Plan for Santa Ana Sucker (Dudek 2016a), as well as initiated surveys to assess stream habitat for SAS in four historic tributaries in the Santa Ana River watershed noted in the draft recovery plan for the species (USFWS 2014b) as part of the HCP. The Draft Translocation Plan is currently being reviewed by the USFWS and CDFW, National Environmental Policy Act (NEPA) review and documentation has been initiated, and coordination with the USFS is ongoing. All required approvals will be obtained prior to conducting any translocation/relocation of SAS into portions of its historic range.

In 2016, Valley District provided funding to the RCRCD for the construction and operation of two large (approximately 20 feet wide by 300 feet long) artificial streams that will be used for captive propagation of SAS for purposes of relocation into the historic tributaries. The RCRCD estimates each artificial stream will be able to sustain approximately 1,000 SAS of multiple age classes. The RCRCD has submitted a Draft Captive Breeding Plan (Dudek 2016a) to the USFWS for review and approval.

Status of Critical Habitat in the Action Area

The Santa Ana River unit is the largest of the three SAS critical habitat units, 7,097 acres. A majority of this area was designated in support of sediment transport to downstream occupied

reaches of the river. The action area includes a large portion of this unit, from upstream of Prado Basin to Rialto Channel along the mainstem of the river and in the mountain and lowland portions of City Creek. The species is currently only occupies the critical habitat in the low-flow mainstem river and its tributaries within and downstream of the unlined portion of Rialto Channel. The area occupied by the species within Santa Ana River critical habitat unit is a very small portion of the total designated critical habitat area. Anything that degrades the function of critical habitat in the occupied reaches of the river is of significant concern.

The proposed Project is located in Subunits 1A and 1B (Upper Santa Ana River and Santa Ana River, respectively) of designated SAS critical habitat. This area extends approximately 34 miles from Prado Dam upstream to the West Fork of City Creek (USFWS 2010b). Together these subunits constitute approximately 89 percent of designated critical habitat in Unit 1. The final rule recognizes that Subunit 1A provides stream and storm waters necessary to transport essential coarse sediments to maintain preferred substrate conditions in occupied portions in the Santa Ana River (PCEs 1 and 2), whereas Subunit 1B includes the majority of the currently occupied range of the species in Unit 1 and contains all SAS PCEs. Special management considerations or protection may be required in Subunit 1B to address habitat degradation associated with water diversion, dams, water quality impacts from non-point source and point source pollution (including untreated urban run-off and discharge of treated wastewater), and altered hydrology throughout the watershed (including alterations from instream barriers, construction of bridges, channelization, and other flood control structures) (USFWS 2010b). The majority of Subunits 1A and 1B are located within the action area and will benefit from management actions that will be implemented by the USEPA and Valley District as part of the Project to ensure the baseline acreage of SAS suitable aquatic habitat is maintained within the mainstem portion of the action area and through reintroduction of SAS to portions of its historic range, including City Creek.

Past Consultations in the Action Area

Prado Mainstem and Santa Ana River Reach 9 Flood Control Projects and Norco Bluffs Stabilization Project

The Santa Ana River Mainstem Project includes modifications to the Santa Ana River and its tributaries in San Bernardino, Riverside, and Orange counties. We issued the first biological opinion on the project in 1980 (1-1-80-F-75). There have been multiple amendments since then. On December 5, 2001, we issued a revision (FWS-SB-909.6) to the USACE for the purposes of construction of flood control projects in the Santa Ana River watershed. This revision analyzed potential effects to SAS not included in the original consultation. At the time this consultation occurred no critical habitat had been designated for SAS. Multiple components of the larger project including the Norco Bluffs stabilization, River Road floodwall, and River Road dike are within the SNRC Project action area. Permanent impacts from the flood control projects included loss of 52.5 acres of riparian habitat and 9 acres of aquatic habitat, and temporary impacts to 4.2 acres of aquatic habitat, most of which was located downstream of the action area. It was estimated that 45 SAS would be incidentally taken, in addition to 10 or more SAS taken per each

trap haul, when fish were captured and relocated out of work areas. Most measures to offset project impacts were placed downstream of Prado Dam. Near the action area in Prado Basin just downstream of River Road, the USACE agreed to create a bi-directional fish passage through an existing dike in the river.

Emergency River Road Sand Mining Operation and amendment

We issued biological opinions FWS-SB-2371.2 and FWS-SB-2371.4 on April 30, 2002, and May 15, 2002, respectively, to the USACE for the purposes of River Road Bridge sand mining operations. The Section 7 consultation and later amendment analyzed the temporary loss of 22.5 acres of habitat in the river and 4.8 acres of temporary disturbance along the river bank. At the time this consultation occurred no critical habitat had been designated for SAS. Incidental take of SAS was assessed to be 20 fish captured per relocation event in the original consultation and was increased to 315 fish to account for take associated the construction of Basin 1. In order to offset project impacts to SAS, Riverside County Transportation Department was required to participate in the sucker program and sand berm construction was limited to between September 15 and April 30.

Study Examining Effects of Shutdowns at RIX Facility

The USFWS issued an intra-USFWS biological opinion (FWS-SB-3057.1) on August 23, 2002, for the purposes of conducting a study to determine the effects of wastewater discharge stoppage from the RIX facility on SAS. This study was designed to monitor and evaluate changes to the amount of effected wetted habitat, change in water temperature, effect to pools, and potential for stranding. Temporal loss/degradation of critical habitat was anticipated from the RIX outlet to Riverside Avenue Bridge with an unquantifiable number of SAS affected. SAS were not observed to be injured or killed during the study.

Western Riverside Multiple Species Habitat Management Plan

The USFWS issued an intra-USFWS biological opinion (FWS-WRIV-0870.19) on June 22, 2004, for a regional habitat conservation plan (MSHCP) that covered 146 species, including SAS, within the western portion of Riverside County. The MSHCP covers a wide range of public and private land uses. Up to 443 acres of modeled SAS habitat were anticipated to become unsuitable as a result of the MSHCP. At the time this consultation occurred no critical habitat had been designated for SAS. A small, but undeterminable, number of SAS were anticipated to be incidentally harmed as a result of long-term management and monitoring activities. To minimize and mitigate MSHCP impacts to SAS and other covered species, the 22 permittees conserved 3,480 acres of suitable SAS habitat within the plan boundary and provided long-term management and monitoring. Long-term management and monitoring were to be conducted by reserve managers who would assess and restore connectivity when potential barriers to SAS movement are found, restore habitat, improve water quality, protect critical areas to SAS life history needs, remove non-native aquatic predators, and remove vegetation within the plan area. We issued an amendment FWS-WRIV-11IB0266-11F0413 on September 22, 2011 which

addressed the effects of the MSHCP on designated SAS critical habitat. We determined that the MSHCP would not adversely modify SAS critical habitat.

River Road Bridge Replacement

The USFWS issued a biological opinion (FWS-WRIV-2669.2) on March 11, 2005, to the Federal Highway Administration for the purposes of replacing River Road Bridge. The River Road Bridge was widened and lengthened to minimize the potential for flood-related damage. Riparian habitat was temporarily disturbed (0.99 acres) and SAS designated critical habitat was permanent impacted (1.83 acres). In order to offset project impacts to SAS Riverside County Transportation Department agreed to conserve 8.17 acres of riparian habitat in the Santa Ana River watershed.

Van Buren Bridge Replacement Project

The USFWS issued a biological opinion (FWS-WRIV-3035.3) on May 5, 2005, to the Federal Highway Administration for the purposes of replacing Van Buren Bridge. The Van Buren Bridge was widened and realigned to minimize the potential for flood-related damage. Riparian habitat was temporarily disturbed (5.5 acres) and SAS designated critical habitat was permanent impacted (0.5 acres). This project was consistent with the MSHCP and all take of SAS and impacts to riparian habitat was accounted for in that consultation.

Forest Service Land Management Plans

The USFWS issued a biological opinion (FWS-SB-773.9) on September 15, 2005, to the USFS or the purposes of revising land and resource management plans within four Southern California National Forests. This Section 7 consultation covered all of the proposed actions that forest plans to implement and their potential affects to listed species. All potential impacts to SAS critical habitat (City Creek) were minimized. The species does not currently occur within the San Bernardino National Forest so no incidental take of the species was anticipated. Reintroduction of the species to City Creek and one other Forest tributary is expected to occur. Forest management, culverts, in-stream road crossing, etc. are not expected to significantly affect the establishment and success of SAS to streams in the San Bernardino National Forest.

Reinitiation of River Road Bridge Sediment Removal Project

The USFWS issued a revision to the original April 30, 2002 biological opinion (FWS-SB-2371.2) in 2010, (FWS-09B0283-10F0846) to the USACE for the purposes of continuing sand mining operations. Due to project delays in the construction timeframe, new unanticipated effects to SAS, and the designation of critical habitat in the interim, there was a need to reinitiate consultation. Dewatering of a 33-acre area of aquatic habitat was anticipated in order to conduct sediment removal activities. Incidental take, in the form of harm or harassment, was issued for up to 70 SAS for the capture and relocation to outside of the work area. In order to offset project

impacts to SAS Riverside County Transportation Department agreed to supply cool groundwater to the river below the work area in addition to measures included in the previous consultations.

Seven Oaks Dam Gate Testing Project

The USFWS issued a biological opinion (FWS-SB/WRIV-08B0408-10F0825) on July 12, 2010, to the USACE for the purposes of testing the flood gates at Seven Oaks Dam. The Gate testing is a component of the Santa Ana River Mainstem Project. It was anticipated that by testing the dam gates the associated high flow event would achieve a 2,500 cubic feet per second (cfs) discharge rate at the dam. Flows were predicted to be up to 750 cfs at Rialto Channel. Take was authorized for the stranding of up to 20 SAS over 3 days of gate testing. No conservation was included in this consultation.

Reinitiation of Prado Mainstem and Santa Ana River Reach 9 Flood Protection and Norco Bluffs Stabilization Project

The USFWS issued this revision on March 28, 2012, (FWS-SB/WRIV/OR-08B0408-11F0551) to the USACE for the purposes of construction of flood control projects in the Santa Ana River watershed. This revision analyzed potential effects to SAS not included in the original consultation including effect to SAS critical habitat that was designated in 2010. Conservation measures were amended to increase their conservation values for SAS, as well as riparian habitat in general. Two of the measures included a Trust Fund of $1,000,000 to manage previously restored habitat in the Santa Ana River watershed free of giant reed for the life of the project and create 10.9 acres of aquatic habitat for SAS below Prado Dam.

Santa Ana River Bridge Seismic Retrofit and Routine Maintenance Project

The USFWS issued a biological opinion on February 17, 2015, (FWS-WRIV-15B0116-15F0180) to the USACE for the seismic retrofit of the Santa Ana River Bridge that supports the Metropolitan Water District Upper Feeder pipeline. Temporary impacts to 0.07 acres of in-stream habitat was authorized. In order to offset project impacts to SAS, Metropolitan Water District agreed restore and maintain 1.22 acres of native riparian habitat in the Santa Ana River watershed.

Reinitiation of Santa Ana River Mainstem Project

The USFWS issued a revision on July 23, 2015, (FWS-OR-08B0408-15F0592) to the USACE for the purposes of adding bank and bridge protection to portions of the Santa Ana River downstream of Prado Dam. These protections were needed to prevent undercutting or erosion of Santa Ana River embankments and railroad bridge piers during up to 30,000 cfs discharge from Prado Dam. All impacts to stream habitat are located outside of the SNRC action area. The USACE agreed to place offsetting compensatory measures for the temporary impact of 1.22 acres of perennial stream habitat upstream within the SNRC action area.

Temporary enhancement of perennial stream habitat of at least 2.54 acres was required and has yet to be constructed. The USACE and Valley District anticipate both restoration/enhancement projects will occur at approximately the same time resulting in the cumulative enhancement of at least 4.04 acres of perennial stream habitat. In addition, the USACE is required to either reintroduce SAS to a suitable unoccupied habitat within its historic range in the Santa Ana River watershed or enhance 2 acres of SAS habitat below Prado Dam through gravel/cobble augmentation of the substrate. In discussion with the USACE, they are pursuing the reintroduction alternative along with SNRC and the HCP. If the reintroduction option is pursued, this will bring the cumulative number of SAS-occupied streams to four in the Santa Ana River watershed, (including the two proposed by SNRC).

Programmatic Consultation on SAS Recovery Permits

The USFWS issued an intra-USFWS programmatic consultation (USFWS 2015a) on December 22, 2015 to analyze various recovery actions for SAS across its range and set limits on incidental take associated with specific recovery actions. In this case take was considered mortally wounding an individual.

1. Survey, capture, and handling activities throughout species' range – up to 30 adults and 60 juveniles per year;

2. Electrofishing – up to 1 percent per year;

3. Voucher specimens – up to 5 individuals per new or rediscovered populations;

4. Translocations – up to 25 percent of a population within a given pool/sampling area or up to 400 individuals per year per watershed;

5. Removal from the wild and release of captive SAS – up to 10 percent of the individual SAS observed per year per watershed and up to 100 juveniles per watershed and 50 adults per watershed overall; and/or

6. Removal for recovery and/or research purposes to salvage individuals from drying habitat or other natural threats that subject them to imminent mortality – no limit.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species, together with the effects of other activities that are interrelated and interdependent with that action, which will be added to the environmental baseline. 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. Indirect effects are those that are caused by the proposed action, are later in time, and still reasonably certain to occur.

San Bernardino Kangaroo Rat

Direct Effects

Habitat Destruction

Project construction activities will permanently impact approximately 0.04 acres (combined footprint of outlet structure and energy dissipater at both City Creek and Redlands Basins) and temporarily impact 0.66 acres of SBKR habitat at the outlet structures and at the Redlands Basins (Table 1, see below). These impacts will be offset by the conservation and management of 1.24 acres of SBKR habitat. CMs have been included to restore and revegetate habitat disturbed by construction activities which should minimize the duration of habitat loss. It is expected that appropriate SBKR habitat (same or better quality as pre-Project condition) will be reestablished within 3 years and at most 5 years from the start of the Project.

Death/Injury

Any SBKR within ground disturbance areas of the Project, 0.7 acres of initial construction, may be crushed or buried within their burrows as a result of Project-related disturbance. To minimize the number of SBKR injured or killed by construction activities, the contractor will install exclusionary fencing to prevent SBKR from entering any construction areas adjacent to occupied habitat. Any SBKR found during fence installation, and subsequently found within the fenced area throughout the course of construction activities, will be captured and released in nearby suitable habitat by an approved biologist. Trenching completed to install the exclusionary fence may directly injure and/or kill SBKR through crushing of the burrows by movement of personnel, vehicles, and equipment. Indirect injury and death may result from the effects of trapping and relocation to maintain the SBKR-free enclosed action area, as discussed below in the Indirect Effects section below. Despite risks associated with the exclusionary fencing, trapping, and release of SBKR to adjacent habitat, we believe these activities will minimize the number of animals that otherwise would be killed by construction activities. Moreover, though captured SBKR may be injured or killed during live-trapping or relocation, such take rarely occurs during trapping conducted by biologists approved by our agency.

We expect that SBKR will be prevented from entering construction areas after initial clearing and grading due to the presence of the exclusionary fence. However, there is some possibility that SBKR may burrow under the fence or enter through a temporary breech in it. To minimize injury to these SBKR, all trenches will be backfilled or covered or temporary escape ramps will be constructed at the end of the work day; any stockpiled soils, if outside the exclusionary fence, will be covered or fenced. An Authorized Biologist or Biological Monitor will inspect these sites daily to locate and make any needed repairs to the exclusionary fence and to remove any stranded SBKR from the construction area and release them into nearby suitable habitat.

Indirect Effects

Habitat Degradation/Type Conversion

Although the topsoil will be segregated and placed back in the temporary excavation sites, and revegetated in as near to its original condition as possible, the soil profile will be disrupted and this may affect the quality of the habitat and its ability to support SBKR long term.

Continuous or semi-continuous discharge of up to 10 MGD of effluent into City Creek will alter the habitat within approximately 8.4 acres of the deepest braid (thalweg) of City Creek from Boulder Avenue to approximately Alabama Street. It is expected that the current habitat (scalebroom scrub) will be converted to riparian habitat (southern willow woodland or equivalent) and cause the permanent loss of one or more biological features necessary for SBKR occupation. A trapping survey conducted in 2016 indicated that approximately half of the length of the affected reach of City Creek (4.1 acres) is occupied by SBKR (ESA 2016d). To offset this impact, 20.5 acres of SBKR habitat will be conserved and managed; loss of occupied designated critical habitat offset at a ratio of 3 to 1 and loss of unoccupied designated critical habitat offset at ratio of 2 to 1 (Table 1).

Table 1. Impacts and conservation of scalebroom scrub habitat

Project Feature	Permanent Effects		Temporary Effects		Proposed Conservation (acres)
	occupied	unoccupied	occupied	unoccupied	
City Creek (outlet Structure)	0	0.02	0	0.18	0.22
City Creek (type conversion)	4.10	4.10	0	0	20.5
Redlands Basins	0.02	0	0.48	0	1.02
Total	4.12	4.12	0.48	0.18	**21.74**

Trapping and Relocation

Adverse impacts to SBKR may result from trap and release activities. After release some animals likely will not survive displacement owing to increased vulnerability to predation, while others will suffer from reduced fitness resulting from competitive exclusion by SBKR or other small mammals already established within the release area. Physiological stress associated with inability to successfully reestablish a new home range for obtaining food and shelter will result in reduced individual fitness, as manifested by reduced survival or reproduction after release. Individual SBKR now inhabiting the adjacent habitat also may suffer from these competition-related stresses, including reduced reproduction, for some time after new animals are released into their territories. The early successional stages vegetation and/or degraded conditions of the habitat in the affected Project area suggests that up to two SBKR would be captured and relocated during construction of the 24-inch pipeline and associated outlet structures, assuming less than a 100 percent capture rate. It is expected that capture and translocation will subject captured SBKR to risk of decreased survival, fitness, and reproduction.

Effect on Recovery

While the USFWS has not developed a recovery plan for SBKR, our latest 5-year review for the subspecies recommended that as much remaining habitat as possible be conserved and managed according to (USFWS 2009). The 5-year review also recommends that the USFWS work with partners to identify opportunities for habitat management, restoration, and enhancement, and to protect additional SBKR habitat. Habitat protection must include upland refugia to support SBKR during floods, and occupied floodplains and adjacent upland habitats should be conserved to ensure protection of populations large enough to remain viable in the long term (USFWS 2009). However, owing to the lack of adequate demographic data, we do not know how large a sustainable SBKR population must be or how large a habitat area is needed to support a viable population.

Overall, implementation of the proposed action will result in a gain of up to 21.74 acres of permanently conserved and managed habitat for SBKR, which provides a net gain in the long term function of critical habitat containing PCE/PCRs to support the ecological functions needed to support SBKR in this area. The 4.6 acres of occupied and 4.3 acres of unoccupied suitable habitat which will be impacted by Project construction constitutes a small portion of Unit 1. We do not expect the combined permanent loss of 0.04 acres (total footprint of structures), the permanent replacement of scalebroom scrub with riparian habitat (PCE 2) of 8.2 acres, and the temporary loss of 0.66 acres to impede the recovery of SBKR. We expect the conservation and management of 21.74 acres for the benefit of SBKR to contribute to the function of critical habitat in Unit 1 and recovery of the species.

Effect on Critical Habitat

The Project will result in 8.24 acres of permanent (0.04 acres developed and 8.2 acres converted to riparian woodland) and 0.66 acres of temporary impacts to SBKR critical habitat as a result of Project construction. SBKR occupy 4.6 of those acres. The affected critical habitat supports the appropriate soil types and provides habitat in and adjacent to the 100-year floodplain (PCE/PCRs 1, 2, 3, and 4). To offset the effects of the Project's impacts on SBKR critical habitat, permanent conservation and management of scalebroom scrub habitat (at least 13.32 acres of which must be occupied) including a conservation easement, the purchase of equivalent credits from a Conservation Bank approved by the USFWS, or another equivalent compensatory mitigation option approved by the PSFWO will occur prior to initiation of Project construction. Conservation of habitat linkages between City Creek and the larger Santa Ana River population and/or connectivity between the lower elevations of the creek and upper terrace refugia habitats should be prioritized.

Santa Ana Sucker

Direct Effects

Habitat Node Creation

Construction is expected to occur in the wetted channel as part of the initial establishment of the habitat nodes (Conservation Measure 17b.i) in the mainstem of the Santa Ana River. Although this action is not anticipated to kill SAS, the clearing of the stream using electrofishing (capture and relocation of SAS to outside the work area) will harm or harass all fish that are found inhabiting construction areas. Due to the initial selection of poor quality habitat (sandy substrate with little habitat complexity) the take of SAS associated with each habitat node is expected to be no more than one fish per node, or six SAS in total. Subsequent work will likely encounter higher numbers of SAS as the intent of the node creation is to increase fish numbers. Habitat node re-establishment or enhancement would only occur if a node failed to perform (amount of habitat enhance was less than 0.25 acres) or the structure of the node was significantly degraded due to storm flows.

Assuming a 10-year storm event will degrade or destroy all habitat nodes to a degree that they need replacement and a 5-year storm flow will degrade 50 percent of the nodes to a degree where enhancement is needed, all nodes will need replacing or significant enhancement approximately three times in 20 years. Habitat node enhancement will likely impact a higher number of SAS than node re-establishment since a greater proportion of the node is functional and maintaining SAS habitat at the time of repair. We estimate that up to 100 SAS will be relocated per habitat node during repairs (3 nodes equals 600 SAS) and up to 20 SAS relocated during node replacement (12 nodes equals 240 SAS), or up to 840 SAS relocated in a 20 year period. No more than six SAS are anticipated to be injured or killed per year associated with habitat node construction or future maintenance activities, or up to one fish per node per year.

Long-term Monitoring

Although the potential for injury or mortally wounding SAS during long-term monitoring in the mainstem of the Santa Ana River or in reintroduced populations is low, it is likely to occur. Recovery permits issued to USFWS permitted SAS biologists allow up to 10 SAS per calendar year to be incidentally injured or killed. We anticipate that a cumulative amount of no more than six SAS will be incidentally injured or killed by electroshocking and handling per calendar year as part of the long-term monitoring for the six habitat nodes and the two reintroduced SAS populations in the Santa Ana River watershed, or two SAS per population.

Indirect Effects

Permanent Habitat Loss and Degradation – Reduced Effluent Discharge

1. Reduced Area of Wetted Channel

A study was conducted as part of the BA to estimate the changes in depth and velocity that could be expected from a 6 MGD discharge reduction at the RIX outfall. The study concluded that a reduction of 6 MGD of discharge from RIX would reduce the wetted habitat in the Santa Ana River channel by 4 to 7 percent between the RIX outlet and approximately Mission Boulevard Bridge (ESA 2015b). The existing wetted area of this reach is approximately 15.6 acres; therefore, the 4-7 percent reduction in the wetted channel of the Santa Ana River would equate to 0.6 to 1.1 acres of reduced wetted habitat throughout the affected area. The incremental effect of any flow reduction could degrade the already compromised aquatic habitat, and would result in a gradual decline in the ecological function of the riverine system for SAS within this area (i.e., reduced forage and spawning area). The reduction in aquatic habitat would likely adversely affect SAS at all life stages.

The reduced discharge study used 6 MGD as the value of flow reduction to the Santa Ana River. To ensure use of the best available information when evaluating the change to the wetted environment, the USFWS requested up-to-date data from Valley District. A representative data set from November 2014 to December 2016 (monthly mean) indicated that EVWD supplied 6.01 MGD as influent to the RIX facility for tertiary processing (Valley District 2017). The RIX facility processed to tertiary standards and discharged a mean effluent flow of 28.88 MGD over the same time period (SWRCB 2017).

To ensure that all effluent is removed from the local groundwater, the RIX facility extracts more water than they infiltrate. The rate of over extraction was unaccounted for in the low-flow study, meaning that the effect of the diversion of 6 MGD is loss of more than 6 MGD from the RIX outfall.

Reported values of influent and effluent indicate that RIX over extracted by approximately 10 percent during the studied period (SWRCB 2017). A conservative estimate for Project-related discharge reduction at the RIX outfall is approximately 6.43 MGD, or 22.3 percent of current RIX discharge (6.43 of 28.88 MGD). We estimate that the wetted channel between the RIX outlet downstream to Mission Boulevard will be permanently reduced by approximately 1.21 acres, or 8 percent of the current wetted channel, slightly greater than the 0.6 to 1.1 acres estimated in the reduce flow study.

2. **Reduced Habitat Quality and Function**

a. **Reduced Depth of Aquatic Habitat**

The reduced discharge study concluded that a diversion of 6 MGD from the Santa Ana River at the RIX outlet would lower water depth in the channel by approximately 1.1 inches, resulting in more shallow pools (and fewer deep pools) and therefore less available habitat for adult SAS. Shallower habitat increases the incidence of avian predation and water warming.

b. **Channel Constriction**

Discharge reduction will cause channel constriction where the proportion of open water habitat is reduced as the riparian canopy covers more of the channel. Although canopy shade benefits SAS by reducing warming from the sun, excess shading has recently been shown to negatively affect SAS presence in the Big Tujunga population of SAS (Aspen 2016). The amount of riparian cover is highly variable in the Santa Ana River. The increase in the relative percentage of riparian cover with Project reduced flow is not anticipated to have a negative impact on SAS since the change in any given reach of stream will be small (approximately 8 percent).

c. **Reduced Flow Velocity**

The reduced flow study modeled flow velocity and found that velocities would decrease with reduced flow volume. Using estimates of moderate (1.2 to 3.6 feet per second) and high flow (3.6 to 6.0 feet per second) as surrogates for suitable SAS habitat, approximately 9.8 percent of this habitat will be replaced with low velocity habitat (less than 1.2 feet per second) from downstream of the RIX outfall to Mission Boulevard. A flow of 1.2 feet per second is approximately twice the velocity needed to transport sand (2 millimeters in size or smaller) and it is expected that sandy substrate will dominate these flow velocity areas of the stream. A permanent loss (degradation) of 9.8 percent of the suitable SAS habitat in this reach of the Santa Ana River is a significant loss as this portion of the river supports a majority of the SAS in the watershed.

d. **Reduced Sediment Transport**

The reduced flow study modeled sand transport (particles up to 2 millimeters in size) (ESA 2015b). As flow velocity was reduced the amount and ability of water to transport sediment was reduced proportionately. With a 6 MGD reduction in flow the area of suitable SAS habitat is expected to be reduced by approximately 7 percent upstream of Riverside Avenue as sand buildup covers existing gravel beds.

> Flow reduction will also affect the rate of sediment transport downstream, which controls the rate of re-exposure after sand is deposited over existing gravel beds by storm flows. The Santa Ana River bottom is regularly observed to be mostly covered in sand (USFWS 2017). Because wastewater discharge provides all surface flow outside of infrequent and short-lived storm flows, sand is flushed downstream at a rate that is proportionate to the volume of wastewater discharged. A reduction in effluent discharge will slow the rate of sand transport downstream and lengthen the time required to re-establish suitable SAS (gravel bed re-exposure). Although not quantified, this is an important factor that negatively affects the health, fecundity, and overall viability of SAS in the mainstem Santa Ana River.

Increased Abundance of Aquatic Predators

The reduction in wetted habitat, depth, and velocity as result of the Project would generally create more shallow and slow moving waters within the Santa Ana River downstream of the RIX facility, which could increase habitat suitability for non-native aquatic predators such as bullfrog, sunfish, largemouth bass, and catfish. An increase in the non-native aquatic predator population negatively affects all SAS size classes and reduces recruitment and survival.

Death/Injury

It is not anticipated that SAS will be injured or killed at the onset of flow reduction. SAS are expected to redistribute themselves in the river.

Amount or Extent of Take

USGS estimated that 6,761 suckers occupied the river reach between the RIX outflow and Mission Boulevard in September 2015(Brown and May 2016). As stated in the BA the diversion of 6 MGD from the Santa Ana River at the RIX discharge would reduce the wetted habitat of the Santa Ana River channel from 4 to 7 percent, or 0.6 to 1.1 acres in the reach of the river from the RIX outlet to Mission Boulevard. Using a mean population density of 433 SAS per acre (6,761 suckers per 15.6 acres of existing wetted habitat) the BA assessed this permanent reduction in wetted habitat to result in a worst-case scenario of SAS numbers decreasing by 260 to 476 SAS. Due to the unequal distribution of SAS throughout this reach of river an average density should not be used to estimate the potential take or displacement of SAS.

The 2015 Native Fishes Survey (Brown and May 2016) indicated that 92 percent (6,253 fish) of all SAS occurred in the reach of river between the RIX outfall and Riverside Avenue (4 percent of the current species' range in the Santa Ana River watershed). Most SAS in the watershed (6,135 fish, 91 percent) were found associated with one pool/riffle complex in this reach that was approximately 100 meters in length. The river upstream of the Riverside Avenue Bridge is expected to be most heavily affected reduced flow velocity/sediment transport and increased sand buildup that effectively smothers existing gravel beds (7 to 9.8 percent habitat reduction, BA and as

discussed in the Reduced Flow Velocity section above, respectively). A 7 to 9.8 percent loss of suitable habitat in this reach of river equates to a reduction or displacement of SAS of between 438 and 613 fish, with additional losses expected downstream of Riverside Avenue.

Draft results of the 2016 Native Fishes Survey (Brown and May 2017) indicate the current population of SAS is more evenly distributed than in 2015, with more fish found downstream of Riverside Avenue (5,219 SAS or 58 percent) than upstream (3,752 SAS or 42 percent). The difference in population estimates between 2015 and 2016 (6,761 and 8,971 fish, respectively) highlights the dynamic shift in SAS population numbers that can occur between years; a population increase of approximately 25 percent. Relatively continuous gravel beds were found from the RIX outlet down to beyond Mission Boulevard during the Riverwalk survey which occurred approximately one month after the 2016 Native Fishes Survey (USFWS 2017). Assuming the reduced flow study (ESA 2015b) is applicable to the 2016 Native Fishes Survey, a 7 to 9.8 percent loss of suitable habitat from the RIX outlet to Mission Boulevard equates to a reduction of SAS numbers of between 628 and 880 fish. This estimate of the decline in habitat values and associated reduced population size of SAS is more conservative than what was estimated in the BA (4 to 7 percent reduction in wetted habitat and 260 to 476 SAS), but it incorporates data that were unavailable when it was drafted.

It is anticipated that the reduction of aquatic habitat, reduced depth, and lower velocities associated with the reduction of 6.43 MGD to the Santa Ana River will result in incremental effects of sand deposition that will reduce SAS egg development/survival, increase egg predation, reduce fitness of adults that may expend more energy finding suitable spawning habitat, and reduce survival of SAS at all life stages.

To offset direct and indirect impacts to SAS and its habitat resulting from the loss of up to 22.3 percent of the calculated discharge from the RIX outfall into the Santa Ana River and the resulting substantive loss and degradation of SAS habitat between the RIX outfall and Mission Boulevard, Valley District will establish and implement an HMMP as described in CM 17. The HMMP will contain measures to increase the number of individual SAS in the Santa Ana River, increase the area of suitable and occupied habitat in this watershed, and establish two new populations in the watershed. The measures will either be implemented by Valley District in perpetuity or will be taken over by another entity upon HCP permit issuance. Measures and their expected outcomes are discussed more fully below in the discussion of Project Effects on Recovery.

Effect on Recovery

The recovery objectives (RO) identified in the Draft Recovery Plan for the Santa Ana Sucker (USFWS 2014b) are listed below. Work with landowners and other stakeholders to:

RO 1. Rangewide Monitoring - Develop and implement a rangewide monitoring protocol to accurately and consistently document populations, occupied habitat, and threats;

RO 2. Recovery Research - Conduct research projects specifically designed to inform management actions and recovery;

RO 3. Threat Reduction - Increase the abundance and develop a more even distribution of SAS within its current range by reducing threats to the species and its habitat; and

RO 4. Range Expansion - Expand the range of the SAS by restoring habitat (if needed), and reestablishing occurrences within its historical range.

CM 17 will help achieve a significant number of ROs, goals, and actions identified in the draft recovery plan, including:

CM 17b will create an HMMP that will establish a long-term monitoring program (CM 17b.vi) that will either be implemented by Valley District in perpetuity or will be taken over by another entity (e.g., HCP) upon permit issuance. As a proposed covered activity as part of the HCP, SNRC and its long-term monitoring plan are anticipated to be incorporated into a rangewide monitoring protocol for SAS that is currently in development by Valley District. Measure CM 17b.vi will support RO 1. Measures discussed below will be included as part of the HMMP and will offset Project effects to SAS and its critical habitat and support the recovery of the species.

CM 17b.i "Habitat Node Creation (microhabitat enhancements)" – This measure will support species' recovery objectives and PCEs through range expansion of SAS in the mainstem of the Santa Ana River (RO 4) by enhancing coarse substrate abundance (PCE 2), water depth and velocity (PCE 3), complexity of instream habitat (PCE 6), and use of mainstem tributaries. It is also expected to reduce threats from variable wastewater discharge and the non-native red alga by more evenly distributing SAS throughout the mainstem perennial stream, away from points of discharge (RO 3). This measure is expected to offset Project impacts to stream habitat (reduced stream depth, water velocity, and temporal availability and amount of coarse substrate habitat) by using boulders, large woody debris, or addition of cobble/gravel to increase the abundance and quality of preferred microhabitats (riffle/pool habitat) suitable for SAS foraging and spawning. Current and future native fish studies and other associated research (e.g., stream restoration techniques, fish passage, etc.) will be used to create and adaptively manage these habitat features. Six habitat nodes will be created and maintained in perpetuity, adding at minimum 1.5 acres of SAS habitat (e.g., coarse substrate with variable flow velocities creating areas of scour and riffles) similar to or better than natural riffle/pool habitat measured during the Native Fishes Surveys (Brown and May 2016, 2017) in the Santa Ana River.

The 1.5 acres of foraging and spawning habitat will be enhanced on the Santa Ana River associated with mainstem tributaries downstream of the USACE levee system in the City of Riverside. Fish densities are currently low in the downstream reaches of the river (below Mission Boulevard) due to a lack of suitable SAS habitat (low cover of cobble/gravel substrate). The enhanced habitat created by habitat nodes is expected to attract fish from upstream reaches and increase the use of associated mainstem tributaries. Attracting fish downstream of Mission Boulevard Bridge, will move them out of the area where Project effects are expected to be most

deleterious, as well as downstream of the densest distribution an cover of the invasive red alga, and where natural groundwater inputs reduce the effect of summer warming on surface flow. It is anticipated that SAS will occupy these habitat nodes in relatively high densities, more evenly spreading and increasing fish numbers in the Santa Ana River mainstem.

In one natural riffle/pool complex located upstream of Riverside Avenue USGS found an average of 12.0 and 3.1 SAS per meter of river length (Brown and May 2016 and 2017, respectively). Using these estimates for a relative comparison of the expected change in SAS numbers with Project implementation, we anticipate 1.5 acres (6 habitat nodes or 600 meters of river length) of SAS habitat will sustain between 1,863 and 7,218 adult and young fish. An estimate in the net change in SAS numbers in the watershed is approximately an increase of between 983 and 6,338 fish (assuming a maximum Project impact of 880 SAS), or equivalent to an increase of between 10.9 and 70.6 percent of the 2016 SAS population.

CM 17b.ii "Aquatic Predator Control Program" – This measure will support RO 3. It is anticipated that this measure will reduce the total number of non-native fish, reptile, and amphibian predators in the reach of the river from the RIX outlet to Mission Boulevard, in the habitat node creation areas, and in other locations where non-native predator removal is needed. Reduction of this threat will increase SAS survival and make available habitats to SAS that may currently be occupied by non-native predators.

CM 17b.iii "Exotic Weed Management Program" – This measure will support RO 3. It will help improve ecological function of existing riparian habitat within the Project impact area by removing non-native plant species. Species that use high amounts of water, like giant reed and salt cedar, will be removed, reducing water losses in the system from evapotranspiration, improving surface flow.

CM 17b.iv "Rialto Channel Water Temperature Management" – This measure will support RO 3 and 4. It will enhance water quality for SAS in Rialto Channel (Santa Ana River mainstem tributary) and further downstream by providing cool, high quality supplemental water from local groundwater sources to reduce the water temperature during the summer season. This measure will seasonally enhance habitat in an ecologically valuable tributary of the Santa Ana River, making it available for use by SAS year-round. Current data indicates that very few SAS occupy this tributary and upstream of the RIX outlet during late summer (Brown and May 2016, 2017). By attracting fish upstream of the RIX outlet they are moved outside of the impact area for both this Project and future RIX shutdown activities, as well as outside the known range of the non-native red alga. Combined with aquatic predator removal, after Project implementation these fish are expected to have reduced threats, increased overall health, larger eggs, and greater survival.

CM 17b.v "Upper Watershed SAS Population Establishment" – This measure will support RO 4. It will reestablish two populations of SAS, one in upper City Creek, and the other will include an upper tributary cited in the draft SAS recovery plan. Both of these upper tributaries are part of the species' historic range and have high potential for successful relocation and reestablishment of the species. This measure will offset reduced effluent discharge (surface water flow) in the

mainstem Santa Ana River downstream of the RIX outlet and associated degradation in quantity or quality of habitat that may result in reduced reproduction, fitness, recruitment and/or survivorship of SAS. Implementation of this measure will contribute to the recovery of the species by increasing the number of SAS locations (metapopulations) in the Santa Ana River, increasing the total number of SAS currently found in the watershed, and distributing the risk of a catastrophic event between multiple, managed locations.

Effect on Critical Habitat

The majority of the action area, except the Redlands Basins, is designated critical habitat for SAS. Project-related reduction in wetted habitat in the mainstem of the Santa Ana River is estimated to permanently degrade up to 1.21 acres of critical habitat. This represents approximately 0.02 percent of the 7,097 acres of designated critical habitat in the Santa Ana River Unit, and approximately 0.01 percent of the total 9,331 acres designated for the species. Flow reduction will gradually convert the edges of existing aquatic habitat to riparian habitat, as the channel width constricts. Primary constituent elements associated with instream habitat (i.e., flow, food sources) will be reduced, but those associated with riparian vegetation (i.e., shelter, cover) will remain intact. CM 17b, discussed above, will offset this degradation of ecological values important to SAS critical habitat by enhancing in stream habitat (habitat node creation, non-native plant removal, aquatic predator removal, and Rialto Channel summer water temperature reduction), reintroducing SAS to two historic tributaries in the upper Santa Ana River watershed, and managing and monitoring SAS at these three locations in perpetuity.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. 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 Act. We are not aware of any planned non-Federal actions affecting listed species that are reasonably certain to occur in the action area considered by this biological opinion. The City of San Bernardino Municipal Water Department has also proposed a reduction in discharge from the RIX facility in a Draft Environmental Impact Report for the Clean Water Factory. However, it is our understanding that the Clear Water Factory will seek CWSRF funding and funding and other support from the Bureau of Reclamation, and will therefore be the subject of a future consultation.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Jeopardy Determination

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. “Jeopardize the continued existence of ” means “to engage in an action that

reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02).

The jeopardy analysis in this biological opinion relies on four components: (1) the Status of the Species, which evaluates the range-wide condition of the SBKR and SAS, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which evaluates the condition of the SBKR and SAS in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the SBKR and SAS; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the SBKR and SAS; and (4) the Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the SBKR and SAS.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the current status of the arroyo toad, desert tortoise, flycatcher, and SBKR, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the SBKR and SAS in the wild.

Adverse Modification Determination

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 Code of Federal Regulations 402.02. Instead, we have relied on the statutory provisions of the Endangered Species Act to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this biological opinion relies on four components: (1) the Status of Critical Habitat, which evaluates the condition of designated critical habitat for the SBKR and SAS, in terms of primary constituent elements, the factors responsible for that condition, and the intended recovery function of the critical habitat overall; (2) the Environmental Baseline, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated and interdependent activities on the primary constituent elements and how that will influence the recovery role of the affected critical habitat units; and (4) Cumulative Effects, which evaluates the effects of future non-Federal activities in the action area on the primary constituent elements and how that will influence the recovery role of affected critical habitat units.

For purposes of the adverse modification determination, the effects of the proposed Federal action on the critical habitat of the SBKR and SAS are evaluated in the context of the range-wide condition of the critical habitat, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the

primary constituent elements to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the SBKR and SAS.

The analysis in this biological opinion places an emphasis on using the intended range-wide recovery function of critical habitat for the SBKR and SAS, and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act 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, collect, or attempt to engage in any such conduct. Harm is further defined by us to include significant habitat modification or degradation that actually kills or injures a listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by us as an action that create the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavioral 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 7(o)(2) of the Act, such incidental take is not considered a prohibited taking under the Act, provided that such taking is in compliance with this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the USEPA so that they become binding conditions of any permit or grant documents issued to the permittee, as appropriate, for the exemption in section 7(o)(2) to apply. The USEPA has a continuing duty to regulate the activity covered by this incidental take statement. If the USEPA fails to assume and implement the terms and conditions of the incidental take statement or to make them enforceable terms of permit or grant documents, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of the incidental take, the USEPA must report the progress of the action and its impact on the species to the PSFWO as specified in the incidental take statement [50 CFR § 402.14(i)(3)]. The exemption provided by this incidental take statement to the prohibitions against take contained in section 9 of the Act extends only to the action area as described in the Environmental Baseline section of this biological opinion.

San Bernardino Kangaroo Rat

The exact distribution and population size of SBKR is difficult to estimate due to the dynamic conditions associated with their habitat and biology. Moreover, finding dead or injured SBKR within the construction area is unlikely as the individuals may be underground during construction activities.

Exclusion fencing will be erected, and SBKR will be captured and relocated outside of the construction footprint. However, some animals may be missed and subsequently die as a result of Project clearing and grading activities. Some SBKR may also be injured or killed as a result of the capture and relocation efforts. Because we do not have site-specific data regarding the density of SBKR at the site of the proposed action, the precise number of animals that will be affected by the proposed action is difficult to quantify. Nevertheless, based on the best available information, we have established the following take exemptions for SBKR:

1. Death or injury of adult and/or juvenile SBKR from ground disturbance of up to 0.9 acres resulting from construction of the 24-inch pipeline and associated outlet structures at City Creek and at Redlands Basins. The amount or extent of incidental take will be exceeded if more than 0.9 acres is disturbed or more than one SBKR is known to be injured or killed from ground disturbance during construction of the 24-inch pipeline or the associated outlet structures in City Creek and the Redlands Basins.

2. Death or injury of SBKR as a direct result of the capture and release efforts from within the fenced work areas associated with City Creek and the Redlands Basins. Incidental take will be exceeded if more than one SBKR is known to be injured or killed by the capture/relocation efforts during construction of the 24-inch pipeline and associated outlet structures.

3. Death or injury of adult and/or juvenile SBKR from water inundation of up to 8.2 acres of potentially occupied habitat resulting from the initial flushing of effluent into City Creek. The amount or extent of incidental take will be exceeded if more than 8.2 acres is inundated in the initial flushing of effluent into City Creek.

Santa Ana sucker

The exact distribution and population size of SAS is difficult to estimate due to the dynamic conditions associated with their habitat and biology. Some SAS may be injured or killed as a result of the capture and relocation efforts during habitat node creation, during long-term monitoring, during electroshocking activities for predator removal, or for the purposes of salvage in City Creek or another translocation stream. Because we do not have site-specific data regarding the density of SAS at the site of the proposed action, the precise number of animals that will be affected by the proposed action is difficult to quantify. Nevertheless, based on the best available information, we have established the following take exemptions for SAS:

1. Death or injury of adult and/or young SAS from displacement due to channel constriction and habitat loss of up to 1.21 acres resulting from up to 6.43 MGD of discharge flow reduction from the RIX facility. The amount or extent of incidental take will be exceeded if more than 1.21 acres of aquatic habitat is permanently lost from discharge flow reduction.

2. Capture and relocation of all SAS from within construction areas during construction and/or reconstruction of six habitat nodes in the mainstem of the Santa Ana River. Incidental take will be exceeded if more than six SAS are injured or killed during capture and relocation activities during construction and/or reconstruction of the six habitat nodes (1 fish per node) in any one calendar year.

3. Capture of SAS from the Santa Ana River for translocation to the upper watershed or to supplement the captive-population, for purposes of breeding and subsequent relocation. Incidental take will be exceeded if more than 25 percent of the Santa Ana River population or 400 SAS per year are removed for translocation/relocation purposes, per the programmatic consultation on SAS recovery permits (USFWS 2015a).

4. Capture and measurement of SAS from the mainstem of the Santa Ana River and from the two new populations created in the species' historic range for long-term monitoring and management. Incidental take will be exceeded if more than six SAS are injured or killed during long-term species monitoring in the Santa Ana River watershed per calendar year, or a mean of two (2) fish per metapopulation.

5. Capture and relocation of all SAS for the purpose of salvage from drying habitat or other threats that subject them to imminent mortality. There is no limit on the numbers of SAS that may be relocated during salvage efforts.

EFFECT OF THE TAKE

In this biological opinion, we have determined the level of anticipated take is not likely to result in jeopardy to SBKR or SAS, or adversely modify SBKR or SAS critical habitat.

CONCLUSION

After reviewing the current status of the SBKR and SAS, environmental baseline for the action area, effects of the proposed action, and cumulative effects, it is the USFWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of SBKR or SAS, or adversely modify SBKR or SAS critical habitat. Our conclusion is based on the following:

1. Direct and indirect impacts to SBKR will be minimized through the implementation of the conservation measures;

2. The acquisition of long-term conservation of habitat to offset the impacts of the proposed action will support the range-wide conservation (recovery) of SBKR;

3. The temporary loss of SBKR habitat, including designated critical habitat is relatively small and will be restored, thus minimizing effects to individuals and their territories, and connectivity across the Project area;

4. The permanent loss of SBKR designated critical habitat represents a small proportion of the critical habitat within the affected unit; thus, the ecological function and values of designated critical habitat will be maintained in this unit and within the overall designation;

5. The permanent loss of designated SAS critical habitat will be offset by the creation and maintenance of habitat nodes and cooling of summer water temperature in Rialto Channel; thus, the ecological function and values of designated critical habitat will be maintained in this unit and within the overall designation;

6. The enhancement of Santa Ana River aquatic and riparian habitats, reintroduction to portions of its historic range, and long-term management of existing and new populations to offset the displacement of SAS in the river by the proposed action will support the range-wide conservation (recovery) of SAS.

REASONABLE AND PRUDENT MEASURES

The reasonable and prudent measures below are non-discretionary. Failure to comply may cause the protective coverage of section 7(o)(2) to lapse. The following reasonable and prudent measures are necessary and appropriate to minimize incidental take of SBKR and SAS:

1. The USEPA and or Valley District will monitor and report on compliance with the established take threshold for federally listed wildlife species associated with the proposed action.

2. The USEPA and or Valley District will monitor and report on compliance with, and the effectiveness of, the proposed conservation measures for the Project.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the USEPA must comply with the following terms and conditions, which implement the reasonable and prudent measures described in the previous section, and the reporting and monitoring requirements. These conditions are non-discretionary.

All Species

To implement reasonable and prudent measure number 1(monitor and report on compliance with established take thresholds), the USEPA and or Valley District will:

1-1 Ensure the Authorized Biologist(s) or Biological Monitor(s) who will trap or handle federally listed species are qualified and have been pre-approved by PSFWO for work on this Project.

1-2 Implement the CMs as specified in the Project description evaluated in this biological opinion. If the Biological Monitor detects impacts to federally listed species from Project-related activities in excess of that described in the above incidental take statement, the USEPA, Valley District, or the Biological Monitor will contact the PSFWO within 24 hours. At that time, the PSFWO and the USEPA or Valley District must review the circumstances surrounding the incident to determine whether additional protective measures are required. Project activities may continue pending the outcome of the review, provided that the proposed protective measures and any appropriate terms and conditions of this biological opinion have been and continue to be fully implemented.

1-3 If the amount of authorized take for any federally listed species as defined in the Incidental Take Statement is exceeded, the USEPA must reinitiate consultation, pursuant to the implementing regulations for section 7(a)(2) of the Endangered Species Act at 50 CFR 402.16, on the proposed action.

To implement reasonable and prudent measure number 2 (monitor and report on compliance with, and the effectiveness of, the proposed conservation measures), the USEPA or Valley District will:

2-1 Within 45 days of the completion of the proposed action, the USEPA or Valley District must provide a report to the PSFWO that provides details on the effects of the action on the federally listed species. Specifically, the report must include information on any instances when federally listed species were killed, injured, or handled; the circumstances of such incidents; and any actions undertaken to prevent similar instances from re-occurring.

2-2 Ensure USFWS personnel have the right to access and inspect the Project site during Project implementation (with prior notification from us) for compliance with the Project description, conservation measures, and terms and conditions of this biological opinion.

<u>San Bernardino Kangaroo Rat</u>

To implement reasonable and prudent measure number 1(monitor and report on compliance with established take thresholds), the USEPA and or Valley District will:

SBKR-1 In addition to the conservation measures outlined in this biological opinion, when trapping, collecting, and releasing any SBKR found in the construction area or vicinity during the course of work, the Qualified Biologist/Biological Monitor will implement the following measures:

a. Provide traps in sufficient numbers to provide adequate coverage of the construction area to ensure that any SBKR which are present are captured.

Mark all trap locations with flagging, reflective tape, or other technique that is visible under day and night conditions.

b. Use only 12-inch Sherman or wire-mesh live traps; 9-inch models may be used only if obtained before March 13, 1990. Ensure all trap models are modified to eliminate or substantially reduce the risk of SBKR injury (e.g., tail lacerations or excisions). Do not place any batting in the traps.

c. Sterilize traps previously used outside of San Bernardino County.

d. Conduct trapping only if the nightly low temperature is forecast to be 50 degrees Fahrenheit or above, and if no extended periods of wind, rain, fog, or other inclement weather will occur to make conditions unsuitable for trapping or will unduly imperil the lives of the animals.

e. Adjust traps by hand each time they are placed, set, and baited, at a sensitivity level appropriate for capturing SBKR. Visually inspect all traps before closing, and close them by hand.

f. Check all traps at least twice each night, once near midnight and again at sunrise.

g. Identify all trap locations with a unique identification code on a log sheet, note the date and time each trap is checked, and periodically review the log sheet to ensure no traps are inadvertently missed. Field documentation will be available to USFWS personnel upon request.

h. Hold individual SBKR for no longer than 1 hour before releasing them, and relocate them as quickly as possible; this will mean selecting release locations in advance of trapping. Do not place the animal in a plastic bag; transfer it in a clean, structurally sound, breathable container with adequate ventilation. Do not at any time allow the animal to become stressed due to temperature extremes (either hot or cold).

Santa Ana sucker

To implement reasonable and prudent measure number 1(monitor and report on compliance with established take thresholds), the USEPA and/or Valley District will:

SAS-1-1 In addition to the CMs outlined in this biological opinion, when capturing and releasing any SAS found in the construction area, the Qualified Biologist will implement the following measures:

a. Only the use of fine mesh (2 to 4 millimeter) knot-less seine nets, fine mesh (4 to 6 millimeter) knot-less hoop nets, modified hoop nets, or similar traps, or dip nets of 0.5 millimeter or finer mesh will be used for capturing SAS.

b. Survey methods will be selected to minimize potential injury or mortality to SAS and potential disturbance or damage to breeding areas.

c. If seines are used, particular care will be taken to avoid incidental injury or mortality to SAS that may be caught and suffocated in algal mats or sand.

d. Care will also be taken to keep SAS in river water as much as possible and they should be released as close to the point of capture as possible.

e. Use of non-conventional sampling gear must first be approved by the PSFWO.

f. Electrofishing may be employed with the following restrictions upon following under the following conditions:

    i. Electrofishing activities will not be conducted from March 1 through July 31.

    ii. A Qualified Biologist will be the crew leader during electrofishing. The crew leader must have at least 100 hours of electrofishing experience in the field using similar equipment.

    iii. The crew leader will provide basic training in electrofishing for the crew consisting of:

        1. Definitions of basic terminology (e.g., galvonotaxis, narcosis, and tetany).

        2. An explanation of how electrofishing attracts fish.

        3. An explanation of how gear can injure fish and how to recognize signs of injury.

        4. A review of these terms and conditions as well as the manufacturer’s recommendations.

        5. A demonstration of the proper use of electrofishing equipment, the role each crew member performs, and basic gear maintenance.

        6. A review of safety considerations.

iv. Prior to conducting electrofishing activities, visual surveys will be conducted to search for small, young SAS. If more than 100 small SAS (less than 30 millimeters in total length) occur within the sampling site, electrofishing activities will not be conducted.

v. To avoid potential suffocation of SAS, electrofishing will not occur in areas where algal mats are located.

vi. All captured suckers collected and retained will be placed in river water in insulated, aerated, and covered containers. Temperature, dissolved oxygen levels, and fish behavior (e.g., fish gulping at the surface indicating low dissolved oxygen levels) should be recorded to ensure that ambient river water quality levels are maintained.

vii. Valley District or the Qualified Biologist will coordinate research or long-term monitoring activities with fisheries personnel from other agencies to avoid duplication of effort and unnecessary stress to SAS. Specific stream reaches will be electrofished no more than once every 3 months.

viii. Only direct current or pulsed direct current will be used.

ix. Each session will begin with pulse width and rate set to the minimum needed to capture SAS. These settings will be gradually increased, if necessary, only to the point where SAS are immobilized and captured. Initial pulse width will be no more than 500 microseconds and is not to exceed 5 milliseconds. Care will be taken when exceeding a pulse rate of 30 Hertz. In general, exceeding 30 Hertz will injure more fish.

x. Fish will be netted and removed from the electric fields as quickly as possible.

xi. Sampling will be terminated if injuries or abnormally long recovery times are observed.

xii. Prior to activities that may involve handling SAS, all biologists will ensure that hands are free of sunscreen, lotion, or insect repellent.

xiii. Handling may involve taking length and weight measurements to assess size and age classes of individuals and fish health, and will require minimal exposure out of water. Bagged portions of seines and nets will remain in that water until all SAS are removed, or SAS will be transferred to shallow containers of clean water, aerated if

necessary, and placed in a location that will not result in exposure to extreme temperatures.

xiv. Any SAS exhibiting signs of physiological stress will be immediately released at the point of capture or as close to that location as possible. All fish will be returned in good condition to the point of capture unless an adverse disturbance is occurring, in which case they may be relocated away from disturbance areas and moved to the nearest part of the stream with appropriate habitat. Nets may be used to temporarily preclude individuals from returning to the immediate capture site.

xv. In the event that the number of individuals allowed to be incidentally injured or killed is exceeded during the performance of permitted activities, the Qualified Biologist must immediately cease the activity until reauthorized by the Carlsbad Fish and Wildlife Office (CFWO) or PSFWO.

SAS-1-2 In addition to the CMs outlined in this biological opinion, when capturing SAS for captive rearing and translocation purposes, the Qualified Biologist will implement the measures discussed in the Draft Captive Breeding and Translocation Plan for Santa Ana Sucker (Dudek 2016a) and in the programmatic consultation for SAS recovery permits (USFWS 2015a) including but not limited to:

a. A survey will be conducted to determine the general health of the donor SAS population prior to attempting collection for translocation purposes;

b. To maximize genetic diversity within a collected population, SAS will be taken from multiple locations (e.g., pools/sampling areas) within a stream, as feasible;

c. SAS will be visually examined for disease and signs of spawning (e.g., tubercles and lateral stripes). SAS with signs of disease, spawning, or behavior issues such as flashing or lethargy will not be used for translocation. In addition, fish with physical abnormalities, such as fungal lesions, white spot, skin hemorrhage or lesions, darkened skin, eroded fins, or excessive mucus production will also not be used in translocation.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act 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, help

implement recovery plans, or to develop information. We recommend the USEPA implement the following actions:

1. Shot Hole Borer Monitoring and Research

   Objective: Increase the amount of monitoring and support ongoing research for the long-term management of this invasive non-native insect (Polyphagous and Kuroshio shot hole borer) in order to minimize the long-term effects of this insect-fungal pathogen on the riparian plant community. Vireo, flycatcher, SAS and other riparian-associated species would benefit from these actions.

   Funding or the contribution of other resources would supplement the current volunteer monitoring program started in 2016. Long-term monitoring of shot hole borer along the Santa Ana River and its upper tributaries, including the establishment, maintenance, and monitoring of funnel or other type of insect traps at 1-mile intervals along stream corridors, is needed in order to follow the invasion of this insect across the Santa Ana River watershed.

   Fund research focused on control of the shot hole borer insect, its symbiotic fungi, and/or biocontrol agents as part of a long-term management strategy for the species.

2. Invasive Red Alga Management in the Santa Ana River

   Objective: Develop and implement a strategy to manage (reduce) the non-native invasive red algae in the Santa Ana River. This action would increase the amount of SAS habitat available for use in the mainstem of the river.

   Supplying the stream with relatively cold water (less than 55 degrees Fahrenheit) for extended periods of time has been observed to decrease the amount of algal cover and cause filament bleaching and death (Russell *et al*. 2016). Extirpation of the species from the river may be possible with cold-water treatments but field testing is needed. High pulse flow events would contribute to managing red alga abundance in the occupied river by fracturing algal filaments with high velocity flow and/or by rolling the cobble and gravel. Funding or contributing resources to test these, or other control methods, would benefit SAS if an effective strategy for managing red alga can be found.

3. Rialto Wastewater –Reduce Water Temperature

   Objective: Further reduce the water temperature in Rialto Channel. The current effluent flows down a flat and shallow concrete channel prior to entering the plunge pool downstream of Agua Mansa Road. During warm days this water may warm substantially reducing habitat suitability downstream for SAS.

Moving the discharge location to the plunge pool downstream of Agua Mansa Road will have the effect of minimizing effluent warming that currently occurs in the concrete-lined portion of Rialto Channel. Water temperature may increase by more than 5 degrees Fahrenheit during hot periods in this concrete-lined channel (USGS 2015). An alternative or additional action would be to shade (shade cloth or shade balls) the serpentine holding tank at the Rialto Wastewater Treatment Plant, or other exposed effluent pools in the treatment stream in order to minimize warming. Evaporative cooling and/or solar powered water chilling are other possibilities.

4. Regional Recycled Purple Pipe Project

Objective: Addition of a perennial supply of water to the mainstem of the Santa Ana River to contribute to the low-flow stream. Project impacts include the permanent reduction of available habitat for SAS downstream of RIX in the Santa Ana River.

This recommendation would reduce the impact of the Project on downstream resources, including SAS, by offsetting discharge reduction in the river with an alternative source of effluent discharge (Riverside effluent). The HCP is proposing to move the discharge location of the City of Riverside's effluent further upstream, near Riverside Avenue. In addition to increasing the low-flow volume, depth, and flow velocity of the river, it would also create a new mainstem tributary and new SAS habitat.

5. Rialto Tank – High Flow Pulse Events

Objective: Capture and store water that can be used to serve multiple conservation purposes. Project reduced discharge will degrade SAS habitat by accumulating and transporting fine sediment (sand) at a slower rate than the current condition. In order to maximize the flexibility of the tank there should be two inlets for receiving water and a variable control outlet valve. The two water sources may include, but should not be limited to, groundwater (CM 17b.iv) and Rialto wastewater. The tank and valves should be sized to achieve a maximum discharge and/or duration of sustained discharge, based upon specific conservation objectives.

The Rialto tank is being considered as part of the HCP to benefit SAS. The maximum discharge of a high pulse flow event would likely be equivalent to bank full flow. Flow velocity is directly correlated with the rate of sediment transport. In additional to transporting sand downstream more rapidly and exposing existing gravel beds, high flow pulsed water will turn a portion of the gravels and cobbles, reducing the abundance of the invasive red alga. If used in combination with water temperature reduction, an effective management strategy of the red alga may be possible. In addition, the Rialto tank would serve to further reduce the effect of RIX shutdowns on SAS if it was automatically synchronized to discharge during shutdown events. The duration of sustained discharge should be tied to a potential maximum duration of a

RIX shutdown as well as modeled to achieve an amount of sediment transported over an identified distance.

6. RIX Facility – High Flow Pulse Events

Objective: Create an agreement with the City of San Bernardino to enable artificial flushing flows using RIX effluent. This could be used in combination with or an alternative to the Rialto tank to create high pulse flow events in the river to benefit SAS.

7. Recovery Research

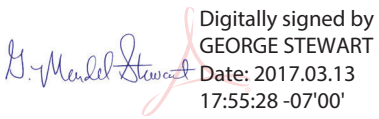
Objective: Participate in research projects that further species' recovery. Research is needed that identifies currently unrealized threats to SAS (e.g., effects of unregulated chemicals commonly found in effluent wastewater and/or elevated water temperature on SAS development, health, and longevity). Research designed to aid in SAS recovery supports SAS recovery objective 2.

REINITIATION NOTICE

This concludes formal consultation regarding the Project as described in materials submitted to us. As provided in 50 CFR §402.16, reinitiation 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 opinion; (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 opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In all instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions about this biological opinion, or the consultation process, please contact Kai Palenscar of the PSFWO, 777 E. Tahquitz Canyon Way, Suite 208, Palm Springs, California 92262 at 760-322-2070, extension 408.

Sincerely,



G. Mendel Stewart
Field Supervisor

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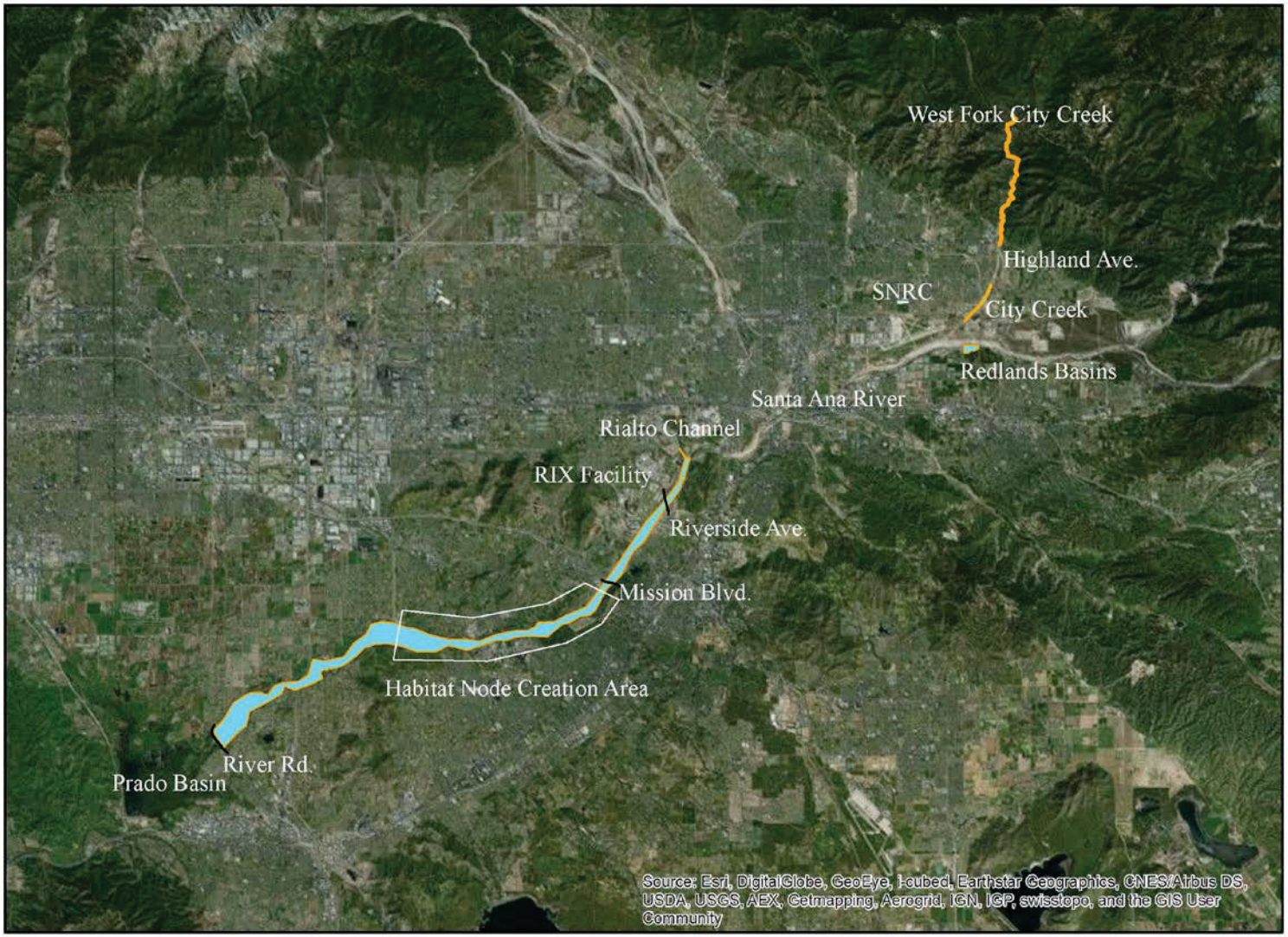

Figure 1. Sterling Natural Resources Center – Action Area

Appendix A

Exclusionary Fence Design and Materials

Fencing Options:

1. Hardware Cloth Fence

   The fence will consist of the following:

   a. Material will be ¼-in mesh, 23-gauge galvanized hardware cloth;

   b. Height will be a minimum of 3 feet above grade and 2 feet below grade; and

   c. Support will be with standard wire fence "T-posts."

   Hardware cloth is normally buried 2 feet below grade; however, if it's not possible to bury the fence because of the substrate (e.g., a high percentage of rocks) or not appropriate for the project (i.e., the disturbance will be only be for a short term), upon approval of the PSFWO, it can be placed at grade as follows:

   d. Bend the 2 feet of fence that would be below grade so that it is at grade and facing out away from the work area and then cover it with sandbags

   e. If "T-posts" cannot be driven in the ground, uprights can be fabricated with rebar which have three legs welded at their base so they are free standing.

2. Chain Link Fence Backed by Shade Cloth

   A possible fencing alternative when the fence will not extend below grade (see criteria above), is chain link fence backed by shade cloth with shade cloth extending out from the fence a minimum of 2 feet at grade, and weighted down by sand bags or suitable alternative, e.g., boulders (Figure 1).

Hand methods will be used to prepare the site for installation of the fence, e.g., the removal of vegetation in the path of the fence; unless an alternative method is approved by the PSFWO.

Mr. Douglas E. Eberhardt (FWS-SB-16B0182-17F0387)

Figure 1. Photograph of Chain Link and Shade Cloth Fence Configuration