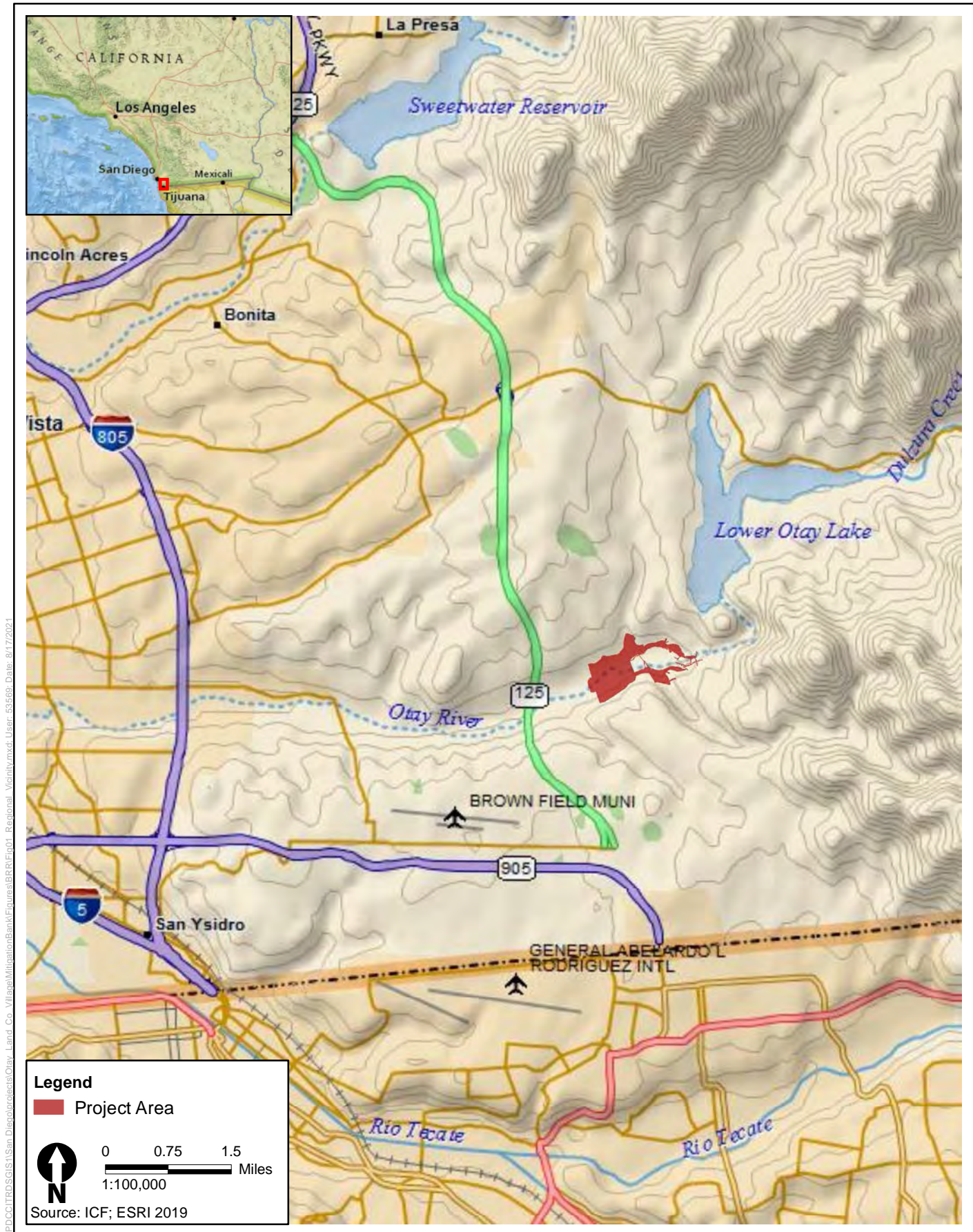


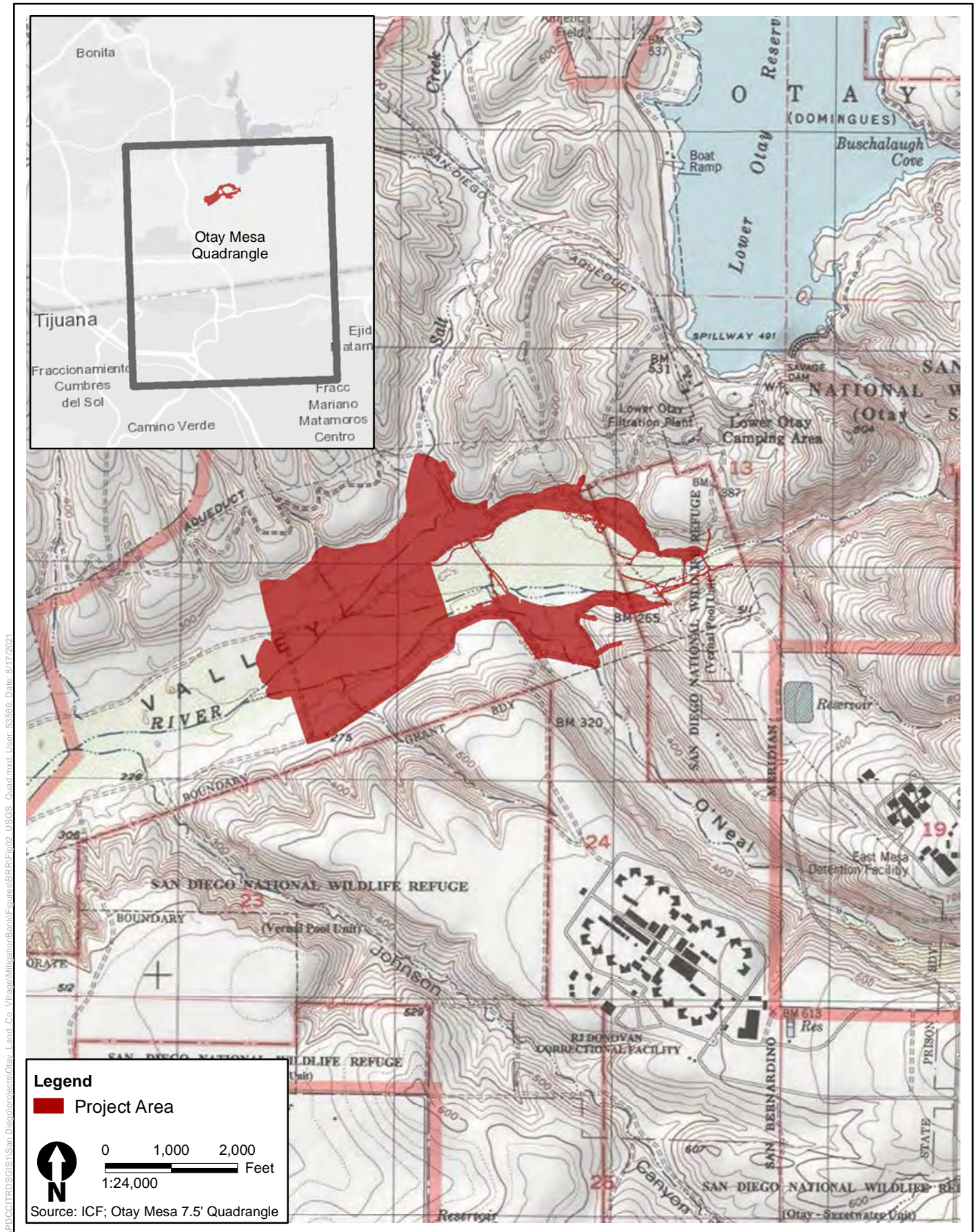
Appendix A
Figures



V:\PROJECTS\GIS\San_Diego\Info\Bart\Bart\Bart\Regional_Vicinity.mxd User: 63669 Date: 8/17/2021

Figure 1
Regional Vicinity





\\PDC01TRD\SIGIS\San_Diego\otay\otay\Land_Co_Village\Multi\otay\Banks\BRR\Fig02_USGS_Quad.mxd; User: 53569; Date: 8/17/2021



Figure 2
USGS Topographic Map within the Otay Mesa Quadrangle

V:\PROJECTS\GIS\San_Diego\Projects\Otay_Land_Co_Village\MitigationBank\Fig03a_StudyArea_Details.mxd User: J6528 Date: 9/21/2021

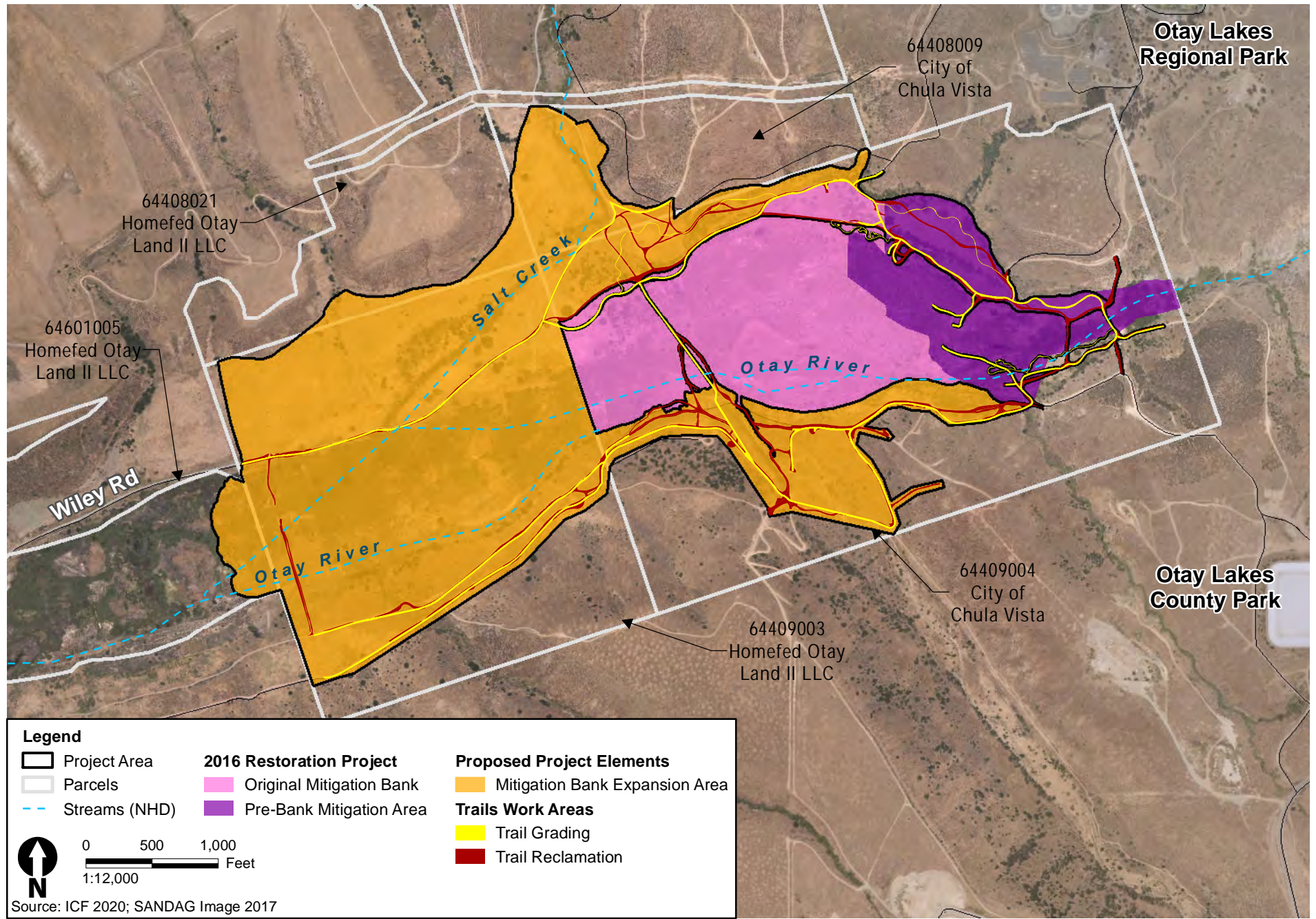
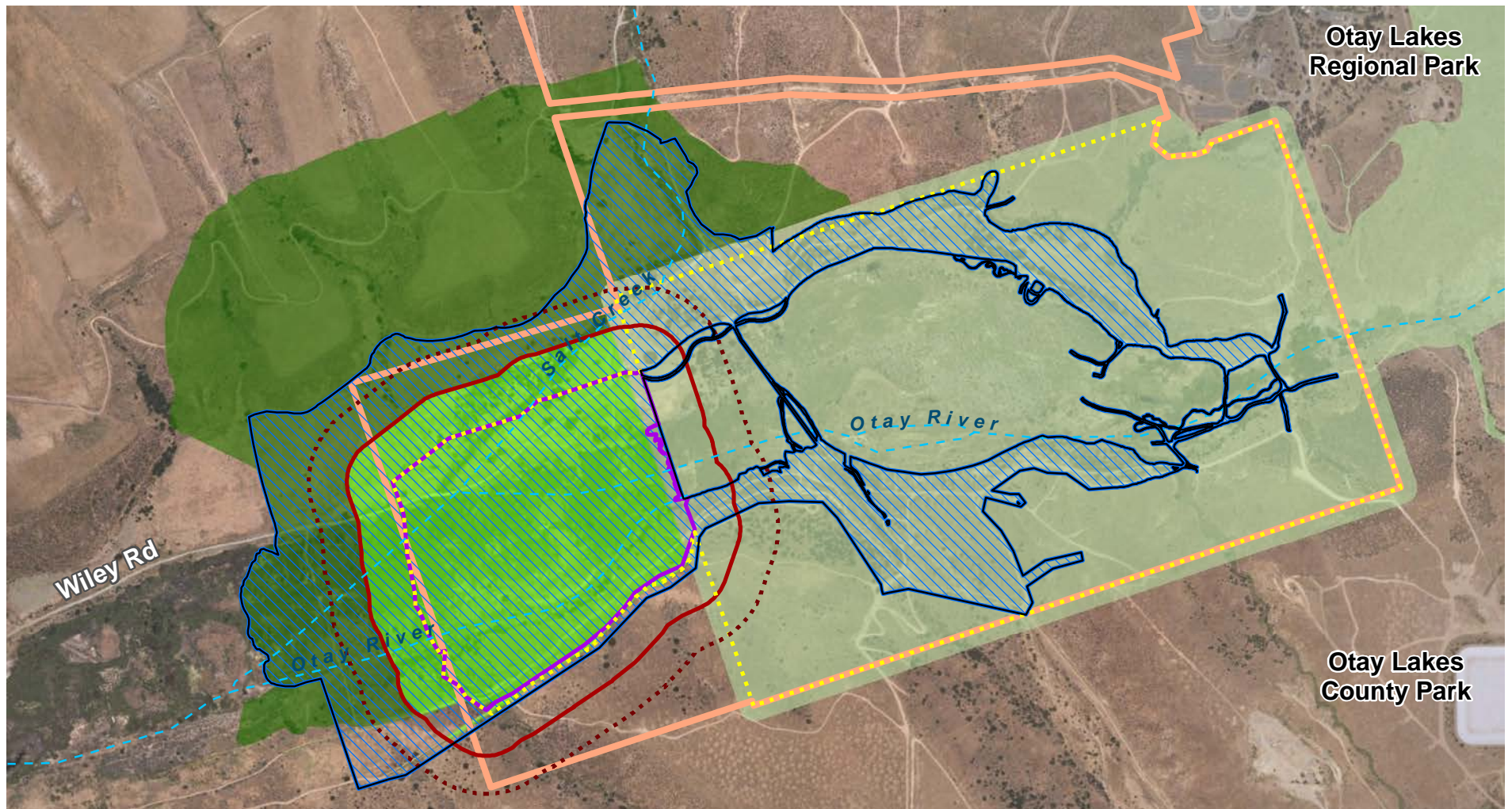


Figure 3a
Project Area Overview



\\PDC\OTROS\GIS\San_Diego\projects\Clay_Land_Co_Village\Map\clay\Barr\Figures\BRR\Fig03b_SurveyArea_Details.mxd User: 53569 Date: 8/17/2021



Legend

Project Site	Vegetation Mapping	Quino Checkerspot Butterfly Assessment Area
Streams (NHD)	2015 Surveys	Gnatcatcher Survey Area
	2018 Surveys	Burrowing Owl Survey Area
	2019 Surveys	Least Bell's Vireo and Yellow Breasted Chat Survey Areas
	Rare Plant Focused Survey Area	Ephemeral Basins and Federally-listed Fairy Shrimp Surveys Areas

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1:12,000

Source: ICF 2020; SANDAG Image 2017



Figure 3b
Study Area and Survey Coverages

\\PDC\CTRD\SGIS\1\San Diego\projects\Otay_Land_Co_Village\Mitigation\Bank\Figures\BRR\Fig04_MSHCP.mxd User: 35528 Date: 9/21/2021

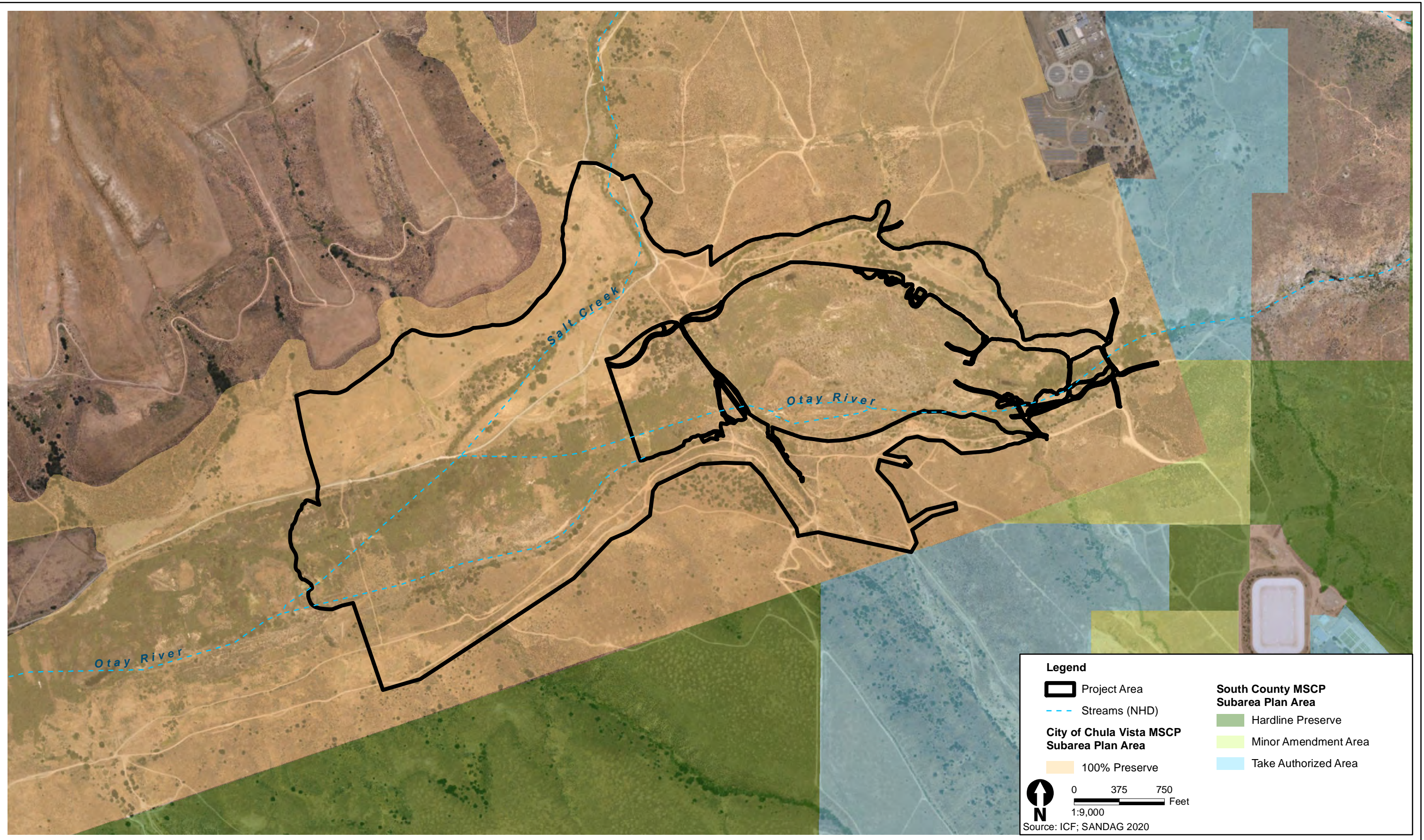
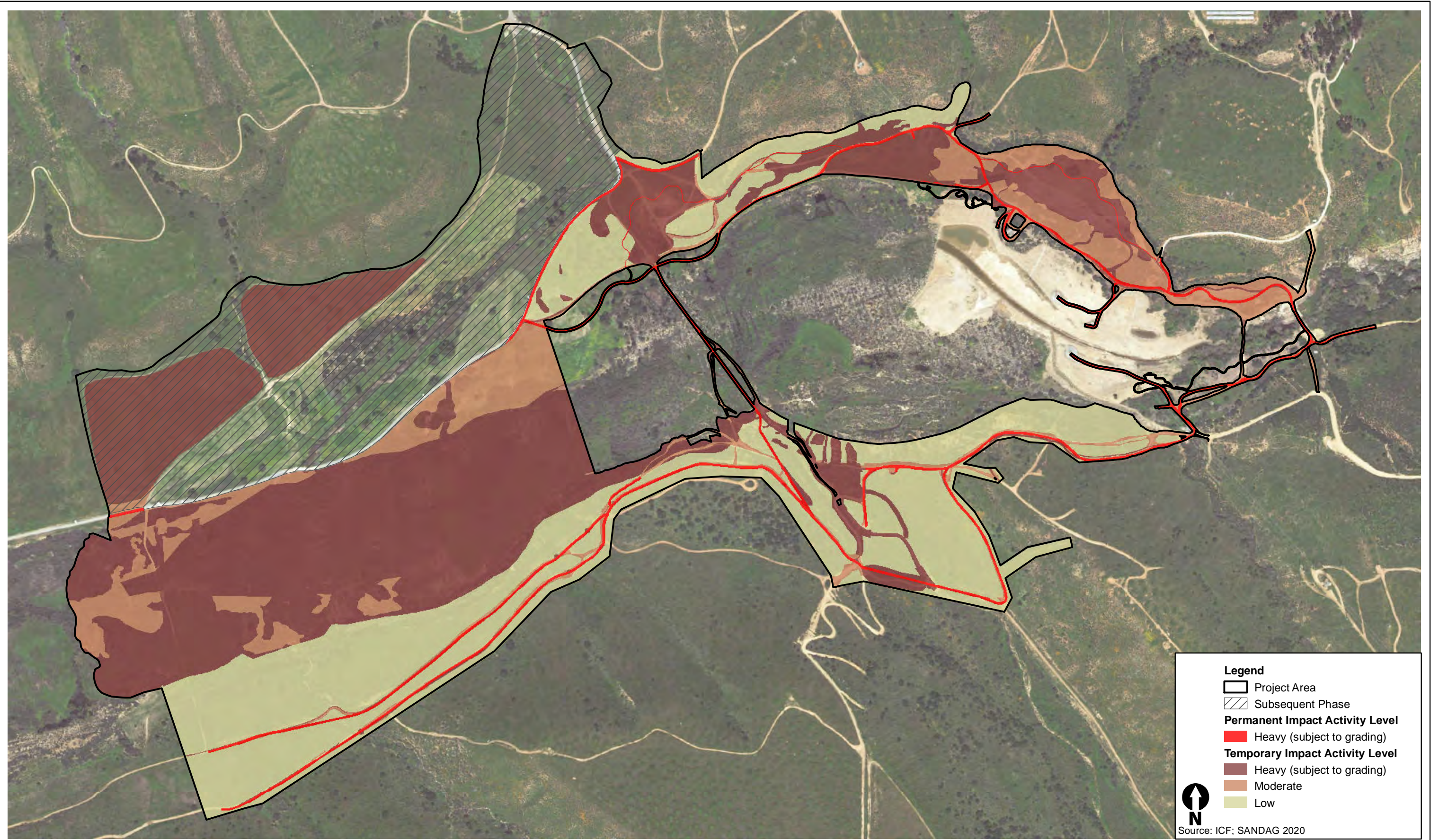


Figure 4
Multiple Species Conservation Program Subarea Plans' Areas

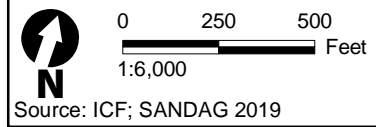
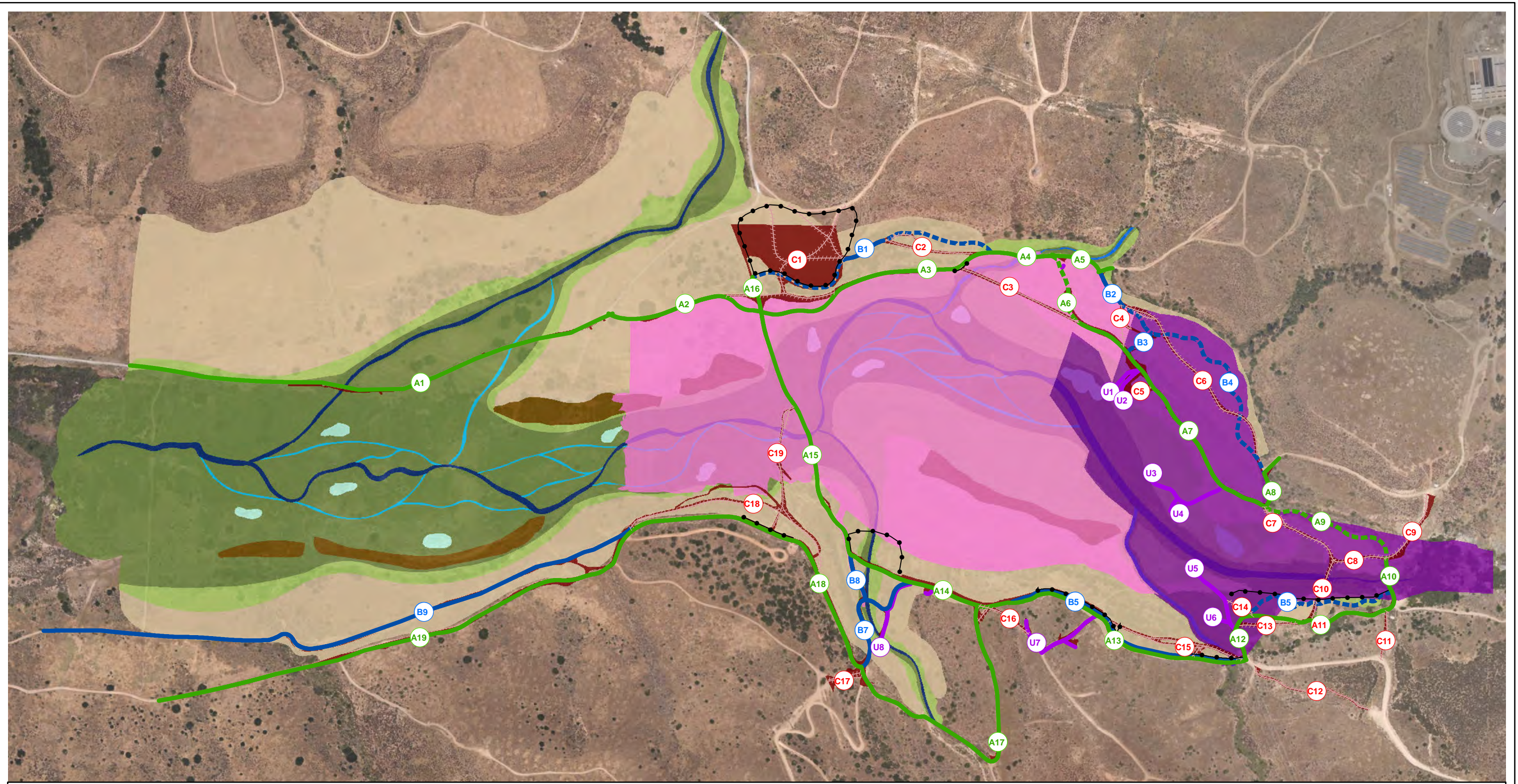
\\PDC\CTRD\GIS\1\San Diego\projects\Orav_Land_Co_Village\MitigationBank\Figures\BRR\Fig05_Resto_Activities.mxd; User: 19542; Date: 8/19/2021



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Figure 5
Restoration Activity Impact Levels

\\PDC\ITRDS\GIS\1\San_Diego\projects\Orav_Land_Co_Village\Mitigation\Bank\Figures\BRR\Fig06_ConceptPlan.mxd User: 35528 Date: 9/16/2019



Source: ICF; SANDAG 2019

Legend

○ Trail ID Marker

Restoration Concept Plan

- Active Floodplain (10 year)
- Channel
- Floodplain Upland Transition
- Pond

River Valley Terrace

- Side Channels
- Tributaries
- Uplands

Trails Concept Plan

- Multi-Use Trail (Improve Existing to 8'-10' wide)
- New Multi-Use Trail (8'-10' wide)
- Secondary (Improve Ex. to 3'-5' wide)

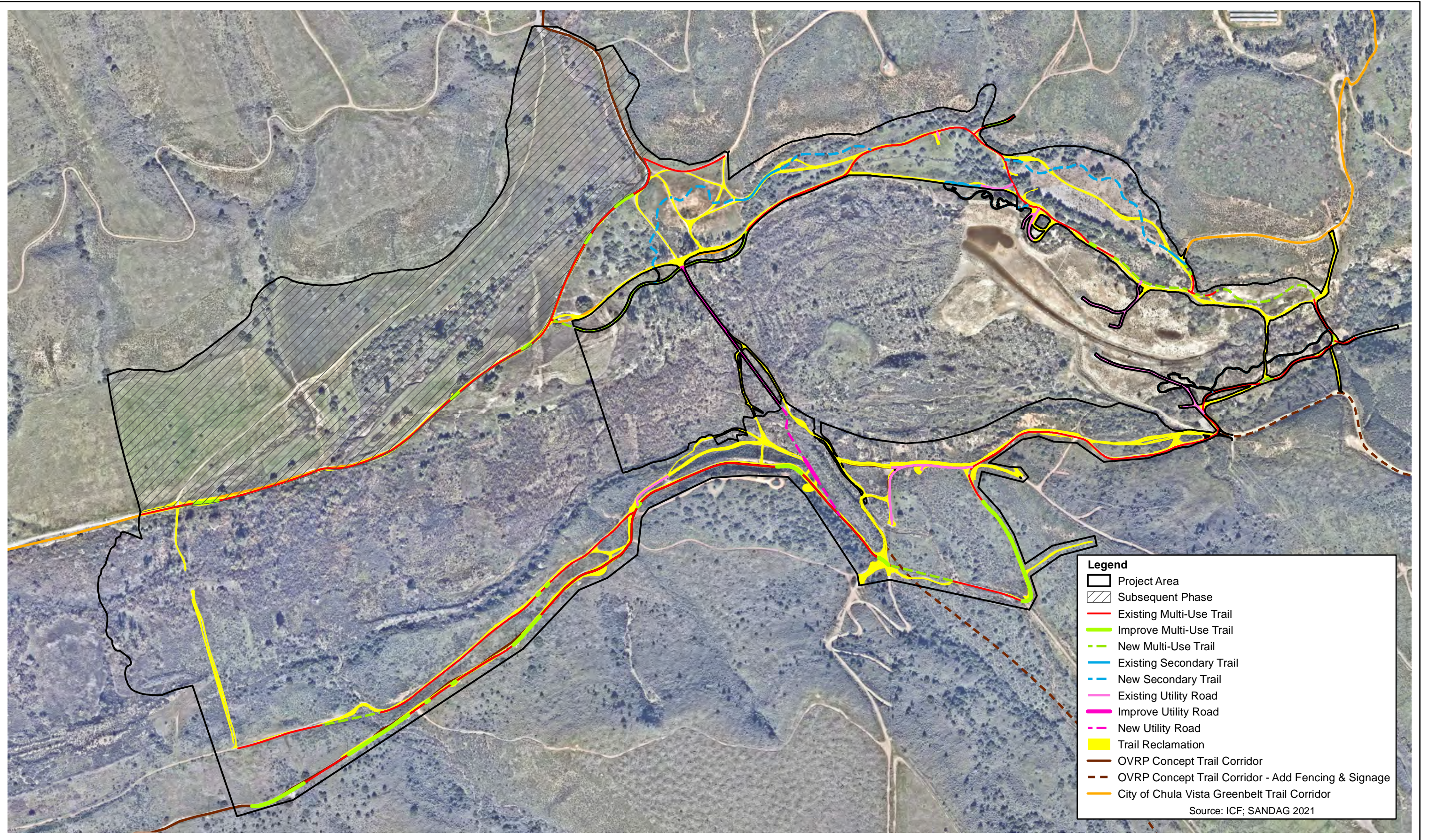
2016 Restoration Project

- New Secondary (3'-5' wide)
- Utility Access Only (8'-10' wide)
- Reclaimed Trails
- Fence
- Trails Reclamation Areas
- Original Mitigation Bank
- Pre-Bank Mitigation Area



Figure 6
Concept Plan Overview

\\PDC\ITRDSGIS\1\San Diego\projects\Orav_Land_Co_Village\Mitigation\Bank\Figures\BRR\Fig07_TrailsOverview.mxd User: 35528 Date: 8/20/2021



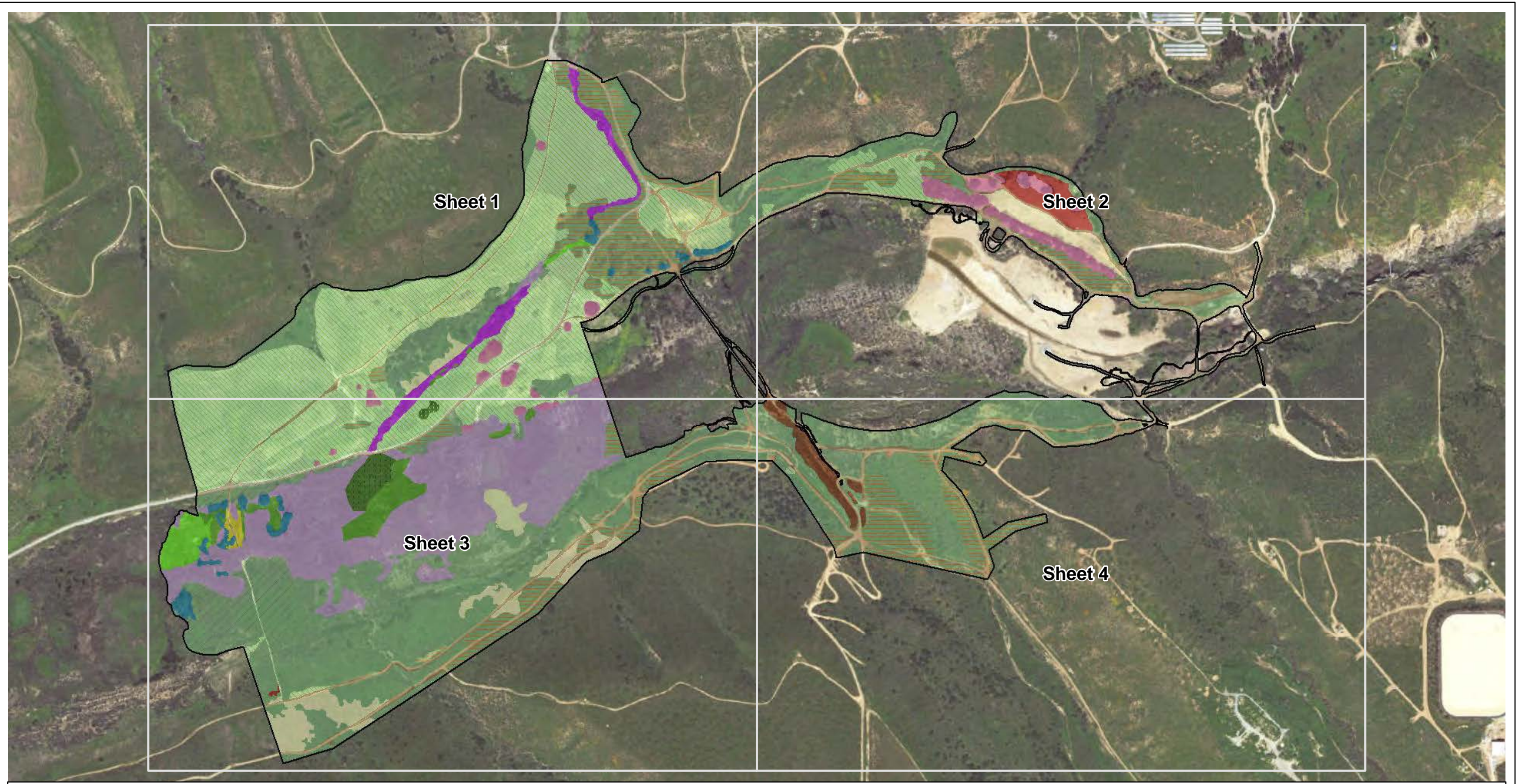
Legend

- Project Area
- Subsequent Phase
- Existing Multi-Use Trail
- Improve Multi-Use Trail
- New Multi-Use Trail
- Existing Secondary Trail
- New Secondary Trail
- Existing Utility Road
- Improve Utility Road
- New Utility Road
- Trail Reclamation
- OVRP Concept Trail Corridor
- OVRP Concept Trail Corridor - Add Fencing & Signage
- City of Chula Vista Greenbelt Trail Corridor

Source: ICF; SANDAG 2021

Figure 7
Trails Overview

\\PDC\CTRD\GIS\1\San_Diego\projects\Orav_Land_Co_Village\Mitigation\Bank\Figures\BRR\Fig08_VegSeries.mxd; User: 19542; Date: 8/19/2021



- | | | | |
|---|---------------------------------------|--|----------------------------------|
| Project Area | Diegan Coastal Sage Scrub (Disturbed) | Non-Native Grassland (Broadleaf dominated) | Southern Interior Cypress Forest |
| Detail Sheet | Diegan Coastal Sage Scrub | Non-Native Riparian (Tamarisk Scrub) | Southern Mixed Chaparral |
| Vegetation and Land Cover Types | | | |
| Prebank (Active restoration site) | Disturbed Habitat (Bare Ground) | Non-Native Woodland | Southern Willow Scrub |
| Coastal and Valley Freshwater Marsh | Eucalyptus Woodland | Saltgrass Grassland | Valley Needlegrass Grassland |
| Diegan Coastal Sage Scrub (Baccharis dominated) | Mulefat Scrub | Southern Cottonwood-Willow Riparian Forest | |
| | Non-Native Grassland | Southern Cottonwood-Willow Riparian Forest (Disturbed) | |



Source: ICF; SANDAG 2020



Figure 8 Overview
Vegetation and Land Cover Types

\\PDC\CTRD\GIS\1\San_Diego\projects\Orav_Land_Co_Village\Mitigation\Bank\Figures\BRR\Fig08_VegSeries.mxd; User: 19542; Date: 8/19/2021



- | | | |
|---|--|--|
| Project Area | Disturbed Habitat (Bare Ground) | Non-Native Woodland |
| Vegetation and Land Cover Types | Eucalyptus Woodland | Southern Cottonwood-Willow Riparian Forest (Disturbed) |
| Coastal and Valley Freshwater Marsh | Mulefat Scrub | Southern Interior Cypress Forest |
| Diegan Coastal Sage Scrub (Baccharis dominated) | Non-Native Grassland | Southern Mixed Chaparral |
| Diegan Coastal Sage Scrub (Disturbed) | Non-Native Grassland (Broadleaf dominated) | Southern Willow Scrub |
| Diegan Coastal Sage Scrub | Non-Native Riparian (Tamarisk Scrub) | |



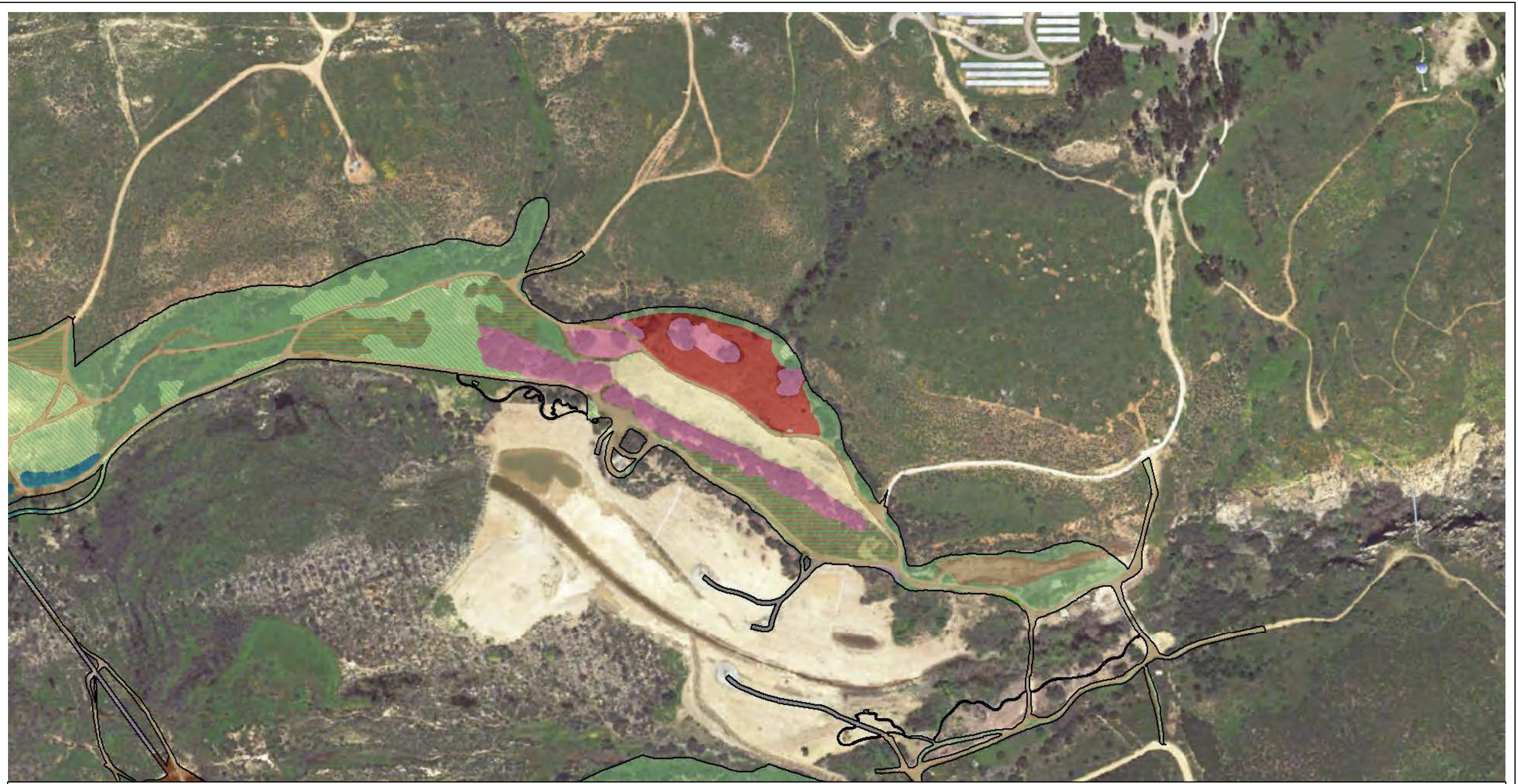
Source: ICF; SANDAG 2020



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Figure 8 Sheet 1
Vegetation and Land Cover Types

\\PDC\ITRDSGIS1\San_Diego\projects\Orav_Land_Co_Village\Mitigation\Bank\Figures\BRR\Fig08_VegSeries.mxd; User: 19542; Date: 8/19/2021



- | | | |
|--|--|--|
| Project Area | Eucalyptus Woodland | Southern Cottonwood-Willow Riparian Forest |
| Vegetation and Land Cover Types | Mulefat Scrub | Southern Cottonwood-Willow Riparian Forest (Disturbed) |
| Prebank (Active restoration site) | Non-Native Grassland | Southern Interior Cypress Forest |
| Diegan Coastal Sage Scrub (Disturbed) | Non-Native Grassland (Broadleaf dominated) | Southern Mixed Chaparral |
| Diegan Coastal Sage Scrub | Non-Native Riparian (Tamarisk Scrub) | Southern Willow Scrub |
| Disturbed Habitat (Bare Ground) | Non-Native Woodland | Valley Needlegrass Grassland |

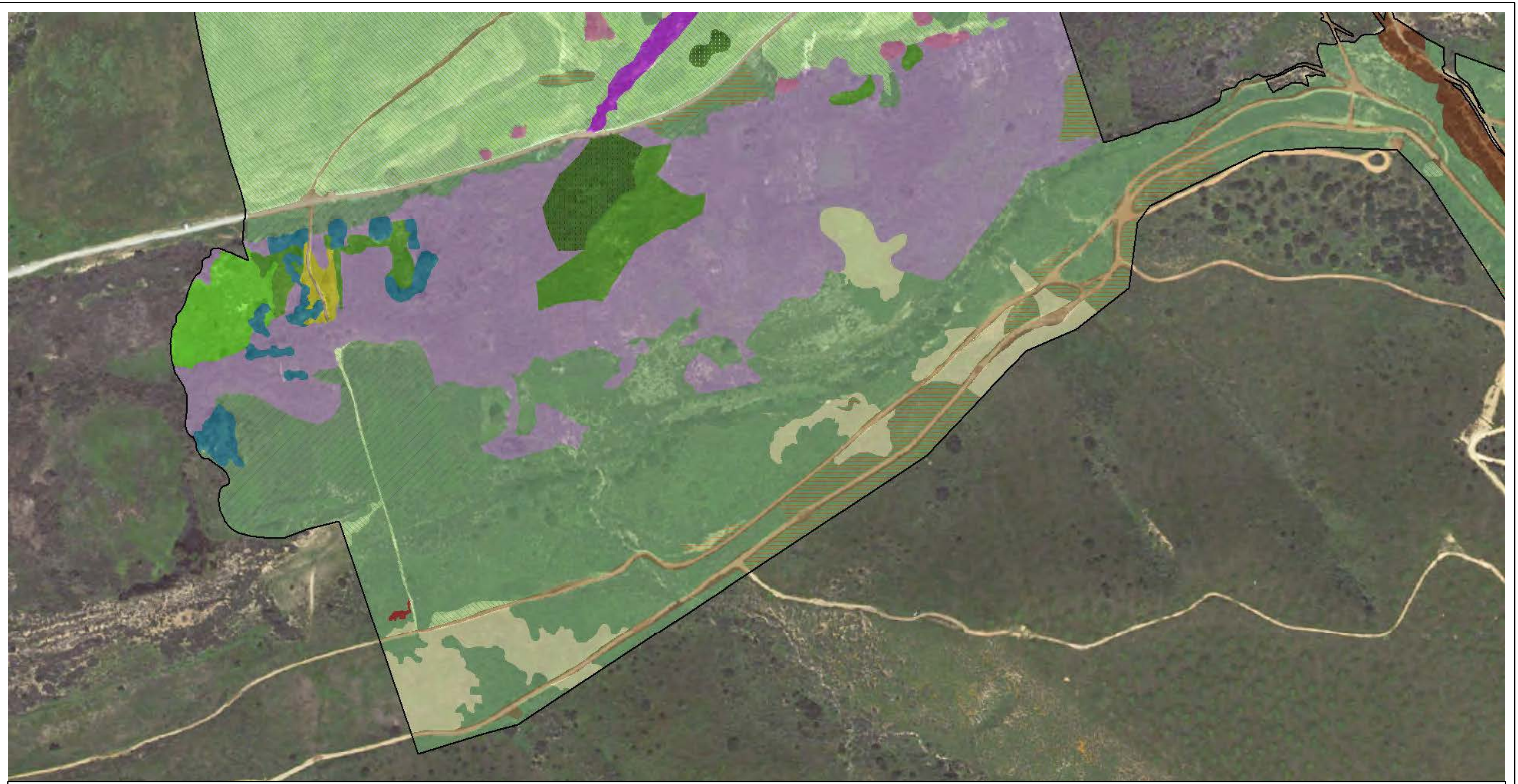


Source: ICF; SANDAG 2020



Figure 8 Sheet 2
Vegetation and Land Cover Types

\\PDC\ITRDSGIS1\San Diego\projects\Orav_Land_Co_Village\Mitigation\Bank\Figures\BRR\Fig08_VegSeries.mxd; User: 19542; Date: 8/19/2021



- | | | | |
|---|--|--|------------------------------|
| Project Area | Disturbed Habitat (Bare Ground) | Non-Native Woodland | Valley Needlegrass Grassland |
| Vegetation and Land Cover Types | Eucalyptus Woodland | Saltgrass Grassland | |
| Coastal and Valley Freshwater Marsh | Mulefat Scrub | Southern Cottonwood-Willow Riparian Forest | |
| Diegan Coastal Sage Scrub (Baccharis dominated) | Non-Native Grassland | Southern Cottonwood-Willow Riparian Forest (Disturbed) | |
| Diegan Coastal Sage Scrub (Disturbed) | Non-Native Grassland (Broadleaf dominated) | Southern Interior Cypress Forest | |
| Diegan Coastal Sage Scrub | Non-Native Riparian (Tamarisk Scrub) | Southern Willow Scrub | |



Source: ICF; SANDAG 2020



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Figure 8 Sheet 3
Vegetation and Land Cover Types

\\PDC\ITRDSGIS1\San Diego\projects\Orav_Land_Co_Village\MitigationBank\Figures\BRR\Fig08_VegSeries.mxd; User: 19542; Date: 8/19/2021



- Project Area
- Vegetation and Land Cover Types**
- Diegan Coastal Sage Scrub (Disturbed)
- Diegan Coastal Sage Scrub
- Disturbed Habitat (Bare Ground)
- Non-Native Grassland
- Non-Native Grassland (Broadleaf dominated)
- Southern Interior Cypress Forest
- Southern Willow Scrub

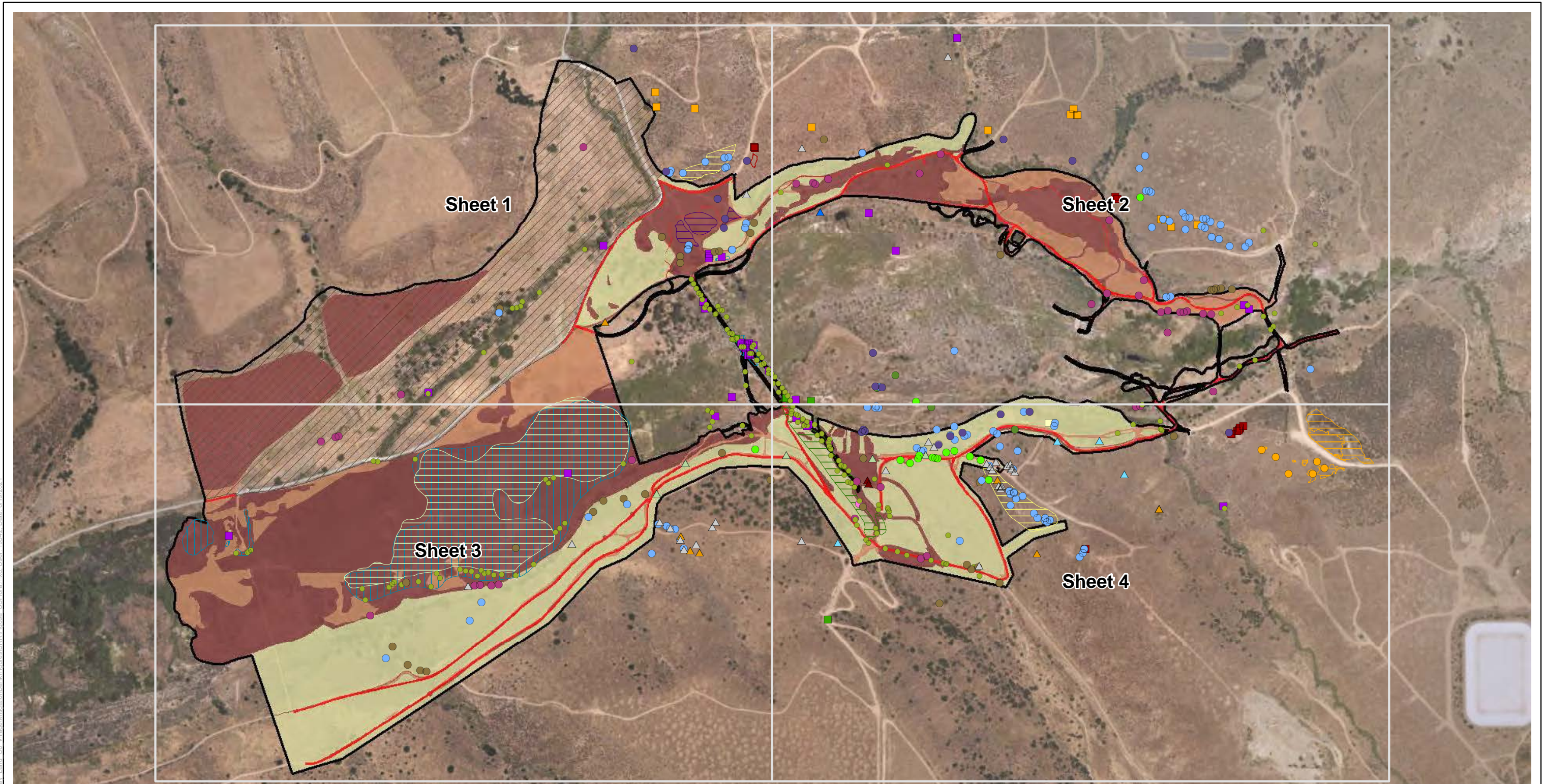


Source: ICF; SANDAG 2020



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Figure 8 Sheet 4
Vegetation and Land Cover Types



<ul style="list-style-type: none"> Project Area Subsequent Phase Detail Sheet 	<p>Permanent Impact Activity Level</p> <ul style="list-style-type: none"> Heavy (subject to grading) <p>Temporary Impact Activity Level</p> <ul style="list-style-type: none"> Heavy (subject to grading) Moderate Low 	<p>Rare Plant Observations (Recon and ICF 2009-2019)</p> <ul style="list-style-type: none"> Palmer's Grapplinghook San Diego Goldenstar San Diego Marsh-elder 	<ul style="list-style-type: none"> San Diego County Viguiera Southwestern Spiny Rush Tecate Cypress Variegated Dudleya 	<p>Special Status Plants (Recon and ICF 2009-2019)</p> <ul style="list-style-type: none"> Ashy Spike-moss Purple stemodia Decumbent Goldenbush 	<ul style="list-style-type: none"> Graceful Tarplant Munz's Sage Otay Mountain Ceanothus Otay Manzanita Palmer's Grapplinghook 	<ul style="list-style-type: none"> San Diego Barrel Cactus San Diego County Viguiera San Diego Goldenstar San Diego Marsh-elder San Diego County Needle Grass 	<ul style="list-style-type: none"> Singlewhorl burrobrush Small-flowered Microseris Snake Cholla South Coast Saltbush Southwestern Spiny Rush 	<ul style="list-style-type: none"> Tecate Cypress Variegated Dudleya
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Source: ICF; SANDAG 2020

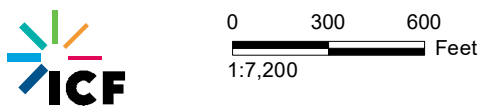
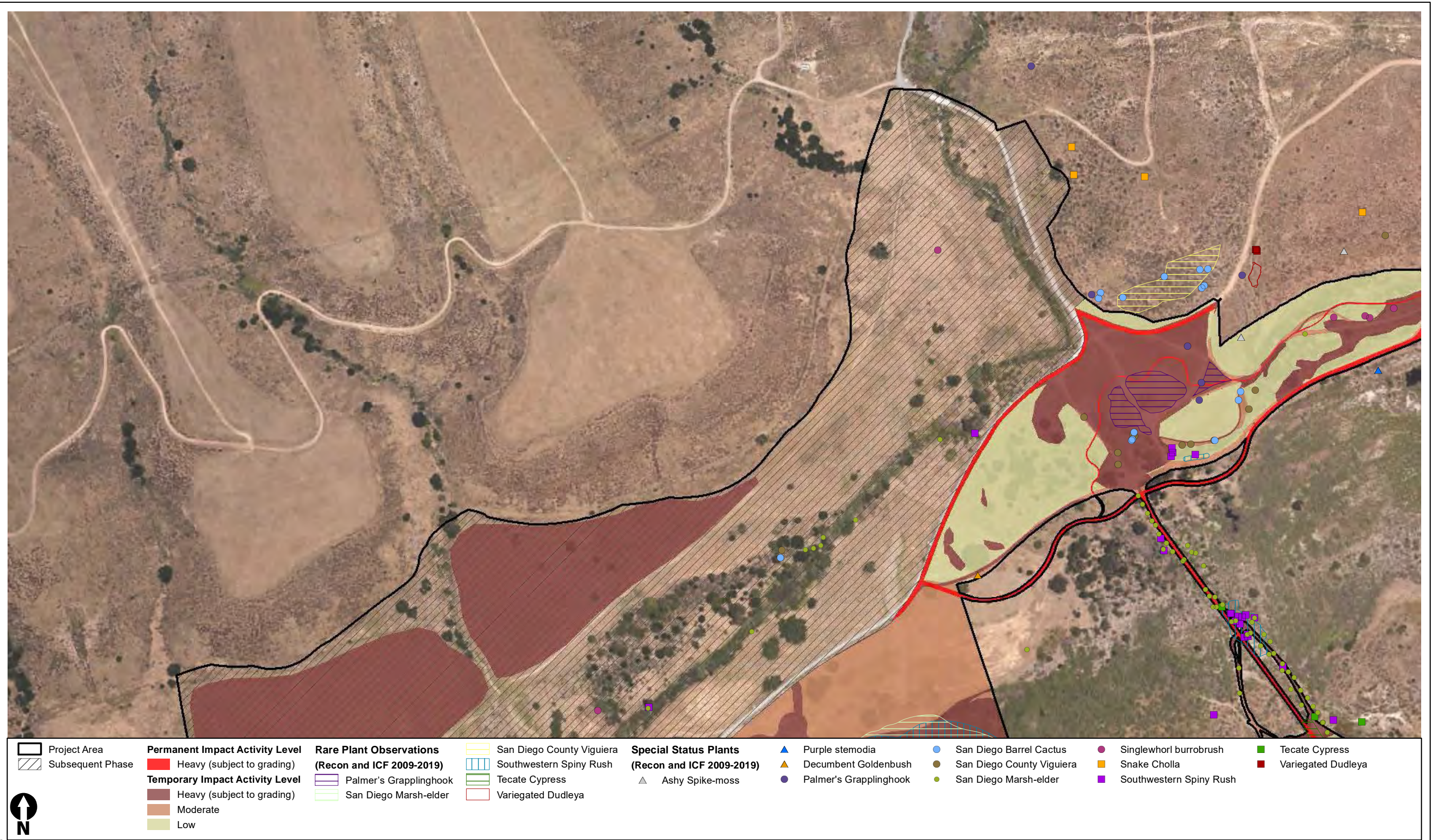


Figure 9a Overview
Special-Status Plant Species Occurring within Project Area

W:\DCC\TRDSGIS\SanDiego\Projects\Olay_Land_Co_Village\MitigationBank\Figures\BRR\Fig09a_SSFlora.mxd User: 19542 Date: 8/19/2021



<ul style="list-style-type: none"> Project Area Subsequent Phase 	<p>Permanent Impact Activity Level</p> <ul style="list-style-type: none"> Heavy (subject to grading) <p>Temporary Impact Activity Level</p> <ul style="list-style-type: none"> Heavy (subject to grading) Moderate Low 	<p>Rare Plant Observations (Recon and ICF 2009-2019)</p> <ul style="list-style-type: none"> Palmer's Grapplinghook San Diego Marsh-elder San Diego County Viguiera Southwestern Spiny Rush Tecate Cypress Variegated Dudleya 	<p>Special Status Plants (Recon and ICF 2009-2019)</p> <ul style="list-style-type: none"> Ashy Spike-moss 	<ul style="list-style-type: none"> Purple stemodia Decumbent Goldenbush Palmer's Grapplinghook San Diego Barrel Cactus San Diego County Viguiera San Diego Marsh-elder Singlewhorl burrobrush Snake Cholla Southwestern Spiny Rush Tecate Cypress Variegated Dudleya
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Source: ICF; SANDAG 2020

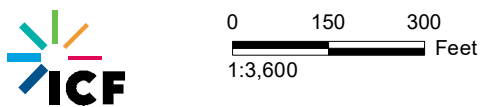


Figure 9a Sheet 1
Special-Status Plant Species Occurring within Project Area

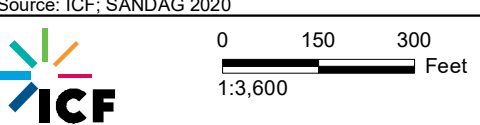
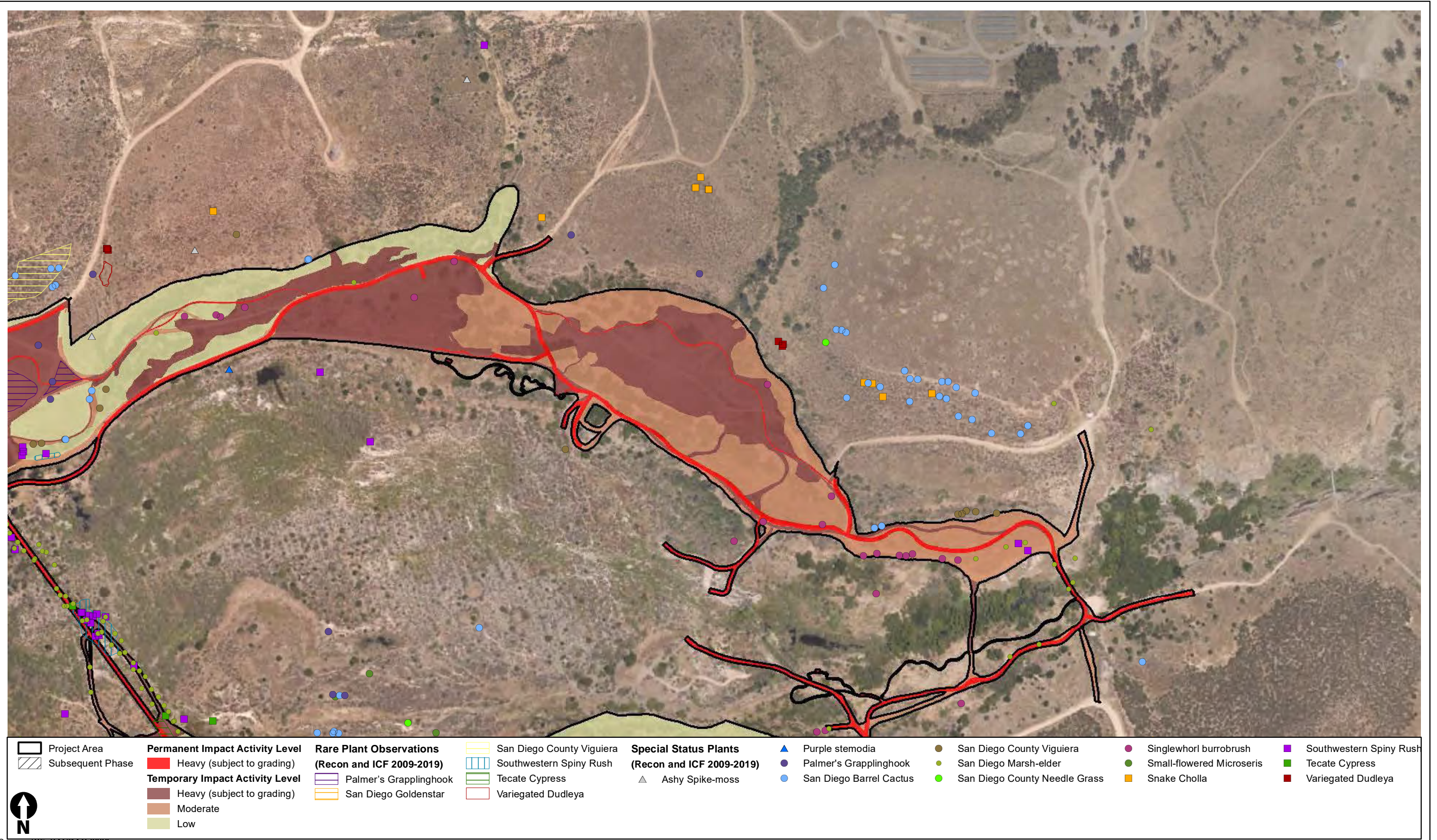
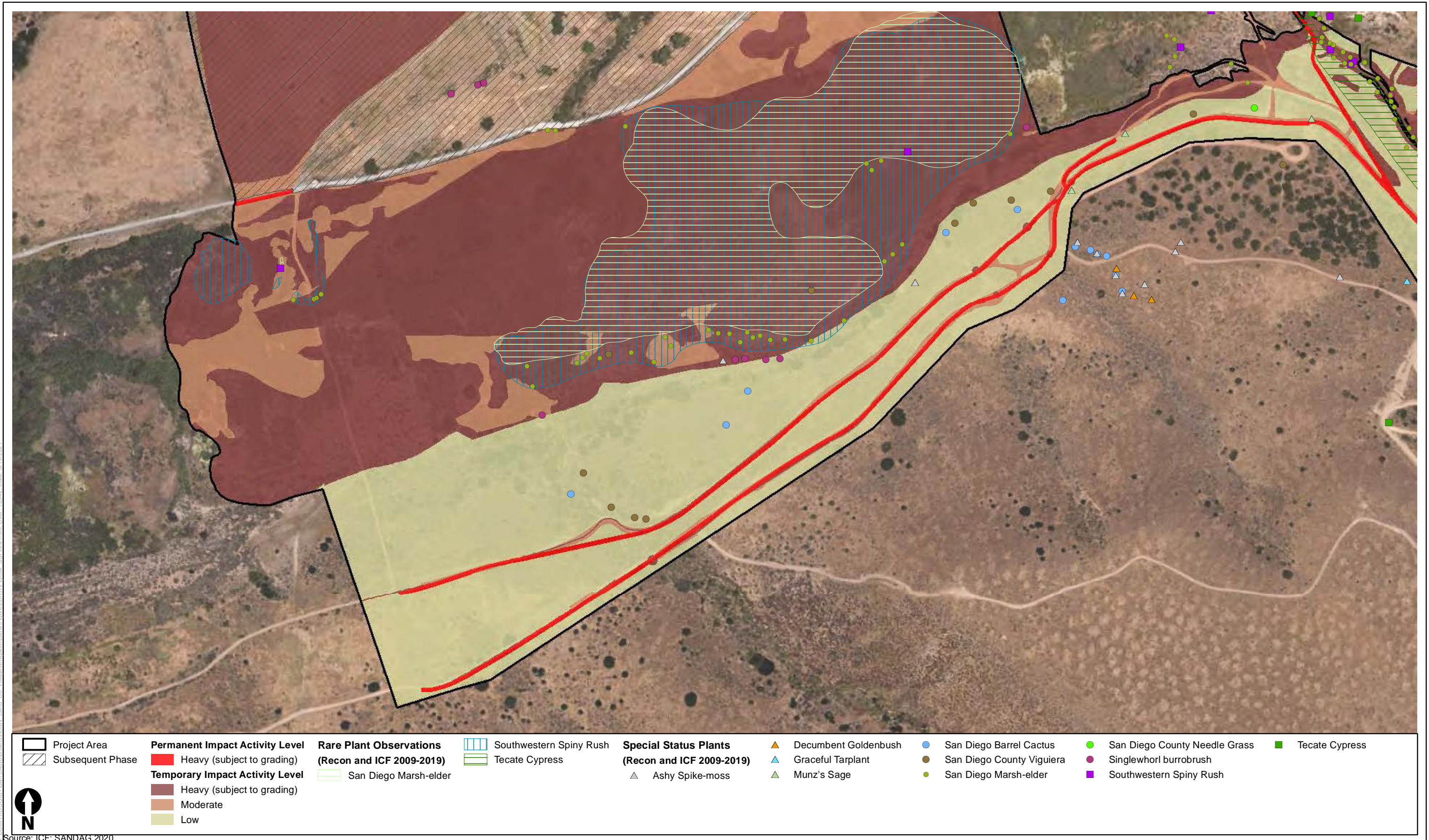


Figure 9a Sheet 2
Special-Status Plant Species Occurring within Project Area



I:\Projects\2020\San Diego\Projects\Orav_Land_Co_Village\MitigationBank\Figures\BRR\Fig09a_SSFlora.mxd User: 19542 Date: 8/19/2021

Source: ICF; SANDAG 2020

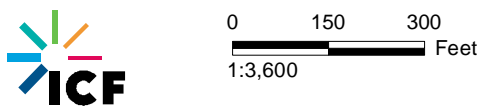
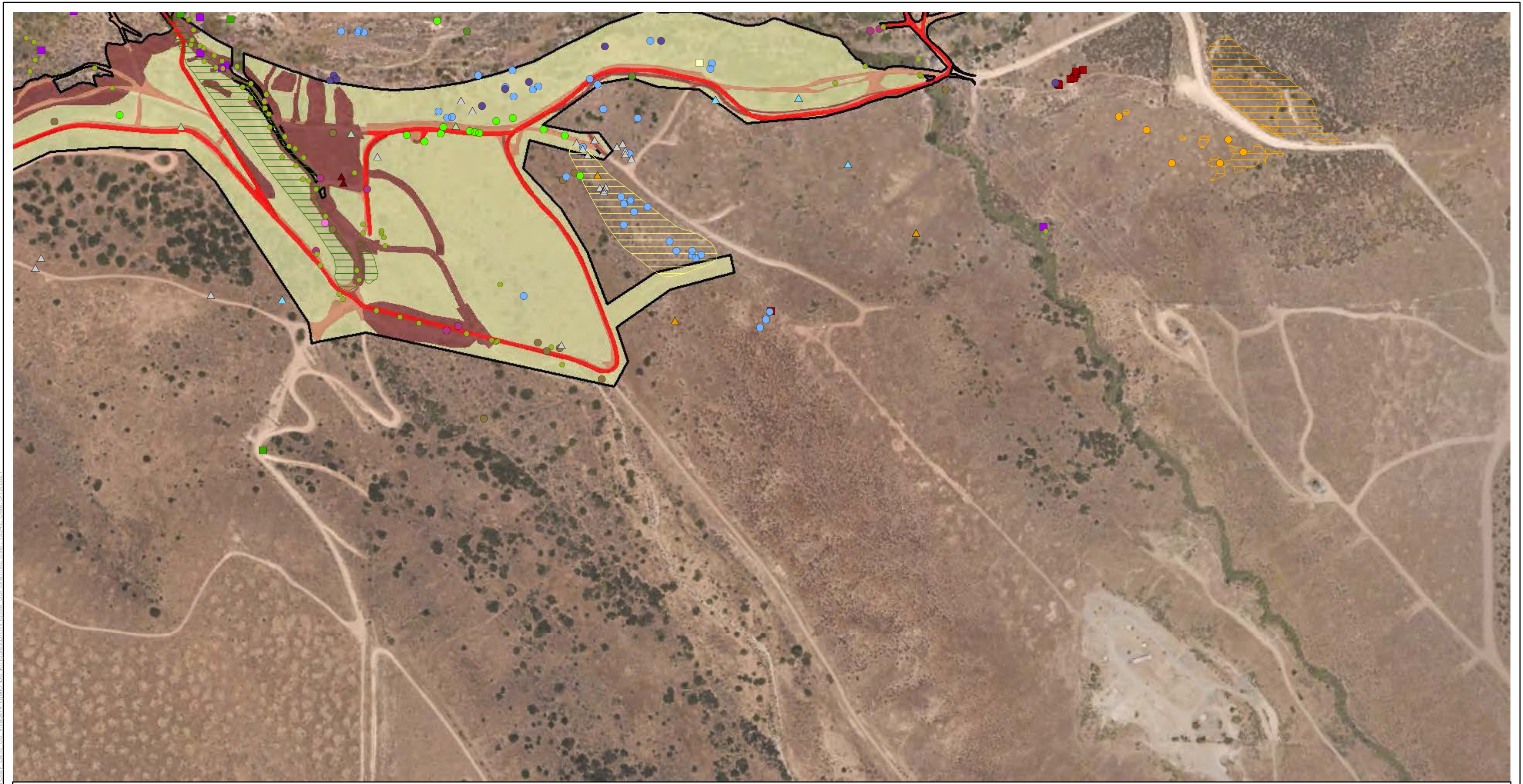


Figure 9a Sheet 3
Special-Status Plant Species Occurring within Project Area



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Source: ICF; SANDAG 2020

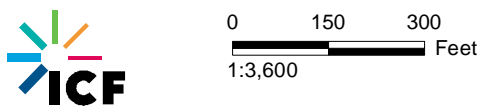
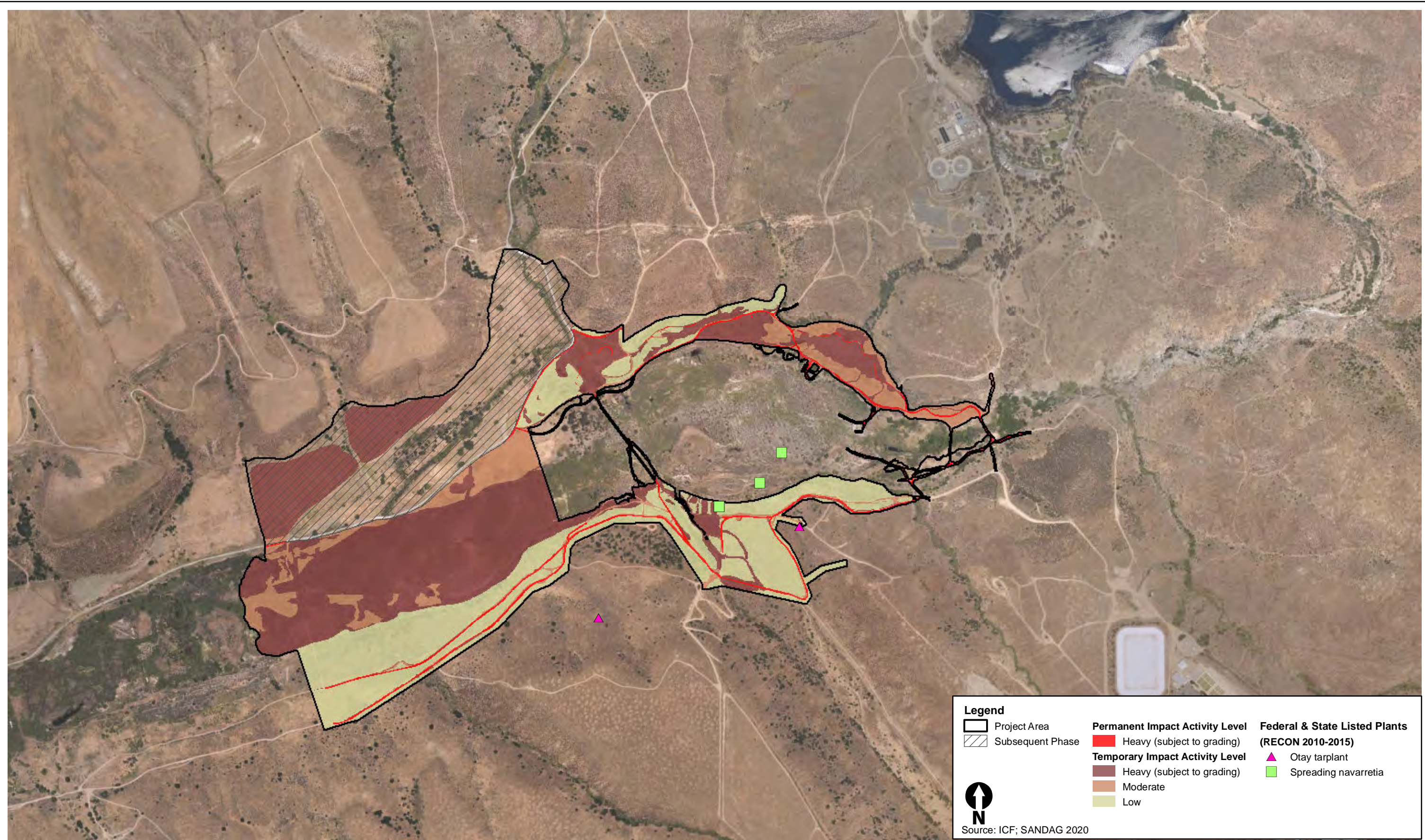


Figure 9a Sheet 4
Special-Status Plant Species Occurring within Project Area

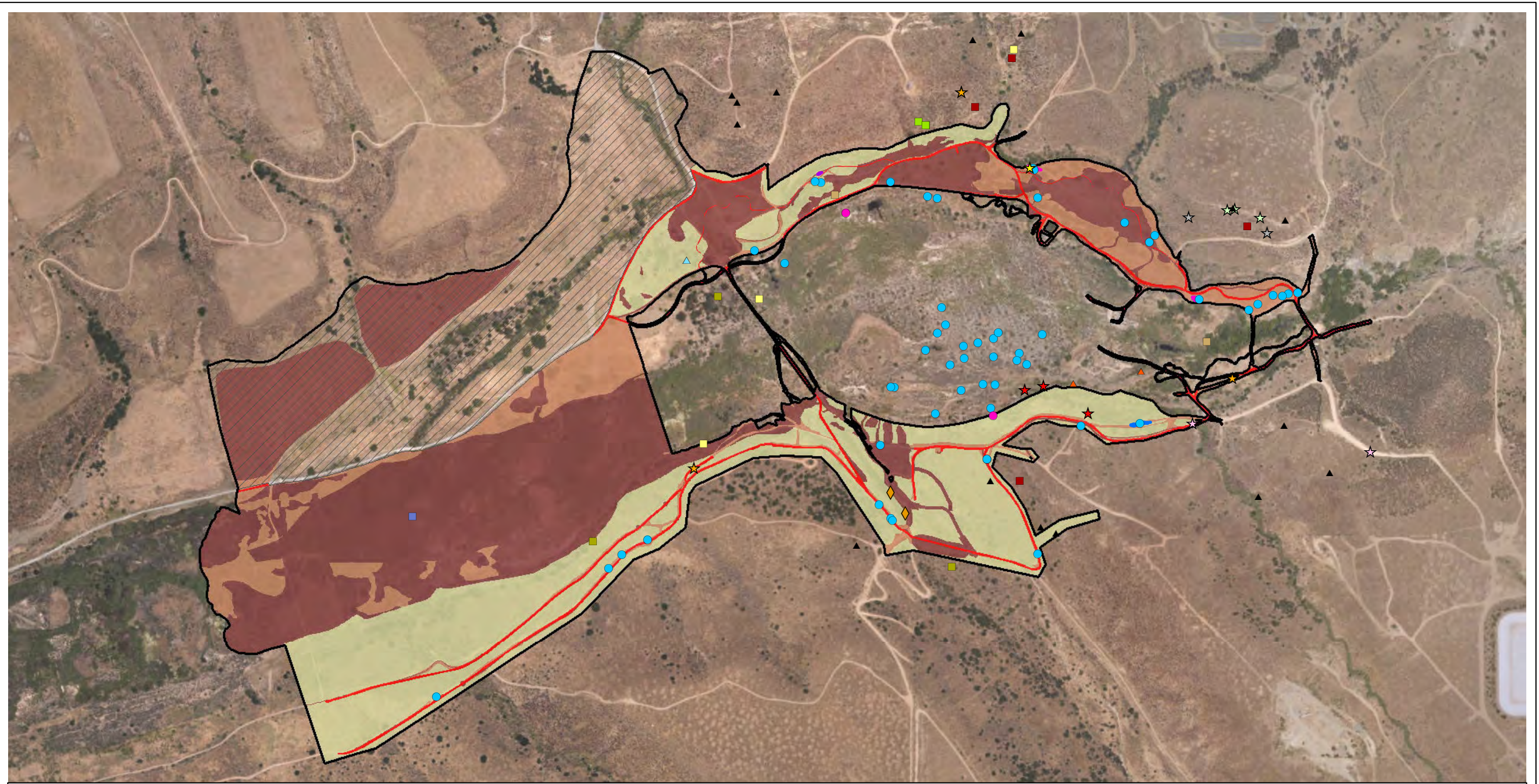
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Figure 9b
Listed Plant Species Occurring with the Project Area and Immediate Vicinity

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Project Area Subsequent Phase	Permanent Impact Activity Level Heavy (subject to grading) Temporary Impact Activity Level Heavy (subject to grading) Moderate Low	Wildlife Observation Common Name (2009-2019) Belding's Orange-throated Whiptail Blainville's Horned Lizard	Burrowing Owl Coastal Rosy Boa Cooper's Hawk Marsh Wren	Red Diamond Rattlesnake San Diego Black-tailed Jackrabbit San Diego Cactus Wren Southern California Rufous-crowned Sparrow*	Southern Mule Deer Thorne's hairstreak Coastal Tiger Whiptail Two-striped Gartersnake	Western Spadefoot Woodrat Yellow Warbler Yellow-breasted Chat	Western Spadefoot Toad Versatile Fairy Shrimp Observed Only Immature Fairy Shrimp Observed
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N
 Source: ICF; SANDAG 2020

* NOTE: Additional species observation described in document was not mapped.

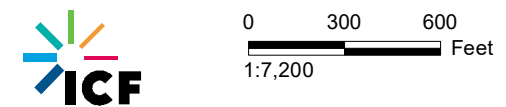
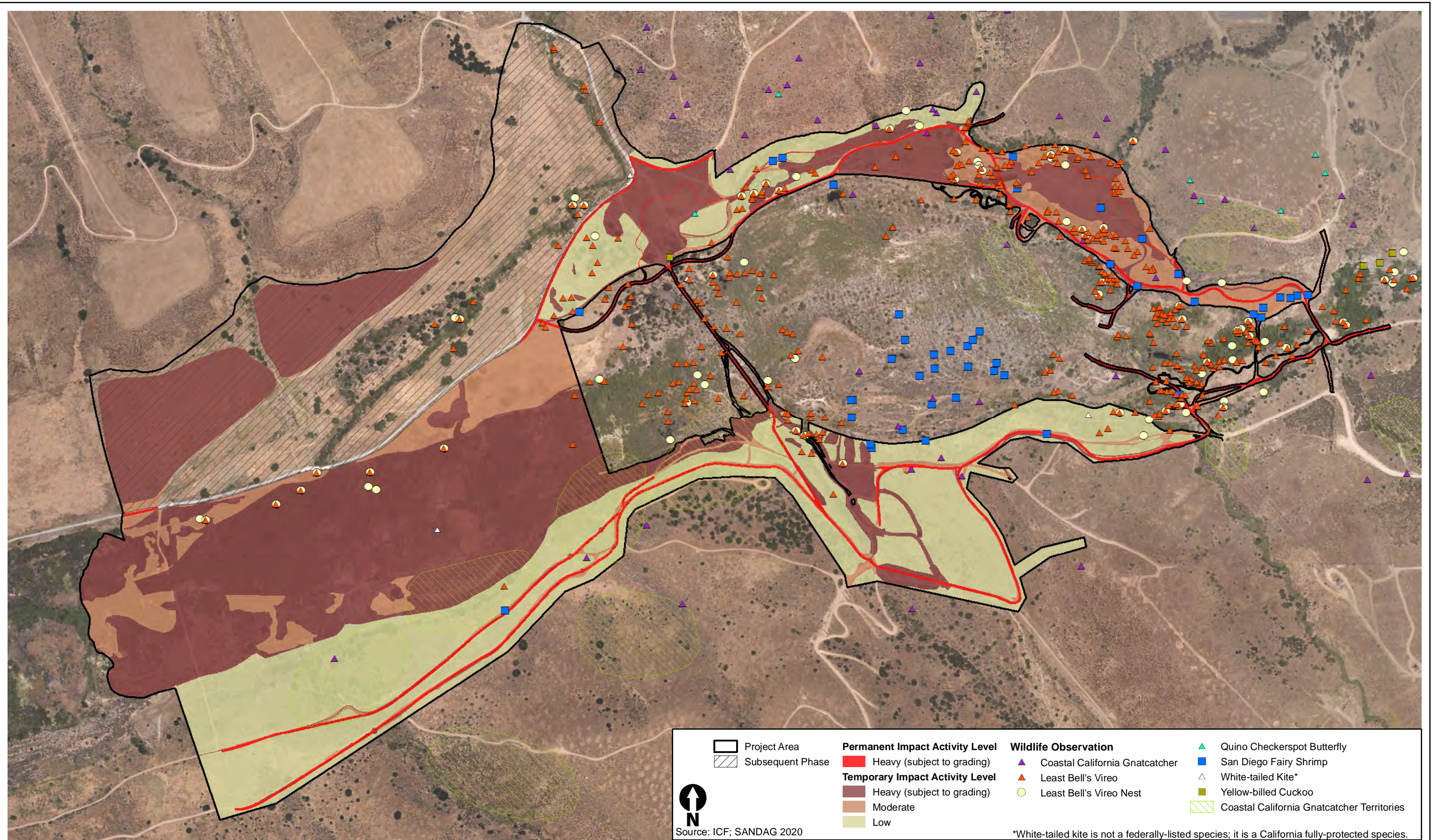


Figure 10a
Special-Status Wildlife Species Occurring within Project Area and Immediate Vicinity

\\PDC\TRD\GIS\1\San Diego\projects\Orav_Land_Co_Village\Mitigation\Bank\Figures\BRR\Fig10b_ListedFauna.mxd; User: 35528; Date: 9/21/2021



Source: ICF; SANDAG 2020

*White-tailed kite is not a federally-listed species; it is a California fully-protected species.

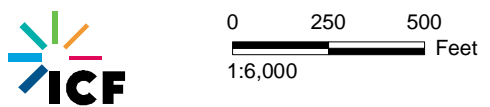
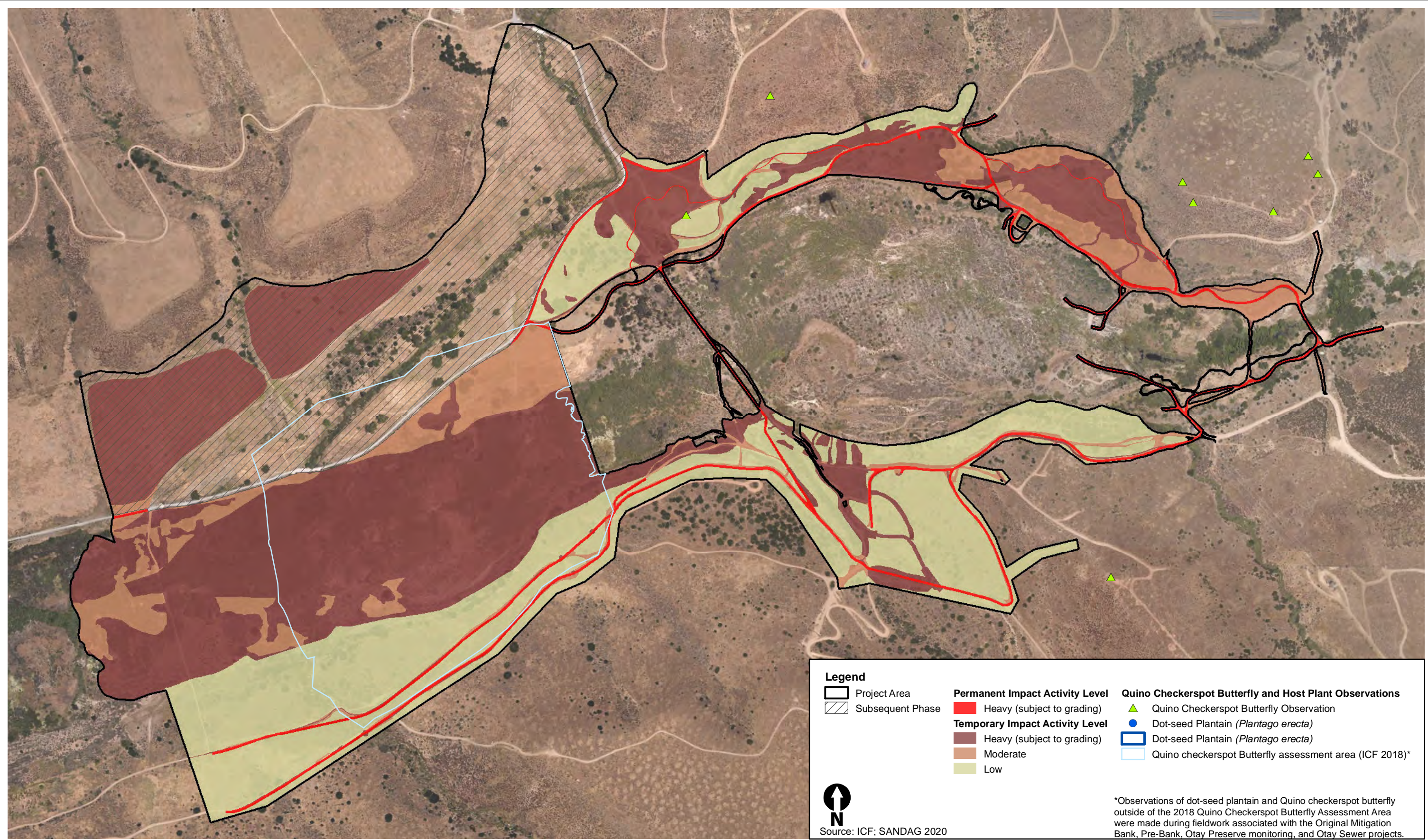


Figure 10b
Listed Wildlife Species Occurring within Project Area and Immediate Vicinity

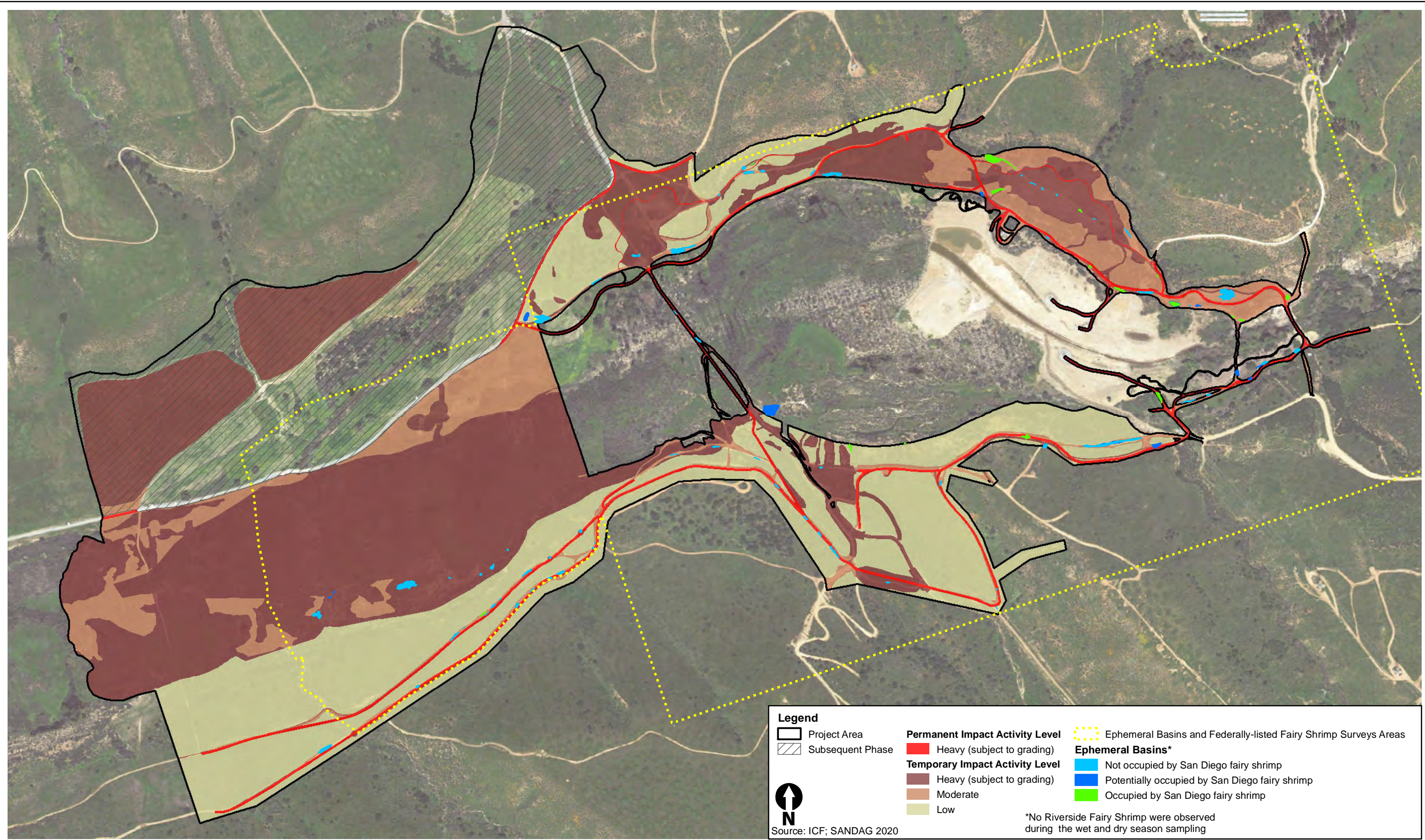
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Figure 11
Quino Checkerspot Butterfly Observations within the Project Area and Immediate Vicinity, and Host Plants documented within the Project Area

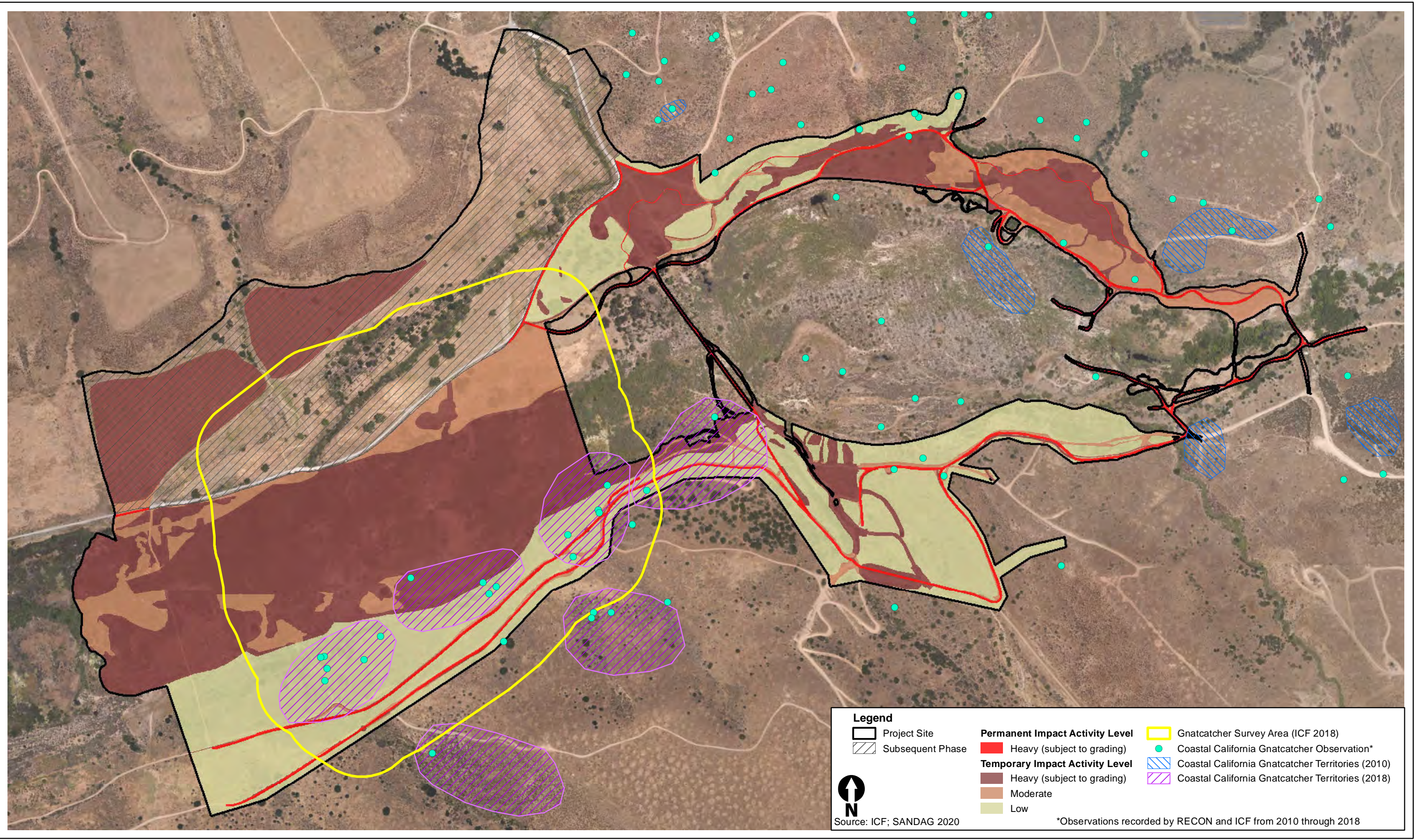
\\PDC\TRD\GIS\1\San_Diego\projects\Orav_Land_Co_Village\Mitigation\Bank\Figures\BRR\Fig12_FairyShrimp.mxd User: 35528 Date: 9/21/2021



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Figure 12
Ephemeral Basins and Federally Listed Fairy Shrimp within the Project Area

\\PDC\TRD\SG\IS1\San Diego\projects\Orav_Land_Co_Village\Mitigation\Bank\Figures\BRR\Fig13_CAGN.mxd User: 19542 Date: 8/19/2021



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Figure 13
Coastal California Gnatcatcher Observations within the Project Area and Immediate Vicinity

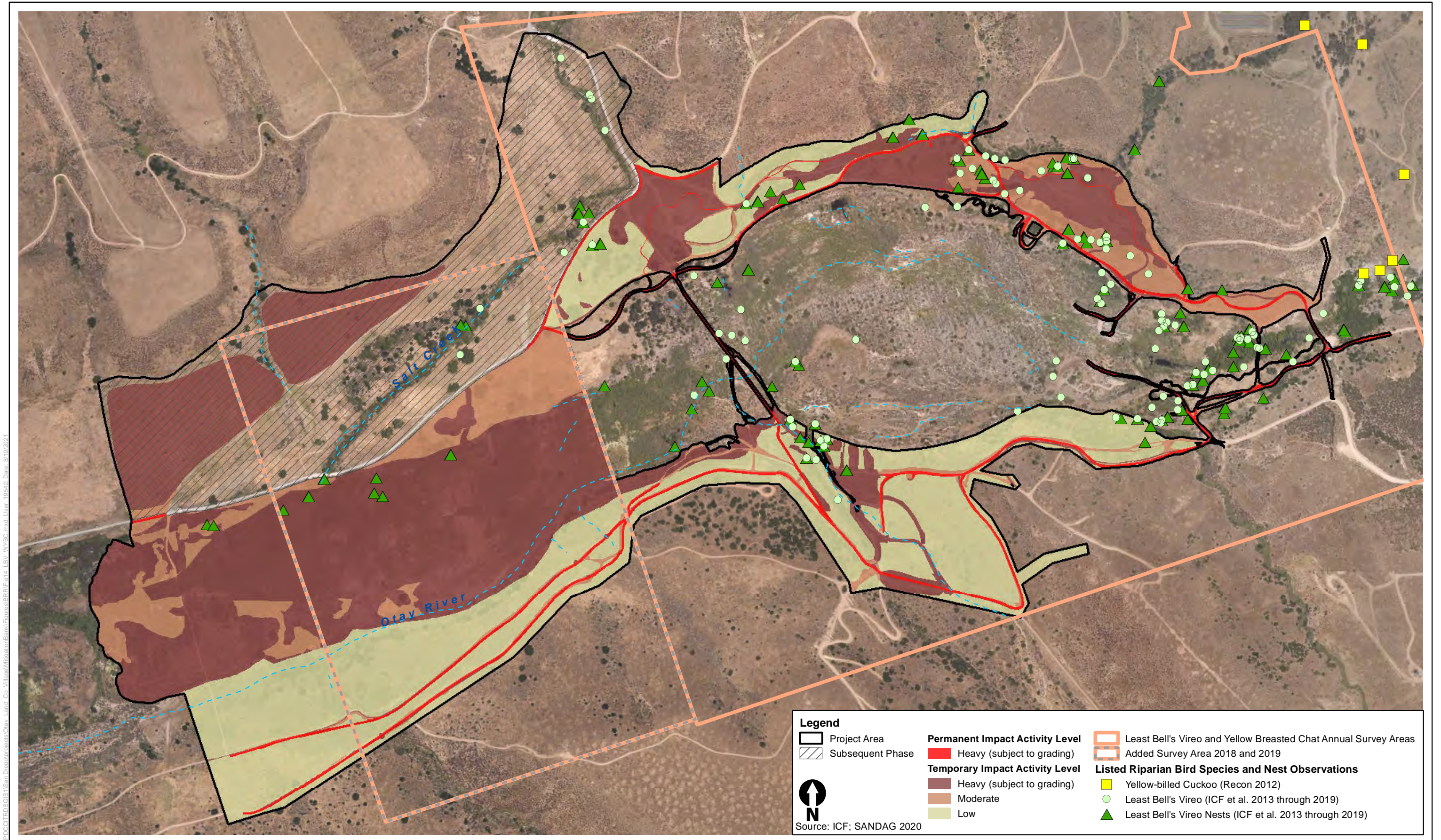
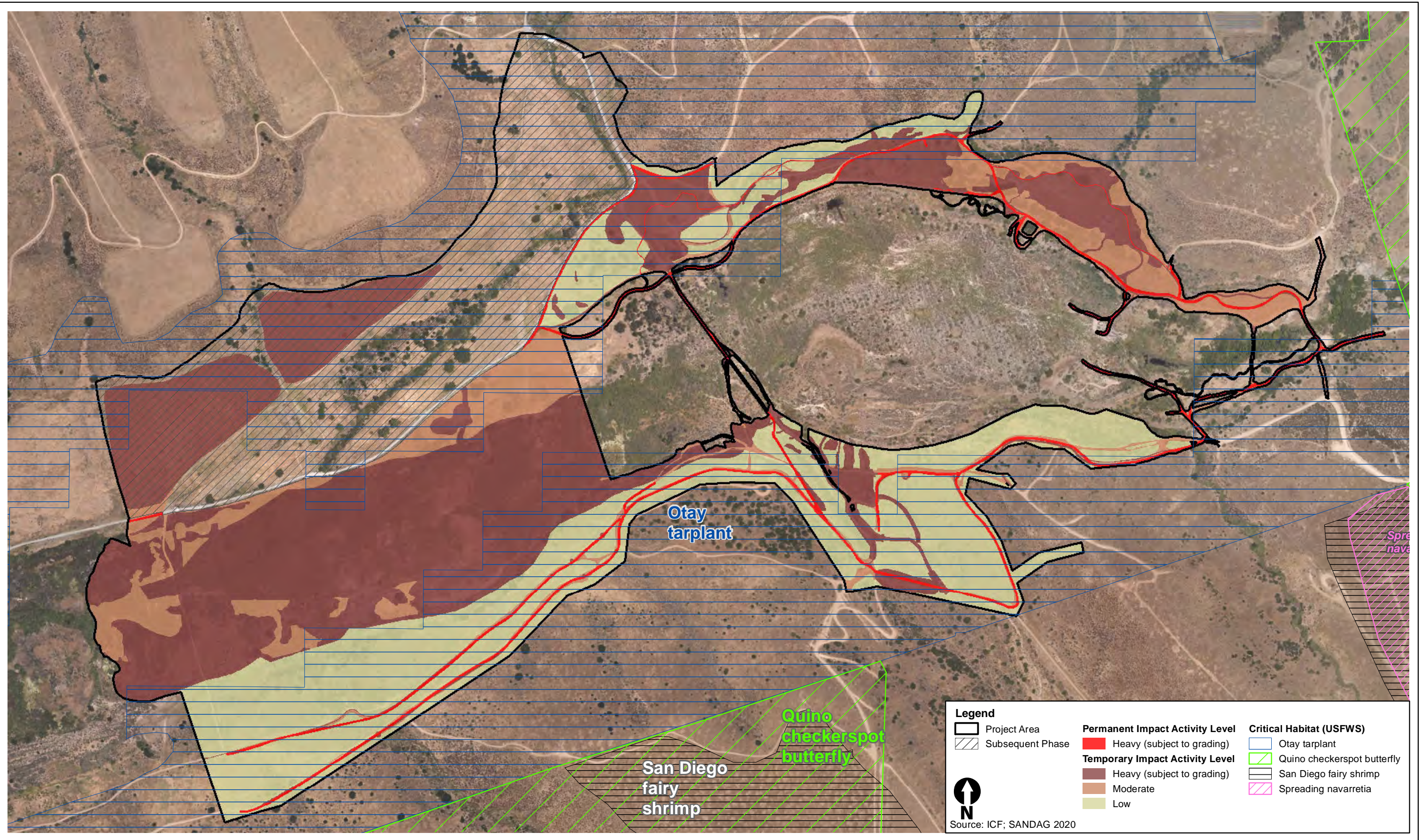


Figure 14
Least Bell's Vireo and Western Yellow Billed Cuckoo Occurrences within the Project Area and Immediate Vicinity

\\PDC\CTRD\SGIS\1\San Diego\projects\Otay_Land_Co_Village\Mitigation\Bank\Figures\BRR\Fig15_CH.mxd User: 19542 Date: 8/19/2021



Legend

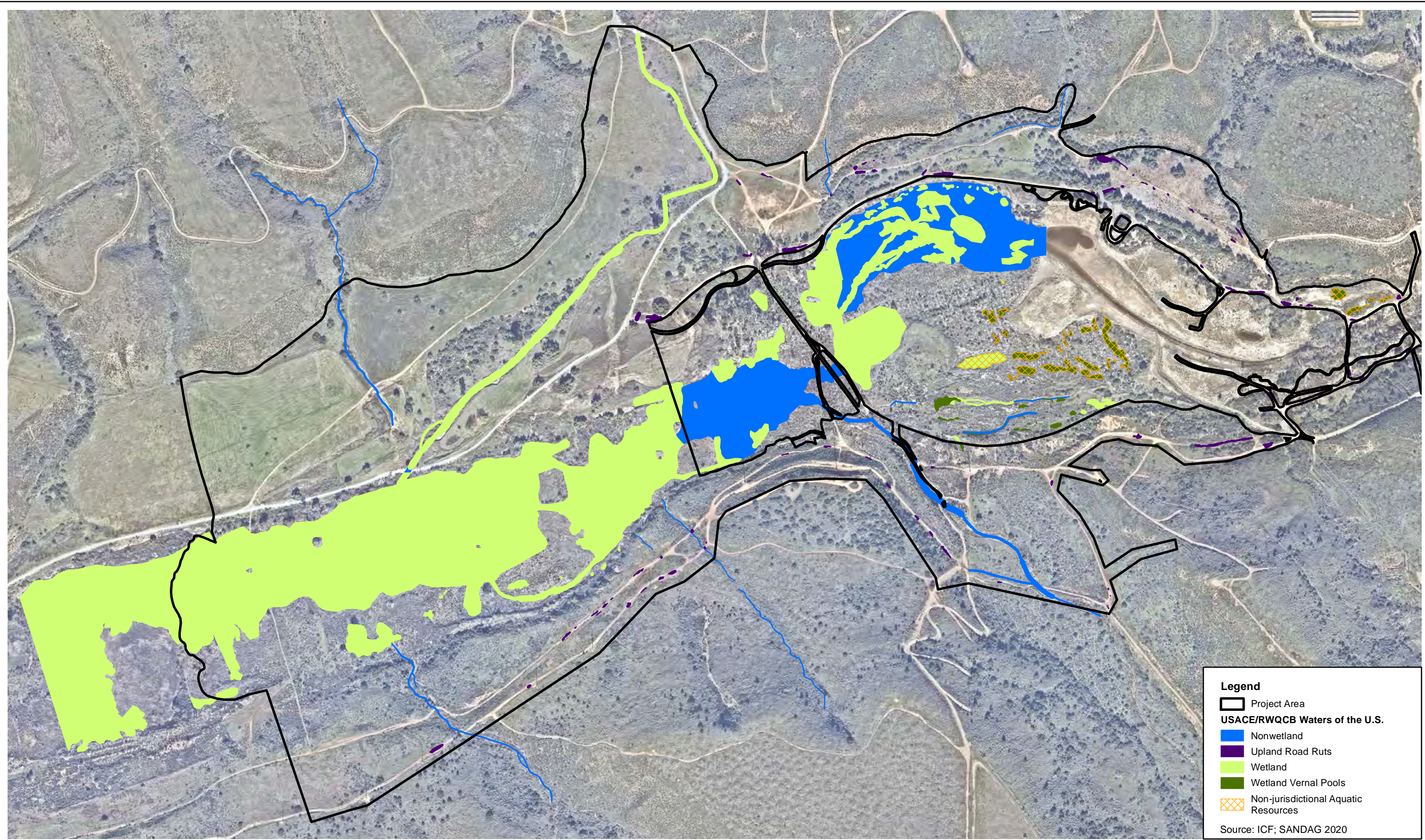
Project Area	Permanent Impact Activity Level	Critical Habitat (USFWS)
Subsequent Phase	Heavy (subject to grading)	Otay tarplant
	Temporary Impact Activity Level	Quino checkerspot butterfly
	Heavy (subject to grading)	San Diego fairy shrimp
	Moderate	Spreading navarretia
	Low	

Source: ICF; SANDAG 2020

0 250 500 Feet
1:6,000

Figure 15
Critical Habitat within the Project Area and Immediate Vicinity

\\PDC\ITRDSGIS\1\San Diego\projects\Oraw_Land_Co_Village\Mitigation\Bank\Figures\BRR\Fig16a_JD_USACE_RWQCB.mxd; User: 53569; Date: 8/18/2021



Legend

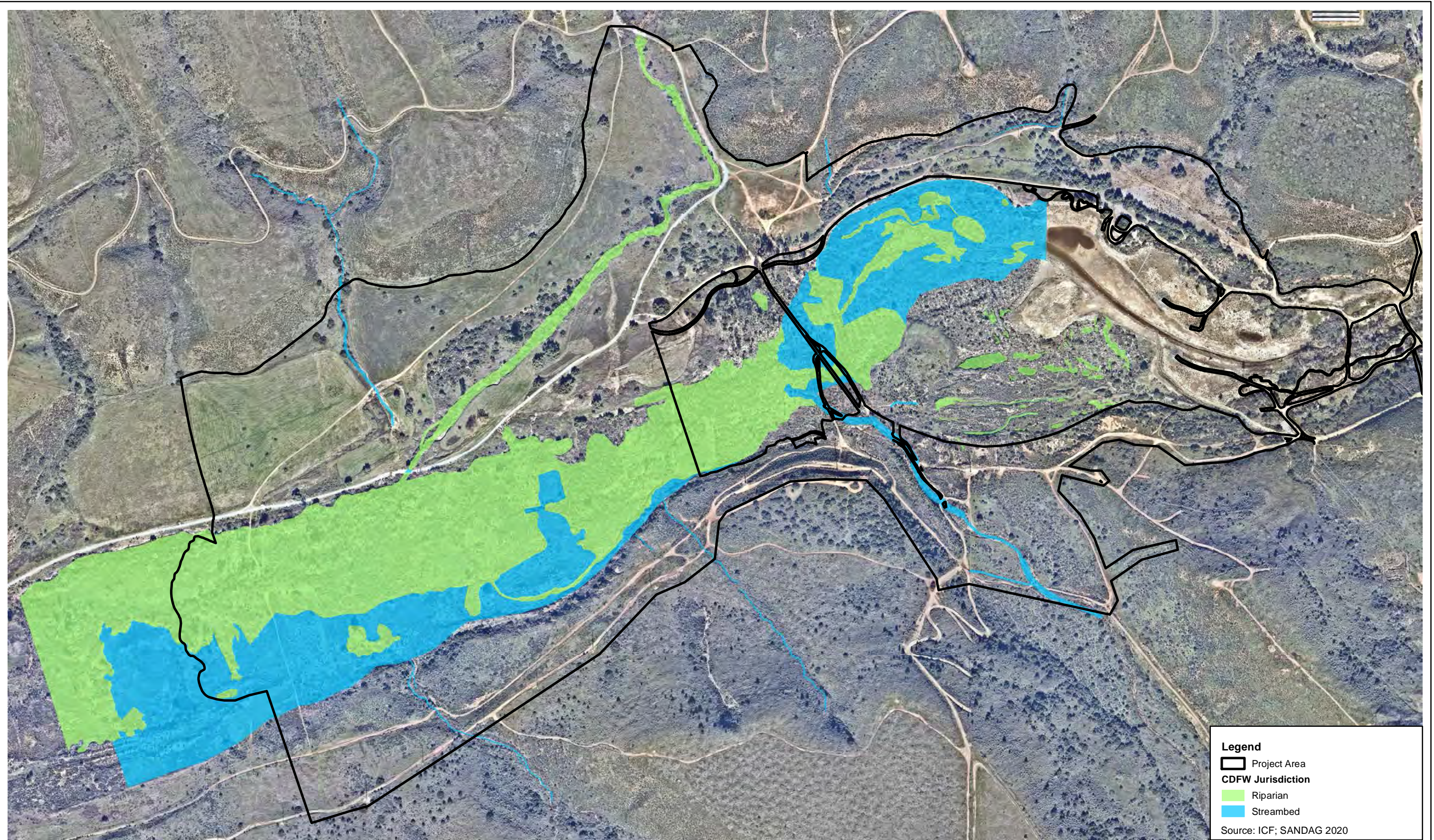
- Project Area
- USACE/RWQCB Waters of the U.S.**
- Nonwetland
- Upland Road Ruts
- Wetland
- Wetland Vernal Pools
- Non-jurisdictional Aquatic Resources

Source: ICF; SANDAG 2020

0 250 500 Feet
1:6,000

Figure 16a
Potential USACE/RWQCB Jurisdictional Waters and Wetlands Occurring within the Project Area

\\PDC\CTRD\GIS\1\San Diego\projects\Orav_Land_Co_Village\Mitigation\Bank\Figures\BRR\Fig16b_JD_CDFW.mxd; User: 535569; Date: 8/20/2021



Legend

- Project Area
- CDFW Jurisdiction
 - Riparian
 - Streambed

Source: ICF; SANDAG 2020

ICF N

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1:6,000

Figure 16b
Potential CDFW Jurisdiction Occurring within the Project Area

Appendix B

Observed Species List – Flora

Appendix B. Species Observed in the Project Site and Vicinity - Flora

Scientific Name	Common Name	Special Status
LYCOPHYTES		
Selaginellaceae - Spike-moss family		
<i>Selaginella bigelovii</i>	bushy spike-moss	
<i>Selaginella cinerascens</i>	ashy spike-moss	CRPR 4.1
FERNS		
Marsileaceae - Marsilea family		
<i>Marsilea vestita ssp. vestita</i>	hairy clover fern	
<i>Pilularia americana</i>	American pillwort	
Pteridaceae - Brake family		
<i>Pellaea mucronata</i>	bird's-foot cliff-break	
<i>Pentagramma triangularis</i>	goldback fern	
GYMNOSPERMS		
Cupressaceae - Cypress family		
<i>Hesperocyparis forbesii</i>	Tecate cypress	CRPR 1B.1
EUDICOTS		
Adoxaceae - Muskroot family		
<i>Sambucus nigra ssp. caerulea</i>	blue elderberry	
Aizoaceae - Fig-marigold family		
* <i>Aptenia cordifolia</i>	baby sun-rose	
* <i>Mesembryanthemum crystallinum</i>	crystalline iceplant	
<i>Sesuvium verrucosum</i>	western sea-purslane	
Anacardiaceae - Sumac Or Cashew family		
<i>Malosma laurina</i>	laurel sumac	
<i>Rhus integrifolia</i>	lemonade berry	
* <i>Schinus molle</i>	Peruvian pepper tree	
* <i>Schinus terebinthifolius</i>	Brazilian pepper tree	
Apiaceae - Carrot family		
<i>Apiastrum angustifolium</i>	mock parsley	
* <i>Apium graveolens</i>	celery	
* <i>Conium maculatum</i>	poison hemlock	
<i>Daucus pusillus</i>	rattlesnake weed	
* <i>Foeniculum vulgare</i>	fennel	

Scientific Name	Common Name	Special Status
Apocynaceae - Dogbane family		
<i>Funastrum cynanchoides</i> var. <i>hartwegii</i>	Hartweg's climbing milkweed	
Asteraceae - Sunflower family		
<i>Achillea millefolium</i>	common yarrow	
<i>Ambrosia acanthicarpa</i>	annual bur-sage	
<i>Ambrosia monogyra</i>	singlehorl burrobrush	CRPR 2B.2
* <i>Anthemis cotula</i>	mayweed	
<i>Artemisia californica</i>	California sagebrush	
<i>Artemisia douglasiana</i>	Douglass' sagebrush	
<i>Baccharis pilularis</i> ssp. <i>pilularis</i>	coyote brush	
<i>Baccharis salicifolia</i> ssp. <i>salicifolia</i>	mule fat	
<i>Baccharis sarothroides</i>	broom baccharis	
<i>Bahiopsis laciniata</i>	San Diego sunflower	CRPR 4.2
<i>Brickellia californica</i>	California brickellbush	
* <i>Carduus pycnocephalus</i> ssp. <i>pycnocephalus</i>	Italian thistle	
* <i>Centaurea melitensis</i>	toalote	
* <i>Cirsium vulgare</i>	bull thistle	
<i>Corethrogyne filaginifolia</i>	common sand aster	
* <i>Cotula australis</i>	Australian cotula	
* <i>Cotula coronopifolia</i>	brass-buttons	
* <i>Cynara cardunculus</i>	cardoon	
<i>Deinandra conjugens</i>	Otay tarplant	FT, SE, CRPR 1B.1
<i>Deinandra fasciculata</i>	fascicled tarplant	
* <i>Dittrichia graveolens</i>	stinkwort	
<i>Encelia californica</i>	California encelia	
<i>Encelia farinosa</i>	brittlebush	
<i>Erigeron canadensis</i>	horseweed	
<i>Eriophyllum confertiflorum</i>	golden woolly sunflower	
<i>Eriophyllum confertiflorum</i> var. <i>confertiflorum</i>	golden woolly sunflower	
* <i>Glebionis coronaria</i>	crown daisy	
<i>Grindelia camporum</i>	field gumplant	
<i>Gutierrezia sarothrae</i>	matchweed	
<i>Hazardia squarrosa</i>	saw toothed goldenbush	
* <i>Hedypnois cretica</i>	crete weed	

Scientific Name	Common Name	Special Status
* <i>Helminthotheca echioides</i>	bristly ox-tongue	
<i>Heterotheca grandiflora</i>	telegraph weed	
<i>Holocarpha virgata</i> ssp. <i>elongata</i>	graceful tarplant	CRPR 4.2
* <i>Hypochaeris glabra</i>	smooth cat's-ear	
<i>Isocoma menziesii</i>	coastal goldenbush	
<i>Isocoma menziesii</i> var. <i>decumbens</i>	decumbent goldenbush	CRPR 1B.2
<i>Iva hayesiana</i>	San Diego marsh-elder	CRPR 2B.2
* <i>Lactuca serriola</i>	prickly lettuce	
<i>Lasthenia gracilis</i>	common goldfields	
<i>Logfia filaginoides</i>	California cottonrose	
* <i>Logfia gallica</i>	French cottonrose	
* <i>Matricaria discoidea</i>	pineapple weed	
<i>Microseris douglasii</i> ssp. <i>platycarpha</i>	small-flowered microseris	CRPR 4.2
<i>Osmadenia tenella</i>	osmadenia	
<i>Pluchea odorata</i> var. <i>odorata</i>	saltmarsh-fleabane	
<i>Pseudognaphalium beneolens</i>	fragrant Everlansting	
<i>Pseudognaphalium californicum</i>	California everlasting	
* <i>Pseudognaphalium luteoalbum</i>	white lamb everlasting	
<i>Psilocarphus brevissimus</i> var. <i>brevissimus</i>	dwarf woolly-marbles	
<i>Psilocarphus tenellus</i>	slender woolly-marbles	
* <i>Silybum marianum</i>	blessed milkthistle	
<i>Stephanomeria</i> sp.	wire-lettuce	
* <i>Symphotrichum subulatum</i> var. <i>elongatum</i>	elongated annual saltmarsh aster	
* <i>Taraxacum officinale</i>	common dandelion	
<i>Xanthium strumarium</i>	cocklebur	
Boraginaceae - Borage family		
<i>Amsinckia menziesii</i>	Menzies's fiddleneck	
<i>Cryptantha intermedia</i>	clearwater cryptantha	
<i>Eriodictyon trichocalyx</i>	hairy yerba santa	
<i>Harpagonella palmeri</i>	Palmer's grapplinghook	CRPR 4.2
<i>Heliotropium curassavicum</i> var. <i>oculatum</i>	alkali heliotrope	
<i>Pectocarya linearis</i> ssp. <i>ferocula</i>	narrow-toothed pectocarya	
<i>Phacelia cicutaria</i>	caterpillar phacelia	
<i>Plagiobothrys acanthocarpus</i>	adobe popcornflower	

Scientific Name	Common Name	Special Status
Brassicaceae - Mustard family		
* <i>Brassica nigra</i>	black mustard	
* <i>Capsella bursa-pastoris</i>	shepherd's purse	
* <i>Hirschfeldia incana</i>	shortpod mustard	
* <i>Lepidium draba</i>	heart podded pepper-grass	
* <i>Lepidium latifolium</i>	perennial pepper-grass	
<i>Lepidium nitidum</i>	shining pepper-grass	
<i>Nasturtium officinale</i>	medicinal water cress	
Cactaceae - Cactus family		
<i>Cylindropuntia californica</i> var. <i>californica</i>	snake cholla	CRPR 1B.1
<i>Cylindropuntia prolifera</i>	coast cholla	
<i>Ferocactus viridescens</i>	San Diego barrel cactus	CRPR 2B.1
<i>Mammillaria dioica</i>	White fishhook cactus	
<i>Opuntia basilaris</i> var. <i>basilaris</i>	beavertail cactus	
<i>Opuntia littoralis</i>	coastal prickly pear	
Caryophyllaceae - Pink family		
* <i>Cerastium glomeratum</i>	sticky mouse-ear chickweed	
* <i>Silene gallica</i>	windmill catchfly	
* <i>Spergularia villosa</i>	hairy sand-spurrey	
Chenopodiaceae - Goosefoot family		
<i>Atriplex pacifica</i>	south coast saltscale	CRPR 1B.2
* <i>Atriplex semibaccata</i>	Australian saltbush	
* <i>Chenopodium album</i>	lamb's quarters	
* <i>Chenopodium murale</i>	nettleleaf goosefoot	
* <i>Salsola tragus</i>	prickly Russian thistle	
Cistaceae - Rock-rose family		
<i>Crocanthemum scoparium</i> var. <i>vulgare</i>	common peak rush-rose	
Cleomaceae - Spiderflower family		
<i>Peritoma arborea</i>	bladderpod	
Convolvulaceae - Morning-glory family		
<i>Calystegia macrostegia</i>	coast morning-glory	
* <i>Convolvulus arvensis</i>	bindweed, orchard morning-glory	
<i>Cuscuta</i> sp.	dodder	

Scientific Name	Common Name	Special Status
Crassulaceae - Stonecrop family		
<i>Crassula aquatica</i>	Water pygmyweed	
<i>Crassula connata</i>	pygmyweed	
<i>Dudleya edulis</i>	ladies fingers	
<i>Dudleya lanceolata</i>	lance-leaved dudleya	
<i>Dudleya pulverulenta</i>	chalk dudleya	
<i>Dudleya variegata</i>	variegated dudleya	CRPR 1B.2
Cucurbitaceae - Gourd family		
<i>Cucurbita foetidissima</i>	calabazilla	
<i>Marah macrocarpa</i>	large fruit wild cucumber	
Elatinaceae - Waterwort family		
<i>Elatine brachysperma</i>	shortseed waterwort	
Ericaceae - Heath family		
<i>Arctostaphylos otayensis</i>	Otay manzanita	CRPR 1B.2
Euphorbiaceae - Spurge family		
<i>Croton setigerus</i>	doveweed	
<i>Euphorbia albomarginata</i>	white margin spurge	
<i>Euphorbia polycarpa</i>	many seed spurge	
Fabaceae - Legume family		
<i>Acmispon americanus var. americanus</i>	Spanish-clover	
<i>Acmispon glaber</i>	deerweed	
<i>Astragalus trichopodus var. lonchus</i>	hairy fruit spear milkvetch	
<i>Lupinus succulentus</i>	arroyo lupine	
* <i>Medicago lupulina</i>	black burclover	
* <i>Melilotus indicus</i>	Indian sweetclover	
* <i>Trifolium hirtum</i>	rose clover	
Fagaceae - Oak family		
<i>Quercus agrifolia</i>	coast live oak	
<i>Quercus berberidifolia</i>	scrub oak	
Gentianaceae - Gentian family		
<i>Zeltnera exaltata</i>	tall centaury	
<i>Zeltnera venusta</i>	California centaury	
Geraniaceae - Geranium family		
* <i>Erodium botrys</i>	longbeak filaree	

Scientific Name	Common Name	Special Status
* <i>Erodium cicutarium</i>	redstem filaree	
* <i>Erodium moschatum</i>	whitestem filaree	
<i>Geranium sp.</i>	geranium	
Grossulariaceae - Gooseberry family		
<i>Ribes speciosum</i>	fuchsia-flowered gooseberry	
Lamiaceae - Mint family		
* <i>Marrubium vulgare</i>	horehound	
<i>Salvia apiana</i>	white sage	
<i>Salvia columbariae</i>	chia	
<i>Salvia mellifera</i>	black sage	
<i>Salvia munzii</i>	Munz's sage	CRPR 2B.2
<i>Trichostema lanceolatum</i>	vinegar weed	
Lythraceae - Loosestrife family		
<i>Ammannia robusta</i>	grand redstem	
* <i>Lythrum hyssopifolia</i>	grass Poly	
Malvaceae - Mallow family		
<i>Malacothamnus fasciculatus</i>	chaparral bush-mallow	
* <i>Malva parviflora</i>	cheeseweed	
<i>Sidalcea malviflora</i>	mallow leaf checkerbloom	
<i>Sidalcea sparsifolia</i>	southern checkerbloom	
Montiaceae - Purslane family		
<i>Claytonia perfoliata ssp. perfoliata</i>	round leaf miner's lettuce	
Myrsinaceae - Myrsine family		
* <i>Anagallis arvensis</i>	scarlet pimpernel	
Myrtaceae - Myrtle family		
* <i>Eucalyptus globulus</i>	blue gum	
<i>Eucalyptus sp.</i>	gum	
Nyctaginaceae - Four O'clock family		
<i>Mirabilis laevis var. crassifolia</i>	coastal wishbone plant	
Onagraceae - Evening Primrose family		
<i>Camissoniopsis bistorta</i>	California sun cup	
<i>Camissoniopsis hirtella</i>	hairy suncup	
<i>Epilobium canum</i>	California fuchsia	

Scientific Name	Common Name	Special Status
Orobanchaceae - Broom-rape family		
<i>Castilleja affinis ssp. affinis</i>	coast indian paintbrush	
Oxalidaceae - Oxalis family		
<i>Oxalis californica</i>	California wood-sorrel	
Papaveraceae - Poppy family		
<i>Eschscholzia californica</i>	California poppy	
Phrymaceae - Lopseed family		
<i>Mimulus brevipes</i>	widethroat yellow monkeyflower	
Plantaginaceae - Plantain family		
<i>Antirrhinum coulterianum</i>	Coulter's snapdragon	
<i>Antirrhinum nuttallianum</i>	Nuttall's snapdragon	
<i>Callitriche marginata</i>	winged water-starwort	
<i>Plantago elongata</i>	prairie plantain	
<i>Plantago erecta</i>	dot seed plantain	
* <i>Plantago lanceolata</i>	English plantain	
<i>Stemodia durantifolia</i>	purple stemodia	CRPR 2B.1
<i>Veronica peregrina ssp. xalapensis</i>	purslane speedwell	
Platanaceae - Plane Tree, Sycamore family		
<i>Platanus racemosa</i>	western sycamore	
Polemoniaceae - Phlox family		
<i>Gilia sp.</i>	gilia	
<i>Linanthus dianthiflorus</i>	fringed linanthus	
<i>Navarretia fossalis</i>	spreading navarretia	FT, CRPR 1B.1
<i>Navarretia hamata</i>	hooked navarretia	
Polygonaceae - Buckwheat family		
<i>Chorizanthe fimbriata</i>	fringed spineflower	
<i>Eriogonum fasciculatum</i>	California buckwheat	
<i>Persicaria lapathifolia</i>	willow smartweed	
* <i>Polygonum aviculare ssp. depressum</i>	dented oval leaf knotweed	
* <i>Rumex crispus</i>	curly dock	
Primulaceae - Primrose family		
<i>Primula clevelandii</i>	padre's shooting star	
Ranunculaceae - Buttercup family		
<i>Clematis pauciflora</i>	few flowered virgin's bower	

Scientific Name	Common Name	Special Status
<i>Delphinium parryi</i> ssp. <i>parryi</i>	Parry's larkspur	
Rhamnaceae - Buckthorn family		
<i>Ceanothus otayensis</i>	Otay Mountain ceanothus	CRPR 1B.2
<i>Ceanothus tomentosus</i>	woollyleaf ceanothus	
<i>Rhamnus crocea</i>	spiny redberry	
Rosaceae - Rose family		
<i>Adenostoma fasciculatum</i> var. <i>fasciculatum</i>	chamise	
<i>Cercocarpus minutiflorus</i>	San Diego mountain mahogany	
<i>Heteromeles arbutifolia</i>	toyon	
<i>Prunus ilicifolia</i>	holly-leaf cherry	
<i>Rosa californica</i>	California rose	
Rubiaceae - Madder family		
<i>Galium angustifolium</i> ssp. <i>angustifolium</i>	narrow leaved bedstraw	
<i>Galium aparine</i>	common bedstraw	
<i>Galium nuttallii</i> ssp. <i>nuttallii</i>	Nuttall's bedstraw	
Salicaceae - Willow family		
<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood	
<i>Salix exigua</i>	sand bar willow	
<i>Salix gooddingii</i>	Goodding's black willow	
<i>Salix lasiolepis</i>	arroyo willow	
Saxifragaceae - Saxifrage family		
<i>Jepsonia parryi</i>	Parry's jepsonia	
Scrophulariaceae - Figwort family		
* <i>Myoporum laetum</i>	ngaio tree	
Simmondsiaceae - Jojoba family		
<i>Simmondsia chinensis</i>	jojoba	
Solanaceae - Nightshade family		
<i>Datura wrightii</i>	wright's jimsonweed	
<i>Lycium andersonii</i>	Anderson's box-thorn	
* <i>Nicotiana glauca</i>	tree tobacco	
<i>Solanum douglasii</i>	Douglas' nightshade	
Tamaricaceae - Tamarisk family		
<i>Tamarix</i> sp.	tamarisk	

Scientific Name	Common Name	Special Status
Urticaceae - Nettle family		
<i>Urtica dioica</i>	stinging nettle	
Verbenaceae - Vervain family		
<i>Phyla nodiflora</i>	turkey tangle fogfruit	
<i>Verbena menthifolia</i>	mint leaf vervain	
Violaceae - Violet family		
<i>Viola pedunculata</i>	johnny-jump-up	
MONOCOTS		
Agavaceae - Century Plant family		
<i>Chlorogalum parviflorum</i>	smallflower soap plant	
<i>Hesperoyucca whipplei</i>	chaparral yucca	
Alismataceae - Water-plantain family		
<i>Echinodorus berteroi</i>	upright burhead	
Arecaceae - Palm family		
* <i>Phoenix canariensis</i>	Canary Island palm	
* <i>Washingtonia robusta</i>	mexican fan palm	
Cyperaceae - Sedge family		
<i>Bolboschoenus maritimus ssp. paludosus</i>	saltmarsh bulrush	
<i>Eleocharis macrostachya</i>	pale spikerush	
Iridaceae - Iris family		
<i>Sisyrinchium bellum</i>	lovely blue-eyed-grass	
Juncaceae - Rush family		
<i>Juncus acutus ssp. leopoldii</i>	southwestern spiny rush	CRPR 4.2
<i>Juncus bufonius</i>	toad rush	
<i>Juncus dubius</i>	mariposa rush	
Liliaceae - Lily family		
<i>Calochortus splendens</i>	splendid mariposa lily	
Poaceae - Grass family		
<i>Aristida adscensionis</i>	sixweeks three-awn	
<i>Aristida purpurea var. nealleyi</i>	Nealley three-awn	
* <i>Arundo donax</i>	giant reed	
* <i>Avena barbata</i>	slender wild oat	
<i>Bothriochloa barbinodis</i>	cane bluestem	
* <i>Brachypodium distachyon</i>	purple false brome	

Scientific Name	Common Name	Special Status
* <i>Bromus diandrus</i>	ripgrut brome	
* <i>Bromus hordeaceus</i>	soft brome	
* <i>Bromus madritensis ssp. rubens</i>	red brome	
* <i>Cortaderia jubata</i>	purple pampas grass	
* <i>Cynodon dactylon</i>	Bermuda grass	
<i>Deschampsia danthonioides</i>	annual hairgrass	
<i>Distichlis spicata</i>	salt grass	
* <i>Festuca myuros</i>	rattail fescue	
* <i>Festuca perennis</i>	rye grass	
* <i>Gastridium phleoides</i>	nit grass	
* <i>Hordeum murinum ssp. glaucum</i>	smooth barley	
* <i>Lamarckia aurea</i>	goldentop grass	
<i>Melica imperfecta</i>	coast range onion grass	
* <i>Melinis repens ssp. repens</i>	natal grass	
<i>Muhlenbergia microsperma</i>	littleseed muhly	
<i>Phalaris sp.</i>	canary grass	
* <i>Poa annua</i>	annual blue grass	
* <i>Polypogon monspeliensis</i>	rabbit foot beard grass	
* <i>Schismus barbatus</i>	Mediterranean schismus	
<i>Sporobolus airoides</i>	alkali sacaton	
<i>Stipa coronata</i>	crested needle grass	
<i>Stipa diegoensis</i>	San Diego County needle grass	CRPR 4.2
<i>Stipa lepida</i>	foothill needle grass	
* <i>Stipa miliacea var. miliacea</i>	smilo grass	
<i>Stipa pulchra</i>	purple needle grass	
Themidaceae - Brodiaea family		
<i>Bloomeria clevelandii</i>	San Diego goldenstar	CRPR 1B.1
<i>Bloomeria crocea</i>	common goldenstar	
<i>Brodiaea terrestris ssp. kernensis</i>	Kern brodiaea	
<i>Dichelostemma capitatum</i>	blue dicks	
Typhaceae - Cattail family		
<i>Typha sp.</i>	cattail	

Scientific Name	Common Name	Special Status
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Legend

*= Non-native or invasive species

Special Status:

CRPR – California Rare Plant Rank

1A. Presumed extinct in California and elsewhere

1B. Rare or Endangered in California and elsewhere

2A. Presumed extinct in California, more common elsewhere

2B. Rare or Endangered in California, more common elsewhere

3. Plants for which we need more information - Review list

4. Plants of limited distribution - Watch list

Threat Ranks

.1 - Seriously endangered in California

.2 – Fairly endangered in California

Appendix C
Observed Species List – Fauna

Appendix C. Wildlife Species Detected within the Project Site and Vicinity

Scientific Name	Common Name	Special Status
INVERTEBRATES		
Branchiopods		
<i>Branchinecta lindahli</i>	Versatile Fairy Shrimp	
<i>Branchinecta sandiegonensis</i>	San Diego Fairy Shrimp	FE
Moths, Skippers and Butterflies		
<i>Papilio rutulus</i>	Western Tiger Swallowtail	
<i>Pontia protodice</i>	Checkered White	
* <i>Pieris rapae</i>	Cabbage White	
<i>Anthocharis sara</i>	Pacific Orangetip	
<i>Zerene eurydice</i>	California Dogface	
<i>Brephidium exile</i>	Western Pygmy-Blue	
<i>Euphilotes bernardino</i>	Bernardino Dotted-Blue	
<i>Icaricia acmon</i>	Acmon Blue	
<i>Apodemia virgulti</i>	Behr's Metalmark	
<i>Phyciodes mylitta</i>	Mylitta Crescent	
<i>Euphydryas editha quino</i>	Quino Checkerspot	FE
<i>Vanessa cardui</i>	Painted Lady	
<i>Junonia coenia</i>	Common Buckeye	
<i>Coenonympha tullia</i>	Common Ringlet	
<i>Hylephila phyleus</i>	Fiery Skipper	
VERTEBRATES		
Amphibians		
* <i>Lithobates catesbeianus</i>	American Bullfrog	
<i>Pseudacris regilla</i>	Pacific Treefrog	
<i>Spea hammondi</i>	Western Spadefoot	CSC
* <i>Xenopus laevis</i>	African Clawed Frog	
Reptiles		
<i>Aspidoscelis hyperythra hyperythra</i>	Belding's Orange-throated Whiptail	CSC
<i>Phrynosoma blainvillii</i>	Blainville's Horned Lizard	CSC
<i>Sceloporus occidentalis</i>	Western Fence Lizard	
<i>Uta stansburiana elegans</i>	Western Side-blotched Lizard	
<i>Crotalus ruber</i>	Red Diamond Rattlesnake	CSC
<i>Lichanura trivirgata</i>	Rosy Boa	

Scientific Name	Common Name	Special Status
<i>Pituophis catenifer annectens</i>	San Diego Gophersnake	
<i>Thamnophis hammondi</i>	Two-striped Gartersnake	CSC
Birds		
<i>Anas platyrhynchos</i>	Mallard	
<i>Callipepla californica</i>	California Quail	
<i>Ardea herodias</i>	Great Blue Heron	
<i>Ardea alba</i>	Great Egret	
<i>Butorides virescens</i>	Green Heron	
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	
<i>Cathartes aura</i>	Turkey Vulture	
<i>Elanus leucurus</i>	White-tailed Kite	CFP
<i>Circus cyaneus</i>	Northern Harrier	CSC
<i>Accipiter cooperii</i>	Cooper's Hawk	
<i>Buteo lineatus</i>	Red-shouldered Hawk	
<i>Buteo jamaicensis</i>	Red-tailed Hawk	
<i>Rallus limicola</i>	Virginia Rail	
<i>Fulica americana</i>	American Coot	
<i>Charadrius vociferus</i>	Killdeer	
* <i>Columba livia</i>	Rock Pigeon	
<i>Zenaida macroura</i>	Mourning Dove	
<i>Coccyzus americanus occidentalis</i>	California Yellow-billed Cuckoo	SE
<i>Geococcyx californianus</i>	Greater Roadrunner	
<i>Bubo virginianus</i>	Great Horned Owl	
<i>Athene cunicularia</i>	Burrowing Owl	CSC
<i>Chordeiles acutipennis</i>	Lesser Nighthawk	
<i>Phalaenoptilus nuttallii</i>	Common Poorwill	
<i>Aeronautes saxatalis</i>	White-throated Swift	
<i>Archilochus alexandri</i>	Black-chinned Hummingbird	
<i>Calypte anna</i>	Anna's Hummingbird	
<i>Calypte costae</i>	Costa's Hummingbird	
<i>Ceryle alcyon</i>	Belted Kingfisher	
<i>Picoides nuttallii</i>	Nuttall's Woodpecker	
<i>Picoides pubescens</i>	Downy Woodpecker	

Scientific Name	Common Name	Special Status
<i>Colaptes auratus</i>	Northern Flicker	
<i>Falco sparverius</i>	American Kestrel	
<i>Empidonax traillii</i>	Willow Flycatcher	SE
<i>Empidonax difficilis</i>	Pacific-slope Flycatcher	
<i>Sayornis nigricans</i>	Black Phoebe	
<i>Sayornis saya</i>	Say's Phoebe	
<i>Myiarchus cinerascens</i>	Ash-throated Flycatcher	
<i>Tyrannus vociferans</i>	Cassin's Kingbird	
<i>Tyrannus verticalis</i>	Western Kingbird	
<i>Vireo bellii pusillus</i>	Least Bell's Vireo	FE, SE
<i>Vireo huttoni</i>	Hutton's Vireo	
<i>Vireo gilvus</i>	Warbling Vireo	
<i>Apelocoma californica</i>	Western Scrub-Jay	
<i>Corvus brachyrhynchos</i>	American Crow	
<i>Corvus corax</i>	Common Raven	
<i>Eremophila alpestris actis</i>	California Horned Lark	
<i>Tachycineta bicolor</i>	Tree Swallow	
<i>Tachycineta thalassina</i>	Violet-green Swallow	
<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow	
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	
<i>Psaltriparus minimus</i>	Bushtit	
<i>Troglodytes aedon</i>	House Wren	
<i>Cistothorus palustris</i>	Marsh Wren	
<i>Thryomanes bewickii</i>	Bewick's Wren	
<i>Campylorhynchus brunneicapillus sandiegensis</i>	San Diego Cactus Wren	CSC
<i>Polioptila caerulea</i>	Blue-gray Gnatcatcher	
<i>Polioptila californica californica</i>	Coastal California Gnatcatcher	FT, CSC
<i>Regulus calendula</i>	Ruby-crowned Kinglet	
<i>Chamaea fasciata</i>	Wrentit	
<i>Sialia mexicana</i>	Western Bluebird	
<i>Catharus guttatus</i>	Hermit Thrush	
<i>Toxostoma redivivum</i>	California Thrasher	
<i>Mimus polyglottos</i>	Northern Mockingbird	

Scientific Name	Common Name	Special Status
<i>*Sturnus vulgaris</i>	European Starling	
<i>Phainopepla nitens</i>	Phainopepla	
<i>Oreothypis celata</i>	Orange-crowned Warbler	
<i>Geothlypis trichas</i>	Common Yellowthroat	
<i>Setophaga petechia</i>	Yellow Warbler	CSC
<i>Setophaga coronata</i>	Yellow-rumped Warbler	
<i>Cardellina pusilla</i>	Wilson's Warbler	
<i>Icteria virens</i>	Yellow-breasted Chat	CSC
<i>Pipilo maculatus</i>	Spotted Towhee	
<i>Aimophila ruficeps canescens</i>	Southern California Rufous-crowned Sparrow	
<i>Melospiza crissalis</i>	California Towhee	
<i>Artemisiospiza belli belli</i>	Bell's Sage Sparrow	
<i>Melospiza melodia</i>	Song Sparrow	
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow	
<i>Zonotrichia atricapilla</i>	Golden-crowned Sparrow	
<i>Piranga ludoviciana</i>	Western Tanager	
<i>Pheucticus melanocephalus</i>	Black-headed Grosbeak	
<i>Passerina caerulea</i>	Blue Grosbeak	
<i>Passerina amoena</i>	Lazuli Bunting	
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	
<i>Sturnella neglecta</i>	Western Meadowlark	
<i>*Molothrus ater</i>	Brown-headed Cowbird	
<i>Icterus cucullatus</i>	Hooded Oriole	
<i>Icterus bullockii</i>	Bullock's Oriole	
<i>Haemorhous mexicanus</i>	House Finch	
<i>Carduelis psaltria</i>	Lesser Goldfinch	
<i>Carduelis lawrencei</i>	Lawrence's Goldfinch	
<i>Carduelis tristis</i>	American Goldfinch	
Mammals		
<i>Sylvilagus audubonii</i>	Desert Cottontail	
<i>Lepus californicus bennettii</i>	San Diego Black-tailed Jackrabbit	CSC
<i>Ostospermophilus beecheyi</i>	California Ground Squirrel	
<i>Neotoma lepida intermedia</i>	San Diego Desert Woodrat	CSC

Scientific Name	Common Name	Special Status
<i>Canis latrans</i>	Coyote	
<i>Procyon lotor</i>	Northern Raccoon	
<i>Mephitis mephitis</i>	Striped Skunk	
<i>Puma concolor</i>	Mountain Lion	
<i>Lynx rufus</i>	Bobcat	
<i>Odocoileus hemionus</i>	Southern Mule Deer	

Legend

*= Non-native or invasive species

Special Status:

Federal:

FE = Endangered

FT = Threatened

State:

SE = Endangered

ST =Threatened

CSC = California Species of Special Concern

CFP = California Fully Protected Species

Potential to Occur – Sensitive Species Table: Flora

Potential To Occur – Special-Status Species Table: Flora

Common Name (<i>Scientific Name</i>)	Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Aphanisma (<i>Aphanisma blitoides</i>)	CRPR 1B.2 SD County List A City of Chula Vista MSCP	Annual herb. Sandy soils in coastal bluff scrub, coastal dunes, and coastal scrub; 1–305 m (3–1,000 ft). Blooming period: March–June	Not Expected	Appropriate coastal bluff and dune habitat does not occur within the Project Area.
Ashy spike-moss (<i>Selaginella cinerascens</i>)	CRPR 4.1 SD County List D	Perennial rhizomatous herb. Chaparral and coastal sage scrub; 20–640 m (65–2,099 ft).	Present	This species was observed within the Project Area during surveys.
Blochman's dudleya (<i>Dudleya blochmaniae</i> ssp. <i>blochmaniae</i>)	CRPR 1B.1 SD County List A	Perennial herb. Rocky, often clay or serpentine soils in coastal bluff scrub, chaparral, coastal scrub, and valley and foothill grassland; 5–450 m (16–1,476 ft). Blooming period: April–June	Low	Suitable habitat for this species is present within the Project Area; however, this species tends to occur in areas with a greater coastal influence.
California adder's tongue (<i>Ophioglossum californicum</i>)	CRPR 4.2 SD County List D	Perennial rhizomatous herb. Mesic areas within chaparral, valley and foothill grassland, and margins of vernal pools; 60–525 m (195–1,720 ft). Blooming period: December–June.	Moderate	Suitable soils and habitat for this species are present within the Project Area. This species has been documented within several miles of the Project Area.
California adolphia (<i>Adolphia californica</i>)	CRPR 2B.1 SD County List B	Deciduous shrub. Clay soils in chaparral, coastal scrub, and valley and foothill grassland; 45–740 m (147–2,428 ft). Blooming period: December–May	Not expected to occur	Suitable soils and habitat are present within the Project Area. This species has been documented in close vicinity to the Project Area. The species was not observed during Project Area surveys.
California box-thorn (<i>Lycium californicum</i>)	CRPR 4.2 SD County List D	Perennial shrub. Coastal buff scrub, and coastal sage scrub; 5–150 m (15–490 ft.). Blooming period: December, March, and June–August.	Moderate	This species is typically restricted to coastal zones on bluff, dunes and at the periphery of coastal marshes. However, potential suitable soils and habitat for this species are present within the Project Area, and this species has been documented within 3 miles of the Project Area.

Common Name (Scientific Name)	Status	Habitat Preference/Requirements	Potential to Occur	Rationale
California Orcutt grass (<i>Orcuttia californica</i>)	FE/CE CRPR 1B.1 SD County List A City of Chula Vista MSCP	Annual herb. Vernal pools; 15–660 m (49–2,165 ft). Blooming period: April–August	Moderate	Appropriate habitat for this species occurs within the Project Area. However, the nearest known occurrence of this species is approximately 2 miles south of the Project Area.
California spineflower (<i>Mucronea californica</i>)	CRPR 4.2 SD County List D	Annual herb. Sandy areas within chaparral, cismontane woodland, coastal dunes, coastal sage scrub, and valley and foothill grasslands; 0–1,400 m (0–4,595 ft). Blooming period: March–August	Not Expected	Appropriate sandy soils for this species do not occur within the Project Area.
Chaparral ash (<i>Fraxinus parryi</i>)	CRPR 2B.2	Perennial shrub. Chaparral; 213–620 m (698–2,033 ft). Blooming period March–May	Not Expected	Suitable dense, southern mixed chaparral habitat for this species does not occur within the Project Area.
Chaparral ragwort (<i>Senecio aphanactis</i>)	CRPR 2B.2 SD County List B	Annual herb. Chaparral, cismontane woodland, coastal scrub, and alkaline flats; 15–800 m (49–2,624 ft.). Blooming period: January–April	High	Suitable soils and habitat for this species are present within the Project Area. This species has been documented within 2 miles east of the Project Area.
Cliff spurge (<i>Euphorbia misera</i>)	CRPR 2B.2 SD County List B	Perennial shrub. Rocky areas in coastal bluff scrub, coastal scrub, and Mojavean desert scrub; 10–500 m (32–1,640 ft). Blooming period: December–October	Low	Suitable coastal bluff habitat for this species does not occur within the Project Area.
Cooper's rein orchid (<i>Piperia cooperi</i>)	CRPR 4.2 SD County List D	Perennial herb. Chaparral, cismontane woodlands, and valley and foothill grasslands; 15–1,585 m (45–5,200 ft.). Blooming period: March–June.	Moderate	Suitable soils and habitat for this species are present within the Project Area. This species has been documented within several miles of the Project Area.
Coulter's matillija poppy (<i>Romneya coulteri</i>)	CRPR 4.2 SD County List D	Perennial herb. Often in burns within chaparral, and coastal sage scrub; 20–1,200 m (65–3,935 ft.). Blooming period: March–August.	Moderate	Suitable soils and habitat for this species are present within the Project Area. This species has been documented within several miles of the Project Area.
Coulter's saltbush (<i>Atriplex coulteri</i>)	CRPR 1B.2 SD County List A	Perennial herb. Alkaline or clay soils in coastal bluff scrub, coastal dunes, coastal scrub, and valley and foothill grassland; 3–460 m (9–1,509 ft). Blooming period: March–October	Moderate	Species is typically restricted to the coastal zone within coastal bluffs, dunes, and scrub communities, and the nearest known occurrence of this species is approximately 3 miles southwest of the Project Area.

Common Name (Scientific Name)	Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Dean's milk-vetch (<i>Astragalus deanei</i>)	CRPR 1B.1 SD County List A	Perennial herb. Open shrubby slopes, coastal sage scrub, chaparral, cismontane woodland, riparian forest, and sandy washes; 75–695 m (246–2,279 ft). Blooming period: February–May	Low	Suitable soils and habitat are present within the Project Area. However, this species has not been detected south of State Route 94.
Decumbent goldenbush (<i>Isocoma menziesii</i> var. <i>decumbens</i>)	CRPR 1B.2 SD County List A	Perennial shrub. Chaparral and in sandy coastal scrub, often in sandy disturbed areas; 10–135 m (33–443 ft). Blooming period: April–November	Present	Suitable soils and habitat for this species are present within the Project Area. This species was observed within the Project Area during surveys conducted by RECON, but was not detected within in the Project Area during surveys conducted from 2009 through 2018.
Dunn's mariposa-lily (<i>Calochortus dunnii</i>)	SR CRPR 1B.2 SD County List A City of Chula Vista MSCP NE	Perennial bulbiferous herb. Gabbroic or metavolcanic soils, or rocky openings in chaparral or grassland/chaparral ecotone, also in closed-cone coniferous forest; 185–1,830 m (606–6,002 ft). Blooming period: February–June	Low	Appropriate ultramafic soils for this species do not occur within the Project Area.
Encinitas baccharis (<i>Baccharis vanessae</i>)	FT/CE CRPR 1B.1 SD County List A City of Chula Vista MSCP NE	Deciduous shrub. Sandstone in maritime chaparral and cismontane woodland; 60–720 m (196–2,362 ft). Blooming period: August–November	Low	Suitable maritime chaparral or cismontane woodland habitat and appropriate soil for this species do not occur within the Project Area.
Engelmann oak (<i>Quercus engelmannii</i>)	CRPR 4.2 SD County List D	Perennial deciduous tree. Chaparral, cismontane woodland, riparian woodland and valley and foothill grassland; 50–1,300 m (160–4,265 ft.). Blooming period: March–June.	Not expected to occur	Suitable soils and habitat for this species are present within the Project Area. This species has been documented within several miles of the Project Area. This tree species was not observed during surveys of the Project Area.
Felt-leaved monardella (<i>Monardella hypoleuca</i> ssp. <i>lanata</i>)	CRPR 1B.2 SD County List A City of Chula Vista MSCP NE	Rhizomatous herb. Chaparral and cismontane woodland; 300–1,575 m (984–5,040 ft). Blooming Period: June–August	Not Expected	Suitable metavolcanic and/or gabbroic soil types for this species do not occur within the Project Area.

Common Name (Scientific Name)	Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Gander's pitcher sage (<i>Lepechinia ganderi</i>)	CRPR 1B.3 SD County List A City of Chula Vista MSCP NE	Perennial shrub. Gabbroic or metavolcanic soils in closed-cone coniferous forest, chaparral, coastal scrub, and valley and foothill grassland; 305–1,005 m (1,000–3,296 ft). Blooming period: June–July	Not Expected	This species typically occurs at higher elevations than the Project Area.
Golden-rayed pentachaeta (<i>Pentachaeta aurea</i> ssp. <i>aurea</i>)	CRPR 4.2 SD County List D	Annual herb. Openings in, coastal sage scrub, and valley and foothill grassland; 80–1,850 m (260–6,070 ft.). Blooming period: March–June.	Moderate	Suitable soils and habitat for this species are present within the Project Area, and this species has been documented within several miles of the Project Area.
Golden-spined cereus (<i>Bergerocactus emoryi</i>)	CRPR 2B.2 SD County List B	Perennial stem succulent. Sandy soils in coastal scrub, chaparral, and closed-cone coniferous forest. Moist ocean breezes may be a key to its habitat requirements; 3–395 m (9–1,295 ft). Blooming period: May–June	Low	Appropriate maritime succulent scrub habitat for this species does not occur within the Project Area.
Graceful tarplant (<i>Holocarpha virgata</i> ssp. <i>elongata</i>)	CRPR 4.2 SD County List D	Annual herb. Chaparral, cismontane woodland, coastal scrub, and valley and foothill grassland; 60–1,100 m (196–3,600 ft). Blooming period: May–November	Present	This species was observed within the Project Area during surveys.
Jennifer's monardella (<i>Monardella stoneana</i>)	CRPR 1B.2 SD County List A	Perennial herb. Usually in rocky, intermittent streambeds in closed-cone coniferous forest, chaparral, coastal scrub, riparian scrub; 10–790 m (32–2,591 ft). Blooming period: June–September	Low	Suitable habitat for this species within the Project Area is highly disturbed.
Laguna Mountains jewel-flower (<i>Streptanthus bernardinus</i>)	CRPR 4.3 SD County List D	Perennial herb. Chaparral and lower montane coniferous forest; 670–2,500 m (2,198–8,202 ft). Blooming period: May–August	Not expected	This species tends to occur farther east and at higher elevations than those found within Project Area.
Lakeside ceanothus (<i>Ceanothus cyaneus</i>)	CRPR 1B.2 SD County List A City of Chula Vista MSCP NE	Evergreen shrub. Closed-cone coniferous forest, dense chaparral; 235–755 m (771–2,543 ft). Blooming period: April–June	Low	Apart from a few isolated occurrences within the local region, the Project Area occurs south of the typical known range of this species.

Common Name (Scientific Name)	Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Lewis' evening primrose (<i>Camissoniopsis lewisii</i>)	CRPR 3 SD County List C	Annual herb. Sandy or clay areas within coastal bluff scrub, cismontane woodland, coastal dunes, valley and foothill grasslands; 0–300 m (0–985 ft). Blooming period: March–June	Low	Appropriate habitat with sandy or clay soils is limited within the Project Area.
Little mouseltail (<i>Myosurus minimus</i> ssp. <i>apus</i>)	CRPR 3.1 SD County List C	Annual herb. Valley and foothill grassland, and alkaline vernal pools; 20–640 m (65–2,100 ft). Blooming period: March–June	High	Appropriate habitat for this species occurs within the Project Area, and this species has been documented close to the Project Area.
Long-spined spineflower (<i>Chorizanthe polygonoides</i> var. <i>longispina</i>)	CRPR 1B.2 SD County List A	Annual herb. Clay lenses, largely devoid of shrubs in chaparral, coastal scrub, meadows and seeps, valley and foothill grassland, and vernal pools; 30–1,530 m (98–5,018 ft). Blooming period: April–July	High	Suitable soils and habitat for this species are present within the Project Area. This species has been documented approximately 1.0 mile north of the Project Area.
Mexican flannelbush (<i>Fremontodendron mexicanum</i>)	FE/SR CRPR 1B.1 SD County List A	Evergreen shrub. Gabbroic, metavolcanic, or serpentine soils in closed-cone coniferous forest, chaparral, and cismontane woodland; 10–716 m (32–2,349 ft). Blooming period: March–June	Low	Suitable ultramafic soils for this species do not occur within the Project Area.
Munz's sage (<i>Salvia munzii</i>)	CRPR 2B.2 SD County List B	Evergreen shrub. Chaparral and coastal sage scrub; 120–1,065 m (393–3,493 ft). Blooming period: February–April	Present	This species was observed within Project Area during surveys.
Nuttall's lotus (<i>Acmispon prostratus</i>)	CRPR 1B.1 SD County List A City of Chula Vista MSCP	Annual herb. Coastal dunes and sandy coastal scrub; 0–10 m (0–32 ft). Blooming period: March–July	Not Expected	Suitable coastal dunes/scrub and sandy soil are not present within the Project Area.
Nuttall's scrub oak (<i>Quercus dumosa</i>)	CRPR 1B.1 SD County List A	Perennial evergreen shrub. Sandy or clay loam in closed-cone coniferous forest, chaparral, and coastal scrub; 15–400 m (49–1,312 ft). Blooming period: February–August	Not expected to occur	Appropriate habitat for this species occurs within the Project Area. This species has been documented within 2 miles of the Project Area. This tree species was not observed during surveys of the Project Area.

Common Name (Scientific Name)	Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Ocellated Humboldt lily (<i>Lilium humboldtii</i> ssp. <i>ocellatum</i>)	CRPR 4.2 SD County List D	Perennial bulbiferous herb. Openings in chaparral, coastal sage scrub, lower montane coniferous forest, and riparian woodland; 30–1,800 m (195–5,905 ft.). Blooming period: March, and May–June.	Moderate	Suitable soils and habitat for this species are present within the Project Area. This species has been documented within three miles of the Project Area.
Orcutt's bird's-beak (<i>Dicranostegia orcuttiana</i>)	CRPR 2B.1 SD County List B City of Chula Vista MSCP	Hemiparasitic annual herb. Coastal scrub, seasonally dry drainages, uplands adjacent to riparian habitat; 10–350 m (32–1,148 ft.). Blooming period: March–September	Low	Suitable habitat for this species is highly disturbed within the Project Area.
Orcutt's brodiaea (<i>Brodiaea orcuttii</i>)	CRPR 1B.1 SD County List A City of Chula Vista MSCP NE	Bulbiferous herb. Found on mesic, clay, sometimes serpentinite soils in closed-cone coniferous forest, chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland, and vernal pools; 30–1,692 m (98–5,550 ft.). Blooming period: May–July	High	Appropriate habitat for this species occurs within the Project Area, and this species has been documented approximately 0.25 mile southwest of the Project Area.
Otay manzanita (<i>Arctostaphylos otayensis</i>)	CRPR 1B.2 SD County List A City of Chula Vista MSCP	Evergreen shrub. Chaparral or cismontane woodlands on volcanic rock outcrops; 275–1,700 m (902–5,576 ft.). Blooming period: January–April	Present	This species was observed within the Project Area during surveys.
Otay Mesa mint (<i>Pogogyne nudiuscula</i>)	FE/CE CRPR 1B.1 SD County List A City of Chula Vista MSCP	Annual herb. Vernal pools; 90–250 (295–820 ft.). Blooming period: May–July	High	Appropriate habitat for this species occurs within the Project Area, and this species has been documented close to the south of the Project Area on Otay Mesa.
Otay Mountain ceanothus (<i>Ceanothus otayensis</i>)	CRPR 1B.2	Perennial evergreen shrub. Metavolcanic or gabbroic chaparral; 600–1,100 m (1,968–3,608 ft.). Blooming period: January–April	Present	Suitable habitat is very limited within the Project Area. This species was observed within the Project Area during survey conducted by RECON in 2010, but it was not detected during the 2018 surveys.
Otay Mountain lotus (<i>Hosackia crassifolia</i> var. <i>otayensis</i>)	CRPR 1B.1 SD County List A	Perennial herb. Metavolcanic chaparral, often in disturbed areas; 380–1,005 m (1,246–3,296 ft.). Blooming period: May–August	Not Expected	Suitable ultramafic soils for this species do not occur within the Project Area.

Common Name (Scientific Name)	Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Otay tarplant (<i>Deinandra conjugens</i>)	FT/CE CRPR 1B.1 SD County List A City of Chula Vista MSCP NE	Annual herb. Clay soils in coastal sage scrub and valley and foothill grassland; 25–300 m (82–984 ft). Blooming period: May–June	High	Suitable soils and habitat for this species are present within the Project Area. This species was observed close to, but outside of, the Project Area during survey conducted by RECON in 2012 but was not observed during the 2018 survey; however, this species is presumed extant within the Project Area.
Palmer's grapplinghook (<i>Harpagonella palmeri</i>)	CRPR 4.2 SD County List D	Annual herb. Clay soils in chaparral, grasslands, coastal sage scrub; 20–955 m (65 to 3,132 ft). Blooming period: March–May	Present	This species was observed within the Project Area during surveys.
Paniculate tarplant (<i>Deinandra paniculata</i>)	CRPR 4.2 SD County List D	Annual herb. Usually vernal mesic sometimes sandy coastal sage scrub, valley foothill grassland, and vernal pools; 25–940 m (80–3,025 ft). Blooming period: March–November.	Moderate	Suitable soils and habitat for this species are present within the Project Area. However, the nearest known occurrence of this species is several miles from the Project Area.
Parry's tetracoccus (<i>Tetracoccus dioicus</i>)	CRPR 1B.2 SD County List A City of Chula Vista MSCP	Deciduous shrub. Chaparral and coastal sage scrub; 165–1,000 m (541–3,280 ft). Blooming period: April–May	Not Expected	Suitable ultramafic soils for this species do not occur within the Project Area.
Purple stemodia (<i>Stemodia durantifolia</i>)	CRPR 2B.1 SD County List B	Perennial herb. Population wide, along minor creeks and seasonal drainages, often in mesic, sandy soils in Sonoran desert scrub. Within the coastal zone in streams and creeks, typically slow moving rocky streams; 180–300 m (590–984 ft). Blooming period: January–December	High	Suitable soils and habitat for this species are present within the Project Area. This species was observed by RECON 2012 close to the Project Area. This species was not detected within the boundaries of the Project Area during surveys conducted by RECON or ICF from 2008 through 2018.
Robinson's pepper- grass (<i>Lepidium virginicum</i> var. <i>robinsonii</i>)	CRPR 4.3 SD County List A	Annual herb. Openings in chaparral and sage scrub; below 885 m (2,900 ft). Blooming Period: January–July	High	Suitable soils and habitat for this species are present within the Project Area. This species has been documented immediately south of the projected area.

Common Name (Scientific Name)	Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Round-leaved filaree (<i>California macrophylla</i>)	SD County List B	Annual herb. Clay soils in cismontane woodland and valley and foothill grassland; 15–1,200 m (50–3,936 ft). Blooming period: March–May	High	Suitable soils and habitat for this are present within the Project Area. This species has been documented approximately 0.5 mile west of the Project Area.
San Diego ambrosia (<i>Ambrosia pumila</i>)	FE CRPR 1B.1 SD County List A City of Chula Vista MSCP NE	Rhizomatous herb. Sandy loam or clay soils in chaparral, coastal scrub, valley and foothill grassland, and vernal pools; often in disturbed areas or sometimes alkaline areas. Can occur in creek beds, seasonally dry drainages, and floodplains; 20–415 m (66– 1,362 ft). Blooming period: April–October	Moderate	Suitable soils and habitat are present within the Project Area. However, the nearest known occurrence of this species is approximately 4 miles west of the Project Area.
San Diego barrel cactus (<i>Ferocactus viridescens</i>)	CRPR 2B.1 SD County List B City of Chula Vista MSCP	Stem succulent. Sandy to rocky areas; chaparral, coastal scrub, valley and foothill grassland, vernal pools; 3–450 m (9–1,476 ft). Blooming period: May–June	Present	This species was observed within the Project Area during surveys.
San Diego bur- sage (<i>Ambrosia chenopodiifolia</i>)	CRPR 2B.1 SD County List B	Perennial shrub. Coastal scrub; 55–155 m (178–508 ft). Blooming period: April–June	High	Suitable soils and habitat are present within the Project Area. This species has been documented approximately 0.5 mile south of the Project Area.
San Diego button- celery (<i>Eryngium aristulatum</i> var. <i>parishii</i>)	FE/CE CRPR 1B.1 SD County List A City of Chula Vista MSCP	Annual/perennial herb. Mesic soils in coastal scrub, valley and foothill grassland, and vernal pools; 20–620 m (65–2,034 ft). Blooming period: April–June	High	This species has not been observed within the Project Area; however, occurrences have been documented within 1 mile of the project site. Specifically, the nearest were on Otay Mesa approximately 2,000 feet southeast of the project site.
San Diego County needle grass (<i>Stipa diegoensis</i>)	CRPR 4.2 SD County List D	Perennial herb. Rocky, often mesic soils within chaparral and coastal scrub; 10–800 m (32–2,624 ft). Blooming period: February–June	Present	This species was observed within the Project Area during surveys.
San Diego County viguiera (<i>Bahiopsis laciniata</i>)	CRPR 4.2 SD County List D	Perennial shrub. Chaparral and coastal scrub; 10–750 m (33–2,461 ft). Blooming period: February–August	Present	This species was observed within the Project Area.

Common Name (Scientific Name)	Status	Habitat Preference/Requirements	Potential to Occur	Rationale
San Diego goldenstar (<i>Bloomeria clevelandii</i>)	CRPR 1B.1 SD County List A City of Chula Vista MSCP	Perennial bulbiferous herb. Clay soils in chaparral, coastal sage scrub, valley grasslands, particularly near mima mound topography or the vicinity of vernal pools; 50 – 465 m (164–1,526 ft). Blooming period : April–May	High	Suitable soils and habitat for this species are present within the Project Area. This species was observed by RECON in 2010 close to the Project Area, but it was not detected within the boundaries of the Project Area during surveys conducted from 2008 through 2018.
San Diego marsh-elder (<i>Iva hayesiana</i>)	CRPR 2B.2 SD County List B	Perennial herb. Marshes and swamps, wetland areas, and playas; 10–500 m (32–1,640 ft). Blooming period: April–October	Present	This species was observed within the Project Area during surveys.
San Diego milk-vetch (<i>Astragalus oocarpus</i>)	CRPR 1B.2 SD County List A	Perennial herb. Openings in chaparral and cismontane woodland, at the periphery of meadows; 305–1,524 m (1,000–4,999 ft). Blooming period: May–August	Low	This species tends to occur farther east and at higher elevations than those found within the Project Area.
San Diego sagewort (<i>Artemisia palmeri</i>)	CRPR 4.2 SD County List D	Deciduous shrub. Sandy soils in mesic areas in chaparral, coastal scrub, riparian forest, riparian scrub, riparian woodland; 15–915 m (49–3,002 ft). Blooming period: February–September	Moderate	Suitable soils and habitat are present within the Project Area. However, the nearest known occurrence of this species is approximately 3 miles northwest of the Project Area.
San Diego thorn-mint (<i>Acanthomintha ilicifolia</i>)	FT/CE CRPR 1B.1 SD County List A City of Chula Vista MSCP NE	Annual herb. Prefers friable or broken clay soils in grassy openings in chaparral and coastal sage scrub, valley and foothill grassland, and vernal pools; 10–960 m (33–3,150 ft). Blooming period: April–June	Low	Marginally suitable friable clay soils for this species occur in a very limited area within the Project Area.
Seaside cistanthe (<i>Cistanthe maritima</i>)	CRPR 4.2 SD County List D	Annual herb. Sandy soils within coastal bluff scrub, coastal sage scrub, and valley and foothill grassland; 5–300 m (15–985 ft). Blooming period: February–August.	Low	Appropriate habitat with suitable sandy soils within coastal bluff, maritime coastal sage scrub, or valley foothill grasslands habitat does not occur within the Project Area.
Shaw’s agave (<i>Agave shawii</i> var. <i>shawii</i>)	CRPR 2B.1 SD County List B City of Chula Vista MSCP NE	Perennial leaf succulent. Coastal bluff scrub, maritime succulent scrub; 10–120 m (32–393 ft). Blooming period: September–May	Not Expected	This species prefers maritime succulent scrub and coastal bluff habitat, which do not occur within the Project Area.

Common Name (Scientific Name)	Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Singlewhorl burrobush (<i>Ambrosia monogyra</i>)	CRPR 2B.2	Perennial shrub. Sandy soils in chaparral, coastal scrub, Sonoran desert scrub, and washes; 10–500 m (328–1,640 ft). Blooming period: August–November	Present	This species was observed within the Project Area during surveys.
Small-flowered microseris (<i>Microseris douglasii</i> ssp. <i>platycarpa</i>)	CRPR 4.2 SD County List D	Annual herb. Clay soils in cismontane woodland, coastal scrub, valley and foothill grassland, and vernal pools; 15–1,070 m (49–3,510 ft). Blooming period: March–May	Present	Suitable soils and habitat for this species are present within the Project Area. This species was observed by RECON in 2013 and 2015 within the Project Area. This species was not detected within the boundaries of the Project Area during surveys conducted by RECON or ICF from 2008 and 2016 through 2018.
Small-flowered morning glory (<i>Convolvulus simulans</i>)	CRPR 4.2 SD County List D	Annual herb. Friable clay soils or serpentine seeps in chaparral openings, coastal scrub, and valley and foothill grassland; 30–700 m (98–2,297 ft). Blooming period: March–July	Moderate	Suitable soils and habitat for this species are present within the Project Area. However, the nearest known occurrence of this species is several miles from the Project Area.
Small-leaved rose (<i>Rosa minutifolia</i>)	CE CRPR 2B.1 SD County List B City of Chula Vista MSCP	Deciduous shrub. Chaparral and coastal scrub; 150–160 m (492–524 ft). Blooming period: January–June	Low	Suitable habitat for this species is present within the Project Area. However, this species is only known from a few locations near State Route 905 in San Diego County.
Snake cholla (<i>Cylindropuntia californica</i> var. <i>californica</i>)	CRPR 1B.1 SD County List A City of Chula Vista MSCP NE	Stem succulent. Chaparral and coastal scrub, typically on xeric hillsides; 30–150 m (98–492 ft). Blooming period: April–May	High	Suitable soils and habitat for this species are present within the Project Area. This species was observed by RECON in 2010, 2013, and 2015 close to, but outside of, the Project Area. It was not detected within the boundaries of the Project Area during surveys conducted from 2016 through 2018.

Common Name (Scientific Name)	Status	Habitat Preference/Requirements	Potential to Occur	Rationale
South coast (saltbush) saltscale (<i>Atriplex pacifica</i>)	CRPR 1B.2 SD County List A	Annual herb. Coastal bluff scrub, coastal dunes, coastal scrub, playas; 0–140 m (0–459 ft). Blooming period: March–October	Present	This species was observed within the Project Area during surveys conducted by RECON in 2012, but it was not detected during the 2018 surveys. However, this species is presumed extant within the Project Area.
Southern mountain misery (<i>Chamaebatia australis</i>)	CRPR 4.2 SD County List D	Evergreen shrub. Chaparral (gabbroic or metavolcanic)	Low	Appropriate chaparral habitat with gabbroic or metavolcanic soils for this species does not occur within the Project Area.
Southwestern Spiny Rush (<i>Juncus acutus</i> ssp. <i>leopoldii</i>)	CRPR 4.2 SD County List D	Perennial rhizomatous herb. Mesic soils in coastal dunes, alkaline seeps in meadows and seeps, and coastal salt marshes and swamps; 3–900 m (9–2,953 ft). Blooming period: May–June	Present	This species was observed within the Project Area during surveys.
Spreading navarretia (<i>Navarretia fossalis</i>)	FT CRPR 1B.1 SD County List A City of Chula Vista MSCP	Annual herb. Chenopod scrub, assorted freshwater marshes and swamps, playas, and vernal pools; 30–655 m (98–2,149 ft). Blooming period: April–June	Present	Suitable soils and habitat for this species are present within the Project Area. This species was observed by RECON in 2011 and 2012 in the Project Area, within the southern side of the Mitigation Bank Expansion area. However, the identification of these occurrences does not appear to have been confirmed by RECON and was not confirmed by ICF in subsequent, and exhaustive surveys for the species in areas where RECON mapped it, as well as throughout the Project Area.
Summer holly (<i>Comarostaphylis diversifolia</i> ssp. <i>diversifolia</i>)	CRPR 1B.2 SD County List A	Evergreen shrub. Chaparral and cismontane woodland; 30–790 m (98–2,591 ft). Blooming period: April–June	Low	Suitable mature, tall southern mixed chaparral habitat for this species does not occur within the Project Area.
Tecate cypress (<i>Hesperocyparis forbesii</i>)	CRPR 1B.1 SD County List A City of Chula Vista MSCP	Perennial evergreen tree. Clay, gabbroic, or metavolcanic soils within closed-cone coniferous forest and chaparral; 80–1,500 m (262–4,921 ft).	Present	This species was observed within the Project Area during surveys.

Common Name (Scientific Name)	Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Variegated dudleya (<i>Dudleya variegata</i>)	CRPR 1B.2 SD County List A City of Chula Vista MSCP NE	Perennial herb. Clay soils in chaparral, cismontane woodland, coastal scrub, valley and foothill grassland, and vernal pools; 3–580 m (9–1,903 ft). Blooming period: April–June	Present	Suitable soils and habitat for this species are present within the Project Area. This species was observed in 19 locations close to the Project Area during surveys conducted by RECON, but it was not detected in the Project Area in 2010, 2013, 2015, and 2018.
Vernal barley (<i>Hordeum intercedens</i>)	CRPR 3.2 SD County List C	Annual Herbs. Coastal dunes, coastal sage scrub, vernal pools, and saline flats and depressions within valley and foothill grasslands; 5–1,000 m (15–3,280 ft). Blooming period: March–June	High	Appropriate habitat for this species occurs within the Project Area. This species has been documented approximately 1.0 mile south of the Project Area.
Wart-stemmed ceanothus (<i>Ceanothus verrucosus</i>)	CRPR 2B.2 SD County List B City of Chula Vista MSCP	Evergreen shrub. Chaparral; 1–380 m (3–1,247 ft). Blooming period: December–May	Low	Appropriate coastal chaparral habitat for this species does not occur within the Project Area.
Western dichondra (<i>Dichondra occidentalis</i>)	CRPR 4.2 SD County List D	Annual herb. Usually vernal mesic sometimes sandy coastal sage scrub, valley foothill grassland, and vernal pools; 50–500 m (160–1,640 ft). Blooming period: January–July.	Moderate	Suitable soils and habitat for this species are present within the Project Area. However, the nearest known occurrence of this species is several miles from the Project Area.
Western spleenwort (<i>Asplenium vespertinum</i>)	CRPR 4.2 SD County List D	Perennial rhizomatous herb (fern). Rocky areas within chaparral, cismontane woodland, and coastal sage scrub; 180–1,000 m (590–3,280 ft). Blooming period: February–June	Low	This species favors rocky outcrops, which do not occur within the Project Area, and the nearest known occurrence of this species is approximately 3 miles east of the Project Area.
Woolly chaparral- pea (<i>Pickeringia montana</i> var. <i>tomentosa</i>)	CRPR 4.3	Evergreen shrub. Chaparral with grabbroic, granitic and clay soils; 520–1,700 m (1,700–5,575 ft.). Blooming period: May–August.	Low	This species typically occurs at higher elevations than the Project Area.

LEGEND:**Status:****Federal**

FE – Listed as endangered under the federal Endangered Species Act.

FT – Listed as threatened under the federal Endangered Species Act.

FC – Candidate for listing under the federal Endangered Species Act.

State

CE – Listed as endangered under the California Endangered Species Act.

CT – Listed as threatened under California Endangered Species Act.

CR – Listed as rare under California Endangered Species Act.

CA Rare Plant Rank (CRPR) – Formerly known as CNPS List

1A. Presumed extirpated in California, and either rare or extinct elsewhere

1B. Rare, Threatened, or Endangered in California and elsewhere

2A. Presumed extirpated in California, more common elsewhere

2B. Rare, Threatened, or Endangered in California, more common elsewhere

3. Plants for which we more information is needed – Review list

4. Plants of limited distribution – Watch list

References:

Special Status plant information from CDFW 2020. Nomenclature and plant descriptions from: CNPS Online Inventory (CNPS 2019), Calflora 2020, Baldwin et al. 2012, Lightner 2011, Reiser 2001, Roberts 1989. Range information from CDFW 2019a, CNPS 2019, and San Diego Natural History Museum 2019.

Threat Ranks

.1 – Seriously endangered in California

.2 – Fairly endangered in California

.3 – Not very endangered in California

San Diego County List

A – Rare, threatened or endangered in California and elsewhere

B – Rare, threatened or endangered in California but more common elsewhere

C – Maybe quite rare, but more information is needed to determine their status

D – Limited distribution and are uncommon but not presently rare or endangered

City of Chula Vista MSCP - MSCP Subarea Plan species with known occurrences or suitable habitat within the Chula Vista Subarea.

NE = Narrow Endemic

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Potential to Occur – Sensitive Species Table: Fauna

Potential To Occur – Special-Status Species Table: Fauna

Common Name (<i>Scientific Name</i>)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
INVERTEBRATES				
Globuse Dune Beetle (<i>Coelus globosus</i>)	SDC Group I	Leaf litter under shrubs and perennial vegetation in coastal dunes	None	Suitable habitat is not present within the Project Area.
Hermes Copper Butterfly (<i>Lycaena hermes</i>)	FCT SDC Group I	Canyon bottoms and hillsides with northern exposure that have spiny redberry (<i>Rhamnus crocea</i>) plant stands, within coastal sage scrub and southern mixed chaparral habitats. Larval host plant is spiny redberry. Requires spiny redberry with <i>Eriogonum</i> patches within 15 feet.	Low	Only a small amount of marginally suitable habitat occurs within the Project Area in chaparral and scrub habitats, where spiny redberry (<i>Rhamnus crocea</i>) and California buckwheat (<i>Eriogonum fasciculatum</i>) are both present. However, the nearest extant populations were observed in 2004, approximately 6 miles north of the Project Area, on Mother Miguel Mountain (CDFW 2019a). Additionally, all of the species' known extant populations as of 2019 occur significantly north and east of the Project Area in the vicinity of McGinty Mountain, Sycuan Peak, and Roberts Ranch (Marschalek and Deutschman 2019). Therefore, the species has a low potential to occur within the Project Area.
Monarch Butterfly (<i>Danaus plexippus</i>)	SDC Group II	Migratory. Populations overwinter in California. Primarily overwinters in large trees, including <i>Eucalyptus</i> , within the immediate vicinity of the coast.	Low	Eucalyptus groves are present within the Project Area; however, the Project Area is 10 miles from coast and all known occurrences of the species are within 1 mile of coast.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Quino Checkerspot Butterfly (<i>Euphydryas editha quino</i>)	FE SDC Group I MSCP	Inhabits openings on clay soils within or in the vicinity of shrublands, grasslands, meadows, vernal pools, and lake margins. Closely tied to its larval host plant, dwarf plantain (<i>Plantago erecta</i>) or owl's clover (<i>Castilleja exserta</i> ssp. <i>exserta</i>).	Present	Host plants have been observed within the Project Area, specifically within the southeastern and northeastern portions of the Mitigation Bank Expansion Area (Appendix J; Appendix A, Figure 10b and Figure 11). Species was observed within the Project Area's Mitigation Bank Expansion Area during 2019 surveys for an un-related Otay Sewer project (ICF 2019); the species has also been previously observed within the Original Mitigation Bank and Pre-Bank Mitigation areas, within 500 feet of the Project Area (Appendix A, Figure 10b and Figure 11).
Riverside Fairy Shrimp (<i>Streptocephalus woottoni</i>)	FE SDC Group I MSCP	Vernal swales, detention basins and deeper vernal pools. It occurs from Los Angeles County to Baja California.	Low	Not known to occur in the Project Area. Vernal pools occur within the Project Area, though they are likely not deep enough for the species.
San Diego Fairy Shrimp (<i>Branchinecta sandiegoensis</i>)	FE SDC Group I MSCP	Vernal pools. All known localities are below 701 m (2,300 ft) and are within 64 km (40 mi) of the Pacific Ocean.	Present	Species has been observed within the Project Area's trails work areas and portions of the Mitigation Expansion Bank area. (Appendix A, Figure 10a). Suitable habitat is present within the Project Area at depressional areas in the Mitigation Bank Expansion Area, and marginal habitat is present within road ruts in the trails work areas.
Sandy Beach Tiger Beetle (<i>Cicindela hirticollis gravidai</i>)	SDC Group II	Coastal dunes.	None	Suitable habitat is not present within the Project Area.
Senile Tiger Beetle (<i>Cicindela senilis frosti</i>)	SDC Group II	Estuaries, tidal mud flats.	None	Suitable habitat is not present within the Project Area.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Thorne's Hairstreak (<i>Callophrys thornei</i>)	SDC Group I MSCP	Dependent on its larval host plant, the Tecate cypress (<i>Hesperocyparis forbesii</i>) (San Diego Management and Monitoring Program 2010).	Present	Host plant Tecate cypress is present within the Project Area, specifically along a portion of the trails work area and within the Mitigation Bank Expansion Area at the southern side of the Project Area (Appendix A, Figure 9a). The species was observed within the Tecate cypress grove (Appendix A, Figure 10a).
Wandering (Salt Marsh) Skipper (<i>Panoquina errans</i>)	SDC Group I MSCP	Salt marshes. The host plant is <i>Distichlis spicata</i> ; individuals overwinter as larvae in California. There are multiple flights each year	None	Suitable habitat is not present within the Project Area.
Western Beach Tiger Beetle (<i>Cicindela latesignata latesignata</i>)	SDC Group II	Estuaries, tidal mud flats.	None	Suitable habitat is not present within the Project Area.
Western (Gabb's) Tidal-flat Tiger Beetle (<i>Cicindela gabbii</i>)	SDC Group II	Estuaries, tidal mud flats, salt marshes and sea beaches.	None	Suitable habitat is not present within the Project Area.
AMPHIBIANS				
Arroyo Toad (<i>Bufo californicus</i>)	FE SSC SDC Group I MSCP	Exposed shallow pools with a sand or gravel base are used for breeding. Breeding pools must occur in the vicinity (ca. 10–100 m) of a braided sandy channel with shorelines or central bars made of stable, adjacent sandy terraces.	None	Suitable habitat with braided channel, adjacent sandy terraces, and seasonally inundated shallow pools to support arroyo toad breeding populations is not present within the Project Area. There are no known occurrences within the Otay River watershed. The nearest known occurrences are within the Sweetwater River watershed to the north and the Tijuana River watershed to the east of the Project Area. The species is not expected to occur within the Project Area.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Western Spadefoot (<i>Spea hammondi</i>)	SSC SDC Group II	Temporary pools with water temperatures between 9°C and < 30°C that last at least 3 weeks within areas of open vegetation.	Present	Species has been observed in the trails work areas within the Mitigation Bank Expansion Area at the northern portion of the Project Area during wet season fairy shrimp surveys in winter 2018–2019 (Appendix A, Figure 10a).
REPTILES				
Belding's Orange-throated Whiptail (<i>Aspidoscelis hyperythra beldingi</i>)	CDFW WL SDC Group II MSCP	The habitat characteristics are poorly understood; however, historically it was found in floodplains or terraces along streams. Closely tied to coastal sage scrub plants and some chaparral plants.	Present	Species has been observed within the Project Area, specifically at the southern edge of the Mitigation Bank Expansion Area (Appendix A, Figure 10a). Suitable habitat occurs within the Project Area, specifically in the Mitigation Bank Expansion Area.
Blainville's (San Diego/Coast) Horned Lizard (<i>Phrynosoma blainvillii</i>)	SSC SDC Group II MSCP	Grasslands, brushlands, woodlands, and open coniferous forest with sandy or loose soil; requires abundant ant colonies for foraging.	High	Species has been observed within approximately 250 feet of the Project Area's eastern trails work areas (Appendix A, Figure 10a). Suitable habitat occurs within the Project Area, specifically within the Mitigation Bank Expansion area.
Coast Patched-Nosed Snake (<i>Salvadora hexalepis virgulata</i>)	SSC SDC Group II	Inhabits semi-arid brushy areas and chaparral in canyons, rocky hillsides, and plains.	High	Suitable habitat occurs in the Project Area within the Mitigation Bank Expansion Area. The nearest observation of a coast patch-nosed snake was approximately 2 miles northeast of the project on the Otay Open Space Preserve (RECON 2018).
Coastal Rosy Boa (<i>Lichanura trivirgata roseofusca</i>)	SDC Group II	Inhabits chaparral and arid scrub habitats.	Present	Species has been observed within the Project Area, specifically at the southeastern corner of the Project Area along a trails work area. Suitable habitat occurs within the Project Area.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Coastal Tiger (San Diegan) Whiptail (<i>Aspidoscelis tigris stejnegeri</i>)	SSC SDC Group II	Found in open and dry areas with sparse foliage within semiarid habitats, brushland, woodlands, and riparian areas.	High	Species has been observed within approximately 200 feet of the Project Area (Appendix A, Figure 10a). Suitable habitat occurs within the Project Area's Mitigation Bank Expansion Area in arid, open areas of scrub, chaparral, woodland, and riparian habitats.
Coronado Skink (<i>Plestiodon skiltonianus interparietalis</i>)	CDFW WL SDC Group II	Forest, open woodland, and grassy areas. Usually found under leaf litter, logs, or rocks, also along edges of water features.	High	Suitable habitat occurs in the existing mitigation parcel and the expansion area. Nearest observation less than 1 mile southwest of Project Area on Otay Ranch Preserve's Millenia parcel east of Highway 125 (RECON 2018).
Green Sea Turtle (<i>Chelonia mydas</i>)	FT	Marine bay. Sea turtles have been reported in San Diego Bay.	None	Suitable habitat is not present within the Project Area.
Red Diamond Rattlesnake (<i>Crotalus ruber</i>)	SSC SDC Group II	Occurs from sea level to 914 m (3,000 ft) in chaparral, woodland, and arid desert habitats with rocky areas and dense vegetation.	Present	Species has been observed within the Project Area's Mitigation Bank Expansion Area on the southeastern side of the project (Appendix A, Figure 10a). Additional observations have been made within approximately 600 feet of the Project Area. Suitable habitat occurs within the Project Area.
San Diego Ringneck Snake (<i>Diadophis punctatus similis</i>)	SDC Group II	Prefers moist habitats, including wet meadows, rocky hillsides, gardens, farmland, grassland, chaparral, mixed coniferous forests, and woodlands.	High	Suitable habitat occurs within the Project Area. The nearest documented observation was on Otay Mesa, approximately 1 to 2 miles south of the Project Area (CDFW 2019a).

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Silvery (Southern California) Legless Lizard (<i>Anniella stebbinsi</i>)	SSC SDC Group II	Occurs in sparsely vegetated areas of beach dunes, chaparral, pine-oak woodlands, desert scrub, sandy washes, and stream terraces with sycamores, cottonwoods, or oaks. Leaf litter under trees and bushes in sunny areas often indicate suitable habitat.	Moderate	The nearest documented observation was in Otay Valley Regional Park, approximately 6 miles west of the Project Area (CDFW 2019a). Suitable habitat occurs in riparian woodland, scrub, chaparral habitats, and floodplain or near wetted areas within the Project Area.
Southern Western Pond Turtle (<i>Actinemys pallida</i>)	SSC SDC Group I MSCP	Requires slack- or slow-water aquatic habitat as well as basking sites. Also requires an upland oviposition site on an unshaded slope with excavatable soils, in the vicinity of the aquatic site (within approximately 0.3 mile).	Low	Marginally suitable aquatic habitat is present in limited portions of the Otay River corridor within the Project Area. However, the nearest known occurrence is approximately 11 miles northeast of the Project Area, along the Sweetwater River at Lawson Creek within the Sycuan Peak Ecological Reserve (CDFW 2019a).
Two-striped Garter Snake (<i>Thamnophis hammondi</i>)	SSC SDC Group I	Inhabits perennial and intermittent streams with rocky beds and bordered by willow thickets or other dense vegetation.	Present	Species has been observed within the Project Area, specifically within the trails work area in the northeastern side of the Project Area (Appendix A, Figure 10a). Within the Project Area, suitable habitat occurs in Salt Creek (along the northern edge of the Project Area); marginal quality habitat occurs in the main channel of the Otay River; and marginal quality habitat potentially occurs at isolated pools.
BIRDS				
American Peregrine Falcon (<i>Falco peregrinus anatum</i>)	F Delisted S Delisted CDFW FP (Nesting) SDC Group I MSCP	Nests on cliff ledges or on tall building or bridges. Will forage over a wide variety of habitats. Species is considered sensitive when nesting (CDFW 2019b).	Nesting: None	Suitable nesting habitat is not present within the Project Area.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Belding's Savannah Sparrow (<i>Passerunculus sandwichensis beldingi</i>)	SE SDC Group I MSCP NE	Resident species that is restricted to coastal marshes dominated by pickleweed. It is known to occur within five general areas of coastal San Diego County (Unitt 2004).	None	Suitable habitat is not present within the Project Area.
Bell's Sage Sparrow (<i>Artemisiospiza belli belli</i>)	CDFW WL SDC Group I	Open chaparral and sage scrubs.	High	Bell's sage sparrow was observed in the vicinity of the Project Area, within Otay Ranch Preserve though the exact location is not known, incidentally during least Bell's vireo surveys in 2018 (Appendix I). Suitable nesting and foraging habitats occur within the Project Area.
California Black Rail (<i>Laterallus Jamaicensis cotumicullus</i>)	ST CDFW FP SDC Group II	Brackish freshwater marsh	None	Species has been extirpated in San Diego County. Suitable habitat is not present within the Project Area.
California Horned Lark (<i>Eremophila alpestris actia</i>)	CDFW WL SDC Group II	Grasslands and open areas of scrub habitats, including recently disturbed areas, where seeds and insects are easy to find.	High	Suitable nesting and foraging habitats occur within the Project Area. California horned lark have been observed within approximately 1 mile south of the Project Area, on Otay Mesa just east of Highway 125 (CDFW 2019a), and within the Otay Ranch Preserve incidentally during 2018 least Bell's vireo surveys, though the exact location is not known (Appendix I).
California Least Tern (<i>Stemula antillarum browni</i>)	FE (nesting colony) SE (nesting colony) CDFW FP (nesting colony) SDC Group I MSCP	Migratory breeder in San Diego County that nests on beaches and dunes and forages over water (Unitt 2004). Occurs in bays, estuaries, lagoons, shoreline.	None	Suitable habitat is not present within the Project Area.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Coastal (San Diego) Cactus Wren (<i>Campylorhynchus brunneicapillus sandiegensis</i>)	SSC (San Diego & Orange Counties only) SDC Group I MSCP	Requires cactus thickets of <i>Opuntia</i> or <i>Cylindropuntia</i> species, preferably over 1 m tall for breeding.	Present	Marginally suitable nesting habitat occurs within the Project Area, and suitable nesting habitat occurs just to the west and to the south of the Project Area. Suitable foraging habitat occurs in the upland portions of the Project Area. Species was observed within the Project Area, specifically within the Mitigation Bank Expansion Area, incidentally during gnatcatcher surveys in 2018 (Appendix H; Appendix A, Figure 10a), and was assumed to be foraging. The species was also previously observed within 100 feet of the Project Area's northeastern boundary (Appendix A, Figure 10a).
Coastal California Gnatcatcher (<i>Polioptila californica californica</i>)	FT SSC SDC Group I MSCP	Prefer open scrubby habitats such as coastal sage scrub and some forms of chaparral.	Present	Suitable nesting and foraging habitats occur within Project Area. Species was observed in coastal sage scrub within the Project Area during protocol surveys conducted between 2009 and 2013. Surveys conducted in 2018 detected four gnatcatcher territories within the Project Area, specifically along the southern side of the Mitigation Bank Expansion Area and trails work areas (Appendix A, Figures 10b and 13). Breeding was confirmed at all four territories. The full report of 2018 gnatcatcher surveys and results is presented as Appendix H.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Cooper's Hawk (<i>Accipiter cooperii</i>)	CDFW WL (nesting) SDC Group I MSCP	Oak groves and mature stands of riparian woodland. This species has adapted well to development and is abundant in urban canyons with eucalyptus trees. Cooper's hawk is considered sensitive when nesting (CDFW 2019b)	Nesting: High	Species has been observed foraging within the northern portion of the Project Area's Mitigation Bank Expansion Area (Appendix A, Figure 10a). Nesting Cooper's hawks have also been observed just outside the southeast corner of the Project Area, though nesting has not been observed within the Project Area. Suitable nesting and foraging habitats occur within the Project Area, specifically within riparian and woodland habitats.
Double-crested Cormorant (<i>Phalacrocorax auritus albociliatus</i>)	SSC (nesting colony) SDC Group II	Bays, lagoons, estuaries.	None	Suitable habitat is not present within the Project Area.
Golden Eagle (<i>Aquila chrysaetos</i>)	BGEPA CDFW FP (nesting & wintering) SDC Group I MSCP	Nests and winters on cliff ledges or trees on steep slopes. Forages in grasslands, sage scrub or broken chaparral.	Nesting: None	Suitable nesting and wintering habitat is not present within the Project Area. Species may forage or perch in the Project Area within suitable foraging habitats; however, the species is not identified as protected when foraging.
Grasshopper sparrow (<i>Ammodramus savannarum perpallidus</i>)	SSC (nesting) SDC Group I	Occurs in dry, dense grasslands, especially those with a variety of grasses and tall forbs and scattered shrubs for singing perches. Nests in slight depressions in dense grasslands. Grasshopper sparrows are considered sensitive when nesting (CDFW 2019b).	High	Suitable nesting habitat occurs in grasslands within the Project Area. Nesting grasshopper sparrows were observed in the vicinity of the Project Area, within Otay Ranch Preserve, incidentally during 2019 least Bell's vireo surveys, though the exact location is unknown (Appendix I).

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Least Bell's Vireo (<i>Vireo bellii pusillus</i>)	FE (nesting) SE (nesting) SDC Group I MSCP	Riparian thickets either near water or in dry portions of river bottoms; nests along margins of bushes and forages low to the ground; may also be found using mesquite and arrow weed in desert canyons. Least Bell's vireo are considered sensitive when nesting (CDFW 2019b).	Present	Nesting individuals were observed within the Project Area during surveys conducted between 2011 and 2019 (Appendix A, Figure 10b and Figure 14; San Diego Natural History Museum 2018). The full report on 2019 least Bell's vireo surveys and results is presented in Appendix I. Suitable nesting and foraging habitats occur within the riparian habitat within the Project Area.
Light-footed Ridgway Rail (<i>Rallus longirostris levipes</i>)	FE SE CDFW FP SDC Group I MSCP	Occurs in coastal salt marshes, especially where cordgrass dominates.	None	Suitable habitat is not present within the Project Area.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	SSC (nesting) SDC Group I	Found near grassland, open sage scrub and chaparral, and desert scrub. They nest in dense vegetation adjacent to their open foraging habitats. Loggerhead shrike are considered sensitive when nesting (CDFW 2019b).	High	Suitable nesting and foraging habitat present within the Project Area. There are multiple observations of the species nearby within approximately 1 to 2 miles of the project, to the north near Lower Otay Lake, to the south on Otay Mesa, and to the west at Brown Field Municipal Airport (eBird 2019).

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Northern Harrier (<i>Circus cyaneus</i>)	SSC (nesting) SDC Group I MSCP	Grasslands and marshes. Nests are on the ground and typically concealed within a marsh or other dense, low-growing vegetation. The northern harrier is considered a breeding resident and a migrant species. Nesting harriers are now considered rare, and the known breeding population in San Diego County is estimated at 25 to 75 pairs (Unitt 2004). Northern harriers are considered sensitive when nesting (CDFW 2019b).	Moderate	Species nesting was observed incidentally within the project vicinity in 2019 during least Bell's vireo surveys of the Otay Ranch Preserve, though the exact location is not provided (Appendix I). A previous nesting observation was made within approximately 1 to 2 miles of the Project Area to the south, on Otay Mesa southwest of Johnson Canyon (CDFW 2019a). Marginal nesting habitat occurs within the Project Area where freshwater marsh habitat exists.
Prairie Falcon (<i>Falco mexicanus</i>)	CDFW WL (nesting) SDC Group I	Nest on cliffs or bluffs and forage in open desert or grasslands. In San Diego County, nest at least 23 miles from the coast (Unitt 2004).	None	Suitable nesting habitat is not present within the Project Area. Species may forage or perch in the Project Area; however, it is only considered as requiring protection when nesting.
Southern California Rufous-crowned Sparrow (<i>Aimophila ruficeps canescens</i>)	CDFW WL SDC Group I MSCP	Fairly common, widespread, and generally fairly conspicuous resident of rocky grassland and patchy shrub habitats, often including areas with disturbance from fire, trash, soil compaction, and non-native vegetation.	Present	Species has been observed within the Project Area's Mitigation Bank Expansion Area incidentally during 2018 gnatcatcher surveys, though the exact location was not noted (Appendix H). It was also observed within 100 feet of the Project Area previously (Appendix A, Figure 10a). Suitable nesting and foraging habitats are present within the Project Area.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Southwestern Willow Flycatcher (<i>Empidonax trallii extimus</i>)	FE (nesting) SE (nesting) SDC Group I MSCP	Will forage over a variety of habitats; however, species does not breed in California. Most often occurs in broad, open river valleys or large mountain meadows with lush growth of shrubby willows. Southwestern willow flycatcher is considered sensitive when nesting (CDFW 2019b).	Low	Not known to occur within the Project Area and not detected during LBV surveys conducted by ICF in the Project Area during 2018. The nearest record of confirmed occurrence was approximately 7 miles north of the Project Area, where breeding was observed near the northeast end of the Sweetwater Reservoir along the Sweetwater River, attempted multiple years in sandbar willow, Tamarix sp, and black willow (CDFW 2019a). Marginally suitable nesting habitat is present within the Project Area along the Otay River mainstem corridor; however, the corridor morphology and vegetation structure are low quality for willow flycatcher breeding.
Swainson's Hawk (<i>Buteo swainsoni</i>)	ST (nesting) SDC Group I MSCP	Open country of the western US and Canada for breeding, from low to moderate elevations. Prairies, rangelands, meadows, open areas with scattered trees. Cultivated lands attract this hawk in some areas, where the human disturbance of agriculture causes concentrations of insects and rodents.	None	No longer known to breed in San Diego County. Nearest nesting observations were recorded approximately 7 to 10 miles north of the Project Area along the Sweetwater River in the 1920s (CDFW 2019a). May soar over or forage within Project Area; however, the species is only considered protected when nesting.
Tricolored Blackbird (<i>Agelaius tricolor</i>)	SSC (nesting colony) SDC Group I MSCP	Breeds near fresh water, preferably in emergent wetland with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, and tall herbs. Feeds in grassland and cropland habitats.	None	The nearest nesting colony records are downstream of the Project Area in the Otay River corridor, along upper Otay Reservoir, and along Lower Otay Lake (CDFW 2019a). However, suitable habitat is not present within the Project Area.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Western Burrowing Owl (<i>Athene cunicularia</i>)	SSC (burrow sites & some wintering sites) SDC Group I MSCP	Prairies, grasslands, lowland scrub, agricultural lands, coastal dunes, desert floors, and some artificial, open areas. They require large open expanses of sparsely vegetated areas on gently rolling or level terrain with an abundance of active small mammal burrows. They use rodent or other burrows for roosting and nesting cover and also known to use pipes, culverts, and nest boxes where burrows are scarce.	Moderate	A burrowing owl habitat assessment was conducted within a portion of the Mitigation Expansion Area; subsequent site visits also examined the northern portion of the Mitigation Expansion Area along Salt Creek. Suitable nesting burrows are not present within the surveyed portions of the Project Area's Mitigation Expansion Area. Based on vegetation mapping results, the un-surveyed areas of the Project Area might contain areas suitable for burrowing owl, though focused habitat suitability surveys have not been performed there. A single burrowing owl was observed near the Project Area, within the existing mitigation parcel during monitoring of non-project related restoration activities in 2018 (Appendix A, Figure 10a). This was likely a transient individual as no suitable burrows were observed in the vicinity.
Western Snowy Plover (<i>Charadrius nivosus nivosus</i>)	FT (nesting) SSC (nesting) SDC Group I MSCP	Sandy beaches, lagoon margins, tidal mud flats. Migrant and winter resident. Migratory breeder in San Diego County; uses beaches, dunes and salt flats for nesting. Silver Strand supports one of the two most concentrated nesting sites in San Diego County (Unitt 2004). Burrowing owls are considered sensitive at burrow sites and some wintering sites (CDFW 2019b).	None	Suitable habitat is not present within the Project Area.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Western Yellow-billed Cuckoo (<i>Coccyzus americanus</i>)	FT (nesting) SE (nesting) SDC Group I	Cottonwood-dominated forests with larger rivers running through arid country. The species requires large blocks of riparian habitat for nesting, approximately 10 to 40 acres of contiguous habitat, and cottonwood and willow trees are important foraging habitat (USFWS 2001). Western yellow-billed cuckoo is considered sensitive when nesting (CDFW 2019b).	Nesting: None Foraging: Present	A single individual was observed in 2019 within the Project Area at the eucalyptus grove along Wiley Road (Appendix I; Appendix A, Figure 10b). The species had previously been observed within the Pre-Bank Mitigation Area, within 100 feet of the Project Area. In both observations, the species was not observed nesting and the individuals were likely migrants. Suitable foraging habitat occurs within the nearby Original Mitigation Bank area and Pre-Bank Mitigation area but is absent from the Project Area. No suitable nesting habitat occurs within the Project Area because riparian woodland patches are too small in extent to support breeding.
White-tailed kite (<i>Elanus leucurus</i>)	FP (nesting) SDC Group I	Lowland areas west of Sierra Nevada from the head of the Sacramento Valley south, including coastal valleys and foothills to western San Diego County at the Mexico border. Suitable nesting trees include a variety of species and habitat, where trees are at least 3 meters tall (Dunk 1995). White-tailed kite is considered fully protected when nesting (CDFW 2019b).	Nesting: High Foraging: Present	Several individuals were observed foraging within the Project Area incidentally during gnatcatcher surveys conducted in 2018 (Attachment H). Suitable nesting and foraging habitat occurs within the Project Area's Mitigation Bank Expansion Area.
Yellow-breasted Chat (<i>Icteria virens</i>)	SSC (nesting) SDC Group I	Dense riparian woodland.	Nesting: High	Foraging yellow-breasted chat were observed incidentally during 2018 gnatcatcher surveys in the Mitigation Expansion Area of the Project Area; however, nesting has not been observed within the Project Area (Appendix A, Figure 10a; Appendix H). Suitable nesting and foraging habitats occur within the Project Area.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Yellow Warbler (<i>Setophaga petechial</i>)	SSC (nesting) SDC Group II	Mature riparian woodlands. Species is considered sensitive when nesting (CDFW 2019b).	Nesting: High	Foraging yellow warblers were observed incidentally during 2018 gnatcatcher surveys in the Mitigation Expansion Area of the Project Area (Attachment A, Figure 10a; Attachment H). Suitable nesting and foraging habitats occur within the Project Area.
MAMMALS				
American Badger (<i>Taxidea taxus</i>)	SSC SDC Group II MSCP	Inhabit a diversity of habitats with principal requirements of sufficient food, friable soils, and relatively open, uncultivated ground. Grasslands, savannas, mountain meadows, and desert scrub.	Moderate	Suitable habitat occurs within the Project Area's Mitigation Bank Expansion Area within grassland and scrub habitats. The nearest recorded observation of badger was approximately 3 miles northwest of the Project Area at Poggi Canyon on Otay Ranch (Tremor et al. 2017). Other observations have been made approximately 7 to 10 miles east of the Project Area, near Dulzura and near the US-Mexican border (CDFW 2019a).
Big free-tailed Bat (<i>Nyctinomops macrotis</i>)	SSC SDC Group II	Inhabits low-lying arid areas in Southern California, including southwestern San Diego County. Roosts in crevices in cliffs or rocky outcrops. Species has been recorded in urban locations in San Diego County (Tremor et al. 2017)).	Roosting: None Foraging: High	The species has previously been detected below Otay Reservoir along the Otay River within Otay Valley Regional Park just east of the Project Area's eastern boundary (Tremor et al. 2017). Suitable roosting habitat is not present within the Project Area. Species could forage throughout the Project Area.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
California Leaf-nosed Bat (<i>Macrotus californicus</i>)	SSC SDC Group II	Found in Riverside, Imperial, San Diego, and San Bernardino counties. Inhabits desert riparian, desert wash, desert scrub, desert succulent shrub, alkali desert scrub, and palm oasis habitats. Day roosts are usually large caves or deep mine tunnels with high ceilings. Forages over nearby flats and washes. Believed to have disappeared from coastal basins of Southern California (Zeiner et al. 1988-1990).	Roosting: None Foraging: Low	Nearest known observation is approximately 14 miles east of the Project Area at Cottonwood Creek Tunnel (CDFW 2019a). Suitable roosting habitat is not present within the Project Area. Species could forage in suitable floodplain, scrub, shrub, and riparian habitats throughout the Project Area, though the species is believed to have disappeared from coastal basins.
Dulzura Pocket Mouse (<i>Chaetodipus californicus femoralis</i>)	SSC SDC Group II	Coastal and montane regions in grassland, sage and coastal scrub, and chaparral slopes. Greatest abundances are found at the edges of where grassland and chaparral habitats meet.	High	The nearest recorded observations are approximately 9 miles east of the Project Area near the town of Dulzura and 20 miles east of the Project Area near Hauser Mountain (CDFW 2019a; Tremor et al. 2017). Suitable habitat occurs within the Project Area's Mitigation Bank Expansion Area where grassland, scrub, and chaparral habitats exist.
Long-eared Myotis (<i>Myotis evotis</i>)	SDC Group II	Brush, woodland and forest habitats from sea level to 9000 ft. Primarily lives in coniferous forests in mountain areas. Nursery colonies are in small colonies in caves, buildings, snags, and under tree bark, and uses caves primarily as night roosts. Forages at edge habitats, in open habitats, and over water.	Roosting: None Foraging: High	Species has been detected below Lower Otay Reservoir along the Otay River within Otay Valley Regional Park just east of the Project Area's eastern boundary (Tremor et al. 2017). Suitable roosting habitat is not present within the Project Area. Species could forage in suitable scrub, woodland, and forest habitats throughout the Project Area.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Mexican Long-tongued Bat (<i>Choeronycteris mexicana</i>)	SSC SDC Group II	Likes desert canyons, arid mountain ranges. Roosts by day in caves, mines, or buildings. Records indicate only a summer resident in San Diego County. Most California records are from urban areas of San Diego County (Tremor et al. 2017).	Roosting: None Foraging: Low	Suitable roosting habitat is not present within the Project Area. The nearest records of observations are approximately 10 to 12 miles from the Project Area within the urban areas of Imperial Beach, San Diego, and La Mesa (CDFW 2019a). Species could forage throughout the Project Area in scrub and riparian habitats, though is unlikely to because it is only known from urban areas within San Diego County.
Mountain Lion (<i>Felis concolor</i>)	SDC Group II MSCP	Occurs in a wide range of habitats, including coastal sage scrub, chaparral, and riparian woodlands. The species is most abundant in riparian areas, and brushy stages of most habitats. Rest in rocky area and on cliffs and use irregular terrain features and tree/brush edges that provide cover.	High	Species was been observed less than a mile west of the Project Area, specifically along Wiley Road just east of the Highway 125 overpass, while biologists were driving to the Project Area. Suitable habitat is present throughout the Project Area.
Pacific Pocket Mouse (<i>Perognathus longimembris pacificus</i>)	FE SSC SDC Group I	Coastal lowland; patchily distributed species only currently known to occur on the immediate coast from Los Angeles County south through San Diego County.	None	Project Area is outside of species' known range.
Pallid Bat (<i>Antrozous pallidus</i>)	SSC SDC Group II	Found throughout California except very high elevations and far northwestern California. Species occurs in grasslands, shrublands, woodlands, and forest habitats. Most common in open, dry habitats with rocky areas for roosting. Roosts in rock crevices, caves, mine shafts, under bridges, in buildings and tree hollows.	Roosting: High Foraging High	Species has been detected below Lower Otay Reservoir along the Otay River within Otay Valley Regional Park just east of the Project Area's eastern boundary (Tremor et al. 2017). Eucalyptus and palm trees with hollow cavities within the Project Area could provide suitable roosting habitat. Species could forage throughout the Project Area in grassland, scrub, chaparral, riparian, and forest habitats.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Pocketed Free-tailed Bat (<i>Nyctinomops femorosaccus</i>)	SSC SDC Group II	Found in Riverside, San Diego, and Imperial counties. Lives in a variety of arid habitats including desert scrub, desert wash, desert riparian, and desert succulent shrub. Roosts in rocky crevices in cliffs.	Roosting: None Foraging: High	Species has been detected less than 1 mile west of the Project Area within the Otay River valley near the Highway 125 overpass (Tremor et al. 2017). Suitable roosting habitat is not present within the Project Area. Species could forage throughout the Project Area in scrub and riparian habitats.
San Diego Black-tailed Jackrabbit (<i>Lepus californicus bennettii</i>)	SSC SDC Group II	Mostly found on the coastal side of our local mountains in open habitats, usually avoiding dense stands of chaparral or woodlands.	High	Species was observed within 50 feet of the Project Area. Suitable habitat occurs within the Project Area in open areas and scrub habitats.
San Diego Desert Woodrat (<i>Neotoma lepida intermedia</i>)	SSC SDC Group II	Occurs in a variety of scrub, riparian, and desert habitats primarily associated with rock outcroppings, boulders, cacti, or areas of dense undergrowth.	Present	A woodrat midden was observed within the Project Area, specifically within the northern portion of the Mitigation Bank Expansion Area (Appendix A, Figure 10a). Suitable habitat occurs throughout the Project Area in scrub, riparian, forest, and other habitats.
San Diego Pocket Mouse (<i>Chaetodipus fallax fallax</i>)	SSC SDC Group II	Found in a variety of habitats, including coastal scrub, sagebrush, desert scrub, desert wash, annual grassland, and chaparral habitats. Favors arid, sandy herbaceous areas with moderate canopy coverage, usually in association with rocks or coarse gravel.	High	The nearest recorded observations are approximately 3 miles east of the Project Area, just east of Brown Field Municipal Airport (CDFW 2019a) as well as just north of the Project Area (Tremor et al. 2017). Suitable habitat occurs within the Project Area in scrub, floodplain, grassland, and chaparral habitats.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Southern grasshopper mouse (<i>Onychomys torridus ramona</i>)	SSC SDC Group II	Found in a wide variety of arid habitats including scrub, sagebrush, and chaparral habitats, though desert scrub habitats are preferred with low to moderate shrub cover and friable soils for digging. Most common in Mojave Desert and southern Central Valley in California.	Low	The nearest recorded observation is approximately 33 miles east of the Project Area on the Campo Indian Reservation (CDFW 2019a). Suitable habitat occurs within the Project Area in scrub habitats; however, the species is found in deserts of Southern California east of the Peninsular Range rather than on the coastal side of the range where the Project Area is located.
Southern Mule Deer (<i>Odocoileus hemionus</i>)	SDC Group II MSCP	Occurs in wide-range of habitats, including conifer and mixed forests, chaparral, brushlands, and grasslands. Found along major river corridors and in a variety of habitats with a mix of woody cover, large openings, edge habitats, and water.	High	Species was observed within 100 feet of the Project Area, within the Original Mitigation Bank area in 2018. Suitable habitat is present throughout the Project Area.
Townsend's Big-eared Bat (<i>Corynorhinus townsendii</i>)	SSC SDC Group II	Species can be found in a variety of habitats throughout the state where appropriate roosting habitat exists. Prefers mesic habitats. Primarily roosts in caves and cavern-like spaces; also roosts in abandoned buildings, mines, culverts, box-like spaces in bridges and other structures, and large hollows in trees. Very sensitive to human disturbances.	Roosting: None Foraging: Moderate	Species has been detected below Lower Otay Reservoir along the Otay River within Otay Valley Regional Park just east of the Project Area's eastern boundary (Tremor et al. 2017). Suitable roosting habitat is not present within the Project Area. Species could forage throughout the Project Area, particularly in the river corridor.
Western Mastiff Bat (<i>Eumops perotis californicus</i>)	SSC SDC Group II	Primarily a cliff-dwelling species for breeding; requires tight crevices in cliffs, rocks, or buildings for roosting. Found in open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, annual and perennial grasslands, palm oases, chaparral, desert scrub, and urban areas.	Roosting: None Foraging: High	Species has been detected below Lower Otay Reservoir along the Otay River within Otay Valley Regional Park just east of the Project Area's eastern boundary (Tremor et al. 2017). Species has also been detected west of the Project Area within the Otay River valley near the Highway 125 overpass (Tremor et al. 2017). Suitable roosting habitat is not present within the Project Area. Species could forage throughout the Project Area.

Common Name (Scientific Name)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Western Red Bat (<i>Lasiurus blossevillii</i>)	SSC SDC Group II	Usually found among dense foliage, in forests and wooded areas, including riparian habitats. The species makes long migrations from the northern latitudes to warmer climes for winter, and sometimes hibernates in tree hollows or woodpecker holes. It roosts primarily in trees up to 40 feet above the ground. Prefers edge and mosaic habitats with trees that provide canopy protection and open areas below for foraging. Feeds over a wide variety of habitats, including grasslands, shrublands, open woodlands and forests, and croplands	Roosting: High Foraging: High	Species has been detected below Lower Otay Reservoir along the Otay River within Otay Valley Regional Park just east of the Project Area's eastern boundary and has been detected within the Otay River Valley near the Highway 125 overpass (Tremor et al. 2017) Suitable roosting habitat occurs in riparian areas with large trees within the Project Area. Species could forage throughout the Project Area.
Western Small-footed Myotis (<i>Myotis ciliolabrum</i>)	SDC Group II	Occurs in arid uplands throughout large portions of California, primarily in relatively dry wooded and brushy uplands near water sources. Prefers open stands in forests and woodlands, and brushy habitats, uses open water for drinking and feeding. Roost under rock slabs and in crevices, mine tunnels, under loose tree bark, and in buildings.	Roosting: High Foraging: High	Species has been detected less than 1 mile west of the Project Area within the Otay River Valley near the Highway 125 overpass (Tremor et al. 2017) west of the Project Area within the Otay River Valley near the Highway 125 overpass (Tremor et al. 2017). Suitable roosting habitat is present within the Project Area where there are large trees with loose bark. Species could forage throughout the Project Area in scrub, forest, and riparian habitats.
Western Yellow Bat (<i>Lasiurus xanthinus</i>)	SSC	Western yellow bats are known from throughout central and northern Mexico into southern California (BCI 2018, Reid 2006). Roosts in dead palm fronds and other trees, and are typically associated with deserts and canyons (Reid 2006). Forages over water and among trees (Harris et al. 2008).	Roosting: High Foraging: High	Species has been detected less than 1 mile west of the Project Area in the Otay River valley near the Highway 125 overpass (Tremor et al. 2017). The eucalyptus trees and palm trees within the Project Area provide suitable roosting habitat. Suitable foraging habitat is present within the Project Area, particularly along the Otay River corridor.

Common Name (<i>Scientific Name</i>)	Sensitivity Code & Status	Habitat Preference/Requirements	Potential to Occur	Rationale
Yuma Myotis (<i>Myotis yumanensis</i>)	SDC Group II	Found near lakes, creeks, or ponds. Optimal habitats are open forests and woodlands near sources of water over which the species forages. Roosts by day under building sidings or shingles. Nursery colonies choose caves, mines, buildings, or the undersides of bridges.	Roosting: High Foraging: High	Species has been detected less than 1 mile west of the Project Area within the Otay River Valley near the Highway 125 overpass (Tremor et al. 2017). Suitable roosting habitat is present within the Project Area where there are eucalyptus and palm trees. Species could forage within the Project Area, particularly along the river corridor.

LEGEND:**STATUS:****Federal**

FE - listed as endangered under the federal Endangered Species Act.

FT - listed as threatened under the federal Endangered Species Act.

FCT – candidate for listing as threatened under the federal Endangered Species Act.

F Delisted = Delisted under the federal Endangered Species Act.

BGEPA = Bald and Golden Eagle Protection Act

State

SE - listed as endangered under the California Endangered Species Act.

ST- listed as threatened under the California Endangered Species Act.

S Delisted – Delisted under the California Endangered Species Act.

CDFW FP – fully protected species in California.

SSC – species of special concern in California.

WL – Watch List.

References

Special Status information from CDFW 2019b. Listing statuses from CDFW 2019a. Nomenclature and vertebrate descriptions from Chesser et al. 2019 and supplements, CDFW 2019d, Shuford and Gardali 2008, Cornell Lab of Ornithology 2019, Jameson and Peeters 2004, Nafis 2019, Stebbins 2003, Jennings and Hayes 1994, Zeiner et al. 1988-1990, Whitaker 1996, and Unitt 2004. San Diego County Group classifications of sensitive plants and animals from County of San Diego 2010. Additional references cited in Rationale comment for individual species.

San Diego County Group (SDC Group)

I = includes animal species that have a very high level of sensitivity, either because they are listed as threatened or endangered or because they have very specific natural history requirements that must be met.

II = includes animal species that are becoming less common, but are not yet so rare that extirpation or extinction is imminent without immediate action. These species tend to be prolific within their suitable habitat types.

MSCP = Covered species under the City of Chula Vista Multiple Species Conservation Program (MSCP) Subarea Plan

MSCP NE = Covered species under an MSCP subarea plan and identified as a narrow endemic species

‡ – Taxa listed with ‡ fall into one or more of the following categories:

- Taxa considered endangered or rare under Section 15380(d) of CEQA guidelines
- Taxa that are biologically rare, very restricted in distribution, or declining throughout their range
- Population(s) in California that may be peripheral to the major portion of a taxon's range, but which are threatened with extirpation within California
- Taxa closely associated with a habitat that is declining in California at an alarming rate (e.g., wetlands, riparian, old growth forests, desert aquatic systems, native grasslands)

Appendix F

**2017 Dry Season Fairy Shrimp Survey Report and
2017-2018 Wet Season Fairy Shrimp Survey Report**

2017 DRY SEASON FAIRY SHRIMP SURVEY FOR OTAY RIVER RESTORATION PROJECT

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June 2018



ICF. 2018. 2017 Dry Season Fairy Shrimp Survey for Otay River Restoration Project. June.

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1.0 Introduction

ICF was contracted to conduct dry season fairy shrimp surveys for the Otay River Restoration Project (ORRP), a permittee-responsible mitigation site and proposed mitigation bank located below Savage dam and Lower Otay Lake in the Otay River. The mitigation site is being implemented to offset impacts associated with several Otay Ranch Village development projects as well as future projects in the vicinity.

The goal of this survey was to determine presence or absence of listed large branchiopods (fairy shrimp) in seasonally inundated depressions within the study area (Figures 1-3), for use in avoiding take of listed large branchiopods. The large branchiopods known from freshwater in southern San Diego County are San Diego fairy shrimp (*Branchinecta sandiegonensis*), Lindahl's fairy shrimp (*Branchinecta lindahl*), and Riverside fairy shrimp (*Streptocephalus woottoni*).

2.0 Methods

ICF conducted dry season fairy shrimp surveys on 30 seasonally inundated depressions located within the study area (Figure 3). The vernal pool preserve in the northeast side of the site was not a subject of this study, will not be affected by project activities, and was not sampled (Figure 3). All seasonally inundated depressions besides #20 were previously mapped by RECON Environmental as part of land stewardship of the Otay River Regional Park, and the boundaries of the depressions are used in Figure 3. Survey methodology follows the USFWS *Survey Guidelines for the Listed Large Branchiopods* (Guidelines; USFWS 2015) as described below. Prior to initiating the surveys, a 15-day pre-survey notification letter was sent to the USFWS Carlsbad Fish and Wildlife Office informing intent to conduct a protocol dry season survey for listed fairy shrimp (Appendix A).

2.1 Soil Collection

On November 28, 2017, ICF fairy shrimp biologist Lance Woolley (Permit# TE-14560C) collected soil samples for the dry season survey. Soil samples were collected when seasonally inundated depressions were dry. A hand trowel was used to collect soil samples from the top 1-3 centimeters of depressions soil. Whenever possible, soil samples were collected in chunks and the trowel was used to pry up intact chunks of sediment. Loosening the soil by raking or shoveling was avoided as such methods can damage cysts. For each of the 30 seasonally inundated depressions, two perpendicular transects were visually estimated, with one transect passing along the depressions lowest point and the second transect passing through the depressions second lowest point. Ten samples of approximately 100-milliliter (ml) aliquots were removed at each sub-sample site (for a total of 1 liter/ponded area), ensuring that no more than 10% of the sampled vernal pool's surface area was disturbed. Soil samples were taken as follows: two in the pool's lowest point, one at the pool's second lowest point, and two radiating in each of the four directions on the transect lines, at least 1.0 m from the pool center.

Ten 100-mililiter soil samples were collected from each pools. Each label included information necessary to identify the collection date, location of feature and name of collector for each sample.

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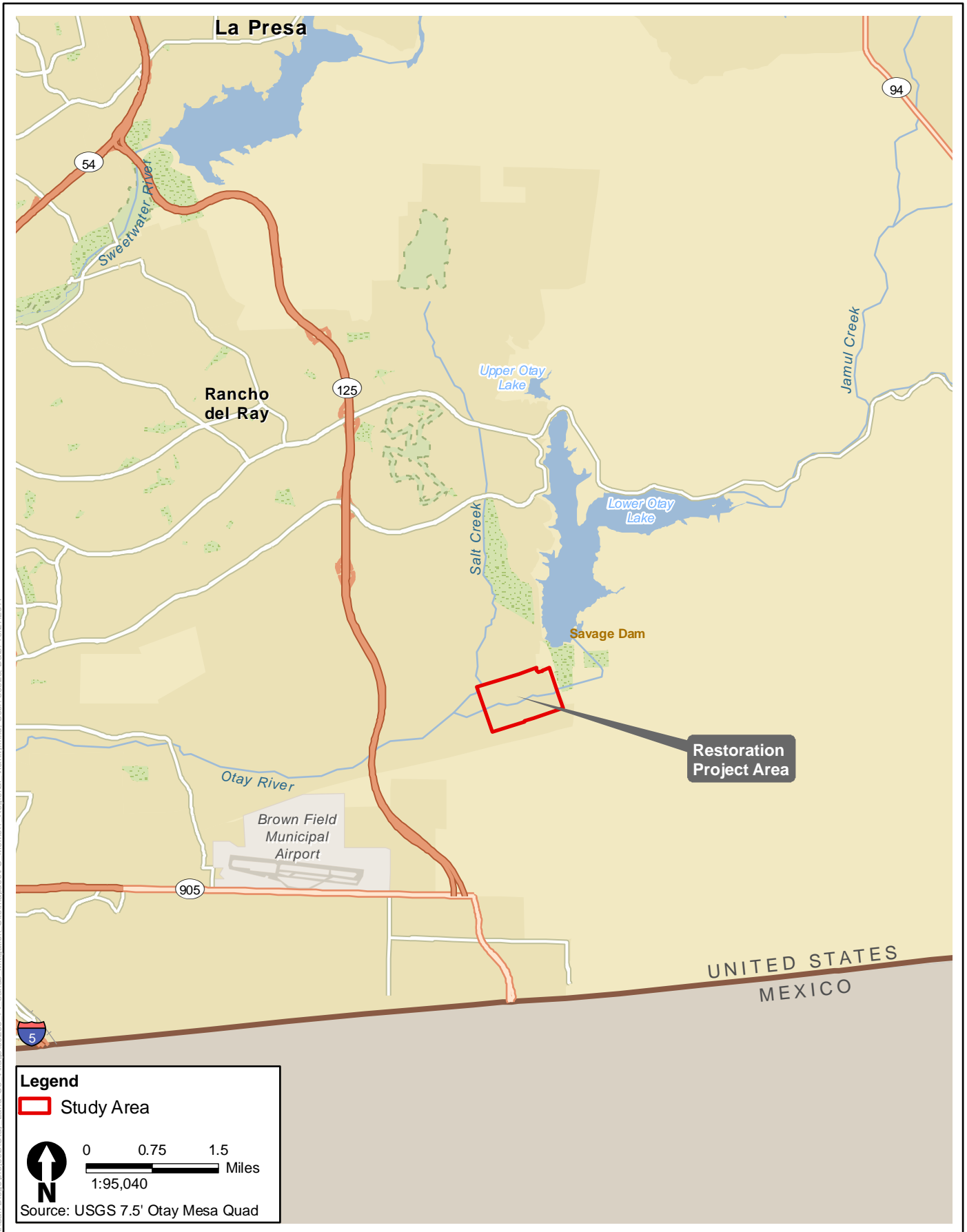
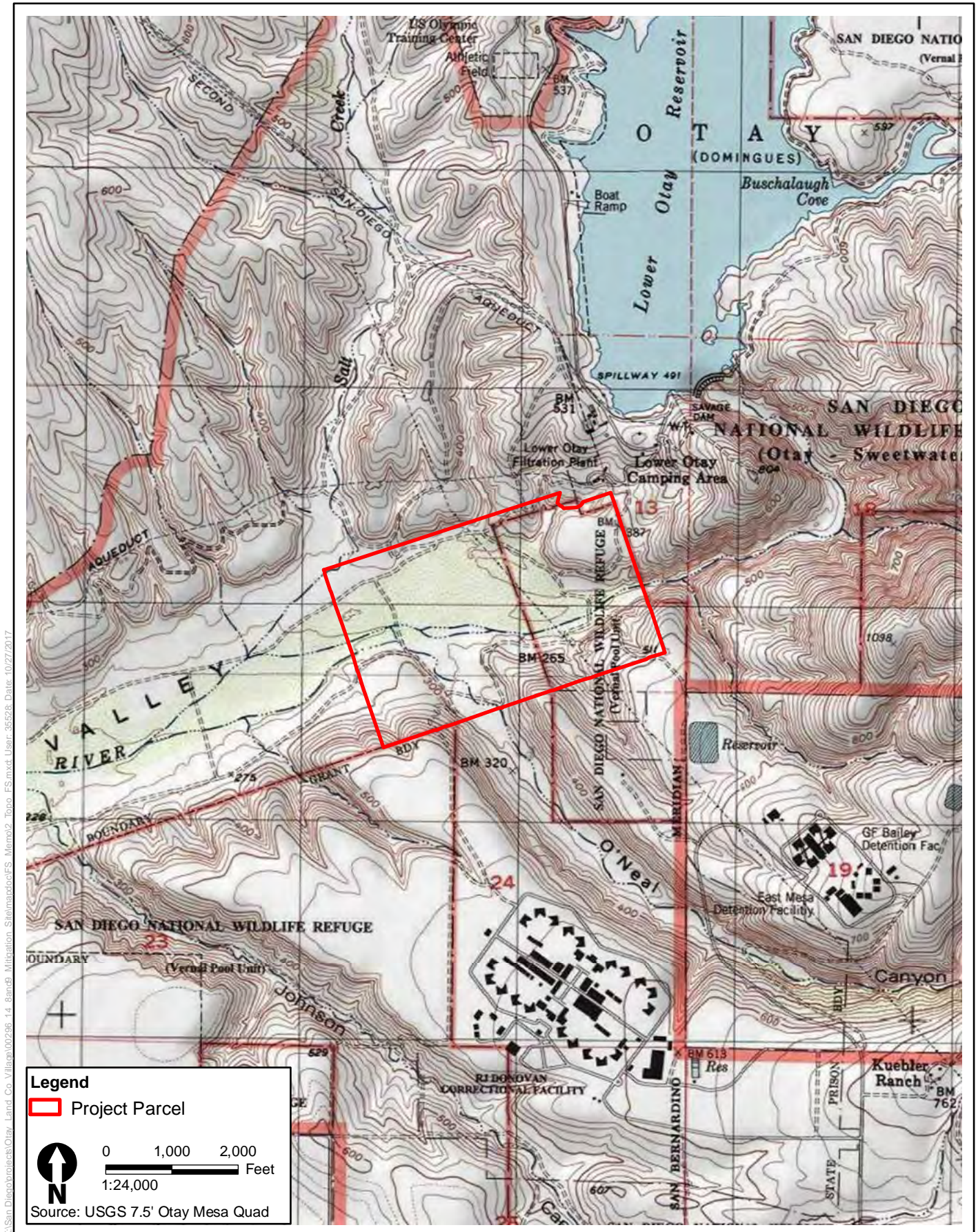


Figure 1
Regional Location
Otoy River Restoration Project

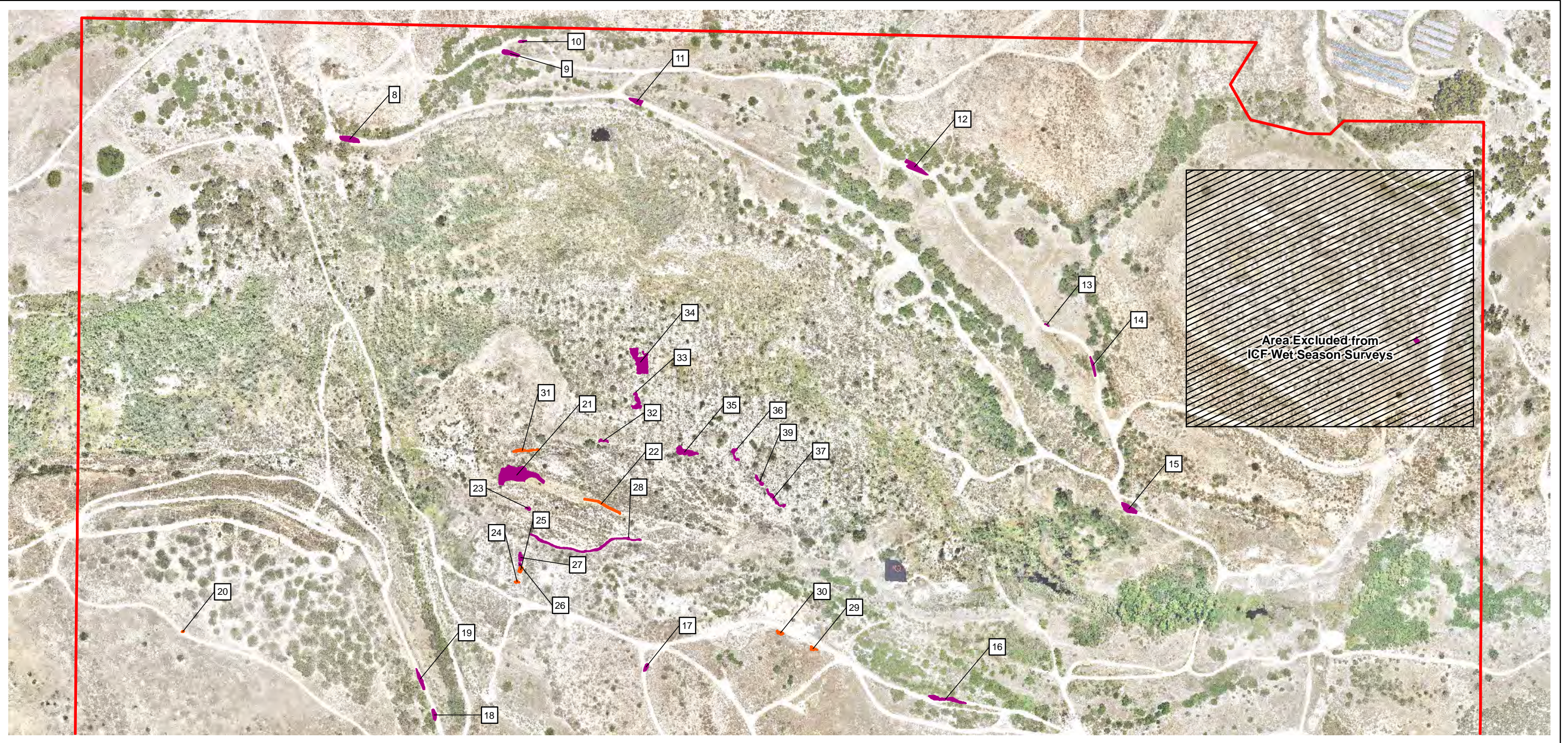


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Figure 2
Project Location
Otay River Restoration Project

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Legend

- Project Parcel
- Sampled Ephemeral Basins***
- Branchinecta sp. cysts observed
- no cysts observed

*No riverside fairy shrimp cysts were obtained from the sampled basins

Source: RECON; ICF, 2017

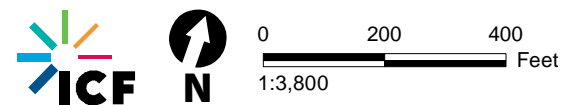


Figure 3
Surveyed Depressions
Otay River Restoration Project

2.2 Soil Processing and Analysis

Soil samples were processed by ICF fairy shrimp biologist and USFWS permitted cyst-identifier Dale Ritenour (Permit# TE-58888A-2) in accordance with the Guidelines. The soil samples were measured into ten individual plastic containers. These samples were hydrated in tap water then washed through a set of sieves. Material passing through a Number 45 (355 micrometer) USA Standard Testing Sieve, A.S.T.M.E.-11 specification was caught on a Number 70 (212 micrometer) Sieve. The 355-micrometer sieve allows the passage of cysts while the 212- micrometer sieves was selected as the appropriate size to collect cysts from large branchiopods with ranges including the study area in southern San Diego County, including *Branchinecta sandiegonensis*, *Branchinecta lindahl*, and *Streptocephalus woottoni*. The 212-micrometer sample material was rinsed into a container with approximately 200 milliliters of a saturated brine solution to float organic material, including fairy shrimp cysts. The material floating on the brine was decanted onto a paper filter. The organic material collected on the paper was examined under a stereo zoom microscope. Distinctive fairy shrimp cysts were counted if present. All sieves were soaked in a bleach solution and then thoroughly cleaned after completion of the procedure for each depression, to ensure no cysts adhered to the surfaces of the sieves.

Fairy shrimp cysts were identified to the genus level through microscope examination. *Streptocephalus* cysts can be discerned from *Branchinecta* cysts based on cyst surface characteristics. Riverside fairy shrimp is the only member of the *Streptocephalus* genus known from San Diego County; therefore any observed *Streptocephalus* cysts would be accepted as Riverside fairy shrimp. *Branchinecta sandiegonensis* and *Branchinecta lindahl* are both known to occur in the Otay Mesa region. Their cysts are similar in appearance and have some overlap in size, and may not be conclusively separated and identified for each other. Therefore, *Branchinecta* cysts observed require wet season survey to confirm the species present in the depressions.

3.0 Results and Discussion

Branchinecta cysts were observed in 23 of the 30 sampled pools in the 2017 dry season sampling (Table 1). *Branchinecta* cysts were found in high abundance, averaging over 50 cysts per 100ml of soil, in depression 28. *Branchinecta* cysts were found in medium abundance, defined as averaging 11-50 cysts/100ml, in depressions 9, 10, 11, 12, 13, 14, 15, 19, 33, and 35. *Branchinecta* cysts were found in low abundance in depressions 8, 17, 18, 21, 23, 26, 27, 32, 34, 36, 37, and 39.

No Riverside fairy shrimp cysts were observed in samples in the 2017 dry season survey.

Both San Diego and Lindahl's fairy shrimp are known from the Otay Mesa area. Wet season sampling is necessary to determine which shrimp species are present. ICF is conducting a wet season fairy shrimp survey of the study area in the winter/spring of 2017-2018. Results will be provided in a separate document.

Table 1. Dry Season Sampling Results

Pool	Cyst Presence	Cyst Abundance	sample number									
			1	2	3	4	5	6	7	8	9	10
8	<i>Branchinecta</i> sp.	Low	1	0	2	0	0	0	0	0	3	0
9	<i>Branchinecta</i> sp.	Moderate	27	22	13	55	80	25	20	30	20	20
10	<i>Branchinecta</i> sp.	Moderate	9	10	6	15	12	15	10	15	25	10
11	<i>Branchinecta</i> sp.	Moderate	20	35	28	15	20	20	25	30	20	15
12	<i>Branchinecta</i> sp.	Moderate	9	12	10	19	14	7	22	24	20	11
13	<i>Branchinecta</i> sp.	Moderate	6	15	19	33	22	9	28	45	16	48
14	<i>Branchinecta</i> sp.	Moderate	23	5	26	14	12	24	12	35	11	22
15	<i>Branchinecta</i> sp.	Moderate	0	20	11	7	6	10	20	14	8	10
17	<i>Branchinecta</i> sp.	Low	0	0	0	1	1	1	0	1	0	0
18	<i>Branchinecta</i> sp.	Low	4	2	2	10	23	6	7	5	4	20
19	<i>Branchinecta</i> sp.	Moderate	10	6	24	12	28	45	15	18	4	8
20	-none-		0	0	0	0	0	0	0	0	0	0
21	<i>Branchinecta</i> sp.	Low	0	0	0	0	1	0	0	0	2	0
22	-none-		0	0	0	0	0	0	0	0	0	0
23	<i>Branchinecta</i> sp.	Low	0	1	4	2	6	0	3	0	4	0
24	-none-		0	0	0	0	0	0	0	0	0	0
25	-none-		0	0	0	0	0	0	0	0	0	0
26	<i>Branchinecta</i> sp.	Low	0	0	1	0	0	0	0	0	0	0
27	<i>Branchinecta</i> sp.	Low	0	1	0	0	0	0	0	0	0	0
28	<i>Branchinecta</i> sp.	High	100	200	100	250	100	90	100	60	100	100
29	-none-		0	0	0	0	0	0	0	0	0	0
30	-none-		0	0	0	0	0	0	0	0	0	0
31	-none-		0	0	0	0	0	0	0	0	0	0
32	<i>Branchinecta</i> sp.	Low	1	0	3	0	0	0	0	5	0	2
33	<i>Branchinecta</i> sp.	Moderate	10	40	20	10	12	10	20	25	30	40
34	<i>Branchinecta</i> sp.	Low	1	3	3	1	0	0	5	5	1	3
35	<i>Branchinecta</i> sp.	Moderate	20	10	10	20	20	50	20	15	20	10
36	<i>Branchinecta</i> sp.	Low	4	4	5	16	5	1	8	5	6	1
37	<i>Branchinecta</i> sp.	Low	15	10	10	20	10	10	5	8	10	7
39	<i>Branchinecta</i> sp.	Low	4	10	9	14	30	8	2	6	10	3

no *Streptocephalus* observed in any pool

4.0 References

(U.S. Fish and Wildlife Service (USFWS). 2015. Survey Guidelines for the Listed Large Branchiopods. May 31.

5.0 Certification

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.



March 19, 2018

Dale Ritenour (Permit No. TE-58888A-2)
Vernal Pool Biologist
Author and USFWS Approved Cyst Identification

Date

Appendix A
USFWS Notification



November 8, 2017

Ms. Stacey Love
Recovery Permit Coordinator
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, CA 92008

RE: 15-Day Notice for Protocol Surveys for Listed Vernal Pool Branchiopods
Otay River Restoration Project

Dear Ms. Love:

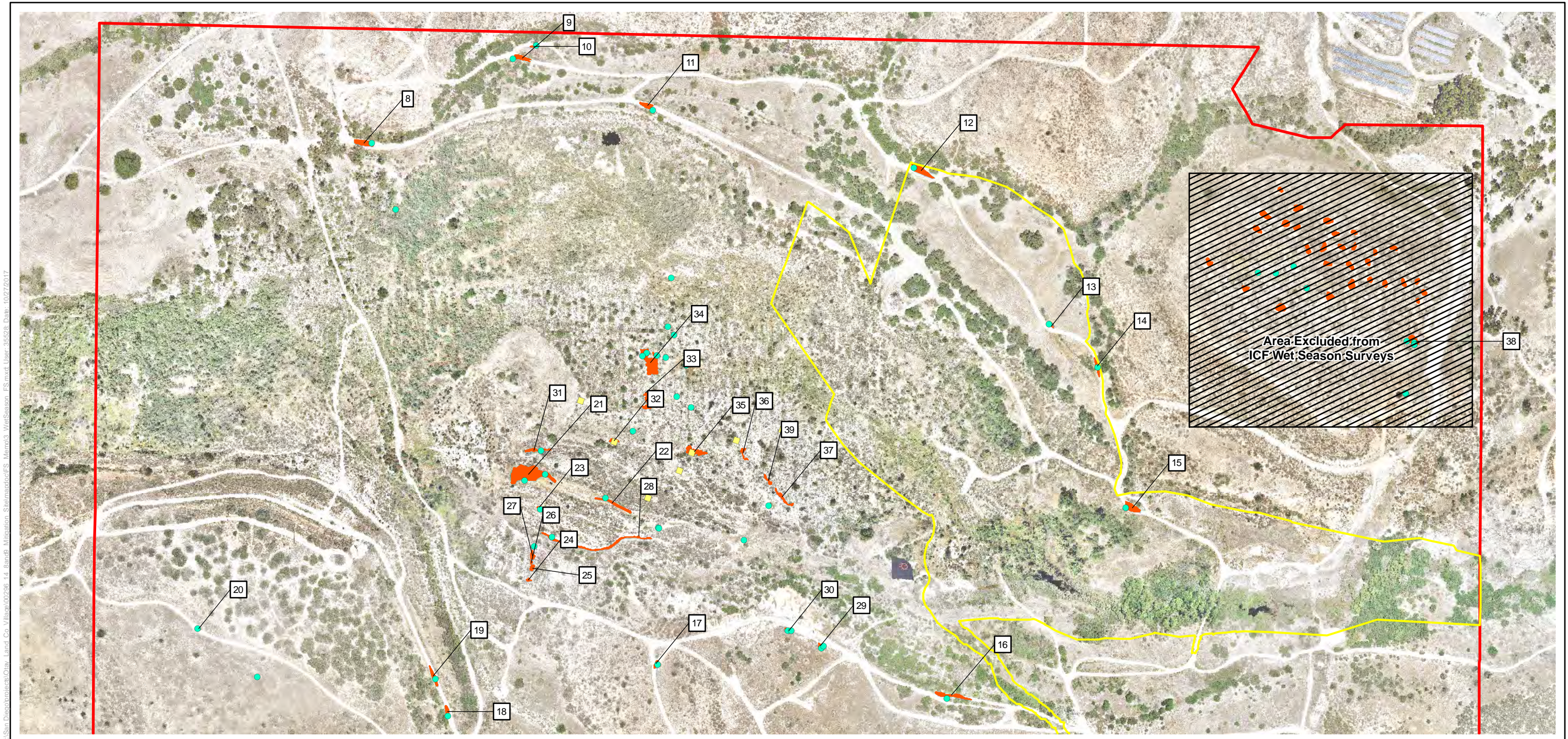
ICF is planning on conducting a protocol wet season and dry season survey for listed vernal pool branchiopods within the Otay River Restoration Project (Figures 1 and 2). The surveys will be conducted to document the presence of listed branchiopods within the Otay River Restoration Project prior to commencement of project activities. Thirty-one seasonally-inundated depressions within the Otay River Restoration Project have been previously mapped and will be surveyed (Figure 3). I will be conducting the wet season survey under the guidelines stated in the 2017 Survey Guidelines for Listed Large Branchiopods issued by the U.S. Fish and Wildlife Service. I will collect soil samples following the terms and conditions of section 5 of my TE permit, in accordance with the 2017 Survey Guidelines for Listed Large Branchiopods issued by the Service. Service-approved listed branchiopod cyst identifier Dale Ritenour (TE-58888A-2) will conduct the processing and analyzation of dry season soil samples. All dry season efforts will follow the 2017 Survey Guidelines for Listed Large Branchiopods.

Please do not hesitate to contact me with any comments or questions.

Sincerely,

A handwritten signature in black ink that reads "Lance Woolley". The signature is written in a cursive, slightly slanted style.

Lance Woolley
TE-14560C
(858) 444-3924
Lance.Woolley@icf.com



- Legend**
- █ Project Parcel
 - █ Pre Bank Boundary
 - Ponding Points
 - █ Ponding Polygons
 - █ Vernal Pools (RECON)
 - █ Woolly Marbles

Figure 3
Vernal Pools to Survey
 Otay River Restoration Project

Appendix B
USFWS Dry Season Data Sheets

Appendix 2. U.S. Fish and Wildlife Service – Data Sheet for Dry Season Sample Analysis for Listed Large Branchiopods

Project Information				Biologist Information			
Project Name: <u>Otay River Restoration Project</u>		Quad: <u>Otay Mesa</u>		Name of Person(s) Who Conducted the Following Tasks and Permit Number(s):			
USFWS Project Number: _____		Township: _____		Soil Collection: <u>Lance Wooley TE-14560C</u>			
County: <u>San Diego</u>		Range: _____		Soil Processing: <u>Dale Ritenour TE 58888A-2</u>			
Lat: _____		Section: _____		Soil Analysis/Cysts ID: <u>Dale Ritenour TE 58888A-2</u>			
Long: _____				Soil Collection Date: <u>11/28/2017</u>			

Pool/ Habitat/ Basin No.	Invertebrates Present (X)														Comments	
	Insect Exo- Skeletons	Micro- Turbellaria Cysts	Cladocera Ephippia	Ostracods Live/Cysts/ Carapaces	Copepods Live/Cysts	Number of Large Branchiopod Cysts						Hydracarina Live	Nematoda	Collembola		Other Species
						Branchinecta sp.	Lepidurus packardii	Streptocephalus wootoni	Linderiella occidentalis	Lynceus brachyurus	Cyzicus californicus					
8 9 10						6 312 127		♂								
11 12 13						228 148 241		♂								
14 15 17						184 106 4		♂								
18 19 20						83 170 0		♂								
21 22 23						3 0 20		♂								
24 25 26						0 0 1		♂								
27 28 29						1 1200 0		♂								
30 31 32						0 0 11		♂								
33 34 35						217 22 195		♂								
36 37 39						55 105 96		♂								

2017-2018 WET SEASON FAIRY SHRIMP SURVEY FOR OTAY RIVER RESTORATION PROJECT

PREPARED FOR:

Otay Land Company, LLC
1903 Wright Place, Suite 220
Carlsbad, CA 92008

PREPARED BY:

ICF
525 B Street, Suite 1700
San Diego, California 92101

September 2018



ICF. 2018. 2017-2018 Wet Season Fairy Shrimp Survey for Otay River
Restoration Project. September.

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2.1 Wet Season Fairy Shrimp Sampling	1
3.0 Results and Discussion.....	2
4.0 References	6
5.0 Certification	6

Appendix A USFWS Notification

Appendix B USFWS Wet Season Data Sheets

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2. Project Vicinity	1
3. 2017-2018 Wet Season Fairy Shrimp Surveys	1

1.0 Introduction

ICF was contracted to conduct wet season fairy shrimp surveys for the Otay River Restoration Project (ORRP), a permittee-responsible mitigation site and proposed mitigation bank located below Savage Dam in the Otay River. The mitigation site is being implemented to offset impacts associated with several Otay Ranch Village development projects as well as future projects in the vicinity.

The goal of this survey was to determine presence or absence of listed large branchiopods (fairy shrimp) in seasonally inundated depressions within the study area (Figures 1-3), for use in avoiding take of listed large branchiopods. The large branchiopods known from freshwater in southern San Diego County are San Diego fairy shrimp (*Branchinecta sandiegonensis*), Lindahl's fairy shrimp (*Branchinecta lindahl*), and Riverside fairy shrimp (*Streptocephalus woottoni*).

2.0 Methods

ICF conducted wet season fairy shrimp surveys on 30 seasonally inundated depressions located within the study area (Figure 3). The vernal pool preserve in the northeast side of the site was not a subject of this study and was not sampled (Figure 3). All seasonally inundated depressions besides #20 were previously mapped by RECON Environmental as part of land stewardship of the Otay River Regional Park, and the boundaries of the depressions are used in Figure 3

Survey methodology follows the USFWS *Survey Guidelines for the Listed Large Branchiopods* (Guidelines; USFWS 2015) as described below. Prior to initiating the surveys, a 15-day pre-notification letter was sent to the USFWS Carlsbad Field Office informing intent to conduct a protocol dry season survey for listed fairy shrimp (Appendix A).

2.1 Wet Season Fairy Shrimp Sampling

The site was monitored for any inundation, beginning after the first rains in fall of 2017. Wet season sampling commenced after the first ponding was observed. Wet season sampling was conducted by Lance Woolley (Permit# TE-14560C), assisted by ICF biologist Nicole Salas. No measurable rain fell at the weather station at Brown Field in October, November, or December 2017 (NOAA 2018). The storm event on January 9 and 10, 2018 produced 1.58 inches of rainfall and produced the most rain of the season (NOAA 2018). Several pools were confirmed to be inundated on January 12, 2018. The first sampling event took place on January 19, 2018, and was considered completed on April 20, 2018, after the last pools dried.

During the wet season, biologists visited the pools after storm events of at least one inch to document when a pool was inundated (held more than 3 centimeters of standing water) (Table 1). After inundation, pools were visited once every week until the pools were no longer inundated, to assess the growth of fairy shrimp and to evaluate if the pools were refilling with late season rain events. Surveys were reinitiated if pools refilled to above 3 centimeters. During each visit, portions of the pool bottom, edges and vertical water column were sampled using a dip net or aquarium net appropriate for the size of the pool. Mesh size was no larger than 1/8 inch. Sampling tools were examined and emptied at least once every five linear meters. Depth of ponding at deepest location was recorded. Voucher specimens of all listed vernal pool branchiopods captured were be collected

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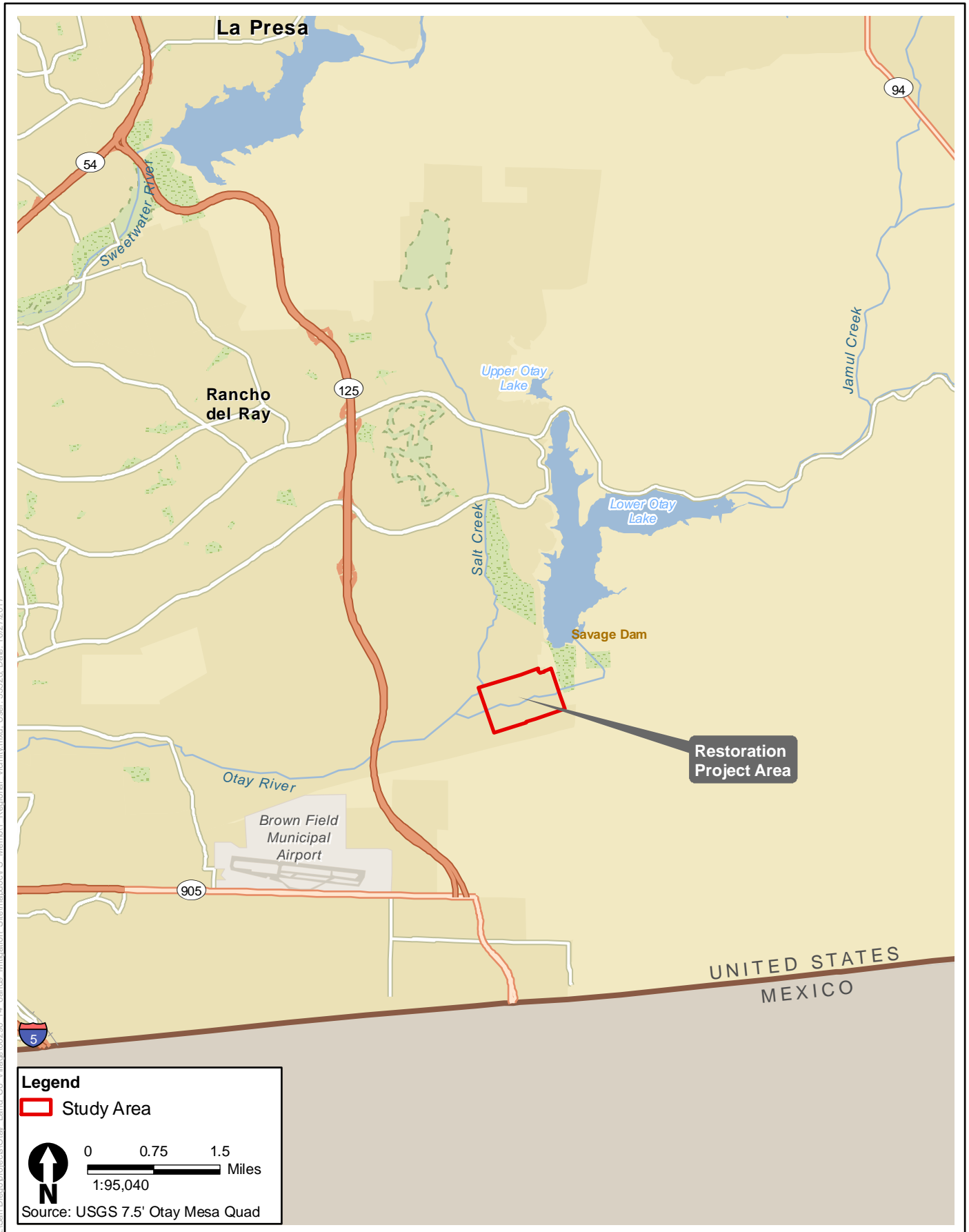
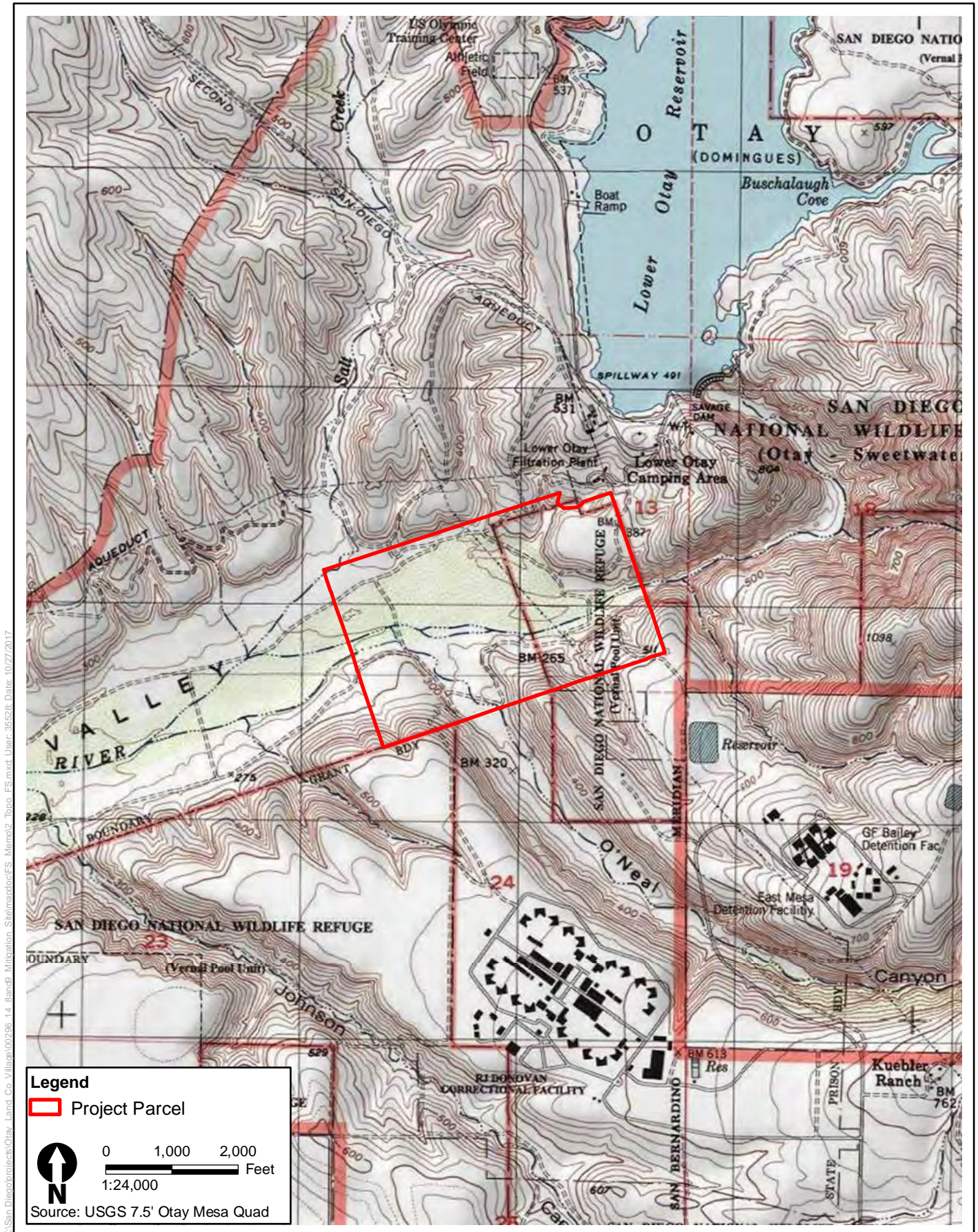


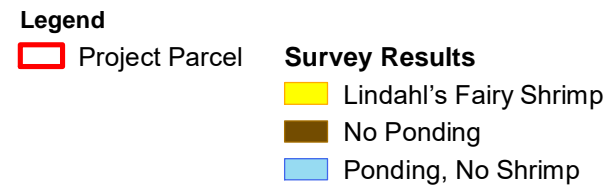
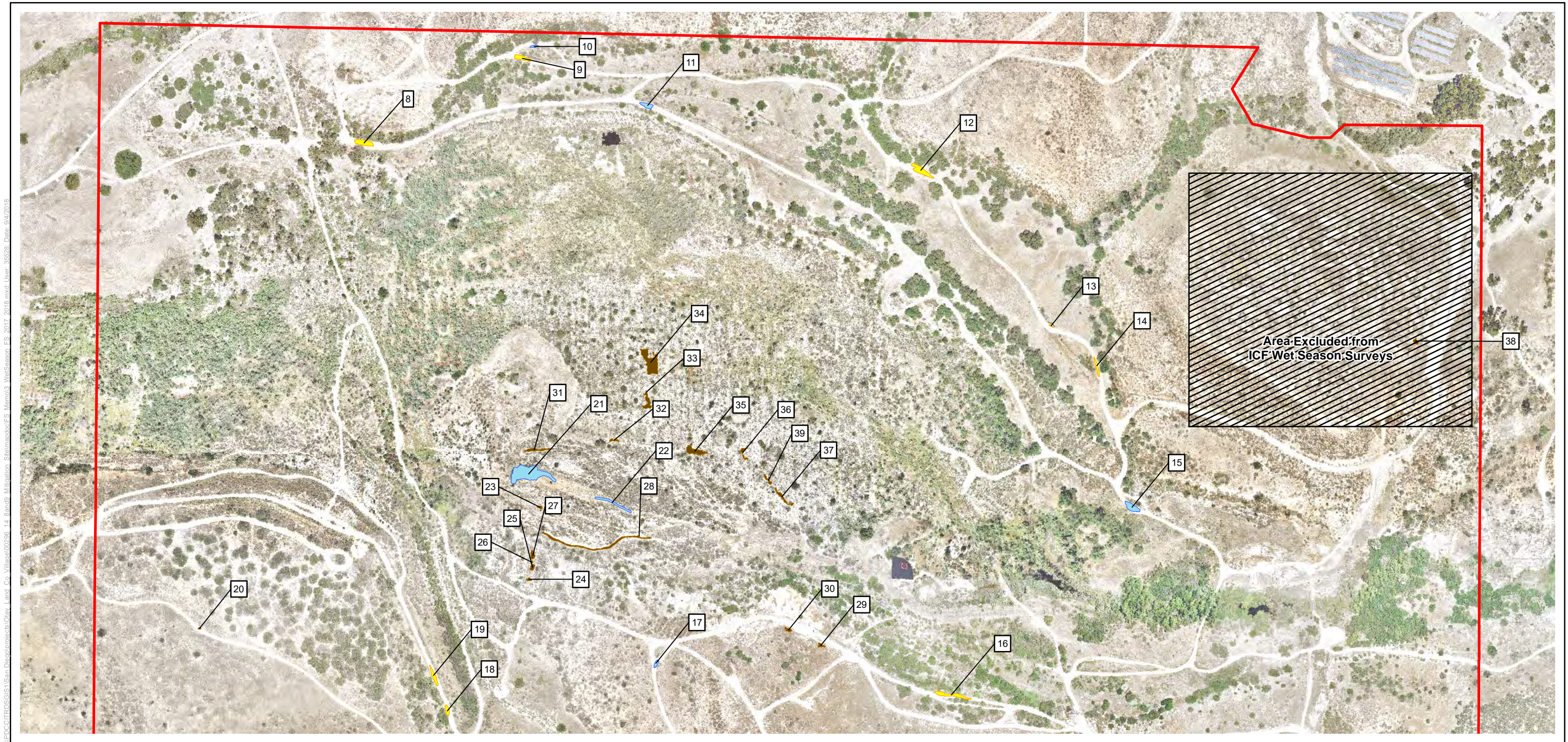
Figure 1
Regional Location
Otoy River Restoration Project



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Figure 2
Project Location
Otay River Restoration Project



Source: RECON; ICF, 2018

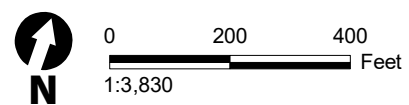


Figure 3
2017-2018 Wet Season Fairy Shrimp Survey Results
Otay River Restoration Project

and all other specimens were returned to the pool. Specimens were be only collected once for each pool, with a maximum of 20 specimens (3 specimens of either sex) or less than 10% of the population of each listed species collected.

3.0 Results and Discussion

Lindahl's fairy shrimp were observed in the following 8 of 30 basins during the 2017-2018 wet season surveys: 8, 9, 12, 13, 14, 16, 18, and 19 (Table 2; Figure 3).

No Riverside fairy shrimp or San Diego fairy shrimp were observed in any of the sampled basins in 2017-2018.

Branchinecta sp. cysts were observed in the following 23 basins during dry season sampling in 2017: 8 -19, 21, 23, 26, 27, 28, and 32-39 (ICF 2018).

2017-2018 was a year of below-average rainfall. Basins 20 and 23 through 39 never ponded during the sampling period. All other basins except 10 and 15 held water long enough in 2017-2018 to at least marginally support the life-cycle of San Diego fairy shrimp (Table 1), with 30 days being the typical average time needed for San Diego fairy shrimp to reach reproductive maturity (Eriksen and Belk 1999).

Table 1. 2018 Hydrological Monitoring – Approximate maximum ponding depth per visit (centimeters).

Pool	1/19	1/26	2/2	2/9	2/16	2/23	3/2	3/9	3/16	3/23	3/30	4/6	4/13	4/20
8	dry	dry	dry	dry	dry	dry	5	15	15	6	dry	dry	dry	dry
9	20	15	3	dry	dry	dry	10	4	5	dry	dry	dry	dry	dry
10	dry	dry	dry	dry	dry	dry	dry	dry	dry	6	dry	dry	dry	dry
11	dry	dry	dry	dry	dry	dry	8	5	5	dry	dry	dry	dry	dry
12	20	5	dry	dry	dry	dry	40	25	25	30	20	8	dry	dry
13	dry	dry	dry	dry	dry	dry	12	15	15	15	9	dry	dry	dry
14	10	dry	dry	dry	dry	dry	50	40	40	35	25	18	8	dry
15	10	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
16	10	10	4	dry	dry	dry	40	25	25	25	15	10	dry	dry
17	dry	dry	dry	dry	dry	dry	dry	5	5	dry	dry	dry	dry	dry
18	5	3	dry	dry	dry	dry	dry	15	15	6	dry	dry	dry	dry
19	5	dry	dry	dry	dry	dry	dry	10	10	6	dry	dry	dry	dry
20	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
21	40	37	35	20	10	dry	10	dry	dry	dry	dry	dry	dry	dry
22	25	18	18	10	5	dry	2	dry	dry	dry	dry	dry	dry	dry
23	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
24	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
25	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
26	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
27	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
28	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
29	dry	dry	dry	dry	dry	dry	20	dry	dry	dry	dry	dry	dry	dry
30	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
31	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
32	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
33	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
34	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
35	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
36	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
37	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
39	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry

* = ponding observed; no depth sampled; Note: all pools dry on 4/20/2018

Table 2. 2018 Wet Season Fairy Shrimp Sampling Results

Pool	1/19	1/26	2/2	2/9	2/16	2/23	3/2	3/9	3/16	3/23	3/30	4/6	4/13	4/20
8	dry	dry	dry	dry	dry	dry	*	dry	*	LFS	dry	dry	dry	dry
9	imm FS	LFS	LFS	dry	dry	dry	*	dry	*	dry	dry	dry	dry	dry
10	dry	dry	dry	dry	dry	dry	dry	dry	dry	*	dry	dry	dry	dry
11	dry	dry	dry	dry	dry	dry	*	dry	*	dry	dry	dry	dry	dry
12	imm FS	*	dry	dry	dry	dry	LFS	LFS	*	*	*	*	dry	dry
13	dry	dry	dry	dry	dry	dry	LFS	*	*	*	*	dry	dry	dry
14	LFS	dry	dry	dry	dry	dry	*	LFS	*	*	*	*	*	dry
15	*	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
16	*	LFS	*	dry	dry	dry	*	*	LFS	LFS	*	*	dry	dry
17	dry	dry	dry	dry	dry	dry	dry	dry	*	*	dry	dry	dry	dry
18	LFS	*	dry	dry	dry	dry	dry	LFS	LFS	LFS	dry	dry	dry	dry
19	LFS	dry	dry	dry	dry	dry	dry	dry	*	LFS	dry	dry	dry	dry
20	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
21	*	*	*	*	*	dry	*	dry	dry	dry	dry	dry	dry	dry
22	*	*	*	*	*	dry	*	dry	dry	dry	dry	dry	dry	dry
23	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
24	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
25	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
26	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
27	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
28	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
29	dry	dry	dry	dry	dry	dry	20	dry	dry	dry	dry	dry	dry	dry
30	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
31	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
32	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
33	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
34	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
35	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
36	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
37	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
39	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry

* = pool inundated, no shrimp; imm FS = immature fairy shrimp; LFS = mature Lindahl's fairy shrimp observed. All basins were dry on 4/20/2017.

4.0 References

Eriksen, C. and D. Belk. Fairy Shrimps of California's Puddles, Playas, and Pools. Mad River Press, 141 Carter Lane, Eureka, CA 95503. 196pp.

ICF. 2018. 2017 Dry Season Fairy Shrimp Survey at Otay River Restoration Project. June.

Environmental Science Associates and ICF International. 2015. Comprehensive Monitoring Plan. Prepared for the County of San Diego Department of Parks and Recreation

NOAA National Weather Service Forecast Office, San Diego, CA. Chronological RTP Listings by Station. Available: <<https://www.wrh.noaa.gov/sgx/obs/rtp/rtpmap.php?wfo=sgx>>

U.S. Fish and Wildlife Service (USFWS). 2015. Survey Guidelines for the Listed Large Branchiopods. May 31.

5.0 Certification

We certify that the information in this survey report and attached exhibits fully and accurately represent our work.



Lance Woolley (Permit No. TE-14560C)
Vernal Pool Biologist

September 14, 2018

Date

Appendix A
USFWS Notification



November 8, 2017

Ms. Stacey Love
Recovery Permit Coordinator
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, CA 92008

RE: 15-Day Notice for Protocol Surveys for Listed Vernal Pool Branchiopods
Otay River Restoration Project

Dear Ms. Love:

ICF is planning on conducting a protocol wet season and dry season survey for listed vernal pool branchiopods within the Otay River Restoration Project (Figures 1 and 2). The surveys will be conducted to document the presence of listed branchiopods within the Otay River Restoration Project prior to commencement of project activities. Thirty-one seasonally-inundated depressions within the Otay River Restoration Project have been previously mapped and will be surveyed (Figure 3). I will be conducting the wet season survey under the guidelines stated in the 2017 Survey Guidelines for Listed Large Branchiopods issued by the U.S. Fish and Wildlife Service. I will collect soil samples following the terms and conditions of section 5 of my TE permit, in accordance with the 2017 Survey Guidelines for Listed Large Branchiopods issued by the Service. Service-approved listed branchiopod cyst identifier Dale Ritenour (TE-58888A-2) will conduct the processing and analyzation of dry season soil samples. All dry season efforts will follow the 2017 Survey Guidelines for Listed Large Branchiopods.

Please do not hesitate to contact me with any comments or questions.

Sincerely,

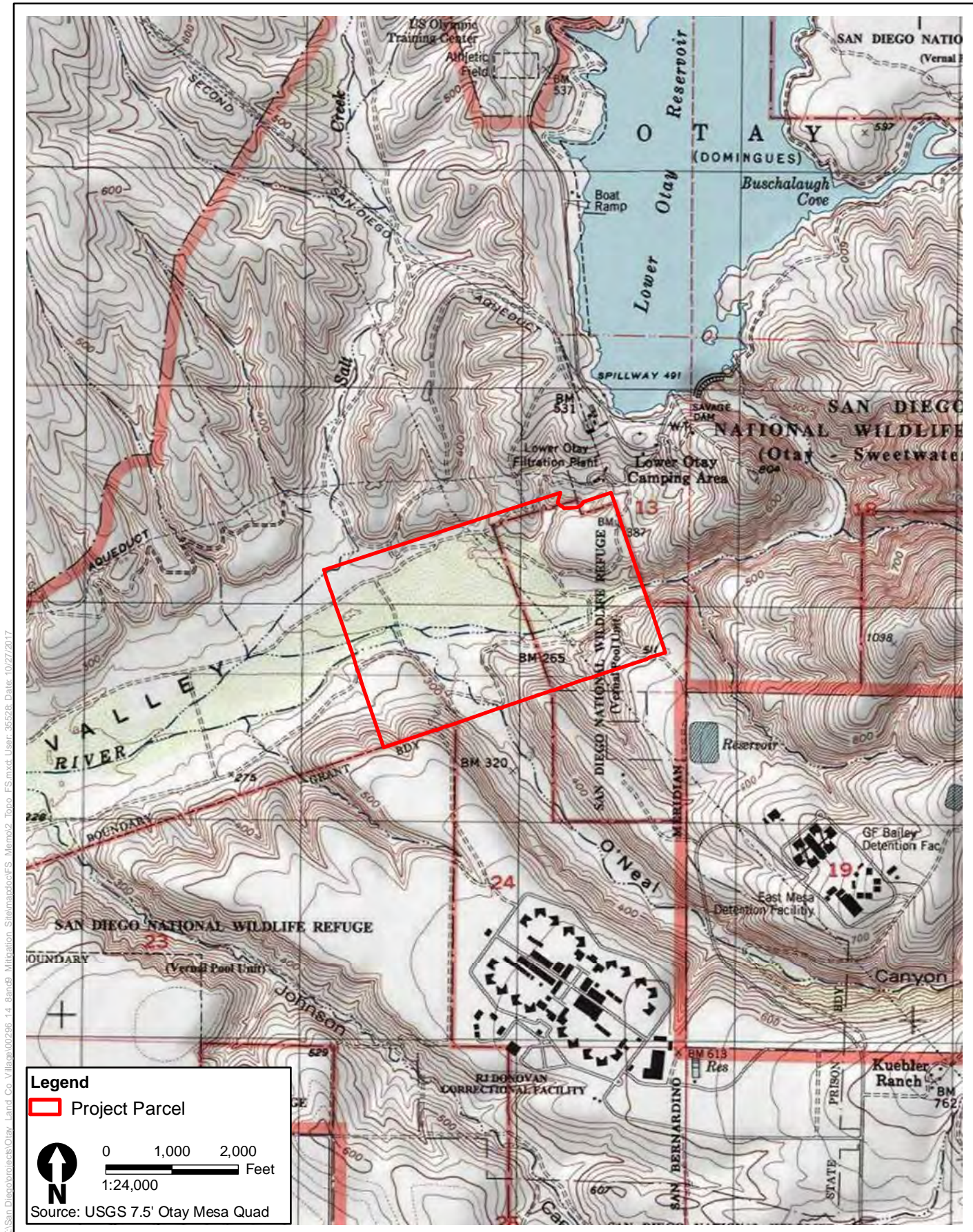
A handwritten signature in black ink that reads "Lance Woolley". The signature is written in a cursive, slightly slanted style.

Lance Woolley
TE-14560C
(858) 444-3924
Lance.Woolley@icf.com

K:\San_Diego\projects\Otay_Land_Co_Village\00296_14_Band9_Mitigation_SF\matador\ES_Memo\1_Regional_Vicinity\user-36528_Data_10/27/2017



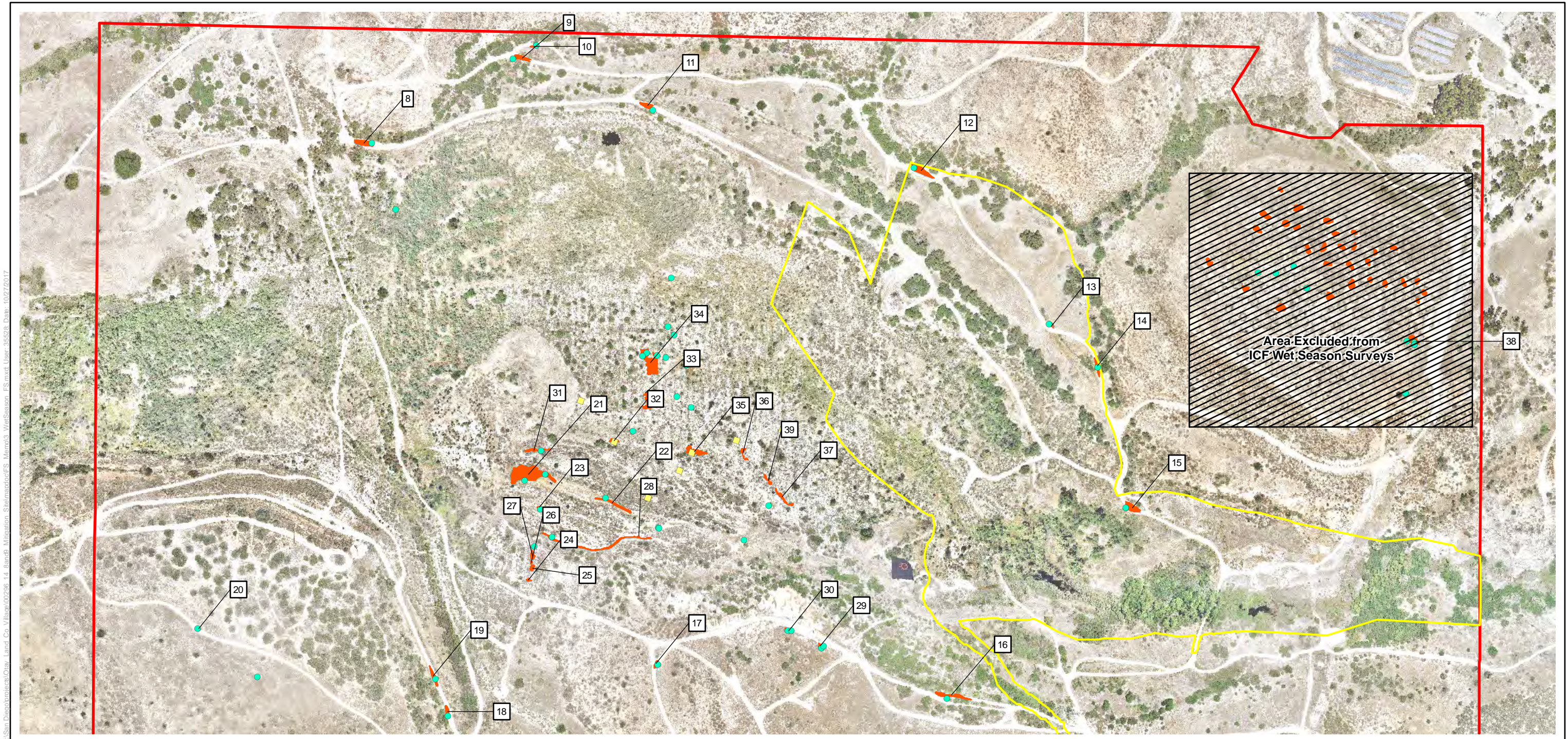
Figure 1
Regional Location
Otoy River Restoration Project



K:\San_Diego\projects\Otay_River_Land_Co_Village\02296_14_Band9_Mitigation_Schematic\ES_Memo2_Topo_ES.mxd User: 35528 Date: 10/27/2017



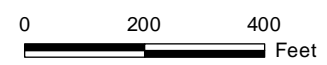


Figure 2
Project Location
Otay River Restoration Project



- Legend**
- █ Project Parcel
 - █ Pre Bank Boundary
 - Ponding Points
 - █ Ponding Polygons
 - █ Vernal Pools (RECON)
 - █ Woolly Marbles

Source: RECON; ICF, 2017

1:3,830

Figure 3
Vernal Pools to Survey
Otay River Restoration Project

Appendix B
USFWS Wet Season Data Sheets

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 1

Date: 01/19/17 **Time:** 0830-1230 **Weather Conditions:** Overcast, 56 °F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
8	3607130, 505379 NAD83	--	--	--	--	--	80	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
9	3607253, 505498 NAD83	56	50	10	20	10	55	BRSP	--	--	--	--	--	--	--	--	--	D/TT	Juveniles
10	3607276, 505505 NAD83	--	--	--	--	--	12	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
11	3607258, 505361 NAD83	--	--	--	--	--	46	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
12	3607290, 505906 NAD83	56	50	10	20	80	102	BRSP	--	--	--	--	--	--	--	--	--	D/TT	Juveniles
13	3607189, 506078 NAD83	--	--	--	--	--	3	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
14	3607165, 506135 NAD83	57	50	8	10	400	31	BRLI	--	--	--	--	--	--	--	--	--	D/TT	8 Male BRLI Collected
15	3607047, 506213 NAD83	57	52	7	10	79	79	--	--	--	--	--	--	--	--	--	--	D/TT	
16	3606812, 506107 NAD83	57	54	7	10	22	84	--	--	--	--	--	--	--	--	--	--	D/TT	
17	3606744, 505823 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
18	3606631, 505644 NAD83	61	55	3	5	18	30	BRLI	--	--	--	--	--	--	--	--	--	D/TT	12 Male BRLI Collected
19	3606658, 505621 NAD83	61	55	3	5	24	47	BRLI	--	--	--	--	--	--	--	--	--	D/TT	3 Male BRLI Collected
20	3606625, 505387 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
21	3606877, 505640 NAD83	61	55	20	40	400	428	--	--	--	--	--	--	--	--	--	--	NP, UD	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 1

Date: 01/19/17 **Time:** 00-831230 **Weather Conditions:** Overcast, 56 °F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
22	3606879, 505731 NAD83	61	56	15	25	71	71	--	--	--	--	--	--	--	--	--	--	NP, UD	
23	3606851, 505664 NAD83	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
24	3606779, 505677 NAD83	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
25	3606792, 505676 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
26	3606797, 505674 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
27	3606803, 505672, NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
28	3606827, 505714 NAD83	--	--	--	--	--	148	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
29	3606815, 505970 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
30	3606819, 505935 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
31	3606903, 505643 NAD83	--	--	--	--	--	44	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
32	3606937, 505710 NAD83	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
33	3606984, 505729 NAD83	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
34	3607020, 505720 NAD83	--	--	--	--	--	236	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
35	3606954, 505790 NAD83	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 1

Date: 01/19/17 **Time:** 0830-1230 **Weather Conditions:** Overcast, 56°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
36	3606967, 505834 NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
37	3606941, 505885 NAD83	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
39	3606952, 505865 NAD83	--	--	--	--	--	21	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindieriella occidentalis*, BRLI = *Branchinecta lindahl*).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 2

Date: 01/26/2018 **Time:** 0800-1230 **Weather Conditions:** Sunny, 57°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
8	3607130, 505379 NAD83	--	--	--	--	--	80	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
9	3607253, 505498 NAD83	57	50	12	15	30	55	BRLI	--	--	--	--	--	--	--	--	--	D/TT	
10	3607276, 505505 NAD83	--	--	--	--	--	12	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
11	3607258, 505361 NAD83	--	--	--	--	--	46	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
12	3607290, 505906 NAD83	57	52	4	5	12	102	BRLI	--	--	--	--	--	--	--	--	--	D/TT	
13	3607189, 506078 NAD83	--	--	--	--	--	3	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
14	3607165, 506135 NAD83	--	--	--	--	--	31	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
15	3607047, 506213 NAD83	--	--	--	--	--	79	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
16	3606812, 506107 NAD83	58	52	8	10	84	84	BRLI	--	--	--	--	--	--	--	--	--	D/TT	
17	3606744, 505823 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
18	3606631, 505644 NAD83	57	51	3	3	5	30	BRLI	--	--	--	--	--	--	--	--	--	D/TT	
19	3606658, 505621 NAD83	--	--	--	--	--	47	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
20	3606625, 505387 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
21	3606877, 505640 NAD83	57	51	15	25	200	428	--	--	--	--	--	--	--	--	--	--	NP, UD	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project | **County:** San Diego | **Quad:** Otay Mesa | **Township:** 18S | **Range:** 1W | **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas | Survey 2

Date: 01/26/2018 | **Time:** 0800-1230 | **Weather Conditions:** Sunny, 57°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
22	3606879, 505731 NAD83	57	52	13	18	71	71	--	--	--	--	--	--	--	--	--	--	NP, UD	
23	3606851, 505664 NAD83	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
24	3606779, 505677 NAD83	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
25	3606792, 505676 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
26	3606797, 505674 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
27	3606803, 505672, NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
28	3606827, 505714 NAD83	--	--	--	--	--	148	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
29	3606815, 505970 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
30	3606819, 505935 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
31	3606903, 505643 NAD83	--	--	--	--	--	44	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
32	3606937, 505710 NAD83	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
33	3606984, 505729 NAD83	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
34	3607020, 505720 NAD83	--	--	--	--	--	236	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
35	3606954, 505790 NAD83	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 2

Date: 01/26/2018 **Time:** 0800-1230 **Weather Conditions:** Sunny, 57°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
36	3606967, 505834 NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
37	3606941, 505885 NAD83	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
39	3606952, 505865 NAD83	--	--	--	--	--	21	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindieriella occidentalis*, BRLI = *Branchinecta lindahl*). For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present. (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 3

Date: 02/02/2018 **Time:** 0930-1200 **Weather Conditions:** Mostly Sunny, 70°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
8	3607130, 505379 NAD83	--	--	--	--	--	80	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
9	3607253, 505498 NAD83	70	60	2	3	4	55	BRLI	--	--	--	--	--	--	--	--	--	D/TT	
10	3607276, 505505 NAD83	--	--	--	--	--	12	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
11	3607258, 505361 NAD83	--	--	--	--	--	46	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
12	3607290, 505906 NAD83	--	--	--	--	--	102	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
13	3607189, 506078 NAD83	--	--	--	--	--	3	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
14	3607165, 506135 NAD83	--	--	--	--	125	31	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
15	3607047, 506213 NAD83	--	--	--	--	--	79	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
16	3606812, 506107 NAD83	75	63	3	4	20	84	--	--	--	--	--	--	--	--	--	--	D/TT	
17	3606744, 505823 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
18	3606631, 505644 NAD83	--	--	--	--	--	30	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
19	3606658, 505621 NAD83	--	--	--	--	--	47	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
20	3606625, 505387 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
21	3606877, 505640 NAD83	77	61	15	35	125	428	--	--	--	--	--	--	--	--	--	--	NP, UD	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 3

Date: 02/02/2018 **Time:** 0930-1200 **Weather Conditions:** Mostly Sunny, 70°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
22	3606879, 505731 NAD83	77	61	11	18	71	71	--	--	--	--	--	--	--	--	--	--	NP, UD	
23	3606851, 505664 NAD83	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
24	3606779, 505677 NAD83	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
25	3606792, 505676 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
26	3606797, 505674 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
27	3606803, 505672, NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
28	3606827, 505714 NAD83	--	--	--	--	--	148	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
29	3606815, 505970 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
30	3606819, 505935 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
31	3606903, 505643 NAD83	--	--	--	--	--	44	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
32	3606937, 505710 NAD83	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
33	3606984, 505729 NAD83	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
34	3607020, 505720 NAD83	--	--	--	--	--	236	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
35	3606954, 505790 NAD83	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 3

Date: 02/02/2017 **Time:** 0930-1200 **Weather Conditions:** Mostly Sunny, 70°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
36	3606967, 505834 NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
37	3606941, 505885 NAD83	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
39	3606952, 505865 NAD83	--	--	--	--	--	21	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindieriella occidentalis*, BRLI = *Branchinecta lindahl*). For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present. (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 4

Date: 02/09/2018 **Time:** 1000-1300 **Weather Conditions:** Sunny, 64°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
8	3607130, 505379 NAD83	--	--	--	--	--	80	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
9	3607253, 505498 NAD83	--	--	--	--	--	55	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
10	3607276, 505505 NAD83	--	--	--	--	--	12	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
11	3607258, 505361 NAD83	--	--	--	--	--	46	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
12	3607290, 505906 NAD83	--	--	--	--	--	102	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
13	3607189, 506078 NAD83	--	--	--	--	--	3	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
14	3607165, 506135 NAD83	--	--	--	--	30	31	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
15	3607047, 506213 NAD83	--	--	--	--	--	79	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
16	3606812, 506107 NAD83	--	--	--	--	--	84	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
17	3606744, 505823 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
18	3606631, 505644 NAD83	--	--	--	--	--	30	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
19	3606658, 505621 NAD83	--	--	--	--	--	47	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
20	3606625, 505387 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
21	3606877, 505640 NAD83	64	60	15	20	30	428	--	--	--	--	--	--	--	--	--	--	NP, UD	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 4

Date: 02/09/2018 **Time:** 1000-1300 **Weather Conditions:** Sunny, 64°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
22	3606879, 505731 NAD83	64	60	8	10	37	71	--	--	--	--	--	--	--	--	--	--	NP, UD	
23	3606851, 505664 NAD83	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
24	3606779, 505677 NAD83	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
25	3606792, 505676 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
26	3606797, 505674 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
27	3606803, 505672, NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
28	3606827, 505714 NAD83	--	--	--	--	--	148	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
29	3606815, 505970 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
30	3606819, 505935 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
31	3606903, 505643 NAD83	--	--	--	--	--	44	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
32	3606937, 505710 NAD83	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
33	3606984, 505729 NAD83	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
34	3607020, 505720 NAD83	--	--	--	--	--	236	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
35	3606954, 505790 NAD83	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 4

Date: 02/09/2018 **Time:** 1000-1300 **Weather Conditions:** Sunny, 64°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
36	3606967, 505834 NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
37	3606941, 505885 NAD83	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
39	3606952, 505865 NAD83	--	--	--	--	--	21	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Linderiella occidentalis*, BRLI = *Branchinecta lindahl*).
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Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C Survey 5

Date: 02/16/2018 **Time:** 1300-1400 **Weather Conditions:** Mostly Sunny, 74°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
8	3607130, 505379 NAD83	--	--	--	--	--	80	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
9	3607253, 505498 NAD83	--	--	--	--	--	55	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
10	3607276, 505505 NAD83	--	--	--	--	--	12	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
11	3607258, 505361 NAD83	--	--	--	--	--	46	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
12	3607290, 505906 NAD83	--	--	--	--	--	102	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
13	3607189, 506078 NAD83	--	--	--	--	--	3	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
14	3607165, 506135 NAD83	--	--	--	--	10	31	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
15	3607047, 506213 NAD83	--	--	--	--	--	79	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
16	3606812, 506107 NAD83	--	--	--	--	--	84	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
17	3606744, 505823 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
18	3606631, 505644 NAD83	--	--	--	--	--	30	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
19	3606658, 505621 NAD83	--	--	--	--	--	47	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
20	3606625, 505387 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
21	3606877, 505640 NAD83	74	62	7	5	10	428	--	--	--	--	--	--	--	--	--	--	NP, UD	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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SURVEYOR / Permit Number: Lance Woolley -- TE 14560C Survey 5

Date: 02/16/2018 **Time:** 1300-1400 **Weather Conditions:** Partly Sunny, 74°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
22	3606879, 505731 NAD83	74	62	8	10	8	71	--	--	--	--	--	--	--	--	--	--	NP, UD	
23	3606851, 505664 NAD83	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
24	3606779, 505677 NAD83	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
25	3606792, 505676 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
26	3606797, 505674 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
27	3606803, 505672, NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
28	3606827, 505714 NAD83	--	--	--	--	--	148	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
29	3606815, 505970 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
30	3606819, 505935 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
31	3606903, 505643 NAD83	--	--	--	--	--	44	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
32	3606937, 505710 NAD83	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
33	3606984, 505729 NAD83	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
34	3607020, 505720 NAD83	--	--	--	--	--	236	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
35	3606954, 505790 NAD83	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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SURVEYOR / Permit Number: Lance Woolley -- TE 14560C Survey 5

Date: 02/16/2018 **Time:** 1300-1400 **Weather Conditions:** Partly Sunny, 74°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
36	3606967, 505834 NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
37	3606941, 505885 NAD83	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
39	3606952, 505865 NAD83	--	--	--	--	--	21	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C Survey 6

Date: 02/23/2018 **Time:** 0600-0700 **Weather Conditions:** Mostly Cloudy, 55°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
8	3607130, 505379 NAD83	--	--	--	--	--	80	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
9	3607253, 505498 NAD83	--	--	--	--	--	55	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
10	3607276, 505505 NAD83	--	--	--	--	--	12	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
11	3607258, 505361 NAD83	--	--	--	--	--	46	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
12	3607290, 505906 NAD83	--	--	--	--	--	102	BRLI	--	--	--	--	--	--	--	--	--	D/TT	Dry
13	3607189, 506078 NAD83	--	--	--	--	--	3	BRLI	--	--	--	--	--	--	--	--	--	D/TT	Dry
14	3607165, 506135 NAD83	--	--	--	--	--	31	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
15	3607047, 506213 NAD83	--	--	--	--	--	79	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
16	3606812, 506107 NAD83	--	--	--	--	--	84	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
17	3606744, 505823 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
18	3606631, 505644 NAD83	--	--	--	--	--	30	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
19	3606658, 505621 NAD83	--	--	--	--	--	47	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
20	3606625, 505387 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
21	3606877, 505640 NAD83	--	--	--	--	--	428	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C Survey 6

Date: 02/23/2018 **Time:** 0600-0700 **Weather Conditions:** Mostly Cloudy, 55°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
22	3606879, 505731 NAD83	--	--	--	--	--	71	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
23	3606851, 505664 NAD83	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
24	3606779, 505677 NAD83	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
25	3606792, 505676 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
26	3606797, 505674 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
27	3606803, 505672, NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
28	3606827, 505714 NAD83	--	--	--	--	--	148	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
29	3606815, 505970 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
30	3606819, 505935 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
31	3606903, 505643 NAD83	--	--	--	--	--	44	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
32	3606937, 505710 NAD83	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
33	3606984, 505729 NAD83	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
34	3607020, 505720 NAD83	--	--	--	--	--	236	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
35	3606954, 505790 NAD83	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C Survey 6

Date: 02/23/2018 **Time:** 0600-0700 **Weather Conditions:** Mostly Cloudy, 55°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
36	3606967, 505834 NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
37	3606941, 505885 NAD83	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
39	3606952, 505865 NAD83	--	--	--	--	--	21	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 7

Date: 03/02/2018 **Time:** 1000-1300 **Weather Conditions:** Sunny, 62°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
8	3607130, 505379 NAD83	62	57	4	5	30	80	--	--	--	--	--	--	--	--	--	--	D/TT	
9	3607253, 505498 NAD83	62	56	8	10	15	55	--	--	--	--	--	--	--	--	--	--	D/TT	
10	3607276, 505505 NAD83	--	--	--	--	--	12	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
11	3607258, 505361 NAD83	62	57	7	8	24	46	--	--	--	--	--	--	--	--	--	--	D/TT	
12	3607290, 505906 NAD83	62	56	20	40	100	102	BRLI	--	--	--	--	--	--	--	--	--	D/TT	
13	3607189, 506078 NAD83	62	57	9	12	4	3	BRLI	--	--	--	--	--	--	--	--	--	D/TT	
14	3607165, 506135 NAD83	62	57	20	50	31	31	--	--	--	--	--	--	--	--	--	--	D/TT	
15	3607047, 506213 NAD83	--	--	--	--	--	79	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
16	3606812, 506107 NAD83	62	57	20	40	84	84	--	--	--	--	--	--	--	--	--	--	D/TT	
17	3606744, 505823 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
18	3606631, 505644 NAD83	--	--	--	--	--	30	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
19	3606658, 505621 NAD83	--	--	--	--	--	47	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
20	3606625, 505387 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
21	3606877, 505640 NAD83	62	58	3	10	6	428	--	--	--	--	--	--	--	--	--	--	NP, UD	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 7

Date: 03/02/2018 **Time:** 1000-1300 **Weather Conditions:** Sunny, 62°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
22	3606879, 505731 NAD83	62	58	2	2	2	71	--	--	--	--	--	--	--	--	--	--	NP, UD	
23	3606851, 505664 NAD83	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
24	3606779, 505677 NAD83	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
25	3606792, 505676 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
26	3606797, 505674 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
27	3606803, 505672, NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
28	3606827, 505714 NAD83	--	--	--	--	--	148	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
29	3606815, 505970 NAD83	62	57	10	20	17	17	--	--	--	--	--	--	--	--	--	--	NP, UD	
30	3606819, 505935 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
31	3606903, 505643 NAD83	--	--	--	--	--	44	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
32	3606937, 505710 NAD83	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
33	3606984, 505729 NAD83	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
34	3607020, 505720 NAD83	--	--	--	--	--	236	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
35	3606954, 505790 NAD83	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 7

Date: 03/02/2018 **Time:** 1000-1300 **Weather Conditions:** Sunny, 62°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
36	3606967, 505834 NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
37	3606941, 505885 NAD83	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
39	3606952, 505865 NAD83	--	--	--	--	--	21	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

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Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 8

Date: 03/09/2018 **Time:** 0900-1200 **Weather Conditions:** Mostly Sunny, 65°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
8	3607130, 505379 NAD83	--	--	--	--	--	80	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
9	3607253, 505498 NAD83	--	--	--	--	--	55	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
10	3607276, 505505 NAD83	--	--	--	--	--	12	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
11	3607258, 505361 NAD83	--	--	--	--	--	46	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
12	3607290, 505906 NAD83	65	58	10	15	45	102	BRLI	--	--	--	--	--	--	--	--	--	D/TT	Tadpoles
13	3607189, 506078 NAD83	65	58	4	6	3	3	--	--	--	--	--	--	--	--	--	--	D/TT	Tadpoles
14	3607165, 506135 NAD83	65	57	12	20	31	31	BRLI	--	--	--	--	--	--	--	--	--	D/TT	
15	3607047, 506213 NAD83	--	--	--	--	--	79	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
16	3606812, 506107 NAD83	65	57	20	40	84	84	--	--	--	--	--	--	--	--	--	--	D/TT	
17	3606744, 505823 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
18	3606631, 505644 NAD83	65	58	3	5	7	30	BRLI	--	--	--	--	--	--	--	--	--	D/TT	Dry
19	3606658, 505621 NAD83	--	--	--	--	--	47	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
20	3606625, 505387 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
21	3606877, 505640 NAD83	--	--	--	--	--	428	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 8

Date: 03/09/2018 **Time:** 0900-1200 **Weather Conditions:** Mostly Sunny, 65°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
22	3606879, 505731 NAD83	--	--	--	--	--	71	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
23	3606851, 505664 NAD83	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
24	3606779, 505677 NAD83	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
25	3606792, 505676 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
26	3606797, 505674 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
27	3606803, 505672, NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
28	3606827, 505714 NAD83	--	--	--	--	--	148	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
29	3606815, 505970 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
30	3606819, 505935 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
31	3606903, 505643 NAD83	--	--	--	--	--	44	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
32	3606937, 505710 NAD83	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
33	3606984, 505729 NAD83	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
34	3607020, 505720 NAD83	--	--	--	--	--	236	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
35	3606954, 505790 NAD83	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 8

Date: 03/09/18 **Time:** 0900-1200 **Weather Conditions:** Mostly Sunny, 65°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
36	3606967, 505834 NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
37	3606941, 505885 NAD83	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
39	3606952, 505865 NAD83	--	--	--	--	--	21	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindieriella occidentalis*, BRLI = *Branchinecta lindahl*). For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present. (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 9

Date: 03/16/2018 **Time:** 0900-1200 **Weather Conditions:** Overcast, 63°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
8	3607130, 505379 NAD83	53	50	10	15	40	80	--	--	--	--	--	--	--	--	--	--	D/TT	Juvenile shrimp
9	3607253, 505498 NAD83	53	51	3	5	13	55	--	--	--	--	--	--	--	--	--	--	D/TT	juvenile shrimp
10	3607276, 505505 NAD83	--	--	--	--	--	12	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
11	3607258, 505361 NAD83	53	51	3	5	13	46	--	--	--	--	--	--	--	--	--	--	D/TT	
12	3607290, 505906 NAD83	53	51	15	25	102	102	--	--	--	--	--	--	--	--	--	--	D/TT	Tadpoles
13	3607189, 506078 NAD83	53	51	9	15	3	3	--	--	--	--	--	--	--	--	--	--	D/TT	
14	3607165, 506135 NAD83	53	50	20	40	31	31	--	--	--	--	--	--	--	--	--	--	D/TT	
15	3607047, 506213 NAD83	--	--	--	--	--	79	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
16	3606812, 506107 NAD83	55	51	15	25	84	84	BRLI	--	--	--	--	--	--	--	--	--	D/TT	
17	3606744, 505823 NAD83	55	52	4	5	19	19	--	--	--	--	--	--	--	--	--	--	D/TT	
18	3606631, 505644 NAD83	55	52	10	15	30	30	BRLI	--	--	--	--	--	--	--	--	--	D/TT	
19	3606658, 505621 NAD83	55	52	7	10	9	47	--	--	--	--	--	--	--	--	--	--	D/TT	Juvenile shrimp
20	3606625, 505387 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
21	3606877, 505640 NAD83	--	--	--	--	--	428	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 9

Date: 03/16/2018 **Time:** 0900-1200 **Weather Conditions:** Overcast, 63°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
22	3606879, 505731 NAD83	--	--	--	--	--	71	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
23	3606851, 505664 NAD83	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
24	3606779, 505677 NAD83	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
25	3606792, 505676 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
26	3606797, 505674 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
27	3606803, 505672, NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
28	3606827, 505714 NAD83	--	--	--	--	--	148	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
29	3606815, 505970 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
30	3606819, 505935 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
31	3606903, 505643 NAD83	--	--	--	--	--	44	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
32	3606937, 505710 NAD83	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
33	3606984, 505729 NAD83	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
34	3607020, 505720 NAD83	--	--	--	--	--	236	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
35	3606954, 505790 NAD83	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 9

Date: 03/16/18 **Time:** 0900-1200 **Weather Conditions:** Overcast, 63°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
36	3606967, 505834 NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
37	3606941, 505885 NAD83	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
39	3606952, 505865 NAD83	--	--	--	--	--	21	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Linderiella occidentalis*, BRLI = *Branchinecta lindahl*). For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present. (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 10

Date: 03/23/2018 **Time:** 1000-1200 **Weather Conditions:** Overcast, 61°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
8	3607130, 505379 NAD83	61	55	5	6	5	80	BRLI	--	--	--	--	--	--	--	--	--	D/TT	
9	3607253, 505498 NAD83	--	--	--	--	--	55	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
10	3607276, 505505 NAD83	61	55	4	6	6	12	--	--	--	--	--	--	--	--	--	--	D/TT	Juvenile shrimp
11	3607258, 505361 NAD83	--	--	--	--	--	46	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
12	3607290, 505906 NAD83	61	55	10	30	100	102	--	--	--	--	--	--	--	--	--	--	D/TT	
13	3607189, 506078 NAD83	61	56	8	15	4	3	--	--	--	--	--	--	--	--	--	--	D/TT	
14	3607165, 506135 NAD83	61	56	20	35	31	31	--	--	--	--	--	--	--	--	--	--	D/TT	
15	3607047, 506213 NAD83	--	--	--	--	--	79	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
16	3606812, 506107 NAD83	63	56	17	25	84	84	BRLI	--	--	--	--	--	--	--	--	--	D/TT	
17	3606744, 505823 NAD83	64	55	3	3	3	19	--	--	--	--	--	--	--	--	--	--	D/TT	
18	3606631, 505644 NAD83	64	55	4	6	16	30	BRLI	--	--	--	--	--	--	--	--	--	D/TT	
19	3606658, 505621 NAD83	64	55	4	6	4	47	BRLI	--	--	--	--	--	--	--	--	--	D/TT	Juvenile shrimp
20	3606625, 505387 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
21	3606877, 505640 NAD83	--	--	--	--	--	428	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 10

Date: 03/23/2018 **Time:** 1000-1200 **Weather Conditions:** Overcast, 61°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
22	3606879, 505731 NAD83	--	--	--	--	--	71	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
23	3606851, 505664 NAD83	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
24	3606779, 505677 NAD83	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
25	3606792, 505676 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
26	3606797, 505674 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
27	3606803, 505672, NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
28	3606827, 505714 NAD83	--	--	--	--	--	148	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
29	3606815, 505970 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
30	3606819, 505935 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
31	3606903, 505643 NAD83	--	--	--	--	--	44	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
32	3606937, 505710 NAD83	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
33	3606984, 505729 NAD83	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
34	3607020, 505720 NAD83	--	--	--	--	--	236	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
35	3606954, 505790 NAD83	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 10

Date: 03/23/18 **Time:** 1000-1200 **Weather Conditions:** Overcast, 61°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
36	3606967, 505834 NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
37	3606941, 505885 NAD83	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
39	3606952, 505865 NAD83	--	--	--	--	--	21	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 11

Date: 03/30/2018 **Time:** 0800-1000 **Weather Conditions:** Overcast, 58°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
8	3607130, 505379 NAD83	--	--	--	--	--	80	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
9	3607253, 505498 NAD83	--	--	--	--	--	55	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
10	3607276, 505505 NAD83	--	--	--	--	--	12	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
11	3607258, 505361 NAD83	--	--	--	--	--	46	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
12	3607290, 505906 NAD83	58	53	5	20	70	102	--	--	--	--	--	--	--	--	--	--	D/TT	
13	3607189, 506078 NAD83	58	54	4	9	2	3	--	--	--	--	--	--	--	--	--	--	D/TT	
14	3607165, 506135 NAD83	58	54	15	25	26	31	--	--	--	--	--	--	--	--	--	--	D/TT	
15	3607047, 506213 NAD83	--	--	--	--	--	79	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
16	3606812, 506107 NAD83	58	54	10	15	50	84	--	--	--	--	--	--	--	--	--	--	D/TT	
17	3606744, 505823 NAD83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
18	3606631, 505644 NAD83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
19	3606658, 505621 NAD83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
20	3606625, 505387 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
21	3606877, 505640 NAD83	--	--	--	--	--	428	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 11

Date: 03/30/2018 **Time:** 0800-1000 **Weather Conditions:** Overcast, 58°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
22	3606879, 505731 NAD83	--	--	--	--	--	71	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
23	3606851, 505664 NAD83	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
24	3606779, 505677 NAD83	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
25	3606792, 505676 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
26	3606797, 505674 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
27	3606803, 505672, NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
28	3606827, 505714 NAD83	--	--	--	--	--	148	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
29	3606815, 505970 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
30	3606819, 505935 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
31	3606903, 505643 NAD83	--	--	--	--	--	44	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
32	3606937, 505710 NAD83	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
33	3606984, 505729 NAD83	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
34	3607020, 505720 NAD83	--	--	--	--	--	236	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
35	3606954, 505790 NAD83	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 11

Date: 03/30/18 **Time:** 0800-1000 **Weather Conditions:** Overcast, 58°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
36	3606967, 505834 NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
37	3606941, 505885 NAD83	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
39	3606952, 505865 NAD83	--	--	--	--	--	21	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 12

Date: 04/06/2018 **Time:** 0900-1100 **Weather Conditions:** Partly Sunny, 61°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
8	3607130, 505379 NAD83	--	--	--	--	--	80	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
9	3607253, 505498 NAD83	--	--	--	--	--	55	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
10	3607276, 505505 NAD83	--	--	--	--	--	12	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
11	3607258, 505361 NAD83	--	--	--	--	--	46	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
12	3607290, 505906 NAD83	61	55	3	8	15	102	--	--	--	--	--	--	--	--	--	--	D/TT	
13	3607189, 506078 NAD83	--	--	--	--	--	3	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
14	3607165, 506135 NAD83	61	54	8	18	20	31	--	--	--	--	--	--	--	--	--	--	D/TT	
15	3607047, 506213 NAD83	--	--	--	--	--	79	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
16	3606812, 506107 NAD83	61	54	6	10	20	84	--	--	--	--	--	--	--	--	--	--	D/TT	
17	3606744, 505823 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
18	3606631, 505644 NAD83	--	--	--	--	--	30	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
19	3606658, 505621 NAD83	--	--	--	--	--	47	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
20	3606625, 505387 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
21	3606877, 505640 NAD83	--	--	--	--	--	428	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 12

Date: 04/06/2018 **Time:** 0900-1100 **Weather Conditions:** Partly Sunny, 61°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
22	3606879, 505731 NAD83	--	--	--	--	--	71	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
23	3606851, 505664 NAD83	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
24	3606779, 505677 NAD83	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
25	3606792, 505676 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
26	3606797, 505674 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
27	3606803, 505672, NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
28	3606827, 505714 NAD83	--	--	--	--	--	148	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
29	3606815, 505970 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
30	3606819, 505935 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
31	3606903, 505643 NAD83	--	--	--	--	--	44	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
32	3606937, 505710 NAD83	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
33	3606984, 505729 NAD83	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
34	3607020, 505720 NAD83	--	--	--	--	--	236	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
35	3606954, 505790 NAD83	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 12

Date: 04/06/18 **Time:** 0900-1100 **Weather Conditions:** Partly Sunny, 61°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
36	3606967, 505834 NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
37	3606941, 505885 NAD83	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
39	3606952, 505865 NAD83	--	--	--	--	--	21	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindieriella occidentalis*, BRLI = *Branchinecta lindahl*).
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SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 13

Date: 04/13/2018 **Time:** 0900-1030 **Weather Conditions:** Sunny, 58°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
8	3607130, 505379 NAD83	--	--	--	--	--	80	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
9	3607253, 505498 NAD83	--	--	--	--	--	55	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
10	3607276, 505505 NAD83	--	--	--	--	--	12	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
11	3607258, 505361 NAD83	--	--	--	--	--	46	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
12	3607290, 505906 NAD83	--	--	--	--	--	102	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
13	3607189, 506078 NAD83	--	--	--	--	--	3	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
14	3607165, 506135 NAD83	58	54	5	10	4	31	--	--	--	--	--	--	--	--	--	--	D/TT	
15	3607047, 506213 NAD83	--	--	--	--	--	79	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
16	3606812, 506107 NAD83	--	--	--	--	--	84	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
17	3606744, 505823 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
18	3606631, 505644 NAD83	--	--	--	--	--	30	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
19	3606658, 505621 NAD83	--	--	--	--	--	47	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
20	3606625, 505387 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
21	3606877, 505640 NAD83	--	--	--	--	--	428	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas | Survey 13

Date: 04/13/2018 | **Time:** 0900-1030 | **Weather Conditions:** Sunny, 58°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
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23	3606851, 505664 NAD83	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
24	3606779, 505677 NAD83	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
25	3606792, 505676 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
26	3606797, 505674 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
27	3606803, 505672, NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
28	3606827, 505714 NAD83	--	--	--	--	--	148	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
29	3606815, 505970 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
30	3606819, 505935 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
31	3606903, 505643 NAD83	--	--	--	--	--	44	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
32	3606937, 505710 NAD83	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
33	3606984, 505729 NAD83	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
34	3607020, 505720 NAD83	--	--	--	--	--	236	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
35	3606954, 505790 NAD83	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

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Date: 04/13/18 **Time:** 0900-1030 **Weather Conditions:** Sunny, 58°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
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36	3606967, 505834 NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
37	3606941, 505885 NAD83	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
39	3606952, 505865 NAD83	--	--	--	--	--	21	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 14

Date: 04/20/2018 **Time:** 0800-0900 **Weather Conditions:** Sunny, 56°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
8	3607130, 505379 NAD83	--	--	--	--	--	80	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
9	3607253, 505498 NAD83	--	--	--	--	--	55	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
10	3607276, 505505 NAD83	--	--	--	--	--	12	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
11	3607258, 505361 NAD83	--	--	--	--	--	46	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
12	3607290, 505906 NAD83	--	--	--	--	--	102	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
13	3607189, 506078 NAD83	--	--	--	--	--	3	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
14	3607165, 506135 NAD83	--	--	--	--	--	31	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
15	3607047, 506213 NAD83	--	--	--	--	--	79	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
16	3606812, 506107 NAD83	--	--	--	--	--	84	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
17	3606744, 505823 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
18	3606631, 505644 NAD83	--	--	--	--	--	30	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
19	3606658, 505621 NAD83	--	--	--	--	--	47	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
20	3606625, 505387 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	D/TT	Dry
21	3606877, 505640 NAD83	--	--	--	--	--	428	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
 For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.
 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

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SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 14

Date: 04/20/2018 **Time:** 0800-0900 **Weather Conditions:** Sunny, 56°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
22	3606879, 505731 NAD83	--	--	--	--	--	71	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
23	3606851, 505664 NAD83	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
24	3606779, 505677 NAD83	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
25	3606792, 505676 NAD83	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
26	3606797, 505674 NAD83	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
27	3606803, 505672, NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
28	3606827, 505714 NAD83	--	--	--	--	--	148	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
29	3606815, 505970 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
30	3606819, 505935 NAD83	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
31	3606903, 505643 NAD83	--	--	--	--	--	44	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
32	3606937, 505710 NAD83	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
33	3606984, 505729 NAD83	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
34	3607020, 505720 NAD83	--	--	--	--	--	236	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
35	3606954, 505790 NAD83	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindleriella occidentalis*, BRLI = *Branchinecta lindahl*).
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 (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys For Listed Large Branchiopods

Site or Project Name: Otay River Restoration Project **County:** San Diego **Quad:** Otay Mesa **Township:** 18S **Range:** 1W **Section:** S13

SURVEYOR / Permit Number: Lance Woolley -- TE 14560C, assisted by Nicole Salas Survey 14

Date: 04/20/18 **Time:** 0800-0900 **Weather Conditions:** Sunny, 56°F

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°F)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes / Voucher information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
36	3606967, 505834 NAD83	--	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
37	3606941, 505885 NAD83	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry
39	3606952, 505865 NAD83	--	--	--	--	--	21	--	--	--	--	--	--	--	--	--	--	NP, UD	Dry

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = *Lindieriella occidentalis*, BRLI = *Branchinecta lindahl*). For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present. (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix G

**2018 Dry Season Fairy Shrimp Survey Report and
2018-2019 Wet Season Fairy Shrimp Survey Report**

2018 DRY SEASON FAIRY SHRIMP SURVEY FOR OTAY RIVER RESTORATION EXPANSION PARCELS

PREPARED FOR:

Otay Land Company, LLC
1903 Wright Place, Suite 220
Carlsbad, CA 92008

PREPARED BY:

ICF
525 B Street, Suite 1700
San Diego, California 92101

September 2018



ICF. 2018. 2018 Dry Season Fairy Shrimp Survey for Otay River Restoration
Expansion Parcels. September.

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1.0 Introduction

ICF was contracted to conduct dry season fairy shrimp surveys for the Otay River Restoration Expansion Parcels, a permittee-responsible mitigation site and proposed mitigation bank located below Savage dam and Lower Otay Lake in the Otay River. The mitigation site is being implemented to offset impacts associated with several Otay Ranch Village development projects as well as future projects in the vicinity.

The goal of this survey was to determine presence or absence of listed large branchiopods (fairy shrimp) in seasonally inundated depressions within the study area (Figures 1-3), for use in avoiding take of listed large branchiopods. The large branchiopods known from freshwater in southern San Diego County are San Diego fairy shrimp (*Branchinecta sandiegonensis*), Lindahl's fairy shrimp (*Branchinecta lindahl*), and Riverside fairy shrimp (*Streptocephalus woottoni*).

2.0 Methods

ICF conducted dry season fairy shrimp surveys on 28 seasonally inundated depressions located within the study area (Figure 3). Survey methodology follows the USFWS *Survey Guidelines for the Listed Large Branchiopods* (Guidelines; USFWS 2015) as described below. Prior to initiating the surveys, a 15-day pre-survey notification letter was sent to the USFWS Carlsbad Fish and Wildlife Office informing intent to conduct a protocol dry season survey for listed fairy shrimp (Appendix A). Wet and dry season surveys were previously conducted for the adjacent Otay River Restoration Project (ICF 2018a and b). The current study area includes the expansion parcels to the west of ORRP.

2.1 Soil Collection

On August 1, 2018, fairy shrimp biologist Brian Lohstroh (Permit# TE- 063608-6) collected soil samples for the dry season survey. Soil samples were collected when seasonally inundated depressions were dry. A hand trowel was used to collect soil samples from the top 1-3 centimeters of depressions soil. Whenever possible, soil samples were collected in chunks and the trowel was used to pry up intact chunks of sediment. Loosening the soil by raking or shoveling was avoided as such methods can damage cysts. For each of the 28 seasonally inundated depressions, two perpendicular transects were visually estimated, with one transect passing along the depressions lowest point and the second transect passing through the depressions second lowest point. Ten samples of approximately 100-milliliter (ml) aliquots were removed at each sub-sample site (for a total of 1 liter/ponded area), ensuring that no more than 10% of the sampled vernal pool's surface area was disturbed. Soil samples were taken as follows: two in the pool's lowest point, one at the pool's second lowest point, and two radiating in each of the four directions on the transect lines, at least 1.0 m from the pool center.

Ten 100-mililiter soil samples were collected from each pools. Each label included information necessary to identify the collection date, location of feature and name of collector for each sample.

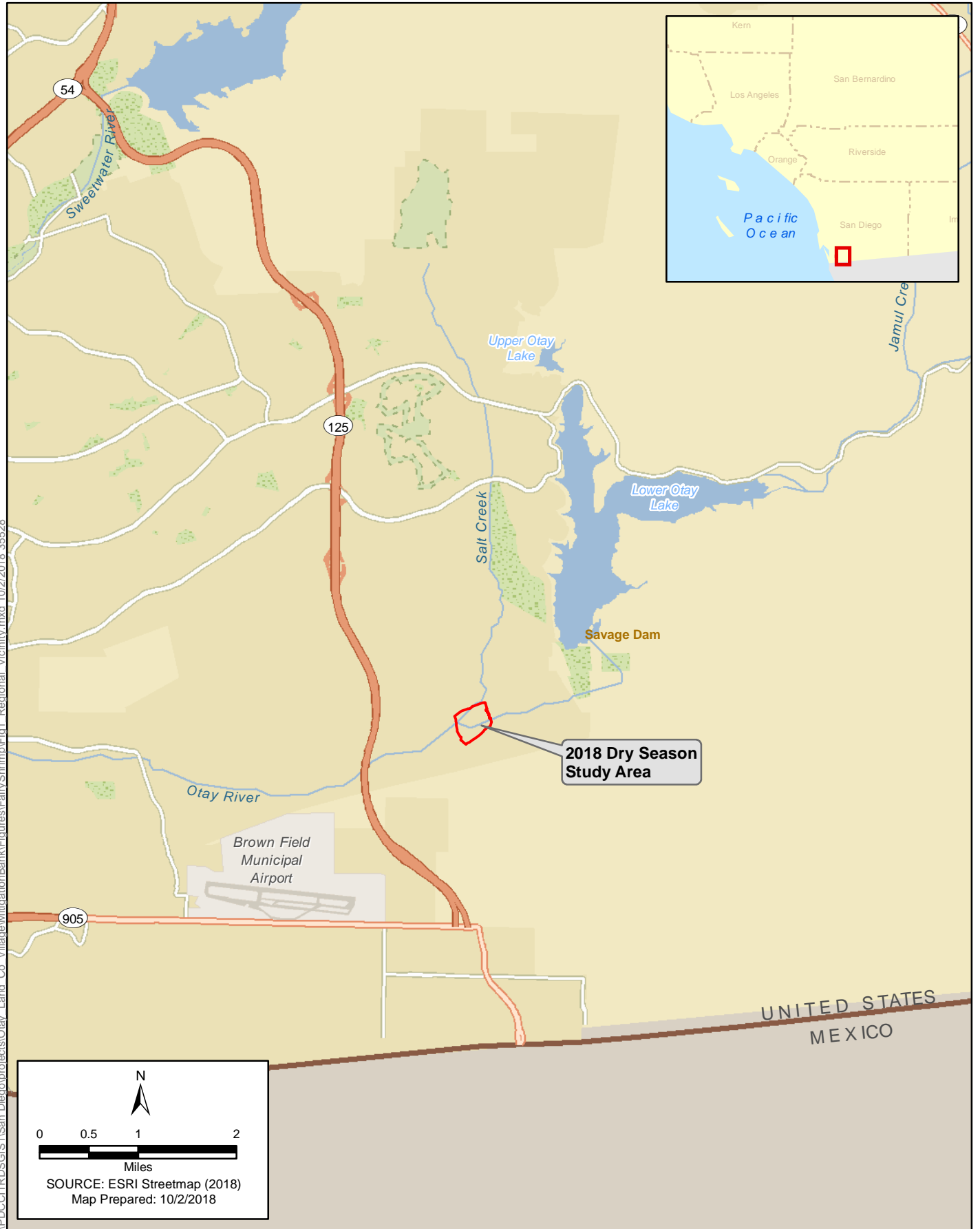


Figure 1
Regional Location
Otoy River Restoration Project



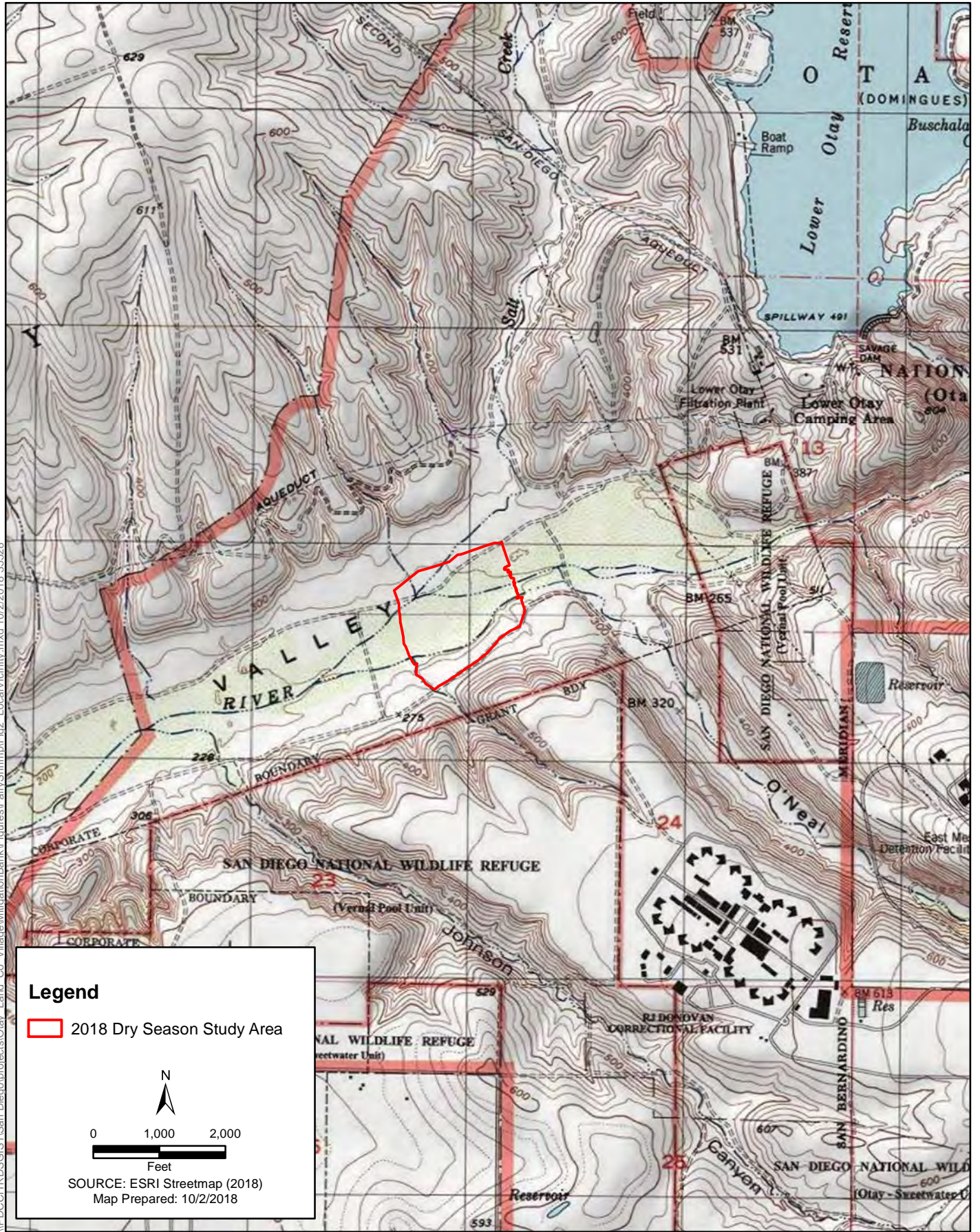


Figure 2
Project Vicinity
Otay River Restoration Project

\\PDC\IT\RD\GIS\1\San_Diego\projects\Otay_Land_Co_Village\MitigationBank\Figures\Fairy Shrimp\Fig3_Fairy Shrimp_2018_Results.mxd Date: 10/2/2018 35528

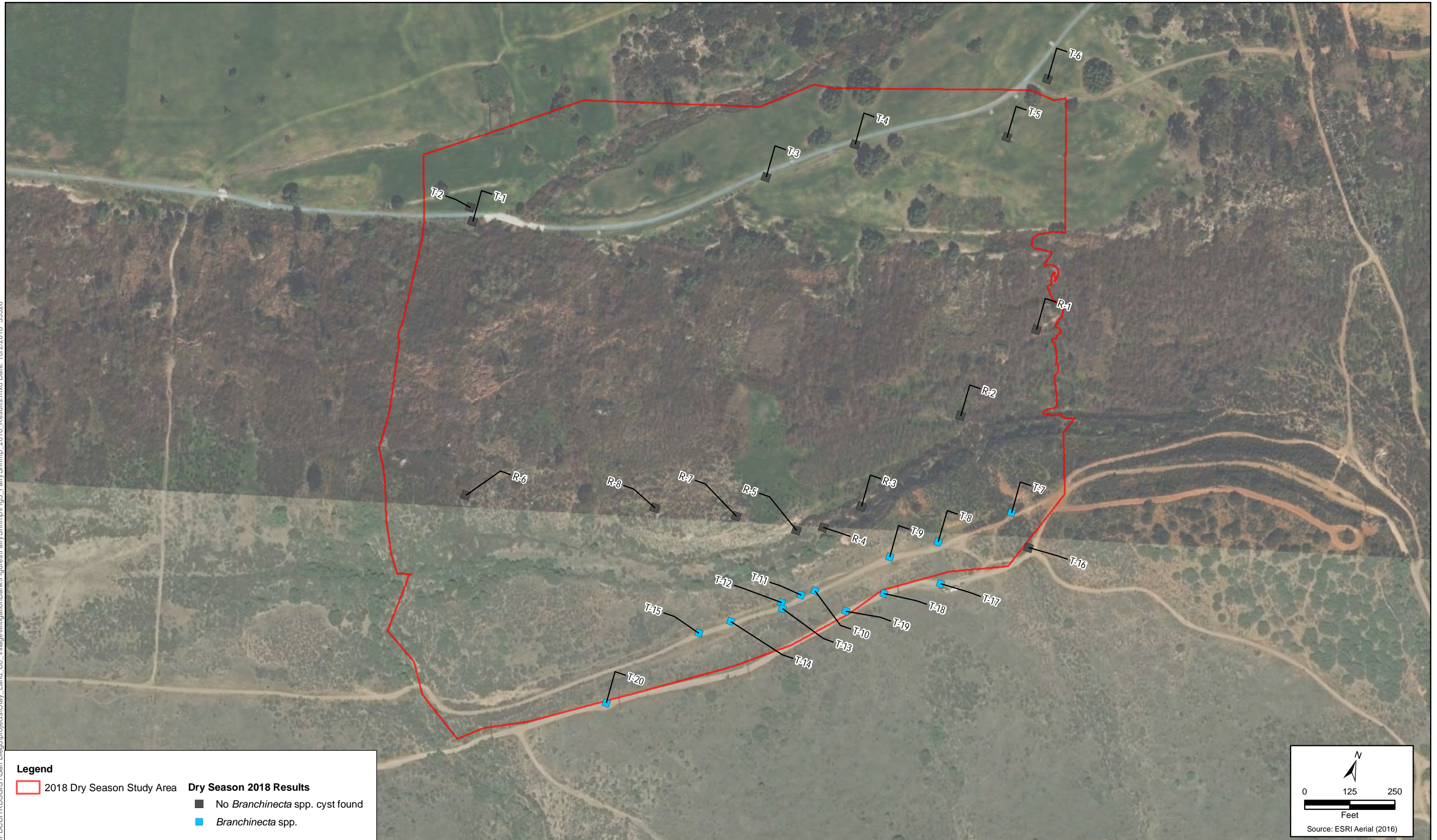


Figure 3
2018 Dry Season Fairy Shrimp Survey Results
Otay River Restoration Project

2.2 Soil Processing and Analysis

Soil samples were processed by ICF fairy shrimp biologist and USFWS permitted cyst-identifier Dale Ritenour (Permit# TE-58888A-2) in accordance with the Guidelines. The soil samples were measured into ten individual plastic containers. These samples were hydrated in tap water then washed through a set of sieves. Material passing through a Number 45 (355 micrometer) USA Standard Testing Sieve, A.S.T.M.E.-11 specification was caught on a Number 70 (212 micrometer) Sieve. The 355-micrometer sieve allows the passage of cysts while the 212- micrometer sieves was selected as the appropriate size to collect cysts from large branchiopods whose ranges include the study area in southern San Diego County, including San Diego fairy shrimp, Lindahl's fairy shrimp, and Riverside fairy shrimp. The 212-micrometer sample material was rinsed into a container with approximately 200 milliliters of a saturated brine solution to float organic material, including fairy shrimp cysts. The material floating on the brine was decanted onto a paper filter. The organic material collected on the paper was examined under a stereo zoom microscope. Distinctive fairy shrimp cysts were counted if present. All sieves were soaked in a bleach solution and then thoroughly cleaned after completion of the procedure for each depression, to ensure no cysts adhered to the surfaces of the sieves.

Fairy shrimp cysts were identified to the genus level through microscope examination. *Streptocephalus* cysts can be discerned from *Branchinecta* cysts based on cyst surface characteristics. Riverside fairy shrimp is the only member of the *Streptocephalus* genus known from San Diego County; therefore any observed *Streptocephalus* cysts would be accepted as Riverside fairy shrimp. *Branchinecta sandiegonensis* and *Branchinecta lindahl* are both known to occur in the Otay Mesa region. Their cysts are similar in appearance and have some overlap in size and may not be conclusively separated under the microscope. Therefore, *Branchinecta* cysts observed require wet season survey to confirm the species present in the depressions.

3.0 Results and Discussion

Branchinecta cysts were observed in 13 of the 28 sampled pools in the 2018 dry season sampling (Table 1). *Branchinecta* cysts were found in moderate abundance, defined as averaging 11-50 cysts/100ml, in depressions T-7, T-8, T-14, T-15, and T-17. *Branchinecta* cysts were found in low abundance in depressions t-9 through T-13 and T-18, T-19, and T-20.

No Riverside fairy shrimp cysts were observed in samples in the 2018 dry season survey of the expansion parcels.

Both San Diego and Lindahl's fairy shrimp are known from the Otay Mesa area and from the immediate vicinity (ICF 2018a and b). Wet season sampling is necessary to determine which shrimp species are present. ICF will conduct a wet season fairy shrimp survey of the study area in the winter/spring of 2018-2019. Results will be provided in a separate document.

Table 1. Dry Season Sampling Results

Basin	Shrimp cysts observed	Cyst Abundance	Sample number										
			1	2	3	4	5	6	7	8	9	10	
R-1	none		0	0	0	0	0	0	0	0	0	0	0
R-2	none		0	0	0	0	0	0	0	0	0	0	0
R-3	none		0	0	0	0	0	0	0	0	0	0	0
R-4	none		0	0	0	0	0	0	0	0	0	0	0
R-5	none		0	0	0	0	0	0	0	0	0	0	0
R-6	none		0	0	0	0	0	0	0	0	0	0	0
R-7	none		0	0	0	0	0	0	0	0	0	0	0
R-8	none		0	0	0	0	0	0	0	0	0	0	0
T-1	none		0	0	0	0	0	0	0	0	0	0	0
T-2	none		0	0	0	0	0	0	0	0	0	0	0
T-3	none		0	0	0	0	0	0	0	0	0	0	0
T-4	none		0	0	0	0	0	0	0	0	0	0	0
T-5	none		0	0	0	0	0	0	0	0	0	0	0
T-6	none		0	0	0	0	0	0	0	0	0	0	0
T-7	<i>Branchinecta</i> sp.	moderate	55	60	65	45	55	60	40	22	35	45	
T-8	<i>Branchinecta</i> sp.	moderate	21	15	20	35	18	20	33	18	23	25	
T-9	<i>Branchinecta</i> sp.	low	1	3	1	2	1	2	4	3	3	5	
T-10	<i>Branchinecta</i> sp.	low	1	1	0	0	0	1	0	0	0	0	
T-11	<i>Branchinecta</i> sp.	low	2	1	1	1	2	3	10	11	7	3	
T-12	<i>Branchinecta</i> sp.	low	1	2	4	3	0	4	14	3	2	2	
T-13	<i>Branchinecta</i> sp.	low	3	1	10	6	4	7	2	10	3	0	
T-14	<i>Branchinecta</i> sp.	moderate	40	9	27	12	10	9	20	25	5	11	
T-15	<i>Branchinecta</i> sp.	moderate	18	13	15	19	27	20	20	17	22	20	
T-16	none		0	0	0	0	0	0	0	0	0	0	
T-17	<i>Branchinecta</i> sp.	moderate	9	5	6	12	13	11	8	15	20	7	
T-18	<i>Branchinecta</i> sp.	low	7	4	5	6	2	3	1	3	4	1	
T-19	<i>Branchinecta</i> sp.	low	3	2	2	6	4	3	2	2	3	0	
T-20	<i>Branchinecta</i> sp.	low	1	0	0	0	2	1	2	0	0	4	

4.0 References

ICF. 2018a. 2017 Dry Season Fairy Shrimp Survey for Otay River Restoration Project. September.

ICF. 2018b. 2017-2018 Dry Season Fairy Shrimp Survey for Otay River Restoration Project. September.

U.S. Fish and Wildlife Service (USFWS). 2015. Survey Guidelines for the Listed Large Branchiopods. May 31.

5.0 Certification

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.



September 28, 2018

Dale Ritenour (Permit No. TE-58888A-2)

Date

Vernal Pool Biologist

Author and USFWS Approved Cyst Identification

Appendix A
USFWS Notification



July 24, 2018

Ms. Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Ste. 250
Carlsbad, CA 92008

Subject: Pre-Survey Notice for 2018 and 2019 Vernal Pool Branchiopod Surveys at Otay River Valley Mitigation Expansion, San Diego County, California

Dear Ms. Love:

This letter serves as notification to conduct presence/absence surveys for federally listed large branchiopods (fairy shrimp) for the Otay River Valley Mitigation Expansion near Chula Vista, San Diego County. The surveys will consist of conducting dry season surveys in late summer 2018, and wet season surveys during the wet season of 2018-2019. The proposed mitigation bank expansion is located within the Otay River Valley, approximately one mile downstream of Lower Otay Lake (Figure 1). The approximately 69-acre expansion area is estimated to support 20 to 30 features that could support listed fairy shrimp species such as San Diego Fairy Shrimp (*Branchinecta sandiegonensis*) and Riverside Fairy Shrimp (*Streptocephalus woottoni*).

The mitigation bank is conducting the surveys to determine presence or absence of the listed species for mitigation purposes. The bank currently includes the parcels upstream of the proposed expansion area, extending approximately 0.8 mile upstream.

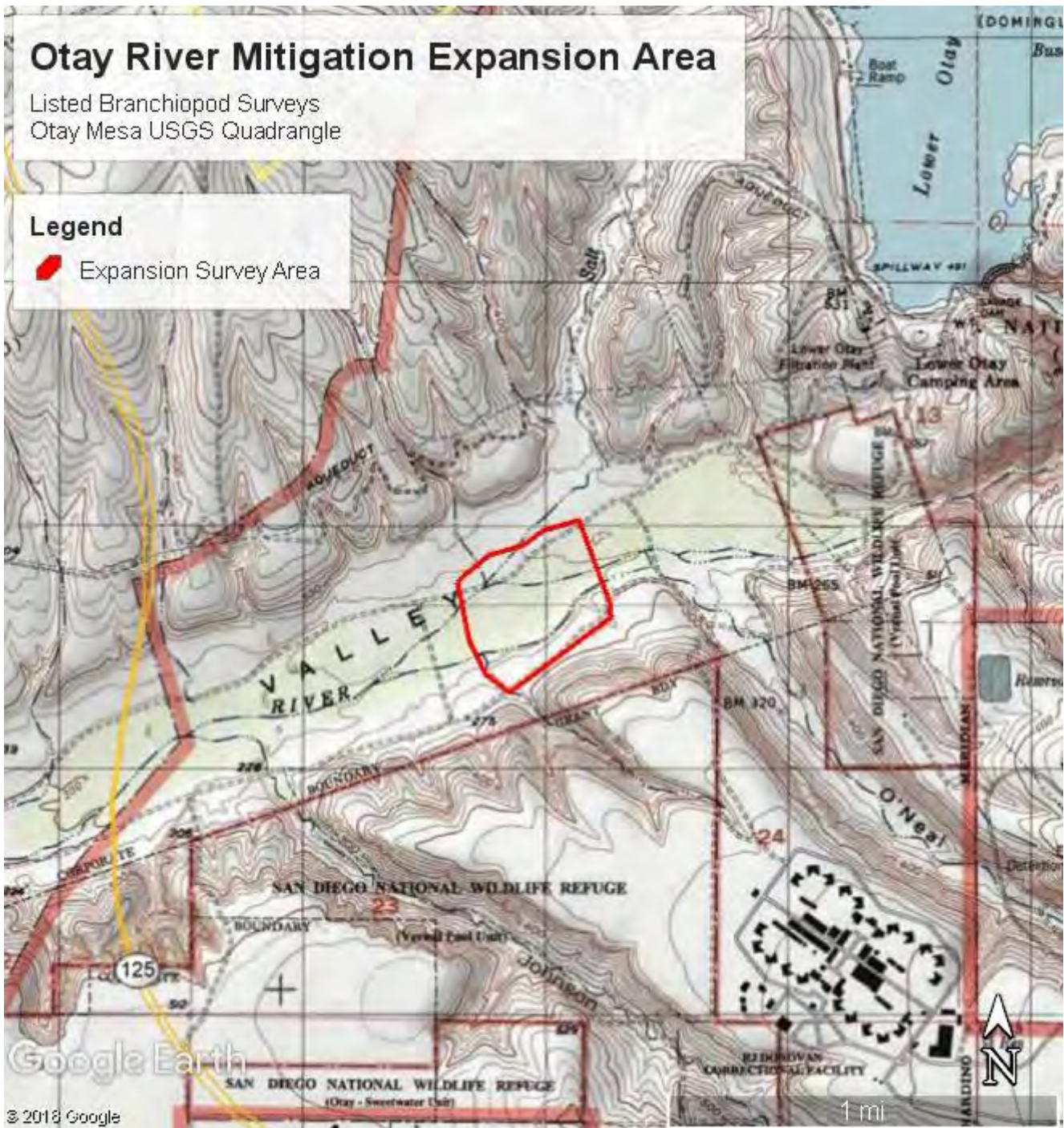
Fieldwork for the dry and wet season surveys will be conducted by biologist Brian Lohstroh (TE-063608-6), with dry season sample processing conducted by Dale Ritenour (TE-58888A-2) following the revised USFWS survey guidelines (November 13, 2017). Please contact me at (858) 750-9300 or via email if you have any questions about these surveys.

Sincerely,

A handwritten signature in black ink, appearing to read "Brian Lohstroh", with a long, sweeping horizontal line extending to the right.

Brian Lohstroh
Senior Biologist
ICF International
brian@lohstrohbio.com

Figure 1. Project Location and Survey Area



Appendix B
USFWS Dry Season Data Sheets

Appendix 2. U.S. Fish and Wildlife Service – Data Sheet for Dry Season Sample Analysis for Listed Large Branchiopods

Project Information				Biologist Information			
Project Name: <u>Otay River Restoration Expansion</u>		Quad: <u>Otay Mesa</u>		Name of Person(s) Who Conducted the Following Tasks and Permit Number(s):			
USFWS Project Number:		Township:		Soil Collection: <u>Brian Lobstroh</u> <u>TE-063608-6</u>			
County: <u>San Diego</u>		Range:		Soil Processing: <u>Dale Ritenour</u> <u>TE-58888A-2</u>			
Lat:		Section:		Soil Analysis/Cysts ID: <u>Dale Ritenour</u>			
Long:				Soil Collection Date: <u>August 1, 2018</u>			

Pool/ Habitat/ Basin No.	Invertebrates Present (X)															Comments	
	Insect Exo- Skeletons	Micro- Turbellaria Cysts	Cladocera Ephippia	Ostracods Live/Cysts/ Carapaces	Copepods Live/Cysts	Number of Large Branchiopod Cysts						Hydracarina Live	Nematoda	Collembola	Other Species		
						<i>Branchinecta</i> sp.	<i>Lepidurus</i> <i>packardii</i>	<i>Streptocephalus</i> <i>wootoni</i>	<i>Linderiella</i> <i>occidentalis</i>	<i>Lynceus</i> <i>brachyurus</i>	<i>Cyzicus</i> <i>californicus</i>						
R-1						0		0									
R-2						0		0									
R-3						0		0									
R-4						0		0									
R-5						0		0									
R-6						0		0									
R-7						0		0									
R-8						0		0									
T-1						0		0									
T-2						0		0									
T-3						0		0									
T-4						0		0									
T-5						0		0									
T-6						0		0									
T-7						482		0									
T-8						228		0									
T-9						25		0									
T-10						3		0									
T-11						41		0									
T-12						35		0									
T-13						46		0									
T-14						168		0									
T-15						191		0									
T-16						0		0									
T-17						106		0									
T-18						36		0									
T-19						27		0									
T-20						10		0									



September 25, 2019

Ms. Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Ste. 250
Carlsbad, CA 92008

Subject: 90-Day Survey Report for Wet Season Surveys for Listed Large Branchiopods at the Otay River Restoration Project.

Dear Ms. Love:

This letter documents the results of protocol presence/absence surveys for listed large branchiopods conducted by ICF during the 2018-2019 wet season in support of the Otay River Restoration Project.

Introduction

ICF was contracted to conduct wet season listed large branchiopods surveys for the Otay River Restoration Project, a permittee-responsible mitigation site and proposed mitigation bank located below Savage Dam in the Otay River Valley (Figures 1 and 2; all figures provided in Attachment A). The 349.6-acre study area is located within the U.S Geological Survey Otay Mesa 7.5' quadrangle and ranges in elevation between approximately 248 and 272 feet above mean sea level. The mitigation site is being implemented to offset impacts associated with several Otay Ranch Village development projects as well as develop a mitigation bank for future projects in the vicinity.

The goal of this survey was to determine presence or absence of listed large branchiopods (*e.g.*, fairy shrimp) in seasonally inundated depressions within the study area (Figure 3), for use in avoiding take of listed large branchiopods. The large branchiopods known from freshwater in southern San Diego County are San Diego fairy shrimp (*Branchinecta sandiegonensis*), versatile fairy shrimp (*Branchinecta lindahli*), and Riverside fairy shrimp (*Streptocephalus woottoni*). San Diego fairy shrimp was determined to be present within 44 basins, versatile fairy shrimp was confirmed present in 59 basins, and no Riverside fairy shrimp were observed within the study area.

Methods

ICF conducted wet season fairy shrimp surveys within 145 seasonally inundated depressions located within the study area (Figure 3). The vernal pool preserve in the northeast side of the site was not part of this survey and was not sampled. Survey methodology follows the USFWS *Survey Guidelines for the Listed Large Branchiopods* (Guidelines; USFWS 2017).

Beginning in the Fall of 2018, rainfall events were tracked to ascertain when basins became inundated using National Weather Service forecasts and observations (NWS 2018), along with observations from nearby Weather Underground personal weather stations (WU 2018). Hydrology checks were performed as needed to confirm basin inundation, and sampling was performed on weekly intervals after initial inundation. Wet season sampling commenced after the first ponding was observed on 12/7/2018 and was conducted by permitted fairy shrimp biologists Brian Lohstroh (TE-063608-6), Linnea Spears-Lebrun (TE-58888A2.1), and Marty Lewis (TE72549C-0), with assistance from unpermitted trainees/ICF biologists Ryan Layden and Kesley Dix (Table 1).

Sampling was performed using a 1 mm mesh dip net suitable for capturing fairy shrimp adults, as well as a 255-micron mesh net to make observations of nauplii and other smaller aquatic invertebrates. Water temperature was ascertained using an infrared thermometer after gentle agitation of the water column to homogenize any potential temperature variations within the water column. Basin perimeters were logged with a Trimble R1 submeter Bluetooth GPS using ArcGIS Collector. Depth was recorded at deepest location within each basin. Additional data collected for each basin included basin type (natural/constructed/road rut), other aquatic animal species present, basin condition and if necessary, disturbance type.

A subset of the fairy shrimp captured during sampling at a given basin were identified live, in the field by a permitted biologist using a hand lens and a watch glass. One set of voucher specimens was collected for each fairy shrimp species observed in a given basin. If no vouchers were needed, captured specimens were returned to the basin live and in good condition.

Dip nets were cleaned with sanitized water between basins to prevent cross-contamination and all equipment used in the water, including boots, were cleaned and sanitized with a 3-6% sodium hypochlorite solution before and after each sampling survey visit. Basins were sampled until they became dry or after 120 days of continuous inundation, and surveys were re-initiated when basins refilled.

Results and Discussion

The 2018-2019 wet season experienced above-average precipitation for the survey area and vicinity. A total of 26.63 inches of precipitation was recorded at the Otay Mountain Weather Station (Western Regional Climate Center 2019) located approximately five miles east of the survey area and at approximately 3,500 feet in elevation. February experienced the highest amount of precipitation with over nine inches recorded.

The study area can be characterized as a wide river valley with terraces adjacent to the primary flood plain. Large portions of the study area are disturbed by agricultural activities, off-highway vehicle activity, and habitat restoration. Historic sand extraction activities from within the valley bottom has also created an undulating, boulder-strewn landscape that is ideal for the creation of numerous basins. Dominant vegetation communities present within the area include coastal sage scrub, riparian scrub, non-native grassland, Eucalyptus woodland and chaparral.

A total of 145 seasonally inundated basins were sampled for fairy shrimp throughout the 2018-2019 wet season (Figure 3). These basins included highly disturbed road ruts located within various access roads throughout the project area as well as natural basins located on the various terraces adjacent to and within the Otay River Valley bottom. The wet season sampling results for each basin is detailed below in Table 2 and summarized in Table 3. A list of aquatic species detected within the

basins is provided in Table 4. Survey results from each weekly survey are included in Attachment B: 2018-2019 Wet Season Survey Data, and representative photographs of the basins are provided in Appendix C.

Fairy shrimp were observed in 98 basins, with San Diego fairy shrimp observed in 44 basins, versatile fairy shrimp observed in 59 basins and both species confirmed in 15 basins. No Riverside fairy shrimp were observed within the survey area. 48 basins contained no fairy shrimp throughout the survey season. Voucher specimens will be accessioned at the Natural History Museum of Los Angeles per their specifications.

Wet season sampling concluded on June 6, 2019 after basin 1819-008 achieved 120 days of continuous inundation. Upon further review, this basin appeared to be part of the greater Otay River system, which supported relatively high flows and may have established flows in channels that rarely experience flow. A few other basins in the vicinity of 1819-008 also hit 120 days of continuous inundation under similar circumstances.

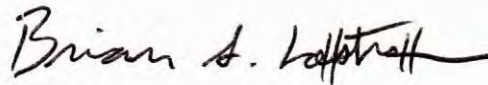
As many of these basins exist within access roads, it is likely that both fairy shrimp species are being spread between basins throughout the site due to the frequent off-highway vehicle traffic that occurs onsite. Results of successive fairy shrimp surveys are likely to vary over time, especially if the frequent vehicle traffic continues in the area.

Please call Brian Lohstroh at (858) 750-9300 if you have any questions.

Sincerely,



Ryan Layden
Biologist
ICF
ryan.layden@icf.com



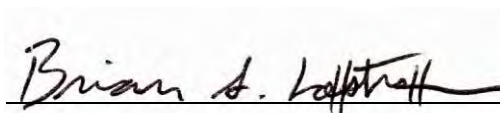
Brian Lohstroh
Senior Biologist
ICF
brian@lohstrohbio.com


References

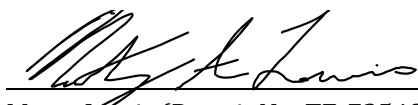
- National Weather Service (NWS). 2018. Extended Forecast for 3 Miles SE Chula Vista-Eastlake CA. <https://www.weather.gov/sgx/> Accessed November 2018-June 2019.
- Weather Underground (WU). 2018. Personal Weather Stations near Lower Otay Lake. <https://www.wunderground.com/> Accessed November 2018-June 2019.
- Western Regional Climate Center. Otay Mountain Weather Station. Accessed September, 2019. <https://wrcc.dri.edu/cgi-bin/rawMAIN.pl?caCOTA>
- U.S. Fish and Wildlife Service (USFWS). 2017. Survey Guidelines for the Listed Large Branchiopods. November 13.

Certification

We certify that the information in this survey report and attached exhibits fully and accurately represent our work.


September 25, 2018
Date
Brian Lohstroh (Permit No. TE-063608-6)
Wildlife Biologist


September 25, 2018
Date
Linnea Spears-Lebrun (Permit No. TE-58888A2.1)
Vernal Pool Biologist


September 25, 2018
Date
Marty Lewis (Permit No. TE-72549C-0)
Wildlife Biologist

Attachments

- | | |
|---------------|--|
| Table 1. | Survey Dates and Personnel |
| Table 2. | Wet Season Fairy Shrimp Sampling Results |
| Table 3. | Results Summary |
| Table 4. | Aquatic Species Observed |
| Attachment A: | Figures |
| Attachment B: | 2018-2019 Wet Season Survey Data |
| Attachment C: | Representative Photographs |

2018-2019 Wet Season Fairy Shrimp Report
 Otay River Restoration Project

Table 1. 2018-2019 Survey Dates and Personnel

Survey Type	Date	Time on site	Temp (°F)	Sky Cover (%)	Wind Speed (MPH)	Personnel
Hydrology Check	12/3/2018	1200-1530	62-66	0-0	0-2; 2-3	KD
Survey 1	12/7/2018	0900-1515	63-66	0-10	0-1; 2-4	BL, KD
Survey 2	12/13/2018	0815-1450	50-71	0-0	0-1; 2-6	BL, KD
Survey 3	12/20/2018	0820-1420	50-74	2-10	0-3; 2-4	BL, KD
Survey 4	12/28/2018	0830-1440	47-61	0-0	0-1; 3-5	BL
Survey 5	1/3/2019	0820-1310	39-63	0-0	0-1; 1-3	BL, KD
Survey 6	1/10/2019	0825-1615	53-63	90-0	0-1; 1-3	BL, KD
Survey 7	1/18/2019	0810-1550	55-63	60-20	0-3; 0-3	BL, RL
Survey 8	1/24/2019	0830-1630	50-54	10-5	0-1; 0-1	BL, KD
Survey 9	1/31/2019	0820-1345	50-63	40-100	0-1; 3-5	BL, KD
Survey 10	2/7/2019	0840-1615	49-58	0-0	0-3; 3-6	BL, RL
Survey 11	2/15/2019	0830-1506	53-59	15-100	0-7; 1-3	BL, KD
Survey 12	2/21/2019	0725-1400	52-48	100	0-3, 3-5	LSL, RL
Survey 13	2/28/2019	0730-1630	54-68	20-40	0-2; 0-2	LSL, RL
Survey 13	3/1/2019	0920-1300	67-68	30-70	0-3, 3-7	LSL, LT
Survey 14	3/7/2019	0730-1530	65-71	100-80	0; 0-2	LSL, KD
Survey 15	3/15/2019	0730-1500	56-78	55-75	0-2; 0-2	LSL, RL
Survey 16	3/21/2019	0845-1500	54-61	40-100	0-2; 3-5	BL, NS
Survey 17	3/28/2019	0715-1430	55-68	100-20	0-3; 5-8	ML, RL
Survey 18	4/4/2019	0715-1145	57-64	100-50	0-3; 3-6	ML, RL
Survey 19	4/10/2019	0745-1140	55-71	0-0	0-3; 3-6	ML, RL
Survey 20	4/17/2019	0730-1015	61-68	0-0	0-3; 0-3	ML, RL
Survey 21	4/23/2019	1115-1305	71-75	0-0	0-3; 3-5	BL, RL
Survey 22	5/1/2019	1045-1230	68-74	10-0	0-3; 5-10	BL, RL
Survey 23	5/8/2019	0730-1030	60-63	100-100	0-1; 0-1	ML
Survey 24	5/15/2019	1100-1245	70-70	60-100	0-3; 2-5	BL
Survey 25	5/23/2019	1130-1500	64-64	100-50	1-4; 2-6	BL
Survey 26	5/30/2019	0745-1040	61-66	100-10	0-3; 3-6	BL, RL
Survey 27	6/6/2019	0815-0945	63-64	100-40	0-1; 1-2	BL

Table 2. 2018-2019 Wet Season Fairy Shrimp Sampling Results

Basin Number	Fairy Shrimp Species Present	Basin Number	Fairy Shrimp Species Present	Basin Number	Fairy Shrimp Species Present
1819-001	<i>Branchinecta</i> sp.	1819-034	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	1819-069	none
1819-002	<i>B. lindahli</i>	1819-035	<i>B. lindahli</i>	1819-070	<i>B. sandiegonensis</i> , <i>B. lindahli</i>
1819-003	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	1819-036	<i>B. lindahli</i>	1819-071	<i>Branchinecta</i> sp.
1819-004	none	1819-037	none	1819-072	<i>B. lindahli</i>
1819-005	none	1819-038	none	1819-073	none
1819-006	<i>B. lindahli</i>	1819-039	<i>B. lindahli</i>	1819-074	<i>B. sandiegonensis</i> , <i>B. lindahli</i>
1819-007	<i>B. lindahli</i>	1819-040	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	1819-075	<i>B. lindahli</i>
1819-008	none	1819-041	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	1819-076	<i>B. lindahli</i>
1819-009	none	1819-042	<i>B. lindahli</i>	1819-077	<i>B. lindahli</i>
1819-010	none	1819-043	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	1819-078	<i>B. lindahli</i>
1819-011	none	1819-044	<i>B. sandiegonensis</i>	1819-079	none
1819-012	none	1819-045	<i>B. lindahli</i>	1819-080	<i>B. lindahli</i>
1819-013	none	1819-046	<i>B. lindahli</i>	1819-081	<i>B. lindahli</i>
1819-014	<i>B. sandiegonensis</i>	1819-047	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	1819-082	none
1819-015	none	1819-050	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	1819-083	<i>B. lindahli</i>
1819-016	none	1819-051	<i>B. lindahli</i>	1819-084	<i>B. lindahli</i>
1819-017	none	1819-052	none	1819-085	<i>B. lindahli</i>
1819-018	none	1819-053	<i>Branchinecta</i> sp.	1819-086	<i>B. lindahli</i>
1819-019	none	1819-054	none	1819-087	<i>B. lindahli</i>
1819-020	none	1819-055	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	1819-088	<i>B. sandiegonensis</i>
1819-021	none	1819-056	<i>B. sandiegonensis</i>	1819-089	<i>B. sandiegonensis</i>
1819-022	none	1819-057	<i>B. sandiegonensis</i>	1819-090	<i>Branchinecta</i> sp.
1819-023	<i>B. lindahli</i>	1819-058	<i>Branchinecta</i> sp.	1819-091	none
1819-024	<i>B. lindahli</i>	1819-059	<i>B. sandiegonensis</i>	1819-092	<i>B. sandiegonensis</i>
1819-025	<i>B. lindahli</i>	1819-060	<i>B. sandiegonensis</i>	1819-093	<i>B. sandiegonensis</i>
1819-026	<i>B. lindahli</i>	1819-061	<i>B. sandiegonensis</i>	1819-094	<i>B. sandiegonensis</i>
1819-027	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	1819-062	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	1819-095	<i>B. sandiegonensis</i>
1819-028	<i>B. sandiegonensis</i>	1819-063	none	1819-096	<i>B. sandiegonensis</i>
1819-029	none	1819-064	<i>B. lindahli</i>	1819-097	<i>B. sandiegonensis</i>
1819-030	<i>B. lindahli</i>	1819-065	<i>Branchinecta</i> sp.	1819-098	<i>B. sandiegonensis</i>
1819-031	<i>Branchinecta</i> sp.	1819-066	<i>Branchinecta</i> sp.	1819-099	<i>B. sandiegonensis</i>
1819-032	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	1819-067	<i>Branchinecta</i> sp.	1819-100	<i>B. sandiegonensis</i>
1819-033	none	1819-068	none	1819-101	none

Table 2. 2018-2019 Wet Season Fairy Shrimp Sampling Results

Basin Number	Fairy Shrimp Species Present	Basin Number	Fairy Shrimp Species Present
1819-102	<i>B. sandiegonensis</i>	1819-135	none
1819-103	<i>B. sandiegonensis</i>	1819-136	none
1819-104	<i>B. sandiegonensis</i>	1819-137	none
1819-105	<i>B. sandiegonensis</i>	1819-140	none
1819-106	none	1819-143	none
1819-107	none	1819-144	<i>B. lindahli</i>
1819-109	none	1819-148	<i>B. lindahli</i>
1819-110	none	1819-149	<i>B. sandiegonensis, B. lindahli</i>
1819-111	none	1819-150	<i>B. sandiegonensis</i>
1819-112	<i>B. sandiegonensis</i>	1819-151	none
1819-113	<i>B. sandiegonensis</i>	1819-152	none
1819-114	<i>B. sandiegonensis</i>	1819-153	<i>B. sandiegonensis</i>
1819-115	<i>B. sandiegonensis</i>	1819-154	none
1819-116	<i>B. lindahli</i>	1819-155	none
1819-117	none		
1819-118	<i>B. lindahli</i>		
1819-119	<i>B. lindahli</i>		
1819-120	<i>B. lindahli</i>		
1819-121	<i>B. lindahli</i>		
1819-122	<i>B. lindahli</i>		
1819-123	none		
1819-124	<i>B. lindahli</i>		
1819-125	<i>B. lindahli</i>		
1819-126	<i>B. sandiegonensis, B. lindahli</i>		
1819-127	<i>B. lindahli</i>		
1819-128	<i>B. lindahli</i>		
1819-129	<i>B. lindahli</i>		
1819-130	<i>B. lindahli</i>		
1819-131	<i>B. lindahli</i>		
1819-132	<i>B. lindahli</i>		
1819-133	none		
1819-134	none		

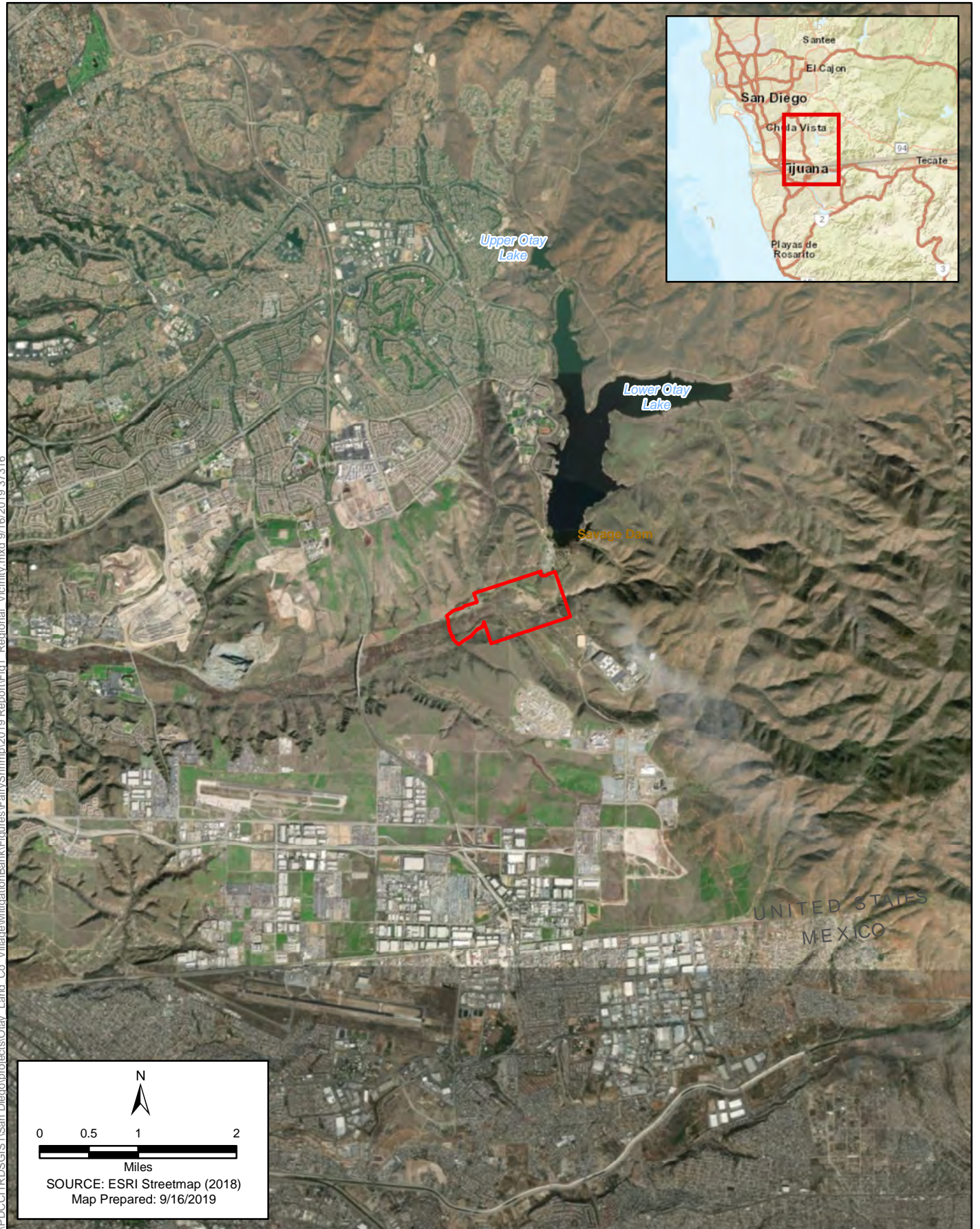
Table 3. Results Summary

No. Basins	Fairy Shrimp Species Present
29	<i>B. sandiegonensis</i>
15	<i>B. sandiegonensis</i> , <i>B. lindahli</i>
44	<i>B. lindahli</i>
9	<i>Branchinecta</i> sp.
48	No Fairy Shrimp Observed
145	Total Basins Sampled
44	Basins supporting <i>B. sandiegonensis</i>
59	Basins supporting <i>B. lindahli</i>
98	Basins supporting fairy shrimp

Table 4. Aquatic Species Observed

Scientific Name	Common Name
Worms	
Nematoda	roundworms
Platyhelminthes	flatworms
Mollusks	
Gastropoda	snails
Crustaceans	
Anostraca	fairy shrimp*
Cladostera	water fleas
Coleoptera	beetles
Conchostraca	clam shrimp
Copepoda	copepods
Ostracoda	seed shrimp
Insects	
Anisoptera	dragonflies
Chironomidae	midges
Collembola	springtails
Corixidae	water boatmen
Culicidae	mosquitos
Diptera	true flies
Ephemeroptera	mayflies
Notonectidae	backswimmers
Zygoptera	damselflies
Arachnids	
Hydracarina	water mites
Amphibians	
<i>Anaxyrus boreas halophilus</i>	California toad
<i>Pseudacris hypochondriaca</i>	Baja California chorus frog
<i>Spea hammondi</i>	western spadefoot
<i>Xenopus laevis</i>	African clawed frog

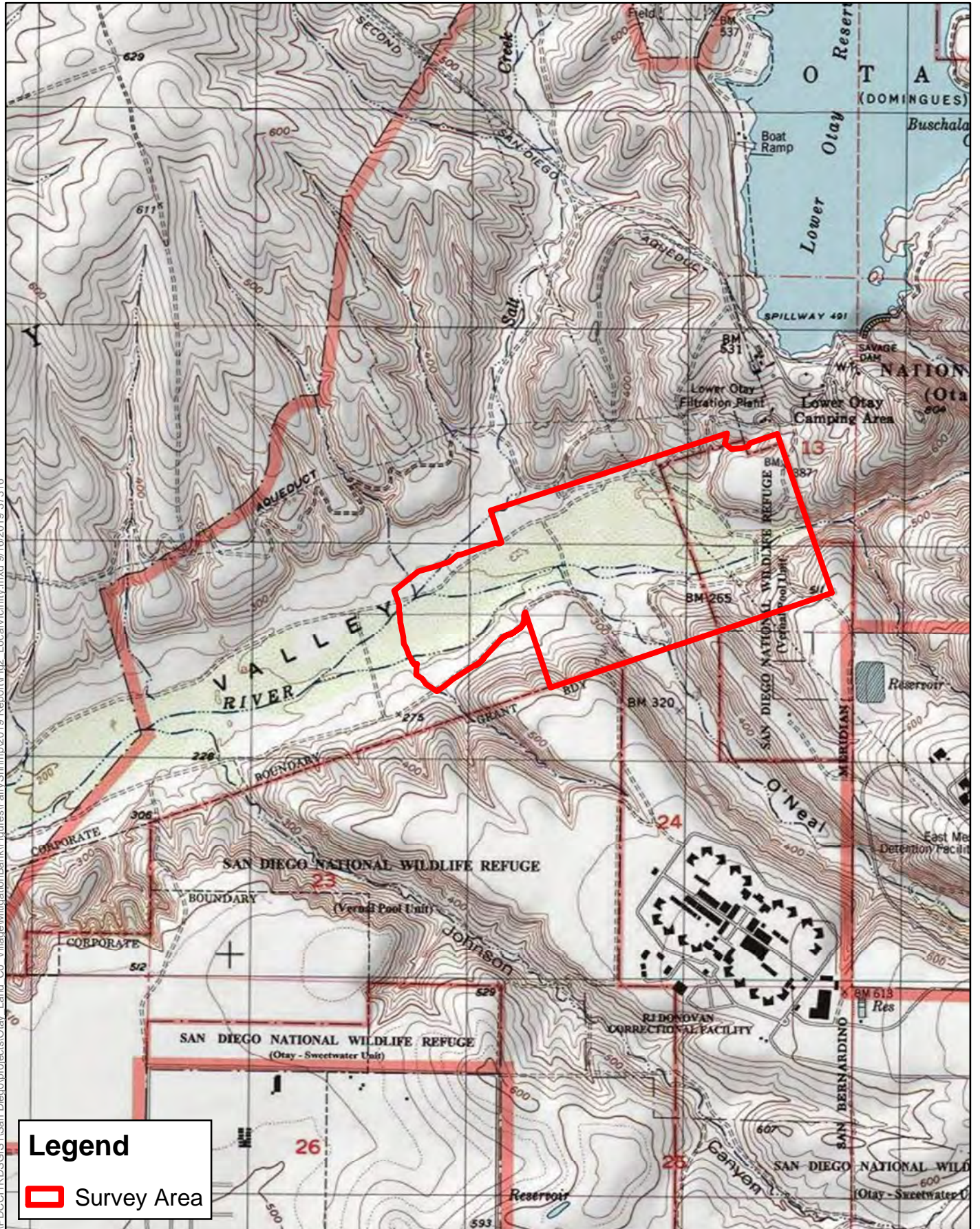
*see Table 3 for species



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Figure 1
Regional Location
Otay River Restoration Project





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Figure 2
Project Vicinity
Otay River Restoration Project



0 1,000 2,000
 Feet

SOURCE: ESRI Streetmap (2018)

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Legend

 Otay River Restoration Boundary

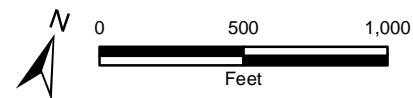


Figure 3
2019 Wet Season Fairy Shrimp Survey Results
Otay River Restoration Project

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Legend

- Olay River Restoration Boundary
- Sampled Basins**
- B. sandiegonensis*; *B. lindahli*
- B. lindahli*
- B. sandiegonensis*
- Branchinecta* sp.
- No fairy shrimp observed

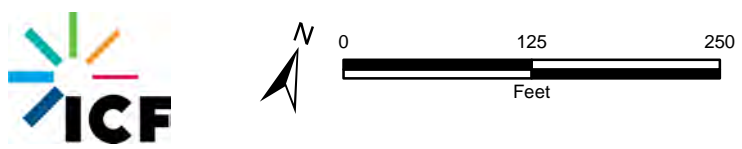
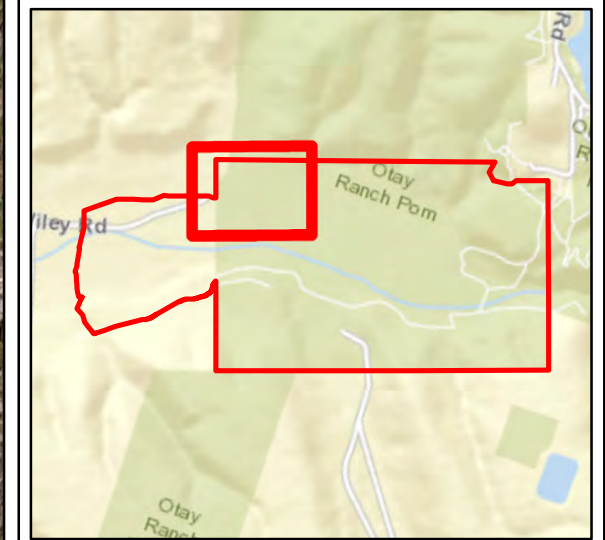


Figure 3 Sheet 1
2019 Wet Season Fairy Shrimp Survey Results
Olay River Restoration Project



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Legend

Olay River Restoration Boundary

Sampled Basins

B. sandiegonensis; *B. lindahli*

B. lindahli

B. sandiegonensis

Branchinecta sp.

No fairy shrimp observed

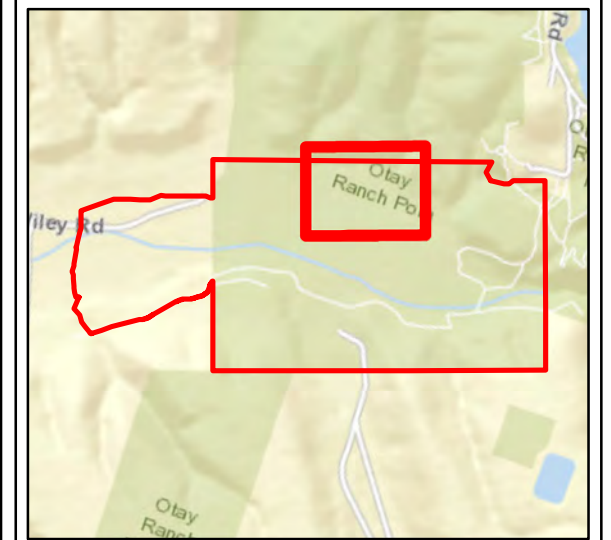


Figure 3 Sheet 2
2019 Wet Season Fairy Shrimp Survey Results
Olay River Restoration Project

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Legend

- Olay River Restoration Boundary

Sampled Basins

- B. sandiegonensis*; *B. lindahli*
- B. lindahli*
- B. sandiegonensis*
- Branchinecta* sp.
- No fairy shrimp observed

Vernal Pool Preserve not surveyed during 2018-2019 wet season surveys.

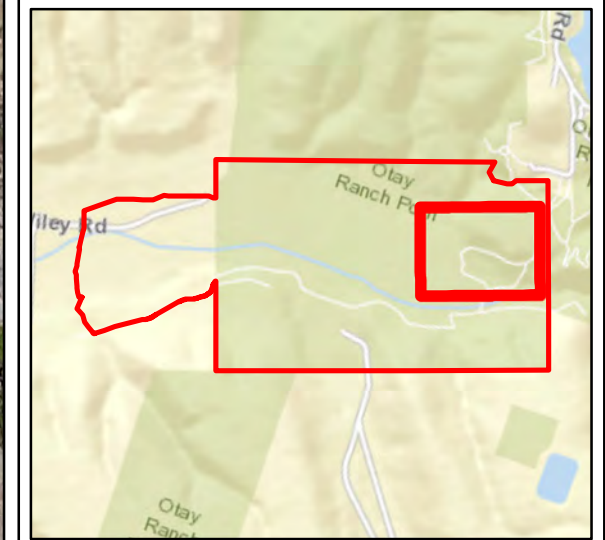


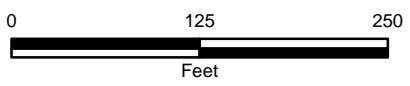





Figure 3 Sheet 3
2019 Wet Season Fairy Shrimp Survey Results
Olay River Restoration Project

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Legend

Olay River Restoration Boundary

Sampled Basins

B. sandiegonensis; *B. lindahli*

B. lindahli

B. sandiegonensis

Branchinecta sp.

No fairy shrimp observed

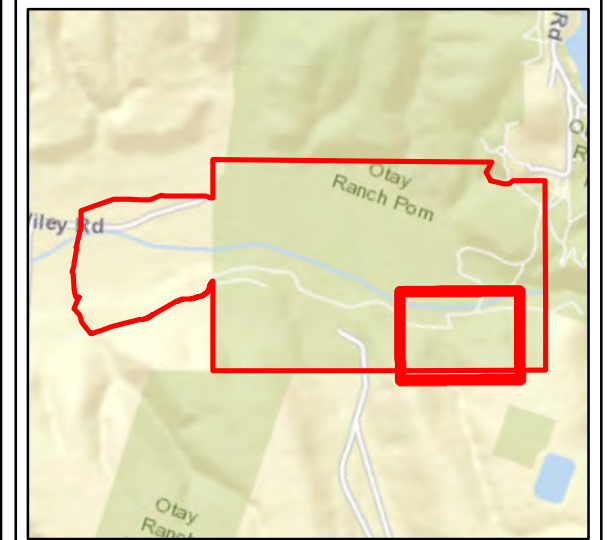
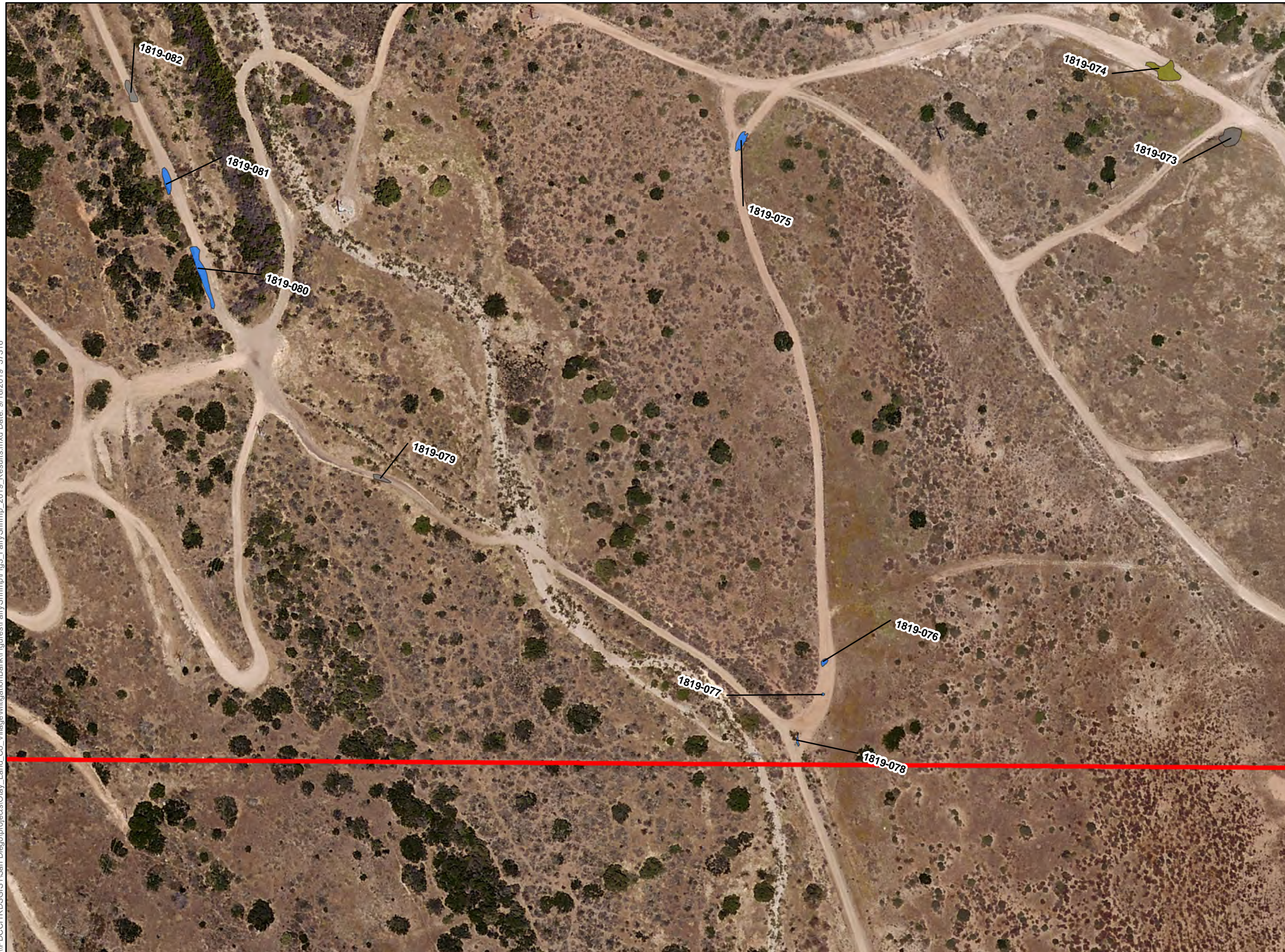


Figure 3 Sheet 4
2019 Wet Season Fairy Shrimp Survey Results
Olay River Restoration Project

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Legend

Olay River Restoration Boundary

Sampled Basins

B. sandiegonensis; *B. lindahli*

B. lindahli

B. sandiegonensis

Branchinecta sp.

No fairy shrimp observed

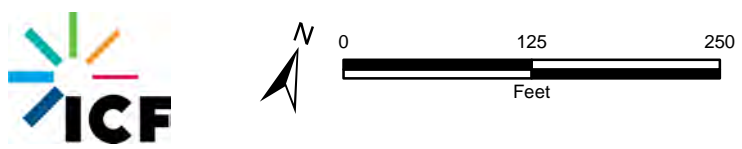
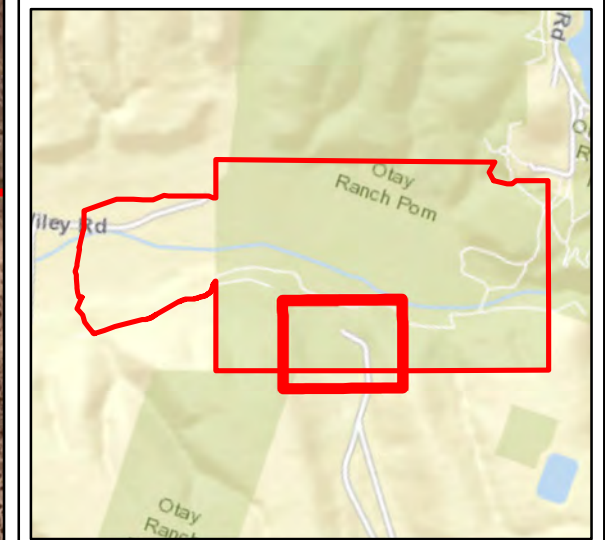
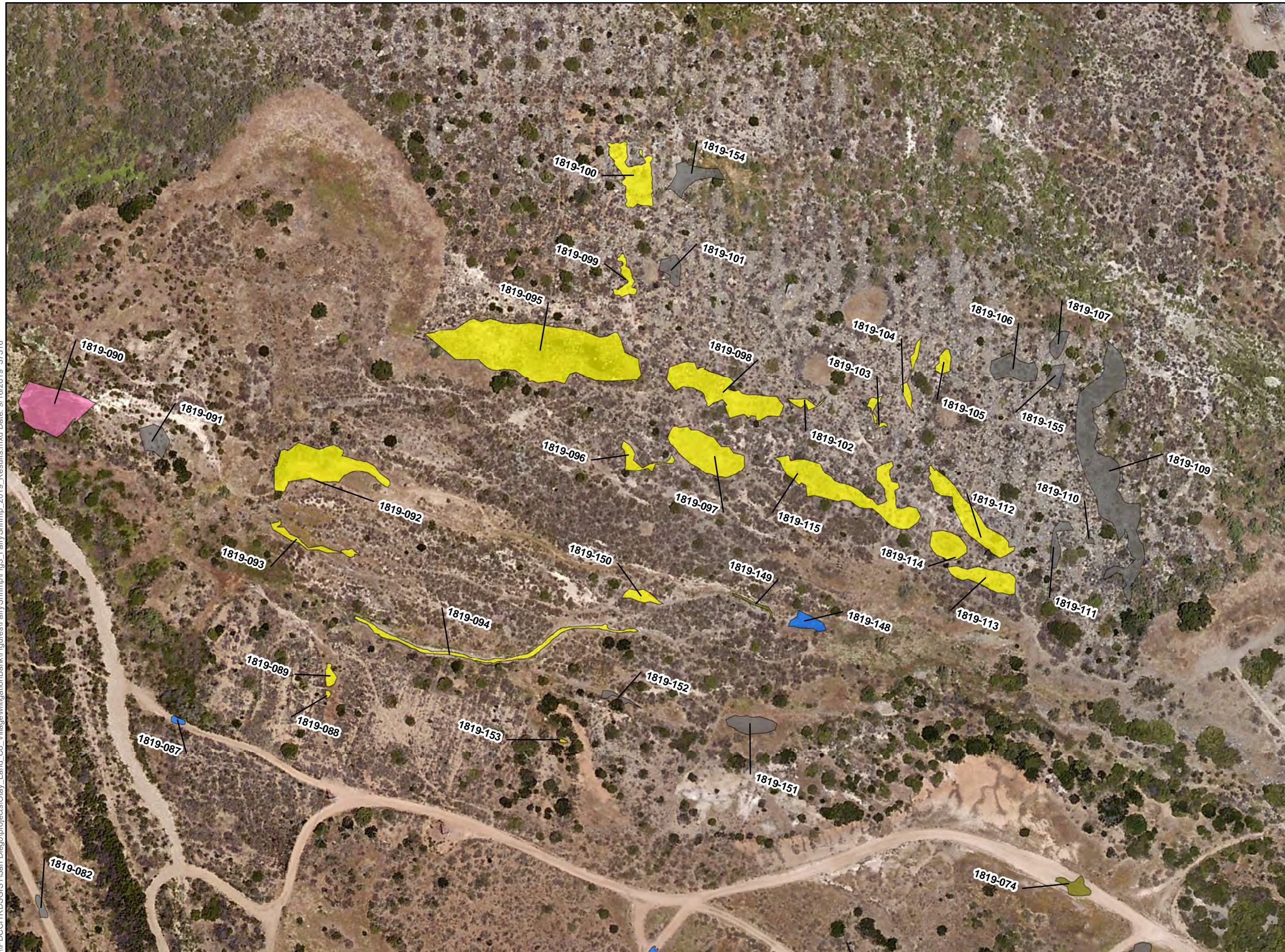


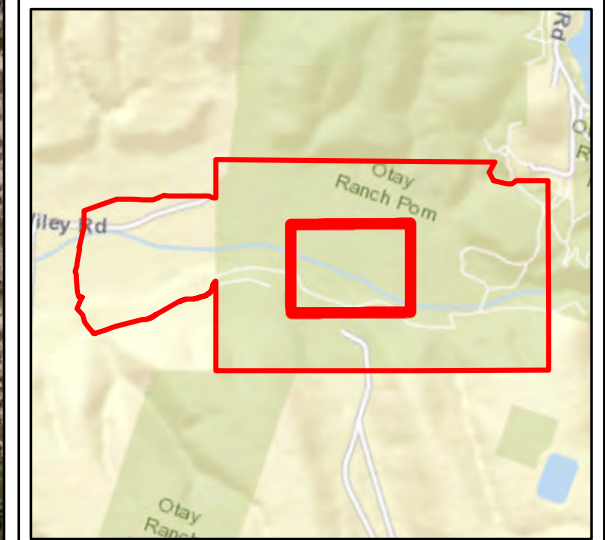
Figure 3 Sheet 5
2019 Wet Season Fairy Shrimp Survey Results
Olay River Restoration Project

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Legend

- Olay River Restoration Boundary
- Sampled Basins**
- B. sandiegonensis*; *B. lindahli*
- B. lindahli*
- B. sandiegonensis*
- Branchinecta* sp.
- No fairy shrimp observed



0 125 250
Feet

Figure 3 Sheet 6
2019 Wet Season Fairy Shrimp Survey Results
Olay River Restoration Project

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Legend

Olay River Restoration Boundary

Sampled Basins

B. sandiegonensis; *B. lindahli*

B. lindahli

B. sandiegonensis

Branchinecta sp.

No fairy shrimp observed

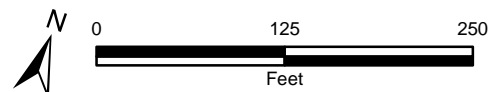
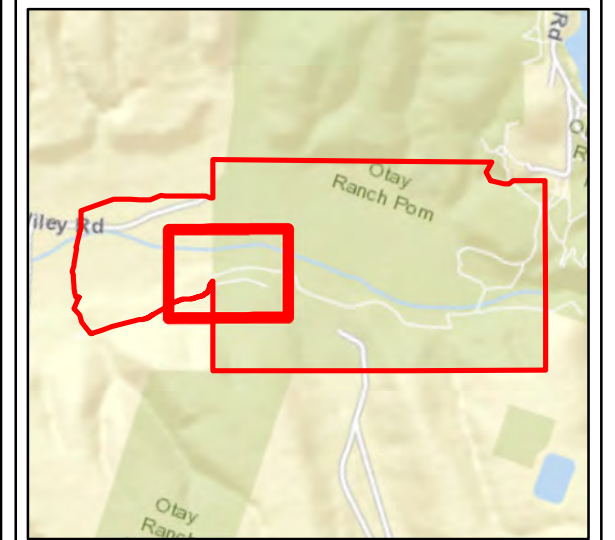


Figure 3 Sheet 7
2019 Wet Season Fairy Shrimp Survey Results
Olay River Restoration Project

\\PDC\ITR\DSGIS\San_Diego\projects\Olay_Land_Co_Village\MitigationBank\Figures\Fairy Shrimp\Fig3_Fairy Shrimp_2019_Results.mxd Date: 9/16/2019 37316



Legend

- Olay River Restoration Boundary
- Sampled Basins**
- B. sandiegonensis*; *B. lindahli*
- B. lindahli*
- B. sandiegonensis*
- Branchinecta* sp.
- No fairy shrimp observed

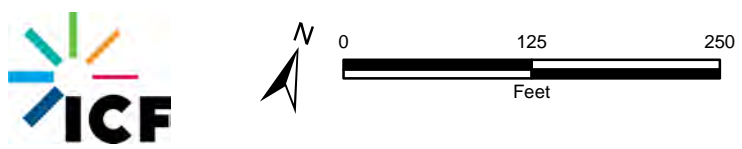
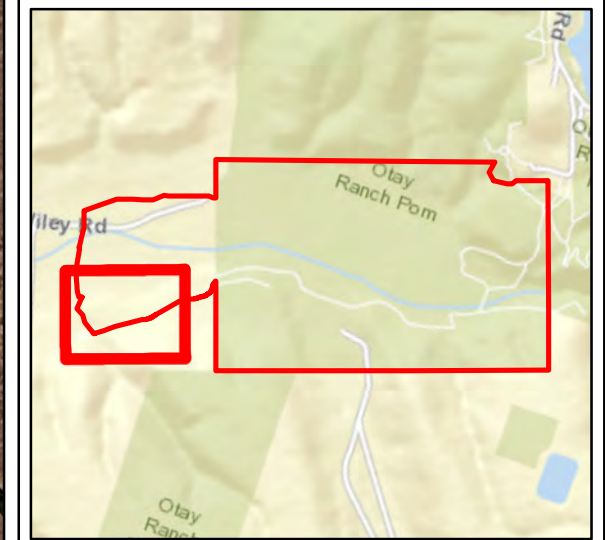


Figure 3 Sheet 8
2019 Wet Season Fairy Shrimp Survey Results
Olay River Restoration Project



Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-001	12/13/2018	8.9	7.5	30	<i>Branchinecta</i> sp.	10s	no	Noto	Road Rut	Disturbed, Tire Tracks	Immatures, complex of 3 ruts
1819-001	12/20/2018	8.7	4	15	<i>Branchinecta</i> sp.	1s	no	none			2-3 ruts, only 2 females observed
1819-001	12/28/2018	8.5	2.5	1.7	<i>Branchinecta</i> sp.	1s	no	Coll			One female observed
1819-001	1/3/2019	2.8	1	1	<i>Branchinecta</i> sp.	1s	no	Cope, Coll			One female observed
1819-001	1/10/2019	9.6	0.2	2.4	None	n/a	no	Clad			
1819-001	1/18/2019	15.1	12	3.3	None	n/a	no	none			Area disced
1819-001	2/7/2019	9.1	15	7.5	None	n/a	no	none			
1819-001	2/15/2019	12.3	10	10.5	None	n/a	no	none			
1819-001	2/21/2019	6.7	19	10.5	None	n/a	no	none			
1819-001	2/28/2019	8.3	10	1.5	None	n/a	no	none			
1819-001	3/7/2019	12.5	8	5	None	n/a	no	none			
1819-002	12/7/2018	13.6	17	90	None	n/a	no	Notonectids	Road Rut	Disturbed, Tire Tracks	
1819-002	12/13/2018	10.4	7.5	56	<i>Branchinecta</i> sp.	10s	no	Ostr, Noto			Immatures
1819-002	12/20/2018	10.2	8	70	<i>B. lindahli</i>	1s	no	none			
1819-002	12/28/2018	9.4	8	12	<i>B. lindahli</i>	1s	yes	Culi, Nema, Coll			
1819-002	1/3/2019	1.5	1.5	4	<i>B. lindahli</i>	1s	no	Ostr, Coll			
1819-002	1/10/2019	10.8	7	5.6	None	n/a	no	Coll			
1819-002	1/18/2019	14.8	19	21.6	None	n/a	no	Culi			Area disced
1819-002	1/24/2019	11.4	11	18	<i>B. lindahli</i>	100s	no	Ostr, Chir			
1819-002	1/31/2019	10.6	6	3.25	<i>B. lindahli</i>	10s	no	Chir			
1819-002	2/7/2019	7.7	18	30	<i>B. lindahli</i>	10s	no	Ostr, Coll			
1819-002	2/15/2019	17.6	10.5	52	<i>Branchinecta</i> sp.	1s	no	Clad			immature female only observed
1819-002	2/21/2019	7.3	21	30	<i>Branchinecta</i> sp.	1s	no	none			Female only observed
1819-002	2/28/2019	7.8	16	10.5	<i>B. lindahli</i>	1s	no	none			
1819-002	3/7/2019	11.2	14	57.6	None	n/a	no	none			
1819-002	3/15/2019	4.3	5	3	None	n/a	no	none			
1819-002	3/21/2019	12.7	3	0.5	<i>B. lindahli</i>	1s	no	Coll			
1819-003	12/13/2018	12	0.2	0.5	None	n/a	no	none	Road Rut		
1819-003	1/24/2019	11.7	2.8	1	<i>B. sandiegonensis, B. lindahli</i>	1s	yes				
1819-003	2/7/2019	10.7	4	1.44	None	n/a	no	none			
1819-003	2/15/2019	13.7	6.5	2.25	None	n/a	no	none			
1819-003	2/21/2019	7.3	9	1.5	None	n/a	no	none			
1819-003	2/28/2019	8	2	0.025	None	n/a	no	none			
1819-004	3/7/2019	10.7	6	0.075	None	n/a	no	none	Road Rut		
1819-005	2/7/2019	7	7	8	None	n/a	no	none	Natural	Undisturbed	
1819-005	2/15/2019	11	12	18	None	n/a	no	Nema			
1819-005	2/21/2019	7.1	12		None	n/a	no	none			
1819-005	3/7/2019		2		None						<3cm, didn't sample
1819-006	2/7/2019	7.1	7	3	None	n/a	no	Nema	Road Rut	Disturbed, Tire Tracks	
1819-006	2/15/2019	11.1	10	5	None	n/a	no	Nema			
1819-006	2/21/2019	7.7	2	9	None	n/a	no	none			algal bloom
1819-006	2/21/2019	7.7	11	5	None	n/a	no	none			
1819-006	2/28/2019	7.1	4	0.125	<i>B. lindahli</i>	1s	yes	none			
1819-006	3/7/2019	9.7	10	9	None	n/a	no	none			
1819-006	3/15/2019	4.8	9	2	None	n/a	no	none			
1819-006	3/21/2019	13	2.5	0.5	None	n/a	no	Ostr			
1819-006	5/23/2019	22.1	6	3	None	n/a	no	n/a			
1819-007	12/7/2018	18.9	10	432	None	n/a	no	none	Road Rut	Disturbed, Tire Tracks	
1819-007	12/13/2018	9.5	6	336	<i>B. lindahli</i>	1000s	yes	none			
1819-007	12/20/2018	10	3	312	<i>B. lindahli</i>	100s	no	Ostr, Clad, Culi			complex of 2 features

Attachment B: 2018-2019 Wet Season Survey Data

Otay River Restoration Project

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-007	12/28/2018	9.4	3.5	250	<i>B. lindahli</i>	10s	no	Clad			Complex of 2 pools
1819-007	1/3/2019	7.6	3.5	126	<i>B. lindahli</i>	1s	no	Clad			
1819-007	1/10/2019	11.8	9.5	70	None	n/a	no	Ostr, Coll			
1819-007	1/18/2019	14.6	12	135	<i>B. lindahli</i>	100s	no	Ostr, Clad			
1819-007	1/24/2019	10	12	176	<i>B. lindahli</i>	1000s	no	Ostr, Clad, Chir			
1819-007	1/31/2019	10.9	8	60	<i>B. lindahli</i>	1000s	no	Ostr, Clad			
1819-007	2/7/2019	9.7	18	125	<i>B. lindahli</i>	1000s	no	PSHY Larvae			
1819-007	2/15/2019	13	18	270	<i>B. lindahli</i>	100s	no	none			
1819-007	2/21/2019	8.7	15	10	<i>B. lindahli</i>	10s	no	none			water flowing in from road, spilling off road into River
1819-007	2/28/2019	10.6	10	150	<i>B. lindahli</i>	10s	no	SPHA Larvae			
1819-007	3/7/2019	10.2	10	90	None	n/a	no	none			
1819-007	3/15/2019	4.8	15	60	<i>B. lindahli</i>	10s	no	none			
1819-007	3/21/2019	14.8	7	180	<i>B. lindahli</i>	1s	no	Cole, Chir, SPHA larvae			
1819-007	3/28/2019	11.5	4	2	None	n/a	no	Ostr, Dipt, Cole, Chir			
1819-007	5/23/2019	22.9	10.5	52.5	None	n/a	no	n/a			
1819-008	1/31/2019	12.3	13	54	None	n/a	no	Ostr, Culi, Frog Larvae	Natural	Undisturbed	
1819-008	2/7/2019	9.3	20	90	None	n/a	no	Ostr, Clad, Culi, PSHY Larvae			
1819-008	2/15/2019	14.2	30	100	None	n/a	no	Ostr, Clad, Culi, PSHY Larvae		Algal blooms	
1819-008	2/21/2019	6.4	20	54	None	n/a	no	PSHY and SPHA larvae			
1819-008	2/28/2019	8.6	20	150	None	n/a	no	none			
1819-008	3/7/2019	12.7	25	5	None	n/a	no	PSHY Larvae			
1819-008	3/15/2019	6.2	20	175	None	n/a	no	none			
1819-008	3/21/2019	14	30	175	None	n/a	no	none			
1819-008	3/28/2019	12.9	25	100	None	n/a	no	Clad, Noto, Cori, Coll, Chir, Anis			Algal blooms
1819-008	4/3/2019	15.8	18	540	None	n/a	no	Noto, Cori, Anis, PSHY Larvae		Algal blooms	clawed frog larvae
1819-008	4/10/2019	12.7	16	150	None	n/a	no	Ost, Clad, Culi, PSHY Larvae		algae	clawed frog present
1819-008	4/17/2019	12.7	17	108	None	n/a	no	Ostr, Culi, Noto, Cori, Chir, Gast, Ephe			
1819-008	4/24/2019	23.1	14	99	None	n/a	no	Culi, Cole, Noto, Chir, Ephe, Anis, PSHY Larvae, XELA			
1819-008	5/1/2019	25.4	9	60	None	n/a	no	Noto, Coll, Chir, Ephe, Anis, PSHY Larvae, XELA			
1819-008	5/8/2019	17.1	2	16	None	n/a	no	Chir, Cori			
1819-008	5/15/2019	21.5	30	4500	None	n/a	no	Noto, Ephe, PSHY Larvae			Dense tamarisk
1819-008	5/23/2019	18.6	50	700	None	n/a	no	Anis, XELO,		algae	River back water
1819-008	5/30/2019	18.2	50	400	None	n/a	no	Cole, Noto, Gast, XELO,		Algae	
1819-008	6/6/2019	20.3	30	500	None	n/a	no	Cole, Noto			
1819-009	2/21/2019	9.3	11	36	None	n/a	no	none	Natural		
1819-009	2/28/2019	8	14	36	None	n/a	no	none			
1819-009	3/7/2019	12	17	18	None	n/a	no	PSHY Larvae			
1819-009	3/15/2019	6	17	60	None	n/a	no	none			
1819-009	3/21/2019	13.9	9	5	None	n/a	no	Coll, Culi			
1819-009	3/28/2019	12.7	6	30	None	n/a	no	Ostr, Clad, Dipt, Culi, Chir			Algal blooms
1819-009	4/3/2019	15	20	20	None	n/a	no	Cole			
1819-009	4/10/2019	12.3	15.5	24	None	n/a	no	Cole, Chir, PSHY Larvae,		algae	
1819-009	4/17/2019	14.2	20	45	None	n/a	no	Culi, Cole, Chir, PSHY larvae			
1819-009	4/24/2019	20.7	11.5	30	None	n/a	no	Culi, Cole, Chir, PSHY larvae			
1819-009	5/1/2019	21.2	13	9	None	n/a	no	Culi, Ephe, PSHY Larvae			
1819-009	5/8/2019	16.1	5	35	None	n/a	no	PSHY Larvae, Cole, Chir, Cori		Algae	
1819-010	1/31/2019	9.8	6.2	5	None	n/a	no	Ostr, Culi, ANBO Larvae	Natural	Undisturbed	mapped as new 56, merged with new 69; 1819-010
1819-010	2/7/2019	8.7	17	15	None	n/a	no	Ostr, Clad, Culi			mapped as new 56, merged with new 69; 1819-010
1819-010	2/15/2019	13.4	20	35	None	n/a	no	Ostr, Clad, Culi PSHY Larvae			mapped as new 56, merged with new 69; 1819-010

Attachment B: 2018-2019 Wet Season Survey Data

Otay River Restoration Project

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-010	2/21/2019	13.7	20	31.5	None	n/a	no	none			mapped as new 56, merged with new 69; 1819-010
1819-010	3/7/2019	14	19	12.5	None	n/a	no	PSHY Larvae			
1819-010	3/15/2019	7.3	18	15	None	n/a	no	none			
1819-010	3/21/2019	m	20	2	None	n/a	no	Cole, Noto, Chir			
1819-010	3/28/2019	13.9	20	25	None	n/a	no	Ostr, Clad, Culi, Cole, Chir			
1819-010	4/3/2019	15.1	18	25	None	n/a	no	Ostr, Dipt, Cole, Anis, PSHY Larvae			
1819-010	4/10/2019	12.1	19	15	None	n/a	no	Ostr, Culi, PSHY Larvae			
1819-010	4/17/2019	14.1	20	54	None	n/a	no	Cole, Anis, PSHY Larvae			
1819-010	4/24/2019	27.2	19	17.5	None	n/a	no	Chir, Anis, PSHY Larvae			
1819-010	5/1/2019	25.8	15.2	12.5	None	n/a	no	Ephe			
1819-010	5/8/2019	16.4	5	25	None	n/a	no	PSHY Larvae, Cole, Zygo, Cori			
1819-011	2/28/2019	8.1	15	6	None	n/a	no	none	Natural		
1819-011	3/7/2019	11.5	14	4	None	n/a	no	none			
1819-011	3/15/2019	6.4	10.5	1	None	n/a	no	none			
1819-011	3/21/2019	14.7	12	m	None	n/a	no	Culi			
1819-012	2/28/2019	8.7	25	75	None	n/a	no	none	Natural		
1819-012	3/7/2019	12.3	18	45	None	n/a	no	none			
1819-012	3/15/2019	6.2	20.5	54	None	n/a	no	none			
1819-012	3/21/2019	14	12	4	None	n/a	no	Culi, Cole			
1819-012	3/28/2019	13.3	3	0.25	None	n/a	no	Ostr, Dipt, Culi			
1819-013	2/28/2019	10.1	14	15	None	n/a	no	none	Natural		
1819-013	3/7/2019	13.7	15	6.25	None	n/a	no	Diptera			
1819-013	3/15/2019	6.8	15	9	None	n/a	no	none			
1819-013	3/21/2019	15.4	6	2	None	n/a	no	Ostr, Culi, Cole			
1819-013	3/28/2019	13.7	7.5	1.5	None	n/a	no	Ostr, Dipt, Culi, Cole, Anis, PSHY Larvae			
1819-013	4/3/2019	15.3	5	1	None	n/a	no	Ostr, Anis			
1819-014	2/28/2019	8.6	21	105	<i>B. sandiegonensis</i>	1s	yes	none	Natural		
1819-014	3/7/2019	13.6	20	32	None	n/a	no	Ostracoda, Diptera			
1819-014	3/15/2019	5.7	10	15	None	n/a	no	none			
1819-015	2/28/2019	12.2	9	6	None	n/a	no	none	Natural		
1819-015	3/7/2019	13.7	4	1	None	n/a	no	Ostracoda, Diptera			
1819-016	2/28/2019	9.6	20	24	None	n/a	no	none	Natural		
1819-016	3/7/2019	13	15	1.5	None	n/a	no	PSHY Larvae			
1819-017	2/28/2019	12.3	3	0.25	None	n/a	no	none	Natural		
1819-018	1/31/2019	10.8	14	25	None	n/a	no	Ostr, Clad, Culi	Natural	Undisturbed	
1819-018	2/7/2019	9.7	30	19.25	None	n/a	no	Culi			
1819-018	2/15/2019	12.4	100	100	None	n/a	no	Coll, Chir			
1819-018	2/21/2019	7.7	91	64	None	n/a	no	Cope			
1819-018	3/7/2019	11.5	25	27.5	None	n/a	no	Diptera			
1819-018	3/15/2019	5.9	20	25	None	n/a	no	none			
1819-018	3/21/2019	14	20	12	None	n/a	no	Clad, Chir			
1819-018	3/28/2019	13.5	18	20	None	n/a	no	Ostr, Clad, Cole, Coll			
1819-018	4/3/2019	15.2	17	20	None	n/a	no	Ostr, Cole, Anis			
1819-018	4/10/2019	11.9	15.5	12	None	n/a	no	Ostr, Clad, Coll, Chir			
1819-018	4/24/2019	28.1	7	7.5	None	n/a	no	Culi, Cole, Coll, Epe		algae	
1819-018	5/1/2019	28.8	5.5	2.25	None	n/a	no	Ostr, Cope, Culi, Cole, Chir, Ephe			
1819-019	2/21/2019	9	10	6	None	n/a	no	none	Natural	Hydro Check Only	
1819-019	4/17/2019	12.7	14	14	None	n/a	no	Ostr, Cole, Coll, Chir, Anis			
1819-020	2/28/2019		0		None				Natural		Dry

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-021	2/28/2019	10	25	84	None	n/a	no	none	Natural		
1819-021	3/7/2019	13.1	20	28	None	n/a	no	Diptera, SPHA larvae			
1819-021	3/15/2019	4.8	7	0.75	None	n/a	no	none			
1819-022	2/28/2019	8.3	25	15	None	n/a	no	none	Natural		
1819-022	3/7/2019	12.3	14	15	None	n/a	no	Diptera, PSHY larvae, SPHA larvae			
1819-022	3/15/2019	5.3	10	10	None	n/a	no	none			
1819-022	3/21/2019	14.4	6	7.5	None	n/a	no	ANBO Larvae, Ostr, Culi			
1819-022	3/28/2019	12.6	5	1	None	n/a	no	Ostr, Culi, Chir			
1819-022	4/3/2019	15.3	5	0.75	None	n/a	no	Ostr, Chir			
1819-022	4/10/2019	10.8	3	0.25	None	n/a	no	Ostr, Coll			
1819-022	4/17/2019	11.8	2.5	0.1	None	n/a	no	Ostr			
1819-023	2/21/2019	8.4	12	2.25	None	n/a	no	none	Road Rut		
1819-023	2/28/2019	10.5	10	1	<i>B. lindahli</i>	10s	yes	none			
1819-023	3/7/2019	13.9	6	1.3	<i>B. lindahli</i>	1s	no	Collembola			
1819-023	3/15/2019	3.9	6	1	<i>B. lindahli</i>	1s	no	none			
1819-023	3/21/2019	15.6	3	1	<i>B. lindahli</i>	1s	no	Ostr			
1819-024	12/13/2018	10.8	5	40	<i>B. lindahli</i>	1000s	yes	none	Road Rut	Disturbed, Tire Tracks	complex of 2 ruts
1819-024	1/3/2019	1.7	4	2.5	<i>B. lindahli</i>	1s	no	Coll			
1819-024	1/10/2019	10.8	4	0.8	<i>B. lindahli</i>	10s	no	Ostr, Clad, Coll			
1819-024	1/18/2019	14.5	9	9.6	<i>Branchinecta</i> sp.	1s	no	Ostr, Clad			females only observed
1819-024	1/24/2019	12.1	3	6	<i>Branchinecta</i> sp.	1s	no	Ostr, Clad, Chir, Coll			Females only present
1819-024	2/7/2019	12.2	12.2	5	None	n/a	no	Ostr, Coll			
1819-024	2/15/2019	12.8	6.8	17.5	None	n/a	no	Chir			hydrologically connected to 1819-025
1819-024	2/21/2019	8.7	9	6	None	n/a	no	PSHY Larvae			
1819-024	3/7/2019	15.7	6	2	None	n/a	no	none			
1819-024	3/15/2019	4.8	3.5	0.75	None	n/a	no	none			
1819-025	12/7/2018	16.3	38	176	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures
1819-025	12/13/2018	11.3	30	180	<i>Branchinecta</i> sp.	1000s	no	none			Immatures
1819-025	12/20/2018	7.7	22	112.5	<i>B. lindahli</i>	1000s	yes	none			
1819-025	12/28/2018	8.5	20	60	<i>B. lindahli</i>	1000s	no	none			
1819-025	1/3/2019	1.8	20	80	<i>B. lindahli</i>	100s	no	none			
1819-025	1/10/2019	9.4	13	45	<i>B. lindahli</i>	100s	no	Clad, Coll			
1819-025	1/18/2019	13.7	30	35	<i>B. lindahli</i>	10s	no	SPHA egg masses			
1819-025	1/24/2019	11.1	45	140	<i>Branchinecta</i> sp.	10s	no	SPHA Larvae/egg masses	Road Rut	Disturbed, Tire Tracks	Females only present
1819-025	1/31/2019	11.2	35	57.5	<i>B. lindahli</i>	1s	no	SPHA larvae			
1819-025	2/7/2019	10.2	10.2	24	None	n/a	no	none			
1819-025	2/15/2019	13.6	40	85	None	n/a	no	Ostr, Clad, SPHA Larvae			
1819-025	2/21/2019	8.8	46	31.5	None	n/a	no	none			receiving flow from road, breach on S. side
1819-025	2/28/2019	12.8	20	44	<i>Branchinecta</i> sp.	1s	no	none			Females only observed
1819-025	3/15/2019	5.5	30	44	None	n/a	no	none			
1819-025	3/21/2019	15.6	45	14	None	n/a	no	Ostr, SPHA Larvae			
1819-025	3/28/2019	13.9	12	21	None	n/a	no	Clad			
1819-025	4/3/2019	14.5	13	18	None	n/a	no	Clad			
1819-025	4/10/2019	15	2.5	0.025	None	n/a	no	Ostr, Clad			
1819-026	1/18/2019		8		None		no	Ostr			Hydro check only
1819-026	1/24/2019	13.9	6.6	2.25	<i>B. lindahli</i>	100s	yes	Clad, Coll	Road Rut	Disturbed, Tire Tracks	
1819-026	2/7/2019	11.9	11.9	5	None	n/a	no	Chir			
1819-026	2/15/2019	14.1	17	8.75	<i>B. lindahli</i>	10s	no	Coll			
1819-026	2/21/2019	9.4	17	9	<i>B. lindahli</i>	100s	no	none			
1819-026	2/28/2019	13.7	13	24	<i>B. lindahli</i>	100s	no	none			
1819-026	3/7/2019	15.2		8.75	<i>B. lindahli</i>	100s	no	none			

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-026	3/15/2019	3.8	8	6.25	None	n/a	no	none			
1819-026	3/21/2019	16.2	5	2	<i>B. lindahli</i>	1s	no	Ostr			
1819-027	12/7/2018	16.9	17	48	None	n/a	no	none	Road Rut	Disturbed, Tire Tracks	
1819-027	12/13/2018	13.1	4	6	<i>Branchinecta</i> sp.	1000s	no	none	Road Rut	Disturbed, Tire Tracks	Immatures
1819-027	12/20/2018	11.5	1.5	0.5	<i>B. lindahli</i>	100s	yes	none			
1819-027	12/28/2018	7.5	1	0.75	None	n/a	no	Coll			likely dried before rain on 12/25
1819-027	1/10/2019	11.8	4	6	None	n/a	no	Coll			dry previous survey
1819-027	1/18/2019	15	8.5	4.5	<i>B. lindahli</i>	1000s	no	Ostr, Nema, Coll			immatures and nauplii present
1819-027	1/24/2019	13.1	4.2	6	<i>B. lindahli</i>	m	no	Ostr, Coll			
1819-027	1/31/2019	15.1	0.6	0.06	<i>B. lindahli</i>	10s	no	Ostr, Cope, Clad			
1819-027	2/7/2019	10.9	10.9	8.25	None	n/a	no	Ostr, Clad, Coll			
1819-027	2/15/2019	12.4	50	230	<i>Branchinecta</i> sp.	1s	no	none			Merged with New 8, Female only observed
1819-027	2/21/2019	7.9	17	9	<i>B. sandiegonensis</i>	10s	yes	none			
1819-027	3/15/2019	4.2	9	3	None	n/a	no	none			
1819-027	3/21/2019	15.8	3	3	<i>Branchinecta</i> sp.	10s	no	none			females only observed
1819-028	1/18/2019	15.7	10	0.96	<i>Branchinecta</i> sp.	100s	no	Coll	Road Rut	Disturbed, Tire Tracks	immatures and nauplii present
1819-028	2/7/2019	13.5	11	2.5	None	n/a	no	Coll			
1819-028	2/15/2019	12.4	50	N/A	<i>Branchinecta</i> sp.	1s	no	Nema			Merged with 1819-027, Female only observed
1819-028	2/21/2019	8.2	21	2	<i>B. sandiegonensis</i>	10s	yes	none			
1819-028	3/15/2019	5.8	9.5	0.5	None	n/a	no	none			
1819-028	3/21/2019	15.9	4.5	0.5	None	n/a	no	Cole, Chir			
1819-029	2/28/2019	13.6	5	21	None	n/a	no	none			
1819-029	3/7/2019	14.5	5	9	None	n/a	no	none			
1819-030	12/7/2018	15.3	16	288	<i>Branchinecta</i> sp.	n/a	no	Collembola	Road Rut	Disturbed, Tire Tracks	Immatures, need type/condition
1819-030	12/13/2018	12	15	256	<i>B. lindahli</i>	1000s	yes	Coll			
1819-030	12/20/2018	9.3	7.5	76.5	<i>B. lindahli</i>	10s	no	none			
1819-030	12/28/2018	5.7	5	21	<i>B. lindahli</i>	100s	no	Coll			
1819-030	1/3/2019	0.5	4.5	10.5	<i>B. lindahli</i>	10s	no	none			
1819-030	1/10/2019	12.3	10.5	56	<i>B. lindahli</i>	10s	no	Coll			
1819-030	1/18/2019	14.6	30	54	<i>B. lindahli</i>	100s	no	none		AB	
1819-030	1/24/2019	13.1	18	150	<i>B. lindahli</i>	m	no	none			
1819-030	1/31/2019	11.6	9	49.5	<i>B. lindahli</i>	1000s	no	SPHA larvae			
1819-030	2/7/2019	10.1	32	125	<i>B. lindahli</i>	100	no	none			
1819-030	2/15/2019	12.1	30	104	None	n/a	no	Nema			
1819-030	2/21/2019	8.3	25	48	None	n/a	no	none			
1819-030	2/28/2019	12.7	19	80	None	n/a	no	none			
1819-030	3/7/2019	14.4	27	65	None	n/a	no	none			
1819-030	3/15/2019	4.4	11.5	42	None	n/a	no	none			
1819-030	3/21/2019	15.6	15	16	<i>Branchinecta</i> sp.	1s	no	Culi, Noto, Chir			females only observed
1819-030	3/28/2019	15.1	0.5	6	None	n/a	no	Clad			
1819-030	5/23/2019	21.3	5.5	39.6	None	n/a	no	n/a			Four separate pools
1819-031	1/24/2019	7.6	2.5	12	<i>Branchinecta</i> sp.	m	no	none	Road Rut	Disturbed, Tire Tracks	Immatures present
1819-031	2/7/2019	10.6	3	7	None	n/a	no	none			
1819-031	2/15/2019	14.7	7	21	None	n/a	no	Nema			
1819-031	2/21/2019	7.9	6	1.5	None	n/a	no	none			
1819-031	2/28/2019	16.7	3	0.1	None	n/a	no	none			
1819-032	12/7/2018	13	14	240	None	n/a	no	none	Road Rut	Disturbed, Tire Tracks	
1819-032	12/13/2018	8	8	105	<i>B. sandiegonensis</i>	100s	yes	Coll			Complex of 3 ruts
1819-032	12/20/2018	6.1	4	90	<i>B. sandiegonensis</i>	10s	no	Coll			
1819-032	12/28/2018	6.6	5	35	<i>B. sandiegonensis</i>	100s	no	Coll			
1819-032	1/3/2019	1.6	5	40	<i>B. sandiegonensis</i>	100s	no	none			

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-032	1/10/2019	10.3	8.5	58.5	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	10s	yes	Coll			second voucher for <i>B. lindahli</i> presence.
1819-032	1/18/2019	13.1	12	36	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	100s, 1s	no	Clad			younger males appear to be <i>B. san.</i>
1819-032	1/24/2019	7.6	18	67.5	<i>B. sandiegonensis</i>	100s	no	none			
1819-032	1/31/2019	11.1	7	37	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	100s	no	none			
1819-032	2/7/2019	7.1	15	140	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	100s/10s	no	Clad, Nema, Coll, Chir, SPHA larvae			
1819-032	2/15/2019	12.7	23	80	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	10s/1s	no	none			
1819-032	2/21/2019	7.4	20	1.2	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	10s	no	none			
1819-032	3/15/2019	3.2	10.5	36	None	n/a	no	none			
1819-032	3/21/2019	14.7	7	10	None	n/a	no	Clad, Culi, Coll, Chir			
1819-032	3/28/2019	12.4	4	11.25	None	n/a	no	Ostr, Cole, Chir,		Algal blooms	
1819-032	4/3/2019	14.9	3	1	None	n/a	no	Ostr, Coll			
1819-033	2/21/2019	9.5	3	6	None	n/a	no	none			Hydro Check Only
1819-034	12/7/2018	16.6	30	500	<i>Branchinecta</i> sp.	n/a	no	Collembola	Road Rut	Disturbed, Tire Tracks	Immatures, need type/condition. Irrigation Adjacent
1819-034	12/13/2018	19	28	296	<i>B. lindahli</i>	1000s	yes	Coll			Irrigation fed
1819-034	12/20/2018	7.2	18	256	<i>B. lindahli</i>	1000s	no	Coll			Irrigation fed
1819-034	12/28/2018	11.6	25	91	<i>B. lindahli</i>	1000s	no	Coll			
1819-034	1/3/2019	3.5	12	125	<i>B. lindahli</i>	100s	no	none			Irrigation fed
1819-034	1/10/2019	11.2	18	76.5	<i>B. lindahli</i>	1000s	no	Coll			irrigation fed
1819-034	1/18/2019	15	35	125	<i>B. lindahli</i>	10s	no	Clad, Coll, SPHA egg mass			immatures present
1819-034	1/24/2019	15.1	25	207	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	100s	yes	Coll, SPHA Egg masses			
1819-034	1/31/2019	11.9	20	132	<i>B. lindahli</i>	10s	no	SPHA larvae			irrigation fed
1819-034	2/7/2019	12	35	280	<i>B. lindahli</i>	1s	no	Ostr, Clad, Coll, Chir, SPHA larvae			
1819-034	2/15/2019	11.9	35	144	<i>Branchinecta</i> sp.	1s	no	Coll, SPHA Larvae			Female only observed
1819-034	2/21/2019	9.4	30	100	None	n/a	no	SPHA Larvae			
1819-034	2/28/2019	14.8	14	150	None	n/a	no	SPHA Larvae			
1819-034	3/15/2019	6.6	22	70	None	n/a	no	SPHA Larvae			
1819-034	3/21/2019	15.7	25	24	None	n/a	no	Coll, SPHA Larvae			
1819-034	3/28/2019	15.1	6.5	10	None	n/a	no	Ostr, Cole, Cori, Chir		Algal blooms	
1819-035	2/7/2019	17.5	3	0.04	<i>B. lindahli</i>	10s	yes	Clad, Nema, Chir	Road Rut	Disturbed, Tire Tracks	
1819-035	2/15/2019	16.1	2	0.45	None	n/a	no	Nema, Coll			
1819-035	2/21/2019	11.3	11	1	None	n/a	no	none			
1819-036	12/7/2018	19.8	7	28	None	n/a	no	none			
1819-036	12/13/2018	18	6.5	10	<i>Branchinecta</i> sp.	1s	no	none			Irrigation fed, not enough to collect, female only?
1819-036	12/20/2018	15.2	2	6	<i>B. lindahli</i>	1s	yes	none			Irrigation fed
1819-036	12/28/2018	14.7	2.7	1.5	None	n/a	no	none			likely dried before rain on 12/25
1819-036	1/10/2019	15	6.5	5.25	None	n/a	no	Coll			
1819-036	1/18/2019	16.3	9.6	7.2	<i>B. lindahli</i>	10s	no	Clad		Algal blooms	
1819-036	1/24/2019	15.7	8.5	21	<i>B. lindahli</i>	100s	no	Chir	Road Rut	Disturbed, Tire Tracks	complex of 2 features
1819-036	1/31/2019	15.3	6	6	<i>B. lindahli</i>	100s	no	Ostr, Clad, Chiro, Dipt			irrigation fed
1819-036	2/7/2019	14.2	10	8.25	<i>B. lindahli</i>	10s	no	Clad			
1819-036	2/15/2019	15.5	6.5	5.25	None	n/a	no	Chir			
1819-036	2/21/2019	10.6	14	3	None	n/a	no	none			
1819-036	2/28/2019	18.2	9	4	None	n/a	no	none			
1819-036	3/7/2019	18.7	8	1.25	None	n/a	no	none			

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-036	3/15/2019	7.3	3	0.1875	<i>B. lindahli</i>	1s	no	none			
1819-037	2/21/2019	10.5	9	1.25	None	n/a	no	none	Road Rut		Hydro Check Only
1819-038	2/21/2019	10.9	7	0.625	None	n/a	no	none	Road Rut		Hydro Check Only
1819-038	3/7/2019	19.8	4	0.2	None	n/a	no	none			
1819-039	12/13/2018	18	6	55	<i>Branchinecta</i> sp.	10s	no	Coll			Immatures, recently filled from last rain
1819-039	12/20/2018	14.4	6	12.5	<i>B. lindahli</i>	1s	yes	none			
1819-039	12/28/2018	14.1	4	2.1	<i>Branchinecta</i> sp.	1s	no	none			One female observed
1819-039	1/3/2019	11	1	1.34	None	n/a	no	Ostr			
1819-039	1/10/2019	16.2	8	10	None	n/a	no	Coll			
1819-039	1/18/2019	17.2	13	17.6	<i>B. lindahli</i>	10s	no	Coll			
1819-039	1/24/2019	17.1	10	36	<i>B. lindahli</i>	100s	no	none	Road Rut	Disturbed, Tire Tracks	
1819-039	1/31/2019	16.7	3	8	<i>B. lindahli</i>	10s	no	none			
1819-039	2/7/2019	20.7	9	40	<i>B. lindahli</i>	1s	no	Coll			
1819-039	2/15/2019	15.2	15	21	<i>B. lindahli</i>	10s	no	none			
1819-039	2/21/2019	10.6	15	28	<i>B. lindahli</i>	10s	no	none			
1819-039	2/28/2019	21.1	8	14	<i>B. lindahli</i>	10s	no	none			
1819-039	3/7/2019	19.3	5	12.5	<i>B. lindahli</i>	1s	no	none			
1819-039	3/15/2019	7.2		6	<i>B. lindahli</i>	1s	no	none			
1819-039	3/21/2019	19	3	2	None	n/a	no	Ostr			
1819-039	5/23/2019	18.9	6.5	7.8	None	n/a	no	n/a			
1819-039	5/30/2019	18.3	8	1.75	<i>B. lindahli</i>	10s	4 male/1female	n/a			
1819-040	12/13/2018	16.1	4.5	32	<i>Branchinecta</i> sp.	n/a	no	none			Immatures, recently filled from last rain
1819-040	12/20/2018	16.6	1	12.5	<i>B. sandiegonensis, B. lindahli</i>	1s	yes	none			
1819-040	12/28/2018	14.1	3	1.25	None	n/a	no	none			likely dried before rain on 12/25
1819-040	1/10/2019	14.6	5.5	3.75	None	n/a	no	none			
1819-040	1/18/2019		9		None		no				hydo check only
1819-040	1/24/2019	19	7	17.5	<i>B. lindahli</i>	10s	no	none	Road Rut	Disturbed, Tire Tracks	
1819-040	2/7/2019	19.3	6	6	<i>Branchinecta</i> sp.	100s	no	none			immatures
1819-040	2/15/2019	15.7	11	15	<i>B. lindahli</i>	10s	no	Nema			Immatures
1819-040	2/21/2019	12.3	14	21	<i>B. lindahli</i>	10s	no	none			
1819-041	1/18/2019		5		None		no				hydo check only
1819-041	1/24/2019	21.4	2.1	24.5	<i>B. sandiegonensis, B. lindahli</i>	1s	yes	none	Road Rut	Disturbed, Tire Tracks	
1819-041	1/31/2019	17.9	2	0.9	None	n/a	no	none			irrigation fed
1819-041	2/7/2019	17.9	5	23.75	None	n/a	no	none			
1819-041	2/15/2019	15	6	25	None	n/a	no	Nema			
1819-041	2/21/2019	9.1	13	4.5	None	n/a	no	none			
1819-042	1/18/2019		6		None		no				hydo check only
1819-042	1/24/2019	21.2	1.5	18	<i>B. lindahli</i>	1s	yes	none	Road Rut	Disturbed, Tire Tracks	
1819-042	2/7/2019	18.2	7.4	24	None	n/a	no	none			
1819-042	2/15/2019	16.5	7	20.4	<i>B. lindahli</i>	1s	no	none			
1819-042	2/21/2019	9.2	7	25	<i>B. lindahli</i>	1s	no	none			
1819-042	2/28/2019	20.5	5	24	<i>Branchinecta</i> sp.	10s	no	none			Female only observed
1819-043	12/13/2018	15.7	2.5	8.25	<i>B. lindahli</i>	1s	yes	none			
1819-043	1/10/2019	16.4	2	10	None	n/a	no	Coll			
1819-043	1/18/2019		6		None		no				hydo check only
1819-043	1/24/2019	19.4	3.8	28	<i>B. lindahli</i>	1s	no	none	Road Rut	Disturbed, Tire Tracks	
1819-043	1/31/2019	17.3	2.1	3	<i>B. lindahli</i>	10s	no	Clad			

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-043	2/7/2019	17.2	5.5	12	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	10s/10s	yes	Clad, Coll, Chir			
1819-043	2/15/2019	15.7	9	18	<i>B. sandiegonensis</i>	1s	no	Chir			
1819-043	2/21/2019	8.6	8	17.5	<i>B. lindahli</i>	10s	no	none			
1819-044	12/7/2018	18.8	30	108	None	n/a	no	Collembola	Road Rut	Disturbed, Tire Tracks	
1819-044	12/13/2018	16.5	12	45	<i>Branchinecta</i> sp.	n/a	no	none			Immatures, recently filled from last rain
1819-044	12/20/2018	14.8	9.5	17.5	<i>B. sandiegonensis</i>	1000s	yes	none			Irrigation fed
1819-044	12/28/2018	14.2	3	1.8	<i>B. sandiegonensis</i>	10s	no	Coll			
1819-044	1/3/2019	12.1	0.5	0.4	None	n/a	no	Ostr, Cope, Coll, Cole			Irrigation fed
1819-044	1/10/2019	16.3	2	3	Nauplii	n/a	no	Ostr			Nauplii, irrigation fed
1819-044	1/18/2019	17.5	16	7.56	<i>B. sandiegonensis</i>	100s	no	Coll			
1819-044	1/24/2019	19	7	15	<i>B. sandiegonensis</i>	10s	no	Coll			
1819-044	1/31/2019	14.9	15	7	<i>B. sandiegonensis</i>	100s	no	none			irrigation fed
1819-044	2/7/2019	15.1	25	30	<i>B. sandiegonensis</i>	100s	no	Clad, Coll, SPHA egg mass			
1819-044	2/15/2019	13.1	100	52	<i>Branchinecta</i> sp.	10s	no	Nema, Coll, Chir			Female only observed
1819-044	2/21/2019	8.3	46	20	<i>Branchinecta</i> sp.	1s	no	none			Female only observed
1819-044	3/15/2019	7.9	22	14	None	n/a	no	none			
1819-044	3/21/2019	17.1	5	4	None	n/a	no	Clad, Cole, Plat, Coll			
1819-044	3/28/2019	15.9	5	1	None	n/a	no	Ostr, Clad, Cole, Cori, Chir			
1819-045	12/7/2018	18.3	45	175	None	n/a	no	none	Road Rut	Disturbed, Tire Tracks	
1819-045	12/13/2018	11.7	30	180	<i>B. lindahli</i>	100s	yes	Noto			Irrigation fed
1819-045	12/20/2018	14.5	30	160	<i>B. lindahli</i>	100s	yes	none			Irrigation fed, second voucher for this pool for clarification
1819-045	12/28/2018	13.2	18	60	<i>B. lindahli</i>	10s	no	Coll			
1819-045	1/3/2019	7.1	5	26	<i>B. lindahli</i>	100s	no	none			
1819-045	1/10/2019	11.1	16	10.5	<i>B. lindahli</i>	10s	no	none			irrigation fed
1819-045	1/18/2019	16.6	30	20	<i>Branchinecta</i> sp.	1s	no	Ostr, Cad, Cole, PSHY egg masses			females only observed
1819-045	1/24/2019	16.4	20	45	<i>Branchinecta</i> sp.	1s	no	Ostr, Clad, SPHA eggs			Females only present
1819-045	1/31/2019	14	20	9.1	<i>Branchinecta</i> sp.	n/a	no	Ostr, Clad, Cole, Noto			Irrigation fed, Females only present
1819-045	2/7/2019	11.7	30	60	None	n/a	no	Coll			
1819-045	2/15/2019	15.3	45	112	<i>Branchinecta</i> sp.	10s	no	none			Immatures
1819-045	2/21/2019	9.1	25	52.5	<i>B. lindahli</i>	10s	no	SPHA Larvae			
1819-045	2/28/2019	16.1	30	45	<i>B. lindahli</i>	100s	no	none			
1819-045	3/7/2019	16.3	25	10	<i>Branchinecta</i> sp.	1s	no	SPHA Larvae			female only observed
1819-045	3/15/2019	6.6	35	25	<i>Branchinecta</i> sp.	10s	no	SPHA Larvae			females only observed
1819-045	3/21/2019	15.9	20	8	<i>Branchinecta</i> sp.	1s	no	Ostr, Clad, SPHA Larvae			females only observed
1819-045	3/28/2019	13.5	14	8	None	n/a	no	Ostr, Chir			
1819-045	4/3/2019	15.5	7	0.3	None	n/a	no	Ostr, Cori, Chir, PSHY Larvae			
1819-046	12/7/2018	19.9	11	24	None	n/a	no	Collembola	Road Rut	Disturbed, Tire Tracks	
1819-046	12/13/2018	15.38	14	10.5	<i>B. lindahli</i>	100s	yes	Ostr			irrigation fed
1819-046	12/20/2018	16.8	6	9	<i>B. lindahli</i>	10s	no	Ostr, Culi			
1819-046	12/28/2018	14.3	6	0.12	None	n/a	no	Ostr, Culi			Irrigation fed
1819-046	1/24/2019	18.8	8	5	<i>Branchinecta</i> sp.	n/a	no	SPHA larvae			Immatures present
1819-046	1/31/2019	15.3	9	2	<i>B. lindahli</i>	10s	no	Ostr, Culi			irrigation fed
1819-046	2/7/2019	15.7	25	5	None	n/a	no	Ostr			
1819-046	2/15/2019	13.6	20	12.25	<i>B. lindahli</i>	100s	no	SHPA Larvae			immatures
1819-046	2/21/2019	9.6	23	6.25	<i>B. lindahli</i>	100s	no	none			
1819-046	2/28/2019	18.1	21	3.75	<i>B. lindahli</i>	100s	no	PSHY Larvae			
1819-046	3/7/2019	19.1	14	4	None	n/a	no	SPHA Larvae			
1819-047	12/7/2018	17.8	13	25	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Nauplii
1819-047	12/13/2018	17.2	4.5	35	None	n/a	no	none			complex of 2 pools, irrigation fed
1819-047	12/20/2018	18	6.5	21	None	n/a	no	none			

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-047	12/28/2018	15.7	1.5	1.4	<i>B. lindahli</i>	1s	no	Ostr, Clad			
1819-047	1/10/2019	16.7	1	0.25	Nauplii	n/a	no	none			Nauplii, irrigation fed
1819-047	1/18/2019	17.8	15	12	None	n/a	no	Coll			
1819-047	1/24/2019	20.3	7	22	<i>B. lindahli</i>	10s	yes	Coll			
1819-047	1/31/2019	15.4	6.4	4.5	<i>B. sandiegonensis, B. lindahli</i>	10s	yes	Ostr, Clad			irrigation fed
1819-047	2/7/2019	16.9	9	10.5	<i>B. sandiegonensis, B. lindahli</i>	1s/10s	no	Clad			
1819-047	2/15/2019	14.6	11	21	<i>B. sandiegonensis, B. lindahli</i>	1s/1s	no	Chir			
1819-047	2/21/2019	10.1	11	14	<i>Branchinecta</i> sp.	1s	no	none			Female only observed
1819-047	3/15/2019	9.1	3.5	1	None	n/a	no	none			
1819-050	12/7/2018		8		None	n/a	no	none			Hydro check only
1819-050	1/10/2019	20.4	1.5	2	<i>Branchinecta</i> sp.	n/a	no	none			Nauplii
1819-050	1/24/2019	16.8	0.5	4.5	<i>B. sandiegonensis, B. lindahli</i>	1s	yes	none	Road Rut	Disturbed, Tire Tracks	
1819-050	2/7/2019	20.5	5	6.75	None	n/a	no	none			
1819-050	2/15/2019	18.5	6	6	None	n/a	no	Gast			
1819-050	2/21/2019	8.7	10	9	None	n/a	no	none			Flow from road, breach on S. bank
1819-051	12/13/2018	18.5	2	6	None	n/a	no	Coll			
1819-051	1/24/2019	20.4	3.5	8	<i>B. lindahli</i>	1s	yes	none	Road Rut	Disturbed, Tire Tracks	
1819-051	2/7/2019	20.3	7	8.75	None	n/a	no	none			
1819-051	2/15/2019	18.4	8	12	None	n/a	no	Chir			
1819-051	2/21/2019	9.8	14	12	None	n/a	no	none			
1819-051	2/28/2019	25	4	0.1	None	n/a	no	none			
1819-051	3/1/2019	21.6	8	4.5	<i>B. lindahli</i>	100s	no	none			
1819-052	2/7/2019	21.1	6	14	None	n/a	no	none			
1819-052	2/15/2019	18.3	9.5	15	None	n/a	no	none			
1819-052	2/21/2019	9.4	7	18	None	n/a	no	none			
1819-052	2/28/2019	26.5	3	0.15	None	n/a	no	none			
1819-053	1/24/2019	23.3	0.2	0.09	None	n/a	no	none	Road Rut	Disturbed, Tire Tracks	
1819-053	2/7/2019	20.8	4.5	6	None	n/a	no	none			
1819-053	2/15/2019	19.7	7	10	None	n/a	no	none			
1819-053	2/21/2019	9.4	8	15	None	n/a	no	none			
1819-053	2/28/2019	25.3	3	0.4	<i>Branchinecta</i> sp.	1s	no	none			Females only observed
1819-054	2/21/2019	10	15	120	None	n/a	no	none	Natural		Hydro Check Only
1819-054	2/28/2019	26.3	4	0.75	None	n/a	no	none			
1819-055	1/10/2019	19.7	8	15	None	n/a	no	Coll	Road Rut	Disturbed, Tire Tracks	
1819-055	1/18/2019	19.5	8.5	6	<i>Branchinecta</i> sp.	1s	no	none			females only observed
1819-055	1/24/2019	23.3	2.1	6.75	<i>B. lindahli</i>	1s	yes	none			
1819-055	2/7/2019	19.5	10	6	None	n/a	no	none			
1819-055	2/15/2019	19.7	8	6	<i>B. sandiegonensis</i>	10s	yes	Coll, SPHA Larvae			
1819-055	2/21/2019	10.6	14	8	None	n/a	no	none			Receiving flow from New-36
1819-055	3/15/2019	8.5	7.5	1	None	n/a	no	none			
1819-056	1/10/2019	19.6	3	10.5	None	n/a	no	Coll	Road Rut	Disturbed, Tire Tracks	
1819-056	1/18/2019	19.1	11.5	17.6	<i>Branchinecta</i> sp.	1s	no	none			Immatures
1819-056	1/24/2019	22.1	5	17.5	<i>B. sandiegonensis</i>	1s	yes	none			
1819-056	2/7/2019	20.1	13	10.5	None	n/a	no	none			
1819-056	2/15/2019	19.3	15	60	<i>Branchinecta</i> sp.	1s	no	Coll, Chir			
1819-056	2/21/2019	10.6	17	18	<i>Branchinecta</i> sp.	1s	no	none			Female only observed
1819-056	3/15/2019	6.9	5	1.5	None	n/a	no	none			

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-057	12/13/2018	17.8	30	450	<i>Branchinecta</i> sp.	n/a	no	Clad	Natural	Undisturbed	Immatures
1819-057	12/20/2018	15.7	17	330	<i>B. sandiegonensis</i>	100s	yes	Ostr			Irrigation fed
1819-057	12/28/2018	12.3	20	240	<i>B. sandiegonensis</i>	100s	no	Ostr, Clad			
1819-057	1/3/2019	9.3	15	184	<i>B. sandiegonensis</i>	1000s	no	Ostr, Clad, Dipt, Coll, Culi			Irrigation fed
1819-057	1/10/2019	17	21	66	<i>B. sandiegonensis</i>	100s	no	Ostr, Clad, Culi, Noto, PSHY Larvae			
1819-057	1/18/2019	18.5	30	36	<i>B. sandiegonensis</i>	1s	no	Ostr, Clad, Dipt, Culi, Cole, PSHY egg masses			
1819-057	1/24/2019	19.2	30	56	None	n/a	no	Ostr, Clad, Chir, Culi, Cole			
1819-057	1/31/2019	16.3	6.8	7.4	None	n/a	no	Ostr, Clad, Chiro, ANBO Larvae			irrigation fed
1819-057	2/7/2019	15.2	40	90	None	n/a	no	Ostr, Clad, Coll			
1819-057	2/15/2019	16.9	100	70	<i>B. sandiegonensis</i>	1000s	no	Ostr, Clad, Cori, XELA Larvae			
1819-057	2/21/2019	10.1	46	90	<i>Branchinecta</i> sp.	10s	no	SPHA Larvae			Female only observed
1819-057	3/15/2019	9.1	22	60	None	n/a	no	PSHY and SPHA larvae			
1819-057	3/21/2019	16.2	25	21	None	n/a	no	PSHY, XELA Larvae			
1819-057	3/28/2019	17.8	7	3	None	n/a	no	Coll, Chir, PSHY Larvae			African clawed frog larvae
1819-058	12/13/2018	19.1	12	5	<i>Branchinecta</i> sp.	n/a	no	none	Natural	Undisturbed	Immatures
1819-058	12/20/2018	19.7	8.5	32	None	n/a	no	none			Irrigation fed
1819-058	2/7/2019	18.9	10	3.75	None	n/a	no	Coll			
1819-058	2/15/2019	17.9	10	9	<i>Branchinecta</i> sp.	1s	no	Ephe			
1819-058	2/21/2019	10.8	13	12	<i>Branchinecta</i> sp.	1s	no	none			Female only observed, spilling into New-36
1819-059	12/13/2018	16.7	15	18	<i>Branchinecta</i> sp.	n/a	no	none			Immatures
1819-059	12/20/2018	17.7	15	35	<i>B. sandiegonensis</i>	100s	yes	none	Natural	Undist	Irrigation fed
1819-059	12/28/2018	12.7	20	60	<i>B. sandiegonensis</i>	100s	no	Ostr, Coll			Complex of 2 features
1819-059	1/18/2019		13		None		no				hydo check only
1819-059	2/7/2019	17.4	40	125	None	n/a	no	SPHA egg masses			Pools 31-34 flooded together
1819-059	2/15/2019	16.7	50	N/A	<i>B. sandiegonensis</i>	n/a	no	none			Pools 31-34 flooded together
1819-059	3/15/2019	7.9	25	44	None	n/a	no	none			
1819-059	3/21/2019	15.3	35	10	None	n/a	no	Ostr, Culi, PSHY Larvae			
1819-059	3/28/2019	18	12	17.5	None	n/a	no	Clad, Culi, Chir, Anis			African clawed frog larvae
1819-060	12/13/2018	17.2	20	48	<i>Branchinecta</i> sp.	n/a	no	none			Immatures, Irrigation fed
1819-060	12/20/2018	17.6	15	28	<i>B. sandiegonensis</i>	1000s	yes	none			Irrigation fed
1819-060	12/28/2018	15.7	5	7	<i>B. sandiegonensis</i>	10s	no	none			
1819-060	1/18/2019		33		None		no				hydo check only
1819-060	1/24/2019	21.4	2.6	0.01	None	n/a	no	Ostr, Chir	Natural	Undist	
1819-060	2/7/2019	17.4	40	125	None	n/a	no	SPHA egg masses			Pools 31-34 flooded together
1819-060	2/15/2019	16.7	50	N/A	<i>B. sandiegonensis</i>	n/a	no	none			Pools 31-34 flooded together
1819-060	3/15/2019	7.1	22	75	None	n/a	no	none			combined with 1819-61
1819-060	3/21/2019	14.3	45	60	None	n/a	no	Culi, Chir, SHPA and PSHY Larvae			
1819-060	3/28/2019	17.2	13	25	None	n/a	no	Clad, Cor, Chir, Anis, PSHY Larvae			
1819-060	4/3/2019	16.1	7	2	None	n/a	no	Clad, Cori, Chir, PSHY Larvae			
1819-061	12/13/2018	14.8	22	315	<i>Branchinecta</i> sp.	n/a	no	none			Immatures, Irrigation fed
1819-061	12/20/2018	12.7	15	210	<i>B. sandiegonensis</i>	100s	yes	none			Irrigation fed
1819-061	12/28/2018	13.9	8.5	28	None	n/a	no	none			
1819-061	1/3/2019	11.6	6.5	2	<i>B. sandiegonensis</i>	1s	no	Ostr, Cole, Noto			Irrigation fed
1819-061	1/10/2019	18.2	3	9	None	n/a	no	Ostr			
1819-061	1/18/2019	18	20	22	<i>Branchinecta</i> sp.	1s	no	Ostr, Coll			females only observed
1819-061	1/24/2019	21	15	12	None	n/a	no	Ostr, Chiro	Natural	Undist	
1819-061	1/31/2019	18.4	2.7	0.04	None	n/a	no	Ostr, Chir			irrigation fed
1819-061	2/7/2019	17.4	40	125	None	n/a	no	SPHA egg masses			Pools 31-34 flooded together
1819-061	2/15/2019	16.7	50	N/A	<i>B. sandiegonensis</i>	n/a	no	none			Pools 31-34 flooded together
1819-061	3/15/2019				None						combined with 1819-60

Attachment B: 2018-2019 Wet Season Survey Data

Otay River Restoration Project

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-061	3/21/2019	14.3	45	60	None	n/a	no	Culi, Chir, SHPA and PSHY Larvae			
1819-061	3/28/2019	17.7	18	12	None	n/a	no	Clad, Cole, Chir, PSHY Larvae			
1819-061	4/3/2019	16	19	6.75	None	n/a	no	Clad, Cole, Chir, Anis, PSHY Larvae			
1819-062	12/13/2018	18.1	8	48	None	n/a	no	none			series of ruts, irrigation fed
1819-062	12/20/2018	16	7.5	66	<i>B. sandiegonensis</i>	10s	yes	Ostr			Irrigation fed
1819-062	12/28/2018	13.5	11	4.5	None	n/a	no	Ostr, Clad, Coll			
1819-062	1/3/2019	10.1	7	8	None	n/a	no	Ostr, Clad, Coll, Hydr			rut complex
1819-062	1/10/2019	15.6	12.5	29.25	None	n/a	no	none			
1819-062	1/18/2019	16.9	17	24	None	n/a	no	Ostr, Clad			
1819-062	1/24/2019	20.8	10	17.5	<i>B. sandiegonensis</i>	1s	no	Ostr, Clad, Chir	Road Rut	Disturbed, Tire Tracks	
1819-062	1/31/2019	18.1	7	3.24	<i>B. lindahli</i>	1s	yes	Ostr, Chir			irrigation fed
1819-062	2/7/2019	17.4	40	125	None	n/a	no	SPHA egg masses			Pools 31-34 flooded together
1819-062	2/15/2019	16.7	50	259	<i>B. sandiegonensis</i>	1000s	no	none			Pools 31-34 flooded together
1819-062	2/21/2019	9.4	28	280	<i>B. sandiegonensis</i>	100s	no	SPHA Larvae			combined with 1819-061, 060, 059
1819-062	3/15/2019	7.2	10	8.75	None	n/a	no	none			
1819-062	3/21/2019	16.9	4	2	None	n/a	no	Coll, Chir, SPHA Larvae			
1819-063	2/15/2019	19.7	6.4	8	None	n/a	no	none	Road Rut		
1819-063	2/21/2019	11.4	7	7	None	n/a	no	none			
1819-064	1/24/2019	22	4	10	<i>B. lindahli</i>	1s	yes	none	Road Rut	Disturbed, Tire Tracks	
1819-064	2/7/2019	19.1	8	18	None	n/a	no	Nema			
1819-064	2/15/2019	21	9	12.1	None	n/a	no	Coll			
1819-064	2/21/2019	10.6	11	320	None	n/a	no	none			Combined with 1819-065, 066, 067, water flowing down road, strong flow into river
1819-064	3/15/2019	8.6	3	0.2	None	n/a	no	none			
1819-065	1/24/2019	20.4	1.6	15	<i>Branchinecta</i> sp.	10s	no	none	Road Rut	Disturbed, Tire Tracks	Immatures present
1819-065	2/15/2019	20.8	13	18.4	None	n/a	no	Coll			
1819-065	2/28/2019	19.8	4	0.5	None	n/a	no	none			
1819-065	3/15/2019				None						combined with 1819-064
1819-066	1/10/2019	15.4	12	28	None	n/a	no	Coll			
1819-066	1/18/2019	17.8	10.5	7.5	<i>Branchinecta</i> sp.	1s	no	none			females only observed
1819-066	1/24/2019	20.3	1.1	11.25	None	n/a	no	none	Road Rut	Disturbed, Tire Tracks	
1819-066	2/7/2019	17.5	16	13.2	None	n/a	no	Nema			
1819-066	2/15/2019	17.5	10	24	None	n/a	no	none			
1819-066	3/15/2019	6.8	6	0.75	None	n/a	no	none			
1819-067	12/13/2018	19.7	8	63	None	n/a	no	Coll	Natural	Disturbed	
1819-067	12/20/2018	15	15	54	None	n/a	no	Coll			
1819-067	12/28/2018	15.2	12	8	None	n/a	no	coll			
1819-067	1/3/2019	12.4	2	2	None	n/a	no	Coll			
1819-067	1/10/2019	18.2	2.5	3	None	n/a	no	Coll			Irrigation fed
1819-067	1/18/2019	17.5	20	27.5	None	n/a	no	Dipt, Coll			
1819-067	1/24/2019	19.8	10	16	None	n/a	no	Coll, Chir			
1819-067	1/31/2019	15.4	15	15	None	n/a	no	Coll, Chir			
1819-067	2/7/2019	17.9	30	150	None	n/a	no	Coll			
1819-067	2/15/2019	18.6	50	96	None	n/a	no	Coll			
1819-067	2/28/2019	21.5	10	21	<i>Branchinecta</i> sp.	10s	no	PSHY Larvae			Females only observed
1819-068	2/21/2019	13.1	7	6.75	None	n/a	no	none	Road Rut		Hydro Check Only
1819-069	2/21/2019	11.7	9	27	None	n/a	no	none	Road Rut		Hydro Check Only
1819-070	1/10/2019	13.8	1.5	8	None	n/a	no	Coll			Complex of 4 ruts
1819-070	1/18/2019	19	5.4	18	None	n/a	no	Coll			
1819-070	1/24/2019	16.4	3	10	<i>B. sandiegonensis</i>	1s	no	Chir	Road Rut	Disturbed, Tire Tracks	one male observed

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-070	1/31/2019	18.9	1.9	1.61	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	1s	yes	Chir			
1819-070	2/7/2019	21.7	4.5	15	<i>Branchinecta</i> sp.	1s	no	Ostr, Chir			Female only observed
1819-070	2/15/2019	20	5	30	<i>B. lindahli</i>	1s	no	Nema, Chir			
1819-070	2/21/2019	11.5	6	20	None	n/a	no	none			
1819-070	3/15/2019	7.5	5	5.25	None	n/a	no	none			
1819-070	3/21/2019	17.2	2	0.5	<i>B. lindahli</i>	10s	no	Ostr			
1819-071	2/7/2019	20	5	8.4	None	n/a	no	none	Road Rut	Disturbed, Tire Tracks	
1819-071	2/15/2019	22.3	5	17	<i>Branchinecta</i> sp.	1s	no	none			immatures
1819-071	2/21/2019	11.4	8	8.4	None	n/a	no	none			
1819-071	2/28/2019	27.2	5	1.5	None	n/a	no	none			
1819-072	12/13/2018	16.2	20	822	<i>B. lindahli</i>	1000s	yes	none	Road Rut	Disturbed, Tire Tracks	
1819-072	12/20/2018	15.3	15	780	<i>B. lindahli</i>	1000s	no	none			
1819-072	12/28/2018	10.2	12	160	<i>B. lindahli</i>	1000s	no	none			
1819-072	1/3/2019	8.5	15	360	<i>B. lindahli</i>	1000s	no	Coll			Complex of two pools
1819-072	1/10/2019	14.8	14	271	<i>B. lindahli</i>	1000s	no	Coll			
1819-072	1/18/2019	16	35	125	<i>B. lindahli</i>	1000s	no	none			Immatures present
1819-072	1/24/2019	16.2	35	285	<i>B. lindahli</i>	1000s	no	Coll			
1819-072	1/31/2019	13.8	20	211.5	<i>B. lindahli</i>	100s	no	none			
1819-072	2/7/2019	14	30	210	<i>B. lindahli</i>	1000s	no	Ostr			
1819-072	2/15/2019	13	45	270	<i>B. lindahli</i>	100s	no	none			
1819-072	2/21/2019	9.8	25	180	None	n/a	no	none			
1819-072	2/28/2019	19.8	37	200	<i>B. lindahli</i>	1000s	no	none			
1819-072	3/7/2019	15.5	30	4	None	n/a	no	none			
1819-072	3/15/2019	9.7	36	180	<i>B. lindahli</i>	100s	no	none			
1819-072	3/21/2019	16.6	45	105	None	n/a	no	Culi, Noto, SPHA Larvae			
1819-072	3/28/2019	18.6	26	200	<i>B. lindahli</i>	10s	no	Clad, Cori, Chir			
1819-072	4/3/2019	15.8	27	160	None	n/a	no	Ostr, Cole, Cori, Chir, Anis, SPHA Larvae		algal blooms	
1819-072	4/10/2019	14.5	29	140	None	n/a	no	Ostr, Cole, Cori, Anis, PSHY/SPHA Larvae			
1819-072	4/17/2019	12.4	22	62.5	None	n/a	no	Cole, Cori, Chir, Anis, PSHY/SPHA larvae			
1819-072	4/24/2019	30.7	10	9	None	n/a	no	Noto, Anis, PSHY Larvae		algae	
1819-073	2/15/2019	16.4	18	12	None	n/a	no	Ostr	Natural		
1819-073	2/21/2019	10.1	19	7	None	n/a	no	none			
1819-073	2/28/2019	24.4	18	9	None	n/a	no	SPHA Larvae			
1819-073	3/7/2019	17.4	19	10.5	None	n/a	no	none			
1819-073	3/15/2019	8.6	15	4	None	n/a	no	none			
1819-074	12/13/2018	21	25	117	<i>B. lindahli</i>	1000s	yes	none	Road Rut	Disturbed, Tire Tracks	
1819-074	12/20/2018	18.2	18	126	<i>B. sandiegonensis</i>	100s	yes	none			second voucher collected with new species. Younger shrimp.
1819-074	12/28/2018	18.9	9.5	3	None	n/a	no	none			thick, silt laden water
1819-074	1/3/2019	13.6	0.2	2	None	n/a	no	Coll			
1819-074	1/10/2019	17.4	7	49.5	None	n/a	no	Clad, Coll, Hydr			
1819-074	1/18/2019	18.9	38	54	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	1000s	no	none			
1819-074	1/24/2019	21.8	35	48	<i>B. lindahli</i>	100s	no	none			
1819-074	1/31/2019	17	18	40.5	<i>B. lindahli</i>	10s	no	none			
1819-074	2/7/2019	19.4	35	72	<i>B. lindahli</i>	1s	no	none			
1819-074	2/15/2019	17.7	15	77	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	100s/100s	no	none			Immatures

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-074	2/21/2019	10.9	23	90	<i>Branchinecta</i> sp.	n/a	no	none			Female only observed
1819-074	3/15/2019	13.9	22	28	<i>Branchinecta</i> sp.	1s	no	none			female only observed
1819-074	3/21/2019	19.8	15	14	None	n/a	no	none			
1819-075	12/7/2018	22.3	7	21	<i>Branchinecta</i> sp.	n/a	no	Collembola	Road Rut	Disturbed, Tire Tracks	Immatures
1819-075	1/10/2019	18.6	4	1	None	n/a	no	Nema, Coll, Gast			
1819-075	1/18/2019		8.2		None		no				hydo check only
1819-075	1/24/2019	21.2	3	5.25	<i>B. lindahli</i>	10s	yes	none			
1819-075	2/7/2019	20.4	9.5	1.5	None	n/a	no	SPHA Larvae			
1819-075	2/15/2019	21.6	15	2.1	None	n/a	no	Chir			
1819-075	3/7/2019	19.3	11	7	None	n/a	no	none			
1819-075	3/15/2019	8.3		2	<i>B. lindahli</i>	10s	yes				
1819-076	1/10/2019	27.7	5.5	6.25	None	n/a	no	Ostr, Dipt, Coll			
1819-076	1/18/2019	19.5	11	3.6	<i>Branchinecta</i> sp.	10s	no	Dipt, Coll, SPHA Egg masses			Females and immatures only observed
1819-076	1/24/2019	19.1	5	6	<i>B. lindahli</i>	10s	yes	SPHA larvae			
1819-076	1/31/2019	17	6.8	2.89	<i>B. lindahli</i>	1s	no	Ostr, SPHA Larvae	Road Rut	Disturbed, Tire Tracks	
1819-076	2/7/2019	18.7	11	2.25	<i>B. lindahli</i>	1s	no	Ostr, SPHA larvae			
1819-076	2/15/2019	20.6	16	3	None	n/a	no	Chir, SPHA larvae			
1819-076	2/28/2019	25.9	10	3	None	n/a	no	SPHA Larvae			
1819-076	3/7/2019	20.7	12	4	None	n/a	no	SPHA Larvae			
1819-076	3/15/2019	13.2	10	2.25	None	n/a	no	none			
1819-076	3/21/2019	18.5	6	1.5	None	n/a	no	Clad, SPHA Larvae			
1819-077	1/10/2019	21.5	2.5	1	None	n/a	no	Hydr, Coll	Road Rut	Disturbed, Tire Tracks	
1819-077	1/18/2019	19.7	6	0.64	None	n/a	no	Coll			
1819-077	1/24/2019	22	2.5	1	<i>B. lindahli</i>	1s	yes	Chir			
1819-077	2/7/2019	20.5	4.5	1	None	n/a	no	none			
1819-077	2/15/2019	21.6	6	1	None	n/a	no	none			
1819-077	2/28/2019		<3		<i>B. lindahli</i>	10s	no	none			drying pool but live shrimp
1819-078	2/28/2019	28.5	7	1.125	None	n/a	no	none	Road Rut		
1819-078	3/7/2019	21	7	15.4	None	n/a	no	none			
1819-078	3/15/2019	15.9	5	0.75	<i>B. lindahli</i>	1s	yes	none			
1819-079	1/10/2019	20.6	4.5	0.6	None	n/a	no	Coll			
1819-079	1/18/2019				None		no				washed out by creek
1819-079	1/24/2019	20.7	6.4	4.5	None	n/a	no	none	Road Rut	Disturbed, Tire Tracks	
1819-079	2/28/2019	25.2	7	1.2	None	n/a	no	none			
1819-080	12/13/2018	14.9	8	90	<i>Branchinecta</i> sp.	n/a	no	none			Immatures, complex of 2 features
1819-080	12/20/2018	16.4	5.5	44	<i>B. lindahli</i>	1000s	yes	Coll			
1819-080	12/28/2018	18.7	5	20	<i>B. lindahli</i>	1000s	no	none			
1819-080	1/3/2019	15.6	7.5	39	<i>B. lindahli</i>	1000s	no	Coll			
1819-080	1/10/2019	14.5	9	31.5	<i>B. lindahli</i>	100s	no	Coll			Complex of 2 features
1819-080	1/18/2019				<i>Branchinecta</i> sp.	n/a	no				washed out by creek, Female observed
1819-080	1/24/2019	17.1	12	52.5	<i>B. lindahli</i>	100s	no	none	Road Rut	Disturbed, Tire Tracks	
1819-080	1/31/2019	18.2	8.5	18	<i>B. lindahli</i>	10s	no	Culi, Chir, SHPA Larvae			
1819-080	3/1/2019	19.9	10	6	None	n/a	no	none			
1819-080	3/7/2019	24	10	6.25	<i>B. lindahli</i>	1000s	yes	none			
1819-080	3/15/2019	18.2	8	3	<i>Branchinecta</i> sp.	1s	no	none			females only observed
1819-080	3/21/2019	18.8	3	3	None	n/a	no	Ostr, Clad, Chir			
1819-081	12/13/2018	16.7	15	144	<i>B. lindahli</i>	m	yes	none			
1819-081	12/20/2018	18.3	7.5	71.5	<i>B. lindahli</i>	1000s	no	none			
1819-081	12/28/2018	18.1	6.5	25	<i>B. lindahli</i>	1000s	no	none			
1819-081	1/3/2019	16.1	5.5	36	<i>B. lindahli</i>	100s	no	Coll			
1819-081	1/10/2019	20.1	6	34	<i>B. lindahli</i>	10s	no	none			

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Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-081	1/18/2019	20.1	18	25.3	<i>B. lindahli</i>	10s	no	Coll, SPHA Egg masses		AB	
1819-081	1/24/2019	19.1	14	80	<i>B. lindahli</i>	10s	no	Clad, SPHA Larvae	Road Rut	Disturbed, Tire Tracks	
1819-081	1/31/2019	18.8	7	17.5	<i>B. lindahli</i>	10s	no	SPHA larvae			
1819-081	2/7/2019	20.4	15	42	<i>Branchinecta</i> sp.	1s	no	Chir, SPHA larvae			Female only observed
1819-081	2/15/2019	19.5	20	162	None	n/a	no	Chir, SPHA larvae			
1819-081	3/1/2019	20.4	8	30	None	n/a	no	none			
1819-081	3/7/2019	25.1	7	30	None	n/a	no	PSHY Larvae			
1819-081	3/15/2019	18.9	8	20	None	n/a	no	none			
1819-081	3/21/2019	19	4	10	None	n/a	no	Ostr, Culi, Chir			
1819-082	3/1/2019		0		None				Road Rut		Dry
1819-083	12/13/2018	13.1	4.5	8	None	n/a	no	Dipt			
1819-083	12/20/2018	12.3	2	12	<i>B. lindahli</i>	1s	yes	none			
1819-083	12/28/2018	7	6.5	5	<i>Branchinecta</i> sp.	1s	no	none			One female observed
1819-083	1/3/2019	4.9	5	6.75	None	n/a	no	none			
1819-083	1/10/2019	10.3	3	15	<i>B. lindahli</i>	1s	no	no			
1819-083	1/18/2019	17.5	12	11.7	None	n/a	no	Coll			
1819-083	1/24/2019	14.1	8	26	<i>B. lindahli</i>	10s	no	none			
1819-083	1/31/2019	15.6	9.5	5.64	<i>B. lindahli</i>	1s	no	none	Road Rut	Disturbed, Tire Tracks	
1819-083	2/7/2019	13.1	5	12	None	n/a	no	none			
1819-083	2/15/2019	16	15	24	None	n/a	no	Nema, Chir			
1819-083	3/1/2019	20.1	14	45	None	n/a	no	none			
1819-083	3/7/2019	18.9	7	11	None	n/a	no	none			
1819-083	3/15/2019	15.5	14	10	None	n/a	no	none			
1819-083	3/21/2019	18	12	3	None	n/a	no	Clad, Coll			
1819-083	3/28/2019	24.2	4.5	2	None	n/a	no	Ostr			
1819-083	5/23/2019	19.8	7.5	16	None	n/a	no	n/a			
1819-083	5/30/2019	23.1	4	1	<i>B. lindahli</i>	1s	no	Clad			
1819-084	1/10/2019	14.3	5.5	16.5	<i>B. lindahli</i>	10s	yes	none	Road Rut	Disturbed, Tire Tracks	new pool, 1st voucher.
1819-084	1/18/2019	18.2	10	10	<i>B. lindahli</i>	100s	no	Coll			
1819-084	1/24/2019	16.3	6	27.6	<i>B. lindahli</i>	10s	no	Ostr			
1819-084	1/31/2019	17.8	10.5	13.5	<i>Branchinecta</i> sp.	10s	no	none			Females only present
1819-084	2/7/2019	14.2	10.3	7	<i>B. lindahli</i>	1s	no	none			
1819-084	2/15/2019	16.5	16	7.2	None	n/a	no	Ostr, Clad			
1819-084	3/1/2019	18.2	5	16	None	n/a	no	none			
1819-084	3/7/2019	21.1	9	56.25	None	n/a	no	none			
1819-084	3/15/2019	21.6	15	6	None	n/a	no	none			
1819-084	3/21/2019	19.2	7	4	None	n/a	no	Ostr, Coll			
1819-085	12/13/2018	27.6	8	30	<i>B. lindahli</i>	100s	yes	none	Road Rut	Disturbed, Tire Tracks	
1819-085	12/20/2018	20.1	5.5	25	<i>B. lindahli</i>	1000s	no	Coll			
1819-085	12/28/2018	17.1	5	1.8	<i>B. lindahli</i>	100s	no	none			
1819-085	1/3/2019	15.3	0.5	0.4	<i>B. lindahli</i>	10s	no	none			
1819-085	1/10/2019	17.1	7.5	18	None	n/a	no	none			
1819-085	1/18/2019	20.1	8	45	<i>B. lindahli</i>	10s	no	Coll			
1819-085	1/24/2019	17.2	8	35	<i>B. lindahli</i>	100s	no	none			
1819-085	1/31/2019	19.7	10	21	<i>B. lindahli</i>	10s	no	none			
1819-085	2/7/2019	18.1	15	20	<i>B. lindahli</i>	1s	no	Ostr, Nema			
1819-085	2/15/2019	18.7	18	22.5	<i>Branchinecta</i> sp.	1s	no	Ostr, Clad, Chir, Nema			Female only observed
1819-085	3/1/2019	16.7	12	60	None	n/a	no	none			
1819-085	3/7/2019	23.3	13	20	None	n/a	no	none			
1819-085	3/15/2019	20	10	16	None	n/a	no	none			
1819-085	3/21/2019	19.3	7	m	None	n/a	no	Ostr, Coll			

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Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-086	12/13/2018	19.3	5	36	<i>B. lindahli</i>	1000s	yes	none	Road Rut	Disturbed, Tire Tracks	
1819-086	12/20/2018	19.3	4	21	<i>B. lindahli</i>	100s	no	none			
1819-086	12/28/2018	18.3	5	4	<i>B. lindahli</i>	100s	no	none			
1819-086	1/3/2019	16.3	2.5	0.6	<i>B. lindahli</i>	10s	no	Coll			
1819-086	1/10/2019	17.8	5	8.5	<i>B. lindahli</i>	100s	no	none			
1819-086	1/18/2019	19.6	10	10	<i>B. lindahli</i>	1s	no	Coll			
1819-086	1/24/2019	16.8	7.2	13.2	<i>B. lindahli</i>	1s	no	none			
1819-086	1/31/2019	18.2	4.3	8.4	<i>B. lindahli</i>	1s	no	none			
1819-086	2/7/2019	17.5	8.5	8.4	None	n/a	no	Clad, Coll			
1819-086	2/15/2019	17.1	8	8	<i>Branchinecta</i> sp.	10s	no	Ostr, Clad			Immatures
1819-086	3/1/2019	20.4	4	10	None	n/a	no	none			
1819-086	3/15/2019		6	2	None						Hydro Check Only
1819-086	3/21/2019	19.2	4	4	<i>B. lindahli</i>	10s	no	none			
1819-086	5/23/2019	22.1	7	12	None	n/a	no	n/a			
1819-086	5/30/2019	28.3	3	4	<i>B. lindahli</i>	100s	3 male/2 female	n/a			
1819-087	12/7/2018	17.8	30	75	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures
1819-087	12/13/2018	20.1	20	40	<i>B. lindahli</i>	1000s	yes	none			
1819-087	12/20/2018	17.2	15	21	<i>B. lindahli</i>	100s	no	none			
1819-087	12/28/2018	14.9	7	6	<i>B. lindahli</i>	100s	no	none			
1819-087	1/3/2019	5.7	7	12.5	<i>B. lindahli</i>	10s	no	Coll			
1819-087	1/10/2019	17.2	14	12.5	<i>Branchinecta</i> sp.	1s	no	none			only 2 females observed
1819-087	1/18/2019	18.1	20	9.9	<i>B. lindahli</i>	1s	no	SPHA egg masses			
1819-087	1/24/2019	16	40	30	<i>B. lindahli</i>	10s	no	none	Road Rut	Disturbed, Tire Tracks	
1819-087	1/31/2019	16.4	20	18	<i>B. lindahli</i>	100s	no	Clad, SPHA Larvae			
1819-087	2/7/2019	16.2	45	16	<i>B. lindahli</i>	10s	no	SPHA larvae			
1819-087	2/15/2019	15.2	60	21	None	n/a	no	SPHA Larvae			
1819-087	2/28/2019	23.2	36	24	None	n/a	no	SPHA Larvae			
1819-087	3/7/2019	18.3	41	24	None	n/a	no	PSHY Larvae			
1819-087	3/15/2019	14.3	30	16	None	n/a	no	none			
1819-087	3/21/2019	17.2	45	10	<i>Branchinecta</i> sp.	1s	no	Culi, Cole, Chir			females only observed
1819-087	3/28/2019	20.6	16	13.5	<i>B. lindahli</i>	1s	no	Ostr, Clad, Culi, Cole, Chir			
1819-087	4/3/2019	18.1	11	3.75	None	n/a	no	Ostr, Clad, Culi, Chir			
1819-087	4/10/2019	24.1	2	0.03	None	n/a	no	Ostr, Culi			
1819-087	5/30/2019	19.3	3	1	<i>B. lindahli</i>	100s	3 male/ 1 female	n/a			
1819-088	12/7/2018	21.7	11	35	None	n/a	no	none	Natural	Undist	
1819-088	12/13/2018	m	1	2.5	<i>Branchinecta</i> sp.	100s	no	none			Immatures
1819-088	1/18/2019	19	11	11	None	n/a	no	Coll			
1819-088	2/7/2019	19.5	11	4	None	n/a	no	Ostr, Plat, PSHY eggs			
1819-088	2/15/2019	19.3	15	60	<i>B. sandiegonensis</i>	100s	yes	Ostr, Cole, Plat, Chir, PSHY eggs			Merged with 1819-089
1819-088	2/28/2019	23.5	14	54	<i>B. sandiegonensis</i>	10s	yes	none			combined with 1819-089
1819-088	3/15/2019				None						combined with 1819-089
1819-088	3/21/2019	19	5	1.5	None	n/a	no	PSHY Larvae			
1819-088	3/28/2019	22.1	4	1	None	n/a	no	PSHY Larvae			
1819-089	12/7/2018	21.8	11.5	84	None	n/a	no	none	Natural	Undist	
1819-089	12/13/2018	m	0.5	2.5	<i>Branchinecta</i> sp.	100s	no	none			Immatures
1819-089	1/18/2019	19.1	11.5	16.25	None	n/a	no	PSHY egg masses			
1819-089	2/7/2019	19.3	13	21	None	n/a	no	PSHY eggs			
1819-089	2/15/2019	19.3	15	N/A	<i>B. sandiegonensis</i>	n/a	yes	Ostr, Cole, Plat, Chir, PSHY eggs			Merged with 1819-088
1819-089	2/28/2019	25.9	14	54	None	n/a	no	none			combined with 1819-088

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Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-089	3/15/2019	12.6	15	37.5	None	n/a	no	none			
1819-089	3/21/2019	19.4	8	4	None	n/a	no	Culi, PSHY Larvae			
1819-090	2/28/2019	23.1	10	150	<i>Branchinecta</i> sp.	1s	no	PSHY Larvae	Natural		Female only observed
1819-090	3/7/2019	18.8	15	56	None	n/a	no	Diptera, PSHY larvae			
1819-090	3/28/2019	20.6	13	100	None	n/a	no	Ostr, Culi, Cole, Chir, PSHY Larvae		Algal blooms	
1819-090	4/3/2019	19.8	17	64	None	n/a	no	Ostr, Culi, Cole, Gast, PSHY Larvae			
1819-090	4/10/2019	23.2	17	64	None	n/a	no	Ostr, Cole, Chir, PSHY Larvae			
1819-090	4/17/2019	19	15	36	None	n/a	no	Ostr, Cole, Coll, Chir, PSHY larvae			
1819-090	4/24/2019	30	16	36	None			Ostr, Culi, Cole, Chir, Gast, Anis, PSHY Larvae			
1819-090	5/1/2019	21.6	14	64	None	n/a	no	Cole, Chir, Anis, PSHY Larvae			
1819-090	5/8/2019	18	10	300	None	n/a	no	PSHY Larvae, Culi, Cole, Anis, Zygo, Chir, Cori			
1819-090	5/15/2019	22.24	7	10	None	n/a	no	Cole, Ephe, PSHY Larvae			Spring Fed
1819-090	5/23/2019	23.2	12	200	None	n/a	no	Culi, Cole, Ephe, PSHY Larvae			Spring fed?
1819-090	5/30/2019	23.5	4.5	0.05	None	n/a	no	Ostr, Cope, Clad, Coll			
1819-091	2/28/2019	22.5	14	49	None	n/a	no	none	Natural		
1819-091	3/7/2019	21.1	11	20	None	n/a	no	none			
1819-092	2/28/2019		91	120	<i>B. sandiegonensis</i>	10s	yes	none	Natural		
1819-092	3/15/2019	15.6	50	200	None	n/a	no	SPHA Larvae			
1819-092	3/21/2019	18.2	50	90	None	n/a	no	Ostr, Culi, PSHY Larvae			
1819-092	3/28/2019	22.4	36	125	None	n/a	no	Ostr, Cole, Chir, PSHY Larvae		algal blooms	
1819-092	4/3/2019	16.4	50	77	None	n/a	no	Ostr, Culi, Chir, PSHY Larvae			
1819-092	4/10/2019	17	35.5	52.5	None	n/a	no	Ostr, Culi, Cori, Chir, PSHY Larvae			
1819-092	4/17/2019	17.5	27	17.5	None	n/a	no	Ostr, Chir, PSHY/SPHA larvae			
1819-092	4/24/2019	29.6	2	0.75	None	n/a	no	Ostr, Noto, Chir, Epe, PSHY Larvae			
1819-093	12/7/2018	20.5	6.5	13.5	None	n/a	no	none	Natural	Undist	
1819-093	2/28/2019	24.7	8		<i>B. sandiegonensis</i>	1000s	yes	none			
1819-094	2/28/2019	20.9	75	240	<i>B. sandiegonensis</i>	1000s	yes	none	Natural		
1819-094	3/15/2019	14.5	50	120	None	n/a	no	PSHY Larvae			
1819-094	3/21/2019	17.3	150	120	None	n/a	no	PSHY Larvae		AB	
1819-094	3/28/2019	21.3	72	125	None	n/a	no	Ostr, Clad, Cori, Chir, PSHY/SPHA Larvae			
1819-094	4/3/2019	17	50	157.5	None	n/a	no	Ostr, Cole, Chir, PSHY/SPHA Larvae			
1819-094	4/10/2019	20.1	41	100	None	n/a	no	Ostr, Culi, Chir, PSHY Larvae			clawed frog present,
1819-094	4/17/2019	17.6	32	80	None	n/a	no	Cole, Cori, Chir, Ephe, PSHY/SPHA larvae		algae	
1819-094	4/24/2019	28	211	37.5	None	n/a	no	Chir, Ephe, PSHY Larvae, XELA, Conc			
1819-094	5/1/2019	26.2	11	50	None	n/a	no	Noto, Chir, Ephe, Anis, PSHY Larvae, Conc			
1819-094	5/8/2019	18.5	17	72	None	n/a	no	PSHY Larvae, Cole, Anis, Zygo, Chir, Cori, Noto, Ephe			
1819-094	5/15/2019	27	7	9	None	n/a	no	Cole, Noto, Chir, Ephe, Anis, XELO larvae, Conch			
1819-095	12/7/2018	19	9	64	None	n/a	no	none	Natural	Undist	
1819-095	1/18/2019	18.9	5.5	0.6	None	n/a	no	none			
1819-095	2/28/2019	13.7	70	600	<i>B. sandiegonensis</i>	1000s	yes	none			
1819-095	3/15/2019	15.4	150	700	None	n/a	no	PSHY Larvae			
1819-095	3/21/2019	18.5	175	700	None	n/a	no	Ostr, Culi, SPHA Larvae		AB	
1819-095	3/28/2019	20.2	>50	675	None	n/a	no	Cole, Gast, Anis, SPHA Larvae		algal blooms	clawed frog larvae
1819-095	4/3/2019	17	50	296	None	n/a	no	Cole, Chir, PSHY Larvae		algal blooms	clawed frog larvae

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Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-095	4/10/2019	17.9	>50	320	None	n/a	no	Ostr, Clad, Cori, Coll, Chir, PSHY Larvae, Conc		algae	
1819-095	4/17/2019	15.7	42	175	None	n/a	no	Ostr, Clad, Culi, Cori, PSHY larvae		algae	
1819-095	4/24/2019	25	25	100	None	n/a	no	Noto, Chir, XELA		algae	
1819-096	2/28/2019	19.4	45	40	<i>B. sandiegonensis</i>	1000s	yes	none	Natural		
1819-096	3/21/2019	18.2	60	36	None	n/a	no	Cope, PSHY and SPHA Larvae		AB	
1819-096	3/28/2019	21.6	36	30	None	n/a	no	Culi, Chir, Anis, PSHY Larvae			
1819-096	4/3/2019	17.2	35	25	None	n/a	no	Anis, PSHY Larvae		algal blooms	
1819-096	4/10/2019	18.9	30	20	None	n/a	no	none			
1819-096	4/17/2019	17.1	26.5	2.5	None	n/a	no	Culi, Cole, Anis, PSHY larvae		algae	
1819-096	4/24/2019	28.1	20	15	None	n/a	no	Ole, Anis			
1819-096	5/1/2019	22.3	16	6	None	n/a	no	Culi, Chir, Ephe, Anis, PSHY Larvae			
1819-096	5/8/2019	18.4	8	6	None	n/a	no	PSHY Larvae, Cole, Anis, Zygo, Ephe		Algae	
1819-096	5/15/2019	26.1	5.5	1	None	n/a	no	Ephe, Anis			
1819-096	5/23/2019	21.6	4.7	1	None	n/a	no	Coll, Ephe, Anis			
1819-097	2/28/2019	22.2	40	90	<i>B. sandiegonensis</i>	1000s	yes	none	Natural		
1819-097	3/7/2019	19.7	45	154	None	n/a	no	PSHY and SPHA larvae			
1819-097	3/21/2019	19.6	100	see map	None	n/a	no	Ostr, Clad, Culi, Cole, PSHY Larvae		AB	
1819-097	3/28/2019	20.4	58	108	None	n/a	no	Culi, Cole, Chir, Anis, PSHY Larvae			
1819-097	4/3/2019	17.1	41	48	None	n/a	no	Cole, Chir, Anis, PSHY Larvae		algal blooms	
1819-097	4/10/2019	18	39	50	None	n/a	no	Cori, Chir, Anis, PSHY Larvae			
1819-097	4/17/2019	16.5	30	40	None	n/a	no	PSHY/SPHA Larvae		algae	
1819-097	4/24/2019	27.7	20	28	None	n/a	no	Coll, Noto, Coll, PSHY Larvae			
1819-097	5/1/2019	22.5	11.8	15	None	n/a	no	Noto, Anis, PSHY Larvae			
1819-098	12/7/2018	15.6	17	189	None	n/a	no	none	Natural	Undist	
1819-098	12/13/2018	20.1	15	72	<i>Branchinecta</i> sp.	n/a	no	PSHY eggs			Immatures
1819-098	12/20/2018	20	8	50	<i>B. sandiegonensis</i>	1000s	yes	none			
1819-098	1/18/2019	19.3	15	61	None	n/a	no	PSHY egg masses			
1819-098	2/28/2019	21.1	28	120	<i>B. sandiegonensis</i>	1000s	yes	PSHY Larvae			
1819-098	3/15/2019	14.2	22	585	None	n/a	no	PSHY and SPHA larvae			
1819-098	3/21/2019	18.6	20	24	None	n/a	no	Clad, Culi, SPHA Larvae		AB	
1819-098	3/28/2019	22.4	25	54	None	n/a	no	Ostr, Anis, PSHY Larvae			
1819-098	4/3/2019	17.6	26	12	None			PSHY Larvae			
1819-098	4/10/2019	17.8	7	5	None	n/a	no	Cole, PSHY Larvae			
1819-099	12/7/2018	18.3	16	180	None	n/a	no	none	Natural	Undist	
1819-099	1/18/2019	19	15	236	None	n/a	no	none			
1819-099	2/28/2019	20.5	75	120	None	n/a	no	none			
1819-099	3/7/2019	19	17	28	<i>B. sandiegonensis</i>	1000s	yes	PSHY and SPHA larvae			
1819-100	12/7/2018	15.3	30	297	None	n/a	no	none	Natural	Undist	
1819-100	12/13/2018	22.2	4	2	<i>Branchinecta</i> sp.	n/a	no	none			Immatures
1819-100	1/18/2019	19.5	9	3.6	None	n/a	no	none			
1819-100	2/28/2019	21.7	35	60	<i>B. sandiegonensis</i>	1000s	yes	none			
1819-100	3/15/2019	12.6	30	280	None	n/a	no	none			
1819-100	3/21/2019	18.8	20	75	None	n/a	no	Culi, Plat, Chir, Plat, PSHY Larvae			
1819-100	3/28/2019	19.9	23	300	None	n/a	no	Culi, Cole, Gast, Anis, PSHY Larvae			
1819-100	4/3/2019	17.2	19	30	None	n/a	no	Gast, Anis, PSHY Larvae			
1819-100	4/10/2019	15.9	14	35	None	n/a	no	Culi, Cole, Gast, Anis, PSHY Larvae			
1819-101	2/28/2019	19.9	42	80	None	n/a	no	PSHY and SPHA larvae	Natural		
1819-101	3/7/2019	20.1	30	30	None	n/a	no	PSHY and SPHA larvae			
1819-101	3/15/2019	13.2	21	25	None	n/a	no	PSHY and SPHA larvae			

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Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-101	3/21/2019	19.4	30	3	None	n/a	no	Ostr, Clad, PSHY Larvae			
1819-101	3/28/2019	19.1	21.5	6	None	n/a	no	Ostr, Clad, Dipt, Cole, PSHY Larvae			
1819-101	4/3/2019	16.5	11	6	None	n/a	no	Cole, Coll, PSHY Larvae			
1819-102	2/28/2019	16.9	27	30	<i>B. sandiegonensis</i>	100s	yes	none	Natural		
1819-102	3/15/2019	14		12	None	n/a	no	PSHY and SPHA larvae			
1819-102	3/21/2019	22	8	2	None	n/a	no	Clad, PSHY Larvae, Anis			
1819-103	12/7/2018	19.4	16	105	None	n/a	no	none	Natural	Undist	
1819-103	12/13/2018	21.7	6.5	9	<i>Branchinecta</i> sp.	n/a	no	Osra, Cope, Clad			Immatures
1819-103	1/18/2019	19.6	11	92	None	n/a	no	none			
1819-103	2/28/2019	22.2	20	80	<i>B. sandiegonensis</i>	1000s	yes	none			
1819-103	3/15/2019	16.2	14	24	None	n/a	no	PSHY and SPHA larvae			
1819-104	2/28/2019	19.3	25	60	<i>B. sandiegonensis</i>	1000s	yes	none	Natural		
1819-104	3/15/2019	16.1	13	6	None	n/a	no	SPHA Larvae			
1819-105	2/28/2019	18.6	17	12	<i>B. sandiegonensis</i>	100s	yes	none	Natural		
1819-105	3/15/2019	14.6	13	3	<i>B. sandiegonensis</i>	10s	no	none			
1819-105	3/21/2019	24.6	6	1	None	n/a	no	Ostr, Clad			
1819-106	2/28/2019	18	14	48	None	n/a	no	none	Natural		
1819-106	3/7/2019	19.3	30	84	None	n/a	no	Diptera			
1819-106	3/15/2019	17.7	30	48	None	n/a	no	none			
1819-106	3/21/2019	20.5	8	4.5	None	n/a	no	Ostr, Culi			
1819-106	3/28/2019	18.9	28	72	None	n/a	no	Ostr, Culi, Cole, PSHY Larvae			
1819-106	4/3/2019	15.9	30	35	None	n/a	no	Ostr, Culi			
1819-106	4/10/2019	15.5	17.5	12	None	n/a	no	Ostr, Culi, Cole, Anis, PSHY Larvae			
1819-106	4/17/2019	17.2	11	4.5	None	n/a	no	Ostr, Cole, Chir, Anis, PSHY larve		algae	
1819-107	2/28/2019	16.3	45	10	None	n/a	no	none	Natural		
1819-107	3/7/2019	17.4	60	48	None	n/a	no	Diptera, PSHY larvae			
1819-107	3/15/2019	12.8	50	10	None	n/a	no	none			
1819-107	3/21/2019	17.4	100	10	None	n/a	no	Ostr, Clad, Culi, Cole, Gast, PSHY Larvae			
1819-107	3/28/2019	17.4	43	10	None	n/a	no	Ostr, Culi, Cole, Gast		algal blooms	
1819-107	4/3/2019	16.2	37	15	None	n/a	no	Ostr, Culi, Cole, Gast, PSHY Larvae, Hydr			
1819-107	4/10/2019	15.1	35.5	5.25	None	n/a	no	Ostr, Cope, Culi, Cole, Gast, Anis, Hydr			
1819-107	4/17/2019	14.5	27	7.5	None	n/a	no	Culi, Cole, Gast, Anis, PSHY Larvae		algae	
1819-107	4/24/2019	25.8	18	2.5	None	n/a	no	Culi, Cole, Coll, Gast, ANBO			
1819-107	5/1/2019	29.8	10	1.125	None	n/a	no	Cope, Culi, Cole, Coll, Gast, Anis, PSHY Larvae			
1819-107	5/8/2019	18.1	8	1	None	n/a	no	PSHY Larvae, Culi, Cole, Gast		Algae	
1819-109	2/28/2019	19.8	31	400	None	n/a	no	SPHA Larvae	Natural		
1819-109	3/7/2019	19.5	50		None	n/a	no	PSHY Larvae			
1819-109	3/15/2019	13.7	36	500	None	n/a	no	none			
1819-109	3/21/2019	19.1	45	60	None	n/a	no	Culi, PSHY Larvae			
1819-109	3/28/2019	21.8	29	550	None	n/a	no	Ostr, Culi, Cole, Gast, Anis		algal blooms	
1819-109	4/3/2019	17.7	29	270	None	n/a	no	Culi, Gast, Anis, PSHY Larvae			clawed frog larvae
1819-109	4/10/2019	16.4	27	250	None	n/a	no	Culi, Cole, Chir, Gast, Zygo, PSHY Larvae,			clawed frog present
1819-109	4/17/2019	13.5	23	140	None	n/a	no	Gast, PSHY		algae	clawed frog
1819-109	4/24/2019	23.5	16	140	None	n/a	no	Cole, Gast, Anis, PSHY Larve			
1819-109	5/1/2019	26.1	14	16	None	n/a	no	Culi, Cole, Ephe, PSHY Larvae, XELA			
1819-109	5/8/2019	17.1	8	40	None	n/a	no	PSHY Larvae, Cole, Gast, Anis		Algae	
1819-109	5/15/2019	24.5	8.5	30	None	n/a	no	Culi, Gast, Anis, PSHY Larvae			tail area?

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Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-109	5/23/2019	18.9	9	24	None	n/a	no	Culi, Gast, Anis, PSHY Larvae			
1819-109	5/30/2019	19.4	8	6	None	n/a	no	Culi, Gole, Gast, Anis, PSHY Larvae			
1819-110	3/7/2019	21.3	12	56.25	None	n/a	no	none	Natural		
1819-110	3/15/2019	15.1	11	0.5625	None	n/a	no	none			
1819-111	2/28/2019	18.5	15	4	None	n/a	no	none	Natural		
1819-111	2/28/2019	17.5	23	36	None	n/a	no	none			
1819-111	3/7/2019	18.9	21	52	None	n/a	no	PSHY Larvae			
1819-111	3/15/2019	12.9	21	36	None	n/a	no	none			
1819-111	3/21/2019	23	25	30	None	n/a	no	Ostr, Cope, Clad, PSHY and ANBO Larvae			
1819-111	3/28/2019	18.8	16	30	None	n/a	no	Ostr, Culi, Anis, PSHY Larvae		algal blooms	
1819-111	4/3/2019	16.8	15	9	None	n/a	no	Culi, Chir, Anis, PSHY Larvae			
1819-111	4/10/2019	13.9	13	6	None	n/a	no	Coll, Chir, Anis, PSHY Larvae			
1819-111	4/17/2019	12.2	10	5	None	n/a	no	Anis, PSHY Larvae		algae	
1819-112	2/28/2019	20.5	21	72	<i>B. sandiegonensis</i>	1000s	yes	PSHY Larvae			combination of 2013-37 and 2013-39
1819-112	3/15/2019	14.6	19	60	None	n/a	no	PSHY and SPHA larvae			
1819-112	3/21/2019	22.2	15	17.5	None	n/a	no	Ostr, Clad, Ephe, SPHA Larvae			
1819-112a	12/7/2018	17.1	20	162	None	n/a	no	none	Natural	Undist	
1819-112a	12/13/2018	20	15	162	<i>Branchinecta</i> sp.	n/a	no	Cope			Immatures, 2013-37
1819-112a	12/20/2018	21.6	6	18	<i>B. sandiegonensis</i>	1000s	yes	Ostr, Plat			2013-37
1819-112a	12/28/2018	19.4	19.4	0.3	<i>B. sandiegonensis</i>	10s	no	Ostr, Plat			2013-37
1819-112a	1/18/2019	18.7	18	6.75	<i>Branchinecta</i> sp.	n/a	no	Ostr, Plat			Nauplii present, 2013-37
1819-112b	12/7/2018	18.3	32	264	None	n/a	no	none	Natural	Undist	2013-39
1819-112b	12/13/2018	m	20	48	<i>Branchinecta</i> sp.	n/a	no	Cope			Immatures, complex of 2 features, 2013-39
1819-112b	12/20/2018	20.7	15	40	<i>B. sandiegonensis</i>	1000s	yes	Ostr, Plat			2013-39
1819-112b	12/28/2018	17.1	17.1	8	<i>B. sandiegonensis</i>	1000s	no	Ostr, Plat			2013-39
1819-112b	1/18/2019	19.3	22	10.8	None	n/a	no	Ostr, Plat			2013-39
1819-113	2/28/2019	20.8	30	32	<i>B. sandiegonensis</i>	1000s	yes	PSHY Larvae	Natural		
1819-113	3/15/2019	15.7	20	18	None	n/a	no	SPHA Larvae			
1819-113	3/21/2019	21.5	25	12	None	n/a	no	Ostr, Clad, Culi, PSHY and SPHA Larvae			
1819-113	3/28/2019	22.8	11	10	None	n/a	no	PSHY/SPHA Larvae		algal blooms	
1819-114	2/28/2019	20.4	75	35	<i>B. sandiegonensis</i>	1000s	yes	none	Natural		
1819-114	3/15/2019	13.8	50	28	None	n/a	no	SPHA Larvae			
1819-114	3/21/2019	23	100	30	None	n/a	no	Ostr, Culi, Plat, SPHA Larvae			
1819-114	3/28/2019	20.5	35.5	21	None	n/a	no	Culi, cole, SPHA Larvae		algal blooms	clawed frog larvae
1819-114	4/3/2019	17.8	29.5	15	None	n/a	no	Cole, Anis, PSHY Larvae		algal blooms	clawed frog larvae
1819-114	4/10/2019	18	23	15	None	n/a	no	Cole, PSHY Larvae			
1819-114	4/17/2019	17.2	10	12.25	None	n/a	no	Cole, Zygo, Anis, PSHY larvae			
1819-115	2/28/2019	24.1	20	425	<i>B. sandiegonensis</i>	1000s	yes	none	Natural		
1819-115	3/15/2019	16.7	14	105	<i>Branchinecta</i> sp.	10s	no	SPHA Larvae			females only observed
1819-115	3/21/2019	25.4	2	0.5	None	n/a	no	Culi, Anis, SPHA Larvae			
1819-115	3/28/2019	20.5	7	37.5	None	n/a	no	Ostr, Culi, Cole, Chir, PSHY Larvae			
1819-116	12/7/2018	21.4	12	25	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures, Complex of two pools
1819-116	12/13/2018	20.7	3.5	2	<i>B. lindahli</i>	10	yes	none			
1819-116	1/10/2019	19.7	6	7.5	None	n/a	no	Coll			Complex of 2 features
1819-116	1/18/2019	19.4	13.5	4.5	<i>B. lindahli</i>	100s	no	none			complex of 2 features
1819-116	1/24/2019	18.3	8.5	7.5	<i>B. lindahli</i>	100s	no	none			
1819-116	2/7/2019	18.2	9	12	<i>Branchinecta</i> sp.	100s	no	none			immatures
1819-116	2/15/2019	19.4	15	5	<i>B. lindahli</i>	1000s	no	none			
1819-116	3/7/2019	25	7	5	<i>B. lindahli</i>	10s	no	none			
1819-116	3/15/2019	18.5	9.5	2	<i>B. lindahli</i>	10s	yes	none			unknown sprimp collected

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-116	3/21/2019	25.9	2	0.5	<i>Branchinecta</i> sp.	10s	no	Ostr, Clad			Immatures
1819-117	5/23/2019	21.6	10	3.74	None	n/a	no	n/a			
1819-118	12/7/2018	17.9	38	360	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures, Complex of two pools
1819-118	12/13/2018	18.4	45	336	<i>Branchinecta</i> sp.	1000s	no	Coll			Immatures
1819-118	12/20/2018	15.1	45	280	<i>B. lindahli</i>	1000s	yes	Dipt, Coll, Noto			
1819-118	12/28/2018	15.1	52	90	<i>B. lindahli</i>	1000s	no	Hydr, Coll			Complex of two pools
1819-118	1/3/2019	16.7	35	189	<i>B. lindahli</i>	1000s	no	Hydr, Culi			Complex of two pools
1819-118	1/10/2019	19.7	45	96	<i>B. lindahli</i>	1000s	no	Coll			Field ID
1819-118	1/18/2019	19.7	50	125	<i>B. lindahli</i>	100s	no	Cope, Dipt, Culi, Noto, Coll, SPHA egg masses			
1819-118	1/24/2019	13.9	50	90	<i>B. lindahli</i>	100s	no	Chir, SPHA Larvae/eggs			complex of 2 features
1819-118	1/31/2019	16	50	108.1	<i>B. lindahli</i>	1000s	no	SPHA larvae			
1819-118	2/7/2019	16.9	100	100	<i>B. lindahli</i>	10s	no	none			
1819-118	2/15/2019	17.2	100	100	None	n/a	no	SPHA Larvae			
1819-118	3/1/2019	17.5	50	84	None	n/a	no	SPHA Larvae			combined with 1819-119
1819-118	3/7/2019	22.7	30	48	None	n/a	no	SPHA Larvae			
1819-118	3/15/2019	18.1	50	60	None	n/a	no	none			
1819-118	3/21/2019	21.5	50	45	None	n/a	no	Clad, Chir, SPHA Larvae			
1819-118	3/28/2019	20.8		50	None	n/a	no	Ostr, Clad, Chir, Cori			
1819-118	4/3/2019	19.4	42	20	None	n/a	no	Cori, Chir			
1819-118	4/10/2019	22.3	27	20	None	n/a	no	Chir			
1819-118	4/17/2019	19.5	5	7.5	None	n/a	no	Cole			
1819-118	5/23/2019	21.3	20	28	None	n/a	no	n/a			
1819-118	5/30/2019	21.8	9	7.5	<i>B. lindahli</i>	100s	3 male/2 female	Noto			
1819-119	3/7/2019	23.3	15	18	None	n/a	no	none	Road Rut		
1819-119	3/15/2019	17.5	20	10	None	n/a	no	none			
1819-119	3/21/2019	23.5	18	8	None	n/a	no	Ostr, Clad			
1819-119	3/28/2019	22.4	14	17.5	None	n/a	no	Clad, Chir			
1819-119	4/3/2019	19.2	17.5	10	None	n/a	no	Clad, Cori			
1819-119	4/10/2019	24.4	12	1.25	None	n/a	no	Clad, Cole			
1819-119	4/17/2019	21.4	3.5	2	None	n/a	no	Ostr, Clad, Cori			
1819-119	5/23/2019	24	8	5	None	n/a	no	n/a			
1819-119	5/30/2019	22.9	2.5	0.25	<i>B. lindahli</i>	100s	3 male/2 female	n/a			
1819-120	12/7/2018	19.5	16	175	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures, Complex of two pools
1819-120	12/13/2018	19	20	135	<i>B. lindahli</i>	1000s	yes	none			complex of 2 pools
1819-120	12/20/2018	18	8.5	85.5	<i>B. lindahli</i>	1000s	no	none			
1819-120	12/28/2018	16.7	20	30	<i>B. lindahli</i>	1000s	no	Hydr, Coll			
1819-120	1/3/2019	16.4	9	12	<i>B. lindahli</i>	10s	no	Ostr, Hydr, Coll			
1819-120	1/10/2019	20.8	15	18	None	n/a	no	Hydr, Coll			
1819-120	1/18/2019	20.1	40	15	<i>B. lindahli</i>	1000s	no	none			Immatures present
1819-120	1/24/2019	17.5	28	25	<i>B. lindahli</i>	1000s	no	none			complex of 2 features
1819-120	1/31/2019	17.1	16	17.1	<i>B. lindahli</i>	1000s	no	Cole, Cope			
1819-120	2/7/2019	17.5	25	45	<i>B. lindahli</i>	10s	no	Culi			
1819-120	2/15/2019	18.6	35	39	<i>B. lindahli</i>	1s	no	none			
1819-120	3/1/2019	18.9	14	40	<i>B. lindahli</i>	100s	no	PSHY Larvae			
1819-120	3/7/2019	24.2	25	32	None	n/a	no	SPHA Larvae			
1819-120	3/15/2019	19.9	25	22	None	n/a	no	SPHA Larvae			
1819-120	3/21/2019	24.1	15	12	None	n/a	no	Ostr, SPHA larvae			
1819-120	3/28/2019	24.4	11	8	None	n/a	no	Clad, Gast, SPHA Larvae			

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-120	4/3/2019	20.7	3	1.25	None	n/a	no	Ostr, Clad, PSHY Larvae			
1819-120	5/23/2019	22.2	11.5	3.5	None	n/a	no	n/a			
1819-120	5/30/2019	24.2	2	1.5	<i>B. lindahli</i>	100s	3 male/2 female	n/a			
1819-121	12/7/2018	20	18	220	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures
1819-121	12/13/2018	17.5	20	88	<i>B. lindahli</i>	1000s	yes	Coll			
1819-121	12/20/2018	20	18	67.5	<i>B. lindahli</i>	1000s	no	none			
1819-121	12/28/2018	17.8	12.5	7	<i>B. lindahli</i>	1000s	no	Hydr, Coll			
1819-121	1/3/2019	16.9	9	18	<i>B. lindahli</i>	100s	no	Ostr, Coll			
1819-121	1/10/2019	19.5	19	45	<i>Branchinecta</i> sp.	1s	no	Coll			One female observed
1819-121	1/18/2019	20	27	30	<i>B. lindahli</i>	1000s	no	none			
1819-121	1/24/2019	17.9	16	35	<i>B. lindahli</i>	100s	no	none			
1819-121	1/31/2019	18.4	10	17.02	<i>B. lindahli</i>	1000s	no	none			
1819-121	2/7/2019	17.6	17	42	<i>B. lindahli</i>	100s	no	none			receiveng flow from hillside
1819-121	2/15/2019	15.6	25	30.25	<i>B. lindahli</i>	1s	no	none			
1819-121	3/1/2019	16.8	30	42	None	n/a	no	PSHY Larvae			
1819-121	3/7/2019	24.5	30	35	<i>B. lindahli</i>	10s	no	none			
1819-121	3/15/2019	19.6	15	20	None	n/a	no	none			
1819-121	3/21/2019	23.5	15	8	None	n/a	no	Clad, SPHA Larvae			
1819-121	5/23/2019	21.8	19	30	None	n/a	no	n/a			
1819-121	5/30/2019	23.9	6	10	<i>B. lindahli</i>	100s	3 male/2 female	Cole			
1819-122	12/7/2018	18.7	20	231	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures
1819-122	12/13/2018	18.3	18	126	<i>B. lindahli</i>	1000s	yes	none			
1819-122	12/20/2018	19.9	10	88	<i>B. lindahli</i>	1000s	no	none			
1819-122	12/28/2018	17	13	7	<i>B. lindahli</i>	1000s	no	none			
1819-122	1/3/2019	16.2	4	10	<i>B. lindahli</i>	1s	no	Clad, Culi			
1819-122	1/10/2019	20.5	15	28	None	n/a	no	Coll			
1819-122	1/18/2019	20.4	25	31.5	<i>B. lindahli</i>	1000s	no	none			
1819-122	1/24/2019	18.3	20	48	<i>B. lindahli</i>	1000s	no	none			
1819-122	1/31/2019	18.6	8	24	<i>B. lindahli</i>	1000s	no	none			
1819-122	2/7/2019	17.9	15	24	<i>B. lindahli</i>	10s	no	none			
1819-122	2/15/2019	16.9	18	63	<i>B. lindahli</i>	100s	no	none			
1819-122	3/1/2019	21.1	20	54	<i>B. lindahli</i>	100s	no	none			
1819-122	3/7/2019	24.4	20	35	<i>B. lindahli</i>	10s	no	none			
1819-122	3/15/2019	18	20	24	<i>B. lindahli</i>	10s	no	none			
1819-122	3/21/2019	23.7	8	5.25	None	n/a	no	Ostr, Clad			
1819-122	5/23/2019	22.3	14	13.5	None	n/a	no	n/a			
1819-122	5/30/2019	24.8	3.5	0.375	<i>B. lindahli</i>	10s	no	n/a			Several shrimp observed dying in adjacent drying mud pool
1819-123	3/1/2019	21.8	20	110	None	n/a	no	SPHA Larvae	Road Rut		
1819-123	3/7/2019	22.6	15	27	None	n/a	no	SPHA Larvae			
1819-123	3/15/2019	19.5	18	30	None	n/a	no	none			algal bloom
1819-123	3/21/2019	m	15	17.5	None	n/a	no	Ostr, Culi, Chir, Coll			
1819-123	3/28/2019	26.7	5	7	None	n/a	no	Ostr, Cole, Chir			
1819-123	5/23/2019	24	11	10.5	None	n/a	no	n/a			
1819-124	12/7/2018	21.2	6	140	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures
1819-124	12/13/2018	19.8	5	125	<i>B. lindahli</i>	1000s	yes	Coll			
1819-124	12/20/2018	19.5	4.5	11	<i>B. lindahli</i>	1000s	no	Coll			
1819-124	12/28/2018	18.1	5	8	<i>B. lindahli</i>	100s	no	Hydr, Coll			
1819-124	1/10/2019	20.6	7	30	None	n/a	no	Coll			
1819-124	1/18/2019	20.3	13	18	<i>Branchinecta</i> sp.	1000s	no	Coll			Immatures present

Attachment B: 2018-2019 Wet Season Survey Data

Otay River Restoration Project

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-124	1/24/2019	19.4	6.5	25.5	<i>B. lindahli</i>	100s	no	none			
1819-124	1/31/2019	18.2	3.5	4.2	<i>B. lindahli</i>	100s	no	Coll			
1819-124	2/7/2019	18.7	8	30	<i>B. lindahli</i>	100s	no	Chiro			Immatures present
1819-124	2/15/2019	16.8	15	N/A	<i>B. lindahli</i>	100s	no	none			
1819-124	3/1/2019	20.6	10	75	<i>B. lindahli</i>	10s	no	none			
1819-124	3/15/2019	17.3	9	20	None	n/a	no	none			
1819-124	3/21/2019	23.6	5	10.5	None	n/a	no	Ostr, Culi, Coll			
1819-124	3/28/2019	27.3	4	2.5	None	n/a	no	Ostr, Clad, Cole, Chir			
1819-124	5/23/2019	20.4	4	6	None	n/a	no	n/a			
1819-125	12/7/2018	20.7	9	21	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures
1819-125	12/13/2018	19.4	6	10	<i>B. lindahli</i>	1000s	yes	none			
1819-125	12/20/2018	20.3	2.5	4.5	<i>B. lindahli</i>	100s	no	Dipt			
1819-125	12/28/2018	17.6	2	0.3	None	n/a	no	Culi			
1819-125	1/10/2019	20.7	8	6.3	None	n/a	no	Coll			
1819-125	1/18/2019	19.1	7	2.2	<i>Branchinecta</i> sp.	100s	no	Coll			Immatures present
1819-125	1/24/2019	18.6	7.5	4.5	<i>Branchinecta</i> sp.	n/a	no	none			Immatures present
1819-125	1/31/2019	17.6	3.5	1.54	<i>B. lindahli</i>	100s	no	Ostr			
1819-125	2/7/2019	18.4	8	8	<i>B. lindahli</i>	10s	no	none			Flowing into T-15, receiving flow from T-12
1819-125	2/15/2019	16.8	15	44	<i>B. lindahli</i>	100s	no	none			
1819-125	3/1/2019	24.1	10	8	None	n/a	no	none			
1819-125	3/7/2019	24.7	12	57.5	<i>B. lindahli</i>	100s	no	none			combined with 1819-124
1819-125	3/15/2019	18.4	10	3	None	n/a	no	none			
1819-125	3/21/2019	23.7	7	3	None	n/a	no	Ostr, Clad, Coll			
1819-125	5/23/2019	20.2	7.5	1.75	None	n/a	no				
1819-126	12/7/2018	19.4	16	235	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures
1819-126	12/13/2018	19.4	12	44	<i>B. lindahli</i>	1000s	yes	Coll			
1819-126	12/20/2018	18.3	11	48	<i>B. lindahli</i>	1000s	no	none			complex of 2 features
1819-126	12/28/2018	18.6	12	7.5	<i>B. sandiegonensis</i> , <i>B. lindahli</i>	1000s	yes	none			second voucher collected with new species.
1819-126	1/3/2019	16.8	7.5	14	<i>B. lindahli</i>	10s	no	Ostr, Clad, Hydr, Coll			looked at several males, no <i>B. sand.</i>
1819-126	1/10/2019	21	8	14.25	<i>B. lindahli</i>	1s	no	none			
1819-126	1/18/2019	19.8	8	18	<i>B. lindahli</i>	10s	no	none			
1819-126	1/24/2019	18.9	20	57	<i>B. lindahli</i>	1000s	no	Clad			
1819-126	1/31/2019	18.4	13.5	20	<i>B. lindahli</i>	100s	no	Ostr, Clad			
1819-126	2/7/2019	17.5	16	60	<i>B. lindahli</i>	10s	no	none			
1819-126	2/15/2019	16.9	15	54	<i>Branchinecta</i> sp.	1s	no	none			Female only observed
1819-126	3/1/2019	22.5	12	30	None	n/a	no	none			
1819-126	3/15/2019	18.7	10	13	None	n/a	no	none			
1819-126	3/21/2019	22.9	10	11.25	None	n/a	no	Ostr, Clad, Culi			
1819-126	3/28/2019	26.5	7	8	None	n/a	no	Ostr, Cole			
1819-127	12/7/2018	20.1	8	90	None	n/a	no	none	Natural	Disturbed, Tire Tracks	
1819-127	1/18/2019	20.6	12	8	None	n/a	no	none			
1819-127	1/24/2019	19.7	4	11	<i>B. lindahli</i>	10s	yes	none			
1819-127	2/7/2019	17.2	11	22.5	None	n/a	no	none			
1819-127	2/15/2019	16.8	15	4.2	None	n/a	no	Ostr			
1819-127	3/1/2019	21.6	9	22.5	None	n/a	no	none			
1819-127	3/7/2019	20.9	12	11	None	n/a	no	PSHY Larvae			
1819-127	3/15/2019	19.8	10	4.5	None	n/a	no	none			
1819-127	3/21/2019	24.1	4	3.5	None	n/a	no	Ostr, Culi, Cole, Gast, PSHY Larvae			
1819-128	12/7/2018	20	25	180	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures
1819-128	12/13/2018	19.8	30	162	<i>B. lindahli</i>	1000s	yes	Coll			

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-128	12/20/2018	19.7	20	100	<i>B. lindahli</i>	1000s	no	Coll			
1819-128	12/28/2018	19.2	22	60	<i>B. lindahli</i>	1000s	no	Hydr, Clad			
1819-128	1/3/2019	15.7	12	48	<i>B. lindahli</i>	100s	no	Ostr, Coll			
1819-128	1/10/2019	20.9	13	19	<i>B. lindahli</i>	1s	no	Hydr, Coll			Field ID
1819-128	1/18/2019	20.4	26	22.4	<i>B. lindahli</i>	1s	no	Cope, Clad, Coll		AB	new cohort established
1819-128	1/24/2019	18.7	30	52	<i>B. lindahli</i>	100s	no	Clad			
1819-128	1/31/2019	17.9	20	54	<i>B. lindahli</i>	100s	no	Ostr, Clad, Coll, Chir			
1819-128	2/7/2019	18.4	30	60	<i>B. lindahli</i>	1s	no	Coll			
1819-128	2/15/2019	17.3	45	N/A	None	n/a	no	none			
1819-128	3/1/2019	19.6	12	52.5	None	n/a	no	none			combined with T-10
1819-128	3/7/2019	22.2	25	84	None	n/a	no	none			combined with 1819-129
1819-128	3/15/2019	17.1	25	20	None	n/a	no	none			
1819-128	3/21/2019	19.7	40	17.5	None	n/a	no	Ostr, Clad,			
1819-128	3/28/2019	25.1	13	9	None	n/a	no	Ostr			
1819-128	4/3/2019	21.2	10	5	None	n/a	no	Ostr, Clad, Cole			
1819-128	4/10/2019	25.5	0	0.5	None	n/a	no	Ostr, Clad			
1819-128	5/23/2019	20.8	6	4	None	n/a	no	n/a			
1819-129	12/7/2018	19.7	9	60	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures
1819-129	12/13/2018	18.1	4.5	16	<i>B. lindahli</i>	100s	yes	Coll			
1819-129	12/20/2018	20.2	2.5	9	<i>B. lindahli</i>	10s	no	Coll			
1819-129	12/28/2018	17.1	4	1.75	<i>B. lindahli</i>	1000s	no	Hydr, Coll			
1819-129	1/3/2019	15.8	1	0.28	None	n/a	no	Ostr, Cope, Clad			
1819-129	1/10/2019	21	5	7.5	None	n/a	no	Coll			
1819-129	1/18/2019	20.5	10.5	9	<i>B. lindahli</i>	100s	no	Coll			
1819-129	1/24/2019	18.6	9.5	10.2	<i>B. lindahli</i>	100s	no	none			
1819-129	1/31/2019	18.7	6.5	7.95	<i>B. lindahli</i>	100s	no	none			
1819-129	2/7/2019	18.5	8	5	<i>B. lindahli</i>	1s	no	Coll			
1819-129	2/15/2019	17.3	45	115	None	n/a	no	none			hydrologically connected to T-12, 13,14, 15
1819-129	3/1/2019	19.9	9	9	None	n/a	no	none			Combined with T-11
1819-129	3/15/2019	20.8	10	3	None	n/a	no	none			
1819-129	3/21/2019	24.1	10	3	None	n/a	no	Ostr, Clad			
1819-129	5/23/2019	20.1	5	1.2	None	n/a	no	n/a			
1819-130	12/7/2018	21.2	12	315	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures
1819-130	12/13/2018	18.4	11	175	<i>B. lindahli</i>	1000s	yes	none			
1819-130	12/20/2018	20.1	6	175	<i>B. lindahli</i>	1000s	no	none			
1819-130	12/28/2018	16.1	8	37.5	<i>B. lindahli</i>	1000s	no	none			Complex of 3 ruts
1819-130	1/3/2019	16.2	5.5	60	<i>B. lindahli</i>	1000s	no	Ostr, Hydr, Coll			
1819-130	1/10/2019	19.6	8.5	40	<i>B. lindahli</i>	100s	no	Coll			Complex of 3 features
1819-130	1/18/2019	19.9	10	57.6	<i>B. lindahli</i>	100s	no	none			
1819-130	1/24/2019	19	15	85	<i>B. lindahli</i>	10s	no	none			
1819-130	1/31/2019	18.1	15	15	<i>B. lindahli</i>	10s	no	Clad, Chir			
1819-130	2/7/2019	17.5	18	45	None	n/a	no	Nema			
1819-130	2/15/2019	16.7	20	90	None	n/a	no	Chir			
1819-130	3/1/2019	22.8	15	60	None	n/a	no	none			
1819-130	3/7/2019	22.6	17	40	None	n/a	no	none			
1819-130	3/15/2019	17.7	20	13.75	None	n/a	no	none			
1819-130	3/21/2019	24	10	11.25	None	n/a	no	Ostr, Clad			
1819-130	3/28/2019	22.5	14	17.5	None	n/a	no	Ostr			
1819-130	5/23/2019	19.8	6	1.3	None	n/a	no	n/a			
1819-131	12/7/2018	21.3	8	50	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures
1819-131	12/13/2018	20.4	4	6	<i>B. lindahli</i>	100s	yes	none			

Attachment B: 2018-2019 Wet Season Survey Data

Otay River Restoration Project

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-131	1/10/2019	20	5	5	None	n/a	no	Coll			
1819-131	1/18/2019	20.1	5.3	5.6	<i>B. lindahli</i>	1000s	no	Ostr, Clad			
1819-131	1/24/2019	19.4	4	9	<i>B. lindahli</i>	100s	no	Chir			
1819-131	2/7/2019	19.3	8	7.5	None	n/a	no	Chir			
1819-131	2/15/2019	16.8	10	22.5	None	n/a	no	Chir			
1819-131	3/1/2019	19.2	20	18	None	n/a	no	none			
1819-131	3/7/2019	20.7	12	18	None	n/a	no	none			
1819-131	3/21/2019	22.7	5	3	None	n/a	no	Ostr, Clad, Culi, Cole			
1819-131	3/28/2019	24.2	6	1.5	None	n/a	no	Ostr, Culi			
1819-132	12/7/2018	22.5	22	72	<i>Branchinecta</i> sp.	n/a	no	none	Road Rut	Disturbed, Tire Tracks	Immatures
1819-132	12/13/2018	19.5	20	72	<i>B. lindahli</i>	1000s	yes	none			
1819-132	12/20/2018	18.9	6	30	<i>B. lindahli</i>	1000s	no	Coll			
1819-132	12/28/2018	18.5	8.5	10.5	<i>B. lindahli</i>	100s	no	none			
1819-132	1/3/2019	16.4	3.5	10.5	<i>B. lindahli</i>	10s	no	Clad, Coll			
1819-132	1/10/2019	17	18	22.5	<i>B. lindahli</i>	100s	no	no			
1819-132	1/18/2019	19.2	25	9	<i>B. lindahli</i>	10s	no	none			
1819-132	1/24/2019	18.9	25	49	<i>B. lindahli</i>	10s	no	none			
1819-132	1/31/2019	19	18	10.5	<i>B. lindahli</i>	1s	no	Ostr, Cope			
1819-132	2/7/2019	15.6	25	12	<i>Branchinecta</i> sp.	1s	no	none			Female only observed
1819-132	2/15/2019	14.5	25	16	<i>Branchinecta</i> sp.	1s	no	Nema			Female only observed
1819-132	3/1/2019	17.3	25	35	None	n/a	no	none			
1819-132	3/7/2019	22.5	25	25	None	n/a	no	none			
1819-132	3/15/2019	18.1	20	12	None	n/a	no	none			
1819-132	3/21/2019	23.3	18	6.25	None	n/a	no	Ostr, Clad			
1819-132	5/23/2019	20.5	16	122.5	None	n/a	no	n/a			
1819-132	5/30/2019	23.7	4	1.75	<i>B. lindahli</i>	100s	2 female	n/a			
1819-133	3/1/2019	16.9	15	21	None	n/a	no	none	Natural		
1819-133	3/7/2019	19.7	15	9	None	n/a	no	none			
1819-133	3/15/2019	19.6	10	3	None	n/a	no	none			
1819-133	3/21/2019	20.1	7	3	None	n/a	no	Ostr, Culi			
1819-133	3/28/2019	22.2	4	1.5	None	n/a	no	Ostr, Culi			
1819-134	12/7/2018	20.5	3.5	6	None	n/a	no	none	Natural	Undist	
1819-134	2/7/2019	18.5	0.2	1	None	n/a	no	none			
1819-135	12/7/2018	22	3	1	None	n/a	no	none	Natural	Undist	
1819-136	12/7/2018	18.8	3.5	2	None	n/a	no	none	Natural	Undist	
1819-137	2/7/2019	16.4	20	90	None	n/a	no	Coll	Natural	Undist	
1819-137	3/1/2019	21.6	30	300	None	n/a	no	none			
1819-137	3/7/2019	24.2	35	84	None	n/a	no	none			
1819-137	3/15/2019	17.3	20	3	None	n/a	no	none			
1819-140	12/7/2018	NR	5	4	None	n/a	no	none	Natural	Undist	
1819-140	2/7/2019	16	30	40	None	n/a	no	none			
1819-140	3/1/2019		15	40	None	n/a	no	none			
1819-140	3/7/2019	21.3	10	19.25	None	n/a	no	none			
1819-143	3/7/2019	21.9	9	36	None	n/a	no	none	Road Rut		
1819-143	3/15/2019	23.6	10	2.25	None	n/a	no	none			
1819-144	1/10/2019	15.7	15.7	8.5	None	n/a	no	none	Road Rut	Disturbed, Tire Tracks	
1819-144	1/18/2019	19.8	7.2	22.5	<i>B. lindahli</i>	100s	yes	none			
1819-144	1/24/2019	15.4	0.4	1.2	None	n/a	no	none			
1819-144	2/7/2019	15.1	10	7	<i>B. lindahli</i>	1s	no	Nema			
1819-144	2/15/2019	19.3	12	10.45	<i>B. lindahli</i>	10s	no	Coll			
1819-144	3/7/2019	22.7	10	6	None	n/a	no	none			

Attachment B: 2018-2019 Wet Season Survey Data

Otay River Restoration Project

Feature	Survey Date	Water Temp (°C)	Max Depth (cm)	Surface Area (sq m)	Anostracans Present	Population Estimate	Vouchers Collected	Other Species Present	Basin Type	Basin Condition	Comments
1819-144	3/15/2019	21.6	9.5	4	None	n/a	no	none			
1819-144	3/21/2019	23.6	1	0.25	<i>B. lindahli</i>	1s	no	Clad, Coll			
1819-144	5/23/2019	22.3	7	7.2	None	n/a	no	n/a			
1819-148	3/7/2019	21.6	21	48	<i>B. lindahli</i>	100s	yes	none			
1819-148	3/15/2019	16.8	12	16	None	n/a	no	SPHA Larvae			
1819-149	3/7/2019	20.3	30	12	<i>B. sandiegonensis, B. lindahli</i>	100s	yes	PSHY Larvae	Natural		
1819-149	3/15/2019	15.1	30	5.5	None	n/a	no	SPHA Larvae			
1819-149	3/21/2019	19.8	35	7	None	n/a	no	Ostr, Culi, PSHY Larvae			
1819-149	3/28/2019	22.4	13	3	None	n/a	no	Culi, PSHY Larvae			
1819-150	3/7/2019	22.3	23	8.4	<i>B. sandiegonensis</i>	100s	yes	none	Natural		
1819-150	3/15/2019	16.8	14	1.125	None	n/a	no	SPHA Larvae			
1819-151	3/7/2019	23.5	17	52	None	n/a	no	none	Natural		
1819-151	3/15/2019	18.1	9	21	None	n/a	no	SPHA Larvae			
1819-152	3/7/2019	23.2	20	4.5	None	n/a	no	none	Natural		
1819-152	3/15/2019	13.5	15	0.75	None	n/a	no	none			
1819-153	3/7/2019	22.4	10	17.5	<i>B. sandiegonensis</i>	1000s	yes	none	Natural		
1819-154	3/15/2019	12.2	23	300	None	n/a	no	none	Natural		
1819-154	3/28/2019	20.9		180	None	n/a	no	Ostr, Dipt, Culi, Cole, Gast, Ephe, Anis, PSHY Larvae			
1819-154	4/3/2019	16.7	21	64	None	n/a	no	Clad, Culi, Cole, Ephe, Anis, PSHY Larvae			
1819-154	4/10/2019	17.2	15	40	None	n/a	no	Cole, Gast, Anis, PSHY Larvae			
1819-154	4/17/2019	17.3	10	6	None	n/a	no	Gast, Anis, PSHY/SPHA larvae			
1819-155	3/15/2019	15.1	16	3.75	None	n/a	no	none	Natural		
1819-155	3/28/2019	17.6	38	18	None	n/a	no	none			
1819-155	4/3/2019	16.6	39	12	None	n/a	no	Ostr, Culi, Cole, Chir, Gast, Anis, PSHY Larvae			
1819-155	4/10/2019	16.1	31	6	None	n/a	no	Ostr, Clad, Culi, Cole, Anis, PSHY Larvae, Hydr			
1819-155	4/17/2019	14.9	25	6	None	n/a	no	Chir, PSHY larve			
1819-155	4/24/2019	25.3	16.5	3	None	n/a	no	Gast, Anis, PSHY Larvae			Two-striped garter snake
1819-155	5/1/2019	23.7	9	1	None	n/a	no	Ostr, Cope, Clad, Cole, Gast, PSHY Larvae			
1819-155	5/8/2019	18.2	3	1	None	n/a	no	Cole, Anis, Coll		Algae	

Key to Other Species Present:

ANBO: *Anaxyrus boreas halophilus* (California toad)

Anis: Anisoptera (dragonflies)

Chir: Chironomidae (midges)

Clad: Cladostera (water fleas)

Cole: Coleoptera (beetles)

Coll: Collembola (springtails)

Conc: Conchostraca (clam shrimp)

Cope: Copepoda (Copepods)

Cori: Corixidae (water boatmen)

Culi: Culicidae (mosquitos)

Dipt: Diptera (true flies)

Ephe: Ephemeroptera (mayflies)

Gast: Gastropods (snails)

Hydr: Hydracarina (water mites)

Nema: Nematoda (roundworms)

Noto: Notonectidae (backswimmers)

Ostr: Ostracoda (seed shrimp)

Plat: Platyhelminthes (flatworms)

PSHY: *Pseudacris hypochondriaca* (Baja CA Chorus frog)

SPHA: *Spea hammondi* (western spadefoot)

XELA: *Xenopus laevis* (African clawed frog)

Zygo: Zygoptera (damselflies)



Photo 1. (12/7/18) View facing east of basin 1819-119 in the foreground and basin 1819-118 in the background. Versatile fairy shrimp was observed in both of these basins.



Photo 2. (1/18/19) View facing southeast of basin 1819-80 located within an access road. Recent heavy rain events have diverted part of O'Neal Canyon Creek into the access road and basin. Versatile fairy shrimp was observed in this basin.



Photo 3. (2/7/19) View facing east of basin 1819-137 that is located within the bottom of the Otay River Valley. No fairy shrimp were observed in this basin.



Photo 4. (12/20/18) View facing northeast of basin 1819-32, which is near an active restoration area. Both San Diego and versatile fairy shrimp were observed in this basin.



Photo 5. (12/20/18) View facing northwest of basin 1819-44, which is within an active restoration area. San Diego fairy shrimp was observed in this basin.



Photo 6. (2/7/19) View facing west of basin 1819-007, which exists within an access road. Versatile fairy shrimp was observed in this basin.



Photo 7. (1/24/19) View facing west of basin 1819-56, which is within an access road and an active restoration area. San Diego fairy shrimp was observed in this basin.



Photo 8. (2/7/19) Overview of basins 1819-57 to 1819-62, facing south. Recent heavy rains have flooded many of these basins into one another. Both San Diego and versatile fairy shrimp were observed within these basins, which are within an active restoration area.

Appendix H

2018 Coastal California Gnatcatcher Survey Report



August 10, 2018

Stacey Love
Recovery Permit Coordinator
Carlsbad Fish and Wildlife Office
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, CA 92008

Subject: 45-Day Report – Coastal California Gnatcatcher Presence/Absence Survey Results for the Otay Mitigation Bank Expansion (Phase 2) Project, San Diego County, CA

Dear Ms. Love:

This report documents the results of protocol coastal California gnatcatcher (*Poliioptila californica californica*) (CAGN) presence/absence surveys conducted by ICF in 2018 for the Otay Mitigation Bank Expansion (Phase 2) Project (Project) located in the City of Chula Vista, San Diego County, California. The Project is proposed by **NEED WILL'S INPUT**.

Location

The Project site is located in the southeast corner of the City of Chula Vista in the south end of San Diego County, California (Figure 1). The Project site is located within the Otay Mesa River Valley approximately 2 miles downstream from Lower Otay Lake dam and approximately 1 mile upstream from the SR-125 South Bay Expressway overcrossing. The Project site is found within Township 18 South, Range 1 West of the Otay Mesa, California, U.S. Geological Survey 7.5-minute quadrangle map (USGS 1975) (Figure 2). The elevation ranges from approximately 230 feet above mean sea level (msl) within the floodplain to approximately 300 feet above msl along the southern end of the Project site.

Project Description

The Project site is part of a larger mitigation bank and habitat restoration project. Specifically, the Project site is designated as Phase 2 of a proposed plan to expand habitat restoration activities on-going upstream. In addition, the Project site is located within the City of Chula Vista's planned trail enhancement project. The proposed Project will include habitat restoration and enhancement activities that may include grading, temporary irrigation, and native vegetation planting.

Survey Area

The survey area for CAGN includes the approximate 61-acre Project footprint plus a 300-ft buffer (Figure 3). The total acreage associated with the survey area is approximately 120 acres; however, potentially suitable habitat for CAGN is mostly found along the southern half of the survey area. A relatively flat, densely vegetated floodplain associated with the Otay River intersects the center of the survey area and raised terraces are located to the north and south. The center of the survey area, within the Otay River floodplain, supports a mix of vegetation communities including Southern Willow Scrub, Southern

Cottonwood Willow Riparian Forest, Tamarix Scrub, Freshwater Marsh, and Diegan Coastal Sage Scrub. The north terrace is dominated by Non-native Grassland, but also includes Eucalyptus Woodland and a narrow channel supporting Southern Willow Scrub. The southern terrace is dominated by Diegan Coastal Sage Scrub, Disturbed Diegan Coastal Sage Scrub, and Non-native Grassland.

The potentially suitable habitat for CAGN within the survey area included Diegan Coastal Sage Scrub and Disturbed Coastal Sage Scrub vegetation communities supporting the following vegetation species: California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), black sage (*Salvia mellifera*), coyote brush (*Baccharis pilularis*), lemonade berry (*Rhus integrifolia*), California encelia (*Encelia californica*), mule fat (*Baccharis salicifolia*), deerweed (*Acmispon glaber*), white sage (*Salvia apiana*), and laurel sumac (*Malosma laurina*).

Representative photographs of the survey area are provided in Appendix A.

Species Background

California Gnatcatcher

The CAGN is a small resident insectivorous bird whose occurrence is strongly associated with sage scrub habitat found throughout southern California into northern Baja California, Mexico. The USFWS listed this species as threatened in 1993. It is also considered a California Department of Fish and Game Species of Special Concern.

Historically, CAGN's range extended from southern Ventura County southward through Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties, and into Baja California, Mexico, to approximately 30 degrees north latitude near El Rosario (Atwood 1990). Although CAGN have a close association with sage scrub, this species has also been documented using coastal sage-chaparral scrub, chamise chaparral, and other habitat types (Campbell et al. 1998; Bontrager 1991). Habitat destruction, fragmentation, and modification have led to this species' decline (USFWS 1993). Loss of habitat to agriculture and urban development were leading challenges to conserving the species until the interval between 2003 and 2007 when widespread fires consumed one-third of the habitat in the U.S range of the species that the USFWS believed to be suitable for the coastal CAGN (USFWS 2010).

Territory size varies and is influenced by season and locale (Preston et al. 1998). During the breeding season, territories in coastal areas range from approximately 2.5 to 5.7 acres (Atwood et al. 1998). Territories in more inland regions are slightly larger with areas averaging approximately 8.4 acres (Braden et al. 1997). During the nonbreeding season, wandering into adjacent territories or unoccupied habitat may result in up to 80% increase in home range size relative to area used during nesting (Bontrager 1991, Preston et al. 1998).

The breeding season of CAGN extends from mid-February through mid-August, although earlier starts and later seasons have been observed (USFWS 1993). During the breeding season, the male CAGN select a nest site and for approximately 4 to 10 days both sexes build a cup-shaped nest located approximately 1 meter (3 feet) off the ground (Atwood and Bontrager 2001; USFWS 2003). Clutch size is typically four eggs but can range from three to five eggs (Atwood and Bontrager 2001). Both sexes incubate eggs for approximately 14 days and, after the eggs hatch, chicks fledge from the nest around Day 14 (Atwood and Bontrager 2001). Juveniles will stay with adults from 2 to 5 weeks (Atwood and Bontrager 2001).

Survey Methods

The survey protocol to determine presence/absence of CAGN requires a federal 10(A)1(a) permit. From May 24 through June 22, 2018, permitted ICF biologist Phillip Richards (permit # TE-095896) performed three focused surveys for CAGN in all potentially suitable habitat within the Project limits plus a 300-ft buffer (Figure 3). Additional ICF staff participated during each of the visits; however, their involvement was for training purposes (Table 1). The survey effort followed the published survey methodology for CAGN (USFWS 1997) during the breeding season inside a Natural Community Conservation Plan area.

Three surveys were conducted at least one week apart between 6:00 A.M. and 12:00 P.M. Surveys were not conducted during periods of excessive or abnormal heat, wind, rain, fog, or other inclement weather. The rate of coverage during each survey visit was approximately 3 to 4 hectares (8 to 10 acres) per hour. Methods included slowly walking through the vegetation with frequent stops to listen and play taped CAGN vocalizations. During each visit, a taped vocalization was broadcast at least once in all potential habitat at distance intervals of approximately 23 to 30 meters (75 to 100 feet). All vertebrate species detected were recorded (Appendix B). CAGN survey dates, times, weather conditions, and personnel are summarized in Table 1.

Table 1. CAGN Survey Dates, Times, and Weather Conditions

Visit	Date	Start-End Time	Temperature (°F)	Wind Speed (mph)	Skies	Surveyor
1	5/24/2018	0710-1120	58-61	0-3	cloudy	Phil Richards* Ryan Layden Will Kohn Marty Lewis
2	6/13/2018	0700-1150	60-80	0-5	cloudy to sunny	Phil Richards* Ryan Winkleman Ryan Layden Marty Lewis Will Kohn Ford Bendell Courtney Casey
3	6/22/2018	0715-1200	66-77	1-5	cloudy to sunny	Phil Richards* Ryan Layden Marty Lewis Shawn Johnston

* Permit No. TE-095896

Results

CAGN were detected during each of the three focused CAGN surveys. Table 2 summarizes the CAGN observations for each visit. Figure 4 shows the location of CAGN observations. The territory boundaries presented on Figure 4 are approximations based on CAGN activities observed during three visits to the survey area.

Table 3. CAGN Survey Results

Visit	Date	Observations	Territories with Observed Activity
1	5/24/2018	1 pair feeding at least 1 fledgling (Territory 1) 1 pair nest building (Territory 2) 1 pair incubating (Territory 3) 1 males foraging (Territory 5)	4 of 6
2	6/13/2018	3 males foraging (Territories 1, 2, 5) 1 pair feeding nestlings (Territory 3)	4 of 6
3	6/22/2018	2 pairs feeding at least on fledgling (Territory 1, 6) 1 pair feeding nestlings (Territory 2) 1 pair nest building (suspect previous nest failed) (Territory 3) 1 pair feeding at least 3 fledglings (Territory 4) 1 male foraging (Territory 5) 1 dispersing juvenile	6 of 6

Based on the combined observations from each visit to the survey area, three territories are located within the south boundary of the Project limits (Figure 4, Territories 1-3). Breeding was confirmed at all three territories. An additional three territories are located within 300 feet from the southern Project limits (Figure 4, Territories 4-6). Breeding was confirmed at two of the three adjacent territories.

If you have questions or need clarifications regarding this report, please contact me at (949) 333-6643 or Phillip.Richards@icfi.com.

Sincerely,



Phillip Richards
ICF Biologist

Enclosed:

- Figure 1: Regional Location
- Figure 2: Project Vicinity
- Figure 3: Vegetation Communities
- Figure 4: Results

- Appendix A: Site Photographs
- Appendix B: Wildlife Species Detected
- Appendix C: Certification Statement

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Figures

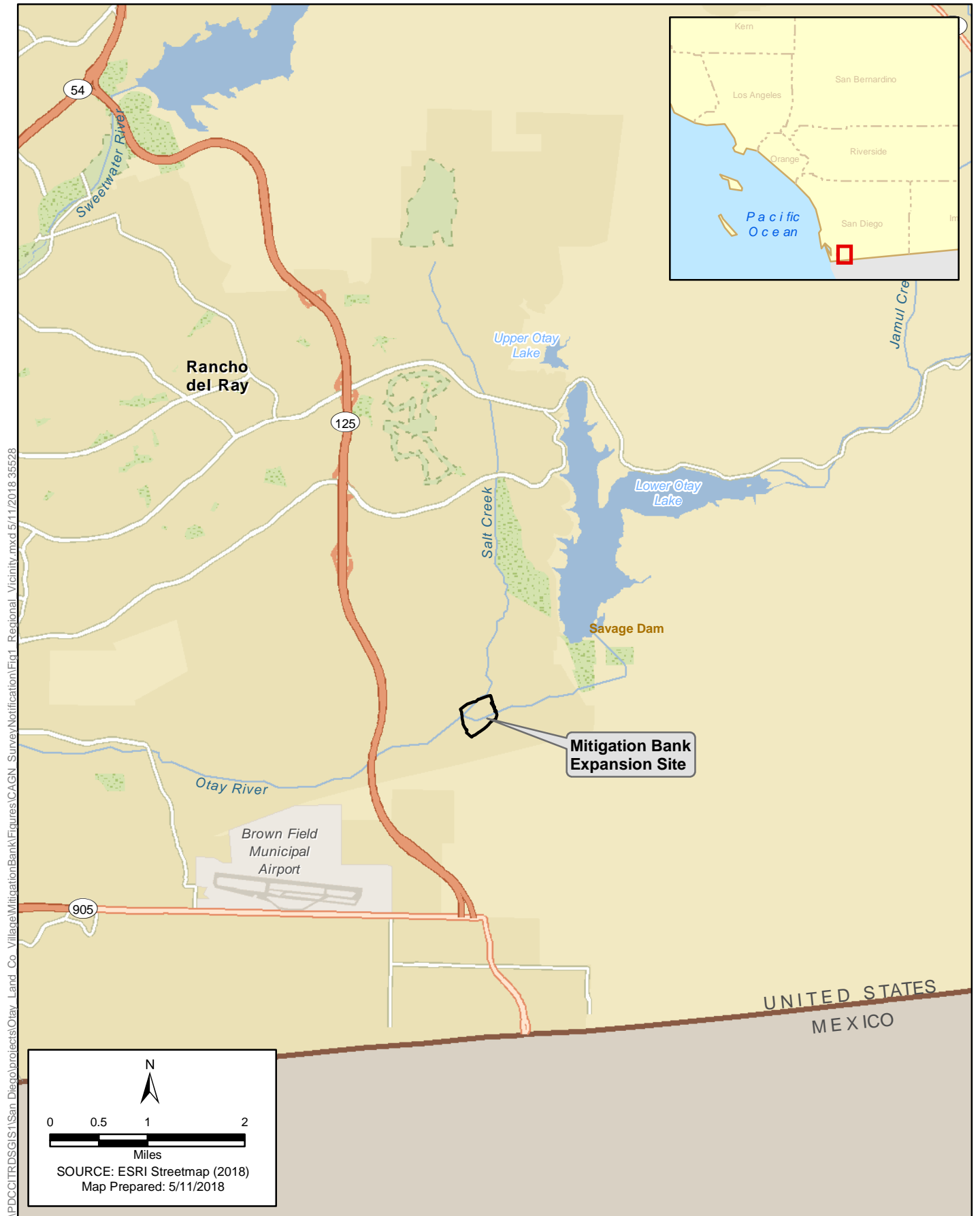
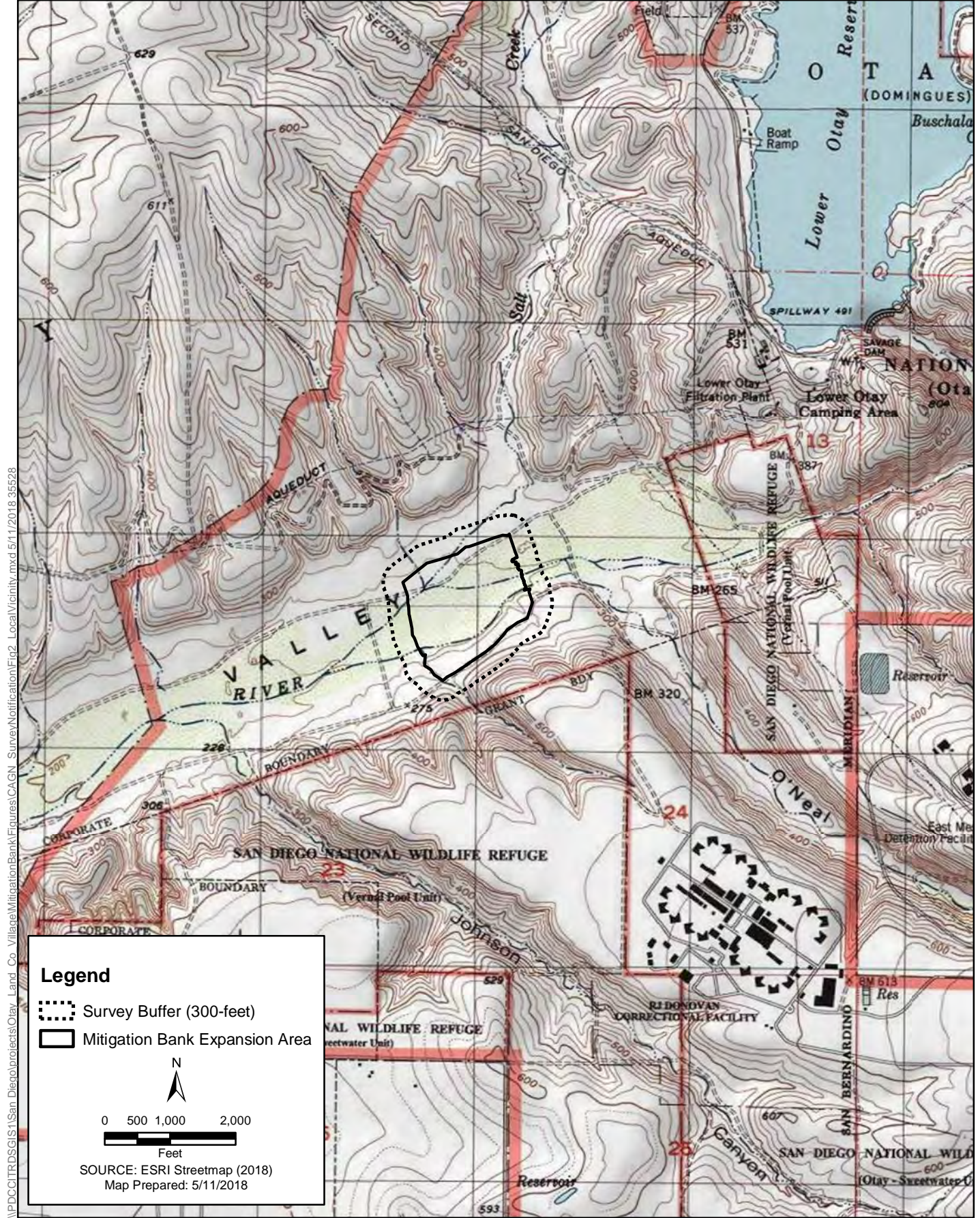


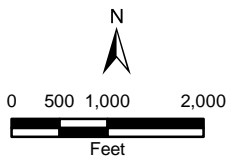
Figure 1
Regional Location
Otay River Mitigation Bank Expansion





Legend

- Survey Buffer (300-feet)
- Mitigation Bank Expansion Area

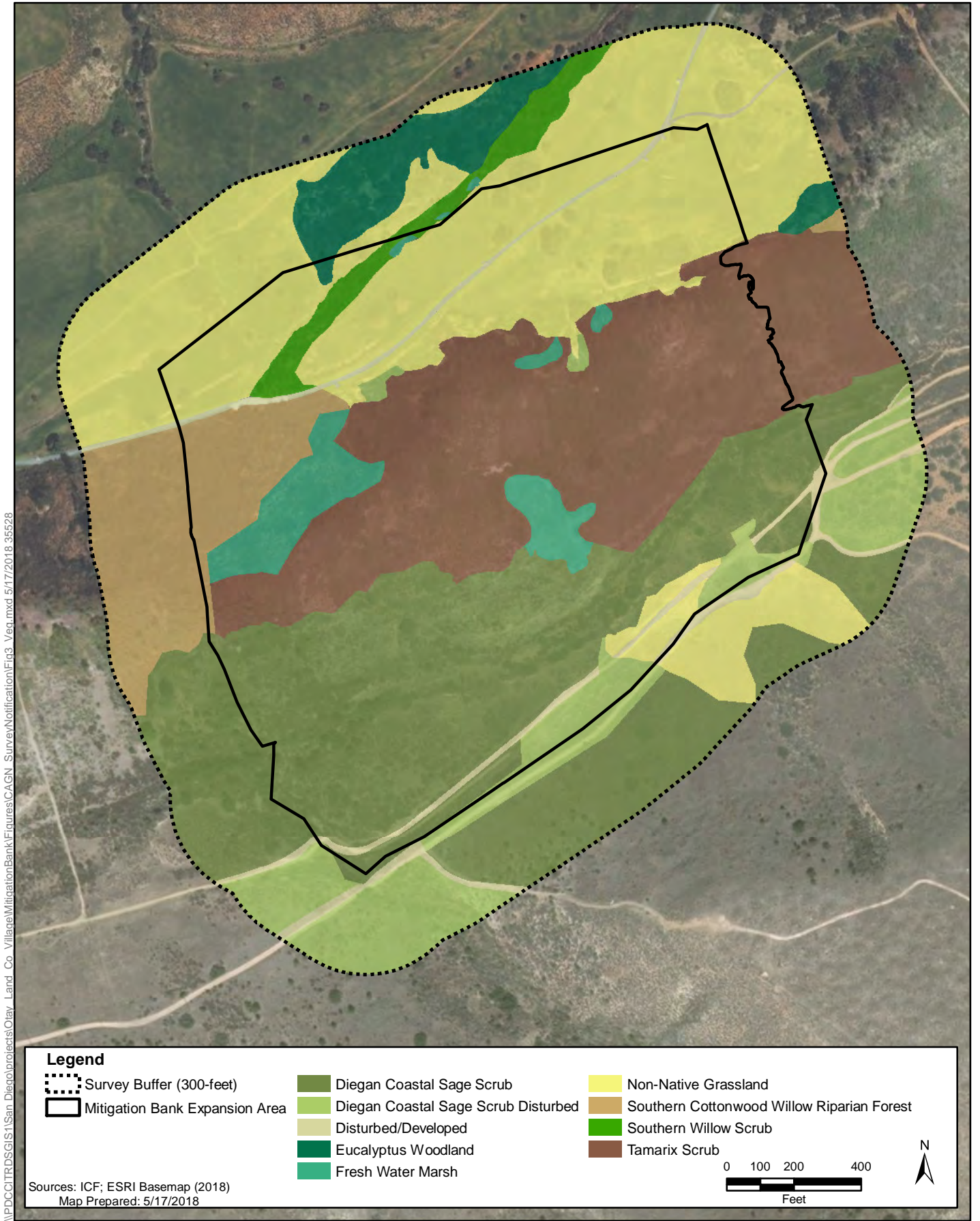


SOURCE: ESRI Streetmap (2018)
Map Prepared: 5/11/2018

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Figure 2
Project Vicinity
Otay River Mitigation Bank Expansion

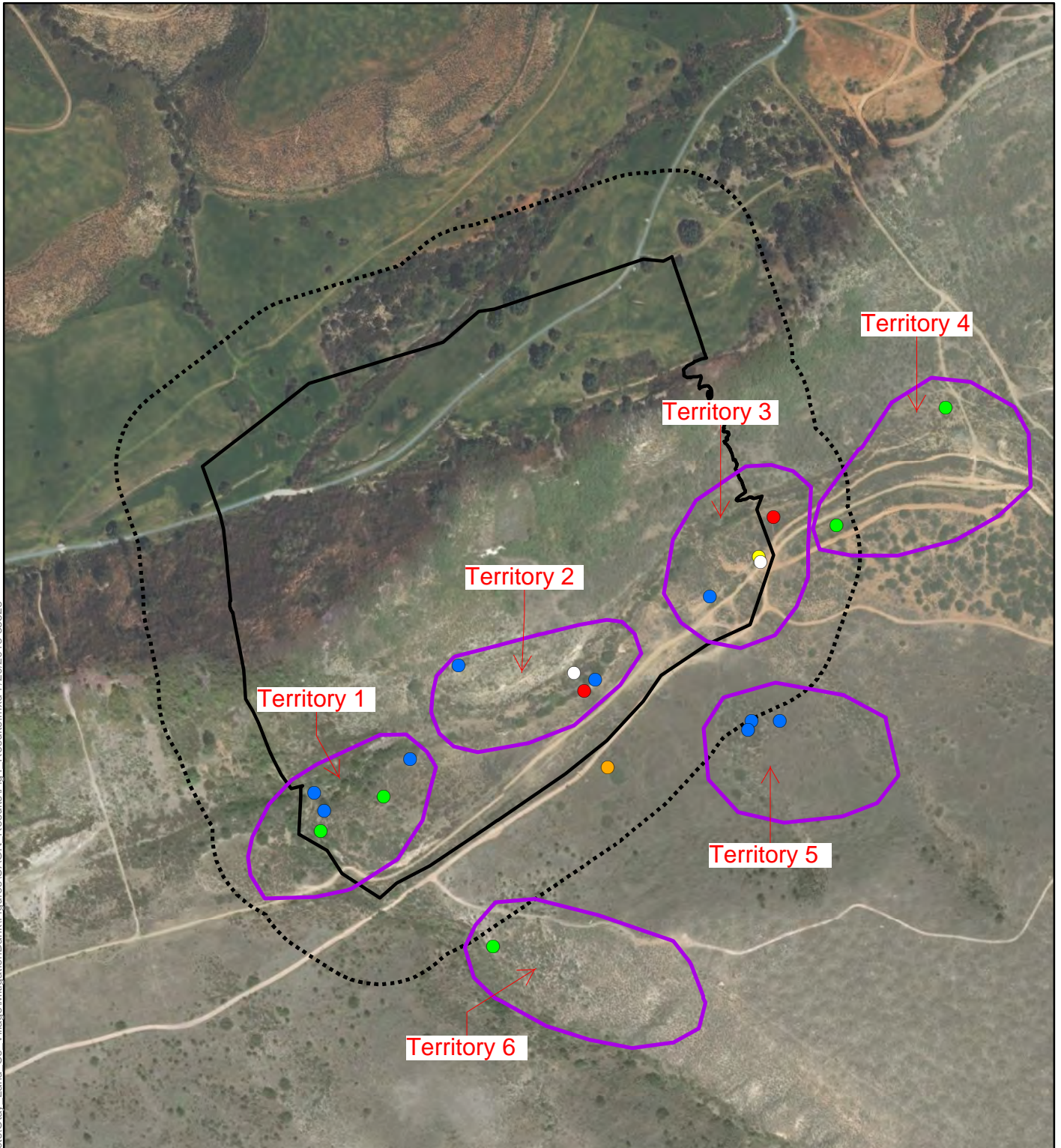


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Figure 3
Vegetation Communities
Otay River Mitigation Bank Expansion

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Legend

Mitigation Bank Expansion Area	California Gnatcatcher Observations	Pair incubating
Survey Buffer (300-feet)	Single Male	Pair feeding nestling(s)
	Pair w/ juvenile(s)	Dispersing juvenile(s)
	Pair nest building	Territory

Sources: ICF; ESRI Basemap (2018)
Map Prepared: 7/20/2018

0 125 250 500
Feet

Figure 4
Gnatcatcher Survey Results
Otay River Mitigation Bank Expansion



Appendix A
Site Photographs



Photograph: 1

Photo Date: June 13, 2018

Location: Southeast corner of survey area.

Direction: View facing northeast.

Comment: Photo depicts upland vegetation on terrace south of Otay River supporting coastal sage scrub.



Photograph: 2

Photo Date: June 13, 2018

Location: Center of survey area along southern boundary.

Direction: View facing north.

Comment: Photo depicts upland habitat above Otay River floodplain.



Photograph: 3

Photo Date: May 24, 2018

Location: Center of survey area along southern boundary.

Direction: View facing west.

Comment: Photo depicts upland habitat above Otay River floodplain.



Photograph: 4

Photo Date: June 13, 2018

Location: Center of survey area along southern boundary.

Direction: View facing southwest.

Comment: Photo depicts upland habitat on terrace south of Otay River supporting coastal sage scrub.



Photograph: 5

Photo Date: May 24, 2018

Location: Southwest corner of survey area.

Direction: View facing northeast.

Comment: Photo depicts upland habitat on terrace south of Otay River supporting coastal sage scrub.



Photograph: 6

Photo Date: April 17, 2018

Location: Southwest corner of survey area.

Direction: View facing west.

Comment: Photo depicts upland habitat on terrace south of Otay River supporting coastal sage scrub.

Appendix B
Wildlife Species Detected

Appendix B. Wildlife Species Detected

Scientific Name	Common Name	Special Status	
VERTEBRATES			
Reptiles			
<i>Sceloporus occidentalis</i>	Western Fence Lizard		
<i>Uta stansburiana elegans</i>	Western Side-blotched Lizard		
Birds			
<i>Callipepla californica</i>	California Quail		
<i>Elanus leucurus</i>	White-tailed Kite	CFP	SDC Group I
<i>Buteo jamaicensis</i>	Red-tailed Hawk		
<i>Zenaida macroura</i>	Mourning Dove		
<i>Chordeiles acutipennis</i>	Lesser Nighthawk		
<i>Aeronautes saxatalis</i>	White-throated Swift		
<i>Archilochus alexandri</i>	Black-chinned Hummingbird		
<i>Calypte anna</i>	Anna's Hummingbird		
<i>Picoides nuttallii</i>	Nuttall's Woodpecker		
<i>Empidonax difficilis</i>	Pacific-slope Flycatcher		
<i>Sayornis nigricans</i>	Black Phoebe		
<i>Sayornis saya</i>	Say's Phoebe		
<i>Myiarchus cinerascens</i>	Ash-throated Flycatcher		
<i>Tyrannus vociferans</i>	Cassin's Kingbird		
<i>Vireo bellii pusillus</i>	Least Bell's Vireo	FE, SE	SDC Group I, MSCP
<i>Vireo huttoni</i>	Hutton's Vireo		
<i>Vireo gilvus</i>	Warbling Vireo		
<i>Corvus brachyrhynchos</i>	American Crow		
<i>Corvus corax</i>	Common Raven		
<i>Tachycineta bicolor</i>	Tree Swallow		
<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow		
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow		
<i>Psaltriparus minimus</i>	Bushtit		
<i>Troglodytes aedon</i>	House Wren		
<i>Cistothorus palustris</i>	Marsh Wren		
<i>Thryomanes bewickii</i>	Bewick's Wren		
<i>Campylorhynchus brunneicapillus</i>	Cactus Wren		

Scientific Name	Common Name	Special Status	
<i>Polioptila caerulea</i>	Blue-gray Gnatcatcher		
<i>Polioptila californica californica</i>	Coastal California Gnatcatcher	FT, CSC	SDC Group I, MSCP
<i>Chamaea fasciata</i>	Wrentit		
<i>Toxostoma redivivum</i>	California Thrasher		
<i>Mimus polyglottos</i>	Northern Mockingbird		
* <i>Sturnus vulgaris</i>	European Starling		
<i>Phainopepla nitens</i>	Phainopepla		
<i>Oreothypis celata</i>	Orange-crowned Warbler		
<i>Geothlypis trichas</i>	Common Yellowthroat		
<i>Setophaga petechia</i>	Yellow Warbler	CSC	SDC Group II
<i>Icteria virens</i>	Yellow-breasted Chat	CSC	SDC Group I
<i>Pipilo maculatus</i>	Spotted Towhee		
<i>Aimophila ruficeps canescens</i>	Southern California Rufous-crowned Sparrow		SDC Group I, MSCP
<i>Melospiza crissalis</i>	California Towhee		
<i>Melospiza melodia</i>	Song Sparrow		
<i>Pheucticus melanocephalus</i>	Black-headed Grosbeak		
<i>Passerina caerulea</i>	Blue Grosbeak		
<i>Sturnella neglecta</i>	Western Meadowlark		
* <i>Molothrus ater</i>	Brown-headed Cowbird		
<i>Icterus cucullatus</i>	Hooded Oriole		
<i>Icterus bullockii</i>	Bullock's Oriole		
<i>Haemorhous mexicanus</i>	House Finch		
<i>Carduelis psaltria</i>	Lesser Goldfinch		
<i>Carduelis lawrencei</i>	Lawrence's Goldfinch		
<i>Carduelis tristis</i>	American Goldfinch		
Mammals			
<i>Sylvilagus audubonii</i>	Desert Cottontail		
<i>Canis latrans</i>	Coyote		

Scientific Name	Common Name	Special Status
Legend		
* = Non-native or invasive species		
Special Status:	County:	
Federal:	SDC Group I = includes animal species that have a very high level of sensitivity, either because they are listed as threatened or endangered or because they have very specific natural history requirements that must be met.	
FE = Endangered	SDC Group II - includes animal species that are becoming less common, but are not yet so rare that extirpation or extinction is imminent without immediate action. These species tend to be prolific within their suitable habitat types.	
FT = Threatened	MSCP = Multiple Species Conservation Program Covered Species	
State:		
SE = Endangered		
ST = Threatened		
CSC = California Species of Special Concern		
CFP = California Fully Protected Species		

Appendix C
Certification Statement

I certify that the information contained in this survey report and attached exhibits fully and accurately represents my work. Should you have any questions regarding the methodology or findings in this report, please do not hesitate to contact Phillip C. Richards by email (Phillip.Richards@icfi.com) or call (949) 333-6643.

Sincerely,

A handwritten signature in black ink that reads "Phillip C. Richards". The signature is written in a cursive style with a large initial 'P'.

Phillip C. Richards
Permit# TE-095896

Appendix I

2018 Least Bell's Vireo Survey Report



Least Bell's Vireo (*Vireo bellii pusillus*) Surveys and Nest Monitoring at the Salt Creek, Northern Salt Creek, and Wolf Canyon Parcels of the Otay Ranch Preserve, City of Chula Vista, San Diego County

October 10, 2019

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Photos on cover page taken 30 April and 11 July 2019 by Kimberly Ferree.

Recommended Citation:

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Introduction

This report presents the results of surveys and nest monitoring conducted for the Least Bell's Vireo (*Vireo bellii pusillus*; vireo) and Yellow-billed Cuckoo (*Coccyzus americanus*; cuckoo) at the Salt Creek, Northern Salt Creek, and Wolf Canyon Parcels of the Otay Ranch Preserve (Preserve), in the city of Chula Vista, San Diego County, California. The Salt Creek, Northern Salt Creek, and Wolf Canyon Parcels are located in southeastern Chula Vista, California, southwest of Lower Otay Lake (Figure 1) and are collectively referred to hereafter as the "Project Area." The Project Area ranges in elevation from approximately 240 to 540 feet above mean sea level (Figure 2). The surveys were conducted on all suitable habitat within the Project Area under U.S. Fish and Wildlife Service (USFWS) 10(a)1(A) permit TE-117947 (Kevin Clark) and TE-122632 (Kimberly Ferree), and a Memorandum of Understanding with the California Department of Fish and Wildlife (CDFW).

Least Bell's Vireo surveys of the Preserve were initiated in 2011. The areas surveyed within the Preserve have changed several times since 2011. To be comparable from year to year, the Project Area has been divided into six survey sites (Table 1, Figure 3). From 2011-2013, the survey sites included the City of Chula Vista (Figure 3; City) site, located in the southern portion of the Salt Creek Parcels; the portion designated as a Formerly Used Defense Site (Figure 3; FUDS), located in the southwestern portion of the Salt Creek Parcels; and the Salt Creek site (Figure 3), located north of the City survey site in the northern portion of the Salt Creek Parcels. In 2014, the City and Salt Creek survey sites were surveyed while the FUDS survey site was excluded by request of the City of Chula Vista. No surveys were conducted in 2015. However, due to proposed restoration activities, surveys were resumed in 2016 by ICF and included the City and FUDS survey sites. The San Diego Natural History Museum was contracted separately by ICF and the City of Chula Vista to survey and monitor vireos beginning in 2017 at all three survey sites (City, FUDS, Salt Creek). The survey boundary on the western end of the Preserve was expanded in 2018 to include additional habitat that is under consideration for future restoration by ICF (Figure 3; ICF). In 2019, the Project Area was expanded once more to include all the potential habitat of the Northern Salt Creek Parcel (Figure 3; Northern Salt Creek), south of Olympic Parkway, and the Wolf Canyon Parcel (Figure 3; Wolf Canyon), located north of the Otay River Valley and west of the Salt Creek Parcels.

For ease of comparison, results of the Least Bell's Vireo surveys and monitoring (e.g. territory numbers, number of nests) are presented individually by survey site. Reproductive success and productivity statistics are presented for the five contiguous survey sites (excluding Wolf Canyon), because sample sizes were too small to present by survey site.

Yellow-billed Cuckoo surveys have been conducted beginning in 2016 as a result of the finding of a Yellow-billed Cuckoo in the Preserve in 2012 (Clark 2012). The areas surveyed for Yellow-billed Cuckoo include the three survey sites located in the Otay River Valley (i.e., City, FUDS, and ICF).



- Northern Salt Creek
- Salt Creek
- Wolf Canyon

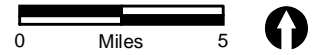
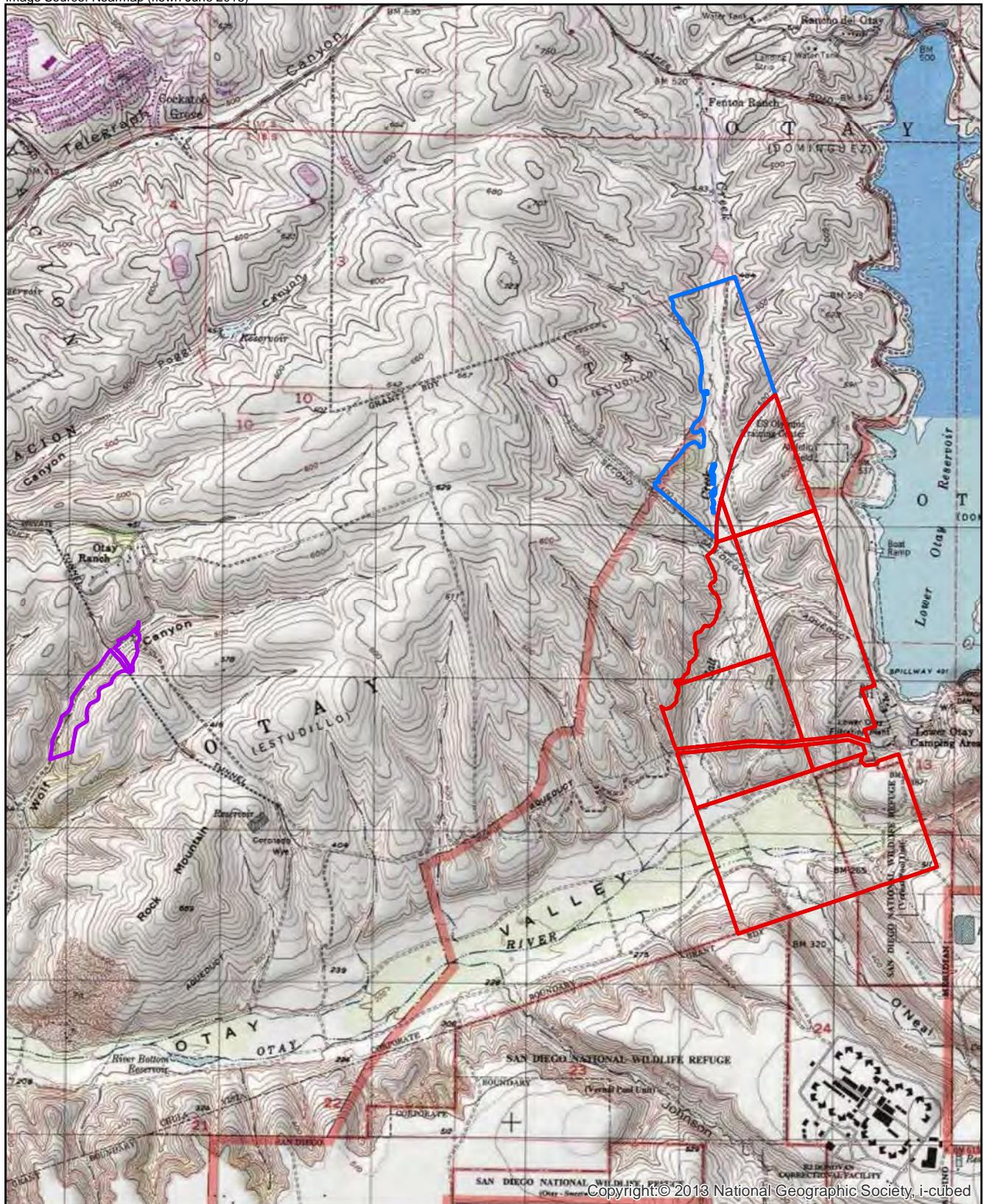





FIGURE 1
 Regional Location of Northern Salt Creek,
 Salt Creek, and Wolf Canyon Parcels
 Otay Ranch Preserve



Otay Ranch Project Area

-  Northern Salt Creek
-  Wolf Canyon
-  Salt Creek

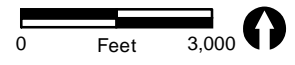
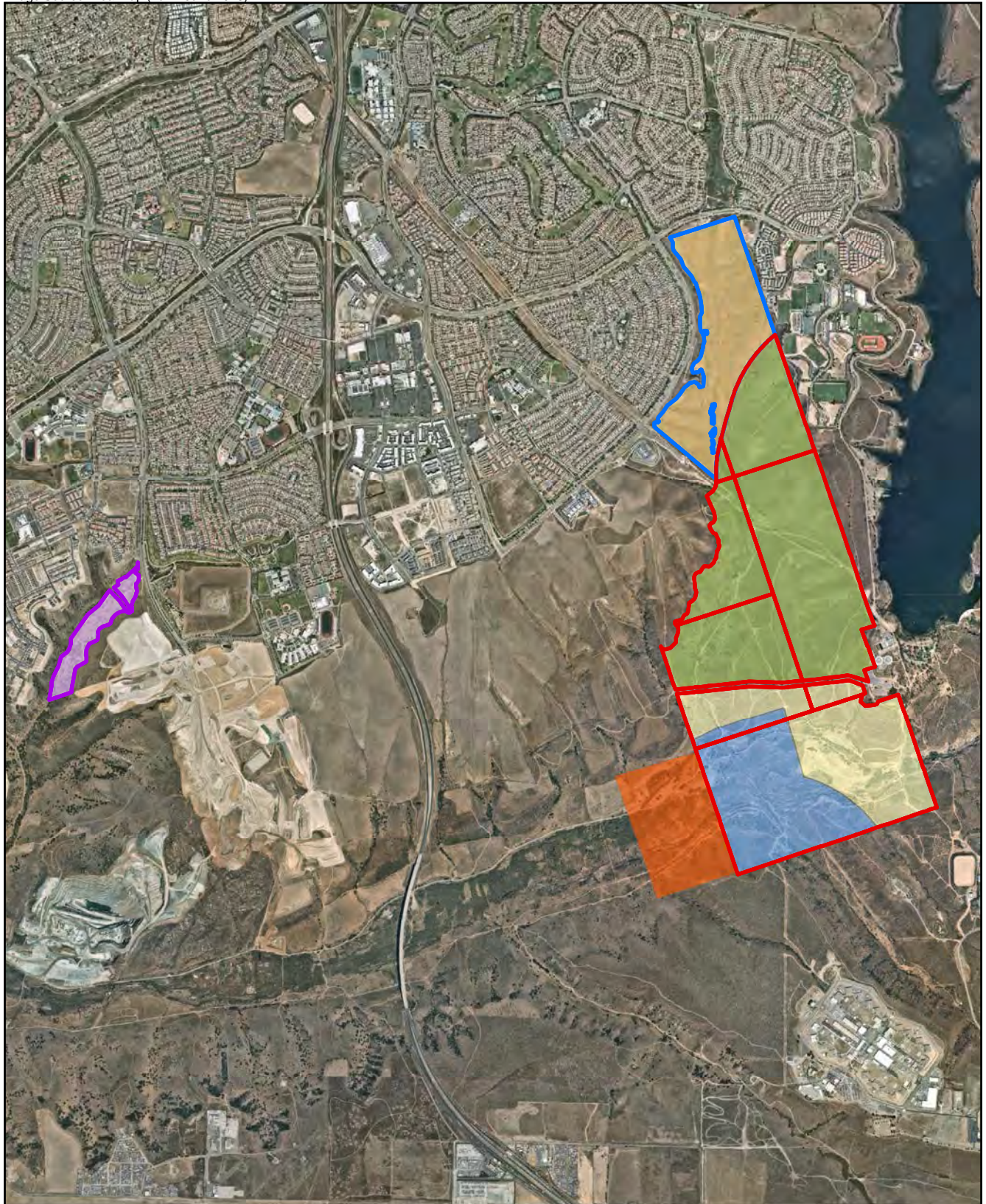


FIGURE 2
Northern Salt Creek, Salt Creek, and
Wolf Canyon Parcels on USGS Map
Otay Ranch Preserve



LBV Survey Sites

- City of Chula Vista
- Formerly Used Defense Site (FUDS)
- ICF
- Northern Salt Creek
- Salt Creek
- Wolf Canyon

Otay Ranch Project Area

- Northern Salt Creek
- Wolf Canyon
- Salt Creek

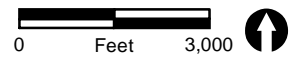


FIGURE 3

Least Bell's Vireo Survey Sites
at Otay Ranch Preserve, 2019

Table 1. Summary of Least Bell's Vireo Surveys and Monitoring in the Otay Ranch Preserve, California, 2011-2019.

Survey Site	Survey Years	Location
City	2011-2013, 2014, 2016-2019	Southeastern portion of Salt Creek Parcels in the Otay River Valley.
FUDS	2011-2013, 2014, 2016-2019	Southwestern portion of Salt Creek Parcels in the Otay River Valley.
Salt Creek	2011-2013, 2016-2019	Northern portion of the Salt Creek Parcels in Salt Creek.
ICF	2018-2019	West of Salt Creek Parcels in the Otay River Valley.
Northern Salt Creek	2019	Northern Salt Creek Parcels in Salt Creek.
Wolf Canyon	2019	Wolf Canyon Parcel in Wolf Canyon. North of the Otay River Valley. Not contiguous with Salt Creek and Northern Salt Creek Parcels.

Least Bell's Vireo Biology

The Least Bell's Vireo breeds in southern California and northwestern Baja California, with the majority of the population located in San Diego County (Kus *et al.* 2010). The Least Bell's Vireo is a small, migratory insectivore that prefers dense riparian vegetation for foraging and nesting. The CDFW listed the Least Bell's Vireo as endangered in 1980. The USFWS followed suit in 1986. Critical habitat was designated for this subspecies in 1994 along the southwestern coastline of California below Santa Barbara (USFWS 1994).

Historically, Least Bell's Vireo was a common to locally abundant species found in lowland riparian habitats between northern California and coastal southern California. However, loss of riparian habitats and Brown-Headed Cowbird (*Molothrus ater*) parasitism led to a large population decline. When USFWS first listed the bird in 1986, the population was estimated to be just 300 pairs. The latest Five-Year Review, dated September 2006, reported a 10-fold increase in population size since the time of its listing to an estimated 2,968 territories (USFWS 2006). The vireo population increase is largely attributed to cowbird control and habitat restoration and preservation (Kus 1999, Kus and Whitfield 2005).

Least Bell's Vireos typically begin to arrive on their breeding grounds by mid- to late March. Males tend to arrive first and establish territories; females arrive a few days later. Site fidelity is high among adult Least Bell's Vireo, with many birds returning to the same territory each year and even using the same shrub for nesting as previous years (Salata 1983, Kus 2002). Nests are typically placed within 1 meter of the ground in dense shrubby riparian habitat. A diverse canopy height is required for foraging, with willows often dominating the canopy layer (Salata 1983). Nesting lasts from early April through July, at which time some vireos may begin to depart; however, most adults and juvenile birds remain on the breeding grounds into late September/early October. In southern California, Least Bell's Vireo nest sites are most frequently located in riparian stands between 5 and 10 years old (SANDAG and RECON 1990).

Based on rigorous statistical analysis of Least Bell's Vireo habitat structure and composition, this species appears to preferentially select sites with large amounts of shrub and tree cover, a large degree of vertical stratification, and small amounts of aquatic and herbaceous cover (SANDAG and RECON 1990).

Existing Conditions

The riparian habitats across the Project Area are variable. Dense riparian woodland occurs in the wetter locales dominated by arroyo willow (*Salix lasiolepis*), black willow (*S. gooddingii*), and Fremont cottonwood (*Populus fremontii*; Appendix A, Photo 1). In more xeric conditions, stands of mule fat (*Baccharis salicifolia*) are present with occasional pockets of arroyo willow and coyote willow (*S. exigua*) (Appendix A, Photo 2). Dense stands of tamarisk (*Tamarix* sp.) are also present in some locations, being particularly prevalent in the Otay River in the City, FUDS, and ICF survey sites (Appendix A, Photo 3). Upland habitats adjacent to the riparian habitat are dominated by laurel sumac (*Malosma laurina*) and Peruvian pepper trees (*Schinus molle*), with blue elderberry (*Sambucus nigra* subsp. *caerulea*) also prevalent (Appendix A, Photo 4). Laurel sumac and pepper trees are especially common on the upland benches adjacent to the Otay River. The ICF survey site consists of a mix of mule fat, tamarisk, and small stands of arroyo willow.

Riparian habitat along Salt Creek occurs as a narrow stand, with scattered patches of arroyo willow intermixed with mule fat, laurel sumac, tamarisk, and lemonade berry (*Rhus integrifolia*), and surrounded by coastal sage scrub species (Appendix A, Photo 5). Of growing concern at Salt Creek is the continuation of a die-off of lemonade berry that was observed beginning in 2017 and appears to be spreading rapidly (Appendix A, Photo 6). It is suspected that the Invasive Shot Hole Borer (ISHB), (*Euwallacea* sp.) an invasive boring beetle is responsible for this die-off. A survey by the San Diego Natural History Museum in 2007 documented that ISHB was present at Salt Creek and Otay River (unpublished SDNHM).

A habitat restoration project was initiated in the fall of 2018 in the upper portion of the Otay River within the Preserve (City and FUDS). This area was cleared of exotic vegetation and the river bed was recontoured and replanted with native riparian and upland plant species. This restoration area will take several years to mature into native riparian habitat.

Wolf Canyon supports a narrow, discontinuous strip of riparian habitat consisting of arroyo willow and mule fat. Upland areas are dominated by exotic vegetation including mustards (*Brassica* spp.), garland chrysanthemum (*Glebionis coronaria*), and tocalote (*Centaurea melitensis*; Appendix A, Photo 7).

Methods

All surveys were led by USFWS section 10(a)(1)(A) permitted biologists, Kevin Clark (TE-117947) and Kimberly Ferree (TE-122632). A summary of dates, personnel, time, and weather conditions for all survey and monitoring visits is provided in Appendix B.

Least Bell's Vireo Protocol Surveys

Least Bell's Vireo surveys were conducted at the Project Area between 10 April and 31 July 2019 following standard survey techniques recommended by the USFWS Least Bell's Vireo survey guidelines (USFWS 2001). Eight protocol presence/absence surveys were conducted at least 10 days apart (Appendix B).

Observers moved slowly through the riparian habitat, stopping frequently to search and listen for vireos. Surveys were conducted between dawn and early afternoon, and did not occur during periods of excessive heat, wind, rain, fog, or other inclement weather. Behavioral observations were used to assist with the determination of breeding status for each individual or pair observed. For each bird encountered, observers recorded age (adult or juvenile), sex, breeding status (paired, single, undetermined, or transient), and whether the bird was banded. Birds were considered transients if they were detected only once during the season. Vireo locations were recorded using a hand-held global positioning system (GPS) unit. In addition, the presence of brown-headed cowbirds within or adjacent to survey sites were noted. All avian species detected during the surveys were recorded. A complete list of avian species detected during surveys is in Appendix C.

Yellow-billed Cuckoo Protocol Surveys

As a result of the finding of a Yellow-billed Cuckoo in the Preserve in 2012 (Clark 2012) and in 2016 (ICF 2017), four cuckoo surveys were conducted in 2019 according to established protocol (Halterman *et al.* 2015) (Appendix B). Taped broadcast calls were played in all suitable habitat in order to solicit a response from any cuckoos present.

Least Bell's Vireo Nest Monitoring

Least Bell's Vireo nests were monitored for nest success and productivity throughout the breeding season from 10 April to 30 July (Appendix B). Vireo territories were visited on a weekly to bi-weekly basis to monitor for evidence of breeding activities. Locations of adults, fledglings, and nests were recorded using a GPS unit or the Collector for ArcGIS (Version 10.4) application on a smart phone (ESRI 2016). In addition, GPS point locations were collected during each visit to estimate territory use and size. Nests were visited every 7 to 10 days, and the contents were recorded, with nest checks as brief as possible. The presence or absence of Brown-headed Cowbird eggs was noted, and if present, cowbird eggs were removed. The presence of fledglings was determined through direct observation of fledglings in the territory. Characteristics of nests, including height, host plant species, and host plant height, were recorded after the young had fledged or the nest had failed.

If a bird was actively foraging, we observed the movements of the species and recorded a GPS point at the limits of its foraging activity. If the bird was not actively foraging, only the initial location was recorded. Observations of aggressive behavior between adjacent individuals was also noted to enable patterns of territory size to be elucidated more clearly. These points were plotted on a map to examine the area used by each individual bird (or pair of birds).

Numbers of vireo territories and nests are presented separately by survey site: City, FUDS, ICF, Salt Creek, Northern Salt Creek, and Wolf Canyon. Reproductive success and productivity measures are pooled across the five contiguous survey sites (City, FUDS, ICF, Salt Creek and Northern Salt Creek). Reproductive success measures for Wolf Canyon are presented separately.

Results

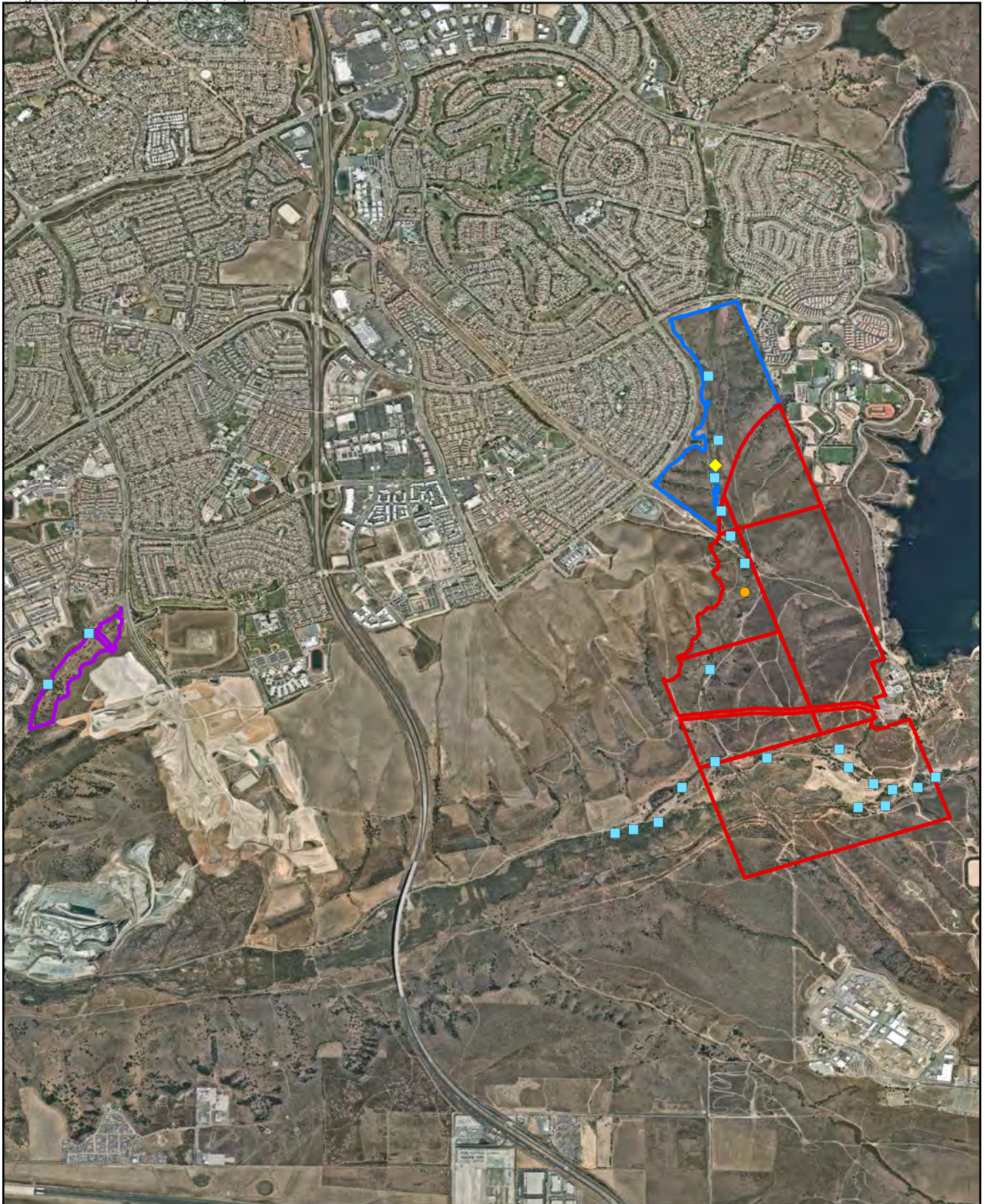
Least Bell's Vireo Protocol Surveys

In 2019, a total of 24 Least Bell's Vireo territories was identified during surveys and monitoring at the Project Area (Table 2, Figure 4). Of the 24 territorial males, 23 were confirmed as paired, and one was confirmed as a single male.

Least Bell's Vireos declined from 13 to 9 territories at the City and FUDS survey sites from 2018 to 2019 (Ferree and Clark 2018) (Figure 5). Territory numbers at Salt Creek increased from four to five territories from 2018 to 2019, although one of these territories was defended by a single male for two and a half weeks. Least Bell's Vireos remained stable at four territories at the ICF survey site in 2018 and 2019. Four territories were detected within the expanded survey site of Northern Salt Creek, and two territories were detected within Wolf Canyon.

Table 2. Number and breeding status of Least Bell's Vireo territories at Otay Ranch Preserve, California, in 2019.

Survey Site	Pairs	Single Male	Total Territories
City	7	–	7
FUDS	2	–	2
ICF	4	–	4
Salt Creek	4	1	5
Northern Salt Creek	4	–	4
Wolf Canyon	2	–	2
Total	23	1	24



LBV Territories

(Source: SDNHM 2019)

- LBV Pair
- LBV Single Male
- ◆ LBV Transient

Otay Ranch Project Area

- Northern Salt Creek
- Wolf Canyon
- Salt Creek

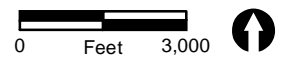


FIGURE 4

Locations of Least Bell's Vireo Territories at Otay Ranch Preserve, 2019

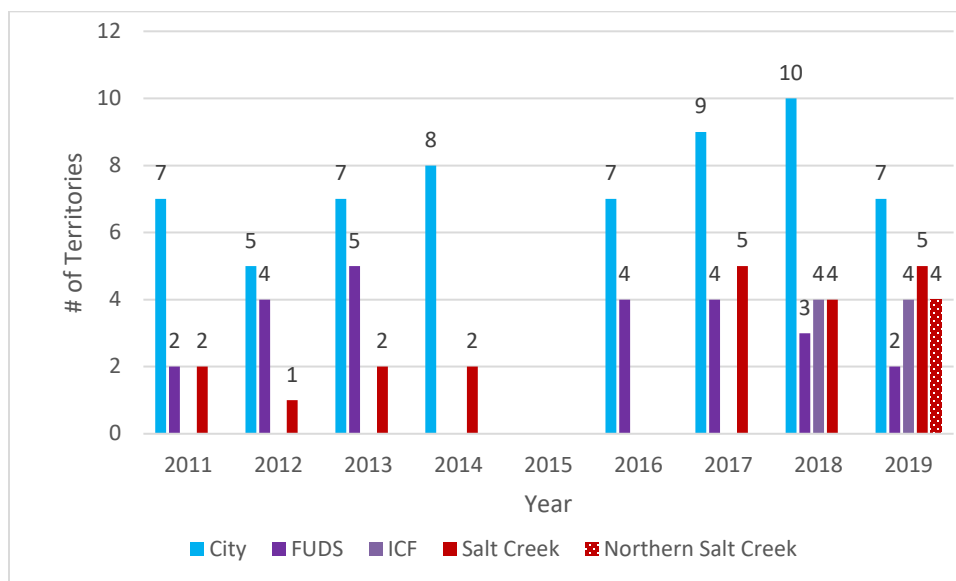


Figure 5. Number of territorial male Least Bell's Vireos by survey site at the Salt Creek and Northern Salt Creek Parcels, Otay Ranch Preserve, California, 2011-2019. Missing bar indicates no survey was conducted in that year.

Yellow-billed Cuckoo Protocol Surveys


One Yellow-billed Cuckoo was observed during the final survey on 3 September 2019. This silent individual was first observed in the large eucalyptus (*Eucalyptus* sp.) grove along Wiley Road in the FUDS survey site (Figure 6). It was then observed flying towards a large eucalyptus about 15 meters (m) up where it perched for a few seconds. It then flew off, about 20 m away to another eucalyptus tree. After foraging briefly, the cuckoo flew off across the riparian over 150 m to the southwest. The bird never vocalized and was not detected again. Yellow-billed Cuckoo observations from previous years comprised one individual in 2012 (Clark 2012) and one individual in 2016 (ICF 2017) within Otay River.

Least Bell's Vireo Nest Monitoring

Nesting activity was monitored in 23 territories across the Project Area, with 21 on the Otay River and Salt Creek (City, FUDS, ICF, Salt Creek, and Northern Salt Creek survey sites) and 2 at Wolf Canyon (Table 3; Appendix D; Appendix E). Of these, 21 were considered "fully monitored," meaning that all nests within the territory were found and monitored during the breeding season. Pairs within the remaining two territories were documented nesting; however, these were "partially monitored," meaning only a subset of nests were monitored. One partially monitored territory was detected with fledglings, but a nest was never found. One territory occupied by a single male from 29 April to 12 May 2019 was excluded from the nesting analysis. A total of 43 nests was monitored during the breeding season, with 41 at Otay River and Salt Creek and 2 at Wolf Canyon.



 Salt Creek

 Yellow-billed Cuckoo


 0 Feet 1,000



FIGURE 6

Location of Yellow-billed Cuckoo,
Otay Ranch Preserve, 2019

Table 3. Number of Least Bell's Vireo territories and nests monitored by survey site at Otay Ranch Preserve, California, in 2019.

	Otay Ranch Preserve					Wolf Canyon ^a	Total
	City	FUDS	ICF	Salt Creek	Northern Salt Creek		
Fully monitored:							
Territories	7	2	3	3	4	2	21
Total number of completed nests	13	3	7	7	9	2	41
Completed nests/pair (SD)	2.0 ± 0.6					NC	
Total number of nest attempts/pair (SD)	2.0 ± 0.6					NC	
Partially monitored:							
Territories	–	–	1	1 ^b	–	–	2
Total number of completed nests	–	–	1	1	–	–	2
Total # of nests monitored	13	3	8	8	9	2	43

^aExcluded from overall reproductive measures.

^bOne pair was detected with fledglings, but a nest was never found.

SD = standard deviation.

NC = not calculated.

Nesting Attempts

The average number of nesting attempts over the course of the 2019 breeding season was 2.0 ± 0.6. The majority of vireo pairs re-nested after their initial attempt (71%; 15/21). Five pairs initiated three nesting attempts. Over 50% of first nesting attempts in 2019 were initiated during the first two weeks of April (57%, 12/21). Least Bell's Vireos began building nests more than two weeks earlier in 2019 compared to 2018 (Figure 7).

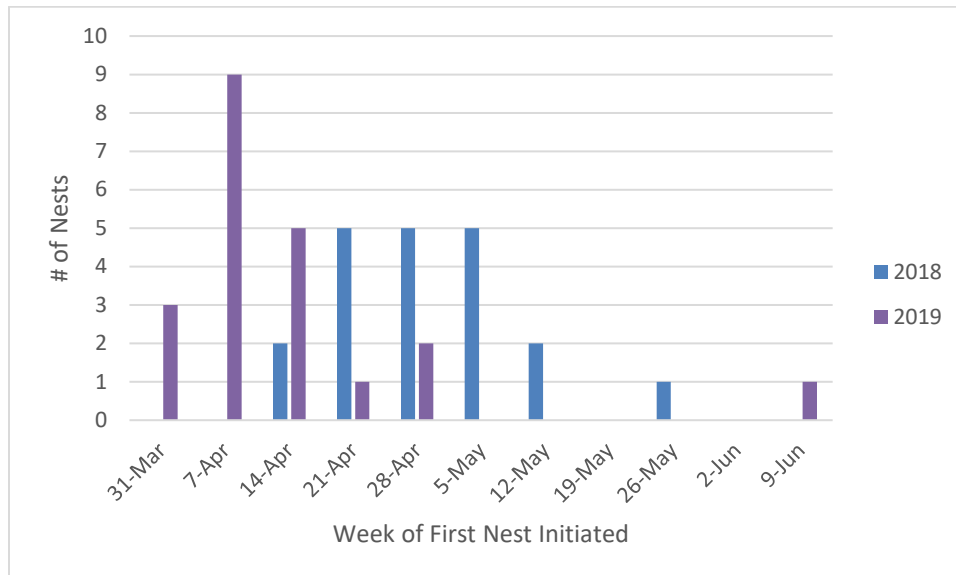


Figure 7. Number of first Least Bell's Vireo nests initiated by week at Otay Ranch Preserve, California, 2018 and 2019.

Nest Success

Overall, 61% (25/41) of completed nests were successful and fledged young at Otay River (City, FUDS, ICF) and Salt Creek (Salt Creek, Northern Salt Creek) in 2019 (Table 4). Predation was believed to be the primary source of nest failure at Otay River (City, FUDS, ICF) and Salt Creek (Salt Creek, Northern Salt Creek) (Table 4). Predation accounted for 34% (14/41) of nest failures. Nest failures were not limited to nest predation. One nest failed directly as a result of parasitism. After the pair had incubated four eggs for approximately one week, the nest was found with one cowbird egg and one vireo egg inside the nest and two cracked vireo eggs below the nest. One nest was abandoned with four eggs three days after the eggs should have hatched.

Table 4. Fate of Least Bell's Vireo nests by survey site at Otay Ranch Preserve, California, in 2019. Proportion of total completed nests shown in parentheses.

Nest Fate	City	FUDS	ICF	Salt Creek	Northern Salt Creek	Total Number of Nests
Successful	9	3	5	3	5	25 (0.61)
Failed						
Predation	4		1	5	4	14 (0.34)
Parasitism			1			1 (0.02)
Abandoned			1			1 (0.02)
Failed Total	4		3	5	4	16 (0.39)
Total completed nests	13	3	8	8	9	41 (1.00)

Brown-headed Cowbird Parasitism

In total, seven nests were parasitized at the Project Area during the 2019 breeding season (17%; 7/41). One nest failed directly as a result of cowbird parasitism. Of the remaining six nests, four nests were parasitized and successful, and two nests were parasitized and subsequently depredated. We removed six cowbird eggs from six nests. Cowbird parasitism occurred between 30 March and 7 May. Parasitism was concentrated on Salt Creek (Salt Creek and Northern Salt Creek survey sites) where five territories were located (Appendix E, Figure 14). One pair located at the southern end was parasitized twice (Appendix E, Figure 14). Although cowbirds were observed within vireo territories, no nests were parasitized in Wolf Canyon.

Reproductive Success and Productivity

Otay River (City, FUDS, ICF) and Salt Creek (Salt Creek, Northern Salt Creek) vireos fledged 4.1 ± 1.9 young per pair (Table 5). Hatching success, fledgling success, and pair success were high; 100% (19/19) of vireos in fully monitored territories were successful and produced at least one vireo fledgling by the end of the season. In addition, both of the partially monitored pairs fledged young, although no nest was found for one of the pairs. Therefore, overall pair success at Otay River (City, FUDS, ICF) and Salt Creek (Salt Creek, Northern Salt Creek) for both fully and partially monitored pairs was 100% (21/21). Five pairs were observed to double brood. Both vireo pairs at Wolf Canyon were successful and fledged young in 2019.

Table 5. Reproductive success and productivity of Least Bell's Vireos at Otay Ranch Preserve, California, 2019. Standard deviations presented with means.

Parameter	Number
Average completed nests per pair (SD)	2.0 ± 0.6
Average clutch size ^a	3.5 ± 0.7
Hatching success eggs ^b	67%
Hatching success nests ^c	75%
Fledgling success hatchlings ^d	84%
Fledgling success nests ^e	83%
Average fledglings per nest ^f	2.0
Average number of young fledged per pair ^g	4.1 ± 1.9
Pairs fledging ≥ one young ^g	19 (100%)
Pairs fledging two broods ^g	5 (26%)

^a Based on 33 unparasitized nests with a full clutch.

^b Percent of all eggs that hatched (94/140).

^c Percent of all nests with eggs in which at least one egg hatched (30/40).

^d Percent of all nestlings that fledged (79/94).

^e Percent of all nests with nestlings in which at least one young fledged (25/30).

^f Number of fledglings per nest (79/40).

^g Based on 19 pairs whose territories were fully monitored.

Host Plant Species

Least Bell's Vireos used 10 different host plant species at Otay River and Salt Creek in 2019 (Table 6). Approximately two-thirds of all nests were placed in laurel sumac and lemonade berry; 32% (13/41) of all nests were placed in laurel sumac and 27% (11/41) were placed in lemonade berry. Tamarisk and mule fat were the next most commonly used substrates representing 19%. The remaining six species were used once or twice. At Wolf Canyon, one nest was placed in lemonade berry, and one nest was placed in mesquite (not identified to species).

Table 6. Host plant species used by Least Bell's Vireos, by survey site, Otay Ranch Preserve, California, 2019. Proportion of total nests shown in parentheses.

Host Species	City	FUDS	ICF	Salt Creek	Northern Salt Creek	Total
Laurel sumac (<i>Malosma laurina.</i>)	9	3			1	13 (0.30)
Lemonade berry (<i>Rhus integrifolia</i>)	1		1	3	6	11 (0.27)
Tamarisk (<i>Tamarix sp.</i>)			2	1	2	5 (0.12)
Mule fat (<i>Baccharis salicifolia</i>)			2	1		3 (0.07)
Arroyo willow (<i>Salix lasiolepis</i>)	1			1		2 (0.05)
Toyon (<i>Heteromeles arbutifolia</i>)			2			2 (0.05)
Arrowweed (<i>Pluchea sericea</i>)	2					2 (0.05)
Broom Baccharis (<i>Baccharis sarothroides</i>)				1		1 (0.02)
Peruvian peppertree (<i>Schinus molle</i>)			1			1 (0.02)
Mexican elderberry (<i>Sambucus nigra</i> subsp. <i>caerulea</i>)				1		1 (0.02)
Total	13	3	8	8	9	41 (1.00)

Avian Species Detected

We detected 88 bird species during Least Bell's Vireo and Yellow-billed Cuckoo surveys and monitoring (Appendix C) from 1 April to 3 September 2019 within or in close proximity to the Preserve. Notable breeding species from the California Bird Species of Special Concern (Shuford and Gardali 2008) include Northern Harrier (*Circus hudsonius*), Cactus Wren (*Campylorhynchus brunneicapillus*), Yellow Warbler (*Setophaga petechia*), Yellow-breasted Chat (*Icteria virens*), and the federally listed California Gnatcatcher (*Polioptila californica*). Notably, a Northern Cardinal (*Cardinalis cardinalis*) pair was also detected at the southern end of Salt Creek. Although a male Northern Cardinal was detected in 2016, this is the first year that a male and female were detected together on multiple visits within the same approximate 150-meter-radius area. While monitoring a Least Bell's Vireo territory, a male cardinal was observed singing and calling frequently on three occasions from 19 June to 2 July. On the third visit, a female Northern Cardinal was observed calling in response to the male. No nest or fledglings were observed for this pair.

Discussion

Least Bell's Vireo territories have fluctuated from a low of 10 territories in 2012 and 2014 to a high of 18 territories in 2017 at the Preserve (Figure 5; Clark 2012, Clark 2013, Clark 2014b, ICF 2017, Ferree and Clark 2017). For the second year in a row, overall vireo numbers declined, losing four territories (17 to 13 territories) from 2018 to 2019 (Ferree and Clark 2018). Most of this change occurred in the Otay River (City and FUDS survey sites), which lost three territories from 2018 to 2019. The ICF survey site

stayed the same (four territories), and Salt Creek increased its population by just one single male, which stayed for approximately three weeks. Although it is unknown why there was a slight population decline from 2018 to 2019, a contributing factor may be the low productivity documented in 2018, at just 1.2 young fledged per pair (Ferree and Clark 2018).

In general, vireos used areas that were occupied in 2018; 16 of 18 territories in 2019 were in the same location as in 2018 at the Preserve. In addition, several vireo pairs increased their territory size to include habitat that was occupied by in 2018, but not occupied in 2019 (Appendix E, Figure 8, Figure 10; OTY02, OTY08, ICF23, ICF20). One territory, which was occupied by a single male in 2018, was occupied by a breeding pair in 2019 (Appendix E, Figure 8: ICF22). Except for two territories located on the northern side, vireos did not use the river channel in the FUDS survey site. This site is dominated by dense stands of tamarisk and is likely less favorable for vireos. Vireo habitat use around the restoration area did not change significantly from 2018 to 2019. After their initial shift, where they used more upland habitat to account for the loss in habitat following the restoration activities in 2018, vireo habitat use has not altered significantly. All 2018 vireo territories were occupied in 2019. One pair nested in a patch of laurel sumac located in the now empty parking area used by the restoration crew (Appendix E, Figure 8: OTY08).

Vireo productivity at Otay River (City, FUDS, ICF) and Salt Creek (Salt Creek, Northern Salt Creek) has fluctuated widely since nest monitoring was initiated in 2011. Between 2.0 and 2.7 fledglings per pair were produced from 2011 to 2013, many from nests rescued from parasitism, but this productivity dropped to 0.8 fledglings per pair in the extreme drought year of 2014. From 2017 to 2018, vireo productivity declined steeply from a high of 4.2 fledglings per pair to 1.2 fledglings, slightly higher than the drought year in 2014. Numbers rebounded in 2019 with vireos producing 4.1 fledglings per pair. Other reproductive measures were high in 2019 compared to 2018: clutch size averaged 3.5 compared to less than three eggs per pair, hatching success was high (75% versus 57%), and nesting started two weeks earlier. Moreover, two of the largest populations of Least Bell's Vireos in southern California located at Camp Pendleton and the San Luis Rey River experienced similar high productivity numbers: 3.4 ± 2.1 young per pair at Camp Pendleton and 3.8 ± 2.1 young per pair at the San Luis Rey River (Suellen Lynn, USGS; personal comm.). Altogether, these upward trends indicate a regional response, rather than local and are likely related to the above average rainfall received in the 2018-2019 wet season. The total seasonal rainfall recorded in San Diego County was 15.7 inches from 1 October 2018 – 30 April 2019 (Mission Trails 2019) well above the San Diego County average annual rainfall of 12 inches. This is the highest rainfall recorded since 2005 with 22.6 inches (NOAA).

Cowbird parasitism was recorded in seven nests, totaling 7% of all nests monitored. Cowbird parasitism has consistently declined since the initial monitoring in 2011 revealed a 45% nest parasitism rate. After the initiation of a trapping program in 2012, the parasitism rate dropped to 36% in 2012 and then to zero in 2013-2014 (Clark 2011, 2012, 2013, 2014a, Sexton 2012). Thus, the cowbird trapping program has been successful in reducing nest parasitism rates, and this reduction has persisted even with the suspension of trapping for three breeding seasons. For a complete discussion of the 2019 cowbird management effort at the Salt Creek Parcels, see Clark 2019.

Certification Statement

I certify that the information in this survey report fully and accurately represents my work.



October 10, 2019

Kevin Clark (TE-117947)



October 10, 2019

Kimberly Ferree (TE-122632)

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Appendix A. Photos of Least Bell's Vireo Habitat



Photo 1. Least Bell's Vireo territory located in riparian woodland with arroyo willow (*Salix lasiolepis*) and black willow (*Salix gooddingii*) at upper Otay River adjacent to restoration area. Photo taken 13 August 2019 by Kimberly Ferree.



Photo 2. Least Bell's Vireo territory dominated by arroyo willow (*Salix lasiolepis*), black willow (*Salix gooddingii*), and mule fat (*Baccharis salicifolia*) at upper Otay River. Photo taken 13 August 2019 by Kimberly Ferree.



Photo 3. Least Bell's Vireo territory consisted of a mix of tamarisk (*Tamarix* sp.), mule fat (*Baccharis salicifolia*), and arroyo willow (*Salix lasiolepis*) located at the southwestern end of the Salt Creek Parcels (ICF survey site). Photo taken 30 July 2019 by Kimberly Ferree.



Photo 4. Least Bell's Vireo pairs nested and foraged in laurel sumac (*Malosma laurina*) located on the upland benches of the Otay River. Photo taken 13 August 2019 by Kimberly Ferree.



Photo 5. Least Bell's Vireo pairs nested in small patches of riparian habitat along Salt Creek. Photo taken 30 May 2018 by Kimberly Ferree



Photo 6. Least Bell's Vireo adult incubating eggs on nest in dying lemonade berry (*Rhus integrifolia*) at Salt Creek. Photo taken 4 June 2019 by Kimberly Ferree.



Photo 7. Least Bell's Vireo territory located in Wolf Canyon. Photo taken 16 July 2019 by Kimberly Ferree.

Appendix B. Survey Summary

Least Bell's Vireo (LBVI) Monitoring and Yellow-billed Cuckoo (YBCU) Survey Schedule, Otay Ranch Preserve and Wolf Canyon, 2019.				
Date	Personnel ^a	Time	Weather	Task
April 1	KF	0930 - 1345	start: 80% cloud cover, calm, 70°F; end: 0% cloud cover, breeze 4-12 mph, 74°	LBVI pre-survey
April 8	KF, RL	0630 - 1230	start: 5% cloud cover, calm, 65°F; end: 65% cloud cover, light breeze, 80°	LBVI survey #1 and monitoring
April 9	KF	0730 - 1230	start: 5% cloud cover, calm, 65°F; end: 45% cloud cover, light breeze, 70°	LBVI survey #1 and monitoring
April 15	KF	0620 - 1230	start: clear, calm, 55°F; end: 75% cloud cover, wind 2-5 mph, 75°	LBVI survey #1 and monitoring
April 16	KF	0620 - 1035	start: 100% cloud cover, calm, 55°F; end: 100% cloud cover, calm, 60°	LBVI monitoring
April 17	KC	0800 - 1130	start: 100% cloud cover, calm, 50°F; end: 100% cloud cover, calm, 70°	LBVI monitoring; BHCO mist nest
April 18	KF	0630 - 1330	start: 10% cloud cover, calm, 55°F; end: clear, calm, 70°	LBVI survey #2 and monitoring
April 22	KF	1035 - 1430	start weather: clear, light breeze, 70°F; end: clear, breeze 4-12 mph, 72°	LBVI survey #2 and monitoring
April 23	KF	0620 - 1320	start weather: 100% cloud cover, calm, 60°F; end: clear, breeze 5 mph, 70°	LBVI survey #2 and monitoring
April 29	KF	0645 - 1205	start weather: 100% cloud cover, 60°F; end: 100%, breeze 5 mph, 68°	LBVI monitoring
April 30	KF	0630 - 1150	start weather: 100% cloud cover, light breeze, 60°F; end: 100% drizzly, breeze 5 mph, 68°	LBVI monitoring
May 1	KF	0645 - 1245	start weather: 100% cloud cover, calm, 60°F; end: 25% cloud cover, breeze 2-5 mph, 73°	LBVI monitoring
May 6	KF	0645 - 1125	start weather: 100% cloud cover, calm, 60°F; end: 95% cloud cover, breeze 1-3 mph, 68°	LBVI monitoring
May 7	KF	0630 - 1215	start: 100% cloud cover, calm, 61°F; end: clear, w 1-3 mph breeze, 74°	LBVI survey #3 and monitoring
May 13	KF	0615 - 1130	start: 100% cloud cover, calm, 60°F; end: clear, breeze 5 mph, 71°	LBVI survey #3 and monitoring
May 14	KF	0620 - 1145	start weather: clear, calm, 60°F; end: 20% cloud cover, 4-12 mph breeze, 70°	LBVI monitoring

Least Bell's Vireo (LBVI) Monitoring and Yellow-billed Cuckoo (YBCU) Survey Schedule, Otay Ranch Preserve and Wolf Canyon, 2019.				
Date	Personnel ^a	Time	Weather	Task
May 20	KF	0730 - 1030	start weather: 100% cloud cover, calm, 50°F; end: 100%, breeze 4-12 mph, 55°, showers on and off	LBVI monitoring
May 21	KF	0645 - 0900	start: 100% cloud cover, calm, 55°F; end: clear, breeze 0-1 mph, 55°, rainy as leaving site	LBVI survey #4 and monitoring
May 29	KF	0700 - 1300	start: 100% cloud cover, calm, 50°F; end: 75% cloud cover, breeze 2-5 mph, 68°	LBVI survey #4 and monitoring
June 4	KF	0730 - 1300	start: 100% cloud cover, calm, 65°F; end: clear, breeze 1-3 mph, 73°	LBVI survey #5 and monitoring
June 11	KF	0615 - 1130	start: 100% cloud cover, calm, 65°F; end: clear, breeze 5 mph, 70°	LBVI monitoring
June 15	KF	0550 - 1155	start: 100% cloud cover, breeze 0-1 mph, 64°F; end: clear, breeze 1-5 mph, 72°	YBCU survey #1 and LBVI monitoring
June 19	KF	0630 - 1230	start weather: 100% cloud cover, light breeze, 64°F; end: clear, breeze 2-5 mph, 72°	LBVI monitoring
June 25	KF	0645 - 1315	start: clear, calm, 64°F; end: clear, calm, 75°	LBVI survey #6 and monitoring
June 26	KF	0550 - 1245	start: 100% cloud cover, calm, 64°F; end: clear, breeze 1-5 mph, 80°	LBVI survey #7 and monitoring
July 2	KF	0615 - 1000	start: 100% cloud, breeze 0-1 mph, 65°F; end: clear, breeze 3-5 mph, 80°	YBCU survey #2 and LBVI monitoring
July 4	KF	0625 - 1030	start: 100% cloud cover, calm, 65°F; end: clear, breeze 5-10 mph, 80°	LBVI survey #7 and monitoring
July 11	KF	0530 - 1130	start: 100% cloud cover, calm, 68°F; end: clear, breeze 5-10 mph, 78°	LBVI survey #8 and monitoring
July 16	KF	0545 - 1215	start: 100% cloud cover, calm, 65°F; end: 20% cloud cover, breeze 5-10 mph, 83°	YBCU survey #3
July 30	KF	0540 - 1135	start: 100% cloud cover, calm, 64°F; end: clear, breeze 5-10 mph, 80°	LBVI monitoring
August 13	KF	0555 - 0910	start: 100% cloud cover, calm, 65°F; end: clear, breeze 1-5 mph, 71°	YBCU survey #4
Sept 3	KF	0600 - 0915	start: 80% cloud cover, calm, 69°F; end: 10% cloud cover, breeze 1-5 mph, 85°	YBCU post-season survey #5

^aPersonnel: KC=Kevin Clark (SDNHM); KF=Kimberly Ferree (SDNHM); RL=Ryan Layden (ICF).

LBVI = Least Bell's Vireo

YBCU = Yellow-billed Cuckoo

Appendix C. Avian Species

Avian species detected during Otay Ranch Preserve Least Bell's Vireo and Yellow-billed Cuckoo surveys, 1 April – 3 September 2019.	
Common Name	Scientific Name
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>
Greater Roadrunner	<i>Geococcyx californianus</i>
American Kestrel	<i>Falco sparverius</i>
White-tailed Kite	<i>Elanus leucurus</i>
Northern Harrier	<i>Circus hudsonius</i>
Cooper's Hawk	<i>Accipiter cooperii</i>
Red-shouldered Hawk	<i>Buteo lineatus</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
California Quail	<i>Callipepla californica</i>
Mourning Dove	<i>Zenaida macroura</i>
Barn Owl	<i>Tyto alba</i>
Great Horned Owl	<i>Bubo virginianus</i>
Lesser Nighthawk	<i>Chordeiles acutipennis</i>
White-throated Swift	<i>Aeronautes saxatalis</i>
Anna's Hummingbird	<i>Archilochus anna</i>
Costa's Hummingbird	<i>Archilochus costae</i>
Selasphorus spp.	<i>Selasphorus spp.</i>
Nuttall's Woodpecker	<i>Picoides nuttallii</i>
Northern Flicker	<i>Colaptes auratus</i>
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>
Say's Phoebe	<i>Sayornis saya</i>
Black Phoebe	<i>Sayornis nigricans</i>
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>
Cassin's Kingbird	<i>Tyrannus vociferans</i>
Western Kingbird	<i>Tyrannus verticalis</i>
Hutton's Vireo	<i>Vireo huttoni</i>
Bell's Vireo	<i>Vireo bellii</i>
Cassin's Vireo	<i>Vireo cassinii</i>
Warbling Vireo	<i>Vireo gilvus</i>
California Scrub Jay	<i>Apelocoma californica</i>
American Crow	<i>Corvus brachyrhynchos</i>
Common Raven	<i>Corvus corax</i>
Swainson's Thrush	<i>Catharus ustulatus</i>
Northern Mockingbird	<i>Mimus polyglottos</i>
California Thrasher	<i>Toxostoma redivivum</i>
European Starling	<i>Sturnus vulgaris</i>
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>
California Gnatcatcher	<i>Polioptila californica</i>

Avian species detected during Otay Ranch Preserve Least Bell's Vireo and Yellow-billed Cuckoo surveys, 1 April – 3 September 2019.	
Common Name	Scientific Name
Cactus Wren	<i>Campylorhynchus brunneicapillus</i>
Rock Wren	<i>Salpinctes obsoletus</i>
Canyon Wren	<i>Catherpes mexicanus</i>
Marsh Wren	<i>Cistothorus palustris</i>
Bewick's Wren	<i>Troglodytes bewickii</i>
Great Blue Heron	<i>Ardea herodias</i>
Great Egret	<i>Ardea alba</i>
Snowy Egret	<i>Egretta thula</i>
Green Heron	<i>Butorides striatus</i>
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>
Virginia Rail	<i>Rallus limicola</i>
American Coot	<i>Fulica americana</i>
Killdeer	<i>Charadrius vociferus</i>
Mallard	<i>Anas platyrhynchos</i>
House Wren	<i>Troglodytes aedon</i>
Bushtit	<i>Aegithalos minimus</i>
Tree Swallow	<i>Tachycineta bicolor</i>
Violet-green Swallow	<i>Tachycineta thalassina</i>
N. Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>
Barn Swallow	<i>Hirundo rustica</i>
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>
Wrentit	<i>Chamaea fasciata</i>
Horned Lark	<i>Eremophila alpestris</i>
Lesser Goldfinch	<i>Spinus psaltria</i>
House Finch	<i>Haemorhous mexicanus</i>
Orange-crowned Warbler	<i>Oreothlypis celata</i>
Yellow Warbler	<i>Setophaga petechia</i>
Yellow-rumped Warbler	<i>Setophaga coronata</i>
Common Yellowthroat	<i>Geothlypis trichas</i>
Wilson's Warbler	<i>Cardellina pusilla</i>
Yellow-breasted Chat	<i>Icteria virens</i>
Blue Grosbeak	<i>Passerina caerulea</i>
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>
Blue Grosbeak	<i>Passerina caerulea</i>
Lazuli Bunting	<i>Passerina amoena</i>
Spotted Towhee	<i>Pipilo maculatus</i>
California Towhee	<i>Melospiza crissalis</i>
Bell's Sparrow	<i>Artemisiospiza belli</i>
Rufous-crowned Sparrow	<i>Aimophila ruficeps</i>
Lark Sparrow	<i>Chondestes grammacus</i>

Avian species detected during Otay Ranch Preserve Least Bell's Vireo and Yellow-billed Cuckoo surveys, 1 April – 3 September 2019.

Common Name	Scientific Name
Grasshopper Sparrow	<i>Ammodramus savannarum</i>
Song Sparrow	<i>Melospiza melodia</i>
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>
Western Meadowlark	<i>Sturnella neglecta</i>
Red-winged Blackbird	<i>Agelaius phoeniceus</i>
Brown-headed Cowbird	<i>Molothrus ater</i>
Hooded Oriole	<i>Icterus cucullatus</i>
Bullock's Oriole	<i>Icterus bullockii</i>
Northern Cardinal	<i>Cardinalis cardinalis</i>

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Appendix D. Nesting Activities of Least Bell's Vireos

Nesting Activities of Least Bell's Vireo at Otay Ranch Preserve and Wolf Canyon, California, 2019.							
Survey Site ^a	Monitoring Type ^b	Pair	Nest Label	Nest #	# Fledged	Nest Outcome ^c	Comments
FUDS	fully	OTY13	OTY13N1	1	4	SUC	Pair fledged 4 young on 13 May.
FUDS	fully	OTY14	OTY14N1	1	4	SUC	Pair fledged 4 young on 12 May.
FUDS	fully	OTY14	Oty14N2	2	2	SUC	Pair fledged 2 young on 9 July.
ICF	partially	ICF20	ICF20N1	1	2	SUC	Pair fledged 2 young on 20 May. May have had 2nd nest that was unsuccessful.
ICF	fully	ICF22	ICF22N1	1		PAR	Nest failed because of parasitism.
ICF	fully	ICF22	ICF22N2	2	3	SUC	Nest parasitized and subsequently fledged 3 young on 1 June.
ICF	fully	ICF23	ICF23N1	1		ABA	Nest abandoned with 4 eggs.
ICF	fully	ICF23	ICF23N2	2		PRE	Nest depredated; found empty, nest intact.
ICF	fully	ICF23	ICF23N3	3	1	SUC	Pair fledged 1 young on 22 June.
ICF	fully	ICF25	ICF25N1	1	4	SUC	Pair fledged 4 young on 6 May.
ICF	fully	ICF25	ICF25N2	2	4	SUC	Pair fledged 4 young on 8 July.
City	fully	OTY03	OTY03N1	1	4	SUC	Pair fledged 4 young on 12 May.
City	fully	OTY03	Oty03N2	2	3	SUC	Pair fledged 3 young on 16 July.
City	fully	OTY04	OTY04N1	1		PRE	Nest depredated; empty, lining messy.
City	fully	Oty04	Oty04N2	2		PRE	Nest depredated; empty, pitched to one side.
City	fully	Oty04	Oty04n3	3	3	SUC	Pair fledged 3 young on 11 July.

Nesting Activities of Least Bell's Vireo at Otay Ranch Preserve and Wolf Canyon, California, 2019.							
Survey Site ^a	Monitoring Type ^b	Pair	Nest Label	Nest #	# Fledged	Nest Outcome ^c	Comments
City	fully	OTY05	OTY05N1	1	4	SUC	Pair fledged 4 young on 18 July.
City	fully	OTY05	Oty05N2	2	4	SUC	Pair fledged 4 young on 17 May.
City	fully	OTY06	OTY06N1	1	4	SUC	Pair fledged 4 young on 5 May.
City	fully	OTY06	Oty06N2	2		PRE	Nest depredated; empty, lining pulled up slightly.
City	fully	OTY08	OTY08N1	1		PRE	Nest depredated in egg stage.
City	fully	OTY08	OTY08N2	2	4	SUC	Pair fledged 4 young on 21 May.
City	fully	OTY15	OTY15N1	1	4	SUC	Pair fledged 4 young on 18 May.
City	fully	Oty16	Oty16N1	1	4	SUC	Pair not detected until early June; late arrival. Pair fledged 4 young on 16 July.
Salt Creek	fully	SAL01	Sal01N1	1		PRE	Nest parasitized and subsequently depredated. Nest empty, intact.
Salt Creek	fully	SAL01	Sal01N2	2		PRE	Nest depredated; 1 intact egg, 1 egg with peck below nest.
Salt Creek	fully	SAL01	Sal01N3	3	2	SUC	Pair fledged 2 young on 6 July. One unhatched egg in nest.
Salt Creek	partially	SAL02	Sal02N1	1		PRE	Nest depredated; nest intact, partial eggshell below nest.
Salt Creek	partially	SAL02			2+	SUC	Pair detected with fledglings; no nest found for this brood.
Salt Creek	fully	SAL04	Sal04N1	1		PRE	First nest was tied up because it was only attached on one side so adult was incubating in an almost vertical nest. This nest was subsequently depredated.
Salt Creek	fully	SAL04	Sal04N2	2	3	SUC	Pair fledged 3 young on 16 June.
Salt Creek	fully	SAL05	Sal05N1	1		PRE	Nest depredated; intact, empty.
Salt Creek	fully	SAL05	Sal05N2	2	3	SUC	Pair fledged 3 young on 1 June.

Nesting Activities of Least Bell's Vireo at Otay Ranch Preserve and Wolf Canyon, California, 2019.							
Survey Site ^a	Monitoring Type ^b	Pair	Nest Label	Nest #	# Fledged	Nest Outcome ^c	Comments
Northern Salt Creek	fully	SAL10	Sal10N1	1		PRE	Nest parasitized and subsequently depredated.
Northern Salt Creek	fully	SAL10	Sal10N3	3	4	SUC	Pair fledged 4 young on 2 July.
Northern Salt Creek	fully	SAL11	SAL11N1	1		PRE	Pair used the same nest for first two clutches. Nest depredated; empty, nest lining pulled up, messy.
Northern Salt Creek	fully	SAL11	Sal11N2	2		PRE	Pair used the same nest for first two clutches. Nest depredated; empty, intact.
Northern Salt Creek	fully	SAL11	Sal11N3	3	2	SUC	Pair fledged 2 young on 14 July.
Northern Salt Creek	fully	SAL12	Sal12N1	1	1	SUC	Pair fledged 1 young 20 June. Nest parasitized. 1 unhatched egg in nest.
Northern Salt Creek	fully	SAL12	Sal12n2	2	2	SUC	Pair fledged 2 young on 4 July. One unhatched egg in nest.
Northern Salt Creek	fully	SAL13	SAL13N1	1	4	SUC	Pair fledged 4 young on 15 May. Nest parasitized.
Northern Salt Creek	fully	SAL13	Sal13n2	2		PRE	Nest depredated.
Wolf Canyon	fully	WC01	WC01N1	1	4	SUC	Pair fledged 4 young on 10 May.

^aFUDS = FUDS portion of the southern Salt Creek Parcel, City = area within the southern Salt Creek Parcel that does not contain FUDS, ICF = section west of southern Salt Creek Parcel along Otay River, Salt Creek = area in northern Salt Creek Parcel (southern section), Northern Salt Creek = area in northern Salt Creek Parcel (northern section). See Figure 3.

^bFully = territory was fully monitored, all nests were located and monitored throughout the breeding season.

Partially = territory was monitored weekly, but not nests were located;

^cNest fate: ABA = nest abandoned with vireo eggs; PAR = nest failed directly as a result of Brown-headed Cowbird parasitism; PRE = nest failure caused by predation event; SUC = fledged at least 1 Least Bell's Vireo young.



Appendix E. Figures 8-14: Least Bell's Vireo Territories and Nests

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 Salt Creek Parcels

LBV Nest Fate
(Source: SDNHM 2019)

-  Failed
-  Successful

LBV Territories
(Source: SDNHM 2019)

 Pair Territory Boundary

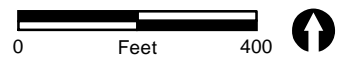


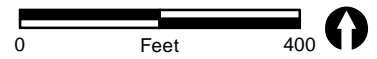
FIGURE 8

**Locations of Least Bell's Vireo Territories and Nests
at ICF Survey Site, Upper Otay River, 2019**




 Salt Creek Parcels

LBV Territories
(Source: SDNHM 2019)



LBV Nest Fate
(Source: SDNHM 2019)

 Pair Territory Boundary

-  Failed
-  Successful

FIGURE 9

Locations of Least Bell's Vireo Territories and Nests at Salt Creek and FUDS, Otay Ranch Preserve, 2019



Salt Creek Parcels

LBV Nest Fate
(Source: SDNHM 2019)

- Failed
- Successful

LBV Territories
(Source: SDNHM 2019)
 Pair Territory Boundary

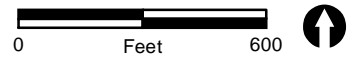
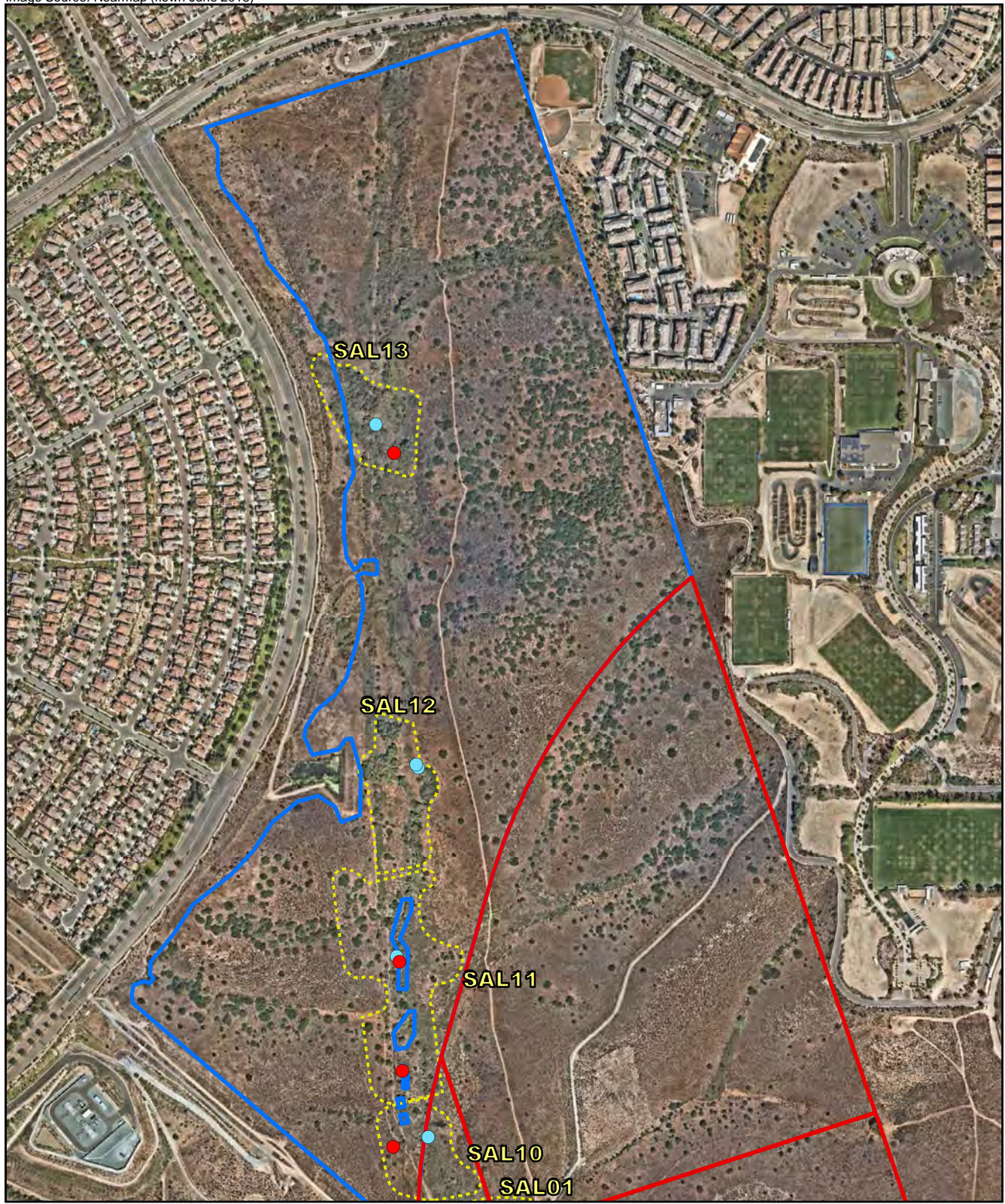


FIGURE 10

**Locations of Least Bell's Vireo Territories and Nests
at City Survey Site, Otay Ranch Preserve, 2019**



Otay Ranch Project Area

- Northern Salt Creek
- Salt Creek

LBV Territories

(Source: SDNHM 2019)

- Pair Territory Boundary

LBV Nest Fate

(Source: SDNHM 2019)

- Failed
- Successful

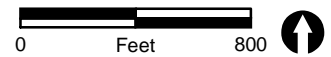
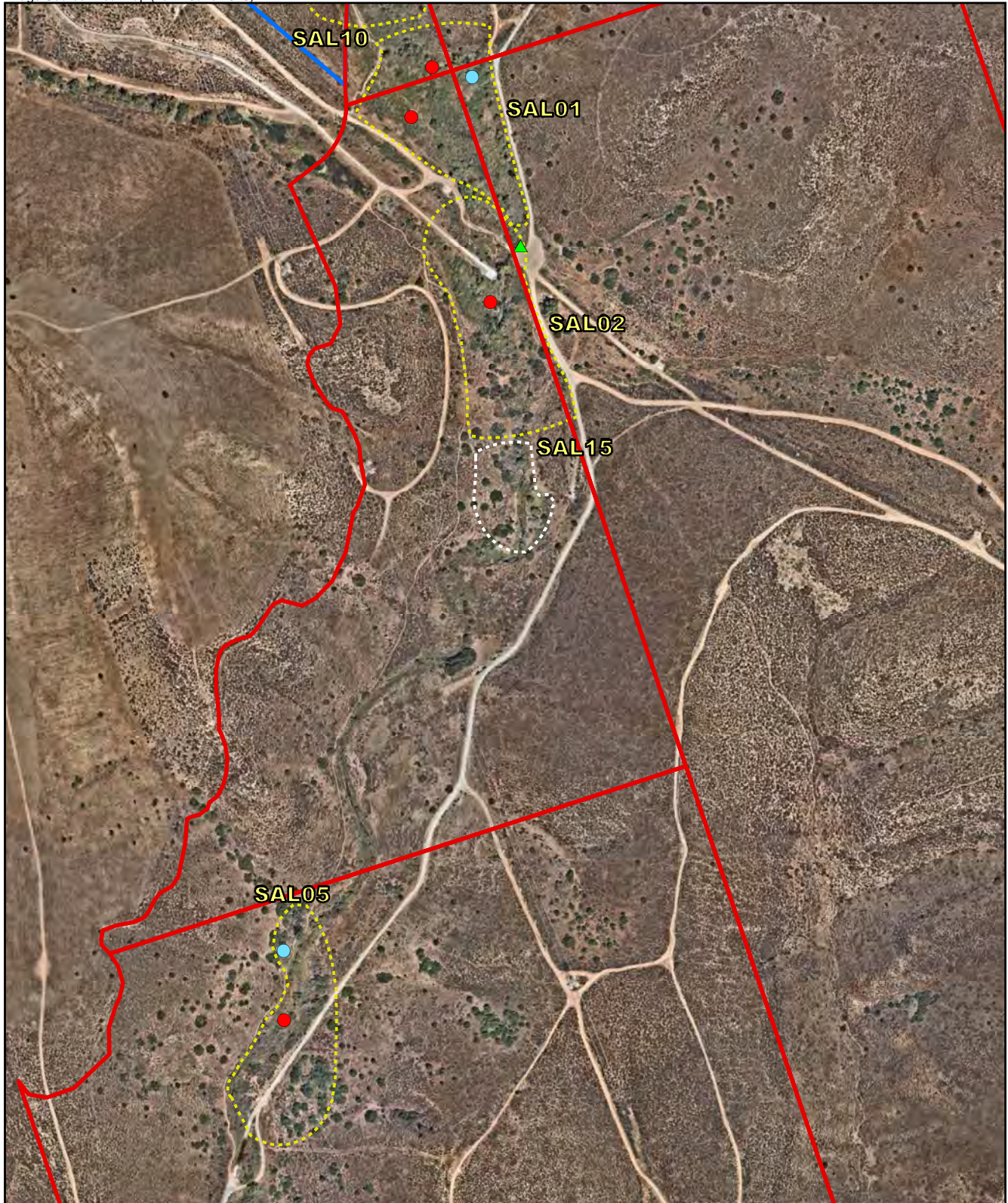


FIGURE 11

Locations of Least Bell's Vireo Territories and Nests at Salt Creek and Northern Salt Creek Survey Sites, 2019



Otay Ranch Project Area

▭ Northern Salt Creek

▭ Salt Creek

LBV Territories

(Source: SDNHM 2019)

▭ Single Male Territory Boundary

▭ Pair Territory Boundary

LBV Nest Fate

(Source: SDNHM 2019)

● Failed

▲ Family Group, no nest located

● Successful

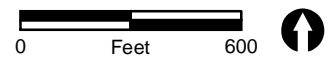


FIGURE 12

Locations of Least Bell's Vireo Territories and Nests at Salt Creek and Northern Salt Creek Survey Sites, 2019



Wolf Canyon

LBV Territories

(Source: SDNHM 2019)

Pair Territory Boundary

LBV Nest Fate

(Source: SDNHM 2019)

Successful

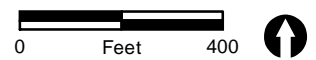


FIGURE 13

Locations of Least Bell's Vireo Territories and Nests at Wolf Canyon, 2019



Otay Ranch Project Area

▭ Northern Salt Creek

▭ Salt Creek

LBV Parasitized Nests

(Source: SDNHM 2019)

■ Failed

■ Successful

LBV Territories

(Source: SDNHM 2019)

▭ Single Male Territory Boundary

▭ Pair Territory Boundary

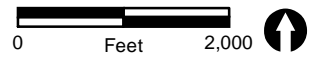


FIGURE 14

Locations of Least Bell's Vireo Territories and Parasitized Nests at Salt Creek and Northern Salt Creek Survey Sites, 2019

Appendix J

**2018 Quino Checkerspot Butterfly Habitat Assessment
Report**

2018 QUINO CHECKERSPOT BUTTERFLY HABITAT ASSESSMENT FOR THE OTAY TRAILS AND MITIGATION BANK EXPANSION PROJECT

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November 2019



ICF. 2019. 2018 Quino Checkerspot Butterfly Habitat Assessment for the Otay Trails and Mitigation Bank Expansion Project. November.

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1.0 Introduction

ICF was contracted to conduct a Quino checkerspot butterfly (*Euphydryas editha quino*; QCB) habitat assessment during the 2018 QCB flight season for the Otay Trails and Mitigation Bank Expansion Project (Project), a permittee-responsible mitigation site and proposed mitigation bank located below Savage Dam in the Otay River Valley near Chula Vista, California (Figure 1). The mitigation site is being implemented to offset impacts associated with several Otay Ranch Village development projects as well as future projects in the vicinity.

The goal of this informal assessment was to determine if there is suitable habitat for QCB, presence of larval host plants, or the presence of QCB itself within the mitigation bank expansion area (Figure 2). Although the assessment was conducted by a QCB-permitted biologist, it is not intended to represent a formal QCB protocol presence/absence survey following the U.S. Fish and Wildlife Service (USFWS) Survey Guidelines (USFWS 2014).

2.0 Methods

The informal QCB assessment was conducted across four weeks within the QCB survey period, as defined in the USFWS Survey Guidelines (Guidelines). The assessment was conducted to evaluate the habitat within the mitigation expansion area (Figure 2) and to determine if areas of suitable QCB habitat were present. The suitable QCB habitat was then surveyed following the methodology described in the Guidelines (aside from the late season start and required number of visits) to determine if QCB were present onsite. Note that a negative result of these surveys would not be used for a “not present” determination because the full season was not covered and the number of required surveys, as specified in the Guidelines, was not conducted in 2019.

The Guidelines describe what areas can be excluded from survey: these include developed areas, active agriculture, and dense, closed-canopy woody vegetation. The habitat evaluation also included mapping of QCB larval host plants such as dot-seed plantain (*Plantago erecta*), purple owl’s clover (*Castilleja exserta* ssp. *exserta*), among others, and noting potential QCB adult nectar sources, which can be diverse, but generally must have a relatively short corolla tube to accommodate the QCB’s relatively short proboscis.

The survey visits that followed the initial habitat assessment consisted of walking the suitable habitat areas and recording the species and abundance of the butterflies observed and well as the potential nectar sources in bloom. The visits were timed to coordinate with the appropriate weather conditions and adhered to the survey rate of coverage defined in the Guidelines.

3.0 Results and Discussion

Of the approximately 69-acre mitigation expansion area evaluated, approximately 18 acres were determined to be suitable habitat for QCB (Figure 3). No QCB were observed during the assessment, but populations of dot-seed plantain, a primary QCB larval host plant, and abundant nectar sources exist within the southern portion mitigation expansion area.

Assessment dates and conditions are provided in Table 1. ICF biologist Brian Lohstroh (USFWS permit #TE-063608-6) conducted the QCB habitat assessment over the course of four weekly visits

from April 18 to May 10, 2018. These dates correspond with the last four weeks of the QCB survey period, as defined in USFWS Guidelines. The first survey visit was conducted following the habitat evaluation on April 18, 2018.

A total of 10 butterfly species were observed within the suitable habitat area as shown in Table 2. A list of all observed blooming plant species detected during the assessment, including potential QCB nectar sources, is provided in Table 3.

The habitat within the mitigation expansion area consists of dense grasslands, active agriculture, riparian scrub, and upland scrub habitat. The suitable QCB habitat within the mitigation expansion area exists along the bluffs on the southern bank of the Otay River and consists of Diegan coastal sage scrub (Oberbauer et al.2008) dominated by California buckwheat (*Eriogonum fasciculatum*) and California sagebrush (*Artemisia californica*), with California encelia (*Encelia californica*), San Diego sunflower (*Bahiopsis laciniata*), non-native grasses and short-pod mustard (*Hirschfeldia incana*). Dot-seed plantain was observed within openings in the scrub vegetation and within disturbed habitat patches.

Common butterfly species observed included Behr's Metalmark (*Apodemia mormo virgulti*), San Bernardino Blue (*Euphilotes bernardino bernardino*), and Comstock's Fritillary (*Speyeria callippe comstocki*). Potential QCB nectar sources that were common included San Diego sunflower (*Bahiopsis laciniata*), blue dicks (*Dichelostemma capitatum*), California buckwheat and popcorn flower (*Cryptantha intermedia*).

Given the presence of QCB larval host plants and abundant nectar sources, the suitable habitat onsite has a moderate potential to support QCB. QCB populations are known to exist within one mile of the mitigation expansion area, and the closest 2019 QCB observation occurred within approximately 1,500 feet of the suitable habitat onsite (ICF 2019).

It is important to note that this assessment does not represent a complete QCB presence/absence protocol survey, as specified in the Guidelines, and the negative results for QCB detection should not, and cannot, be considered conclusive. Only a complete USFWS QCB protocol survey can provide a determination of occupation of the site by QCB.

4.0 References

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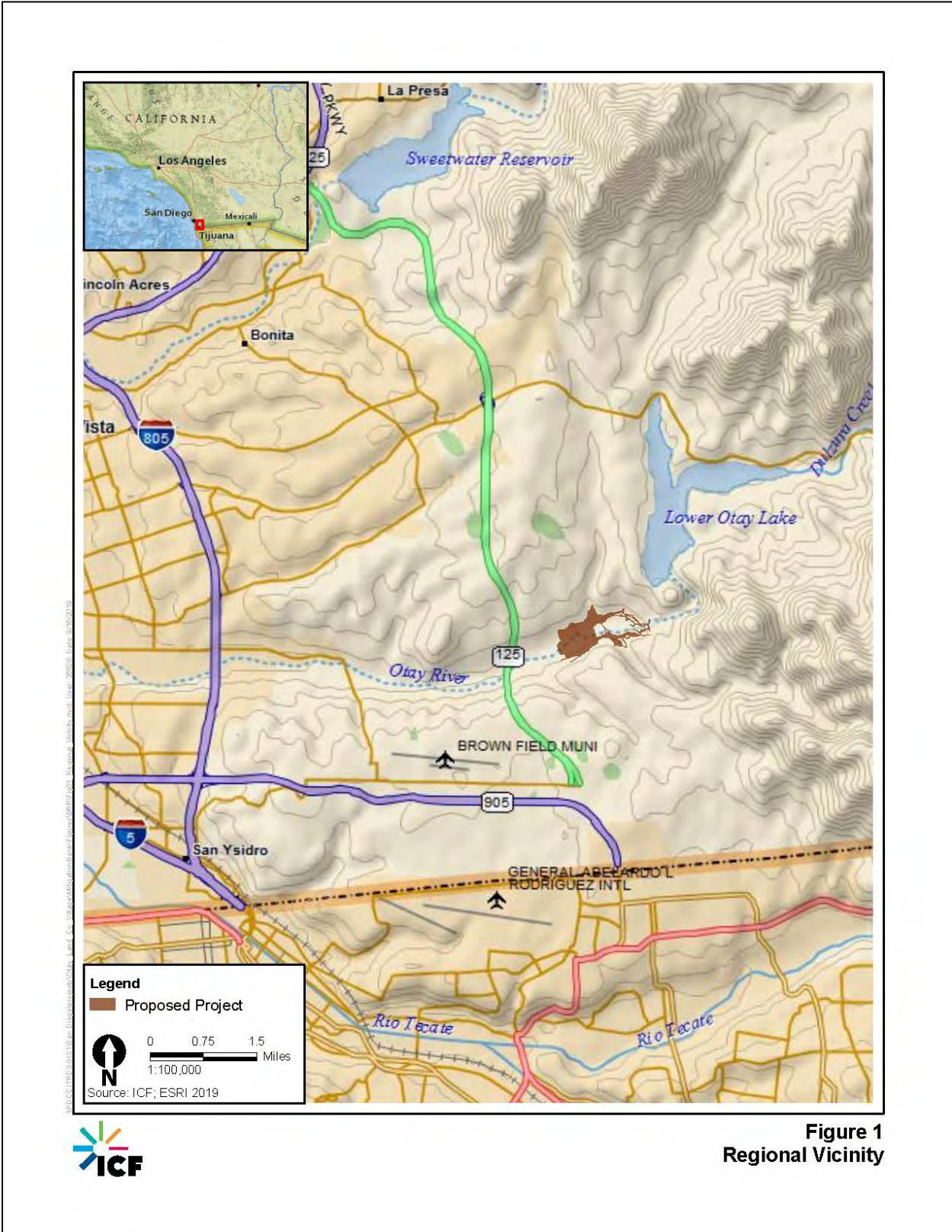


Figure 1
Regional Vicinity

Figure 1. Regional Vicinity

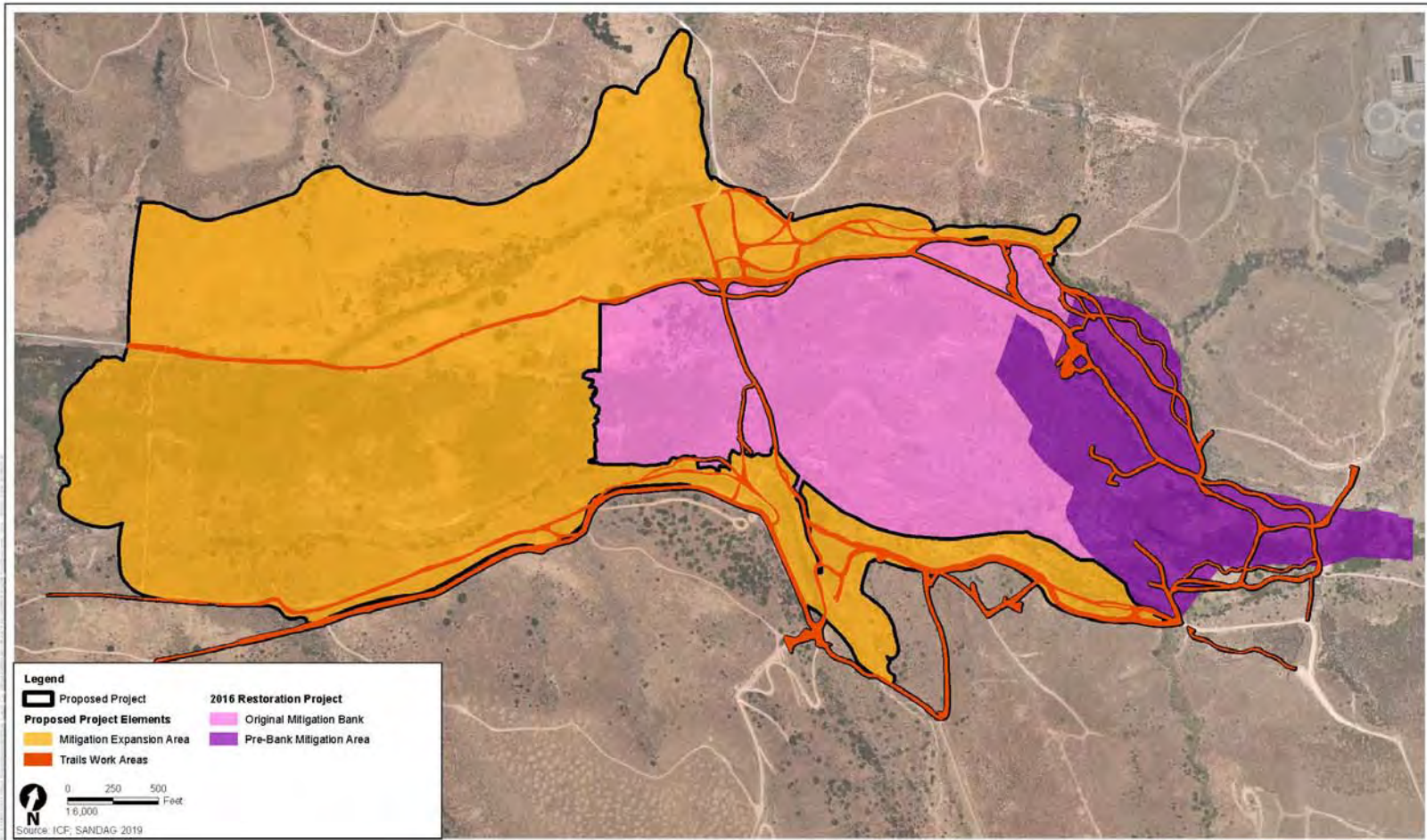


Figure 2
Project Overview

Figure 2. Project Overview

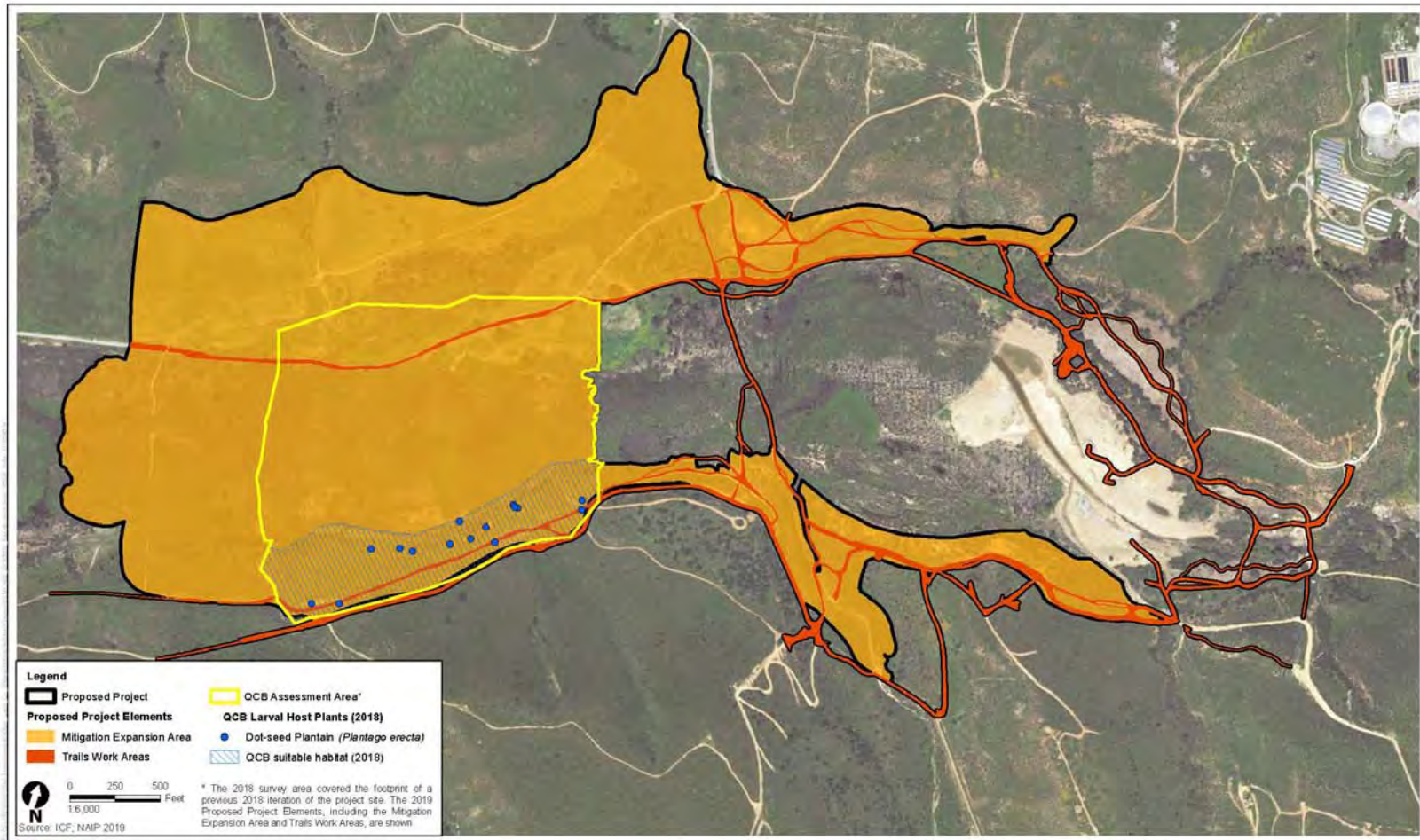


Figure 3
2018 Quino Checkerspot Butterfly Assessment Results



Figure 3. 2018 Quino Checkerspot Butterfly Assessment Results

Table 1. 2018 QCB Assessment Dates and Conditions

Survey Type	Date	Time Onsite	Temp (°F)	Sky Cover (%)	Wind (MPH)	Personnel	
Habitat Evaluation/ Informal Survey	18-Apr-2018	Start	1245	72	0	3-8	B. Lohstroh
		End	1545	73	0	2-7	
Informal Butterfly Survey	26-Apr-2018	Start	1030	66	20	0-2	B. Lohstroh
		End	1300	74	0	2-6	
Informal Butterfly Survey	3-May-2018	Start	1130	70	10	3-7	B. Lohstroh
		End	1430	75	15	2-6	
Informal Butterfly Survey	10-May-2018	Start	0950	66	10	0-3	B. Lohstroh
		End	1300	78	0	2-3	

Table 2. 2018 Butterfly Species and Numbers Observed

Common Name	Scientific Name	Survey Date				No. Surveys Observed	Max No. Observed
		18-Apr-2018	26-Apr-2018	3-May-2018	10-May-2018		
FAMILY PAPILIONIDAE: Swallowtails							
Western Tiger Swallowtail	<i>Papilio rutulus</i>				2	1	2
FAMILY PIERIDAE: Whites and Sulphurs							
Subfamily Pierinae: Whites							
Checkered White	<i>Pontia protodice</i>				1	1	1
Subfamily Anthocharinae: Marbles & Orangetips							
Pacific Sara Orangetip	<i>Anthocharis sara sara</i>	3	1			2	3
FAMILY LYCAENIDAE: Gossamer-wing							
Subfamily Theclinae: Hairstreaks							
Immaculate Bramble Hairstreak	<i>Callophrys dumetorum affinis</i>		1			1	1
Subfamily Polyommatae: Blues							
Western Pygmy-Blue	<i>Brephidium exila</i>		1		5	2	5
San Bernardino Blue	<i>Euphilotes bernardino bernardino</i>	2	5	8	19	4	19
FAMILY RIODINIDAE: Metalmarks							
Behr's Metalmark	<i>Apodemia mormo virgulti</i>	16	5	7	10	4	16
FAMILY NYMPHALIDAE: Brushfoots							
Subfamily Argynninae: Argynnis							
Comstock's Fritillary	<i>Speyeria callippe comstocki</i>		8	5	10	3	10
Subfamily Nymphalinae: True Brushfoots							
Subfamily Satyrinae: Satyrs							
Common California Ringlet	<i>Coenonympha californica californica</i>	12	2			2	12
FAMILY HESPERIIDAE: The Skippers							
Subfamily Herperiinae: Grass Skippers							
Fiery Skipper	<i>Hylephila phyleus muertovalle</i>				1	1	1
Number of Species Observed Per Survey		4	7	3	7	Total Number of Species Observed:	
Total Number of Butterflies Observed Per Survey		33	23	20	48	10	

Nomenclature: Shiriawa 2009

Table 3. Plant Species in Flower During 2018 QCB Assessment

<i>Scientific Name</i>	Common Name	Status
Dicots		
Adoxaceae - Adoxa Family		
<i>Sambucus nigra</i> *	Black Elderberry	
Anacardiaceae-Anacard Family		
<i>Rhus integrifolia</i> *	Lemonade berry	
Asteraceae - Sunflower Family		
<i>Bahiopsis laciniata</i> *	San Diego Sunflower	CRPR 4.2
<i>Centaurea melitensis</i>	Tocolote	
<i>Deinandra fasciculata</i> *	Fascicled Tarweed	
<i>Encelia californica</i> *	California Encelia	
<i>Eriophyllum confertiflorum</i> var. <i>confertiflorum</i> *	Long-Stem Golden-Yarrow	
<i>Holocarpha virgata</i> ssp. <i>elongata</i> *	Graceful tarplant	CRPR 4.2
<i>Hypochaeris glabra</i> *	Smooth Cat's Ear	
<i>Pseudognaphalium californicum</i> *	California everlasting	
<i>Sonchus asper</i> subsp. <i>asper</i> *	Prickly Sow-Thistle	
Boraginaceae - Borage Family		
<i>Amsinckia menziesii</i> *	Rancher's Fiddleneck	
<i>Cryptantha intermedia</i> *	Nievitans Cryptantha	
<i>Pectocarya linearis</i> subsp. <i>ferocula</i> *	Slender Combseed	
<i>Hirschfeldia incana</i> *	Short-Pod Mustard	
Cactaceae - Cactus Family		
<i>Ferocactus viridicens</i>	Coast Barrel Cactus	CRPR 2B.1
Cleomaceae - Spiderflower Family		
<i>Peritoma arborea</i>	Bladderpod	
Convolvulaceae - Morning Glory Family		
<i>Calystegia macrostegia</i> subsp. <i>cyclostegia</i>	Coast Morning-Glory	
Crassulaceae - Stonecrop Family		
<i>Dudleya variegata</i> *	Variegated Dudleya	CRPR 1B.2
Euphorbiaceae - Spurge Family		
<i>Euphorbia albomarginata</i> *	Rattlesnake mat	
Fabaceae - Legume Family		
<i>Acmispon glaber</i> var. <i>glaber</i> *	Coastal Deerweed	
Geraniaceae - Geranium Family		
<i>Erodium cicutarium</i> *	Red-Stem Filaree/Storksbill	
Lamiaceae - Mint Family		
<i>Salvia munzii</i> *	Munz's sage	CRPR 2B.2
Nyctaginaceae - Four O'Clock Family		
<i>Mirabilis laevis</i>	Desert wishbone bush	
Polygonaceae - Buckwheat Family		
<i>Eriogonum fasciculatum</i> var. <i>fasciculatum</i> *	Coast California Buckwheat	
Rosaceae - Rose Family		
<i>Prunus ilicifolia</i> *	Holly-leaf Cherry	
Verbenaceae - Vervain Family		
<i>Verbena lasiostachys</i> var. <i>lasiostachys</i>	Western Vervain	
Moncots		
Liliaceae - Lily Family		
<i>Calochortus splendens</i>	Splendid Mariposa Lily	
Themidaceae - Brodiaea Family		
<i>Bloomeria crocea</i> *	Common Goldenstar	
<i>Brodiaea terrestris</i> ssp. <i>kernensis</i>	Dwarf Brodiaea	
<i>Dichelostemma capitatum</i> subsp. <i>capitatum</i> *	Blue Dicks	

Nomenclature: Baldwin et. al 2012

*Potential QCB nectar source

CRPR 4.2: California Rare Plant Rank Plants of limited distribution, Moderately threatened in California

CRPR 2B.1: Rare or Endangered in California, common elsewhere, Seriously endangered in California

CRPR 1B.2: Rare or endangered in California and elsewhere, Fairly endangered in California

CRPR 2B.2: Rare or Endangered in California, common elsewhere, Fairly endangered in California

Appendix K
**City of Chula Vista Habitat Loss Incidental Take Draft
Findings**

Appendix K

City of Chula Vista Habitat Loss Incidental Take Draft Findings

Draft Section 17.35.080 Required Findings for Issuance of a Habitat Loss Incidental Take (HLIT) Permit

A. In order to approve or conditionally approve a HLIT permit, all of the following written findings shall be made by the decision maker:

1. *The proposed development in the Project Area and associated mitigation is consistent with the Chula Vista MSCP subarea plan, as adopted on May 13, 2003, and as may be amended from time to time, the MSCP implementation guidelines, and the development standards set forth in CVMC 17.35.100.*

The Otay Trails and Mitigation Bank Expansion Project complies with and is consistent with the Chula Vista MSCP Subarea Plan, the MSCP Implementation Guidelines, and the development standards as set forth in Section 17.35.100 of Chula Vista Ordinance No. 3004. The Proposed Project consists of two primary components: the expansion of the Original Mitigation Bank and the creation, modification, and expansion of trails within the entire Project Area. The expansion includes enhancement, rehabilitation, and re-establishment of hydrological processes, vegetation communities, and wildlife habitats associated with the Lower Otay River watershed, which will be self-sustaining and can be adjusted to dynamic natural processes. The trails envisioned as part of the Proposed Project are considered a Covered Project under the City of Chula Vista MSCP Subarea Plan because they generally conform to those described in the Otay Valley Regional Park (OVRP) Concept Plan. The trails designated in the OVRP Concept Plan, and therefore the trails in the Proposed Project, are authorized for take pursuant to the City of Chula Vista Subarea Plan, subject to the provisions of the City Planning Component Framework Management Plan, Section 7.5; the Public Access, Trails, and Recreation Guidelines, Section 7.5.3; and the Otay River Valley Framework Management Plan, Section 7.6.3. The trails in the Proposed Project are also consistent with Section 7.5.3, Public Access, Trails, and Recreation, of the MSCP.

2. *The Project Area is physically suitable for the design and siting of the proposed development and the development results in minimum disturbance to sensitive biological resources, except impacts to natural vegetation in mapped development areas.*

The Otay Trails and Mitigation Bank Expansion Project Area is physically suitable for the design and siting of the Proposed Project. The Proposed Project has been conditioned to require habitat-based mitigation, species-specific mitigation, and/or avoidance, to the extent feasible, of sensitive biological resources including sensitive species and habitats related to and calculated to alleviate negative impacts created by the Proposed Project. The following details the sensitive habitats and sensitive species that would potentially result in impacts by the Project:

Special-Status Plants

Non-listed plant species identified as California Rare Plant Rank 1B or 2B, San Diego County Group A or B plant species are present within the Project Area, including inside of the “heavy” restoration activity areas. One listed plant species has been documented within the Project Area (spreading navarretia), specifically within a low impact activity level area, and five other federally or state-listed as threatened or endangered plant species have moderate to high potential to occur within the Project Area. A very small amount of permanent impacts on natural habitats that can support special-status plant species may occur due to the construction of new trails and armoring of existing stream crossings; however, the project would primarily result in temporary impacts on natural habitats during restoration and enhancement activities.

Special-Status Wildlife

Five species listed as federally or state endangered or threatened have been observed within the Project Area during focused species surveys: San Diego fairy shrimp, Quino checkerspot butterfly, western yellow-billed cuckoo (nesting), least Bell’s vireo (nesting), and coastal California gnatcatcher. Forty non-listed special-status species are known to be present or have a moderate to high potential to occur within the Project Area, including species considered Covered Species under the City of Chula Vista MSCP Subarea Plan. A small amount of permanent impacts on suitable and occupied habitats for special-status wildlife would occur due to habitat removal for trail creation and armoring of existing stream crossings. Special-status wildlife habitat would be temporarily impacted by the project.

Designated Critical Habitat

Activities associated with grading, trails creation and reclamation, and upland enhancement within the Project Area would impact approximately 140.61 acres of designated Otay tarplant critical habitat. However, permanent impacts due to the creation of new trails would occur primarily within existing access roads that do not provide the physical and biological features (PBFs) necessary to support Otay tarplant; only approximately 1.94 acres of critical habitat that has PBFs for Otay tarplant (i.e., Diegan coastal sage scrub and non-native grasslands) would be permanently affected. Revegetation, rehabilitation, and enhancement activities would occur in areas of temporary impact totaling approximately 134.91 acres of Otay tarplant critical habitat. However, only approximately 49.08 acres within the “heavy” temporary work activities area (where grading would occur) contain PBFs for Otay tarplant because they are within coastal sage scrub and non-native grassland vegetation communities. Indirect and direct impacts resulting from restoration-related activities could occur on the areas that contain PBFs, such as increased dust deposition, spills of pollutants, and trampling of plants if present.

Riparian Habitat and Sensitive Natural Communities

Project-related construction, grading, clearing, or other activities would temporarily and permanently remove sensitive native or naturalized habitat within the Project Area. Permanent impacts would occur on sensitive native and naturalized habitats. Approximately 2.96 acres of Tier I, II, and III habitats and 0.19 acre of riparian and wetland habitats would be permanently impacted by the Proposed Project. Temporary impacts could occur on up to 166.21 acres of Tier I, II, or III habitats (67.06 acres of which would be subject to grading during restoration activities; the

remainder of temporary impacts would be associated with disturbance during enhancement activities such as weeding and invasive species treat). Temporary impacts could also occur on up to 40.97 acres of riparian and wetland habitats (35.39 acres of which would be subject to grading during channel and floodplain restoration activities; the remainder of temporary impacts would be associated with disturbance during enhancement activities).

The Proposed Project is a restoration projects and once completed, will enhance the functions and values of existing wetlands. Furthermore, no permanent structures would be built within or near wetlands with the exception of armoring of existing low-flow stream crossings. The result of the work would include an overall net gain in functions and values of the existing wetlands. Overall, the Proposed Project is designed as a restoration and enhancement project to improve natural habitats within the Project Area. The Proposed Project would re-establish primary and secondary flow channels, low and high floodplains, and native transitional habitat as well as remove nonnative invasive species and restore native vegetation. This would serve to improve hydrologic conditions, significantly reduce the upstream invasive species seed sources, preserve connectivity between adjacent areas of preserved land and natural habitats, and preserve wildlife movement corridors, and would result in a net gain in functions and services following restoration activities.

Wetlands and Jurisdictional Resources

The Proposed Project would cause temporary and permanent impacts on wetlands and jurisdictional waters as defined by USACE, RWQCB, and CDFW. Temporary impacts associated with the Proposed Project are focused on two restoration activities: habitat restoration (habitat enhancement and rehabilitation) and grading (for habitat establishment and reestablishment). A relatively small amount of permanent impacts would occur due to creation of new trails (including grading) and from work on at least two existing stream crossings (i.e., channel armoring). All habitat restoration and establishment/reestablishment impacts are considered temporary because the Proposed Project is a restoration project, and any impacts would be restored with native vegetation and ultimately lead to a net gain in viable habitat and native plant communities, and overall improved river conditions. Habitat restoration would involve invasive vegetation removal followed by re-establishment of native vegetation communities. Enhancement and rehabilitation activities would generate little to no ground disturbance, and invasive plant species removal would target select species of plants in order to minimize potential impacts on native and sensitive species. Grading activities would involve considerable ground disturbance, with the ultimate goal of redefining the channel and other hydrologic features along the Otay River.

Approximately 0.06 acre of waters of the U.S. subject to jurisdiction of USACE and RWQCB (0.06 acre of non wetland and approximately 90 square feet of wetland) would be permanently impacted by the Proposed Project. A total of 39.37 acres of waters of the U.S. (1.27 acre of non-wetland and 38.10 acres of wetland) would be temporarily impacted by the Proposed Project.

A total of 0.23 acre of waters of the state subject to jurisdiction of CDFW (0.20 acre of streambed and 0.02 acre of riparian) would be permanently impacted by the Proposed Project. A total of 61.23 acres of waters of the state (18.67 acres of streambed and 42.56 acres of riparian) would be temporarily impacted by the Proposed Project.

Native Resident or Migratory Fish or Wildlife Species or Established Native Resident or Migratory Wildlife Corridors, and Native Wildlife Nursery Sites

The Proposed Project is within a core habitat area under the City of Chula Vista MSCP Subarea Plan, and as a result has the potential to temporarily impact a core wildlife area but would not result in the loss of a core wildlife area. The Proposed Project would not prevent wildlife access to habitat, nor would it create a barrier to wildlife movement. The Proposed Project would not permanently prevent wildlife access to foraging habitat, breeding habitat, water sources, or other areas necessary for their reproduction; overall, the Proposed Project would improve these characteristics of the site. Wildlife nursery areas within the Project Area could include vegetation communities that support nesting birds, riparian habitat, wetlands, and stream habitat.

A small amount of permanent impacts on natural habitats would occur due to conversion to trails, though this would not be expected to negatively impact wildlife access to foraging or breeding habitat, water sources, or other areas necessary for reproduction due to the existing trail networks in the Project Area. Additionally, some existing trails would be reclaimed, improving these characteristics onsite. Temporary impacts on natural habitats would occur due to implementation of restoration activities in the Otay River channel and floodplain (e.g., large areas of grading). Temporary disturbances include increased human activity, noise, and dust, etc., and temporary removal of natural habitats during restoration activities.

3. *The nature and extent of mitigation required as a condition of the permit is reasonably related to and calculated to alleviate negative impacts created in the Project Area.*

The Project Area is within the City of Chula Vista's MSCP Subarea Plan area, specifically within lands designated as 100 percent Conservation Area (i.e., within the MSCP Preserve, where the habitat is protected on site from development and impacts, and is considered a Covered Project under the City of Chula Vista MSCP Subarea Plan. In compliance with the City of Chula Vista MSCP Subarea Plan, and as a condition of issuance of take authorization by the wildlife agencies, the City of Chula Vista established a development standard and an implementing ordinance, the HLIT. The HLIT is consistent with the conservation and mitigation goals of the San Diego County MSCP Subregional Plan and the City of Chula Vista MSCP Subarea Plan, which require impacts on sensitive vegetation communities to be avoided and minimized to the maximum extent practicable.

The Proposed Project would be consistent with the City of Chula Vista MSCP Subarea Plan. Ultimately, the Proposed Project would restore and enhance existing preserve land and minimize impacts on sensitive resources defined by the City of Chula Vista HLIT Ordinance. The Proposed Project would directly benefit the primary goals of the City of Chula Vista MSCP Subarea Plan, which are to conserve covered species and their habitat through the conservation of interconnected significant habitat cores and linkages. The Proposed Project would restore over 1 mile of lost river channel and its floodplain and further enhance existing preserved upland habitats while minimizing impacts on sensitive resources. Thus, the Proposed Project would improve habitat functions and directly benefit many MSCP covered flora and fauna. A small amount of permanent impacts on sensitive resources would occur due to the construction of new trails and armoring of existing stream crossings; however, the Project would primarily result in temporary impacts on sensitive resources during restoration and enhancement activities. Avoidance and minimization of impacts on sensitive resources would be accomplished to the maximum extent practicable through

implementation of Mitigation Measures BIO-1 through BIO-11. Overall, the Proposed Project would increase habitat quantity and quality for narrow endemic species, restore protected riverine, wetland, and riparian habitats, and enhance and restore Tier I, Tier II, and Tier III upland habitats. Therefore, the Proposed Project would not conflict with the provisions of the City of Chula Vista MSCP Subarea Plan.

The following project mitigation measures are required as conditions of the HLIT permit:

Mitigation Measure BIO-1: Obtain Approval of All Necessary Resource Agency Permits

Prior to the issuance of a grading permit, the applicant will obtain all necessary resource agency permits and provide copies to the City. All conditions identified within each of the resource agency permits will be implemented in accordance with the permit. The applicable resource agency permits for the proposed project include a Clean Water Act (CWA) Section 404 Permit from the USACE, a CWA Section 401 Water Quality Certification from the RWQCB, a CWA Section 402 National Pollutant Discharge Elimination System Construction General Permit (Order No. 2012-0006-DWQ) from the RWQCB, and a Section 1602 Streambed Alteration Agreement from the CDFW. In addition to the agency permits, a conservation easement or other approved site protection mechanism and endowment would be established per the USACE and Environmental Protection Agency Compensatory Mitigation Rule.

The applicant will also enter into consultation with the USFWS under Section 7 of the Federal Endangered Species Act (FESA) to seek concurrence that the proposed project is consistent with the City of Chula Vista's MSCP Subarea Plan and that incidental take authorization is provided for the proposed project under the City of Chula Vista's MSCP Subarea Plan.

Mitigation Measure BIO-2: Biological Awareness Training

Prior to initiation of grading activities, biological resource awareness training will be provided by a qualified biologist to all construction personnel. The training will include information regarding sensitive species with the potential to occur at the site as well as minimization and avoidance measures to reduce potential indirect effects on the habitat. A log of personnel who have completed the training and a copy of the training report/outline (including special-status species photos, targeted invasive plant species, and descriptions of the measures discussed in the training session) will be maintained at the construction office.

Mitigation Measure BIO-3: Temporary Fencing

Prior to the initiation of grading activities, the limits of grading will be clearly marked by well installed temporary fencing that is prominently colored. The fence will be installed by the construction contractor and will remain in place during all grading activities.

Mitigation Measure BIO-4: Biological Monitor

A qualified biological monitor will be on site during vegetation clearing activities to ensure that grading activities occur within designated areas. The monitor will also ensure that any special-status species that becomes entrapped within the grading limits is moved away from construction equipment. The biological monitor will also periodically inspect the limits of disturbance fence to ensure that it is in good condition. Any parts of the fence that need attention will be brought to the contractor's attention to be fixed immediately. In the event that a special-status species is located

within the grading limits, the biological monitor will temporarily stop construction. Removal of special-status species should be done by a biologist qualified to handle that specific species. If needed, the CDFW will be informally consulted if there is a question on the best manner to safely address a situation with a special-status wildlife species.

Mitigation Measure BIO-5: Best Management Practices

BMPs will be implemented during all grading activities to reduce potential indirect effects on special-status species and habitat. BMPs will include the following:

- All trash will be properly stored and removed from the site daily to prevent attracting wildlife to the construction area.
- Vehicles and equipment will be stored only on pre-designated staging areas in disturbed or developed areas. Fueling should be conducted in a manner that prevents spillage of fuel into the Otay River or into riparian or wetland habitats.
- All maintenance of vehicles and equipment will be conducted in a manner so that oils and other hazardous materials will not discharge into the Otay River, or into riparian habitat areas (including Freshwater and Freshwater Marsh).
- Dust control measures will be implemented to minimize the settling of dust on vegetation.
- Appropriate firefighting equipment (e.g., extinguishers, shovels, water tankers) will be available on the site during all phases of proposed project construction, and appropriate fire prevention measures will be taken to help minimize the chance of human-caused wildfires.
- All construction will be performed between dawn and dusk to the degree feasible to minimize potential indirect effects (e.g., increased depredation) on the species beyond the limits of disturbance.

Mitigation Measure BIO-6: Nesting Bird Avoidance

To avoid any direct impacts on nesting coastal California gnatcatchers, least Bell's vireo, burrowing owl, raptors, or other birds protected under the Migratory Bird Treaty Act (MBTA), removal of any vegetation that may support active nests on within the project area will occur outside of the breeding season when feasible. The breeding season is defined as February 15–September 15. If work must be conducted during the breeding season, including any trail improvement work and upland enhancement, nesting bird surveys will be conducted within the work area and a 500-foot buffer in order to clear the area or locate active nests for avoidance. Adequate avoidance buffers would be established around any active nests in coordination with the wildlife agencies.

Mitigation Measure BIO-7: Preconstruction Burrowing Owl Survey

A biologist will conduct preconstruction take-avoidance surveys for burrowing owls within 150 meters of project areas in suitable habitat no more than 14 days prior to ground-disturbing activities according to methods outlined in the CDFW's 2012 (or most recent) Staff Report on Burrowing Owl Mitigation (CDFG 2012). Surveys will provide data on whether burrowing owls occupy the site and, if so, whether the owls are actively nesting. If preconstruction take-avoidance surveys detect the presence of any active burrowing owl burrows during breeding season, the burrows will be avoided, and construction activities within 150 meters will be enclosed by construction fencing. Buffer sizes are outlined in CDFW's Staff Report on Burrowing Owl Mitigation. Active burrowing owl burrows will be monitored regularly to ensure no adverse effects on the burrowing owls are occurring. Avoidance

buffers will remain in place until the nest fledges or fails. If, in consultation with the CDFW, it is determined that project activities require removal of occupied burrows, or burrows potentially occupied by burrowing owls, eviction and burrow closure may be required to ensure against “take” of owl or nests. If eviction is required, it will occur only after consulting with CDFW and CDFW approval. Monitoring will be conducted to ensure take is avoided during eviction procedures. Owls may not be evicted or captured without prior authorization from the CDFW.

Mitigation Measure BIO-8: Vernal Pool and Vernal Pool–Dependent Species Avoidance

The trails alignment described in this report is planned to be further refined in order to avoid all permanent impacts on federally listed branchiopods. To avoid potential fairy shrimp habitat areas and potential impacts on San Diego fairy shrimp and western spadefoot (*Spea hammondi*), ephemeral basins, which were primarily seasonally ponding features such as road ruts and road ponds, were identified by an aquatic resource and fairy shrimp specialist. Prior to any ground disturbing work on site, mapped ephemeral basins will be reevaluated using the finalized spatial extents of trails and all work areas. Vernal pools resources will be differentiated from all other ephemeral basins (e.g., unvegetated road ruts and road ponds) in a refined jurisdictional delineation, and the potential for impacts will be re-evaluated using the finalized design and alignments.

In creation of the final extents of trails and work areas, to avoid direct impacts on San Diego fairy shrimp to the maximum extent practicable, road and trail improvements and creation will avoid existing ephemeral basins that are known to support or could potentially support San Diego fairy shrimp by moving the alignment prior to construction, as needed. Construction access routes will also be rerouted within the proposed grading footprint to avoid these ponding features to the maximum extent practicable.

During construction and restoration activities, occupied and potentially occupied habitat for San Diego fairy shrimp will be avoided during the wet season to the maximum extent practicable. Prior to ground disturbance, occupied and potentially occupied fairy shrimp habitats will be temporarily fenced and avoided during construction activities to the maximum extent practicable. No staging of any equipment will be allowed within vernal pools, road ruts, or other ephemeral basins occupied by or potentially occupied by San Diego fairy shrimp at any time. A biological monitor will be present during construction activities occurring adjacent to vernal pools and occupied or potentially occupied habitats, and will ensure that vehicles are fueled and maintained at least 100 feet away from such pools. In addition, where appropriate, the adjacent upland areas surrounding road ruts, vernal pools, and other ephemeral basins will be restored with native species. Wood split-rail fencing, boulders, and signage will be used to inform the public of the sensitivity of the area and deter them from trespassing into the ponded areas and into the river restoration areas. Though the majority of grading will occur within the Otay River floodplain, some grading and staging of equipment will occur in upland areas outside of the floodplain. Grading activities will include vernal pool establishment and enhancement activities, as described in the Otay Trails and Mitigation Bank Expansion Project Biological Resources Report 2020 Update (ICF 2021a) at Section 1.3.3. In accordance with Mitigation Measure BIO-1, should any pools occupied by or potentially occupied by San Diego fairy shrimp be unable to be avoided in the final project design, the applicant will consult with the USFWS under Section 7 of FESA to seek concurrence that the proposed project is consistent with the City of Chula Vista’s MSCP Subarea Plan and that incidental take authorization is provided

for the proposed project under the City of Chula Vista's MSCP Subarea Plan. Mitigation of impacts on fairy shrimp will be addressed in the Section 7 consultation process either with onsite pool enhancement/habitat creation or additional avoidance through project redesign prior to construction. Mitigation of impacts on jurisdictional vernal pool habitats will be also be mitigated for, as needed, to obtain CWA Section 401 and 404 permits from the RWQCB and USACE.

Mitigation Measure BIO-9: Special-Status Plant, Quino Host Plant, and Succulent Plant Salvage Plan

During grading and enhancement activities, special-status plants, Quino checkerspot host plants (e.g., dot-seed plantain), and succulent plants (i.e., target plant species) will be avoided where feasible. Prior to ground-disturbing work on site, special-status plant surveys will be conducted to locate target plant species within defined work limits to determine areas to be avoided. Salvage and relocation of target plant species will occur to the extent feasible in accordance with a Plant Salvage Plan. The Plant Salvage Plan will be prepared for the areas where temporary grading and habitat enhancement activities will occur, with an emphasis on collecting and relocating to adjacent areas the target plant species. The plan will be prepared and implemented prior to grading and enhancement activities. The Plant Salvage Plan will include a list of target plant species list, seed collection methods, succulent plant salvage techniques, transplanting methods, and applicable monitoring activities for transplanted individuals, as appropriate.

Mitigation Measure BIO-10: Quino Checkerspot Butterfly Seasonal Avoidance

Due to the presence of Quino checkerspot butterfly within the project area and known populations nearby, no removal of any host plant vegetation or any native vegetation within 50 feet of host plants will occur within the Quino flight season, defined by the USFWS 2014 protocol as the third week of February to the second Saturday in May. Biological monitors will stake locations of host plants for avoidance and will be present during vegetation removal activities within potentially suitable habitat for Quino located outside of the mapped host plant locations and 50 foot buffer to ensure that construction activities do not result in harm to individual Quino checkerspot butterflies that may be foraging or nectaring in the area.

Mitigation Measure BIO-11: Public Access, Trails, and Recreation

To deter trespassing into the restoration site, wood split-rail fencing will be installed to designate road/trail corridors along existing roads and existing unofficial trails that border the restoration site. Other barriers (boulders, brush piles, logs, and plantings) will be placed at strategic locations when protection of sensitive resources is required where fencing is not present. For safety purposes, reflective material will be placed on the wood fencing at specific locations to aid Border Patrol and other night-time users from unintentionally breaking through fencing into sensitive habitat. Additionally, signage and informational kiosks will be installed for educational purposes and to inform the public of the sensitivity of the restoration site and adjacent habitats. All installation activities (signage, fencing, kiosks) and reflective materials will occur outside of the breeding season defined as February 15–September 15 or be in accordance with Mitigation Measure BIO-6 and require preconstruction surveys.

B. In order to approve or conditionally approve an HLIT permit where the Project Area contains narrow endemic species, all of the following additional written findings shall be made by the decision maker:

1. *Narrow endemic species' populations within the project area have been avoided or total avoidance is infeasible.*

Narrow endemic species present and with moderate to high potential to occur within the Project Area include Otay tarplant (high potential to occur), San Diego ambrosia (moderate potential to occur), Orcutt's brodiaea (high potential to occur), snake cholla (high potential to occur), and variegated dudleya (present).

One narrow endemic plant species occurs within the limits of temporary impacts where no grading would occur and where low- or moderate-intensity restoration activities will occur. No direct mortality of variegated dudleya, a narrow endemic species within the low- to moderate-intensity restoration areas, or spreading navarretia, a federally listed as threatened species, is anticipated from these habitat restoration activities. Fencing or staking would be provided around these species, where necessary, and every effort would be made to completely avoid trampling or affecting these species.

2. *If impacts to narrow endemic species have not been avoided, one of the following findings shall be made:*
 - a. In cases where impacts to covered narrow endemic species' populations within the Project Area have been limited to five percent in 100 percent conservation areas, and 20 percent in 75 to 100 percent conservation areas and development areas outside of covered projects, the Proposed Project design, including mitigation, will result in conservation of the species that is functionally equivalent to its status without the Proposed Project, including species numbers and area, and must ensure adequate preserve design to protect the species in the long-term; or
 - b. In cases where the five percent or 20 percent narrow endemic species impact threshold has been exceeded, the Proposed Project design, including mitigation, results in a preserve design for the narrow endemic species population within the Project Area that is biologically superior to the preserve design that would occur if the impact had been limited to five percent in 100 percent conservation areas or 20 percent in 75 to 100 percent conservation areas and development areas outside of covered projects.

All narrow endemic plant species will be avoided to maximum extent practicable. Under the current Proposed Project design, no narrow endemic plant species are within the area of permanent or temporary grading impacts, and no direct mortality is anticipated. Fencing or staking would be provided around narrow endemic species where necessary within the Project Area, and every effort will be made to completely avoid trampling or affecting narrow endemic species. If individuals must be removed under future design limits, less than 5 percent of the population of a narrow endemic plant species within Project Area will be removed. Therefore, impacts on narrow endemic species would be less than significant.

Implementation of Mitigation Measures BIO-2, BIO-3, BIO-4, BIO-5, BIO-8, and BIO-9 will further minimize temporary impacts and avoid direct impacts on narrow endemic species. Overall, restoration will increase habitat quantity and quality for narrow endemic species.

C. In order to approve or conditionally approve an HLIT permit where the Project Area contains wetlands, all of the following additional written findings shall be made by the decision maker:

1. *Prior to issuance of a land development permit or clearing and grubbing permit, the project proponent will be required to obtain any applicable state and federal permits, with copies provided to the director of planning and building, or his/her designee.*

The Proposed Project would cause temporary and permanent impacts on jurisdictional wetlands and/or riparian habitats, as defined by USACE, CDFW, the City of Chula Vista's Subarea Plan Wetlands Protection Program, and the County of San Diego. Grading (for both trail construction and restoration activity purposes), vegetation removal, re-construction of road (trail) crossings, placement of fill (for crossing armoring), and limited dewatering activities (if a high groundwater table is encountered) could occur within these areas. The Proposed Project will apply for and comply with all regulatory aquatic permits, as appropriate, per Mitigation Measure BIO-1, Obtain Approval of All Necessary Resource Agency Permits.

2. *Where impacts are proposed to wetlands the following findings shall be made:*

- a. Impacts to wetlands have been avoided and/or minimized to the maximum extent practicable, consistent with the city of Chula Vista MSCP subarea plan Section 5.2.4; and

Permanent and temporary impacts resulting from the Proposed Project will be mitigated on-site as part of the Proposed Project, including rehabilitation and re-establishment of the river channel and its floodplain. In addition to restoring existing wetlands and riparian habitat, the Proposed Project will expand and re-establish both federal and state wetlands, including more than 30 acres of waters of the U.S./55 acres of waters of the state and more than 5,500 feet of restored channel length. In addition, hydrology will be restored and invasive vegetation removed, further improving conditions for native species composition, diversity, and abundance throughout the site. Implementation of Mitigation Measures BIO-2 through BIO-5 and BIO-11 would minimize indirect impacts on jurisdictional resources.

- b. Unavoidable impacts to wetlands have been mitigated pursuant to CVMC17.35.110. (Ord. 3004 § 1, 2005).

Proposed Project impacts on jurisdictional wetlands and/or riparian habitats, as defined by USACE, CDFW, the City of Chula Vista's Subarea Plan Wetlands Protection Program, and the County of San Diego, would be less than significant with mitigation.