Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Lower Colorado River Riparian Bird Surveys

2015 Annual Report

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

December 2015

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Lower Colorado River
Multi-Species Conservation Program

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Prepared by:

Great Basin Bird Observatory
1755 E. Plumb Lane #256
Reno, Nevada 89502
(775) 323-4226
www.gbbo.org
ammon@gbbo.org

Lower Colorado River
Multi-Species Conservation Program
Bureau of Reclamation
Lower Colorado Region
Boulder City, Nevada
http://www.lcrmscp.gov

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ACRONYMS AND ABBREVIATIONS

BLCA	Beal Lake Conservation Area
CI	confidence interval
Cibola NWR Unit #1	Cibola National Wildlife Refuge Unit #1 Conservation Area
CRIT	Colorado River Indian Tribes
CV	coefficient of variation
CVCA	Cibola Valley Conservation Area
DS	software for analyzing data collected using double sampling
fpc	finite population correction
GBBO	Great Basin Bird Observatory
GIS	Geographic Information System
GPS	Global Positioning System
ha	hectare(s)
LCR	lower Colorado River
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
m	meter(s)
MVCA	Mohave Valley Conservation Area
n	sample size
PVER	Palo Verde Ecological Reserve
Reclamation	Bureau of Reclamation
SE	standard error
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator

Symbols

>	greater than
<	less than
#	number
%	percent

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EXECUTIVE SUMMARY

The Lower Colorado River riparian bird surveys continue to provide a baseline for monitoring long-term population trends of riparian birds throughout the lower Colorado River (system-wide), as well as for the Lower Colorado River Multi-Species Conservation Program's (LCR MSCP) conservation areas; estimating population sizes of riparian birds; and defining habitat requirements of LCR MSCP covered species (Bureau of Reclamation 2006, 2016).

This report summarizes the results of the 2015 field surveys that were completed to fulfill component 1 of the LCR MSCP riparian bird survey project. The goal of this component is to conduct system-wide and conservation area based monitoring of riparian birds using a double sampling area search survey design.

This sampling design was used to derive population size estimates for six of the LCR MSCP covered bird species (Arizona Bell's vireo [*Vireo bellii arizonae*], Gila woodpecker [*Melanerpes uropygialis*], gilded flicker [*Colaptes chrysoides*], Sonoran yellow warbler [*Dendroica petechial sonorana*], summer tanager [*Piranga rubra*]), and vermilion flycatcher [*Pyrocephalus rubinus*]) as well as the most common riparian bird species.

The double sampling protocol developed by Bart et al. (2010) for the LCR MSCP uses counts of riparian bird territories from rapid and intensive area search surveys on a subset of sampling plots to estimate a detection ratio for correcting rapid counts for the entire sample. Rapid area search surveys on 80 plots selected randomly from the system-wide plot grid and intensive area search surveys on a random subset of 8 of those plots were completed. Rapid area search surveys on 73 plots in the conservation areas and intensive area search surveys on a random subset of 4 of those plots were also completed. The rapid and intensive counts were analyzed using double sampling formulae to generate corrected estimates and standard errors for the total number of territories of 6 LCR MSCP covered species and the 10 most common territorial riparian land bird species.

Based on system-wide rapid area search surveys (n = 80) in 2015, the most common covered species recorded was the Sonoran yellow warbler (114.25 territories), followed by the Arizona Bell's vireo (45.75 territories), Gila woodpecker (24.75 territories), summer tanager (9.25 territories), and gilded flicker (1 territory). On system-wide intensive area search surveys (n = 8) in 2015, territories of 4 covered species were recorded: the Sonoran yellow warbler (19.75 territories), Arizona Bell's vireo (9 territories), Gila woodpecker (6 territories), and summer tanager (1.75 territories). For territories overlapping plot boundaries, part of the territory within the plot was estimated to the nearest 25%, accounting for the decimals in the territory counts. Vermilion flycatchers were not found during system-wide surveys in 2015.

During rapid area search surveys of conservation areas and 1 habitat creation area in 2015 (n = 82), the most common covered species recorded was the Arizona Bell's vireo (24.5 territories), followed by the Sonoran yellow warbler (22.5 territories), summer tanager (5 territories), vermilion flycatcher (4.75 territories), and Gila woodpecker (0.75 territory). The rapid area search survey results for covered species at the specific conservation areas included the Arizona Bell's vireo (19.5 territories) , Sonoran yellow warbler (13 territories), and summer tanager (4 territories) at the Beal Lake Conservation Area (BLCA); Sonoran yellow warbler (7 territories) and Gila woodpecker (0.25 territory) at the Palo Verde Ecological Reserve (PVER); summer tanager (0.25 territory) at the Cibola Valley Conservation Area; 5 Arizona Bell's vireo (5 territories) and Sonoran yellow warbler (1.75 territories) at the Cibola National Wildlife Refuge Unit #1 Conservation Area; and summer tanager (0.75 territory), Sonoran yellow warbler (0.75 territory), and Gila woodpecker territories (0.25 territory) at Yuma East Wetlands. Also recorded were 4.75 vermilion flycatcher (4.75 territories) and Gila woodpecker territories (0.25 territory) within the Colorado River Indian Tribes' (CRIT) site, the CRIT 9 'Ahakhav Tribal Preserve, a non-LCR MSCP habitat creation area. Intensive area search surveys (n = 4) were conducted on the planting areas of BLCA C, PVER 3, PVER 4, and PVER 5. During these surveys, territories of the Sonoran yellow warbler (6.75 territories), Arizona Bell's vireo (4 territories), and summer tanager (2 territories) were found at the BLCA as well as the vermilion flycatcher (0.5 territory) at the PVER.

Overall, a total of 192 species on all area search surveys were recorded, including 175 species in system-wide surveys, compared with 149 species on conservation areas and habitat creation areas, and 132 species were present on both system-wide and conservation area/habitat creation area plots in 2015.

The main new findings of the 2015 survey season include: (1) several cavity nesters, including the Gila woodpecker breeding in older planting phases of the conservation areas, (2) vermilion flycatchers recorded in an apparent nesting attempt in one conservation area, and (3) the recognition that annual population estimates can be heavily influenced by outliers and low sample sizes. The latter findings will be elaborated upon in the upcoming 5-year summary report (Great Basin Bird Observatory 2016).

Component 1: Population Estimates of Avian Species Within the Lower Colorado River Multi-Species Conservation Program Boundaries and Conservation Areas

INTRODUCTION

As in past years, system-wide and conservation area search surveys were conducted in the lower Colorado River (LCR) riparian bird survey project area to obtain population size estimates, trends, and distribution data for the six Lower Colorado River Multi-Species Conservation Program (LCR MSCP) covered bird species (Arizona Bell's vireo [*Vireo bellii arizonae*], Gila woodpecker [*Melanerpes uropygialis*], gilded flicker [*Colaptes chrysoides*], Sonoran yellow warbler [*Dendroica petechia sonorana*], summer tanager [*Piranga rubra*]), and vermilion flycatcher [*Pyrocephalus rubinus*]) (hereafter covered species) as well as for non-covered riparian bird species throughout the Lower Colorado River Valley. The project area for system-wide bird monitoring includes the Colorado River from Separation Canyon (just upstream of Lake Mead) to the Southerly International Boundary with Mexico. The LCR MSCP project area also includes portions of the Bill Williams and Virgin Rivers.

Population estimates were generated using the avian double sampling survey method developed for the LCR MSCP bird monitoring program in 2007–10 (Bart and Manning 2008; Great Basin Bird Observatory (GBBO) 2009; Bart et al. 2010; GBBO 2011). The double sampling method requires both rapid and intensive area search surveys, which are described in more detail in the "Methods" section and in GBBO (2011).

In addition to system-wide surveys, riparian bird monitoring at conservation areas was also conducted at the Beal Lake Conservation Area (BLCA), Cibola National Wildlife Refuge Unit #1 Conservation Area (Cibola NWR Unit #1), Cibola Valley Conservation Area (CVCA), Hunters Hole, Palo Verde Ecological Reserve (PVER), and Yuma East Wetlands, and pre-development surveys were conducted at the Mohave Valley Conservation Area (MVCA). Monitoring also continued at the Colorado River Indian Tribes' (CRIT) site, the CRIT 9 'Ahakhav Tribal Preserve. The results reported in this report include a summary of all findings from system-wide and conservation area monitoring (component 1 of the LCR MSCP riparian bird survey project).

Methods

Double Sampling Study Design

All rapid bird survey techniques may produce biased estimates of species that vary in their detectability. For instance, densities of birds that have a soft song, vocalize rarely, behave secretively, or show strong seasonal changes in detectability may be systematically underestimated in rapid survey techniques such as point counts, belt transects, and single rapid area search surveys. In addition, birds temporarily undetectable, such as those sitting quietly on a nest or having departed the area for long foraging bouts, may be missed entirely by the surveyor.

To quantify and correct this bias, Bart and Earnst (2002) recommend a double sampling approach that uses counts of territories from rapid and intensive area search surveys on a subset of sampling plots to estimate a detection ratio for adjusting rapid counts for the entire sample. They express the detection ratio as the inverse of the traditional ratio estimator (Thompson 2012) to reflect the proportion of birds detected by rapid counts. For double sampling, a surveyor other than the one conducting intensive area search surveys conducts a standard rapid area search survey without any prior knowledge of the plot and its birds. Further information on the double sampling approach developed for the LCR MSCP, including statistical formulae for detection ratios, corrected density, and population estimates and their standard errors can be found in GBBO (2008), Bart and Manning (2008), and Bart et al. (2010).

Study Area

The LCR MSCP study area spans the main stem of the LCR from Separation Canyon (just upstream of Lake Mead) to the Southerly International Boundary with Mexico, just south of Yuma, Arizona (attachments 1a–b). Several regions were purposely excluded from the system-wide monitoring study area in 2015, including Region 1 (access problems), Region 2 (outside the LCR MSCP project area), Region 3 (lack of riparian vegetation and fluctuating lake levels), Region 9 (permit unattainable), and Region 13 (border safety concerns) (table 1).

The study area for monitoring included seven LCR MSCP conservation areas and one non-LCR MSCP habitat creation area (see table 2); all were located within the LCR MSCP project area (attachment 1w).

Plot Selection

Rapid Area Search Survey Plots System-Wide

For the 2015 system-wide area search surveys, 80 plots were randomly selected, covering 4 habitat strata (low woody, tall woody, herbaceous, and unsuitable) in 8 geographic regions (table 1; attachments 1b–v). Regions were not used to

Table 1.—Number of system-wide area search survey plots per region and habitat stratum surveyed in 2015

Region number	Region name	Tall woody	Low woody	Herbaceous	Unsuitable	Total
1	Separation Canyon to Lake Mead	0	0	0	0	0
2	Virgin River	0	0	0	0	0
3	Lake Mead	0	0	0	0	0
5	Hoover Dam to Bill Williams River (excluding the Havasu National Wildlife Refuge)	1	6	0	1	8
6	Havasu National Wildlife Refuge	3	4	5	0	12
7	Bill Williams River	8	5	0	0	13
8	Parker Dam to the Cibola National Wildlife Refuge, excluding Colorado River Indian Tribes' land	0	5	0	4	9
9	Colorado River Indian Tribal Land	0	0	0	0	0
10	Cibola National Wildlife Refuge	0	3	0	2	5
11	Imperial National Wildlife Refuge and adjacent areas	4	6	4	1	15
12	Colorado River from the Imperial National Wildlife Refuge to Yuma	9	6	1	2	18
13	Yuma to the Southerly International Boundary with Mexico	0	0	0	0	0
	Total	**25**	**35**	**10**	**10**	**80**

stratify the random site selection because, based on plot selections in previous years, a random selection by habitat is expected to provide sufficient coverage across available regions.

Plots were listed in separate Excel spreadsheets for the four dominant vegetation types (low woody, tall woody, herbaceous, and unsuitable). In each sheet, a column of random numbers was created, the plots were sorted by the random number column, and then the plots were selected from the beginning of the list. The number of plots per stratum were weighted toward high and low woody habitats for more intensive survey coverage of LCR MSCP covered species as decided by Jon Bart (U.S. Geological Survey [USGS] Forest and Ecosystem Science Center, Boise, Idaho) and the LCR MSCP, resulting in an initial selection of 25 tall woody, 35 low woody, 10 herbaceous, and 10 unsuitable plots (see table 1). These vegetation categories were named early in the project, and the names do not necessarily describe all of the habitat types that are present on a given plot. For example, "unsuitable" habitat contains a variety of habitat types, including some that are suitable for covered and other riparian species. For this reason, it is expected that at least some plots classified as "unsuitable" have a chance of supporting covered species. Details on how plots were classified can be reviewed in GBBO (2011).

If randomly selected plots were inaccessible, the same randomly generated list was used to select alternate plots in the same habitat type and region. If no alternate plots were available within the same region/habitat type combination, the closest region with the same habitat type was used as an alternate. Alternate plots were used when the selected plots were farther than 2 kilometers from the nearest road, trail, or waterway; if private landowners denied access to the site; if plots contained wetlands that were inaccessible by boat or foot or were otherwise unsafe; or if plots overlapped with conservation areas. In 2015, 32 plots were replaced with alternates from the same region and stratum due to one or more of the above reasons. This number is higher than it has been in past years mainly due to an unusually high number of plots in the mostly inaccessible stretch of the river between the Cibola National Wildlife Refuge and the Martinez Lake area.

Rapid Area Search Survey Plots in Conservation Areas

The sample of conservation area plots consisted of 73 randomly selected plots and nine non-randomly selected plots that were 5–18 hectares (ha) in size, which were surveyed using the same methods as were used for the system-wide rapid area search survey plots. An overview map of all conservation areas is provided in attachment 1w. As in years past, plots were selected first by conservation area then by habitat type. The number of plots randomly selected from each was determined by dividing each site's total number of plots by the total number of all conservation area plots. This percentage was then applied to the sample of 73 plots to determine how many plots to select in each conservation area. Further, these plots were divided into three habitat strata, cottonwood-willow, mesquite, and mixed (table 2). For each site, the total number of plots surveyed was subdivided into each of these habitat types proportionally to their availability on a given conservation area.

Table 2.—Conservation areas, number of plots, habitat type, and area surveyed using rapid area search surveys in 2015.

(Dashes mean that habitat strata did not exist in conservation area. Hunters Hole was surveyed by the Bureau of Reclamation in 2015.)

Conservation area	# survey plots, 2015	Cottonwood-willow (ha)	Mesquite (ha)	Mixed (ha)	Total (ha)
MVCA	7	–	–	–	–
CRIT 9 'Ahakhav Tribal Preserve	5	51.7	5	0	56.7
BLCA	4	30.2	11.4	0	41.6
Cibola NWR Unit #1	13	148.9	0	32.3	181.2
CVCA	18	74.2	88.3	17.3	179.8
Hunters Hole	1	17.7	0	0	17.7
PVER	27	185.7	29.2	87.7	302.6
Yuma East Wetlands	7	27.7	34.5	25.3	87.5
Total (2015)	**82**	**536.1**	**168.4**	**162.6**	**867.1**

The CRIT 9 ‘Ahakhav Tribal Preserve is considered a habitat creation area that was developed prior to the LCR MSCP and is not officially considered a conservation area; however, plots were randomly sampled from this area, and data from these plots are included in the conservation area population estimates. In 2015, the MVCA was included in the selection with conservation area plots as pre-development monitoring plots; data from these plots were reported separately and not included with the data from the post-development monitoring of conservation areas. Plots were defined by overlaying the system-wide plot grid and including all plots that were at least 50% within the future conservation area boundary, resulting in seven plots that were surveyed in 2015 at the MVCA. Two additional plots were also added – one each in the BLCA and the CRIT 9 ‘Ahakhav Tribal Preserve – in 2015 to maintain consistency of surveys at these sites which have been surveyed entirely each year since 2009. Therefore, a total of 82 conservation area plots were surveyed in 2015, which included 75 post-development plots (see table 2). Only the 73 randomly selected, post-development conservation area plots were used in population size analyses.

Intensive Area Search Survey Plots

Intensive area search surveys are a necessary component of double sampling for estimating detection rates of birds. Intensive plots were randomly selected from the 80 system-wide and 73 conservation area plots. Twelve plots were surveyed with the intensive area search survey method in 2015; 8 for system-wide surveys and 4 for conservation area surveys (table 3).

Table 3.—Summary of plots that were surveyed using the intensive area search survey method in 2015

Plots surveyed with intensive method, 2015	System-wide (n = 8)	Conservation areas (n = 4)
S2335 (attachment 1e)	X	
S2638 (attachment 1f)	X	
S2877 (attachment 1j)	X	
S6231 (attachment 1p)	X	
S6732 (attachment 1u)	X	
S7335 (attachment 1i)	X	
S8232 (attachment 1h)	X	
S9413 (attachment 1s)	X	
C1503 (attachment 1y)		X
C2306 (attachment 1aa)		X
C2309 (attachment 1aa)		X
C2312 (attachment 1aa)		X

Avian Monitoring Methods

The goal of the rapid area search survey effort was to obtain the most accurate estimate of breeding territories while optimizing the balance between geographic survey coverage and survey effort. The goal for the intensive area search survey effort was to find and document all territories present on each plot.

Rapid area search surveys for this project employ the same field methods as intensive area search surveys, but the reduced number of visits (two, compared with eight in intensive area search surveys) may result in different estimated breeding densities than in intensive area search surveys, as some breeding birds may be missed during both visits. Intensive area search surveys involved accurate delineation of breeding territories of all birds present on the plot, using the cumulative knowledge from eight visits. The birds that were either known, or presumed to be, non-breeders were counted (species known to only occur as migrants in the project area, resident LCR birds using but not defending a mate or territory in the plot, or birds that bred outside the plot but foraged in the plot post-breeding) separately from breeders.

To conduct area search surveys, a combination of a hand-held Global Positioning System (GPS) unit (Garmin Etrex 20 or Garmin GPSMap 60CSx) and an aerial photo of the plot overlaid with a 50-meter (m) Universal Transverse Mercator (UTM) grid was used (attachments 2a–c). Plots were systematically grid-searched, walking at a slow enough pace to stop and record all bird sightings, locations, and breeding evidence on and around a plot. We passed within at least 50 m of every UTM grid point within the plot to assure that all sections of the plot were adequately covered on each visit. All visits of the same area search survey type (rapid or intensive) on a given plot were done by the same surveyor, who was different from surveyors of other area search survey types on the same plot.

All area search surveys were conducted between April 9 and June 16, 2015. This seasonal timing optimizes coverage of the breeding season window for as many species as possible based on data from past years while working within the original study design and contract restrictions. Starting area search surveys later in spring would exclude the riparian bird species that start breeding in April or earlier, and starting them earlier would increase the confusion over separating migrants from breeders. All visits began at sunrise and ended no later than noon in order to minimize surveys during high temperatures (> 100 degrees Fahrenheit) and periods of low bird activity. The period of time spent on each visit depended on the difficulty of terrain, vegetation density, and the amount of bird activity, with plots that were easy to hike with low bird densities taking less time (2–3 hours) and plots that had dense vegetation and high bird activity taking more time (up to 6 hours).

Whether a rapid or intensive area search survey was conducted, the goal was to identify and record data on all birds present within the plot on each visit. During each visit, for both rapid and intensive area search surveys, enough time was

spent observing birds and collecting location and breeding behavior data on the plot to detect as close as possible to 100% of all individual birds present on the plot. Also during each visit, bird locations were mapped and behaviors recorded as accurately as possible in order to estimate the number of territories at the end of the season using cumulative territory observations. Ideally, we were able to distinguish true territories (i.e., the defended area used for breeding). However, for some species, it is difficult to distinguish territory from home range, especially in species that do not sing to defend territory boundaries, such as woodpeckers (Picidae) and raptors (Acciptridae and Falcinidae). In these cases, surveyors used their cumulative knowledge from all visits to denote the area important to the breeding effort using behavioral clues such as vocalizations, defensive behavior, foraging, gathering nesting material, and the time the bird(s) spent in the area.

All bird sightings and territory boundaries were recorded directly onto the gray-scale aerial photograph with a 50-m UTM grid, which also included imagery of the immediate surroundings of the plot (between 20 and 100 m depending on plot shape). Birds near the edge or just outside the plot were also mapped in order to prevent double counting of birds and to assess to what degree these birds were using the plot. At the end of the season, birds that were on the edge and within partial territories in the plot were classified by estimating how much of the territory was within the plot to the nearest 25% (resulting in 0, 25, 50, 75, or 100 of a territory in a plot). If less than 10% of the territory was in the plot, it was counted as 0%.

All observed breeding evidence was marked on the map using shorthand codes (adapted from Bibby et al. 2000), and knowledge of breeding status was recorded explicitly on the data sheet (table 4; attachment 2d). If confirmed breeding evidence was observed on at least one visit, the bird was determined a breeder. If an adult bird of a species known to breed in the area on the same territory was detected over multiple visits, even if the only breeding evidence observed was singing, it was generally determined to be a “breeder,” and it was thus included in the total number of breeding territories regardless of direct evidence of nesting. Exceptions to this rule were repeated sightings of yellow-billed cuckoo (*Coccyzus americanus occidentalis*) and willow flycatcher (*Empidonax traillii*), both of which breed later than most other riparian birds in the project area and are known to occur as migrants in the study area; thus, these two species were never determined to be breeders in this study design, even though some of them may have nested. These species are studied in other projects in the same study area using single-species survey protocols (McLeod and Koronkiewicz 2010; Halterman et al. 2009).

Table 4 illustrates how the breeding evidence was ranked, and observations were classified as breeders if confirmed breeding occurred on at least one visit or possible/probable breeding on a certain threshold of visits depending on the area search survey type (see sections below for thresholds on different survey types). Observations were classified as non-breeders if birds were observed only or

Table 4.—Behavioral information collected to determine breeding status during area search surveys

Categories	Behavior
Observed	Seen or heard only
Possible	Singing
	Pair seen or heard together
Probable	Territorial display
	Pair in suitable nesting habitat
	Courtship and/or mate guarding
	Agitated behavior
Confirmed	Nest building
	Carrying nest material
	Prolonged distraction behavior
	Occupied nest
	Food carrying
	Dependent young present
	Fecal sac carrying
	Nest with eggs
	Nest with young

displayed possible/probable breeding evidence on fewer than the threshold number of visits for that area search survey type. The data entry protocol (GBBO 2014) provides further detail on the process of summarizing breeding observations into the project's Access database.

Birds were recorded at the site of first detection as either a pair, male, female, individual of unknown sex/age, juvenile, flyover (i.e., flying over but not landing in the plot), or incidental (i.e., detected in the plot's general area but not inside the plot). For non-territorial and colonial breeders (including black-crowned night-heron (*Nycticorax nycticorax*), brown-headed cowbird (*Molothrus ater*), cattle egret (*Bubulcus ibis*), cliff swallow (*Petrochelidon pyrrhonota*), double-crested cormorant (*Phalacrocorax auritus*), Eurasian collared-dove (*Streptopelia decaocto*), European starling (*Sturnus vulgaris*), Gambel's quail (*Callipepla gambelii*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), great-tailed grackle (*Quiscalus mexicanus*), greater roadrunner (*Geococcyx californianus*), house finch (*Haemorhous mexicanus*), house sparrow (*Passer domesticus*), mourning dove (*Zenaida macroura*), red-winged blackbird (*Agelaius phoeniceus*), ring-necked pheasant (*Phasianus colchicus*), rock pigeon (*Columba livia*), snowy egret (*Egretta thula*), yellow-headed blackbird (*Xanthocephalus*

xanthocephalus), white-faced ibis (*Plegadis chihi*), and white-winged dove (*Zenaida asiatica*), the number of individuals and breeding evidence was recorded as one entry per species per visit in the Access database. At the end of the season, surveyors estimated the number of pairs of non-territorial species breeding on each plot by reviewing the number of pairs they had recorded for that particular species throughout the season and then making a final determination.

Rapid Area Search Surveys

In their implementation, rapid and intensive area search surveys differed primarily in the amount of data recorded for species that are not covered by the LCR MSCP and by the number of visits to the plot. Rapid area search surveys occurred in two visits spaced by at least 3 weeks, with the first round of visits in early April through mid-May and the second round in mid-May through mid-June 2015.

If one of the six covered species was found during a visit, several locations where the bird/pair/family-group was observed were mapped, and observed breeding evidence was thoroughly documented. Locations were digitized in ArcGIS at the end of the season. To digitize locations, scanned territory maps were imported into a Geographic Information System (GIS) and georeferenced for each of the six covered species. Each surveyor digitized the territories that they had delineated in the field. To map bird locations in GIS, the surveyors created a point shapefile with the following attributes: surveyor, date the bird was observed, species, territory code that they assigned to the species, and survey type.

For all non-covered species, efforts were focused on obtaining a complete count, avoiding double counts, recording breeding evidence (see table 4), and determining the percentage of the territory that was inside the plot. During rapid area search surveys, territories of covered species were delineated to the best of our ability during the two visits. All species known only as migrants in the project area were automatically classified (e.g., Wilson's warbler [*Cardellina pusilla*]) as non-breeders. If a species that is a known breeder in the project area was observed repeatedly in the same location, and if it displayed possible or probable breeding behaviors on both visits, it was classified as a "breeder." If evidence of confirmed breeding (e.g., a nest with young) (see table 4) was observed on one or both visits, the species was also recorded as a breeder. If possible or probable breeding evidence was observed only on one visit for birds that are year-round residents within the project area, they were also classified as breeders. Species that winter elsewhere but may breed in the project area were only classified as breeders if confirmed breeding evidence was recorded on at least one visit or probable/possible breeding evidence was recorded on both visits. If a surveyor was unable to classify birds as breeders using this set of rules, but still felt strongly that a bird was a breeder, the surveyor could still record it as a breeder by providing additional breeding evidence thoroughly in the "Comments"

field of the database. In some cases, the breeding status of a bird of a year-round resident species could not be determined on both visits, in which case it was classified as a non-breeder for the plot.

Breeding evidence justification codes for territorial breeding birds were entered into the Access database for each breeding pair, and for all area search survey types, by the surveyor at the end of the season. For rapid area search surveys, five different breeding justification codes could be used. The first option was "No Justification Required," which the surveyors entered if they determined after their final visit that a given bird was not actually a breeder (or that there was not enough evidence of breeding), classifying it as a "non-breeder." The second option was "Observed Confirmed," which surveyors entered if they found positive confirmation of breeding (e.g., a nest with young [see table 4]). The third code, "Probable Evidence Both," means that the bird was present and territorial on both visits to the plot, but no confirmed breeding evidence was obtained. The fourth code was "Probable Evidence Local," which was entered when a given bird was only observed on one of the rapid survey visits but was determined to be a local breeder rather than a migrant based on natural history. This code is only used for year-round residents (e.g., verdin [*Auriparus flaviceps*]), migratory species that arrive or depart during the field season and therefore cannot be expected to be present on both surveys (e.g., phainopepla [*Phainopepla nitens*], summer tanager), or migratory species for which migration falls outside the field season and are therefore unlikely to be detected as migrants (e.g., Lucy's warbler [*Oreothlypis luciae*]). The fifth and last code, "No Standard Scenarios," was used when the surveyor strongly felt that the bird was breeding on the plot, but they were not able to obtain standard evidence to classify it a breeder. If the surveyors chose this code, they elaborated their reasons in the "Comments" field of the database.

Extensive training of field surveyors and ongoing communication with experienced biologists was implemented throughout the survey season to evaluate specific bird observations and breeding evidence data for the recorded birds. In addition, detailed reference materials (e.g., Floyd et al. 2007; Corman and Wise-Gervais 2005; Rosenberg et al. 1991; Gill and Poole 1992–2003) were provided during training to aid the field crews' understanding of status and breeding behaviors of the species likely to be encountered.

Area search survey data were recorded on a map with a 50-m grid of the plot and the gray-scale aerial photography in the background (attachment 2c). Within several hours of completing a visit, surveyors transferred the data from the field map (attachment 2d) to the Bureau of Reclamation's (Reclamation) Access database for this project. In this database, the raw data from each plot visit, including specific records on each breeding and presumed non-breeding species, were entered and immediately checked for accuracy. For each pair of an LCR MSCP covered species that was ranked at least as a possible breeder, locations, dates, and territory codes from each visit were transferred onto a master copy of

the plot map for each species. At the end of the field season, after surveyors had completed both visits of the plot, their cumulative knowledge from the visits was used to enter the final number of breeding pairs per species for each plot in both the field datasheets and a summary table in the database.

Upon completion of the surveyor's second visit to the plot, and once all of their data had been entered into the Access database, the surveyor re-examined each record in their dataset to determine whether or not the recorded birds had a territory on their plot. Using the knowledge from their visits, they entered the percentage of each territory for each pair in the "Territory In" field. Until the last visit to a given plot, the "Territory In" field in the database was left open and labeled TIOpen. Once all visits were completed, the surveyor filled out the "Territory In" field with TI000, TI025, TI050, TI075, or TI100 to indicate the percentage of the territory that was inside the plot. For approval of a crew member's final dataset at the end of the season, supervising biologists reviewed their data to make certain that the "Territory In" field was correctly filled out. In this final step of dataset processing and approval, the surveyor also needed to complete the "Breeding Justification" field, which supervisors also checked for completeness and correctness.

Intensive Area Search Surveys

Weekly intensive area search survey visits were conducted in each intensive plot during the breeding season for a total of eight visits per plot. Territories were delineated for all territorial species (LCR MSCP covered and non-covered) to the extent possible within the plot, but with primary focus on covered species and other territorial riparian obligate birds. Knowledge of territory locations from previous visits was used in a cumulative manner to arrive at a total territory count at the end of the season (as described above for rapid area search surveys). For this, territory maps from previous visits were used to confirm known territory locations and territory boundaries and to add previously undetected or poorly delineated territories with each visit. During intensive area search surveys, the breeding status of individuals could be determined with much greater accuracy than in rapid area search surveys because of the greater number of visits and less time between visits to the plot. Data from all eight visits were used to determine how many breeding territories were active on the plot and which individuals were only passing through the plot but not breeding.

During each visit, the highest-ranking breeding evidence (confirmed, followed by probable, followed by possible) was recorded for the breeding status of individual birds (see table 4). At the end of the eight visits, a bird was classified as a "breeder" on a given plot if confirmed breeding evidence was recorded during any visit, or if probable or possible breeding evidence was recorded during three or more consecutive visits, or at least five non-consecutive visits. Therefore, it is emphasized that the definition of a "breeder" in this project does not automatically imply that positive nesting evidence was recorded but rather

that a breeding attempt most likely took place in the delineated territory during the area search surveys. Also at the end of the season, the final locations and layouts of breeding territories within the plot were determined based on all visits (attachment 2e). For this, all maps drafted during intensive area search surveys were combined into final maps of territories by species using the cumulative data from all visits. From 2011 to 2015, these final territory maps for covered species were entered into ArcGIS as shapefiles by species and plot in order to provide a digital format for future comparisons.

Entries in the database for breeding justifications from intensive area search surveys were slightly different from the justification codes used for rapid surveys. The "No Justification Required," "Observed Confirmed," and "No Standard Scenarios" were the same codes describing the same scenarios as in rapid surveys, but two additional codes were necessary for intensive area search surveys (table 5). The first additional code, "On Territory Consecutive" described a given bird or pair being observed on territory for at least three consecutive weeks of the intensive area search survey. The second additional code, "On Territory Season," described the scenario of a given bird or pair being recorded on territory during at least 5 weeks of the intensive area search survey but not necessarily in consecutive visits.

Table 5.—Breeding justification codes entered into Reclamation's Access database for the riparian bird survey project
("Number" shows the actual code entered in Access, "Short" provides a brief code description, "Area search survey type" describes the type of area search to which the code applies, and "Long" provides a description (see the "Methods" section).

Number	Short	Area search survey type[1]	Long
BJ0000	No Justification Required	RAP INT	No justification required
BJ0001	Observed Confirmed	RAP INT	For rapid and intensive –observed confirmed breeding evidence
BJ0002	On Territory Consecutive	INT	For intensive – observed the bird/pair "on territory" the required number of times in a row
BJ0003	On Territory Season	INT	For intensive – observed the bird/pair "on territory" the required number of times during the season
BJ0004	Probable Evidence Local	RAP	For rapid – observed probable evidence on at least one visit for known local breeders within the LCR MSCP planning area
BJ0005	Probable Evidence Both	RAP	For rapid – observed probable evidence on both visits for birds that are both migrants and breeders within the LCR MSCP planning area
BJ0006	No Standard Scenarios	RAP INT	For rapid and intensive – called it breeding but does not fit any of the standard scenarios; explanation in the "Notes" field

[1] RAP = rapid and INT = intensive.

The protocol for transferring data from the intensive area search survey data format to the Access database was similar to the process used for rapid area search survey data. In the field, intensive data were collected on a map with a 50-m grid of the plot and gray-scale aerial photography in the background (attachment 2c). Within several hours of completing a visit, surveyors transferred the data from the field map (attachment 2d) to Reclamation's Access database for this project. In this database, the raw data from each visit, including specific records on each breeding and presumed non-breeding species, were entered and immediately checked for accuracy. For all species that were ranked at least as a possible breeder, the locations, dates, and territory codes from each visit were transferred onto a master copy of the plot map for each species. Surveyors continued to add observations to the master copy of the maps throughout the season to accumulate locations of individuals (attachment 2e). At the end of the field season, after surveyors completed all visits of the plot, their cumulative knowledge from the area search survey was used to enter the final number of breeding pairs per species for each plot in both the field datasheets and a summary table in the database.

As with the rapid area search surveys, surveyors re-examined each record in their dataset after the final visit to each plot to determine whether or not each observed bird had a territory on their plot. Using the knowledge from all visits and final species maps, they entered the number of territories for each species in the "Territory In" field. As described above for rapid area search surveys, the "Territory In" field in Access was left open and labeled TIOpen until the final plot visit. After the final visit, the surveyor filled in the "Territory In" field with TI000, TI025, TI050, TI075, or TI100 for each record, indicating the percentage of the territory that was inside the plot. Additionally, after the last visit to the plot, surveyors filled in the "Breeding Justification" field. This field was filled in according to their field observations. The final data approval process by project managers included confirming that these two fields were filled out correctly.

Data Quality Assurance/Quality Control

All bird data collected in 2015 were entered by each surveyor into separate Access databases during the field season. All surveyors' Access datasets were then combined into a single Access database. To ensure the data were entered completely and correctly (quality assurance), GBBO staff checked for accuracy and completeness of field data sheets (daily field maps), Access data, and GIS data for all surveyors during and immediately following the end of the field season. To ensure all data were collected and entered completely into the Access database, each field technician and supervisor examined the data together at the end of the field season. During this vetting process, it was also confirmed that all field maps and species summary maps were scanned into a digital format and that each pair had a percent territory recorded in the Access database. To determine whether or not all the GIS data were entered for the covered species for the

intensive and rapid plots, all covered species records listed as having a territory in Access were compared to those recorded as territories in GIS. The initial GIS data entry process itself also acted as a data check for the Access database since the person entering data needed to compare their final species maps to the Access database in order to determine which species to enter as territories in GIS. If a covered species territory was digitized in GIS then it also had to be recorded as a territory in Access and vice versa.

If a covered species territory was found in GIS that was not listed as a territory in Access during the vetting process, the details entered in Access, breeding justification entries, and the daily survey maps were examined to resolve the discrepancy. This way, we were able to determine whether or not a territory should have been entered in GIS and, if not, the record was deleted. All errors found were corrected in the final Access database and GIS files. In addition to this vetting process, project managers again checked each dataset to make sure all surveys of each survey type were entered in Access by the end of the field season. Pair details, pair breeding justifications, and TI_IN numbers for all pairs on every plot were also checked to ensure that all were entered and there was no conflicting information for each pair. In these thousands of rows of data checked, the error rate was < 3%. At this point, individual databases were delivered to Reclamation to be merged into a single Access database for 2015 data. The final vetting of the data occurred when the data were converted into program Double Sampling (DS) files and report tables.

Population Size Analyses

Detection ratio estimates for most individual species are imprecise due to low density and a clumped spatial distribution; therefore, a single overall detection ratio for correcting population estimates of all species was estimated. Only confirmed breeders were included in the calculations of detection ratio and the resulting breeding bird population size estimates, which were expressed in total number of breeding territories of a species. To automate detection ratio calculation for double sampling using rapid and intensive area search surveys, USGS (Bart 2008, personal communication) wrote the program DS (Bart and Hartley 2011), which was previously used in 2011–14 for all detection ratio calculations and population size estimation for system-wide surveys and conservation areas. DS is not currently supported by USGS and is difficult to install on current versions of Windows OS. In 2015, Reclamation developed a program for calculating double sampling estimates and standard error (SE) with version 9.4 of the SAS System for Windows (SAS Institute 2012) using statistical formulae provided in the DS manual (Bart and Hartley 2011). As with DS estimates from past years, the SAS program treats both region and habitat as stratification variables even though sample selection was only formally stratified by habitat. Following the advice of Thompson (2012), variance estimates are calculated with the traditional formula for stratified sampling (i.e., not the post-stratification formula that treats sample size as a random variable for region). The

resulting variance estimates are conditional on the observed sample sizes in regions. The SAS code includes an option for applying a finite population correction (fpc) to the variance of the density estimates, which is not available in DS. This is recommended when > 5% of the total sampling universe is surveyed, as was the case for conservation areas. Applying an fpc-correction increases precision by reducing the SE (Thompson 2012). This SAS code was used to recalculate all population estimates for 2011–14 (GBBO 2016) as well as 2015 data.

For population size estimates, all non-territorial and colonial species (black-crowned night-heron, brown-headed cowbird, cattle egret, cliff swallow, double-crested cormorant, Eurasian collared-dove, European starling, Gambel's quail, great blue heron, great egret, great-tailed grackle, greater roadrunner, house finch, house sparrow, mourning dove, red-winged blackbird, ring-necked pheasant, rock pigeon, snowy egret, yellow-headed blackbird, white-faced ibis, and white-winged dove) were removed. While these species were included, as well as shorebirds, waterbirds, and raptors in the report tables, they were not included in the detection ratio calculations because it is often impossible to determine the breeding status and territory location of these species during area search surveys due to their large home ranges (some raptors), clustered occurrences (shorebirds), or secretive nature (shorebirds and several waterbirds). The species used for detection ratio calculations are listed in attachment 7.

In 2015, the overall detection ratios were 0.99 (SE = 0.18, coefficient of variation [CV] = 0.18) for system-wide plots and 0.89 for conservation area plots (SE = 0.29, CV = 0.32). These were applied to calculate overall population size estimates for the system-wide project area and the conservation areas (excluding the seven pre-development plots at the MVCA) using the SAS code created by Reclamation.

Descriptive comparisons of population size within or among habitats and years in this report do not reflect a formal assessment of statistical significance. Confidence intervals (CIs) may be used to identify some statistical differences. For example, population estimates for which 95% CI (1.96 * SE) do not overlap are different at the 0.05 level. However, estimates can still be statistically different even if intervals overlap to some degree.

Data Reporting

In this report, rapid area search survey data are summarized by the number of breeding bird territories and a tally of birds considered non-breeders (resident non-breeding birds and migrants) summed over the two surveys. For all intensive area search surveys, the data are summarized by reporting (1) the total number of breeding territories based on end-of-season summaries of all breeders and (2) a list of species that were either migrants or residents but were not confirmed to be breeding within the plot. For these non-breeders, the number seen over the eight

surveys were tallied by males, females, unknown sex, juveniles, flyovers, and incidentals. Flyovers and incidental sightings were only included in summary species lists, and these were excluded from all quantitative analyses in this report.

For population estimates, the 2015 survey data and results tables provided by Reclamation were used to create system-wide territory number tables for covered species and the 10 most abundant non-covered species, excluding colonial nesters and other non-territorial species. Since not all regions were surveyed in the system-wide effort (see "Study Area" and Rapid Area Search Survey Plots System-Wide," above), the overall population size estimate by species should be considered a minimum population size estimate for the LCR MSCP project area.

The species reported do not include subspecies (e.g., Audubon's warbler [*Setophaga coronata auduboni*], Mexican duck [*Anus platyrhynchos diaz*]), super-species (e.g., solitary vireo [*Vireo* spp.]., western flycatcher [*Empidonax* spp.]), or any unidentified species. The only time an unidentified, super-species, or subspecies was counted toward the species richness was if no true species within that taxon were recorded for a given site. For example, if a site had a solitary vireo record but no plumbeous (*Vireo plumbeous*) or Cassin's vireo (*Vireo cassinii)* records, then the solitary vireo was included in species richness for that particular site. Conversely, if multiple subspecies of the same species, such as Audubon's, myrtle (*Dendroica coronate coronate*) and yellow-rumped warblers (*Setophaga coronate*), were recorded at one location, these were counted as only one species toward the species richness of that site. Therefore, while the list in each species table reflects all subspecies, super-species, and unidentified species, the actual species richness discussed in the text only refers to the number of true species recorded.

RESULTS

Overall Species Richness Patterns

A total of 192 bird distinct species were detected in all system-wide and conservation area surveys along the LCR in 2015; some individuals could only be identified to super-species or a higher taxonomic rank. The subspecies of the yellow-rumped warbler, Audubon's warbler, and the myrtle warbler were identified. The subspecies of the white-crowned sparrow (*Zonotrichia leucophrys*), Gambel's white-crowned sparrow (*Zonotrichia leucophrys gambelii*), and the mountain white-crowned sparrow (*Zonotrichia leucophrys oriantha*) were identified. Of the 192 species, 55% were not confirmed as breeders on any plot. Each of this project's six LCR MSCP covered species were also detected in at least one plot. The highest concentrations of covered species were recorded in the Bill Williams River and Havasu National Wildlife Refuge

riparian areas and in the conservation areas. Yellow-billed cuckoos and willow flycatchers were also recorded, but since these species are monitored separately from this effort, they are not discussed in detail in this report nor is there any information on their breeding status. A total of 175 species were recorded in system-wide surveys, compared with 149 species in conservation area surveys, and 132 species were present on both system-wide and conservation area plots in 2015.

System-Wide Surveys

System-Wide Rapid Area Search Surveys

On 80 system-wide rapid area search survey plots surveyed in 2015 (see attachment 4 for a list of all plots surveyed), a total of 169 distinct species were recorded). Some individuals could only be identified to super-species or higher taxonomic ranks. The subspecies of the yellow-rumped warbler, Audubon's warbler, and the myrtle warbler) were identified. The subspecies of the white-crowned sparrow; Gambel's white-crowned sparrow, and the mountain white-crowned sparrow were also identified. Of these, 63 were classified as territorial breeders (3,052.5 territories) (table 6), 17 species were non-territorial breeders (attachment 5a), and 88 were exclusively migrants or otherwise classified as non-breeders. A total of 153 species were recorded as non-breeders on individual plots (table 7), including 41 species recorded only as flyover or incidental records. Approximately one-third of the breeding birds were of species that are not strictly territorial (and thus excluded from the DS analyses), and some of these species were also the most numerous system-wide, including the white-winged dove (450 pairs), mourning dove (313 pairs), red-winged blackbird (272 pairs), and brown-headed cowbird (193 pairs) (attachment 5a). Also of note was a colony of approximately 200 pairs of yellow-headed blackbirds breeding on plot S7960 near Laguna Dam. The most common territorial species included the song sparrow (*Melospiza melodia*), common yellowthroat (*Geothlypis trichas*), yellow-breasted chat (*Icteria virens*), Lucy's warbler, black-tailed gnatcatcher (*Polioptila melanura*), and marsh wren (*Cistothorus palustris*).

The most common breeders of the covered species was found to be the Sonoran yellow warbler (114.25 territories), followed by the Arizona Bell's vireo (45.75 territories), Gila woodpecker (24.75 territories), summer tanager (9.25 territories), and gilded flicker (1 territory) (table 6). Vermilion flycatchers were not found on system-wide surveys in 2015.

Two partial territories of gilded flickers were located in 2015, with two pairs present on Bill Williams River plot S7733 at Reid Valley. In past years, surveyors have also typically detected at least one gilded flicker on the Alamo Dam and Reid Valley plots.

Table 6.—Total number of breeding territories, by species, in the 80 system-wide rapid area search survey plots in 2015

(The number of territories in each plot was determined by the surveyor after the second visit. Species listed in descending order of abundance, and their scientific names are available in GBBO [2011, 2012]. Partial territories are represented in decimals [see the "Methods" section for details]. Non-territorial species are excluded from this list.)

Species (n = 63)	Number of territories
Song sparrow	522.75
Common yellowthroat	509
Yellow-breasted chat	286
Lucy's warbler	233.5
Black-tailed gnatcatcher	164.25
Marsh wren	160.75
Abert's towhee	145
Sonoran yellow warbler*	114.25
Verdin	98.5
American coot	73.75
Bewick's wren	67
Least bittern	56.25
Pied-billed grebe	56.25
Common gallinule	50.5
Ladder-backed woodpecker	49.25
Arizona bell's vireo*	45.75
Ash-throated flycatcher	41.75
Black-chinned hummingbird	37.75
Horned lark	30.25
Yuma clapper rail	29
Lesser nighthawk	29
Blue grosbeak	25.75
Gila woodpecker*	24.75
Crissal thrasher	24.25
Brown-crested flycatcher	22.5
Phainopepla	18.5
Western kingbird	16.25
Canyon wren	15.5
Anna's hummingbird	14.25
Green heron	12.5
Virginia rail	11.5
Northern rough-winged swallow	9.5
Summer tanager*	9.25
Bullock's oriole	6.25
Redhead	4.25

Table 6.—Total number of breeding territories, by species, in the 80 system-wide rapid area search survey plots in 2015

(The number of territories in each plot was determined by the surveyor after the second visit. Species listed in descending order of abundance, and their scientific names are available in GBBO [2011, 2012]. Partial territories are represented in decimals [see the "Methods" section for details]. Non-territorial species are excluded from this list.)

Species (n = 63)	Number of territories
Loggerhead shrike	3
Black phoebe	2.75
Killdeer	2.5
American kestrel	2.25
Common raven	2.25
Costa's hummingbird	2.25
Say's phoebe	2.25
Unidentified hummingbird	***2***
Burrowing owl	1.75
Lesser goldfinch	1.75
Western screech-owl	1.75
White-throated swift	1.75
Common ground-dove	1.5
Rock wren	1.25
California black rail	1
Black-necked stilt	1
Gilded flicker*	1
Hooded oriole	1
Mallard	1
Clark's grebe	0.75
Great horned owl	0.75
Black-throated sparrow	0.5
Cooper's hawk	0.5
Northern cardinal	0.5
Turkey vulture	0.5
Violet-green swallow	0.5
Western grebe	0.5
Common poorwill	0.25
Peregrine falcon	0.25
Total territories	**3,052.5**

* LCR MSCP covered species for this study.

Note: Species name that is both bold and italicized is an unidentified species, not a confirmed separate species, and it is not included in the species total.

Table 7.—Number of non-breeding birds detected during system-wide rapid area search surveys on 80 plots observed on both rapid surveys in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 153)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Abert's towhee†	0	0	0	2	0	0
American avocet	0	0	0	0	5	140
American coot†	0	0	47	0	0	28
American kestrel†	0	2	0	0	4	0
American pipit	0	0	50	0	5	0
American robin†	0	0	2	0	0	0
American white pelican	0	0	0	0	0	75
Anna's hummingbird†	0	0	0	5	0	0
Ash-throated flycatcher†	0	0	1	0	0	0
Audubon's warbler	3	1	9	0	2	0
Bank swallow	0	0	2	0	12	0
Barn swallow	4	0	25	0	1,031	0
Bell's vireo*†	0	0	0	0	0	1
Belted kingfisher	1	0	2	0	1	1
Black phoebe†	0	0	1	0	0	0
Black-chinned hummingbird†	0	0	0	1	0	0
Black-crowned night-heron†	0	0	2	0	6	0
Black-headed grosbeak†	7	4	9	0	0	0
Black-necked stilt†	0	0	0	0	29	0
Black-tailed gnatcatcher†	1	1	2	10	0	0
Black-throated gray warbler	2	4	3	0	0	0
Blue grosbeak†	5	2	1	0	0	0
Blue-gray gnatcatcher	1	0	1	0	0	0
Blue-winged teal	0	0	0	0	2	0
Bonaparte's gull	0	0	0	0	0	1
Brewer's sparrow	2	0	1	0	0	1
Brown-headed cowbird†	3	0	10	0	259	0
Bullock's oriole†	5	1	2	1	2	1
Burrowing owl†	0	0	0	0	0	1
Cactus wren†	0	0	1	0	0	0
California gull	0	0	0	0	1	0
Canada goose†	0	0	2	0	0	0
Caspian tern	0	0	3	0	6	1
Cassin's vireo	8	0	6	0	0	0
Cattle egret†	0	0	0	0	62	0
Cedar waxwing	0	0	2	0	0	0

Table 7.—Number of non-breeding birds detected during system-wide rapid area search surveys on 80 plots observed on both rapid surveys in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 153)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Chipping sparrow	0	0	7	0	0	0
Cinnamon teal†	2	2	1	0	5	0
Clapper rail†	0	0	1	0	0	3
Clark's grebe†	0	0	0	0	0	10
Cliff swallow†	0	0	205	0	535	25
Common gallinule†	0	0	0	0	0	2
Common ground-dove†	0	0	0	0	0	2
Common raven†	0	0	2	0	23	0
Common yellowthroat†	3	3	5	0	0	0
Cooper's hawk†	0	0	1	0	4	0
Costa's hummingbird†	0	0	0	1	0	0
Double-crested cormorant†	0	0	0	0	18	0
Eared grebe	0	0	6	0	0	621
Eurasian collared-dove†	0	0	4	0	18	0
European starling†	0	0	6	0	20	0
Evening grosbeak	0	0	0	0	1	0
Forster's tern	0	0	1	0	2	0
Franklin's gull	0	0	0	0	11	3
Gambel's white-crowned sparrow	0	0	1	0	0	0
Gila woodpecker*†	0	0	0	0	4	3
Gray flycatcher	0	0	5	0	0	0
Great blue heron†	0	0	3	0	27	1
Great egret†	0	0	2	0	14	0
Great horned owl†	1	0	0	0	0	2
Greater yellowlegs	0	0	0	0	1	0
Great-tailed grackle†	11	12	5	0	291	0
Green heron†	0	0	0	0	4	1
Green-tailed towhee	1	0	13	0	0	1
Hammond's flycatcher	0	0	1	0	0	0
Hermit thrush	0	0	1	0	0	0
Hermit warbler	1	0	1	0	0	0
Hooded oriole†	0	1	0	0	1	0
Horned lark†	0	6	2	0	5	0
House finch†	3	2	9	0	75	0
House wren	2	0	1	0	0	0

Table 7.—Number of non-breeding birds detected during system-wide rapid area search surveys on 80 plots observed on both rapid surveys in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 153)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Inca dove	0	0	0	0	0	2
Indian peafowl	0	0	2	0	0	0
Killdeer†	0	0	0	0	6	4
Ladder-backed woodpecker†	0	0	1	1	0	0
Lark sparrow	0	0	2	0	0	0
Lazuli bunting	9	5	28	0	1	0
Least bittern†	0	0	0	0	0	4
Least sandpiper	0	0	0	0	1	0
Lesser goldfinch†	0	0	9	0	13	15
Lesser nighthawk†	9	1	11	0	21	12
Lincoln's sparrow	0	0	3	0	0	0
Loggerhead shrike†	0	0	1	2	0	0
Long-billed curlew	0	0	0	0	5	0
Lucy's warbler†	0	0	2	15	0	0
Macgillivray's warbler	10	1	3	0	0	0
Mallard†	1	1	0	0	25	0
Marsh wren†	0	0	1	1	0	0
Mountain white-crowned sparrow	0	0	10	0	0	0
Mourning dove†	0	0	69	2	315	0
Myrtle warbler	1	0	0	0	0	0
Nashville warbler	3	2	8	0	0	0
Neotropic cormorant	0	0	0	0	2	0
Northern cardinal	0	0	0	0	0	1
Northern harrier†	0	4	1	0	5	1
Northern mockingbird†	0	0	1	0	1	0
Northern parula	0	0	1	0	0	0
Northern pintail	0	0	0	0	8	0
Northern rough-winged swallow†	0	0	75	0	279	1
Northern shoveler	0	0	0	0	1	0
Nutting's flycatcher†	0	0	0	0	0	1
Olive-sided flycatcher	0	0	2	0	0	0
Orange-crowned warbler	7	1	38	0	0	0
Osprey	0	0	4	0	6	0
Pacific-slope flycatcher	106	0	121	0	0	0
Peregrine falcon†	0	0	0	0	2	2

Table 7.—Number of non-breeding birds detected during system-wide rapid area search surveys on 80 plots observed on both rapid surveys in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 153)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Phainopepla†	0	0	1	0	6	0
Pied-billed grebe†	0	0	0	0	0	5
Pine siskin	0	0	0	0	1	0
Prairie falcon	0	0	0	0	1	1
Purple martin	0	0	0	0	1	0
Red-breasted merganser	1	0	0	0	0	0
Redhead†	3	2	0	0	0	0
Red-tailed hawk†	0	0	3	0	3	0
Red-winged blackbird†	37	21	27	27	2,240	0
Ring-billed gull	0	0	0	0	10	0
Ring-necked duck	1	2	0	0	0	0
Rock pigeon†	0	0	0	0	7	10
Rock wren†	0	0	0	1	0	0
Ruby-crowned kinglet	1	0	5	0	0	0
Ruddy duck†	0	5	0	0	0	15
Rufous hummingbird	0	1	0	0	0	0
Savannah sparrow	0	0	17	0	0	0
Say's phoebe†	1	0	0	0	0	0
Snowy egret†	0	0	2	0	5	0
Song sparrow†	0	0	0	2	0	0
Sora	0	0	8	0	0	1
Spotted sandpiper	0	0	6	0	0	0
Summer tanager*†	1	0	0	0	0	0
Swainson's thrush	2	0	1	0	0	0
Swainson's hawk	0	0	0	0	1	0
Townsend's warbler	7	6	9	0	0	0
Tree swallow	0	0	401	0	7,844	2,000
Tropical kingbird†	0	0	1	0	0	0
Turkey vulture†	0	0	26	0	98	1
Unidentified Accipiter hawk	0	0	1	0	1	0
Unidentified duck	0	0	0	0	2	0
Unidentified Empidonax flycatcher	0	0	7	0	0	0
Unidentified gull	0	0	0	0	24	10
Unidentified hummingbird	1	0	0	0	3	0
Unidentified shorebird	0	0	0	0	20	0

Table 7.—Number of non-breeding birds detected during system-wide rapid area search surveys on 80 plots observed on both rapid surveys in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 153)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Unidentified sparrow	0	0	2	0	0	0
Unidentified swallow	0	0	0	0	50	0
Unidentified thrush	0	0	1	0	0	0
Unidentified warbler	0	0	20	0	3	0
Vaux's swift	0	0	1	0	2	0
Verdin†	0	0	2	12	0	1
Violet-green swallow†	0	0	0	0	1	0
Virginia rail†	0	0	2	0	0	0
Warbling vireo	8	0	115	0	0	0
Western flycatcher	1	0	43	0	0	0
Western grebe†	0	0	0	0	0	8
Western kingbird†	0	0	19	0	7	0
Western tanager	12	10	10	0	2	0
Western wood-pewee	15	0	106	0	0	0
White-crowned sparrow	8	0	104	0	0	0
White-faced ibis†	0	0	0	0	706	181
White-throated swift†	0	0	4	0	36	2
White-winged dove†	0	0	112	0	1,032	2
Willet	0	0	0	0	1	0
Willow flycatcher**†	18	0	9	0	0	1
Wilson's snipe	0	0	2	0	0	0
Wilson's warbler	93	9	411	0	1	0
Wood duck	0	0	1	0	0	0
Yellow warbler*†	36	16	37	0	2	0
Yellow-breasted chat†	0	0	0	0	0	2
Yellow-headed blackbird†	307	250	0	80	872	0
Yellow-rumped warbler	33	13	33	0	19	0

* LCR MSCP covered species for this study.

** Willow flycatcher indicates both migrants and the southwestern subspecies because they cannot be differentiated in this study.

† Species occurs as a breeder in the study area, but numbers reported here are of migrant, flyover, or otherwise non-breeding individuals.

Note: Species names that are both bold and italicized are either subspecies, super-species, or unidentified species, not confirmed separate species, and they are not included in the species total.

System-Wide Intensive Area Search Surveys

During system-wide intensive area search surveys (n = 8) in 2015, a total of 112 species were recorded (see attachment 4 for a list of the 2015 intensive area search survey plots). Some individuals could only be identified to super-species or higher taxonomic ranks. The subspecies of the yellow-rumped warbler, Audubon's warbler, and the myrtle warbler were identified. The subspecies of the white-crowned sparrow and Gambel's white-crowned sparrow) were also identified. Of these, 32 were classified as territorial breeders (414.5 territories; table 8), 12 species were non-territorial breeders (attachment 5b), and 70 were exclusively migrants or other non-breeders. A total of 93 species were recorded as non-breeders on individual plots (table 9), including 23 species recorded only as flyover or incidental records.

Breeding evidence for four covered species was found during the system-wide intensive surveys, including the Sonoran yellow warbler (19.75 territories), Arizona Bell's vireo (9 territories), Gila woodpecker (6 territories), and summer tanager (1.75 territories) (table 8). Additionally, non-territorial and colonial species (attachment 5b) were detected that comprised approximately one-third of the breeding birds.

Conservation Areas

Rapid Area Search Surveys

Overall Results

During rapid area search surveys on conservation areas in 2015 (n = 75; MVCA excluded), a total of 148 species were recorded (see attachment 4 for a list of all conservation area plots surveyed in 2015). Some individuals could only be identified to super-species or a higher taxonomic rank. The subspecies of the yellow-rumped warbler and Audubon's warbler were identified. The subspecies of the white-crowned sparrow, Gambel's white-crowned sparrow, and the mountain white-crowned sparrow were also identified. Of these, 39 were classified as territorial breeders (table 10), 13 species were non-territorial breeders (attachment 5a), and 96 were exclusively migrants or other individuals classified as non-breeders. A total of 145 species were recorded as non-breeders on individual plots (table 11), including both migrant species and local breeders confirmed to be breeding on other plots, as well as 47 species recorded only as flyover or incidental records. Five of the six covered species were classified as breeders in conservation areas, including Arizona Bell's vireo (24.5 territories), Sonoran yellow warbler (22.5 territories), summer tanager (5 territories), vermilion flycatcher (4.75 territories), and Gila woodpecker (0.75 territory) (table 10). Gilded flickers were not detected in the 2015 surveys of conservation areas (attachment 3).

Table 8.—Total number of breeding territories of territorial bird species detected during system-wide intensive area search surveys in 2015

(Species listed in descending order of abundance, and their scientific names are available in GBBO [2011, 2012]. Non-territorial species not listed.)

Species (n = 32)	Number of territories
Song sparrow	82.25
Lucy's warbler	48.75
Yellow-breasted chat	48.75
Common yellowthroat	37.75
Black-tailed gnatcatcher	32.75
Verdin	29.75
Abert's towhee	23.5
Sonoran yellow warbler*	19.75
Bewick's wren	13.25
Ladder-backed woodpecker	9.75
Arizona Bell's vireo*	9
Black-chinned hummingbird	8.25
Gila woodpecker*	6
Ash-throated flycatcher	5.75
Lesser nighthawk	5.75
Phainopepla	4.75
Anna's hummingbird	4
Brown-crested flycatcher	4
Canyon wren	4
Crissal thrasher	3
Blue grosbeak	2.25
Summer tanager*	1.75
Western kingbird	1.5
Least bittern	1.25
Northern rough-winged swallow	1.25
Common gallinule	1
Green heron	1
Pied-billed grebe	1
American coot	0.75
Costa's hummingbird	0.75
Lesser goldfinch	0.75
American kestrel	0.5
Total territories	**414.5**

* LCR MSCP covered species for this study.

Table 9.—Number of non-breeding birds detected during eight visits to intensive system-wide area search survey plots in 2015 (n = 8)

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 93)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Abert's towhee†	0	0	0	1	0	0
American kestrel†	1	0	1	0	1	0
Anna's hummingbird†	1	0	0	9	0	0
Ash-throated flycatcher†	0	0	2	0	0	0
Audubon's warbler	7	1	11	0	4	0
Barn swallow	0	0	1	0	93	0
Bewick's wren†	1	0	0	0	0	0
Black-chinned hummingbird†	0	0	2	1	0	0
Black-crowned night-heron†	0	0	1	0	3	0
Black-headed grosbeak†	8	2	1	0	0	0
Black-tailed gnatcatcher†	0	0	0	6	0	0
Blue grosbeak†	0	0	2	0	0	0
Brewer's sparrow	0	0	4	0	0	0
Brown-headed cowbird†	0	0	0	0	120	0
Bullock's oriole†	6	1	1	1	0	0
Cactus wren†	0	0	1	0	0	0
Canada goose†	0	0	0	0	1	0
Canyon wren†	0	0	4	0	0	0
Caspian tern	0	0	0	0	8	0
Cassin's vireo	7	0	1	0	0	0
Cedar waxwing	0	0	3	0	29	0
Clapper rail†	0	0	1	0	0	0
Cliff swallow†	0	0	24	0	141	0
Common loon	0	0	0	0	1	0
Common raven†	0	0	1	0	4	0
Common yellowthroat†	3	0	1	0	0	0
Cooper's hawk†	0	0	1	0	2	0
Double-crested cormorant†	0	0	0	0	3	0

Table 9.—Number of non-breeding birds detected during eight visits to intensive system-wide area search survey plots in 2015 (n = 8)

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 93)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Fox sparrow	0	0	1	0	0	0
Gambel's white-crowned sparrow	0	0	1	0	0	0
Gray flycatcher	0	0	4	0	0	0
Great blue heron†	0	0	6	0	9	0
Great egret†	0	0	1	0	4	0
Great horned owl†	1	0	0	0	0	1
Greater scaup	0	0	0	0	0	15
Great-tailed grackle†	0	0	0	0	23	0
Green heron†	0	0	1	0	0	0
Green-tailed towhee	0	0	11	0	0	1
Hammond's flycatcher	0	0	1	0	0	0
Hermit thrush	0	0	1	0	0	0
Hermit warbler	2	0	0	0	0	0
House wren	1	0	0	0	0	0
Hutton's vireo	0	0	1	0	0	0
Lark sparrow	0	0	2	0	0	0
Lazuli bunting	2	9	16	0	0	0
Lesser goldfinch†	0	1	27	0	9	0
Lesser nighthawk†	2	1	0	0	0	0
Lincoln's sparrow	0	0	1	0	0	0
Loggerhead shrike†	0	0	1	0	0	0
Lucy's warbler†	0	0	0	5	0	0
Macgillivray's warbler	6	0	3	0	0	0
Mallard†	0	0	0	0	11	0
Mourning dove†	0	0	0	0	26	0
Myrtle warbler	3	1	0	0	0	1
Nashville warbler	0	1	2	0	0	1
Northern cardinal†	2	0	0	0	0	0

Table 9.—Number of non-breeding birds detected during eight visits to intensive system-wide area search survey plots in 2015 (n = 8)

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 93)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Northern rough-winged swallow†	0	0	45	0	64	0
Nutting's flycatcher†	0	0	0	0	0	3
Olive-sided flycatcher	0	0	4	0	0	0
Orange-crowned warbler	4	0	12	0	0	0
Osprey	0	0	2	0	0	0
Pacific-slope flycatcher	37	0	138	0	0	0
Phainopepla†	48	11	0	0	0	0
Prairie falcon	0	0	0	0	1	0
Redhead†	0	0	0	0	0	1
Red-tailed hawk†	1	1	2	0	2	0
Red-winged blackbird†	0	0	0	0	339	0
Rose-breasted grosbeak	1	0	0	0	0	0
Scott's oriole	1	0	0	0	0	0
Sharp-shinned hawk	0	1	1	0	1	0
Snowy egret†	0	0	0	0	1	0
Song sparrow†	0	0	0	4	0	0
Sora†	0	0	3	0	0	0
Summer tanager*†	1	0	1	0	0	0
Swainson's thrush	0	0	2	0	0	0
Swainson's hawk	0	0	0	0	1	0
Townsend's warbler	9	5	6	0	0	0
Tree swallow	0	0	0	0	276	0
Turkey vulture†	0	0	4	0	33	0
Unidentified cormorant	0	0	0	0	1	0
Unidentified *Empidonax* flycatcher	0	0	1	0	0	0
Unidentified gull	0	0	0	0	1	0
Unidentified hummingbird	0	0	0	0	1	0
Unidentified loon	0	0	0	0	1	0

Table 9.—Number of non-breeding birds detected during eight visits to intensive system-wide area search survey plots in 2015 (n = 8)

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 93)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Unidentified swallow	0	0	0	0	5	0
Vaux's swift	0	0	0	0	8	0
Verdin†	0	0	0	27	0	1
Warbling vireo	9	0	48	0	0	0
Western flycatcher	3	0	6	0	0	0
Western kingbird†	0	0	0	0	1	0
Western screech-owl†	0	0	2	0	0	0
Western tanager	11	4	3	0	0	0
Western wood-pewee	6	0	72	0	0	0
White-crowned sparrow	7	0	31	0	0	0
White-faced ibis†	0	0	0	0	32	0
White-throated swift†	0	0	0	0	11	0
White-winged dove†	0	0	0	0	169	0
Willow flycatcher**†	8	0	8	0	0	0
Wilson's warbler	25	11	127	0	0	0
Yellow warbler*†	14	8	8	0	0	0
Yellow-headed blackbird	0	0	0	0	1	0
Yellow-rumped warbler	1	0	1	0	0	0

* LCR MSCP covered species for this study.

** Willow flycatcher indicates both migrants and the southwestern subspecies because they cannot be differentiated in this study.

† Species occurs as a breeder in the study area, but numbers reported here are of migrant, flyover, or otherwise non-breeding individuals.

Note: Species names that are both bold and italicized are either subspecies, super-species, or unidentified species, not confirmed separate species, and they are not included in the species total. The species name that is in bold could not be identified to the species level. It was unique because no other species in that taxon was detected; it was included in the species total.

Pre-development area search surveys were also conducted at seven sites within the MVCA in 2015. Since these sites have not yet been developed, they are different from all other conservation areas surveyed in 2015, and thus, the results from these plots are reported separately.

Table 10.—Total number of breeding territories of territorial bird species detected during rapid area search surveys of the conservation area plots in 2015 (n = 75, MVCA excluded)

(Species listed in descending order of abundance, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 39)	Number of territories
Blue grosbeak	202.5
Abert's towhee	189.5
Common yellowthroat	167.5
Verdin	144.25
Black-tailed gnatcatcher	90
Black-chinned hummingbird	89.25
Song sparrow	80.5
Western kingbird	65.25
Bullock's oriole	61.75
Yellow-breasted chat	61.25
Lucy's warbler	48.25
Ladder-backed woodpecker	41.5
Anna's hummingbird	38.5
Ash-throated flycatcher	24.5
Arizona Bell's vireo*	24.5
Sonoran yellow warbler*	22.5
Killdeer	16
Lesser goldfinch	13.75
Crissal thrasher	12.25
Indigo bunting	11.5
Inca dove	8.75
Summer tanager*	5
Brown-crested flycatcher	4.75
Northern mockingbird	4.75
Vermilion flycatcher*	4.75
Common ground-dove	3.5
Great horned owl	3.5
Costa's hummingbird	1.25
Lesser nighthawk	1.25
Black phoebe	1
Unidentified hummingbird	***1***
American kestrel	0.75
Black-necked stilt	0.75
Gila woodpecker*	0.75
Northern rough-winged swallow	0.75
Say's phoebe	0.75
Common raven	0.5
Barn owl	0.25
Green heron	0.25
Marsh wren	0.25
Total territories	**1,448.5**

* LCR MSCP covered species for this study.

Note: Species name that is both bold and italicized is a unidentified species not confirmed separate species and is not included in the species total.

Table 11.—Number of non-breeding birds detected in 2015 during two survey visits on all conservation area rapid area search surveys (n = 75)
(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 145)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Abert's towhee†	0	0	1	3	0	0
American coot†	0	0	0	0	1	0
American kestrel†	4	0	0	0	5	0
American pipit	0	0	0	0	18	1
American redstart	1	0	0	0	0	0
American white pelican	0	0	0	0	0	1
Anna's hummingbird†	0	0	0	36	2	0
Ash-throated flycatcher†	0	0	1	0	0	0
Audubon's warbler	21	4	49	0	3	3
Bank swallow	0	0	0	0	27	0
Barn swallow	1	1	34	0	457	0
Bell's vireo†	0	0	0	0	0	1
Belted kingfisher	0	0	0	0	1	2
Black phoebe†	0	0	7	0	0	0
Black-and-white warbler	1	0	0	0	0	0
Black-chinned hummingbird†	0	0	2	13	2	0
Black-crowned night-heron†	0	0	3	0	1	1
Black-headed grosbeak†	25	6	26	0	0	0
Black-necked stilt†	0	0	7	0	6	3
Black-tailed gnatcatcher†	2	2	1	27	0	0
Black-throated gray warbler	1	0	5	0	0	0
Black-throated sparrow†	1	0	0	0	0	0
Blue grosbeak†	0	0	0	0	0	2

Table 11.—Number of non-breeding birds detected in 2015 during two survey visits on all conservation area rapid area search surveys (n = 75)
(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 145)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Blue-gray gnatcatcher	0	1	0	0	0	0
Brewer's sparrow	5	0	2	0	0	0
Brown-crested flycatcher†	0	0	0	0	0	3
Brown-headed cowbird†	0	0	0	0	833	0
Budgerigar	0	0	1	0	0	0
Bullock's oriole†	1	0	1	0	1	0
California gull	0	0	0	0	1	0
Calliope hummingbird	1	1	1	0	0	0
Canada goose†	0	0	11	0	11	3
Caspian tern	0	0	0	0	7	0
Cassin's vireo	8	0	12	0	0	3
Cattle egret†	0	0	0	0	138	0
Cedar waxwing	0	0	27	0	88	43
Chipping sparrow	0	0	20	0	0	0
Cinnamon teal†	0	0	0	0	0	5
Clapper rail†	0	0	1	0	0	3
Cliff swallow†	0	0	154	0	265	0
Common black hawk†	0	0	1	0	0	2
Common gallinule†	0	0	0	0	0	1
Common ground-dove†	0	0	0	0	5	1
Common loon	0	0	0	0	0	1
Common poorwill†	0	0	0	0	0	1
Common raven†	0	0	0	0	33	2

Table 11.—Number of non-breeding birds detected in 2015 during two survey visits on all conservation area rapid area search surveys (n = 75)
(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 145)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Common yellowthroat†	5	1	4	0	0	5
Cooper's hawk†	0	0	0	1	1	1
Costa's hummingbird†	0	0	0	1	0	0
Crissal thrasher†	0	0	0	0	0	5
Double-crested cormorant†	0	0	0	0	5	0
Dusky flycatcher	0	0	1	0	0	0
Eurasian collared-dove†	0	0	170	0	33	2
European starling†	0	0	0	0	69	0
Gambel's quail†	0	0	1	0	0	31
Gambel's white-crowned sparrow	0	0	1	0	0	0
Gila woodpecker*†	0	0	0	0	0	4
Gray flycatcher	1	0	7	0	0	1
Great blue heron†	0	0	4	0	13	1
Great egret†	0	0	8	0	13	0
Great horned owl†	0	0	0	0	0	5
Greater roadrunner†	0	0	0	0	0	2
Greater yellowlegs	0	0	0	0	1	0
Great-tailed grackle†	7	0	0	0	219	1
Green heron†	0	0	1	0	1	1
Green-tailed towhee	1	0	10	0	0	0
Hammond's flycatcher	2	0	23	0	0	0
Hermit thrush	0	0	8	0	0	0
Hermit warbler	5	0	3	0	0	0

Table 11.—Number of non-breeding birds detected in 2015 during two survey visits on all conservation area rapid area search surveys (n = 75)
(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 145)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Hooded oriole†	1	0	0	0	0	0
Hooded warbler	0	0	0	0	0	1
Horned lark†	0	0	0	0	13	0
House finch†	22	1	38	9	104	0
House wren	3	0	2	0	0	0
Indigo bunting†	0	0	0	0	0	6
Killdeer†	0	0	1	0	16	6
Ladder-backed woodpecker†	0	0	0	0	2	0
Lark sparrow	0	0	1	0	0	0
Lawrence's goldfinch†	0	0	0	0	3	0
Lazuli bunting	34	21	120	0	1	60
Least bittern†	0	0	0	0	0	2
Least sandpiper	0	0	2	0	0	2
Lesser goldfinch†	5	11	16	0	73	0
Lesser nighthawk†	1	0	0	0	31	0
Lincoln's sparrow	0	0	16	0	0	0
Loggerhead shrike†	0	0	3	0	0	1
Long-billed curlew	0	0	1	0	1	1
Lucy's warbler†	38	19	187	49	0	0
Macgillivray's warbler	11	7	12	0	0	0
Mallard†	0	0	0	0	9	1
Merlin	0	0	0	0	1	0
Mountain white-crowned sparrow	0	0	17	0	0	1

Table 11.—Number of non-breeding birds detected in 2015 during two survey visits on all conservation area rapid area search surveys (n = 75)
(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 145)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Mourning dove†	0	0	69	0	451	0
Nashville warbler	16	6	17	0	0	1
Northern harrier†	0	0	0	0	3	1
Northern mockingbird†	0	0	0	0	1	0
Northern parula	1	0	0	0	0	0
Northern rough-winged swallow†	0	0	16	0	180	5
Olive-sided flycatcher	1	0	5	0	0	0
Orange-crowned warbler	11	6	91	0	0	0
Osprey†	0	0	2	0	3	0
Pacific-slope flycatcher	297	0	328	0	0	26
Peregrine falcon†	0	0	2	0	1	0
Phainopepla†	1	1	0	0	1	1
Pine siskin	0	0	21	0	16	1
Prairie falcon	0	0	0	0	1	0
Red-shouldered hawk	0	0	1	0	0	0
Red-tailed hawk†	0	0	3	0	5	0
Red-winged blackbird†	15	0	0	0	5,032	10
Rock pigeon†	0	0	0	0	0	15
Rose-breasted grosbeak	1	0	0	0	0	0
Ruby-crowned kinglet	1	0	14	0	0	1
Rufous hummingbird	0	4	0	0	0	0
Say's phoebe†	0	0	1	3	1	0
Sharp-shinned hawk	0	0	1	1	0	0

Table 11.—Number of non-breeding birds detected in 2015 during two survey visits on all conservation area rapid area search surveys (n = 75)
(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 145)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Snowy egret†	0	0	7	0	4	0
Song sparrow†	1	0	0	0	0	2
Sora	0	0	0	0	0	1
Spotted sandpiper	0	0	3	0	0	2
Spotted towhee	0	0	5	0	0	0
Summer tanager*†	0	0	0	0	0	1
Swainson's hawk	0	0	0	0	1	1
Swainson's thrush	2	0	2	0	0	0
Townsend's warbler	21	4	20	0	0	0
Tree swallow	0	0	80	0	1,546	0
Turkey vulture†	0	0	10	0	76	0
Unidentified Accipiter hawk	0	0	0	0	1	0
Unidentified duck	0	0	0	0	4	0
Unidentified Empidonax flycatcher	0	0	8	0	0	0
Unidentified hummingbird	0	0	0	0	3	0
Unidentified swallow	0	0	0	0	54	0
Unidentified warbler	0	0	11	0	2	0
Verdin†	0	0	0	27	0	0
Vermilion flycatcher*†	0	0	0	0	0	1
Violet-green swallow†	0	0	30	0	2	0
Virginia rail†	0	0	0	0	0	1
Warbling vireo	67	0	410	0	0	6
Western flycatcher	1	0	40	0	0	0

Table 11.—Number of non-breeding birds detected in 2015 during two survey visits on all conservation area rapid area search surveys (n = 75)
(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 145)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Western kingbird†	1	0	2	0	24	0
Western tanager	19	12	40	0	0	0
Western wood-pewee	58	0	274	0	0	11
White-crowned sparrow	5	0	32	0	0	0
White-faced ibis†	0	0	0	0	473	34
White-throated sparrow	0	0	1	0	0	0
White-throated swift†	0	0	0	0	17	0
White-winged dove†	0	0	15	0	1,175	0
Willow flycatcher**†	47	0	16	0	0	9
Wilson's snipe	0	0	1	0	0	0
Wilson's warbler	221	48	746	0	1	0
Yellow warbler*†	44	13	16	0	0	9
Yellow-billed cuckoo†	0	0	0	0	0	1
Yellow-breasted chat†	0	0	0	0	0	5
Yellow-headed blackbird†	0	0	0	0	63	3
Yellow-rumped warbler†	8	8	46	0	22	0
Zone-tailed hawk	0	0	1	0	1	0

* LCR MSCP covered species for this study.
** Willow flycatcher indicates both migrants and the southwestern subspecies because they cannot be differentiated in this study.
† Species occurs as a breeder in the study area, but numbers reported here are of migrant, flyover, or otherwise non-breeding individuals.
Note: Species names that are both bold and italicized are either subspecies, super-species, or unidentified species not confirmed separate species and are not included in the species total.

Beal Lake Conservation Area

In 2015, rapid area search surveys were conducted on four BLCA plots (attachment 1y). A total of 62 species were recorded, 18 of which were classified as territorial breeders (121 territories) (table 12), 8 as non-territorial breeders (attachment 5a), and 36 as migrants or other non-breeders. Some individuals could only be identified to higher taxonomic ranks. The subspecies of the yellow-rumped warbler and Audubon's warbler were identified. A total of 47 species were recorded as non-breeders on individual plots (table 13), including migrant species and species confirmed breeding on other plots. This also includes 25 species recorded only as flyover or incidental records. Arizona Bell's vireos were found to be the most abundant breeder, not only of the covered species but of all species breeding at the BLCA, with 19.5 territories (table 12). Other covered species found breeding on the plots included Sonoran yellow warbler (13 territories) and summer tanager (4 territories) (table 12).

Table 12.—Number of breeding territories of territorial species detected during rapid area search surveys at BLCA plots in 2015

(Species listed in descending order of abundance, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 18)	C1501 (Beal A)	C1502 (Beal B)	C1503 (Beal C)	C1504 (Beal D)	Total
Arizona Bell's vireo*	4	5.25	8.25	2	19.5
Black-tailed gnatcatcher	2.5	5	5.5	6.25	19.25
Yellow-breasted chat	3	3	10	0.5	16.5
Sonoran yellow warbler*	0	1.75	11	0.25	13
Abert's towhee	1.5	4.25	4.5	1.5	11.75
Verdin	1.25	2.75	2.25	3	9.25
Lucy's warbler	2.25	0	0.25	6.25	8.75
Black-chinned hummingbird	0.5	3	1.75	0	5.25
Summer tanager*	0	0.75	3.25	0	4
Bullock's oriole	0.25	0.25	2.75	0.25	3.5
Anna's hummingbird	0	1	2	0	3
Crissal thrasher	0.25	1.25	0	0.5	2
Ladder-backed woodpecker	0	0	1.5	0	1.5
Blue grosbeak	0.5	0	0.25	0.25	1
Ash-throated flycatcher	0	0.5	0	0.25	0.75
Brown-crested flycatcher	0	0	0.75	0	0.75
Common yellowthroat	0.75	0	0	0	0.75
Lesser nighthawk	0	0	0	0.5	0.5
Total territories	**16.75**	**28.75**	**54**	**21.5**	**121**

* LCR MSCP covered species for this study.

Table 13.—Number of non-breeding birds detected during two visits for rapid area search surveys on BLCA plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 47	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Abert's towhee†	0	0	0	1	0	0
Anna's hummingbird†	0	0	0	0	2	0
Audubon's warbler	2	0	1	0	0	0
Bank swallow	0	0	0	0	3	0
Barn swallow	0	0	30	0	8	0
Belted kingfisher	0	0	0	0	1	0
Brown-headed cowbird†	0	0	0	0	23	0
Canada goose†	0	0	0	0	3	0
Cassin's vireo	1	0	0	0	0	0
Cedar waxwing	0	0	4	0	20	0
Clapper rail†	0	0	0	0	0	1
Cliff swallow†	0	0	130	0	36	0
Common raven†	0	0	0	0	4	0
Common yellowthroat†	3	0	0	0	0	0
Double-crested cormorant†	0	0	0	0	1	0
Eurasian collared-dove†	0	0	0	0	6	0
Great blue heron†	0	0	0	0	2	0
Great-tailed grackle†	0	0	0	0	19	0
Green heron†	0	0	0	0	0	1
House finch†	0	0	0	0	2	0
Killdeer†	0	0	0	0	2	0
Lazuli bunting	0	0	1	0	0	0
Least bittern†	0	0	0	0	0	1
Lucy's warbler†	0	0	10	7	0	0
Macgillivray's warbler	0	0	1	0	0	0
Mourning dove†	0	0	0	0	17	0
Northern rough-winged swallow	0	0	2	0	17	0

Table 13.—Number of non-breeding birds detected during two visits for rapid area search surveys on BLCA plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 47	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Pacific-slope flycatcher	14	0	36	0	0	0
Pine siskin	0	0	0	0	1	0
Red-winged blackbird†	0	0	0	0	58	0
Sharp-shinned hawk	0	0	1	0	0	0
Snowy egret†	0	0	0	0	1	0
Townsend's warbler	1	0	0	0	0	0
Tree swallow	0	0	80	0	261	0
Turkey vulture†	0	0	0	0	8	0
Unidentified swallow	0	0	0	0	42	0
Verdin†	0	0	0	2	0	0
Violet-green swallow†	0	0	30	0	2	0
Virginia rail†	0	0	0	0	0	1
Warbling vireo	3	0	3	0	0	0
Western wood-pewee	12	0	55	0	0	0
White-faced ibis†	0	0	0	0	35	23
White-winged dove†	0	0	0	0	1	0
Willow flycatcher**†	2	0	0	0	0	0
Wilson's warbler	6	0	23	0	0	0
Yellow warbler*†	6	0	3	0	0	0
Yellow-headed blackbird†	0	0	0	0	4	0
Yellow-rumped warbler	0	0	5	0	1	0
Zone-tailed hawk	0	0	0	0	1	0

* LCR MSCP covered species for this study.

** Willow flycatcher indicates both migrants and the southwestern subspecies because they cannot be differentiated in this study.

† Species occurs as a breeder in the study area, but numbers reported here are of migrant, flyover, or otherwise non-breeding individuals.

Note: Species names that are both bold and italicized are either subspecies or unidentified species, not confirmed separate species, and they are not included in the species total.

Colorado River Indian Tribes' Site (CRIT 9 'Ahakhav Tribal Preserve)

Five plots in the CRIT 9 'Ahakhav Tribal Preserve (attachment 1z) were surveyed with rapid area search surveys in 2015. A total of 67 species were recorded, 21 of which were classified as territorial breeders (91 territories) (table 14), 7 species as non-territorial breeders (attachment 5a), and 39 as migrants or other non-breeders. Some individuals could only be identified to higher taxonomic ranks. The subspecies of the yellow-rumped warbler and Audubon's warbler were identified. A total of 51 species (table 15) were recorded as non-breeders on individual plots, including migrant species and local breeders confirmed breeding on other plots, as well as 26 species recorded only as flyover or incidental records. Two covered species were found breeding at the CRIT 9 'Ahakhav Tribal Preserve: vermilion flycatchers (4.75 territories) and Gila woodpeckers (0.25 territory) (table 14). A summer tanager was also detected at CRIT A and B, but it was classified as a non-breeder (table 15).

Table 14.—Number of breeding territories of territorial species detected during two visits for rapid area search surveys at CRIT 9 'Ahakhav Tribal Preserve plots in 2015
(Species listed in descending order of abundance, and their scientific names are available in GBBO [2011, 2012]).

Species (n = 21)	C2101 (CRIT 9 Plot A)	C2102 (CRIT 9 Plot B)	C2103 (CRIT 9 Plot C)	C2104 (CRIT 9 Plot D)	C2105 (CRIT 9 Plot E)	Total
Abert's towhee	1.25	3.75	2.75	4.75	2	14.5
Anna's hummingbird	0.75	4.5	0.5	3	4.5	13.25
Verdin	1.75	2.25	3.25	3.25	0	10.5
Ladder-backed woodpecker	0.75	1.25	3.25	2	1.25	8.5
Black-tailed gnatcatcher	2.25	1	1.75	2	0	7
Lucy's warbler	1	0	2	3.5	0	6.5
Western kingbird	1.25	0.5	1.75	0.75	1.25	5.5
Vermilion flycatcher*	3.5	0.25	0.5	0.5	0	4.75
Ash-throated flycatcher	0.25	1.5	1.25	1.25	0.25	4.5
Black-chinned hummingbird	0	0	0.75	0	3	3.75
Bullock's oriole	1	1.75	0.75	0.25	0	3.75
Blue grosbeak	1.75	0	0	1.5	0	3.25
Brown-crested flycatcher	0	1	0	0.25	0	1.25
Crissal thrasher	0.75	0	0	0.25	0	1
Lesser goldfinch	0	0	0.5	0.5	0	1
American kestrel	0.25	0.25	0	0	0	0.5
Great horned owl	0	0.25	0.25	0	0	0.5
Black phoebe	0	0	0	0	0.25	0.25
Common raven	0	0	0.25	0	0	0.25
Gila woodpecker*	0	0.25	0	0	0	0.25
Northern mockingbird	0	0	0	0.25	0	0.25
Total territories	**16.5**	**18.5**	**19.5**	**24**	**12.5**	**91**

* LCR MSCP covered species for this study.

Table 15.—Number of non-breeding birds detected during two visits for rapid area search surveys on CRIT 9 'Ahakhav Tribal Preserve plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012]).

Species (n = 51)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
American redstart	1	0	0	0	0	0
Audubon's warbler	0	0	1	0	0	3
Barn swallow	0	0	0	0	3	0
Black-chinned hummingbird†	0	0	0	0	1	0
Black-headed grosbeak†	1	0	0	0	0	0
Black-throated gray warbler	0	0	2	0	0	0
Brown-crested flycatcher†	0	0	0	0	0	2
Brown-headed cowbird†	0	0	0	0	22	0
Caspian tern	0	0	0	0	7	0
Cassin's vireo	2	0	1	0	0	2
Cedar waxwing	0	0	1	0	4	42
Cliff swallow†	0	0	0	0	2	0
Common raven†	0	0	0	0	5	0
Crissal thrasher†	0	0	0	0	0	2
Double-crested cormorant†	0	0	0	0	2	0
Eurasian collared-dove†	0	0	0	0	0	2
Gambel's quail†	0	0	0	0	0	1
Gila woodpecker*†	0	0	0	0	0	4
Gray flycatcher	0	0	3	0	0	0
Great-tailed grackle†	2	0	0	0	97	0
Hammond's flycatcher	0	0	1	0	0	0
Hooded warbler	0	0	0	0	0	1
Killdeer†	0	0	0	0	0	2
Lazuli bunting	0	0	0	0	1	0
Lesser goldfinch†	0	0	2	0	1	0
Mourning dove†	0	0	0	0	41	0
Nashville warbler	1	1	1	0	0	1
Northern rough-winged swallow†	0	0	0	0	8	5
Olive-sided flycatcher	0	0	4	0	0	0
Orange-crowned warbler	0	0	7	0	0	0

Table 15.—Number of non-breeding birds detected during two visits for rapid area search surveys on CRIT 9 'Ahakhav Tribal Preserve plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012]).

Species (n = 51)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Pacific-slope flycatcher	2	0	5	0	0	0
Phainopepla†	0	0	0	0	0	1
Red-tailed hawk†	0	0	1	0	0	0
Red-winged blackbird†	0	0	0	0	5	10
Ruby-crowned kinglet	0	0	0	0	0	1
Rufous hummingbird	0	1	0	0	0	0
Swainson's thrush	1	0	0	0	0	0
Townsend's warbler	1	1	3	0	0	0
Tree swallow	0	0	0	0	23	0
Turkey vulture†	0	0	6	0	1	0
Unidentified Empidonax flycatcher	0	0	1	0	0	0
Unidentified hummingbird	0	0	0	0	2	0
Vermilion flycatcher*†	0	0	0	0	0	1
Warbling vireo	1	0	3	0	0	2
Western kingbird†	0	0	0	0	1	0
Western tanager	1	0	0	0	0	0
Western wood-pewee	0	0	7	0	0	0
White-winged dove†	0	0	0	0	6	0
Willow flycatcher**†	0	0	0	0	0	2
Wilson's warbler	0	3	3	0	0	0
Yellow warbler*†	1	0	0	0	0	0
Yellow-headed blackbird	0	0	0	0	1	1
Yellow-rumped warbler	0	0	1	0	0	0
Zone-tailed hawk	0	0	1	0	0	0

* LCR MSCP covered species for this study.

** Willow flycatcher indicates both migrants and the southwestern subspecies because they cannot be differentiated in this study.

† Species occurs as a breeder in the study area, but numbers reported here are of migrant, flyover, or otherwise non-breeding individuals.

Note: Species names that are both bold and italicized are either subspecies or unidentified species, not confirmed separate species, and they are not included in the species total.

Palo Verde Ecological Reserve

During rapid area search surveys of 27 plots at the PVER (attachment 1aa), a total of 108 species were recorded, 25 of which were classified as territorial breeders (565 territories) (table 16), 8 as non-territorial breeders (attachment 5a), and 75 as migrants or other non-breeders. Some individuals could only be identified to super-species or a higher taxonomic rank. The subspecies of the yellow-rumped warbler and Audubon's warbler were identified. The subspecies of the white-crowned sparrow, Gambel's white-crowned sparrow, and the mountain white-crowned sparrow were also identified. A total of 94 species (table 17) were recorded as non-breeders on individual plots, including migrant species and local breeders confirmed breeding on other plots, as well as 38 species recorded only as flyover or incidental records. Of the covered species, Sonoran yellow warblers were again found breeding in planting Phases 4, 5, and 6 (7 territories) (table 16). One partial territory (0.25 territory) of Gila woodpeckers was recorded in planting Phase 5. Several summer tanagers were detected and possibly breeding, but breeding could not be confirmed (table 17). The most common non-territorial species breeding at the PVER was the white-winged dove (256 pairs), followed in abundance by 110 pairs of brown-headed cowbirds.

Table 16.—Number of breeding territories of territorial species detected during two visits for rapid area search surveys at PVER plots in 2015

(Species listed in descending order of abundance, and their scientific names are available in GBBO [2011, 2012]).

Species (n = 25)	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	Total
Common yellowthroat	0.75	2.25	5	47.25	28.75	52.5	8	144.5
Blue grosbeak	1.75	12	13	31.75	29.5	26.25	6	120.25
Song sparrow	1	0.25	18.75	18.5	21.75	3	2	65.25
Abert's towhee	3	8	8.25	20	10.5	1.5	2.75	54
Black-chinned hummingbird	3	17	6.25	12	1.5	1	1	41.75
Yellow-breasted chat	1	0	4.75	19.25	3.75	1	0	29.75
Bullock's oriole	2.5	0.25	1.25	8.25	9.5	4	0	25.75
Lucy's warbler	0	0	3.5	9.75	6	0	0	19.25
Ladder-backed woodpecker	0.75	1.75	2.5	4.75	3	1.75	0	14.5
Western kingbird	3	2.5	1	1.75	1	0.25	1	10.5
Indigo bunting	0	0	0.5	1.75	5.5	1	1.5	10.25
Sonoran yellow warbler*	0	0	0.5	0.5	6	0	0	7
Verdin	0	0.75	2.5	1.75	0.5	0	0.25	5.75
Black-tailed gnatcatcher	0	0	2	3.25	0	0	0	5.25
Anna's hummingbird	0	2.25	1.25	0	0	0	0	3.5
Lesser goldfinch	0	0	1	0	1	0.5	0	2.5
Great horned owl	0.25	0.25	0	0.25	0.5	0	0	1.25
Ash-throated flycatcher	0	0	0	0.5	0.5	0	0	1
Inca dove	0	0	1	0	0	0	0	1
Crissal thrasher	0	0.5	0	0	0	0	0	0.5
Killdeer	0	0	0	0	0	0.5	0	0.5
Barn owl	0	0	0	0	0.25	0	0	0.25
Common ground-dove	0	0	0	0	0	0.25	0	0.25
Common raven	0	0.25	0	0	0	0	0	0.25
Gila woodpecker*	0	0	0	0.25	0	0	0	0.25
Total territories	**17**	**48**	**73**	**181.5**	**129.5**	**93.5**	**22.5**	**565**

* LCR MSCP covered species for this study.

Table 17.—Number of non-breeding birds detected during two visits for rapid area search surveys on PVER plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 94)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Abert's towhee†	0	0	0	1	0	0
American kestrel†	0	0	0	0	2	0
American pipit	0	0	0	0	5	0
American white pelican	0	0	0	0	0	1
Audubon's warbler	16	1	35	0	0	0
Bank swallow	0	0	0	0	17	0
Barn swallow	0	0	0	0	93	0
Black phoebe†	0	0	4	0	0	0
Black-chinned hummingbird†	0	0	2	4	0	0
Black-crowned night-heron†	0	0	0	0	0	1
Black-headed grosbeak†	6	3	15	0	0	0
Black-tailed gnatcatcher†	1	1	0	8	0	0
Black-throated gray warbler	1	0	1	0	0	0
Brewer's sparrow	1	0	1	0	0	0
Brown-crested flycatcher†	0	0	0	0	0	1
Brown-headed cowbird†	0	0	0	0	391	0
Bullock's oriole†	0	0	0	0	1	0
California gull	0	0	0	0	1	0
Calliope hummingbird	1	1	1	0	0	0
Cassin's vireo	2	0	7	0	0	1
Cattle egret†	0	0	0	0	72	0
Cedar waxwing	0	0	17	0	64	1
Chipping sparrow	0	0	17	0	0	0
Clapper rail†	0	0	0	0	0	3
Cliff swallow†	0	0	0	0	27	0
Common black hawk†	0	0	1	0	0	2
Common ground-dove†	0	0	0	0	5	1
Common raven†	0	0	0	0	17	0

Table 17.—Number of non-breeding birds detected during two visits for rapid area search surveys on PVER plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 94)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Common yellowthroat†	0	1	0	0	0	0
Cooper's hawk†	0	0	0	1	1	0
European starling†	0	0	0	0	2	0
Gambel's white-crowned sparrow	0	0	1	0	0	0
Gray flycatcher	1	0	3	0	0	0
Great blue heron†	0	0	0	0	3	1
Great egret†	0	0	1	0	5	0
Greater roadrunner†	0	0	0	0	0	2
Greater yellowlegs	0	0	0	0	1	0
Great-tailed grackle†	0	0	0	0	87	0
Green heron†	0	0	0	0	1	0
Green-tailed towhee	0	0	1	0	0	0
Hammond's flycatcher	2	0	10	0	0	0
Hermit thrush	0	0	3	0	0	0
Hermit warbler	2	0	1	0	0	0
Horned lark†	0	0	0	0	1	0
House finch†	16	1	25	8	77	0
House wren	2	0	2	0	0	0
Indigo bunting†	0	0	0	0	0	5
Killdeer†	0	0	0	0	5	0
Ladder-backed woodpecker†	0	0	0	0	1	0
Lawrence's goldfinch†	0	0	0	0	2	0
Lazuli bunting	5	14	54	0	0	60
Lesser goldfinch†	4	1	3	0	56	0
Lesser nighthawk†	1	0	0	0	7	0
Lincoln's sparrow	0	0	13	0	0	0
Loggerhead shrike†	0	0	0	0	0	1
Lucy's warbler†	35	18	168	38	0	0

Table 17.—Number of non-breeding birds detected during two visits for rapid area search surveys on PVER plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 94)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Macgillivray's warbler	4	3	2	0	0	0
Mallard†	0	0	0	0	6	0
Mountain white-crowned sparrow	0	0	17	0	0	1
Mourning dove†	0	0	4	0	170	0
Nashville warbler	8	4	10	0	0	0
Northern parula	1	0	0	0	0	0
Northern rough-winged swallow†	0	0	0	0	75	0
Olive-sided flycatcher	1	0	0	0	0	0
Orange-crowned warbler	6	6	40	0	0	0
Osprey	0	0	0	0	3	0
Pacific-slope flycatcher	142	0	147	0	0	1
Pine siskin	0	0	17	0	8	1
Red-tailed hawk†	0	0	2	0	4	0
Red-winged blackbird†	14	0	0	0	3,381	0
Rose-breasted grosbeak	1	0	0	0	0	0
Ruby-crowned kinglet	1	0	8	0	0	0
Rufous hummingbird	0	2	0	0	0	0
Say's phoebe†	0	0	1	3	1	0
Spotted towhee	0	0	3	0	0	0
Summer tanager*†	0	0	0	0	0	1
Swainson's hawk	0	0	0	0	1	1
Swainson's thrush	0	0	1	0	0	0
Townsend's warbler	12	3	6	0	0	0
Tree swallow	0	0	0	0	317	0
Turkey vulture†	0	0	1	0	28	0
Unidentified Empidonax flycatcher	0	0	6	0	0	0
Unidentified warbler	0	0	9	0	2	0

Table 17.—Number of non-breeding birds detected during two visits for rapid area search surveys on PVER plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 94)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Verdin†	0	0	0	1	0	0
Warbling vireo	31	0	182	0	0	0
Western flycatcher	0	0	24	0	0	0
Western kingbird†	0	0	0	0	9	0
Western tanager	8	4	23	0	0	0
Western wood-pewee	19	0	120	0	0	0
White-crowned sparrow	5	0	16	0	0	0
White-faced ibis†	0	0	0	0	77	0
White-throated sparrow	0	0	1	0	0	0
White-winged dove†	0	0	0	0	782	0
Willow flycatcher**†	12	0	7	0	0	3
Wilson's warbler	140	33	287	0	0	0
Yellow warbler*†	15	6	4	0	0	8
Yellow-billed cuckoo†	0	0	0	0	0	1
Yellow-breasted chat†	0	0	0	0	0	2
Yellow-headed blackbird†	0	0	0	0	27	0
Yellow-rumped warbler	5	2	30	0	15	0

* LCR MSCP covered species for this study.

** Willow flycatcher indicates both migrants and the southwestern subspecies because they cannot be differentiated in this study.

† Species occurs as a breeder in the study area, but numbers reported here are of migrant, flyover, or otherwise non-breeding individuals.

Note: Species names that are both bold and italicized are either subspecies, super-species or unidentified species, not confirmed separate species, and they are not included in the species total.

Cibola Valley Conservation Area

In 18 rapid area search survey plots at the CVCA (attachment 1bb), a total of 87 species were recorded during two visits, 21 of which were classified as territorial breeders (259.5 territories) (table 18), 8 species were non-territorial breeders (attachment 5a), and 58 were migrants or other non-breeders. Some individuals could only be identified to super-species or a higher taxonomic rank. The subspecies of the yellow-rumped warbler and Audubon's warbler (*Setophaga coronata auduboni*) were identified. A total of 73 species (table 19) were recorded as non-breeders on individual plots, including migrant species and local breeders confirmed on other plots, as well as 33 species recorded only as flyover or incidental records. A pair of summer tanagers (0.25 territory) (table 18) exhibited nesting behavior in the Phase 1 plot. One Gila woodpecker was heard calling and drumming on the northern edge of the CVCA planting Phase 1, but the surveyor determined that the bird was not using the plot for breeding (table 19). As in past years, many non-territorial birds breeding were found in large numbers at the CVCA, including mourning and white-winged doves (158 and 187 pairs, respectively) and brown-headed cowbirds (86 pairs) (attachment 5a).

Table 18.—Number of breeding territories of territorial species detected during two visits for rapid area search surveys at CVCA plots in 2015

(Species listed in descending order of abundance, and their scientific names are available in GBBO [2011, 2012]).

Species (n = 21)	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Total
Abert's towhee	4.5	4.25	12	13.75	5	11	50.5
Black-tailed gnatcatcher	0	0	1.5	18	4	14	37.5
Verdin	1.25	0.75	9.25	9.75	5	11	37
Blue grosbeak	8.25	5.25	7	6.75	2.75	2.25	32.25
Western kingbird	0.5	7.25	19	0.5	0	1.75	29
Bullock's oriole	1.75	2.25	12.5	0.75	0	1.75	19
Black-chinned hummingbird	3.25	3	4	0.75	1	0	12
Inca dove	3.75	3.5	0	0	0	0	7.25
Crissal thrasher	0	0	0.25	1.5	0.5	3.75	6
Ladder-backed woodpecker	1.25	0	3.75	0.25	0.25	0.25	5.75
Ash-throated flycatcher	0.5	0	2.25	1.5	0.25	0.75	5.25
Yellow-breasted chat	0	0	0	5	0	0	5
Lucy's warbler	0	0	0	0.75	2.25	1	4
Common ground-dove	0	0	0	1.5	1	0.75	3.25
Great horned owl	0.25	0.75	0.5	0	0	0	1.5
Lesser goldfinch	1	0.5	0	0	0	0	1.5
Common yellowthroat	0	1	0	0	0	0	1
Unidentified hummingbird	***0***	***1***	***0***	***0***	***0***	***0***	***1***
Indigo bunting	0.75	0	0	0	0	0	0.75
Lesser nighthawk	0	0	0.5	0	0	0	0.5
Say's phoebe	0	0.25	0	0	0	0	0.25
Summer tanager*	0.25	0	0	0	0	0	0.25
Total territories	**27.25**	**28.75**	**72.5**	**60.75**	**22**	**48.25**	**2595**

* LCR MSCP covered species for this study.

Note: The species name that is both bold and italicized is a unidentified species, not a confirmed separate species, and it is not included in the species total.

Table 19.—Number of non-breeding birds detected during two visits for rapid area search surveys at CVCA plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012]).

Species (n = 73)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Abert's towhee†	0	0	1	0	0	0
American kestrel†	0	0	0	0	1	0
American pipit	0	0	0	0	2	0
Audubon's warbler	1	0	6	0	2	0
Bank swallow	0	0	0	0	5	0
Barn swallow	0	0	0	0	235	0
Black-and-white warbler	1	0	0	0	0	0
Black-chinned hummingbird†	0	0	0	2	1	0
Black-headed grosbeak†	11	1	8	0	0	0
Black-tailed gnatcatcher†	1	1	0	16	0	0
Black-throated gray warbler	0	0	1	0	0	0
Blue grosbeak†	0	0	0	0	0	2
Brewer's sparrow	1	0	0	0	0	0
Brown-headed cowbird†	0	0	0	0	127	0
Cassin's vireo	0	0	2	0	0	0
Cattle egret†	0	0	0	0	35	0
Cliff swallow†	0	0	0	0	91	0
Common loon	0	0	0	0	0	1
Common raven†	0	0	0	0	2	2
Crissal thrasher†	0	0	0	0	0	3
European starling†	0	0	0	0	4	0
Gambel's quail†	0	0	1	0	0	30
Great blue heron†	0	0	0	0	1	0
Great egret†	0	0	0	0	2	0
Great horned owl†	0	0	0	0	0	4
Great-tailed grackle†	1	0	0	0	8	0
Green-tailed towhee	1	0	3	0	0	0
Hammond's flycatcher	0	0	6	0	0	0

Table 19.—Number of non-breeding birds detected during two visits for rapid area search surveys at CVCA plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012]).

Species (n = 73)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Hermit thrush	0	0	1	0	0	0
Hooded oriole†	1	0	0	0	0	0
Horned lark†	0	0	0	0	8	0
House finch†	6	0	10	0	11	0
Killdeer†	0	0	0	0	3	0
Lazuli bunting	25	4	42	0	0	0
Lesser goldfinch†	1	10	5	0	14	0
Lesser nighthawk†	0	0	0	0	5	0
Loggerhead shrike†	0	0	3	0	0	0
Long-billed curlew	0	0	0	0	0	1
Lucy's warbler†	0	0	9	0	0	0
Macgillivray's warbler	1	3	0	0	0	0
Mourning dove†	0	0	0	0	123	0
Nashville warbler	3	0	1	0	0	0
Northern harrier†	0	0	0	0	1	0
Northern rough-winged swallow†	0	0	0	0	11	0
Olive-sided flycatcher	0	0	1	0	0	0
Orange-crowned warbler	4	0	10	0	0	0
Pacific-slope flycatcher	78	0	30	0	0	25
Peregrine falcon†	0	0	0	0	1	0
Pine siskin	0	0	1	0	4	0
Prairie falcon	0	0	0	0	1	0
Red-tailed hawk†	0	0	0	0	1	0
Red-winged blackbird†	1	0	0	0	727	0
Ruby-crowned kinglet	0	0	5	0	0	0
Sharp-shinned hawk	0	0	0	1	0	0
Spotted sandpiper	0	0	0	0	0	2
Spotted towhee	0	0	2	0	0	0

Table 19.—Number of non-breeding birds detected during two visits for rapid area search surveys at CVCA plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012]).

Species (n = 73)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Townsend's warbler	4	0	0	0	0	0
Tree swallow	0	0	0	0	398	0
Turkey vulture†	0	0	3	0	12	0
Verdin†	0	0	0	3	0	0
Warbling vireo	25	0	97	0	0	4
Western flycatcher	0	0	9	0	0	0
Western kingbird†	0	0	0	0	6	0
Western tanager	3	2	14	0	0	0
Western wood-pewee	11	0	34	0	0	10
White-crowned sparrow	0	0	2	0	0	0
White-faced ibis†	0	0	0	0	166	0
White-throated swift†	0	0	0	0	10	0
White-winged dove†	0	0	0	0	193	0
Willow flycatcher**†	23	0	3	0	0	4
Wilson's warbler	35	5	137	0	0	0
Yellow warbler*†	1	1	0	0	0	1
Yellow-breasted chat†	0	0	0	0	0	1
Yellow-headed blackbird†	0	0	0	0	1	2
Yellow-rumped warbler	0	0	2	0	0	0

* LCR MSCP covered species for this study.

** Willow flycatcher indicates both migrants and the southwestern subspecies because they cannot be differentiated in this study.

† Species occurs as a breeder in the study area, but numbers reported here are of migrant, flyover, or otherwise non-breeding individuals.

Note: Species names that are both bold and italicized are either subspecies or super-species, not confirmed separate species, and they are not included in the species total.

Cibola National Wildlife Refuge Unit #1 Conservation Area

Rapid area search survey plots surveyed in 2015 at the Cibola NWR Unit #1 included Area 1 (research and development; Nature Trail, Mass Planting, seed feasibility, Cottonwood Genetics, and the existing cottonwoods on the northern-most section), Area 5 (Crane's Roost), and the newly added plantings within Area 2 (Hippy Burn) (attachment 1cc). In these 13 plots, a total of 93 species were recorded, 22 of which were classified as territorial breeders (213.25 territories) (table 20), 9 as non-territorial breeders (attachment 5a), and 62 as migrants or other non-breeders. Some individuals could only be identified to super-species or a higher taxonomic rank. The subspecies of the yellow-rumped warbler and Audubon's warbler were identified. A total of 76 species were recorded as non-breeders on individual plots (table 21), including migrant species and local breeders confirmed on other plots and 41 species recorded only as flyover or incidental records. Arizona Bell's vireos (5 territories total at Crane's Roost and Nature Trail) and Sonoran yellow warblers (1.75 territories at Crane's Roost) were breeders. One Gila woodpecker was observed moving through the northern portion of Area 1 (Plot C2707), but the surveyor determined that the bird was not breeding in this area (table 21). Common non-territorial breeders included white-winged and mourning doves (143 and 134 pairs, respectively) and brown-headed cowbirds (79 pairs) (attachment 5a).

As in past years, territory numbers are reported in the two Nature Trail plots separately from other Area 1 plots to maintain consistency with past years and because the age and planting techniques on these plots are unique within Area 1 of Cibola NWR Unit #1.

Table 20.—Number of breeding territories of territorial species detected during two visits for rapid area search surveys at Cibola NWR Unit #1 plots in 2015
(Species listed in descending order of abundance, and their scientific names are available in GBBO [2011, 2012]).

Species (n = 22)	Area 1 (other)	Area 1 (Nature Trail North)	Area 1 (Nature Trail South)	Area 2 (Hippy Burn)	Area 5 (Crane's Roost)	Total
Blue grosbeak	4.25	2.75	1.75	12.5	16.75	38
Abert's towhee	5.5	4.25	4	2.25	14.75	30.75
Verdin	1.5	3.5	5.5	0	8	18.5
Western kingbird	8.5	3.5	2.5	0.75	3.25	18.5
Common yellowthroat	0	0	0	10.5	4	14.5
Song sparrow	0	0	0	0	14.25	14.25
Black-chinned hummingbird	0.75	4.75	1	0	6	12.5
Ash-throated flycatcher	2.25	3	0.75	0	4.25	10.25
Yellow-breasted chat	0	0	2	0	8	10
Bullock's oriole	4.75	2.5	1.5	0	1	9.75
Lucy's warbler	0	2	0	0	7.75	9.75
Ladder-backed woodpecker	1.5	2	0.5	0	3	7
Arizona Bell's vireo*	0	0	1	0	4	5
Anna's hummingbird	1.25	0.25	1.5	0	0	3
Northern mockingbird	0	0	0	0	3	3
Lesser goldfinch	1	1	0	0	0.25	2.25
Crissal thrasher	0.25	1	0.25	0	0.5	2
Sonoran yellow warbler*	0	0	0	0	1.75	1.75
Black-tailed gnatcatcher	0.5	0	0	0	1	1.5
Indigo bunting	0	0	0.5	0	0	0.5
Great horned owl	0	0.25	0	0	0	0.25
Say's phoebe	0	0	0	0	0.25	0.25
Total territories	32	30.75	22.75	26	101.75	213.25

* LCR MSCP covered species for this study.

Table 21.—Number of non-breeding birds detected during two visits for rapid area search surveys at Cibola NWR Unit #1 plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 76)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
American kestrel†	0	0	0	0	2	0
American pipit	0	0	0	0	11	0
Audubon's warbler	0	0	2	0	1	0
Bank swallow	0	0	0	0	2	0
Barn swallow	0	0	0	0	111	0
Bell's vireo*†	0	0	0	0	0	1
Belted kingfisher	0	0	0	0	0	2
Black-headed grosbeak†	3	0	3	0	0	0
Black-tailed gnatcatcher†	0	0	1	1	0	0
Brewer's sparrow	2	0	1	0	0	0
Brown-headed cowbird†	0	0	0	0	226	0
Canada goose†	0	0	0	0	0	1
Cassin's vireo	3	0	2	0	0	0
Cattle egret†	0	0	0	0	12	0
Cedar waxwing	0	0	5	0	0	0
Chipping sparrow	0	0	1	0	0	0
Cliff swallow†	0	0	0	0	73	0
Common gallinule†	0	0	0	0	0	1
Common poorwill†	0	0	0	0	0	1
Common yellowthroat†	0	0	0	0	0	5
Dusky flycatcher	0	0	1	0	0	0
Eurasian collared-dove†	0	0	0	0	6	0
European starling†	0	0	0	0	3	0
Gray flycatcher	0	0	1	0	0	0
Great blue heron†	0	0	0	0	2	0
Great egret†	0	0	0	0	2	0
Great horned owl†	0	0	0	0	0	1
Great-tailed grackle†	0	0	0	0	3	0
Green-tailed towhee	0	0	4	0	0	0

Table 21.—Number of non-breeding birds detected during two visits for rapid area search surveys at Cibola NWR Unit #1 plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 76)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Hammond's flycatcher	0	0	6	0	0	0
Hermit thrush	0	0	4	0	0	0
Hermit warbler	0	0	1	0	0	0
Horned lark†	0	0	0	0	4	0
House finch†	0	0	1	0	4	0
House wren	1	0	0	0	0	0
Killdeer†	0	0	0	0	6	3
Lawrence's goldfinch†	0	0	0	0	1	0
Lazuli bunting	3	3	16	0	0	0
Least bittern†	0	0	0	0	0	1
Lesser goldfinch†	0	0	0	0	2	0
Lesser nighthawk†	0	0	0	0	16	0
Lincoln's sparrow	0	0	2	0	0	0
Lucy's warbler†	3	1	0	4	0	0
Macgillivray's warbler	3	0	6	0	0	0
Merlin	0	0	0	0	1	0
Mourning dove†	0	0	0	0	69	0
Nashville warbler	4	1	4	0	0	0
Northern harrier†	0	0	0	0	2	0
Northern rough-winged swallow†	0	0	0	0	15	0
Orange-crowned warbler	1	0	15	0	0	0
Pacific-slope flycatcher	54	0	42	0	0	0
Phainopepla†	1	1	0	0	0	0
Pine siskin	0	0	2	0	3	0
Red-winged blackbird†	0	0	0	0	754	0
Ruby-crowned kinglet	0	0	1	0	0	0
Rufous hummingbird	0	1	0	0	0	0
Song sparrow†	0	0	0	0	0	2
Sora	0	0	0	0	0	1

Table 21.—Number of non-breeding birds detected during two visits for rapid area search surveys at Cibola NWR Unit #1 plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 76)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Swainson's thrush	1	0	1	0	0	0
Townsend's warbler	3	0	0	0	0	0
Tree swallow	0	0	0	0	521	0
Turkey vulture†	0	0	0	0	13	0
Unidentified Accipiter hawk	0	0	0	0	1	0
Unidentified duck	0	0	0	0	4	0
Unidentified warbler	0	0	2	0	0	0
Warbling vireo	5	0	40	0	0	0
Western flycatcher	1	0	6	0	0	0
Western kingbird†	1	0	0	0	5	0
Western tanager	2	0	3	0	0	0
Western wood-pewee	14	0	39	0	0	1
White-crowned sparrow	0	0	2	0	0	0
White-faced ibis†	0	0	0	0	179	11
White-throated swift†	0	0	0	0	7	0
White-winged dove†	0	0	0	0	146	0
Willow flycatcher**†	7	0	2	0	0	0
Wilson's warbler	32	5	59	0	0	0
Yellow-breasted chat†	0	0	0	0	0	2
Yellow-headed blackbird†	0	0	0	0	12	0
Yellow-rumped warbler	0	2	7	0	1	0

* LCR MSCP covered species for this study.

** Willow flycatcher indicates both migrants and the southwestern subspecies because they cannot be differentiated in this study.

† Species occurs as a breeder in the study area, but numbers reported here are of migrant, flyover, or otherwise non-breeding individuals.

Note: Species names that are both bold and italicized are either subspecies, super-species, or unidentified species, not confirmed separate species, and they are not included in the species total. Species names that are in bold could not be identified to the species level. They were unique because no other species in that taxon was detected; they were included in the species total.

Yuma East Wetlands

In seven rapid area search survey plots at Yuma East Wetlands (attachment 1dd), a total of 86 species were recorded, 29 of which were classified as territorial breeders (190 territories) (table 22), 10 as non-territorial breeders (attachment 5a), and 47 as migrants or other non-breeders. Some individuals could only be identified to super-species. The subspecies of the yellow-rumped warbler and Audubon's warbler were identified. A total of 69 species were recorded as non-breeders on individual plots (table 23), including migrant species and local breeders confirmed on other plots, as well as 17 species recorded only as flyover or incidental records. This was the first year that LCR MSCP covered species were found using the Yuma East Wetlands planting area for breeding, with 0.75 territories each of summer tanagers and yellow warblers, and 0.25 territory of Gila woodpeckers (table 22).

Table 22.—Number of breeding territories of territorial species detected during two visits for rapid area search surveys at Yuma East Wetlands plots in 2015
(Listed in descending order of abundance, and Latin names can be found in attachment 3.)

Species (n = 29)	D	F	G	I	J	South AC	Total
Verdin	6.5	13.75	4.25	12.75	12.75	9.25	59.25
Abert's towhee	4	7.5	0.5	4.75	6.5	3	26.25
Black-tailed gnatcatcher	3.25	7.5	1.5	2.25	2.75	2.25	19.5
Anna's hummingbird	1	3.5	1.25	3.5	4	2.5	15.75
Killdeer	1.5	5.5	7.5	1	0	0	15.5
Black-chinned hummingbird	1.75	2.25	0.25	1.5	5.25	3	14
Blue grosbeak	0.5	0	0	2.25	3.25	0.75	6.75
Lesser goldfinch	0	0	0	1.25	5	0.25	6.5
Common yellowthroat	0	1	0.5	0	2.25	2	5.75
Ladder-backed woodpecker	1.25	1	0.25	0.5	0.25	1	4.25
Ash-throated flycatcher	0.25	1.25	0.25	0.5	0	0.5	2.75
Brown-crested flycatcher	0	0.5	1	0	0.75	0.5	2.75
Northern mockingbird	0	1.25	0	0	0	0.25	1.5
Costa's hummingbird	0	0	0	1.25	0	0	1.25
Song sparrow	0.25	0.25	0	0	0	0.5	1
Black phoebe	0	0	0.25	0	0	0.5	0.75
Black-necked stilt	0.5	0.25	0	0	0	0	0.75
Crissal thrasher	0.25	0.25	0	0	0	0.25	0.75
Northern rough-winged swallow	0	0	0.75	0	0	0	0.75
Summer tanager*	0	0	0	0.75	0	0	0.75
Western kingbird	0.25	0	0.25	0	0	0.25	0.75
Sonoran yellow warbler*	0	0	0	0	0	0.75	0.75
Inca dove	0	0	0	0	0	0.5	0.5
American kestrel	0	0	0	0.25	0	0	0.25
Gila woodpecker*	0	0.25	0	0	0	0	0.25
Green heron	0	0	0	0	0	0.25	0.25
Lesser nighthawk	0	0	0.25	0	0	0	0.25
Marsh wren	0	0	0	0	0	0.25	0.25
Say's phoebe	0	0.25	0	0	0	0	0.25
Total territories	**21.25**	**46.25**	**18.75**	**32.5**	**42.75**	**28.5**	**190**

* LCR MSCP covered species for this study.

Table 23.—Number of non-breeding birds detected during two visits for rapid area search surveys at Yuma East Wetlands plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 69)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
American kestrel†	4	0	0	0	0	0
American pipit	0	0	0	0	0	1
Anna's hummingbird†	0	0	0	36	0	0
Ash-throated flycatcher†	0	0	1	0	0	0
Audubon's warbler	2	3	0	0	0	0
Barn swallow	1	1	4	0	1	0
Black phoebe†	0	0	2	0	0	0
Black-chinned hummingbird†	0	0	0	6	0	0
Black-crowned night-heron†	0	0	3	0	1	0
Black-headed grosbeak†	4	2	0	0	0	0
Black-necked stilt†	0	0	4	0	6	3
Black-throated gray warbler	0	0	1	0	0	0
Black-throated sparrow†	1	0	0	0	0	0
Brewer's sparrow	1	0	0	0	0	0
Brown-headed cowbird†	0	0	0	0	34	0
Budgerigar	0	0	1	0	0	0
Cattle egret†	0	0	0	0	19	0
Chipping sparrow	0	0	2	0	0	0
Cinnamon teal†	0	0	0	0	0	5
Cliff swallow†	0	0	24	0	26	0
Cooper's hawk†	0	0	0	0	0	1
Costa's hummingbird†	0	0	0	1	0	0
Eurasian collared-dove†	0	0	170	0	11	0
European starling†	0	0	0	0	55	0
Great blue heron†	0	0	4	0	5	0
Great egret†	0	0	7	0	4	0
Great-tailed grackle†	4	0	0	0	3	0
Green heron†	0	0	1	0	0	0
Green-tailed towhee	0	0	1	0	0	0
Hermit warbler	1	0	0	0	0	0
House finch†	0	0	0	0	2	0
Indigo bunting†	0	0	0	0	0	1
Killdeer†	0	0	1	0	0	0
Lazuli bunting	1	0	6	0	0	0
Least sandpiper	0	0	2	0	0	2
Lesser goldfinch†	0	0	5	0	0	0
Long-billed curlew	0	0	1	0	0	0
Macgillivray's warbler	2	1	0	0	0	0
Mallard†	0	0	0	0	3	0

Table 23.—Number of non-breeding birds detected during two visits for rapid area search surveys at Yuma East Wetlands plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 69)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Mourning dove†	0	0	65	0	23	0
Northern harrier†	0	0	0	0	0	1
Northern mockingbird†	0	0	0	0	1	0
Northern rough-winged swallow†	0	0	14	0	3	0
Orange-crowned warbler	0	0	9	0	0	0
Osprey	0	0	2	0	0	0
Pacific-slope flycatcher	3	0	4	0	0	0
Peregrine falcon†	0	0	2	0	0	0
Phainopepla†	0	0	0	0	1	0
Pine siskin	0	0	1	0	0	0
Red-shouldered hawk	0	0	1	0	0	0
Red-winged blackbird†	0	0	0	0	105	0
Snowy egret†	0	0	7	0	3	0
Song sparrow†	1	0	0	0	0	0
Spotted sandpiper	0	0	1	0	0	0
Townsend's warbler	0	0	10	0	0	0
Tree swallow	0	0	0	0	8	0
Verdin†	0	0	0	19	0	0
Warbling vireo	0	0	84	0	0	0
Western flycatcher	0	0	1	0	0	0
Western kingbird†	0	0	0	0	3	0
Western tanager	3	3	0	0	0	0
Western wood-pewee	2	0	0	0	0	0
White-crowned sparrow	0	0	3	0	0	0
White-faced ibis†	0	0	0	0	16	0
White-winged dove†	0	0	15	0	20	0
Willow flycatcher**†	3	0	4	0	0	0
Wilson's snipe	0	0	1	0	0	0
Wilson's warbler	3	2	190	0	0	0
Yellow warbler*†	19	5	9	0	0	0
Yellow-headed blackbird†	0	0	0	0	18	0
Yellow-rumped warbler	3	4	0	0	0	0

* LCR MSCP covered species for this study.

** Willow flycatcher indicates both migrants and the southwestern subspecies because they cannot be differentiated in this study.

† Species occurs as a breeder in the study area, but numbers reported here are of migrant, flyover, or otherwise non-breeding individuals.

Note: Species names that are both bold and italicized are either subspecies or super-species, not confirmed separate species, and they are not included in the species total.

Mohave Valley Conservation Area

Rapid area search surveys were performed at seven MVCA pre-development plots (attachment 1x). This area includes six plots classified as low woody and one plot as unsuitable, and the area's dominant vegetation includes short saltcedar (*Tamerix* spp.) scrub, mesquite bosque, and arrowweed (*Pluchea sericea*) patches with interspersed extensive sand dunes. A total of 64 species were recorded, 15 of which were classified as territorial breeders (115 territories) (table 24), 9 as non-territorial breeders (attachment 5a), and 40 as migrants or other non-breeders. Some individuals could only be identified to a higher taxonomic rank. The subspecies of the yellow-rumped warbler and Audubon's warbler were identified. A total of 53 species were recorded as non-breeders on individual plots (table 25), including migrant species and local breeders confirmed on other plots, as well as 22 species recorded only as flyover or incidental records. No LCR MSCP covered species were found on the plots, although a Gila woodpecker was detected just north of the area in a mixed salt cedar-mesquite thicket. Relatively few non-territorial breeders were recorded (attachment 5a), most notably only five pairs of the brown-headed cowbirds.

Table 24.—Number of breeding territories of territorial species detected during two visits for rapid area search surveys at MVCA plots in 2015
(Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 15)	Plot classification n (low woody) = 6 n (unsuitable) = 1	Territories
Abert's towhee	Low woody	13.75
	Unsuitable	2.75
	Total	**16.5**
American kestrel	Low woody	0
	Unsuitable	0.25
	Total	**0.25**
Anna's hummingbird	Low woody	0.5
	Unsuitable	0
	Total	**0.5**
Ash-throated flycatcher	Low woody	3
	Unsuitable	0.75
	Total	**3.75**
Black-chinned hummingbird	Low woody	3
	Unsuitable	4
	Total	**7**
Black-tailed gnatcatcher	Low woody	23
	Unsuitable	8.5
	Total	**31.5**
Blue grosbeak	Low woody	2
	Unsuitable	0
	Total	**2**
Common yellowthroat	Low woody	0.75
	Unsuitable	0
	Total	**0.75**
Crissal thrasher	Low woody	1.75
	Unsuitable	0.75
	Total	**2.5**
Ladder-backed woodpecker	Low woody	1
	Unsuitable	0
	Total	**1**
Lesser nighthawk	Low woody	1.75
	Unsuitable	0
	Total	**1.75**
Lucy's warbler	Low woody	26.75
	Unsuitable	9.5
	Total	**36.25**
Northern rough-winged swallow	Low woody	1
	Unsuitable	0
	Total	**1**
Verdin	Low woody	3.5
	Unsuitable	1.75
	Total	**5.25**
Yellow-breasted chat	Low woody	5
	Unsuitable	0
	Total	**5**
	Total territories	**115**

Table 25.—Number of non-breeding birds detected during two visits for rapid area search surveys at MVCA plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 53)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Abert's towhee†	0	0	0	1	0	0
American coot†	0	0	0	0	1	0
Audubon's warbler	0	0	4	0	0	0
Barn swallow	0	0	0	0	6	0
Black phoebe†	0	0	1	0	0	0
Black-chinned hummingbird†	0	0	0	1	0	0
Black-necked stilt†	0	0	3	0	0	0
Black-tailed gnatcatcher†	0	0	0	2	0	0
Blue-gray gnatcatcher	0	1	0	0	0	0
Brown-headed cowbird†	0	0	0	0	10	0
Bullock's oriole†	1	0	1	0	0	0
Canada goose†	0	0	11	0	8	2
Cliff swallow†	0	0	0	0	10	0
Common raven†	0	0	0	0	5	0
Common yellowthroat†	2	0	4	0	0	0
Double-crested cormorant†	0	0	0	0	2	0
Eurasian collared-dove†	0	0	0	0	10	0
European starling†	0	0	0	0	5	0
Gray flycatcher	0	0	0	0	0	1
Great-tailed grackle†	0	0	0	0	2	1
Green-tailed towhee	0	0	1	0	0	0
Hermit warbler	2	0	1	0	0	0
House finch†	0	0	2	1	8	0
Killdeer†	0	0	0	0	0	1
Ladder-backed woodpecker†	0	0	0	0	1	0
Lark sparrow	0	0	1	0	0	0
Lazuli bunting	0	0	1	0	0	0
Lesser goldfinch†	0	0	1	0	0	0
Lesser nighthawk†	0	0	0	0	3	0
Lincoln's sparrow	0	0	1	0	0	0
Long-billed curlew	0	0	0	0	1	0
Macgillivray's warbler	1	0	3	0	0	0

Table 25.—Number of non-breeding birds detected during two visits for rapid area search surveys at MVCA plots in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 53)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Mallard†	0	0	0	0	0	1
Mourning dove†	0	0	0	0	8	0
Nashville warbler	0	0	1	0	0	0
Northern rough-winged swallow†	0	0	0	0	51	0
Orange-crowned warbler	0	0	10	0	0	0
Pacific-slope flycatcher	4	0	64	0	0	0
Red-winged blackbird†	0	0	0	0	2	0
Rock pigeon†	0	0	0	0	0	15
Spotted sandpiper	0	0	2	0	0	0
Townsend's warbler	0	0	1	0	0	0
Tree swallow	0	0	0	0	18	0
Turkey vulture†	0	0	0	0	14	0
Unidentified Empidonax flycatcher	0	0	1	0	0	0
Unidentified hummingbird	0	0	0	0	1	0
Unidentified swallow	0	0	0	0	12	0
Verdin†	0	0	0	2	0	0
Warbling vireo	2	0	1	0	0	0
Western kingbird†	0	0	2	0	0	0
Western tanager	2	3	0	0	0	0
Western wood-pewee	0	0	19	0	0	0
White-crowned sparrow	0	0	9	0	0	0
White-winged dove†	0	0	0	0	27	0
Wilson's warbler	5	0	47	0	1	0
Yellow warbler*†	2	1	0	0	0	0
Yellow-rumped warbler	0	0	1	0	5	0

* LCR MSCP covered species for this study.

† Species occurs as a breeder in the study area, but numbers reported here are of migrant, flyover, or otherwise non-breeding individuals.

Note: Species names that are both bold and italicized are either subspecies or unidentified species, not confirmed separate species, and they are not included in the species total.

Hunters Hole

Rapid area search surveys were performed at Hunters Hole. This area includes one cottonwood-willow plot, with 5 territorial breeding species recorded (8.75 territories): Abert's towhee (*Pipilo aberti*) (1.75 territories), verdin (4 territories), common yellowthroat (1 territory), blue grosbeak (*Passerina caerulea*) (1 territory), and western kingbird (*Tyrannus verticalis*) (1 territory). No LCR MSCP covered species were found at this site.

Conservation Area Intensive Area Search Surveys

Intensive area search surveys were conducted on four conservation area plots: C1503, C2306, C2309, and C2312. During these area search surveys, a total of 91 species were recorded, 24 of which were classified as territorial breeders (114.25 territories) (table 26), 9 as non-territorial breeders (attachment 5b), and 61 as migrants or other non-breeders. Some individuals could only be identified to super-species or a higher taxonomic rank. The subspecies of the yellow-rumped warbler and Audubon's warbler were identified. The subspecies of the white-crowned sparrow and the mountain white-crowned sparrow were also identified. A total of 69 species were recorded as non-breeders on individual plots, including migrant species and local breeders confirmed on other plots, and 33 species were recorded only as flyover or incidental records. Breeding evidence was found for the four covered species: Sonoran yellow warbler, Arizona Bell's vireo, and summer tanager at the BLCA, and vermilion flycatcher at the PVER (table 26). This was the first year attempted breeding of vermilion flycatchers at the PVER was documented. A male was observed singing on the northern edge of planting Phase 3 on May 21 and 29 as well as courting a female on the latter date. These birds were not detected again on subsequent visits.

Population Size Estimates[1]

System-wide Population Size Estimates

Using SAS for analyzing data from system-wide random plots, an overall detection ratio of 0.99 was obtained (SE = 0.18, CV = 0.18) for territorial riparian land bird species for the 2015 surveys. Using this detection ratio, system-wide minimum population size estimates for LCR MSCP covered species were calculated: 1,720.9 Sonoran yellow warbler territories, 1,263.4 Arizona Bell's vireo territories, 828.8 Gila woodpecker territories, 221.1 summer tanager territories, 0 vermilion flycatcher territories, and 70.6 gilded flicker territories (table 29). The low precision of population estimates, as reflected by the SE, was due to the large number of plots with zero counts. Only a few gilded flickers were detected in 2015, and the population estimates for the whole area of inference is almost certainly inflated for this species.

[1] The total population estimate over strata is not equal to the sum of individual stratum totals because the sampling plots are not all the same size. Stratum totals are based on density, or the total number of territories divided by the total area of sampled plots. Because plot area varies, the population estimate over strata must be calculated by summing the total birds and plot area over strata, calculating territories per unit area from these sums, and then multiplying that by the total area over all strata.

Table 26.—Total number of breeding territories of territorial species detected during eight visits for intensive area search surveys at four conservation area plots in 2015
(Species listed in descending order of abundance, and their scientific names are available in GBBO [2011, 2012]).

Species (n = 24)	C1503 (Beal C)	C2306 (PVER Phase 3)	C2309 (PVER Phase 4)	C2312 (PVER Phase 5)	Total
Black-chinned hummingbird	1	9	1.75	2.5	14.25
Blue grosbeak	0.75	1.5	5	7	14.25
Abert's towhee	5	0.5	1.5	4	11
Lucy's warbler	1.75	0	1	6.75	9.5
Common yellowthroat	0	0	0	8.5	8.5
Bullock's oriole	2	1.75	1.75	2.5	8
Sonoran yellow warbler*	6.75	0	0	0	6.75
Yellow-breasted chat	5.75	0	0	1	6.75
Verdin	5.5	0	0	0	5.5
Black-tailed gnatcatcher	5	0	0	0	5
Arizona Bell's vireo*	4	0	0	0	4
Song sparrow	0	0	2	2	4
Ladder-backed woodpecker	0.75	1.5	0.75	0.75	3.75
Western kingbird	0	1.5	0.75	0.75	3
Lesser goldfinch	0	0.25	0	2	2.25
Summer tanager*	2	0	0	0	2
Inca dove	0	0	1.5	0	1.5
Brown-crested flycatcher	1	0	0	0	1
Indigo bunting	0	0	0	1	1
Crissal thrasher	0.75	0	0	0	0.75
Great horned owl	0	0.25	0	0.25	0.5
Vermilion flycatcher*	0	0.5	0	0	0.5
Ash-throated flycatcher	0	0	0	0.25	0.25
Common raven	0	0.25	0	0	0.25
Total territories	**42**	**17**	**16**	**39.25**	**114.25**

* LCR MSCP covered species for this study.

Table 27.—Non-breeding species detected during eight visits to intensive area search survey plot C1503 at the BLCA in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 24)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Barn swallow	0	0	0	0	2	0
Brown-headed cowbird†	0	0	0	0	1	0
Canada goose†	0	0	0	0	3	0
Cassin's vireo	1	0	0	0	0	0
Cedar waxwing	0	0	2	0	0	0
Cliff swallow†	0	0	0	0	14	0
Common raven†	0	0	0	0	3	0
Great-tailed grackle†	0	0	0	0	2	0
House finch†	0	0	0	0	2	0
Killdeer†	0	0	0	0	1	0
Mourning dove†	0	0	0	0	5	0
Northern rough-winged swallow†	0	0	0	0	2	0
Pacific-slope flycatcher	0	0	14	0	0	0
Red-winged blackbird†	0	0	0	0	21	0
Townsend's warbler	1	0	0	0	0	0
Tree swallow	0	0	0	0	40	0
Turkey vulture†	0	0	0	0	2	0
Unidentified swallow	0	0	0	0	42	0
Warbling vireo	1	0	0	0	0	0
Western wood-pewee	0	0	8	0	0	0
White-faced ibis†	0	0	0	0	7	0
Willow flycatcher**†	2	0	0	0	0	0
Wilson's warbler	3	0	0	0	0	0
Yellow-rumped warbler	0	0	1	0	0	0
Zone-tailed hawk	0	0	0	0	1	0

** Willow flycatcher indicates both migrants and the southwestern subspecies because they cannot be differentiated in this study.

† Species occurs as a breeder in the study area, but numbers reported here are of migrant, flyover, or otherwise non-breeding individuals.

Note: The species name that is both bold and italicized was an unidentified species, not a confirmed separate species, and it is not included in the species total.

Table 28.—Non-breeding species detected during eight visits to PVER intensive area search survey plots Phase 3 C2306, Phase 4 C2309, and Phase 5 C2312 in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 66)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
American kestrel†	0	0	0	0	2	0
American pipit	0	0	0	0	3	0
Audubon's warbler	3	1	7	0	0	0
Bank swallow	0	0	0	0	4	0
Barn swallow	0	0	0	0	2	0
Black phoebe†	0	0	4	0	0	0
Black-chinned hummingbird†	0	0	0	3	0	0
Black-headed grosbeak†	4	3	8	0	0	0
Black-throated gray warbler	0	0	1	0	0	0
Brown-crested flycatcher†	0	0	0	0	0	1
Brown-headed cowbird†	0	0	0	0	127	0
Calliope hummingbird	0	0	1	0	0	0
Cassin's vireo	1	0	1	0	0	0
Cattle egret†	0	0	0	0	63	0
Cedar waxwing	0	0	10	0	21	1
Clapper rail†	0	0	1	0	0	2
Cliff swallow†	0	0	0	0	2	0
Common ground-dove†	0	0	0	0	4	1
Cooper's hawk†	0	0	0	1	1	0
European starling†	0	0	0	0	2	0
Gray flycatcher†	1	0	0	0	0	0
Great egret†	0	0	0	0	3	0
Greater roadrunner†	0	0	0	0	0	2
Greater yellowlegs	0	0	0	0	1	0
Great-tailed grackle†	0	0	0	0	6	0
Green heron†	0	0	0	0	1	0
Hammond's flycatcher	2	0	4	0	0	0
Hermit warbler	2	0	0	0	0	0
House finch†	0	0	0	4	5	0
Indigo bunting†	0	0	0	0	0	2
Killdeer†	0	0	0	0	3	0
Lazuli bunting	0	5	27	0	0	60
Lesser goldfinch†	0	0	0	0	7	0
Lesser nighthawk†	1	0	0	0	3	0
Loggerhead shrike†	0	0	0	0	0	1
Lucy's warbler†	4	1	51	3	0	0
Macgillivray's warbler	2	0	2	0	0	0
Mountain white-crowned sparrow	0	0	1	0	0	0
Mourning dove†	0	0	0	0	91	0

Table 28.—Non-breeding species detected during eight visits to PVER intensive area search survey plots Phase 3 C2306, Phase 4 C2309, and Phase 5 C2312 in 2015

(Birds with "possible" breeding evidence excluded here [but listed as non-breeders in attachment 3]. Species listed in alphabetical order, and their scientific names are available in GBBO [2011, 2012].)

Species (n = 66)	Male	Female	Unknown sex	Juvenile	Flyover	Incidental
Nashville warbler	1	0	1	0	0	0
Northern rough-winged swallow†	0	0	0	0	50	0
Olive-sided flycatcher	1	0	0	0	0	0
Orange-crowned warbler	0	0	4	0	0	0
Osprey	0	0	0	0	1	0
Pacific-slope flycatcher	95	0	60	0	0	1
Pine siskin	0	0	5	0	1	0
Red-tailed hawk†	0	0	0	0	2	0
Red-winged blackbird†	0	0	0	0	1,225	0
Rose-breasted grosbeak	1	0	0	0	0	0
Ruby-crowned kinglet	1	0	1	0	0	0
Rufous hummingbird	0	2	0	0	0	0
Say's phoebe†	0	0	1	3	0	0
Summer tanager*†	0	0	0	0	0	1
Swainson's hawk	0	0	0	0	0	1
Townsend's warbler	5	1	0	0	0	0
Tree swallow	0	0	0	0	25	0
Turkey vulture†	0	0	1	0	10	0
Warbling vireo	2	0	43	0	0	0
Western flycatcher	0	0	2	0	0	0
Western tanager	5	4	6	0	0	0
Western wood-pewee	12	0	22	0	0	0
White-faced ibis†	0	0	0	0	8	0
White-winged dove†	0	0	0	0	405	0
Willow flycatcher**†	4	0	3	0	0	3
Wilson's warbler	69	23	62	0	0	0
Yellow warbler*†	6	0	2	0	0	1
Yellow-headed blackbird†	0	0	0	0	7	0
Yellow-rumped warbler	0	0	5	0	0	0

* LCR MSCP covered species for this study.

** Willow flycatcher indicates both migrants and the southwestern subspecies because they cannot be differentiated in this study.

† Species occurs as a breeder in the study area, but numbers reported here are of migrant, flyover, or otherwise non-breeding individuals.

Note: Species names that are both bold and italicized are super-species or subspecies, not a confirmed separate species, and they are not included in the species total. The species name that is bold is a subspecies; since individuals detected could all be identified to that subspecies and none detected that could only be identified to the species; the subspecies was a unique species and was included in the total.

Table 29.—Estimated number of territories of covered species (and SE), by region-habitat combinations, based on system-wide surveys completed in 2015

(For details on strata definitions, see the "Methods" section. Regions 4 and 5 are combined due to changes in the 2010 plots layer.)

Region	Habitat	Sonoran yellow warbler		Arizona Bell's vireo		Gila woodpecker		Summer tanager		Vermilion flycatcher		Gilded flicker	
		Population size	SE	Population size	SE	Population size	SE	Population size	SE	Population size	SE	Population size	SE
5	Tall woody	197.7	35.1	90.1	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Tall woody	7.3	9.3	43.9	31.6	1.8	2.1	0.0	0.0	0.0	0.0	0.0	0.0
7	Tall woody	458.2	173.3	69.5	23.5	64.8	16.1	25.3	6.6	0.0	0.0	0.0	0.0
8	Tall woody	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Tall woody	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Tall woody	6.1	6.6	0.0	0.0	8.8	3.1	5.3	2.5	0.0	0.0	0.0	0.0
12	Tall woody	0.0	0.0	5.0	5.2	16.7	9.5	6.7	7.0	0.0	0.0	0.0	0.0
All	**Tall woody**	**748.6**	**211.0**	**245.7**	**62.2**	**94.6**	**23.2**	**38.3**	**11.5**	**0.0**	**0.0**	**0.0**	**0.0**
5	Low woody	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Low woody	0.0	0.0	0.0	0.0	0.0	0.0	47.6	46.0	0.0	0.0	0.0	0.0
7	Low woody	695.1	456.1	753.0	289.7	289.6	71.0	101.4	48.1	0.0	0.0	57.9	58.4
8	Low woody	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Low woody	0.0	0.0	0.0	0.0	163.9	99.4	0.0	0.0	0.0	0.0	0.0	0.0
11	Low woody	0.0	0.0	14.2	14.3	85.2	43.2	0.0	0.0	0.0	0.0	0.0	0.0
12	Low woody	0.0	0.0	0.0	0.0	79.4	39.3	0.0	0.0	0.0	0.0	0.0	0.0
All	**Low woody**	**760.5**	**486.8**	**836.7**	**304.2**	**644.4**	**165.9**	**152.9**	**68.7**	**0.0**	**0.0**	**63.4**	**64.3**

Table 29.—Estimated number of territories of covered species (and SE), by region-habitat combinations, based on system-wide surveys completed in 2015

(For details on strata definitions, see the "Methods" section. Regions 4 and 5 are combined due to changes in the 2010 plots layer.)

Region	Habitat	Sonoran yellow warbler		Arizona Bell's vireo		Gila woodpecker		Summer tanager		Vermilion flycatcher		Gilded flicker	
		Population size	SE	Population size	SE	Population size	SE	Population size	SE	Population size	SE	Population size	SE
5	Herbaceous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Herbaceous	16.7	17.6	43.5	45.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Herbaceous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Herbaceous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Herbaceous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Herbaceous	5.9	5.4	0.0	0.0	2.9	3.1	5.9	5.4	0.0	0.0	0.0	0.0
12	Herbaceous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**Herbaceous**	**22.3**	**17.9**	**42.4**	**43.8**	**3.0**	**3.1**	**5.9**	**5.8**	**0.0**	**0.0**	**0.0**	**0.0**
5	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**Unsuitable**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total	**All**	**1,720.9**	**629.3**	**1,263.4**	**379.6**	**828.8**	**199.4**	**221.1**	**81.6**	**0.0**	**0.0**	**70.6**	**71.7**

As in previous years, the Sonoran yellow warbler had the largest estimated population size system-wide of all covered species. This species occurred in 7 of the 28 habitat-region combinations surveyed, with the highest number of territories estimated to be in Region 7's low woody habitat type. Arizona Bell's vireos were recorded as the second most abundant breeder of the covered species. Similar to the Sonoran yellow warbler, this species was found in seven habitat-region combinations, with the greatest densities estimated to be in Region 7's low woody habitat type.

Throughout the last few years, Gila woodpecker population size estimates have remained relatively stable at around 800 territories, and in 2015, this species occurred in 9 habitat-region combinations. Summer tanagers were found within six habitat-region combinations, and gilded flickers were documented to occur within one habitat-region combination (Region 7's low woody). As in previous years, the 2015 surveys indicate that Region 7 (Bill Williams River National Wildlife Refuge) has the largest abundance of covered species compared with other regions of the project area.

For the 10 most abundant territorial riparian species detected system-wide in 2015, population sizes were estimated using the same methods as for covered species. Based on the data, the most abundant species were common yellowthroats and song sparrows (18,730 and 14,913 territories, respectively), followed closely by Lucy's warblers and black-tailed gnatcatchers, with over 10,000 territories each (tables 30a and 30b). The 10 most abundant riparian species were also relatively widespread throughout the project area, with detections in most habitat-region combinations.

Conservation Area Population Size Estimates

Based on the SAS analyses of data from conservation area plots in 2015, an overall detection ratio of 0.89 was determined (SE = 0.29, CV = 0.32) for territorial riparian bird species at conservation areas. In 2015, covered species population size estimates for conservation areas were the highest on record, and of these, Sonoran yellow warblers had the largest estimate, resulting in 41 territories, followed by Arizona bell's vireos with 34 territories (table 31). Summer tanagers and vermilion flycatchers had population size estimates of 9.4 and 6.1, respectively and, for the first time, a breeding territory of Gila woodpeckers was recorded, resulting in a population size estimate of 1.1 for the conservation areas. As in previous years, no gilded flickers were recorded at conservation areas.

The most abundant territorial riparian bird was the blue grosbeak with a population size estimate of 306.3, followed by Abert's towhee, common yellowthroat, and verdin, all with population size estimates in the 200s of territories (tables 32a and 32b). Cottonwood-willow habitat remains very important in the conservation area sites, featuring the highest densities for covered species and other riparian birds recorded in 2015.

Table 30a.—Estimated number of breeding pairs (and SE) of 5 of the 10 most abundant territorial species breeding along the LCR, by region-habitat combination, based on system-wide surveys completed in 2015

(Totals [all] calculated in SAS as estimates from individual region-habitat combinations cannot be added to obtain total estimate due to the survey plots being different sizes. See footnote 1 for explanation. For details on strata definitions, see the "Methods" section. Regions 4 and 5 are combined due to changes in the 2010 plots layer.)

Region	Habitat	Common yellowthroat		Song sparrow		Lucy's warbler		Black-tailed gnatcatcher		Yellow-breasted chat	
		Population size	SE	Population size	SE	Population size	SE	Population size	SE	Population size	SE
5	Tall woody	103.8	18.4	52.9	9.4	45.0	8.0	35.2	6.3	78.3	13.9
6	Tall woody	71.4	90.3	51.3	64.8	64.1	26.9	98.9	45.5	38.4	34.5
7	Tall woody	526.1	162.9	1,431.4	351.4	530.8	115.4	17.4	8.2	954.3	235.9
8	Tall woody	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Tall woody	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Tall woody	171.7	94.1	106.0	65.1	3.5	3.8	31.5	11.3	51.7	32.9
12	Tall woody	123.6	77.6	85.2	60.9	6.7	6.8	150.3	65.8	51.8	36.5
All	**Tall woody**	**1,070.3**	**289.1**	**1,800.2**	**444.7**	**688.6**	**146.6**	**357.5**	**103.3**	**1,236.2**	**296.2**
5	Low woody	1,919.0	1,759.6	648.7	636.7	5,513.7	2,561.5	2,756.9	715.9	351.4	220.8
6	Low woody	2,568.3	1,077.4	1,712.2	704.3	1,783.6	673.0	642.1	172.1	1,165.3	526.6
7	Low woody	1,679.8	882.0	2,461.7	1,330.7	1,636.3	562.3	521.3	166.6	1,636.3	1,046.5
8	Low woody	840.8	465.8	145.0	94.7	347.9	233.4	1,072.7	231.4	174.0	105.3
10	Low woody	1,857.0	1,981.7	436.9	466.3	1,147.0	1,136.6	2,621.7	909.0	1,802.4	1,539.3
11	Low woody	4813.8	1,493.9	4,501.4	2,642.4	610.6	615.5	738.4	251.6	1,320.6	688.3
12	Low woody	510.7	236.1	794.4	518.1	102.1	97.7	646.9	211.3	181.6	120.3
All	**Low woody**	**13,622.4**	**4013.7**	**10,390.9**	**3,390.7**	**11,290.6**	**3,476.5**	**8,992.2**	**1,898.9**	**6,515.7**	**2,292.4**

Table 30a.—Estimated number of breeding pairs (and SE) of 5 of the 10 most abundant territorial species breeding along the LCR, by region-habitat combination, based on system-wide surveys completed in 2015

(Totals [all] calculated in SAS as estimates from individual region-habitat combinations cannot be added to obtain total estimate due to the survey plots being different sizes. See footnote 1 for explanation. For details on strata definitions, see the "Methods" section. Regions 4 and 5 are combined due to changes in the 2010 plots layer.)

		Common yellowthroat		Song sparrow		Lucy's warbler		Black-tailed gnatcatcher		Yellow-breasted chat	
Region	**Habitat**	**Population size**	**SE**	**Population size**	**SE**	**Population size**	**SE**	**Population size**	**SE**	**Population size**	**SE**
5	Herbaceous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Herbaceous	1,164.3	260.9	588.8	244.0	100.4	69.8	30.1	31.7	113.8	70.9
7	Herbaceous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Herbaceous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Herbaceous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Herbaceous	591.3	142.6	225.4	110.8	0.0	0.0	84.9	45.2	64.4	43.3
12	Herbaceous	54.1	9.6	39.4	7.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**Herbaceous**	**1,791.9**	**367.8**	**844.0**	**286.1**	**97.9**	**67.8**	**115.5**	**55.1**	**176.3**	**85.7**
5	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	208.6	218.4	0.0	0.0
11	Unsuitable	88.3	15.7	255.1	45.3	127.6	22.7	39.3	7.0	39.3	7.0
12	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	48.3	51.0	0.0	0.0
All	**Unsuitable**	**98.8**	**17.8**	**285.3**	**51.3**	**142.6**	**25.7**	**439.4**	**357.0**	**43.9**	**7.9**
Total	**All**	**18,730.5**	**4,891.7**	**14,913.8**	**4,156.1**	**13,604.1**	**3,980.6**	**10,936.6**	**2,290.3**	**8,916.8**	**2,711.9**

Table 30b.—Estimated number of breeding pairs (and SE) of 5 of the 10 most abundant territorial species breeding along the LCR, by region-habitat combination, based on system-wide surveys completed in 2015

(Totals [all] calculated in SAS as estimates from individual region-habitat combinations cannot be added to obtain total estimate due to the survey plots being different sizes. See footnote 1 for explanation. For details on strata definitions, see the "Methods" section. Regions 4 and 5 are combined due to changes in the 2010 plots layer.)

Region	Habitat	Abert's towhee		Verdin		Horned lark		Marsh wren		Phainopepla	
		Population size	SE	Population size	SE	Population size	SE	Population size	SE	Population size	SE
5	Tall woody	31.3	5.6	21.5	3.8	0.0	0.0	0.0	0.0	0.0	0.0
6	Tall woody	38.4	15.1	47.6	22.5	0.0	0.0	0.0	0.0	1.8	2.3
7	Tall woody	126.4	31.7	105.9	28.6	0.0	0.0	0.0	0.0	9.5	9.8
8	Tall woody	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Tall woody	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Tall woody	37.7	15.4	6.1	4.9	0.0	0.0	3.5	3.8	0.0	0.0
12	Tall woody	126.9	42.4	152.0	55.7	43.4	24.0	0.0	0.0	0.0	0.0
All	**Tall woody**	**379.9**	**82.1**	**345.4**	**84.9**	**42.0**	**22.9**	**3.9**	**4.0**	**11.8**	**10.4**
5	Low woody	1,729.8	517.2	1,027.1	423.5	0.0	0.0	0.0	0.0	0.0	0.0
6	Low woody	737.2	196.1	237.8	129.1	0.0	0.0	0.0	0.0	0.0	0.0
7	Low woody	622.7	197.4	448.9	147.0	0.0	0.0	57.9	58.4	115.8	96.2
8	Low woody	739.3	196.2	405.9	254.6	0.0	0.0	58.0	59.4	174.0	173.6
10	Low woody	1,420.1	264.3	1,474.7	1,167.4	0.0	0.0	1,310.8	1,398.9	2,512.4	2,489.8
11	Low woody	667.4	323.2	326.6	135.9	0.0	0.0	624.8	650.8	0.0	0.0
12	Low woody	374.5	93.5	136.2	95.6	0.0	0.0	0.0	0.0	0.0	0.0
All	**Low woody**	**6,246.9**	**1,259.8**	**4,052.7**	**1,436.4**	**0.0**	**0.0**	**1,970.2**	**1,476.8**	**2,761.9**	**2,517.8**

Table 30b.—Estimated number of breeding pairs (and SE) of 5 of the 10 most abundant territorial species breeding along the LCR, by region-habitat combination, based on system-wide surveys completed in 2015

(Totals [all] calculated in SAS as estimates from individual region-habitat combinations cannot be added to obtain total estimate due to the survey plots being different sizes. See footnote 1 for explanation. For details on strata definitions, see the "Methods" section. Regions 4 and 5 are combined due to changes in the 2010 plots layer.)

		Abert's towhee		Verdin		Horned lark		Marsh wren		Phainopepla	
Region	**Habitat**	**Population size**	**SE**	**Population size**	**SE**	**Population size**	**SE**	**Population size**	**SE**	**Population size**	**SE**
5	Herbaceous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Herbaceous	46.8	36.9	43.5	27.1	0.0	0.0	501.9	230.9	0.0	0.0
7	Herbaceous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Herbaceous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Herbaceous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Herbaceous	41.0	15.3	5.9	6.2	0.0	0.0	1027.4	299.0	2.9	3.1
12	Herbaceous	24.6	4.4	0.0	0.0	0.0	0.0	305.2	54.2	0.0	0.0
All	**Herbaceous**	**112.9**	**42.3**	**48.4**	**28.4**	**0.0**	**0.0**	**1850.1**	**479.5**	**3.0**	**3.1**
5	Unsuitable	0.0	0.0	0.0	0.0	2,578.1	458.2	0.0	0.0	0.0	0.0
6	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Unsuitable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Unsuitable	59.0	55.7	88.5	83.6	1,651.8	981.9	0.0	0.0	0.0	0.0
10	Unsuitable	208.6	47.6	0.0	0.0	463.6	113.5	0.0	0.0	0.0	0.0
11	Unsuitable	39.3	7.0	39.3	7.0	0.0	0.0	0.0	0.0	0.0	0.0
12	Unsuitable	48.3	51.0	48.3	51.0	48.3	51.0	0.0	0.0	0.0	0.0
All	**Unsuitable**	**517.7**	**134.1**	**215.9**	**131.4**	**5,971.6**	**1,631.5**	**0.0**	**0.0**	**0.0**	**0.0**
Total	**All**	**7,963.3**	**1,572.9**	**5,147.2**	**1,670.7**	**4,996.7**	**1,320.9**	**4,529.7**	**1,858.4**	**3,095.7**	**2,814.3**

Table 31.—Estimated number of breeding pairs (and SE) of covered species breeding in conservation areas along the LCR, by site, based on double sampling analyses for 2015

(Totals [all] calculated in SAS as estimates from individual area-habitat combinations cannot be added to obtain total estimate due to the survey plots being different sizes. See footnote 1 for explanation. For details on habitat strata definitions, see the "Methods" section. CW = cottonwood-willow. Dashes indicate that no plots were surveyed in that region-habitat combination during 2015.)

Conservation area	Habitat	Sonoran yellow warbler		Arizona Bell's vireo		Summer tanager		Vermilion flycatcher		Gila woodpecker	
		Population size	SE	Population size	SE	Population size	SE	Population size	SE	Population size	SE
CRIT 9 'Ahakhav Tribal Preserve	CW	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.6	0.4	0.3
CRIT 9 'Ahakhav Tribal Preserve	Mesquite	0.0	0.0	0.0	0.0	0.0	0.0	3.9	1.3	0.0	0.0
CRIT 9 'Ahakhav Tribal Preserve	Mixed	–	–	–	–	–	–	–	–	–	–
CRIT 9 'Ahakhav Tribal Preserve	**All**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**5.9**	**2.0**	**0.4**	**0.3**
BLCA	CW	21.9	7.0	16.5	5.3	6.5	2.1	0.0	0.0	0.0	0.0
BLCA	Mesquite	–	–	–	–	–	–	–	–	–	–
BLCA	Mixed	0.3	0.1	6.7	2.2	0.0	0.0	0.0	0.0	0.0	0.0
BLCA	**All**	**22.9**	**7.3**	**23.1**	**7.4**	**6.7**	**2.1**	**0.0**	**0.0**	**0.0**	**0.0**
Cibola NWR Unit #1	CW	3.9	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cibola NWR Unit #1	Mesquite	–	–	–	–	–	–	–	–	–	–
Cibola NWR Unit #1	Mixed	0.0	0.0	7.2	3.2	0.0	0.0	0.0	0.0	0.0	0.0
Cibola NWR Unit #1	**All**	**3.5**	**1.8**	**10.2**	**4.7**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
CVCA	CW	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0
CVCA	Mesquite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CVCA	Mixed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CVCA	**All**	**0.0**	**0.0**	**0.0**	**0.0**	**0.4**	**0.2**	**0.0**	**0.0**	**0.0**	**0.0**

Table 31.—Estimated number of breeding pairs (and SE) of covered species breeding in conservation areas along the LCR, by site, based on double sampling analyses for 2015

(Totals [all] calculated in SAS as estimates from individual area-habitat combinations cannot be added to obtain total estimate due to the survey plots being different sizes. See footnote 1 for explanation. For details on habitat strata definitions, see the "Methods" section. CW = cottonwood-willow. Dashes indicate that no plots were surveyed in that region-habitat combination during 2015.)

Conservation area	Habitat	Sonoran yellow warbler		Arizona Bell's vireo		Summer tanager		Vermilion flycatcher		Gila woodpecker	
		Population size	SE	Population size	SE	Population size	SE	Population size	SE	Population size	SE
Hunters Hole	CW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hunters Hole	Mesquite	–	–	–	–	–	–	–	–	–	–
Hunters Hole	Mixed	–	–	–	–	–	–	–	–	–	–
Hunters Hole	**All**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
PVER	CW	6.4	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2
PVER	Mesquite	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PVER	Mixed	3.1	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PVER	**All**	**10.1**	**4.3**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.4**	**0.2**
Yuma East Wetlands	CW	1.1	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yuma East Wetlands	Mesquite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1
Yuma East Wetlands	Mixed	0.0	0.0	0.0	0.0	1.3	0.6	0.0	0.0	0.0	0.0
Yuma East Wetlands	**All**	**1.2**	**0.9**	**0.0**	**0.0**	**1.2**	**0.7**	**0.0**	**0.0**	**0.3**	**0.1**
Habitat all	CW	37.7	12.5	20.0	6.4	8.2	2.7	2.0	0.7	0.8	0.4
Habitat all	Mesquite	0.6	0.2	0.0	0.0	0.0	0.0	4.0	1.3	0.3	0.1
Habitat all	Mixed	3.4	1.9	14.0	5.1	1.3	0.8	0.0	0.0	0.0	0.0
All	**All**	**41.0**	**13.6**	**34.0**	**11.2**	**9.4**	**3.1**	**6.1**	**2.0**	**1.1**	**0.4**

Table 32a.—Estimated number of breeding pairs and (and SE) of 5 of the 10 most abundant territorial riparian species breeding in conservation areas along the LCR, by habitat type, based on double sampling analyses for 2015

(Totals [all] calculated in SAS as estimates from individual area-habitat combinations cannot be added to obtain total estimate due to the survey plots being different sizes. See footnote 1 for explanation. For details on habitat strata definitions, see the "Methods" section. CW = cottonwood-willow. Dashes indicate that no plots were surveyed in that region-habitat combination during 2015.)

Conservation area	Habitat	Blue grosbeak		Abert's towhee		Common yellowthroat		Verdin		Black–tailed gnatcatcher	
		Population size	SE	Population size	SE	Population size	SE	Population size	SE	Population size	SE
CRIT 9 'Ahakhav Tribal Preserve	CW	2.3	1.3	17.2	6.1	0.0	0.0	13.4	4.4	7.3	2.3
CRIT 9 'Ahakhav Tribal Preserve	Mesquite	2.0	0.6	1.4	0.4	0.0	0.0	2.0	0.6	2.5	0.8
CRIT 9 'Ahakhav Tribal Preserve	Mixed	–	–	–	–	–	–	–	–	–	–
CRIT 9 'Ahakhav Tribal Preserve	**All**	**4.3**	**1.7**	**18.6**	**6.5**	**0.0**	**0.0**	**15.4**	**5.0**	**9.8**	**3.2**
BLCA	CW	0.5	0.2	9.0	2.9	0.0	0.0	4.5	1.4	11.0	3.5
BLCA	Mesquite	–	–	–	–	–	–	–	–	–	–
BLCA	Mixed	0.8	0.3	3.4	1.1	0.8	0.3	4.8	1.5	9.8	3.1
BLCA	**All**	**1.3**	**0.4**	**12.3**	**3.9**	**0.8**	**0.2**	**9.0**	**2.9**	**20.3**	**6.5**
Cibola NWR Unit #1	CW	49.2	16.1	35.9	13.1	24.9	10.0	11.1	4.8	1.1	0.6
Cibola NWR Unit #1	Mesquite	–	–	–	–	–	–	–	–	–	–
Cibola NWR Unit #1	Mixed	22.8	7.5	21.0	6.9	4.7	2.3	19.6	7.1	1.4	0.8
Cibola NWR Unit #1	**All**	**76.2**	**24.7**	**61.8**	**20.7**	**29.0**	**11.0**	**37.4**	**13.1**	**3.0**	**1.4**
CVCA	CW	23.7	7.8	21.3	7.1	1.4	0.8	10.7	3.8	0.0	0.0
CVCA	Mesquite	18.7	6.5	47.3	15.5	0.0	0.0	40.9	13.7	57.2	19.1
CVCA	Mixed	3.6	1.2	5.9	1.9	0.0	0.0	3.9	1.3	1.7	0.5
CVCA	**All**	**46.3**	**15.1**	**74.1**	**24.0**	**1.4**	**0.8**	**54.9**	**18.1**	**57.7**	**19.2**

Table 32a.—Estimated number of breeding pairs and (and SE) of 5 of the 10 most abundant territorial riparian species breeding in conservation areas along the LCR, by habitat type, based on double sampling analyses for 2015

(Totals [all] calculated in SAS as estimates from individual area-habitat combinations cannot be added to obtain total estimate due to the survey plots being different sizes. See footnote 1 for explanation. For details on habitat strata definitions, see the "Methods" section. CW = cottonwood-willow. Dashes indicate that no plots were surveyed in that region-habitat combination during 2015.)

Conservation area	Habitat	Blue grosbeak		Abert's towhee		Common yellowthroat		Verdin		Black–tailed gnatcatcher	
		Population size	SE	Population size	SE	Population size	SE	Population size	SE	Population size	SE
Hunters Hole	CW	1.1	0.4	2.0	0.6	1.1	0.4	4.5	1.4	0.0	0.0
Hunters Hole	Mesquite	–	–	–	–	–	–	–	–	–	–
Hunters Hole	Mixed	–	–	–	–	–	–	–	–	–	–
Hunters Hole	**All**	**1.1**	**0.4**	**2.0**	**0.6**	**1.1**	**0.4**	**4.5**	**1.4**	**0.0**	**0.0**
PVER	CW	99.1	32.1	37.9	12.8	92.0	34.4	0.0	0.0	0.0	0.0
PVER	Mesquite	17.4	5.6	13.2	4.2	17.1	5.5	3.9	1.3	2.2	0.7
PVER	Mixed	55.7	18.4	24.7	8.3	102.0	38.1	3.5	1.5	5.1	2.7
PVER	**All**	**172.0**	**55.5**	**75.6**	**24.7**	**209.4**	**71.8**	**7.3**	**2.5**	**7.2**	**3.1**
Yuma East Wetlands	CW	5.8	2.1	13.8	4.4	6.2	2.2	31.9	10.8	7.3	2.5
Yuma East Wetlands	Mesquite	0.0	0.0	9.0	2.9	1.7	0.5	20.2	6.5	10.1	3.2
Yuma East Wetlands	Mixed	4.7	1.6	15.1	5.6	0.0	0.0	33.2	10.8	9.5	4.5
Yuma East Wetlands	**All**	**10.9**	**3.9**	**38.0**	**12.4**	**8.5**	**2.8**	**85.8**	**27.6**	**26.6**	**9.2**
Habitat total	CW	180.4	58.1	136.2	44.1	129.7	46.2	80.9	26.2	28.4	9.1
Habitat total	Mesquite	38.2	12.5	70.7	22.9	19.1	6.1	67.0	21.8	71.7	23.5
Habitat total	Mixed	87.6	28.5	69.9	22.7	107.7	39.5	64.7	21.4	27.7	9.4
Habitat total	**All**	**306.3**	**98.4**	**280.**	**90.1**	**257.3**	**86.8**	**217.8**	**70.1**	**132.9**	**43.0**

Table 32b.—Estimated number of breeding pairs (and SE) of 5 of the 10 most abundant territorial riparian species breeding in conservation areas along the Lower Colorado River, by habitat type, based on double sampling surveys completed in 2015

(Totals [all] calculated in SAS as estimates from individual area-habitat combinations cannot be added to obtain total estimate due to the survey plots being different sizes. See footnote 1 for explanation. For details on habitat strata definitions, see the "Methods" section. CW = cottonwood-willow. Dashes indicate that no plots were surveyed in that region-habitat combination during 2015.)

Conservation area	Habitat	Black–chinned hummingbird		Song sparrow		Western kingbird		Bullock's oriole		Yellow–breasted chat	
		Population size	SE	Population size	SE	Population size	SE	Population size	SE	Population size	SE
CRIT 9 'Ahakhav Tribal Preserve	CW	1.1	0.6	0.0	0.0	4.6	1.6	4.2	2.1	0.0	0.0
CRIT 9 'Ahakhav Tribal Preserve	Mesquite	0.0	0.0	0.0	0.0	1.4	0.4	1.1	0.4	0.0	0.0
CRIT 9 'Ahakhav Tribal Preserve	Mixed	–	–	–	–	–	–	–	–	–	–
CRIT 9 'Ahakhav Tribal Preserve	**All**	**1.1**	**0.6**	**0.0**	**0.0**	**6.0**	**2.1**	**5.4**	**2.4**	**0.0**	**0.0**
BLCA	CW	3.5	1.1	0.0	0.0	0.0	0.0	5.5	1.8	19.9	6.4
BLCA	Mesquite	–	–	–	–	–	–	–	–	–	–
BLCA	Mixed	0.6	0.2	0.0	0.0	0.0	0.0	0.6	0.2	3.9	1.3
BLCA	All	4.1	1.3	0.0	0.0	0.0	0.0	6.2	2.0	24.2	7.7
Cibola NWR Unit #1	CW	12.7	5.1	21.6	11.4	23.8	8.6	10.5	4.2	6.6	3.5
Cibola NWR Unit #1	Mesquite	–	–	–	–	–	–	–	–	–	–
Cibola NWR Unit #1	Mixed	9.8	4.3	6.5	3.4	11.2	4.2	7.2	2.8	10.1	4.3
Cibola NWR Unit #1	**All**	**25.1**	**9.4**	**28.5**	**12.8**	**37.1**	**12.7**	**19.6**	**7.0**	**20.2**	**8.1**
CVCA	CW	12.0	4.1	0.0	0.0	31.3	11.5	19.6	6.7	0.0	0.0
CVCA	Mesquite	2.8	1.3	0.0	0.0	3.6	1.6	4.0	1.6	7.9	4.9
CVCA	Mixed	1.7	0.5	0.0	0.0	4.5	1.4	2.5	0.8	0.0	0.0
CVCA	**All**	**16.8**	**5.6**	**0.0**	**0.0**	**40.2**	**14.2**	**26.6**	**9.0**	**7.8**	**4.8**

Table 32b.—Estimated number of breeding pairs (and SE) of 5 of the 10 most abundant territorial riparian species breeding in conservation areas along the Lower Colorado River, by habitat type, based on double sampling surveys completed in 2015

(Totals [all] calculated in SAS as estimates from individual area-habitat combinations cannot be added to obtain total estimate due to the survey plots being different sizes. See footnote 1 for explanation. For details on habitat strata definitions, see the "Methods" section. CW = cottonwood-willow. Dashes indicate that no plots were surveyed in that region-habitat combination during 2015.)

Conservation area	Habitat	Black–chinned hummingbird		Song sparrow		Western kingbird		Bullock's oriole		Yellow–breasted chat	
		Population size	SE	Population size	SE	Population size	SE	Population size	SE	Population size	SE
Hunters Hole	CW	0.0	0.0	0.0	0.0	1.1	0.4	0.0	0.0	0.0	0.0
Hunters Hole	Mesquite	–	–	–	–	–	–	–	–	–	–
Hunters Hole	Mixed	–	–	–	–	–	–	–	–	–	–
Hunters Hole	**All**	**0.0**	**0.0**	**0.0**	**0.0**	**1.1**	**0.4**	**0.0**	**0.0**	**0.0**	**0.0**
PVER	CW	44.0	16.1	29.0	10.4	9.7	3.8	27.2	9.2	15.7	5.7
PVER	Mesquite	6.7	2.2	18.2	5.8	3.1	1.0	0.3	0.1	4.2	1.3
PVER	Mixed	7.8	3.5	45.1	17.3	1.6	0.9	10.2	3.4	23.5	10.2
PVER	**All**	**59.0**	**20.7**	**91.3**	**31.0**	**14.4**	**5.2**	**37.8**	**12.5**	**43.0**	**15.4**
Yuma East Wetlands	CW	12.0	3.9	0.7	0.6	0.4	0.3	0.0	0.0	0.0	0.0
Yuma East Wetlands	Mesquite	2.8	0.9	0.3	0.1	0.3	0.1	0.0	0.0	0.0	0.0
Yuma East Wetlands	Mixed	5.6	2.4	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.0
Yuma East Wetlands	**All**	**21.2**	**7.1**	**1.5**	**0.8**	**1.1**	**0.6**	**0.0**	**0.0**	**0.0**	**0.0**
Habitat total	CW	96.3	32.2	47.7	17.3	68.2	23.1	66.0	21.7	37.8	12.6
Habitat total	Mesquite	12.5	4.1	18.9	6.0	8.4	2.9	5.4	2.0	12.1	5.6
Habitat total	Mixed	25.4	9.0	52.0	19.4	17.6	6.1	20.5	6.8	37.6	14.2
Habitat total	**All**	**128.0**	**42.2**	**119.7**	**40.4**	**92.9**	**30.7**	**95.0**	**30.8**	**96.4**	**32.2**

DISCUSSION

System-Wide Surveys

As in previous years, Sonoran yellow warblers were the most abundant of the covered species breeding along the LCR. On average, the total territory estimate for this species in 2015 was similar to earlier years of the project; however, the 2015 population size estimates represented a 52% decrease from 2014 estimates (1,720 and 3,658, respectively). Throughout the past 5 years, however, system-wide population estimates for this species were most often between 1,000 to 2,000 territories. System-wide summer tanager territory estimates also showed a decrease of roughly 45% from numbers estimated for 2014, with 221 and 404 pairs, respectively. These differences between the two years are likely due to the random plot selection representing samples of different proportions of their total population. Other factors, such as annual variation in migration arrival times, reproductive phenology, population variation, or fluctuating water levels, may also play a role, and only long-term monitoring will identify statistically and biologically significant trends. In contrast, Gila woodpecker and Arizona bell's vireos population size estimates have remained relatively stable over past years (see the 5-year summary report following this report). Gilded flickers and vermilion flycatchers continued to be present in few of the sampled locations and in low numbers or complete absence (vermilion flycatchers) in the system-wide sample, so their annual population size estimates continue to have high potential for sampling error.

Similar territorial riparian species were found to be the most abundant breeders in 2015 as in years past, with common yellowthroat, song sparrow, Lucy's warbler, and black-tailed gnatcatcher system-wide territory estimates all being over 10,000. Surprisingly, horned larks (*Eremophila alpestris*) had among the highest breeding density estimates in 2015, with population sizes estimates of roughly 5,000 territories. The majority of these birds (n = 2,578 territories) were estimated to be within Region 5's "unsuitable" plots. After further examination of the data, it was determined that seven horned lark territories were recorded on the only plot randomly selected for surveying within this region-habitat stratum in 2015. In most other years, the sample size has been > 1 for this region-habitat and estimated densities much lower. When estimating annual system-wide population size for any species, use caution against trusting "outlier" estimates based on one or very few data points (i.e., plots where the species is detected).

In 2013, a pair of Nutting's flycatchers (*Myiarchus nuttingi*) was first found with fledglings on a salt cedar beetle monitoring plot at Sandy Wash in the Bill Williams River National Wildlife Refuge, representing the first breeding record for the United States. In 2015, a singing male was repeatedly heard in the same area between May 18 and June 2, suggesting that the bird may have attempted breeding once again, but nesting was not confirmed this year.

System-wide surveys continue to show that the LCR corridor is occupied by a large diversity of breeding birds and migrants. Field protocols tend to err on the conservative side for breeding evidence, classifying a bird as a non-breeder if sufficient evidence of nesting was not found during the surveys. Therefore, annual population estimates are only based on observed territory numbers and need to be viewed as minimum breeding population size estimates.

Conservation Area Surveys

The year 2015 was the fifth year of implementing the double sampling protocol at conservation areas of the LCR MSCP. In 2015, it was found that conservation areas supported breeding populations of five of the six covered species: Arizona Bell's vireos, Sonoran yellow warblers, vermilion flycatchers, summer tanagers, and Gila woodpeckers. Gila woodpeckers were documented for the first time using the CRIT 9 'Ahakhav Tribal Preserve, PVER, and Yuma East Wetlands planting areas for foraging, and these areas were considered part of the birds' territories although there was no evidence yet of nests located within the plantings. As the plantings continue to grow and eventually provide mature trees, it is expected that this species will colonize the plantings for nesting.

As in past years, Arizona Bell's vireos were most numerous at the BLCA compared to the other conservation areas. This species was present on all four survey plots, and the highest densities were at Beal C, C1503. Arizona Bell's vireos also bred in Cibola NWR Unit #1 at Nature Trail, as they have in past years, as well as at Crane's Roost.

Sonoran yellow warblers continue to be most numerous at the BLCA, and they had several territories at the PVER and two territories at Cibola NWR Unit #1 at Crane's Roost. At the PVER, they occurred almost entirely in Phase 6 plantings in 2015, but two half territories were also found in Phases 4 and 5. For the first time, Sonoran yellow warblers were found breeding at Yuma East Wetlands, with one partial territory at the northwestern corner of the South Channel area.

As in all previous years, the highest concentration of vermilion flycatchers was recorded at the CRIT 9 'Ahakhav Tribal Preserve. Most of these territories were concentrated on the western edge of the planting area. For the first time, a pair was also discovered attempting to breed at PVER's planting Phase 3, specifically on the border of the planting area and a broad opening where a canal runs between plantings. A male was singing in the area during two consecutive survey visits, and it was seen courting a female on the second visit. The outcome of this breeding attempt is unknown, as no additional territorial data were obtained in subsequent visits. This species has also been observed breeding nearby at Mayflower County Park, which may result in an eventual expansion of full breeding territories into the PVER.

Breeding summer tanagers were found at the BLCA, CVCA, and Yuma East Wetlands in 2015. This was the first time this species was found as a possible breeder at Yuma East Wetlands; a bird was heard calling in the central plantings of the South Channel area. No summer tanagers were found at the CRIT 9 ‘Ahakhav Tribal Preserve, where the species has bred regularly in the four prior years.

Gila woodpeckers were also documented using created habitats during the breeding season for the first time this year. At the CRIT 9 ‘Ahakhav Tribal Preserve, a pair was seen and heard using the central area of the plantings between CRIT B and C on May 9 and again on May 12. However, breeding on the planting area was not confirmed. At PVER Phase 5, one Gila woodpecker was observed foraging in the southern portion of the planting on June 7. Finally, at Yuma East Wetlands, a pair of Gila woodpeckers was observed on several visits using a large area across the south planting area. The birds were seen foraging and flying over, but no nesting evidence was found on the plots. One Gila woodpecker was also observed on two visits foraging in the ornamental plantings around the Yuma Riverside Park and nearby tall trees. This bird was believed to be using the plot area, but it was never observed within the plot boundary.

In 2015, several cavity-nesting species continued to have at least partial territories within conservation areas in addition to the Gila woodpecker records detailed above. Ladder-backed woodpeckers (*Dryobates scalaris*) were found breeding in one of the four planting phases at BLCA (C). This species was also breeding in all planting phases at the CRIT 9 ‘Ahakhav Tribal Preserve, in six of the seven surveyed planting phases at the PVER (Phases 2, 3, 4, 5, 6, and 7), and four of the six phases at the CVCA (Phases 1, 3, 4, and 5). At Cibola NWR Unit #1, ladder-backed woodpeckers bred at Cottonwood Genetics, Crane’s Roost, CW North, Mass Transplanting, Nature Trail North and South, and Research 03, and a ladder-backed woodpecker nest was found in a Goodding’s willow at the southeast corner of Nature Trail North. Territories of this species were also recorded at all six surveyed planting phases at Yuma East Wetlands. Brown-crested flycatcher (*Molothrus ater*) territories were recorded at BLCA (Beal C), CRIT 9 B and D, and four of six surveyed planting phases at Yuma East Wetlands (F, G, J, and South AC). In 2015, Lucy’s warblers were found to be fairly common breeders within all of the conservation areas, with the exception of Yuma East Wetlands, where none were found. Finally, ash-throated flycatchers (*Myiarchus cinerascens*) were documented as a fairly common to uncommon breeder at all of the conservation areas, with four nests discovered in nest boxes at Cibola NWR Unit #1 in the Cottonwood Genetics, Mass Transplanting, Nature Trail, and Crane’s Roost plantings.

In 2015, fewer raptor territories were recorded in conservation areas than in past years. Great horned owls bred in four conservation areas, and the PVER had a partial barn owl territory. A partial American kestrel (*Falco Sparverius*) territory

was recorded at the CRIT 9 ‘Ahakhav Tribal Preserve and another at Yuma East Wetlands, and pair of adult common black hawks (*Buteogallus anthracinus*) were recorded at the PVER. One bird was observed gathering nesting material, but no nest was ever discovered. The only documented nesting of the common black hawk in California to date has been paired with a red-shouldered hawk (*Buteo lineatus*) near Santa Rosa in northern California (Hug 2013, 2015).

Pre-development area search surveys of the MVCA were also conducted in 2015. No covered species were found breeding, and breeding species were typical of open mixed mesquite-salt cedar-arrowweed woodland, such as Lucy’s warblers, black-tailed gnatcatchers, and Abert’s towhees. Notable were fairly high numbers of migrants using the area, such as Pacific-slope flycatchers, (*Empidonax difficilis*) Wilson’s warblers (*Cardellina pusilla*), and western wood-pewees (*Contopus sordidulus*). In the following 5-year summary report, the comprehensive findings of the 5-year study will be discussed in further detail.

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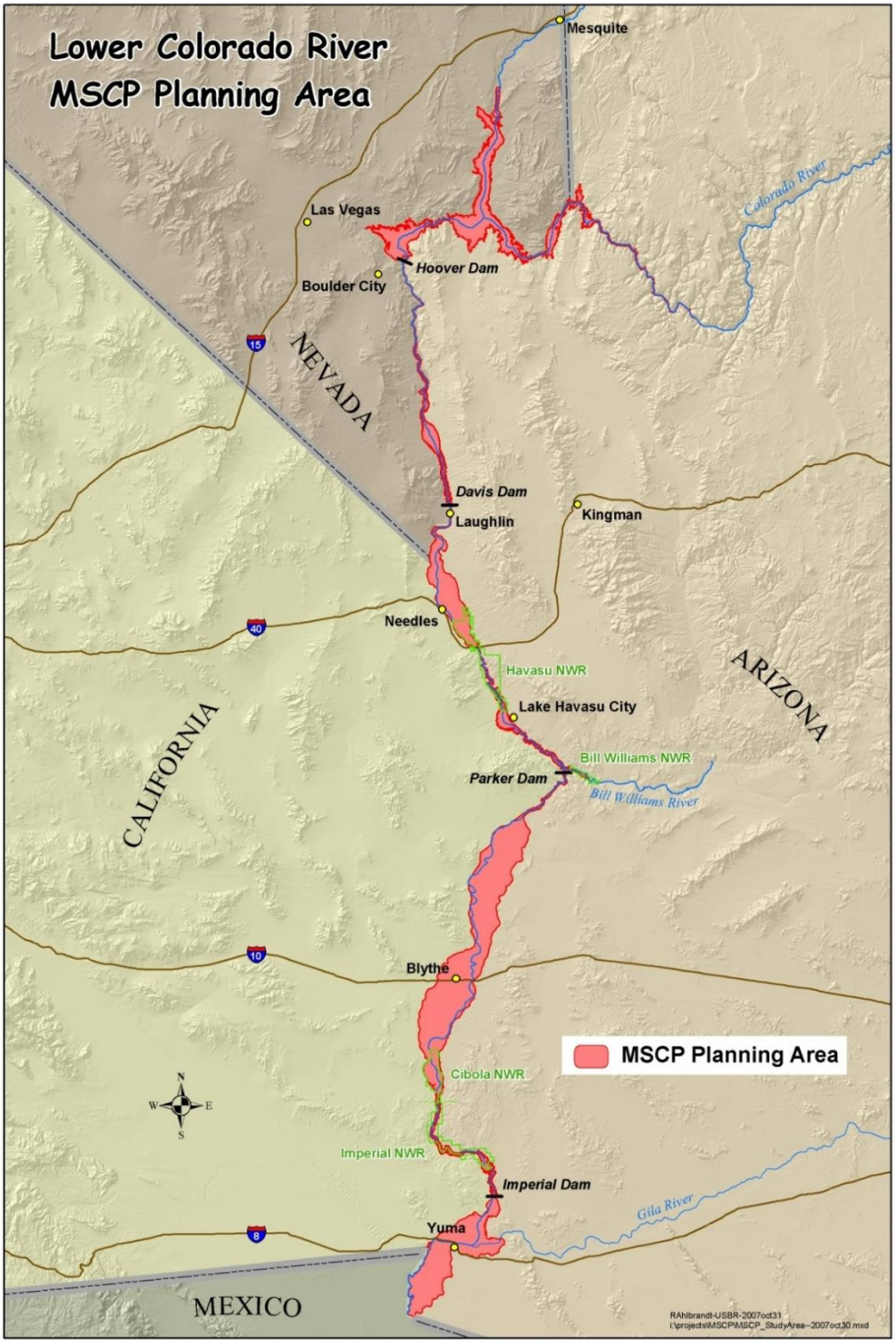
ATTACHMENT 1

System-Wide and Conservation Area Plot Maps, 2015

Attachment 1a – Map of the Lower Colorado River Multi-Species Conservation Program study area for system-wide bird surveys (in pink)
(Map provided by the Bureau of Reclamation, Lower Colorado River Region)



Attachment 1b – Overview of the Lower Colorado River Multi-Species Conservation Program riparian bird project regions

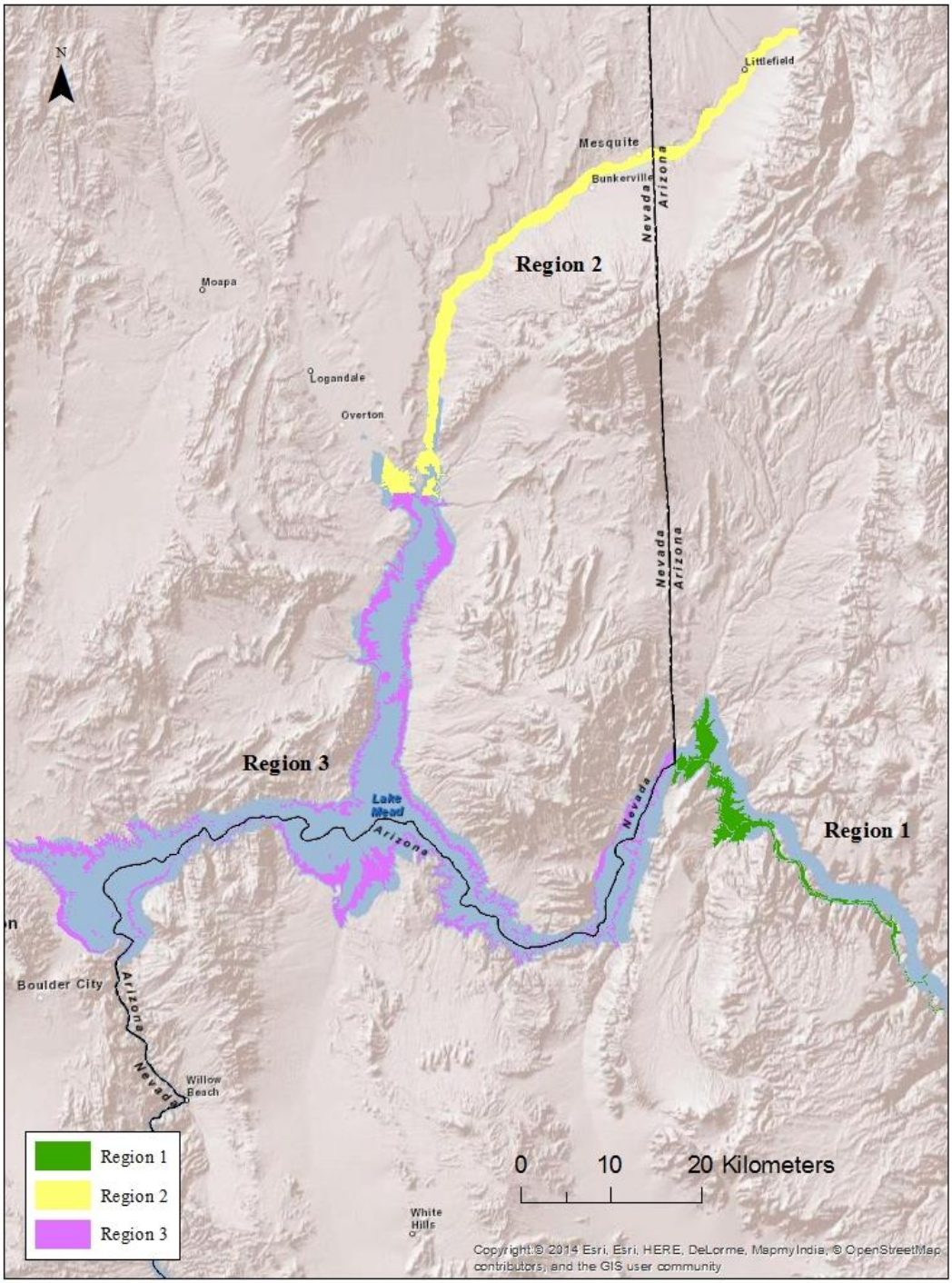


Figure 1b-1.—Region 1 (upper Lake Mead), Region 2 (Virgin River), and Region 3 (Lake Mead). No survey plots in 2015.

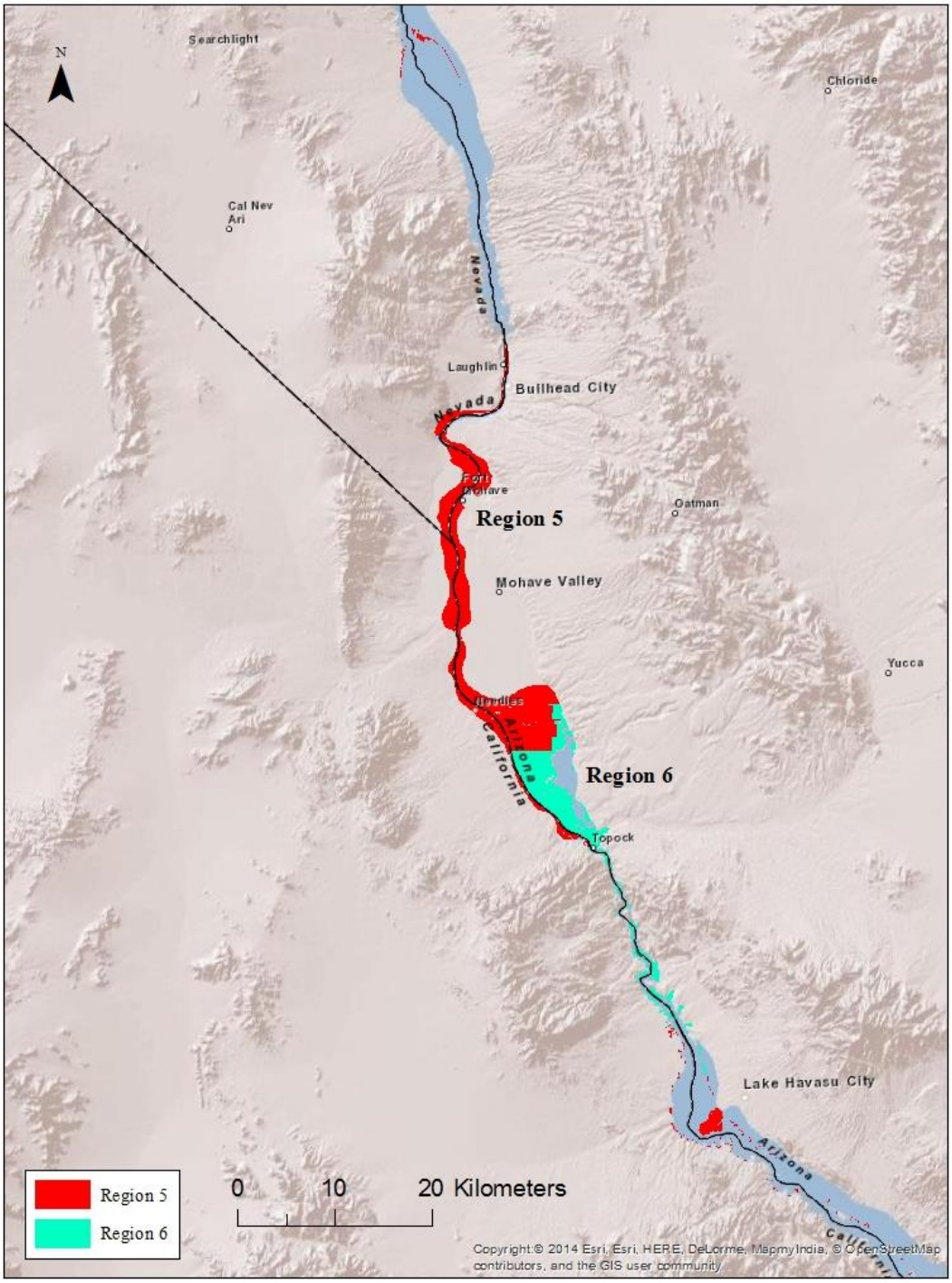


Figure 1b-2.—Region 5, Lake Mohave to Lake Havasu (7 pre-development conservation area rapid plots and 8 system-wide rapid plots, including 2 system-wide intensive plots), and Region 6, Havasu National Wildlife Refuge (4 conservation area plots, including 1 conservation area intensive plot and 12 system-wide rapid plots, including 1 system-wide intensive plot).

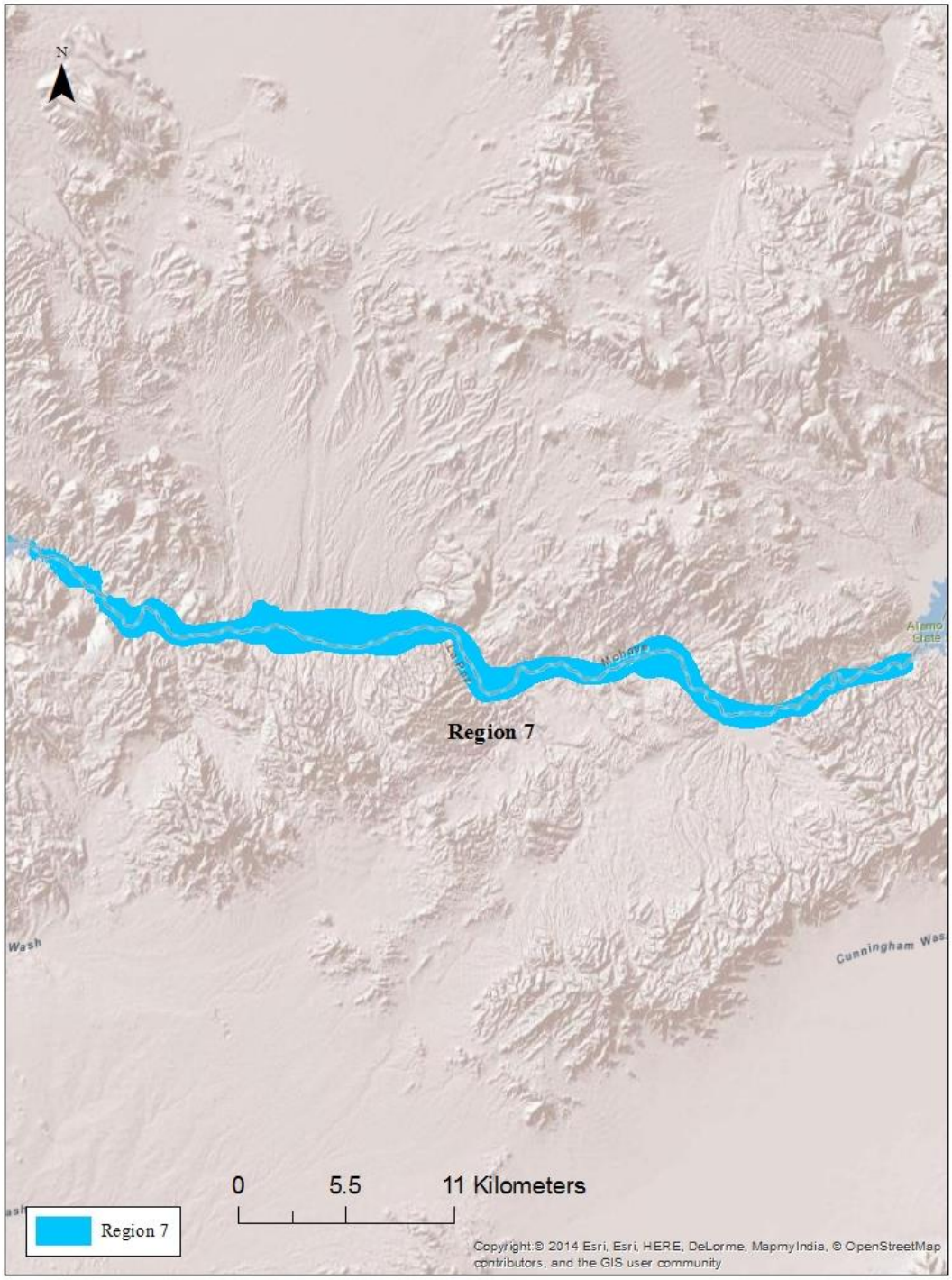


Figure 1b-3.—Region 7, Bill Williams River (13 system-wide rapid plots, including 2 system-wide intensive plots)

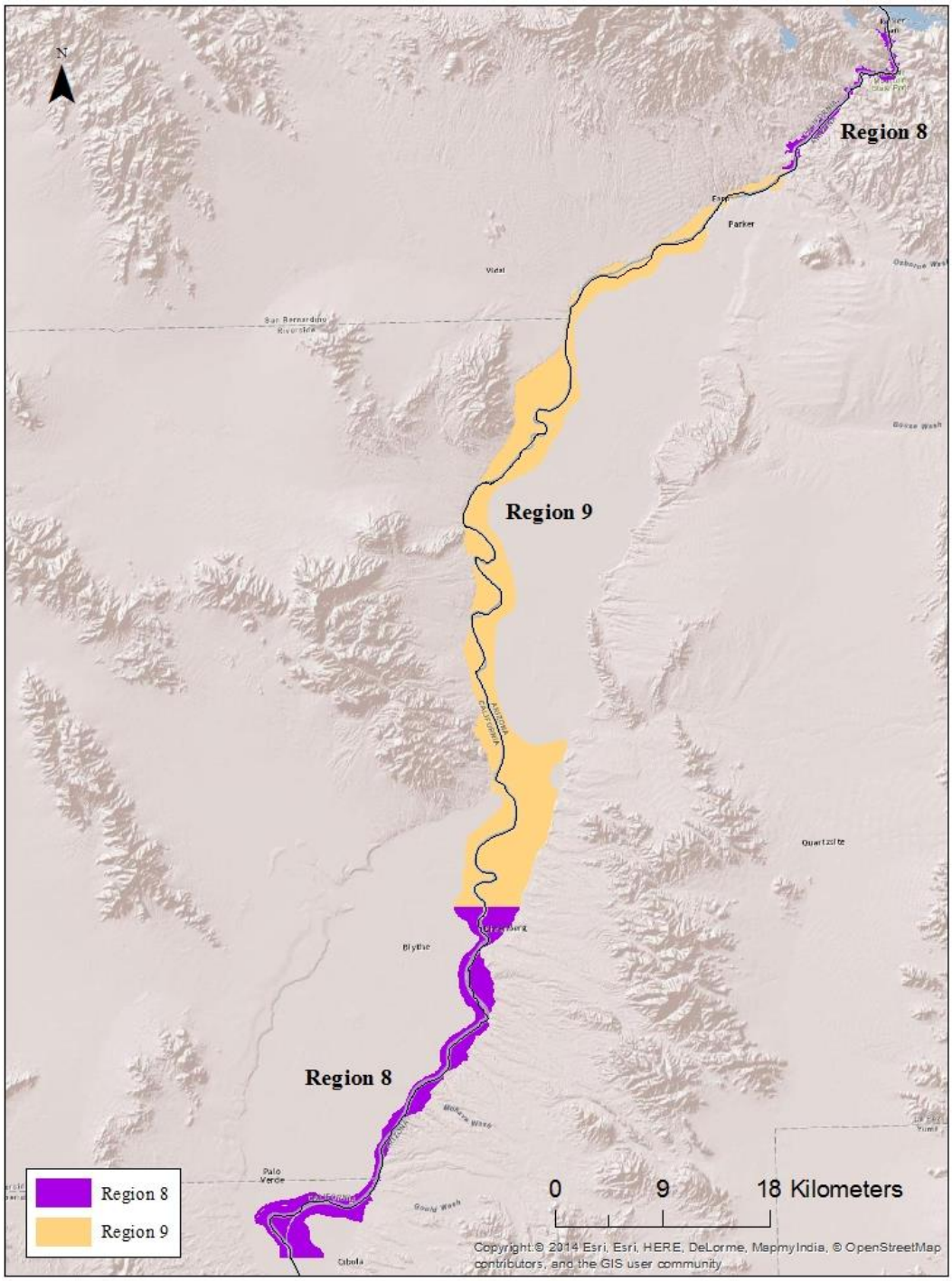


Figure 1b-4.—Region 8, Parker Dam to Cibola National Wildlife Refuge (18 conservation area rapid plots and 9 system-wide rapid plots), and Region 9, Colorado River Indian Tribes' land area (32 conservation area and habitat creation area rapid plots, including 3 conservation area intensive plots).

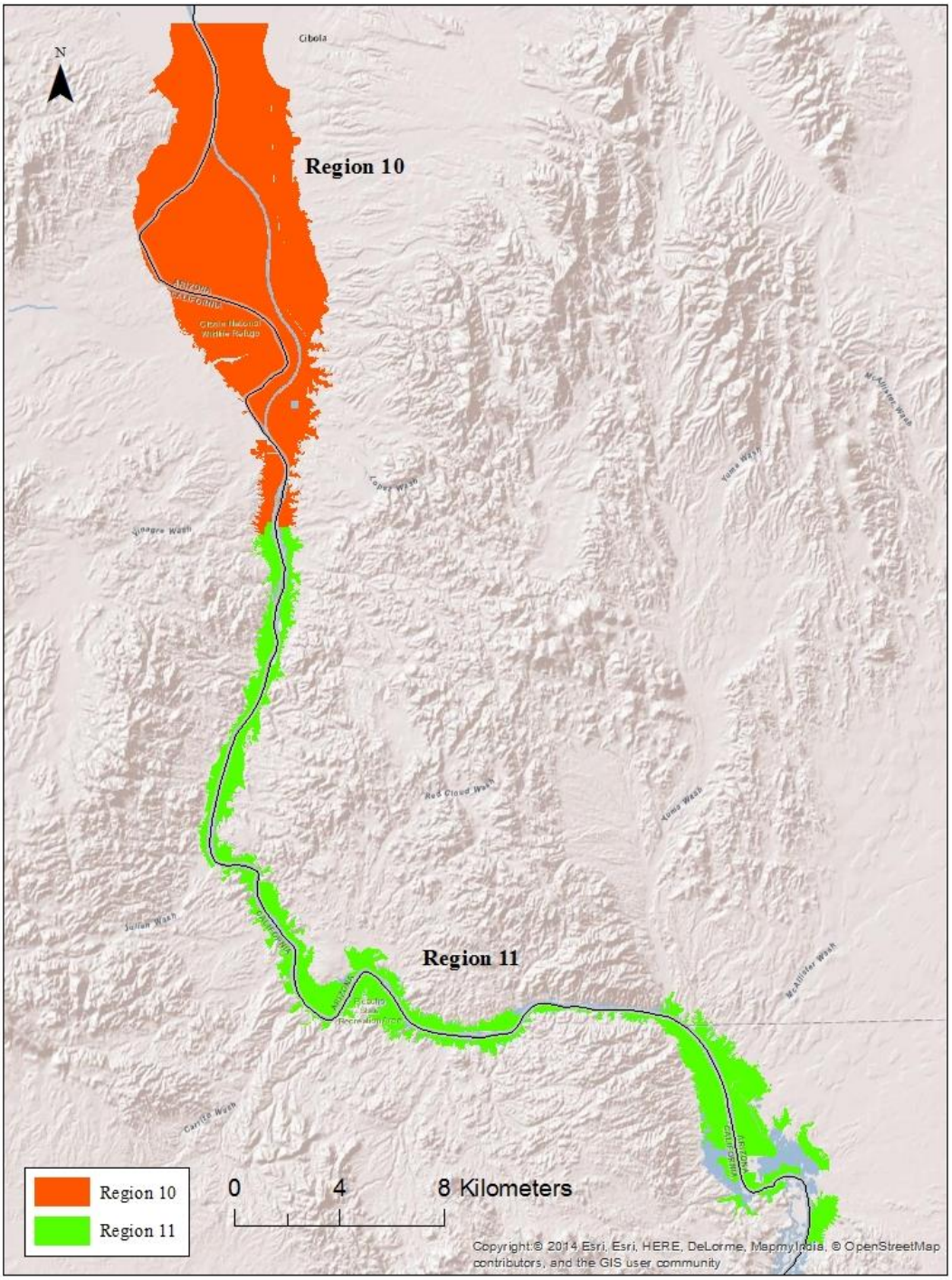


Figure 1b-5.—Region 10, Cibola National Wildlife Refuge area (13 conservation area rapid plots and 5 system-wide rapid plots, including 1 system-wide intensive plot), and Region 11, Cibola National Wildlife Refuge to Martinez Lake (15 system-wide rapid plots).

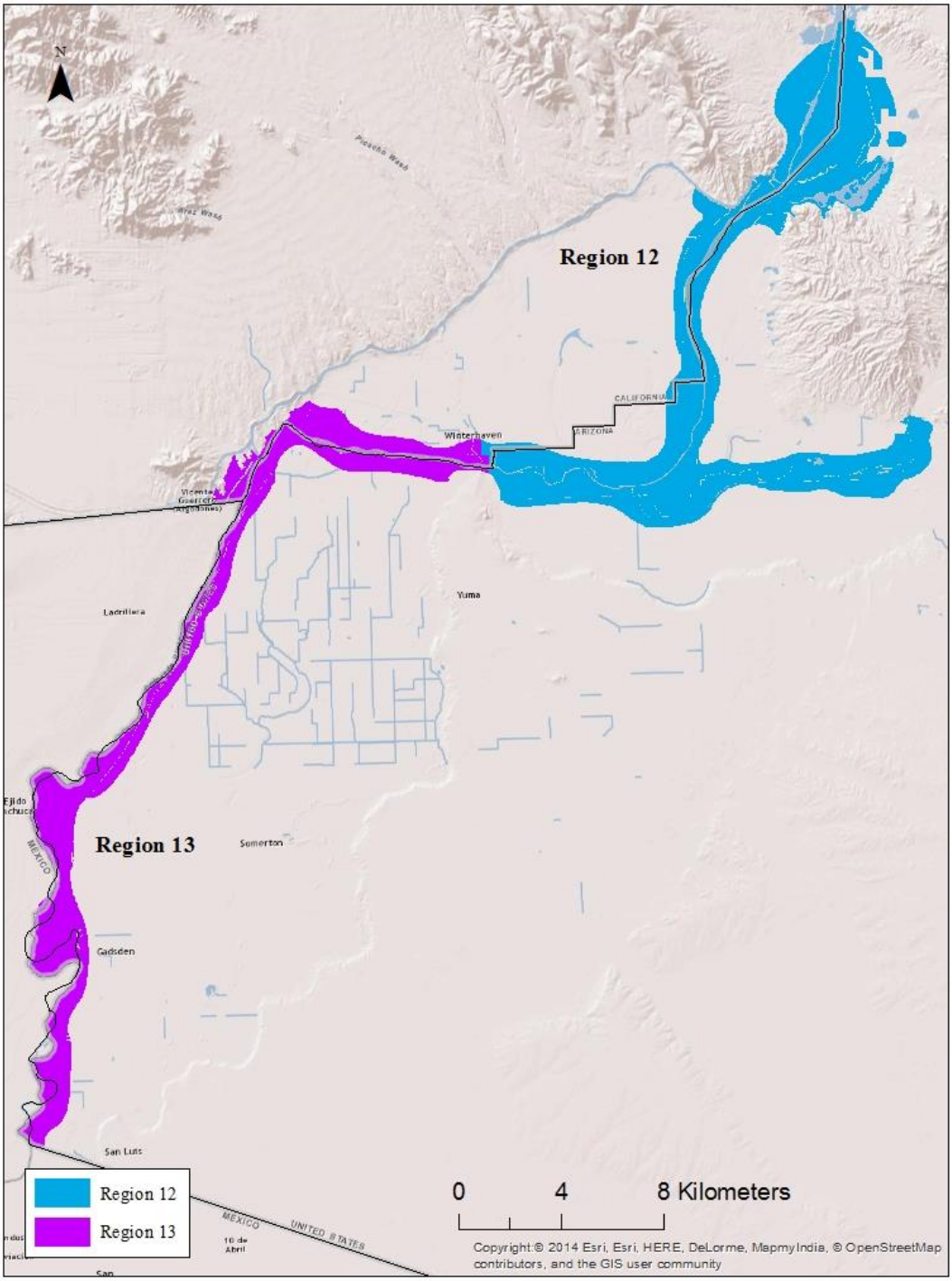
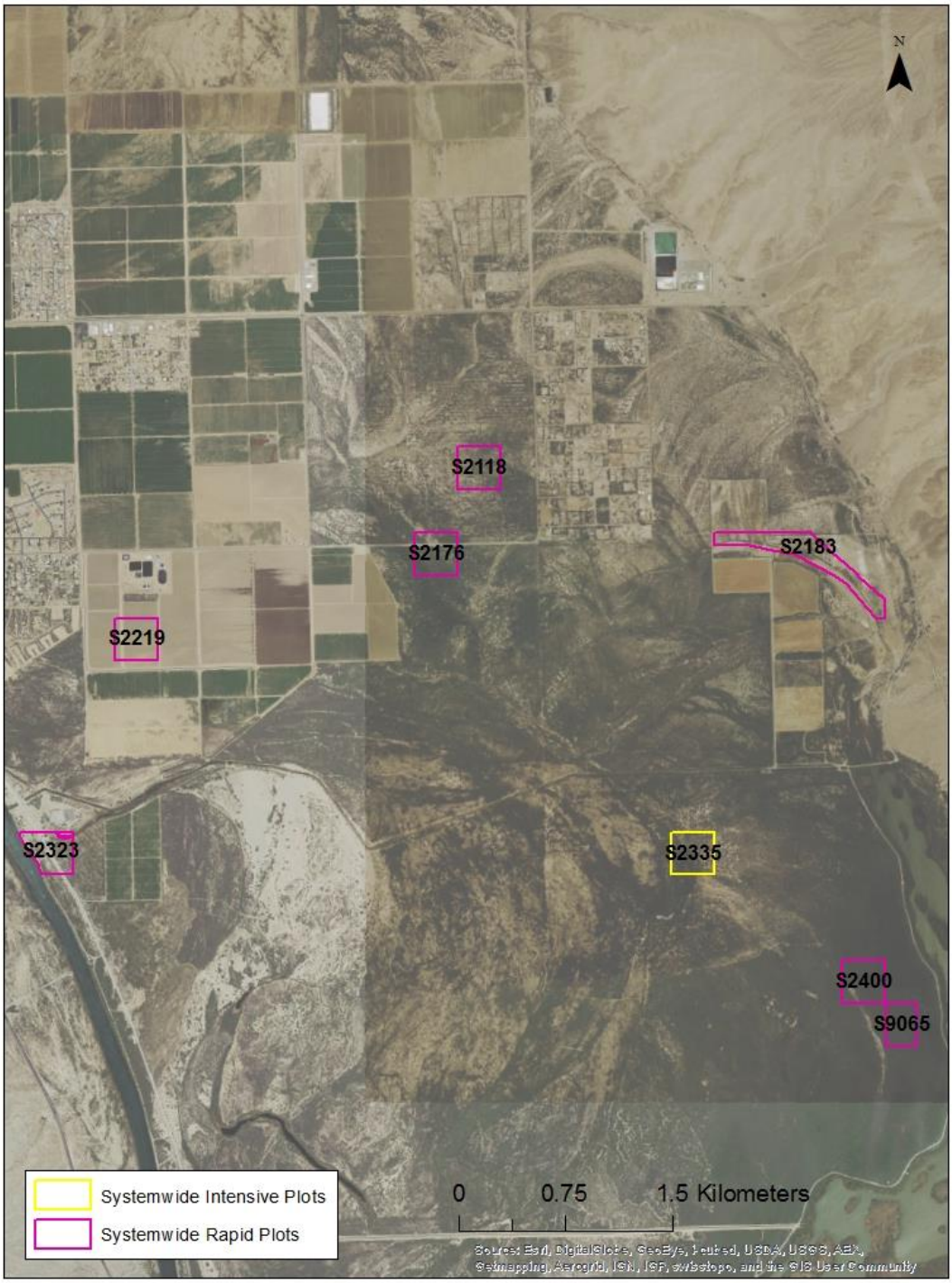


Figure 1b-6.—Region 12, Gila River and Imperial Dam to Yuma, Arizona (7 conservation area rapid plots and 18 system-wide rapid plots, including 2 system-wide intensive plots), and Region 13, Yuma to the Southerly International Boundary with Mexico (1 conservation area rapid plot surveyed by the Bureau of Reclamation).

Attachment 1c – Regional map of system-wide plots surveyed in 2015: Region 5 North, Lake Mohave plots

Attachment 1d – Regional map of system-wide plots surveyed in 2015: Region 5, Laughlin Area plots

Attachment 1e – Regional map of system-wide plots surveyed in 2015: Region 5, Ft. Mohave area plots and Region 6, Havasu National Wildlife Refuge plots

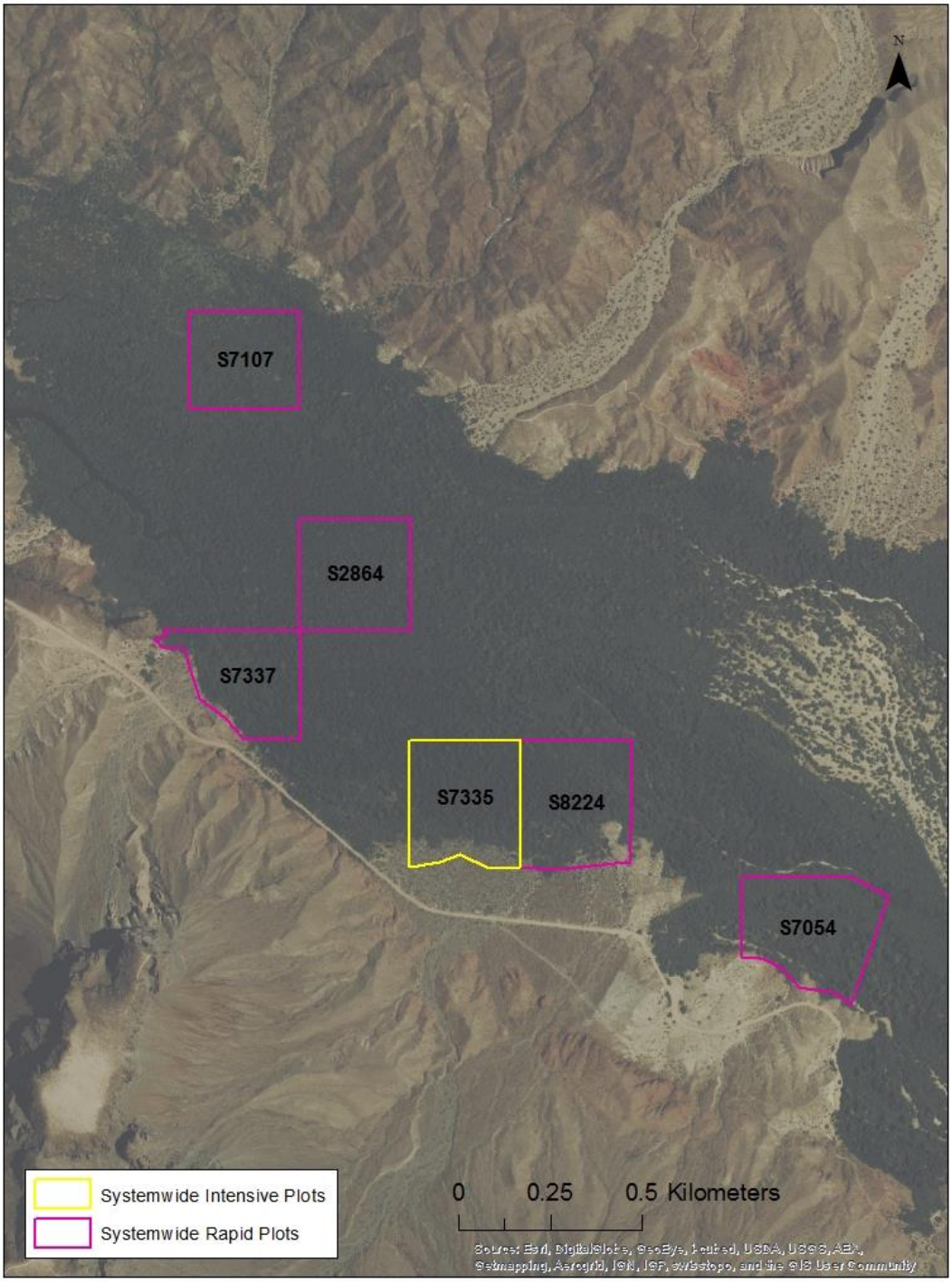


Attachment 1f – Regional map of system-wide plots surveyed in 2015: Region 6, Havasu National Wildlife Refuge plots

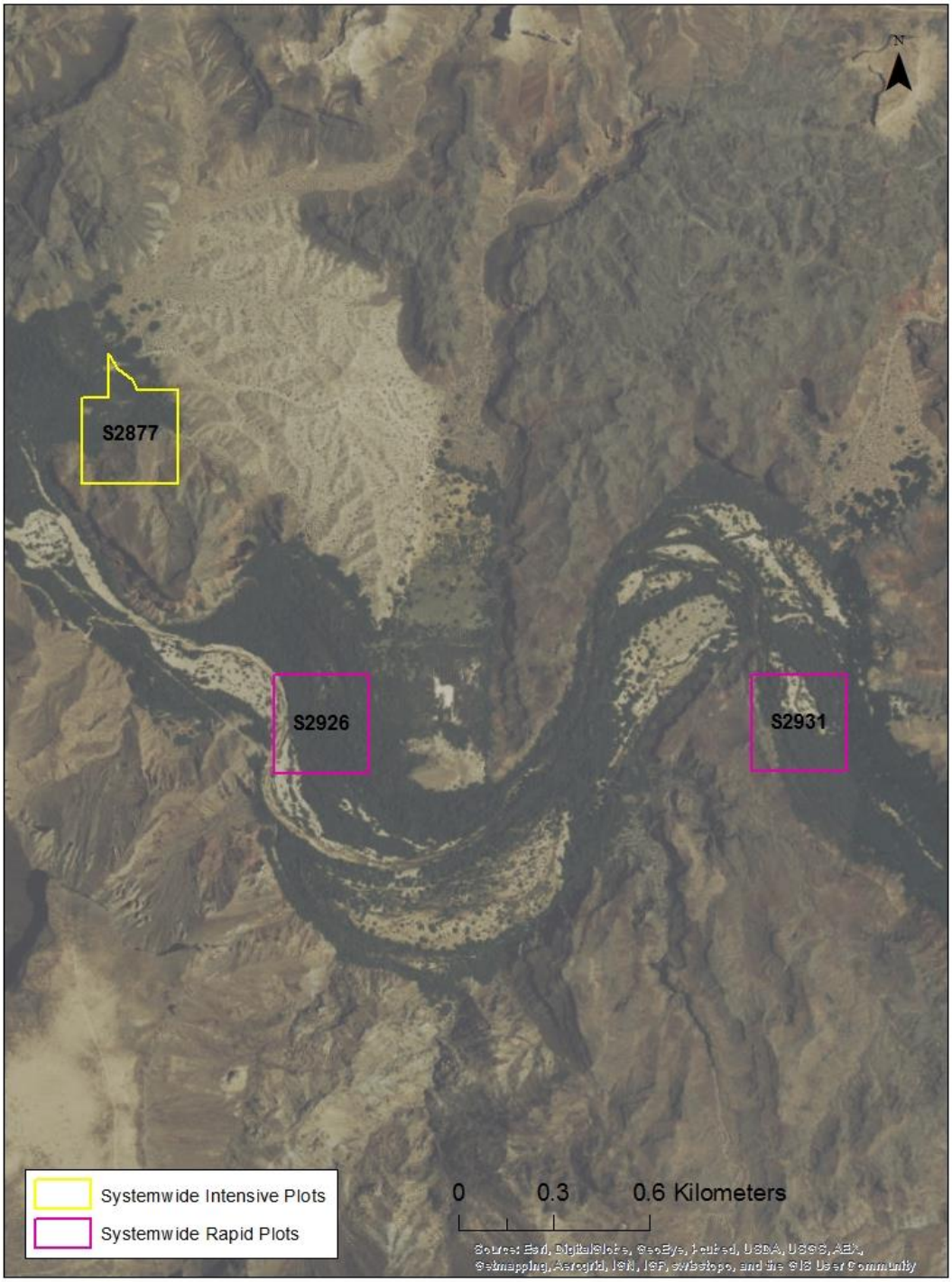
Attachment 1g – Regional map of system-wide plots surveyed in 2015: Region 6, Havasu National Wildlife Refuge south plots

Attachment 1h – Regional map of system-wide plots surveyed in 2015: Region 5 South, Lake Havasu City

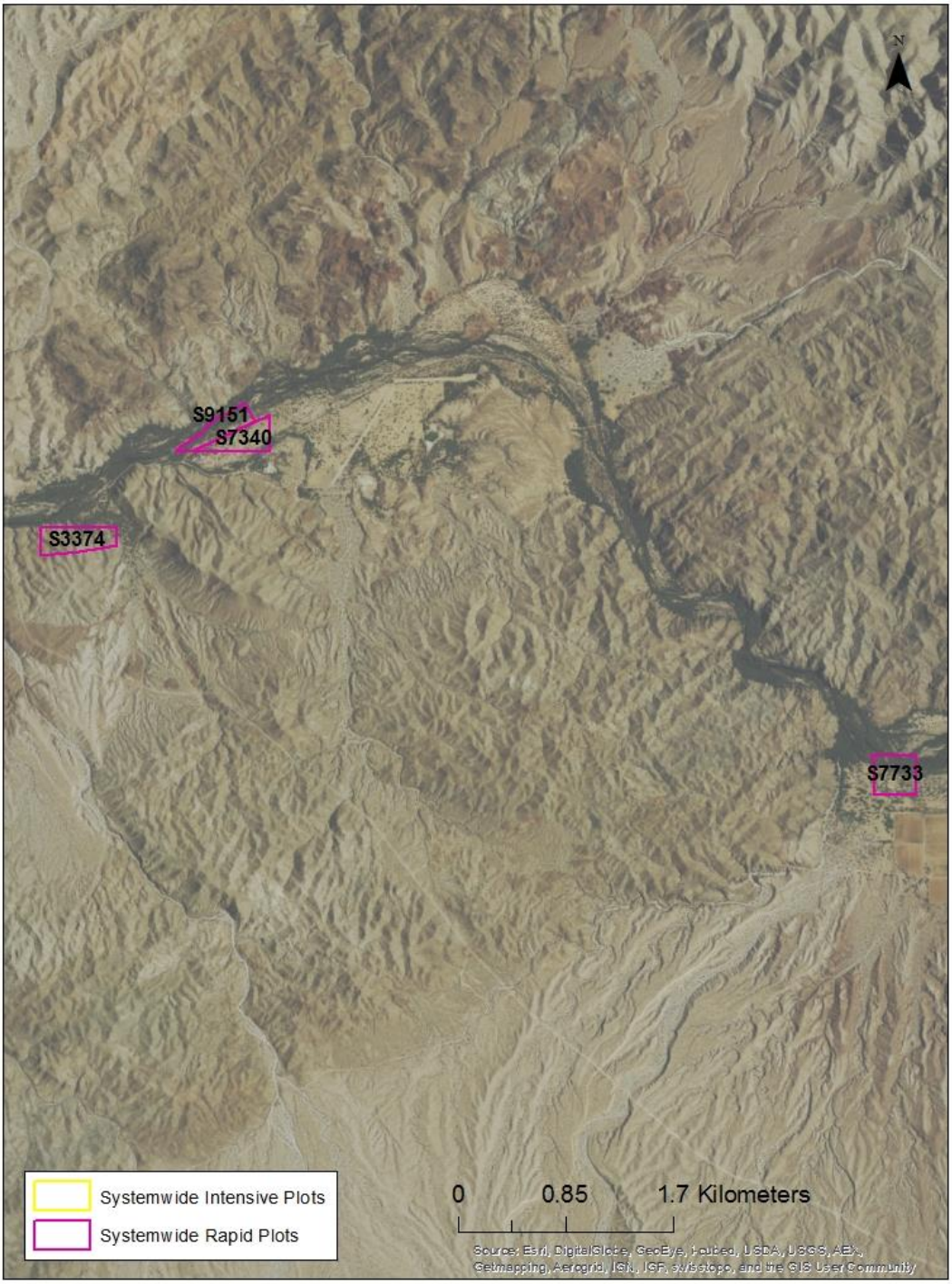
Attachment 1i – Regional map of system-wide plots surveyed in 2015: Region 7 West, Bill Williams River National Wildlife Refuge plots



Attachment 1j – Regional map of system-wide plots surveyed in 2015: Region 7 West, Bill Williams River National Wildlife Refuge plots

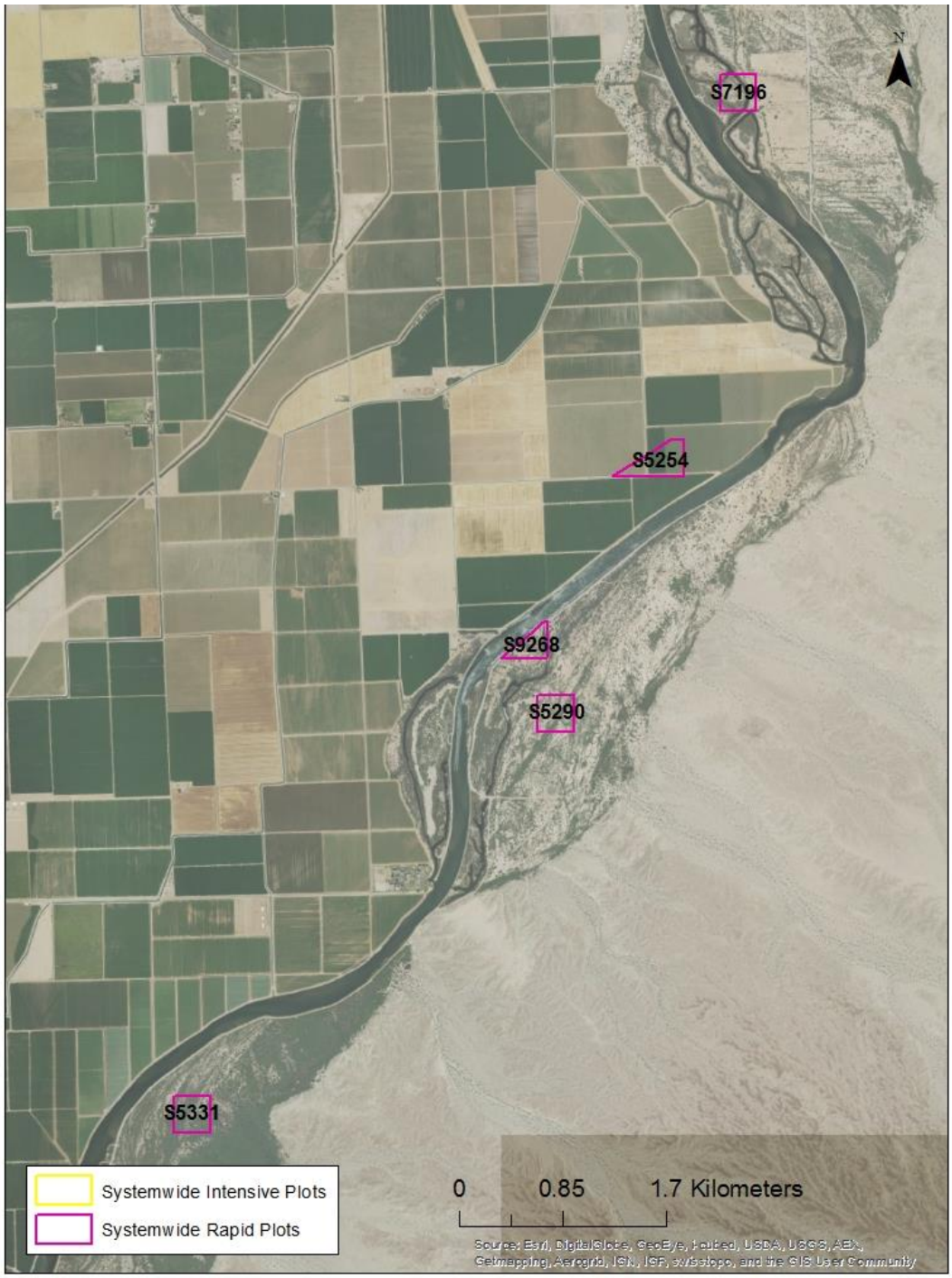


Attachment 1k – Regional map of system-wide plots surveyed in 2015: Region 7 East, Rankin Ranch and Lincoln Ranch area plots

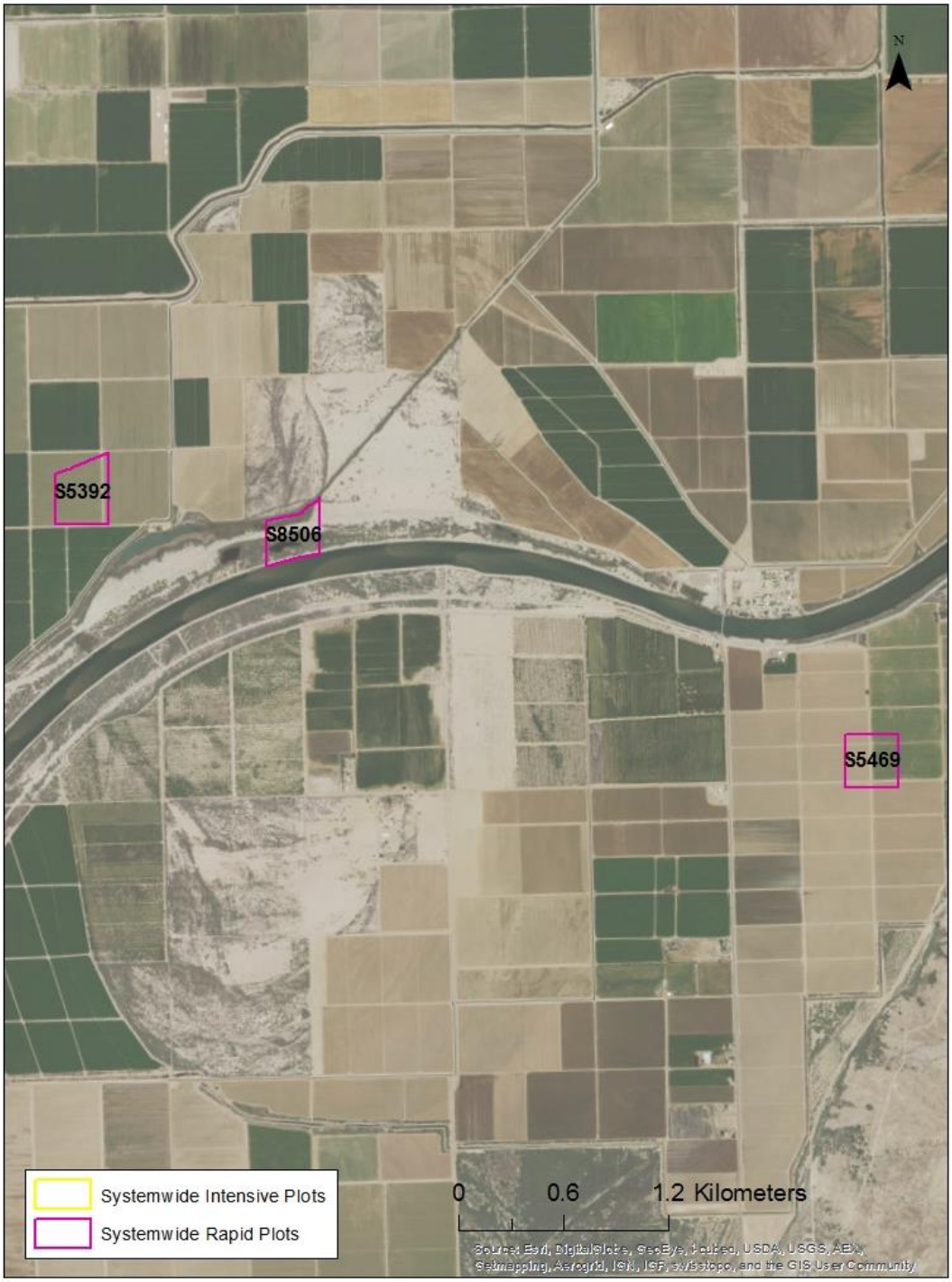


Attachment 1l – Regional map of system-wide plots surveyed in 2015: Region 8 North, below Parker Dam

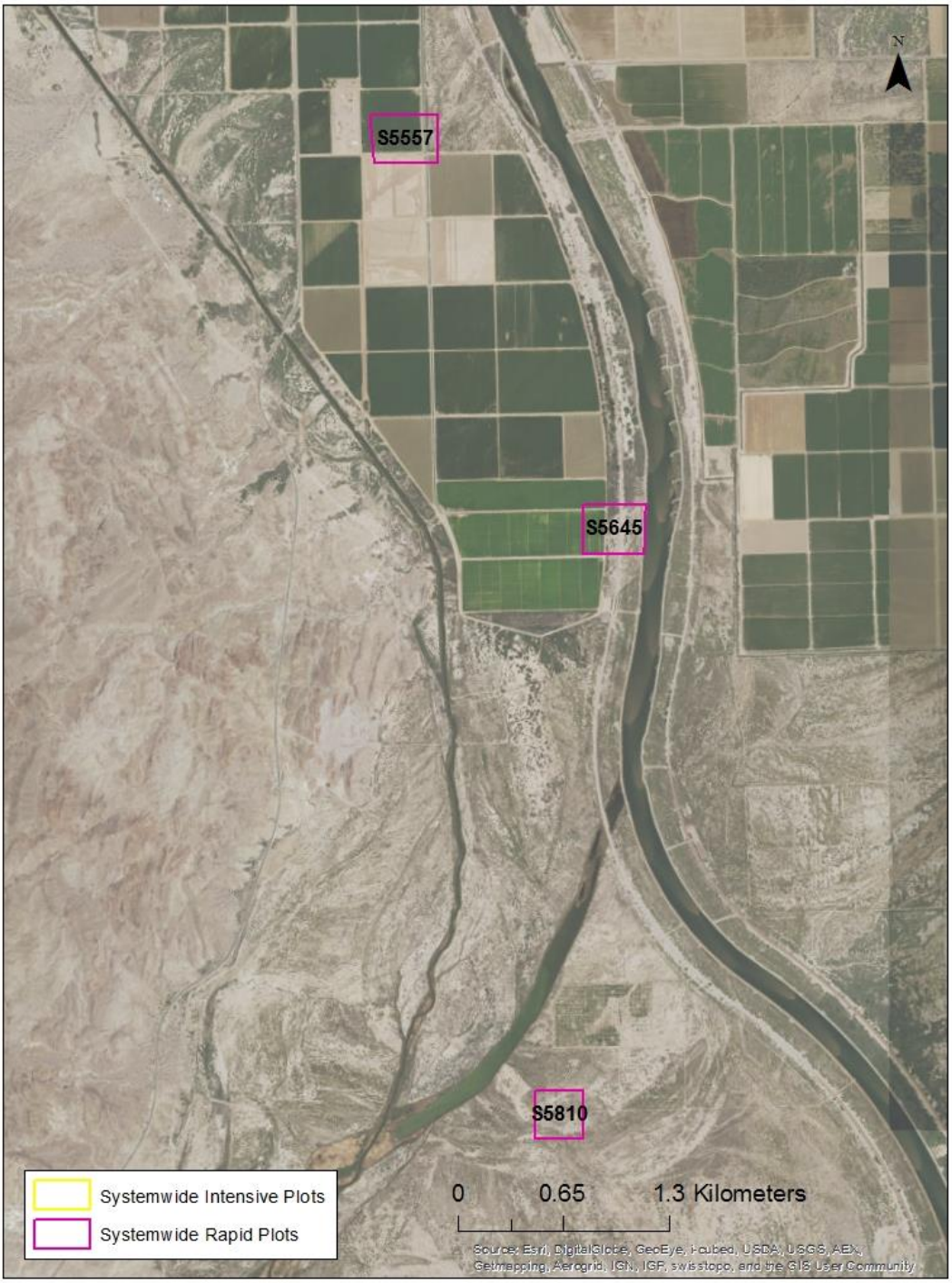
Attachment 1m – Regional map of system-wide plots surveyed in 2015: Region 8, south of Blythe, California



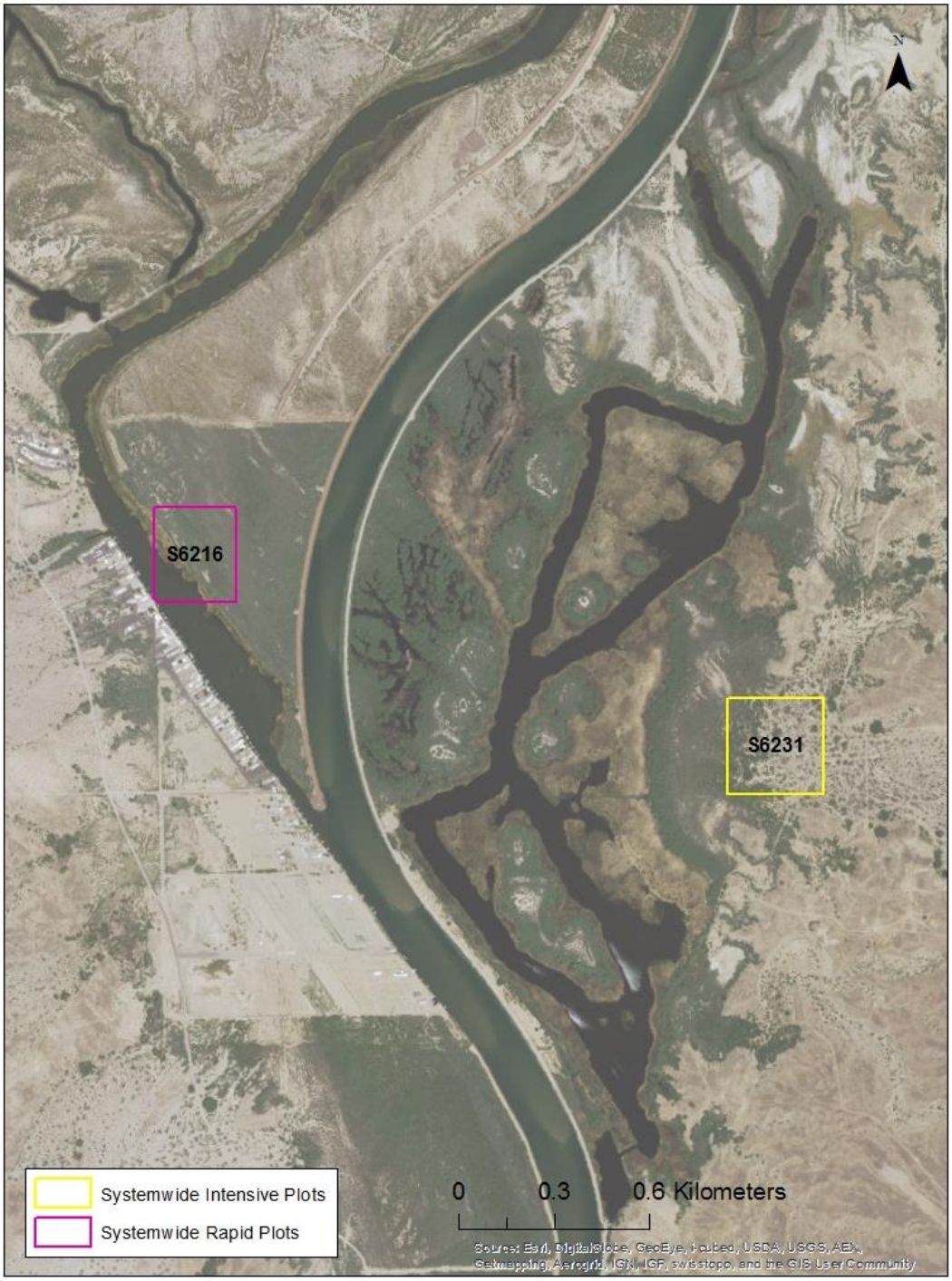
Attachment 1n – Regional map of system-wide plots surveyed in 2015: Region 8, Cibola Valley Conservation Area



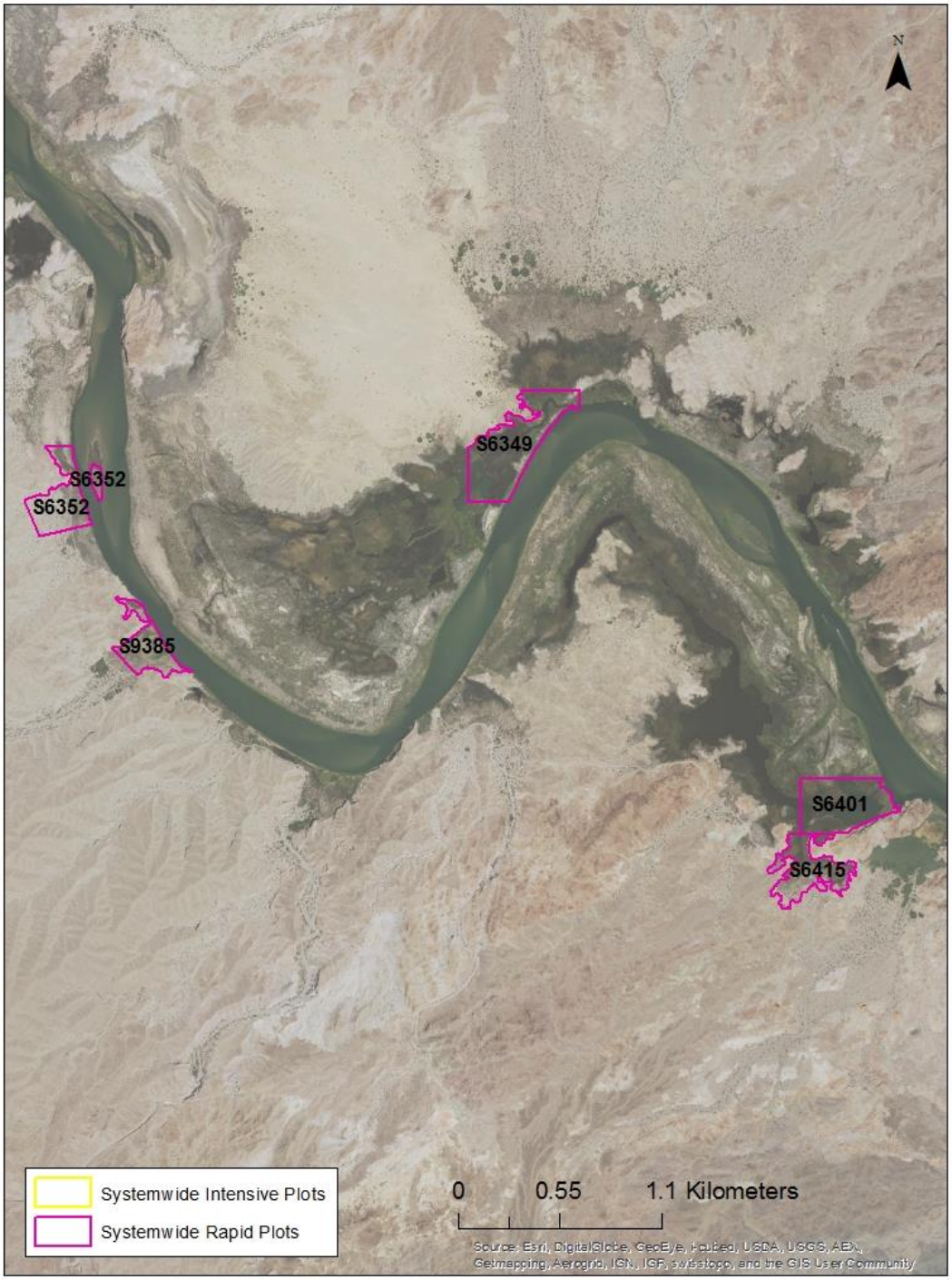
Attachment 1o – Regional map of system-wide plots surveyed in 2015: Region 10, Cibola National Wildlife Refuge area



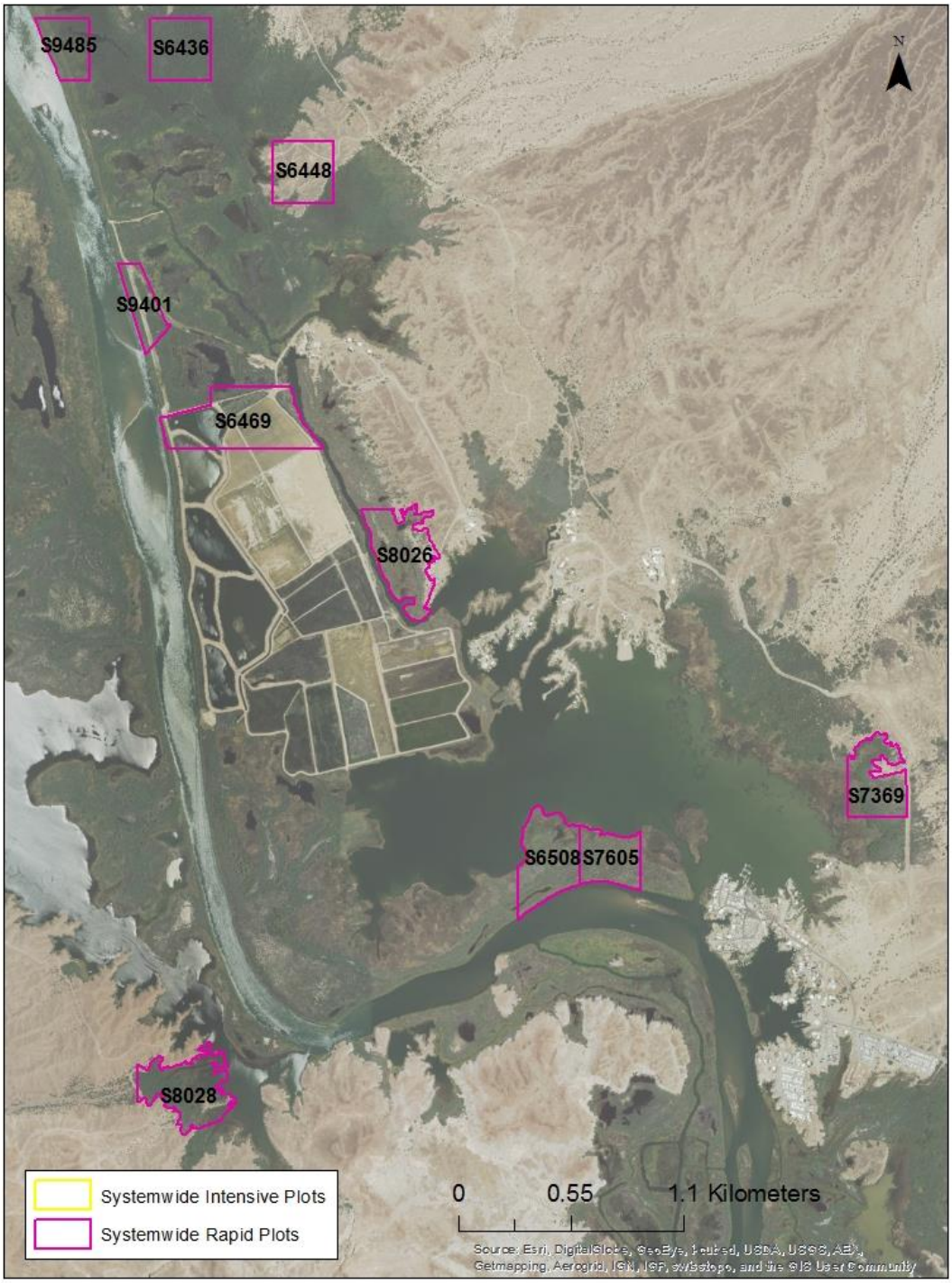
Attachment 1p – Regional map of system-wide plots surveyed in 2015: Region 10, Cibola National Wildlife Refuge



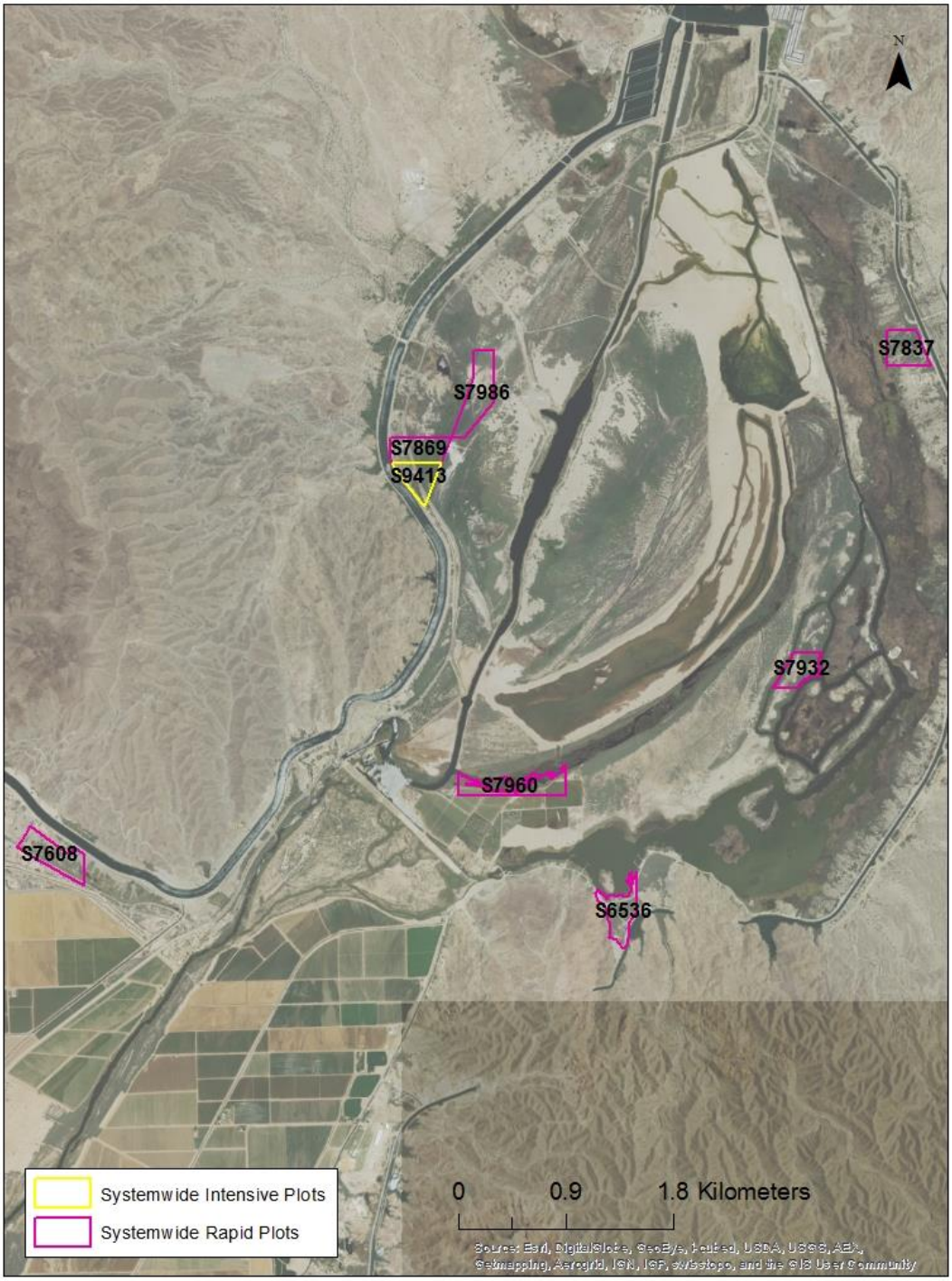
Attachment 1q – Regional map of system-wide plots surveyed in 2015: Region 11, Picacho State Recreation Area



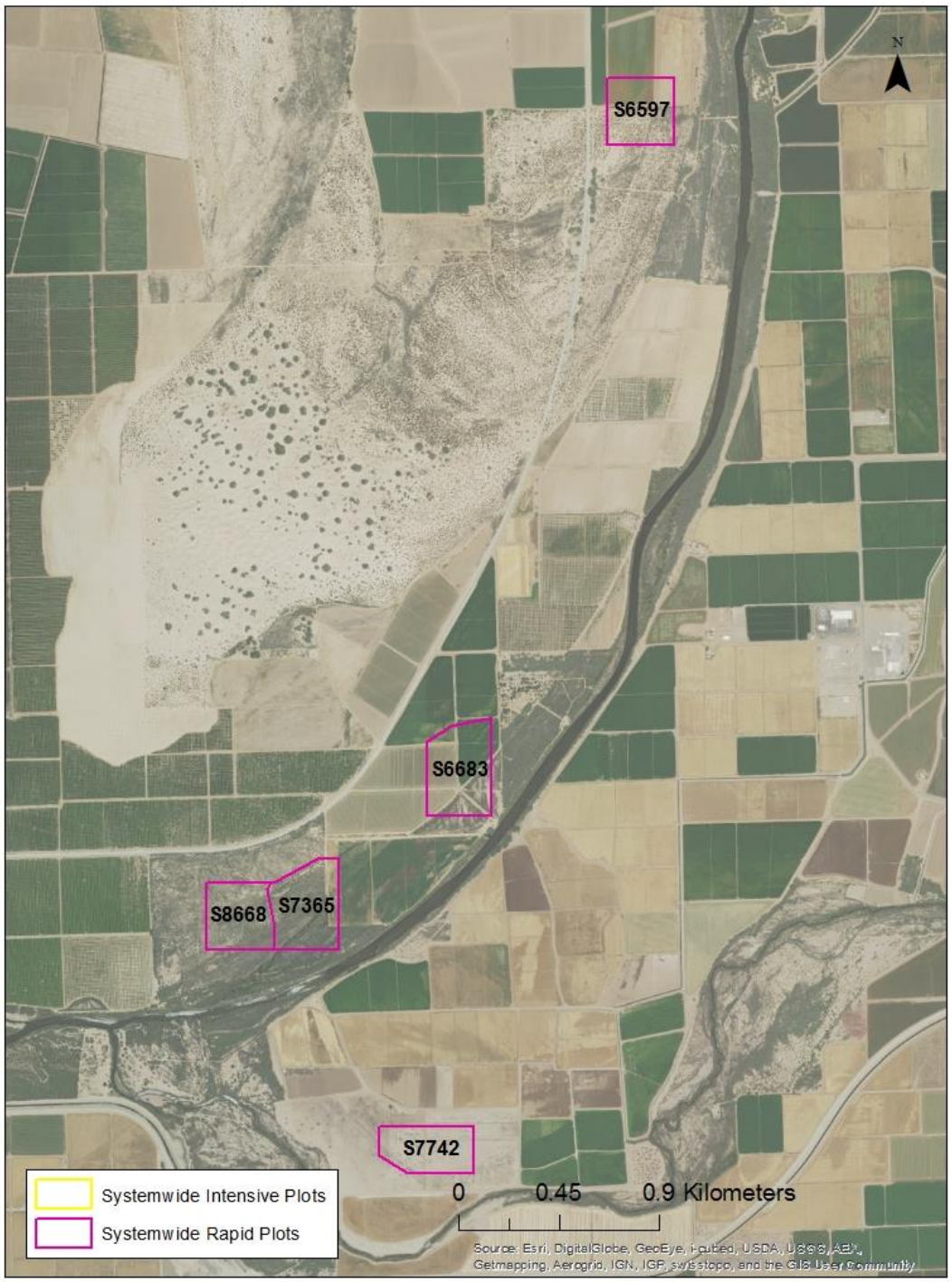
Attachment 1r – Regional map of system-wide plots surveyed in 2015: Region 11, Imperial National Wildlife Refuge area



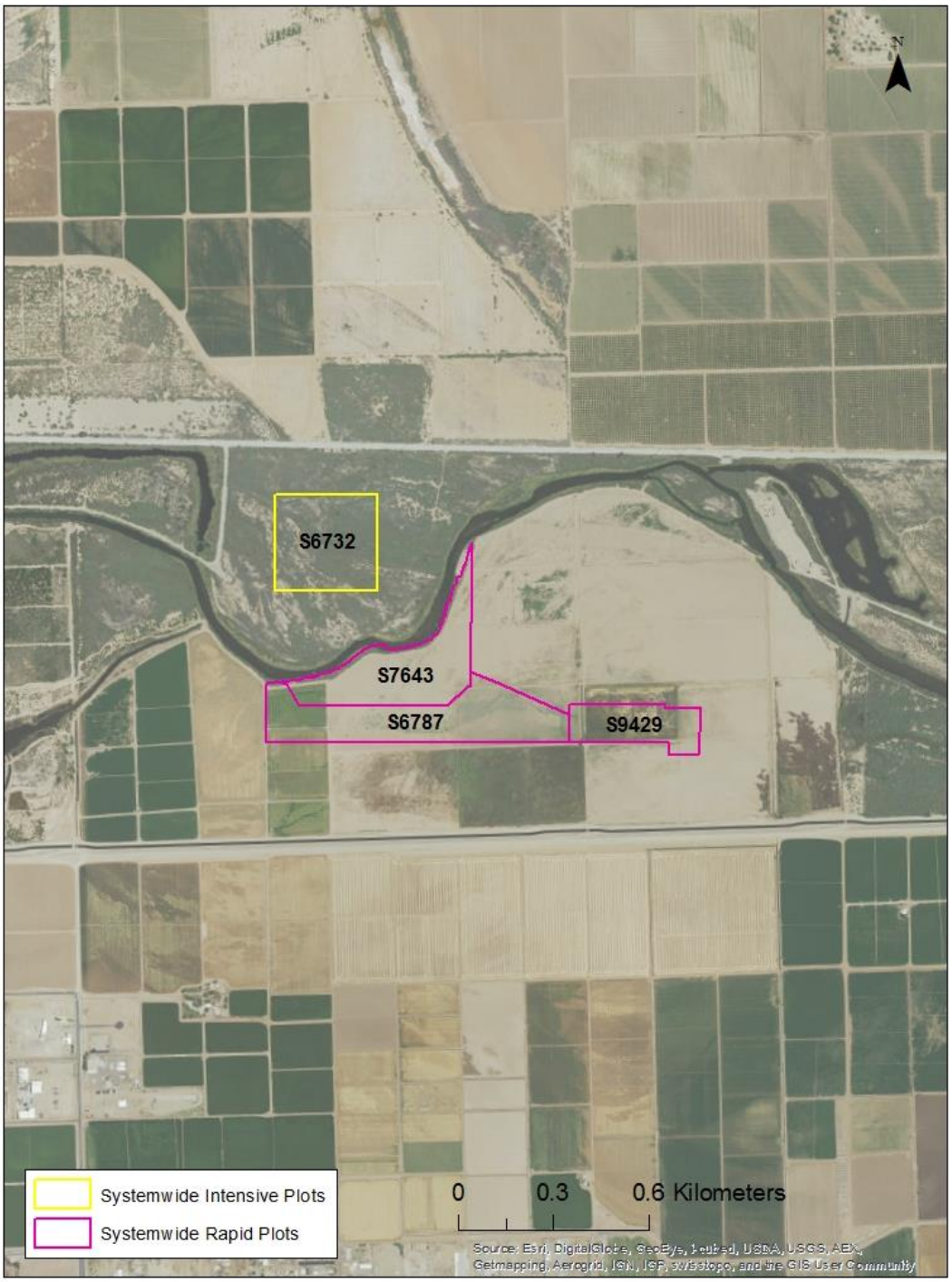
Attachment 1s – Regional map of system-wide plots surveyed in 2015: Region 12, Laguna Dam area



Attachment 1t – Regional map of system-wide plots surveyed in 2015: Region 12, Gila confluence area

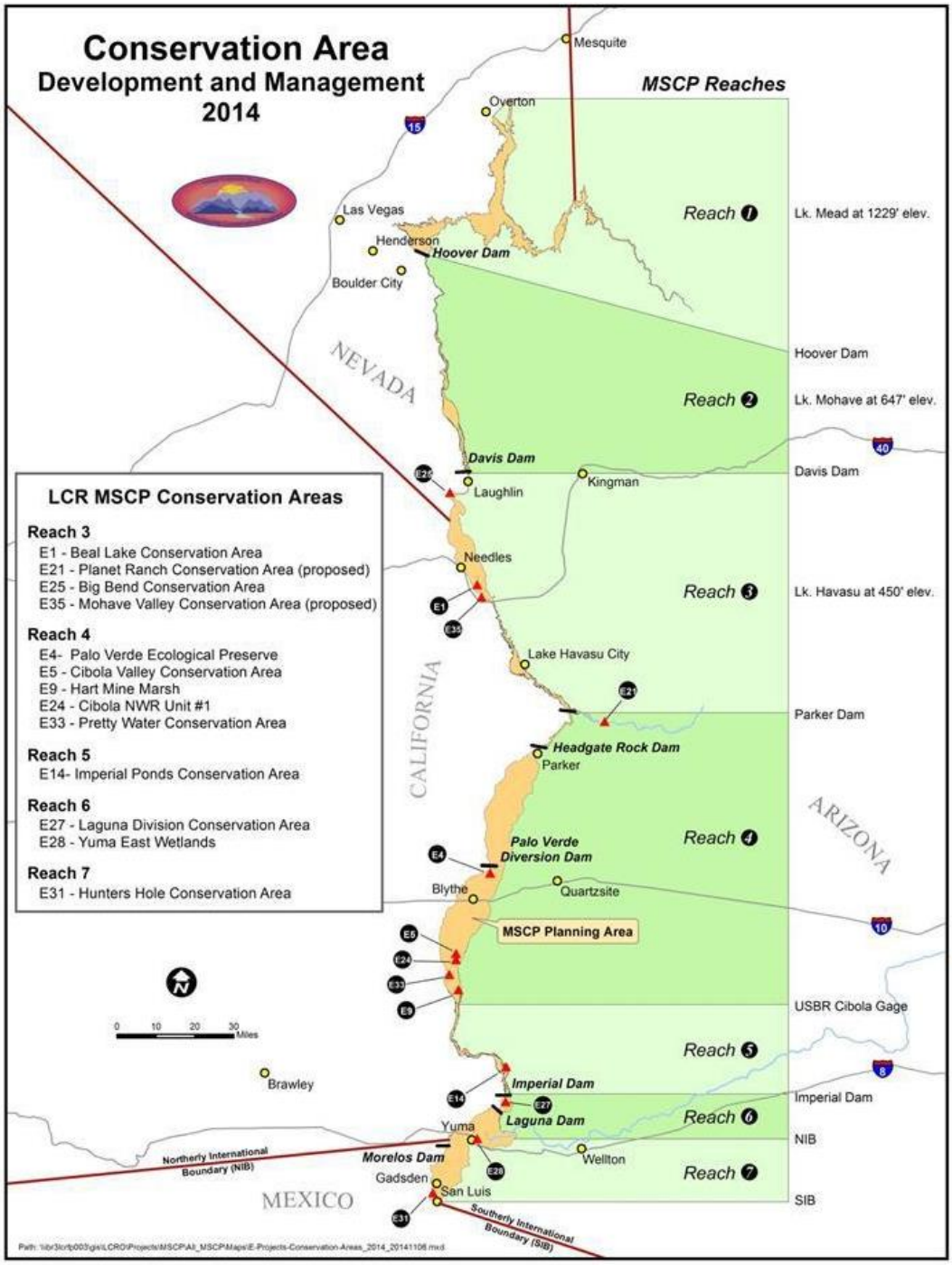


Attachment 1u – Regional map of system-wide plots surveyed in 2015: Region 12, east of Yuma, Arizona

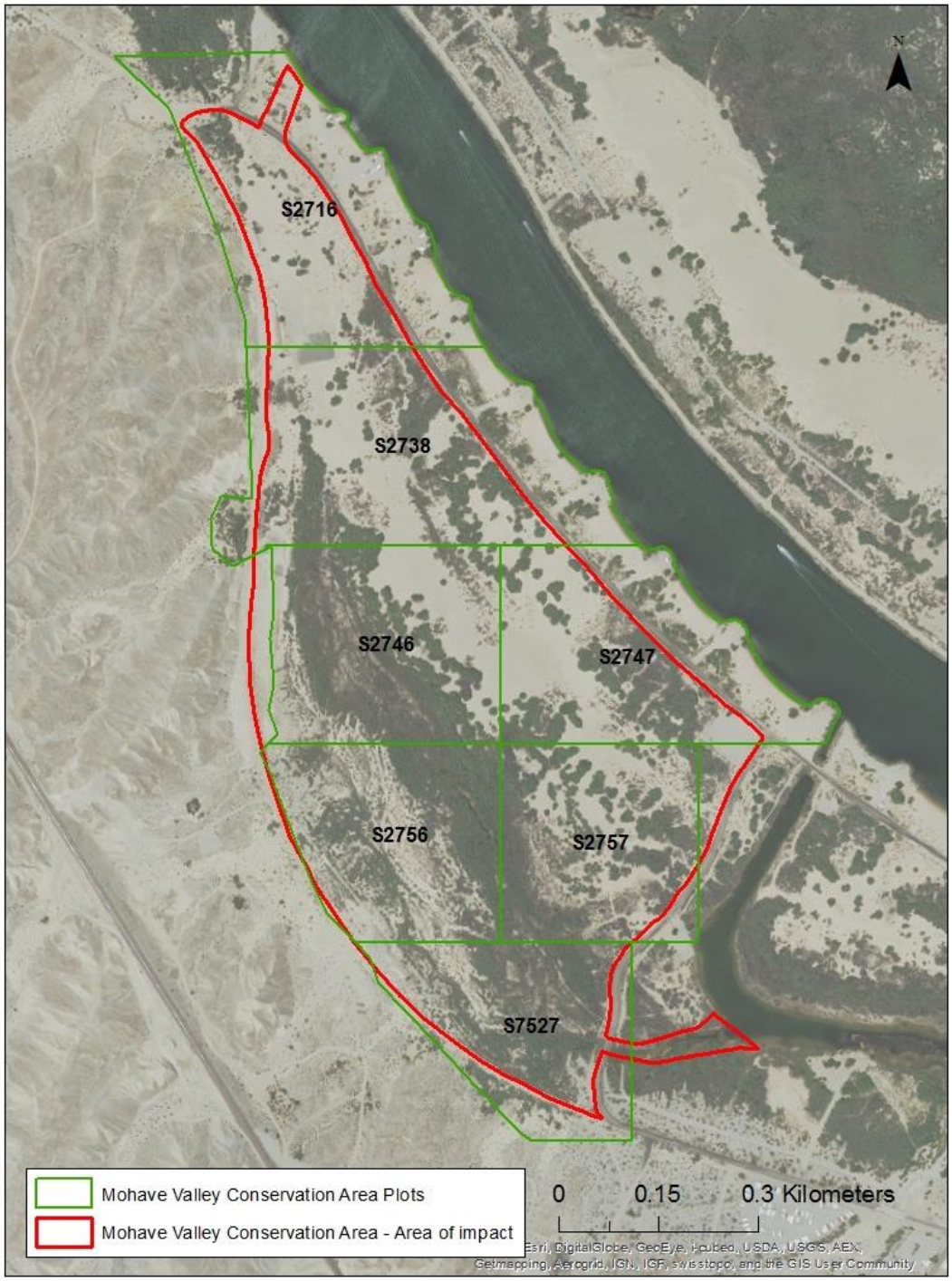


Attachment 1v – Regional map of system-wide plots surveyed in 2015: Region 12, Gila River

Attachment 1w – Overview of conservation areas of the Lower Colorado River Multi-Species Conservation Program in 2015
(Map provided by the Bureau of Reclamation, Lower Colorado River Region)
http://www.lcrmscp.gov/reports/2013/c3_species_accounts_2013.pdf



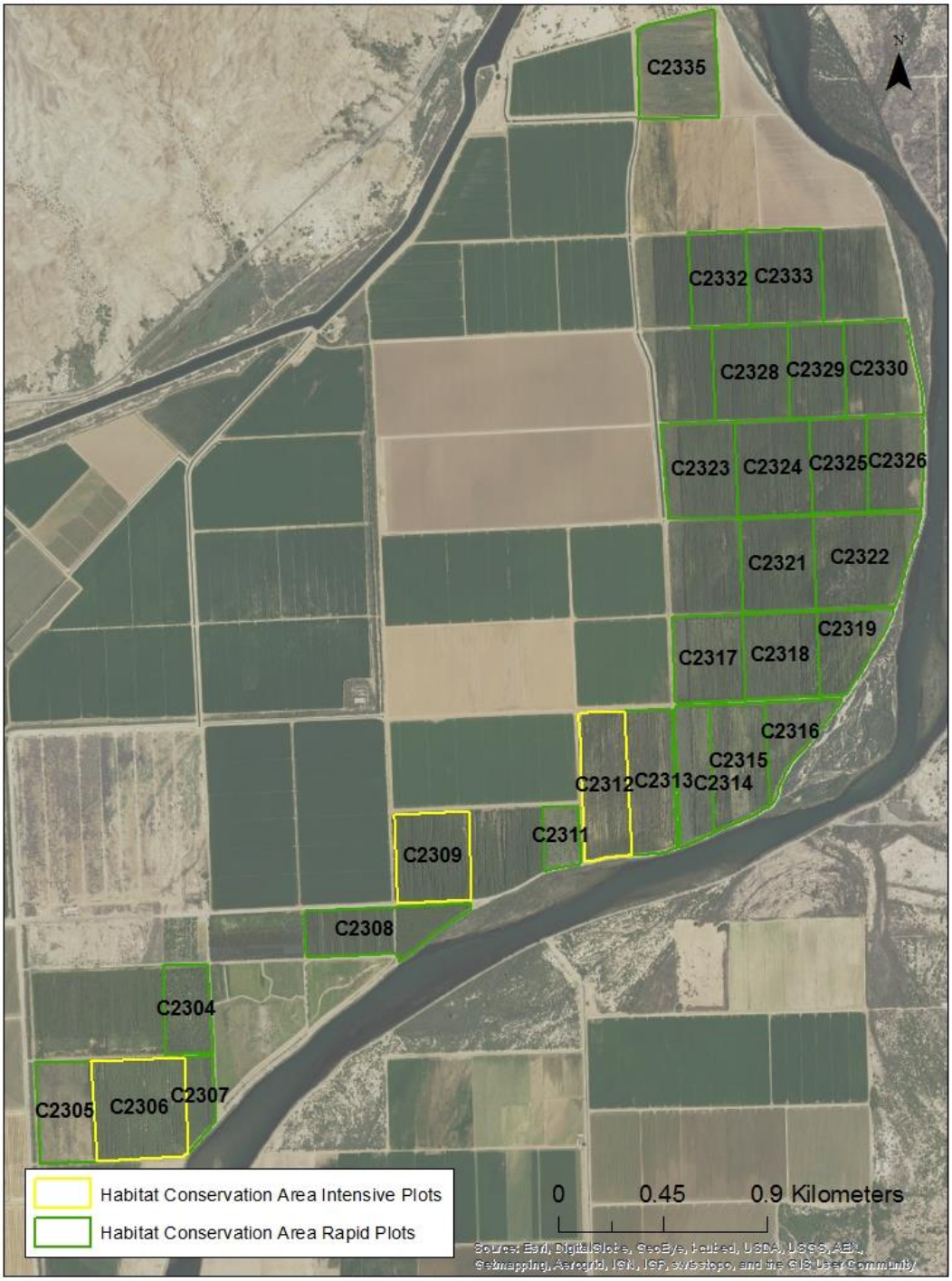
Attachment 1x – Overview of the Mohave Valley Conservation Area showing area of impact for future development and seven riparian bird survey plots, 2015



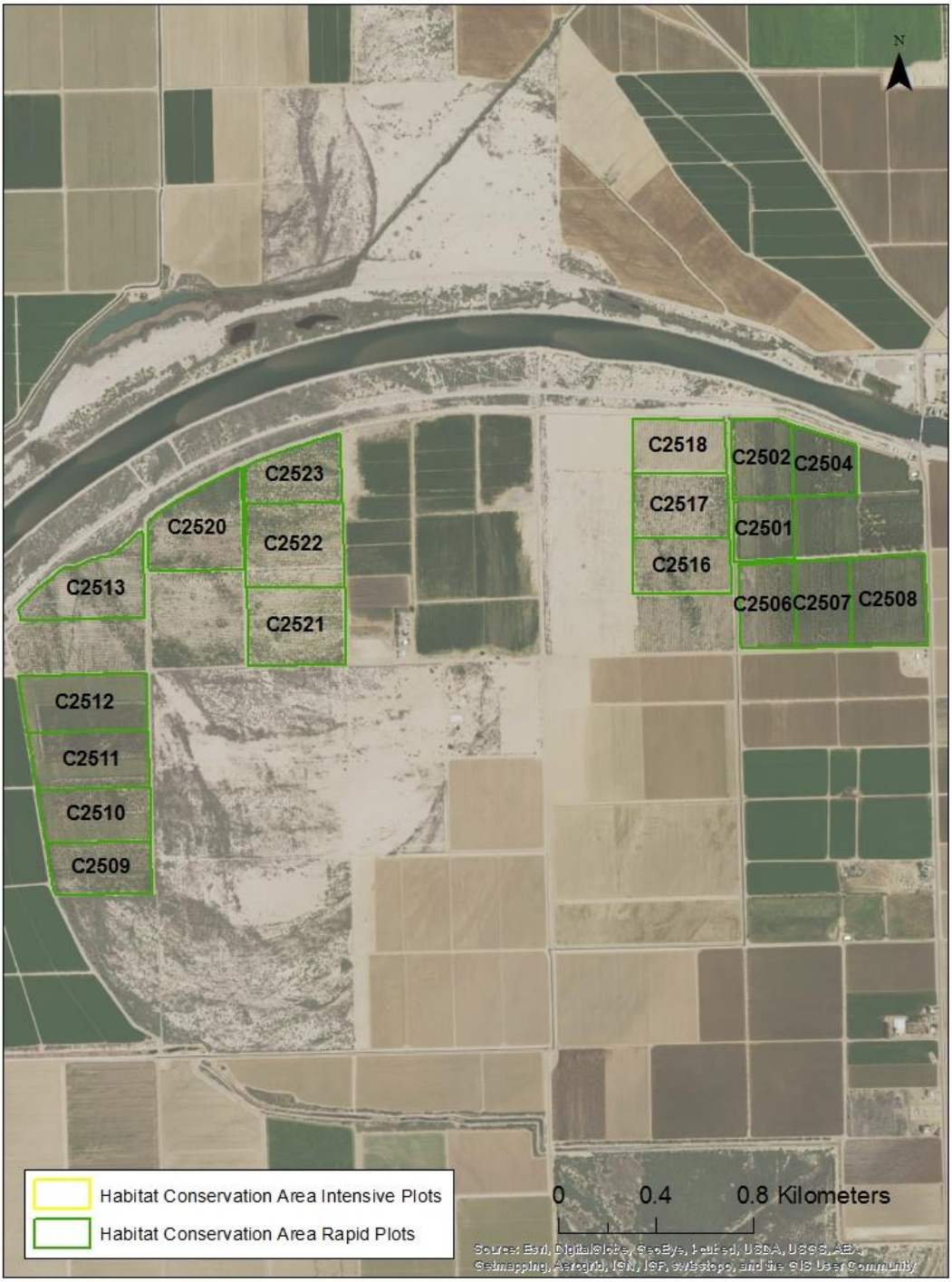
Attachment 1y – Overview of Beal Lake Conservation Area and four riparian bird survey plots, 2015

Attachment 1z – Overview of the Colorado River Indian Tribes' (CRIT) site (CRIT 9 'Ahakhav Tribal Preserve) with five riparian bird survey plots, 2015

Attachment 1aa – Overview of the Palo Verde Ecological Reserve with 27 riparian bird survey plots, 2015



Attachment 1bb – Overview of the Cibola Valley Conservation Area with 18 riparian bird survey plots, 2015



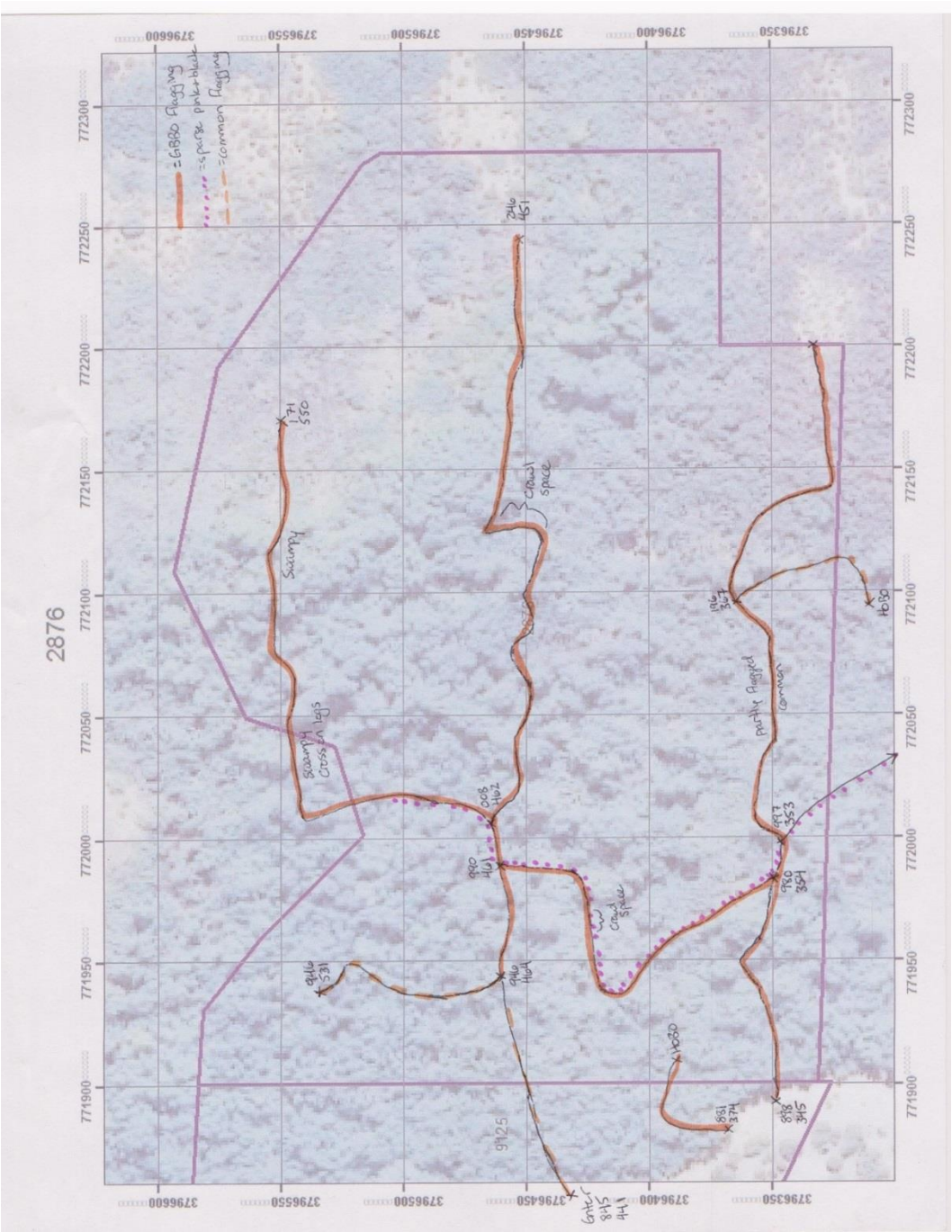
Attachment 1cc – Overview of Cibola National Wildlife Refuge Unit #1 Conservation Area with 13 riparian bird survey plots, 2015

Attachment 1dd – Overview of Yuma East Wetlands with seven riparian bird survey plots, 2015

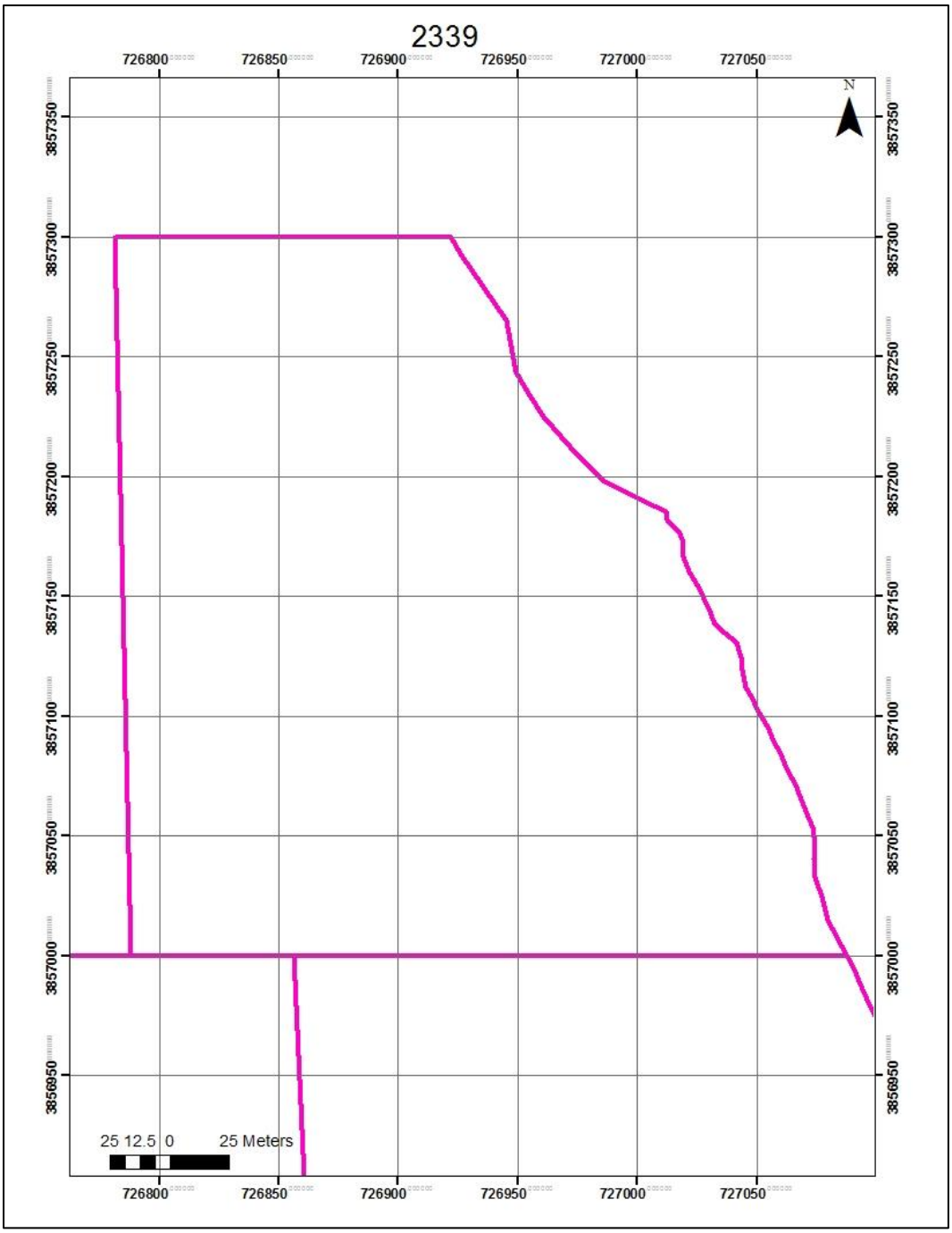
ATTACHMENT 2

Sample Plot Maps

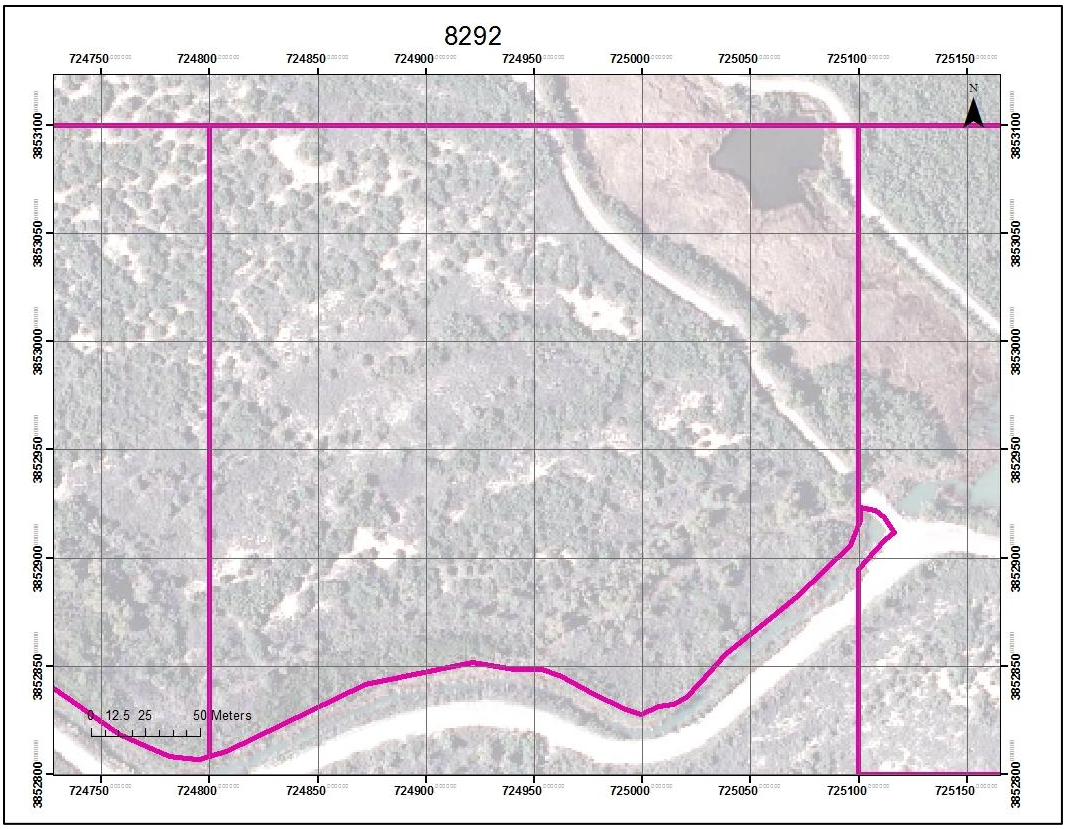
Attachment 2a – Example of a system-wide bird monitoring plot map with trails



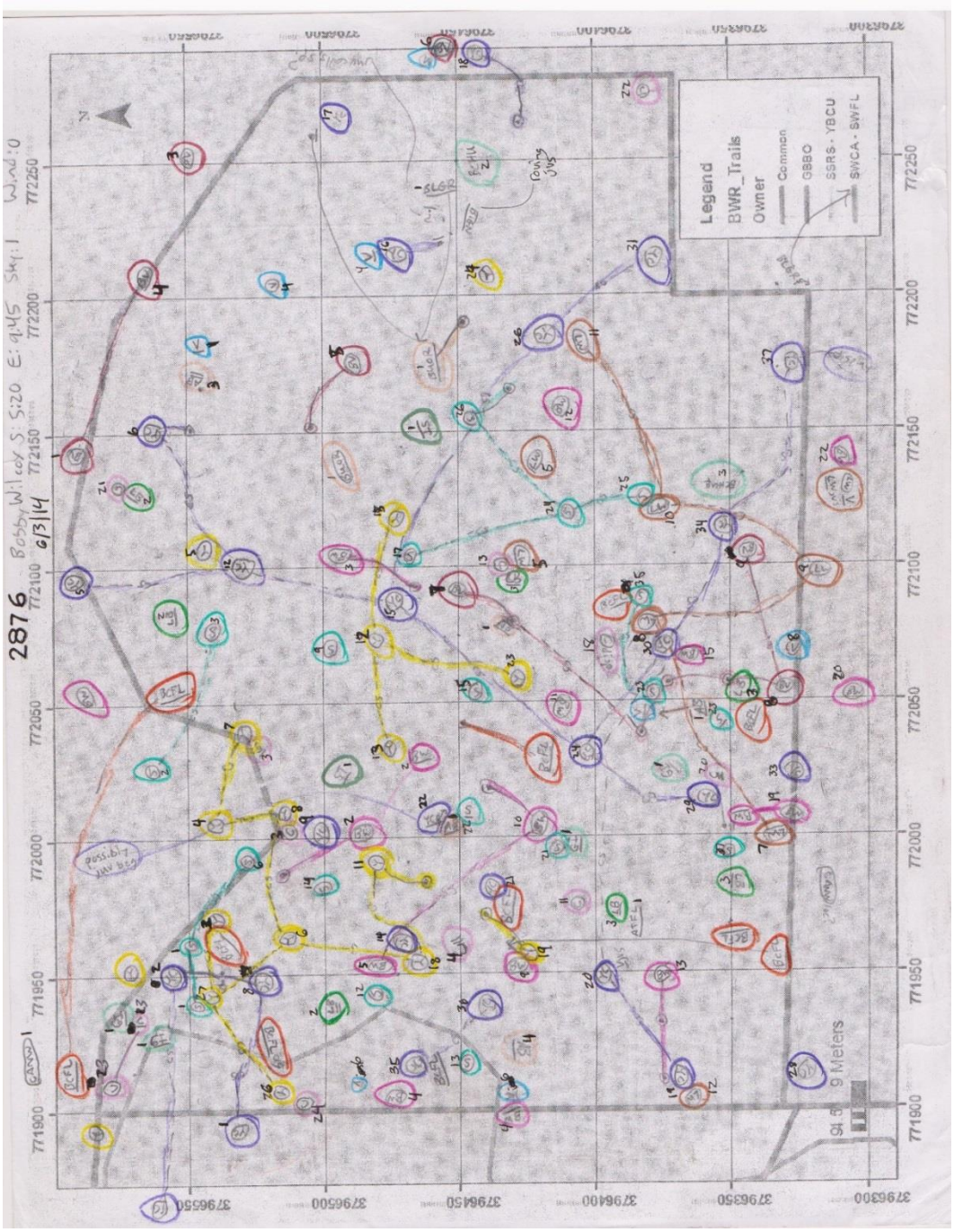
Attachment 2b – Example of a grid bird survey plot (when aerial photo coverage is not useful for reference)



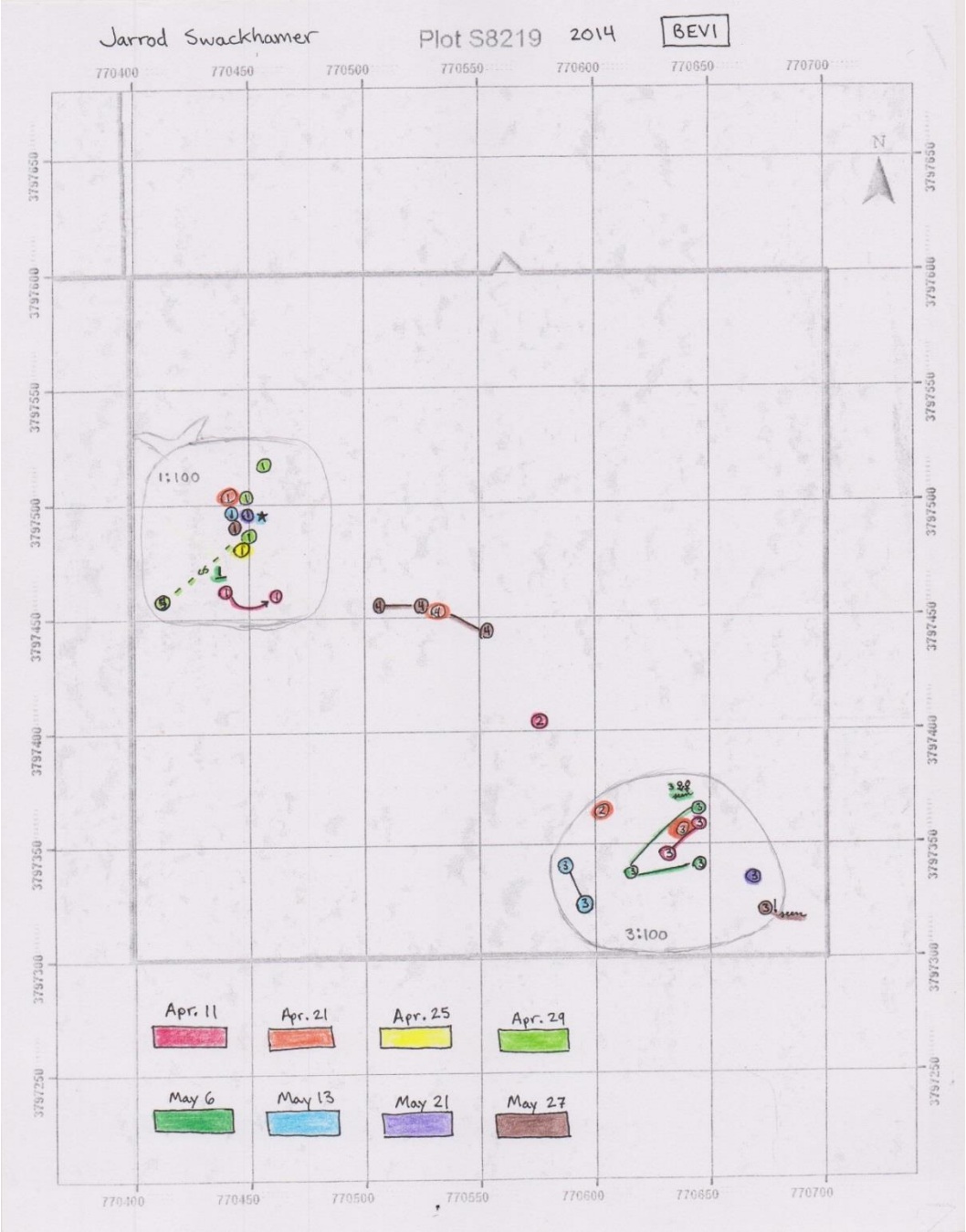
Attachment 2c – Example of a bird survey plot map with grid, including aerial imagery for reference



Attachment 2d – Example of a filled-out bird survey plot map from a rapid area search survey visit



Attachment 2e – Example of a species territory map (Arizona Bell's vireo) compiled at the end of an intensive area search survey for each species on the plot



ATTACHMENT 3

Comprehensive Species List

Comprehensive species list from component 1 avian surveys conducted along the lower Colorado River in 2015 (Species listed in alphabetical order of common name. Scientific names are available in GBBO [02011, 2012].)

Species (n = 192)	Rapid area search surveys				Intensive area search surveys				Flyovers (all sites)
	Detected, not confirmed breeding		Breeders		Detected, not confirmed breeding		Breeders		
	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	
Abert's towhee	✓	✓	✓	✓	✓		✓	✓	
American avocet	✓								✓
American coot	✓	✓	✓				✓		✓
American kestrel	✓	✓	✓	✓	✓	✓	✓		✓
American pipit	✓	✓				✓			✓
American redstart		✓							
American robin	✓								
American white pelican	✓	✓							
Anna's hummingbird	✓	✓	✓	✓	✓		✓		✓
Ash-throated flycatcher	✓	✓	✓	✓	✓		✓	✓	
Audubon's warbler	✓	✓			✓	✓			✓
Bank swallow	✓	✓				✓			✓
Barn owl				✓					
Barn swallow	✓	✓			✓	✓			✓
Bell's vireo	✓	✓	✓	✓			✓	✓	
Belted kingfisher	✓	✓							✓
Bewick's wren			✓		✓		✓		

Comprehensive species list from component 1 avian surveys conducted along the lower Colorado River in 2015 (Species listed in alphabetical order of common name. Scientific names are available in GBBO [02011, 2012].)

Species (n = 192)	Rapid area search surveys				Intensive area search surveys				Flyovers (all sites)
	Detected, not confirmed breeding		Breeders		Detected, not confirmed breeding		Breeders		
	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	
Black phoebe	✓	✓	✓	✓		✓			
Black rail			✓						
Black-and-white warbler		✓							
Black-chinned hummingbird	✓	✓	✓	✓	✓	✓	✓	✓	✓
Black-crowned night-heron	✓	✓			✓				✓
Black-headed grosbeak	✓	✓			✓	✓			
Black-necked stilt	✓	✓	✓	✓					✓
Black-tailed gnatcatcher	✓	✓	✓	✓	✓		✓	✓	
Black-throated gray warbler	✓	✓				✓			
Black-throated sparrow		✓	✓						
Blue grosbeak	✓	✓	✓	✓	✓		✓	✓	
Blue-gray gnatcatcher	✓	✓							
Blue-winged teal	✓								✓
Bonaparte's gull	✓								
Brewer’s sparrow	✓	✓			✓				
Brown-crested flycatcher		✓	✓	✓		✓	✓	✓	
Brown-headed cowbird	✓	✓	✓	✓	✓	✓	✓	✓	✓

Comprehensive species list from component 1 avian surveys conducted along the lower Colorado River in 2015 (Species listed in alphabetical order of common name. Scientific names are available in GBBO [02011, 2012].)

Species (n = 192)	Rapid area search surveys				Intensive area search surveys				Flyovers (all sites)
	Detected, not confirmed breeding		Breeders		Detected, not confirmed breeding		Breeders		
	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	
Budgerigar		✓							
Bullock's oriole	✓	✓	✓	✓	✓			✓	✓
Burrowing owl	✓		✓						
Cactus wren	✓				✓				
California gull	✓	✓							✓
Calliope hummingbird		✓				✓			
Canada goose	✓	✓			✓	✓			✓
Canyon wren			✓		✓		✓		
Caspian tern	✓	✓			✓				✓
Cassin's vireo	✓	✓			✓	✓			
Cattle egret	✓	✓				✓			✓
Cedar waxwing	✓	✓			✓	✓			✓
Chipping sparrow	✓	✓							
Cinnamon teal	✓	✓							✓
Clapper rail	✓	✓	✓		✓	✓			
Clark's grebe	✓		✓						
Cliff swallow	✓	✓	✓	✓	✓	✓	✓		✓

Comprehensive species list from component 1 avian surveys conducted along the lower Colorado River in 2015 (Species listed in alphabetical order of common name. Scientific names are available in GBBO [02011, 2012].)

Species (n = 192)	Rapid area search surveys				Intensive area search surveys				Flyovers (all sites)
	Detected, not confirmed breeding		Breeders		Detected, not confirmed breeding		Breeders		
	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	
Common black-hawk		✓							
Common gallinule	✓	✓	✓				✓		
Common ground-dove	✓	✓	✓	✓		✓			✓
Common loon		✓			✓				✓
Common poorwill		✓	✓						
Common raven	✓	✓	✓	✓	✓	✓		✓	✓
Common yellowthroat	✓	✓	✓	✓	✓		✓	✓	
Cooper’s hawk	✓	✓	✓		✓	✓			✓
Costa’s hummingbird	✓	✓	✓	✓			✓		
Crissal thrasher		✓	✓	✓			✓	✓	
Double-crested cormorant	✓	✓			✓				✓
Dusky flycatcher		✓							
Eared grebe	✓								
Eurasian collared-dove	✓	✓	✓	✓			✓		✓
European starling	✓	✓	✓	✓		✓	✓	✓	✓
Evening grosbeak	✓								✓
Forster's tern	✓								✓

Comprehensive species list from component 1 avian surveys conducted along the lower Colorado River in 2015 (Species listed in alphabetical order of common name. Scientific names are available in GBBO [02011, 2012].)

Species (n = 192)	Rapid area search surveys				Intensive area search surveys				Flyovers (all sites)
	Detected, not confirmed breeding		Breeders		Detected, not confirmed breeding		Breeders		
	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	
Fox sparrow					✓				
Franklin's gull	✓								✓
Gambel's quail		✓	✓	✓			✓	✓	
Gambel's white-crowned sparrow	✓	✓			✓				
Gila woodpecker	✓	✓	✓	✓			✓		✓
Gilded flicker			✓						
Gray flycatcher	✓	✓			✓	✓			
Great blue heron	✓	✓	✓		✓				✓
Great egret	✓	✓	✓		✓	✓			✓
Great horned owl	✓	✓	✓	✓	✓			✓	
Greater roadrunner			✓	✓		✓	✓	✓	
Greater scaup					✓				
Greater yellowlegs	✓	✓				✓			✓
Great-tailed grackle	✓	✓	✓	✓	✓	✓	✓	✓	✓
Green heron	✓	✓	✓	✓	✓	✓	✓		✓
Green-tailed towhee	✓	✓			✓				
Hammond's flycatcher	✓	✓			✓	✓			

Comprehensive species list from component 1 avian surveys conducted along the lower Colorado River in 2015 (Species listed in alphabetical order of common name. Scientific names are available in GBBO [02011, 2012].)

Species (n = 192)	Rapid area search surveys				Intensive area search surveys				Flyovers (all sites)
	Detected, not confirmed breeding		Breeders		Detected, not confirmed breeding		Breeders		
	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	
Hermit thrush	✓	✓			✓				
Hermit warbler	✓	✓			✓	✓			
Hooded oriole	✓	✓	✓						✓
Hooded warbler		✓							
Horned lark	✓	✓	✓						✓
House finch	✓	✓	✓	✓		✓	✓	✓	✓
House sparrow			✓						
House wren	✓	✓			✓				
Hutton's vireo					✓				
Inca dove	✓			✓				✓	
Indian peafowl	✓								
Indigo bunting		✓		✓		✓		✓	
Killdeer	✓	✓	✓	✓		✓			✓
Ladder-backed woodpecker	✓	✓	✓	✓			✓	✓	✓
Lark sparrow	✓	✓			✓				
Lawrence's goldfinch		✓							✓
Lazuli bunting	✓	✓			✓	✓			✓

Comprehensive species list from component 1 avian surveys conducted along the lower Colorado River in 2015 (Species listed in alphabetical order of common name. Scientific names are available in GBBO [02011, 2012].)

Species (n = 192)	Rapid area search surveys				Intensive area search surveys				Flyovers (all sites)
	Detected, not confirmed breeding		Breeders		Detected, not confirmed breeding		Breeders		
	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	
Least bittern	✓	✓	✓				✓		
Least sandpiper	✓	✓							✓
Lesser goldfinch	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lesser nighthawk	✓	✓	✓	✓	✓	✓	✓		✓
Lincoln's sparrow	✓	✓			✓				
Loggerhead shrike	✓	✓	✓		✓	✓			
Long-billed curlew	✓	✓							✓
Lucy's warbler	✓	✓	✓	✓	✓	✓	✓	✓	
Macgillivray's warbler	✓	✓			✓	✓			
Mallard	✓	✓	✓		✓				✓
Marsh wren	✓		✓	✓					
Merlin		✓							✓
Mountain white-crowned sparrow	✓	✓				✓			
Mourning dove	✓	✓	✓	✓	✓	✓	✓	✓	✓
Myrtle warbler	✓				✓				
Nashville warbler	✓	✓			✓	✓			
Neotropic cormorant	✓								✓

Comprehensive species list from component 1 avian surveys conducted along the lower Colorado River in 2015 (Species listed in alphabetical order of common name. Scientific names are available in GBBO [02011, 2012].)

Species (n = 192)	Rapid area search surveys				Intensive area search surveys				Flyovers (all sites)
	Detected, not confirmed breeding		Breeders		Detected, not confirmed breeding		Breeders		
	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	
Northern cardinal	✓		✓		✓				
Northern harrier	✓	✓							✓
Northern mockingbird	✓	✓		✓					✓
Northern parula	✓	✓							
Northern pintail	✓								✓
Northern rough-winged swallow	✓	✓	✓	✓	✓	✓	✓		✓
Northern shoveler	✓								✓
Nutting's flycatcher	✓				✓				
Olive-sided flycatcher	✓	✓			✓	✓			
Orange-crowned warbler	✓	✓			✓	✓			
Osprey	✓	✓			✓	✓			✓
Pacific-slope flycatcher	✓	✓			✓	✓			
Peregrine falcon	✓	✓	✓						✓
Phainopepla	✓	✓	✓		✓		✓		✓
Pied-billed grebe	✓		✓				✓		
Pine siskin	✓	✓				✓			✓
Prairie falcon	✓	✓			✓				✓

Comprehensive species list from component 1 avian surveys conducted along the lower Colorado River in 2015 (Species listed in alphabetical order of common name. Scientific names are available in GBBO [02011, 2012].)

Species (n = 192)	Rapid area search surveys				Intensive area search surveys				Flyovers (all sites)
	Detected, not confirmed breeding		Breeders		Detected, not confirmed breeding		Breeders		
	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	
Purple martin	✓								✓
Red-breasted merganser	✓								
Redhead	✓		✓		✓				
Red-shouldered hawk		✓							
Red-tailed hawk	✓	✓			✓	✓			✓
Red-winged blackbird	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ring-billed gull	✓								✓
Ring-necked duck	✓								
Ring-necked pheasant			✓						
Rock pigeon	✓	✓		✓					✓
Rock wren	✓		✓						
Rose-breasted grosbeak		✓			✓	✓			
Ruby-crowned kinglet	✓	✓				✓			
Ruddy duck	✓								
Rufous hummingbird	✓	✓				✓			
Savannah sparrow	✓								
Say's phoebe	✓	✓	✓	✓		✓			✓

Comprehensive species list from component 1 avian surveys conducted along the lower Colorado River in 2015 (Species listed in alphabetical order of common name. Scientific names are available in GBBO [02011, 2012].)

Species (n = 192)	Rapid area search surveys				Intensive area search surveys				Flyovers (all sites)
	Detected, not confirmed breeding		Breeders		Detected, not confirmed breeding		Breeders		
	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	
Scott's oriole					✓				
Sharp-shinned hawk		✓			✓				✓
Snowy egret	✓	✓	✓		✓				✓
Song sparrow	✓	✓	✓	✓	✓		✓	✓	
Sora	✓	✓			✓				
Spotted sandpiper	✓	✓							
Spotted towhee		✓							
Summer tanager	✓	✓	✓	✓	✓	✓	✓	✓	
Swainson's hawk	✓	✓			✓	✓			✓
Swainson’s thrush	✓	✓			✓				
Townsend's warbler	✓	✓			✓	✓			
Tree swallow	✓	✓			✓	✓			✓
Tropical kingbird	✓								
Turkey vulture	✓	✓	✓		✓	✓			✓
Unidentified Accipiter hawk	✓	✓							✓
Unidentified thrush	✓								
Unidentified cormorant					✓				✓

Comprehensive species list from component 1 avian surveys conducted along the lower Colorado River in 2015 (Species listed in alphabetical order of common name. Scientific names are available in GBBO [02011, 2012].)

Species (n = 192)	Rapid area search surveys				Intensive area search surveys				Flyovers (all sites)
	Detected, not confirmed breeding		Breeders		Detected, not confirmed breeding		Breeders		
	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	
Unidentified duck	✓	✓							✓
Unidentified Empidonax flycatcher	✓	✓			✓				
Unidentified gull	✓				✓				✓
Unidentified hummingbird	✓	✓	✓	✓	✓				✓
Unidentified loon					✓				✓
Unidentified shorebird	✓								✓
Unidentified sparrow	✓								
Unidentified swallow	✓	✓			✓	✓			✓
Unidentified warbler	✓	✓							✓
Vaux's swift	✓				✓				✓
Verdin	✓	✓	✓	✓	✓		✓	✓	
Vermilion flycatcher		✓		✓				✓	
Violet-green swallow	✓	✓	✓						✓
Virginia rail	✓	✓	✓						
Warbling vireo	✓	✓			✓	✓			
Western flycatcher	✓	✓			✓	✓			
Western grebe	✓		✓						

Comprehensive species list from component 1 avian surveys conducted along the lower Colorado River in 2015 (Species listed in alphabetical order of common name. Scientific names are available in GBBO [02011, 2012].)

Species (n = 192)	Rapid area search surveys				Intensive area search surveys				Flyovers (all sites)
	Detected, not confirmed breeding		Breeders		Detected, not confirmed breeding		Breeders		
	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	
Western kingbird	✓	✓	✓	✓	✓		✓	✓	✓
Western meadowlark									
Western screech-owl			✓		✓				
Western tanager	✓	✓			✓	✓			✓
Western wood-pewee	✓	✓			✓	✓			
White-crowned sparrow	✓	✓			✓				
White-faced ibis	✓	✓			✓	✓			✓
White-tailed kite									
White-throated sparrow		✓							
White-throated swift	✓	✓	✓		✓				✓
White-winged dove	✓	✓	✓	✓	✓	✓	✓	✓	✓
Willet	✓								✓
Willow flycatcher	✓	✓			✓	✓			
Wilson's snipe	✓	✓							
Wilson’s warbler	✓	✓			✓	✓			✓
Wood duck	✓								
Yellow warbler	✓	✓	✓	✓	✓	✓	✓	✓	✓

Comprehensive species list from component 1 avian surveys conducted along the lower Colorado River in 2015 (Species listed in alphabetical order of common name. Scientific names are available in GBBO [02011, 2012].)

Species (n = 192)	Rapid area search surveys				Intensive area search surveys				Flyovers (all sites)
	Detected, not confirmed breeding		Breeders		Detected, not confirmed breeding		Breeders		
	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	System-wide	Conservation area	
Yellow-billed cuckoo		✓							
Yellow-breasted chat	✓	✓	✓	✓			✓	✓	
Yellow-headed blackbird	✓	✓	✓	✓	✓	✓	✓		✓
Yellow-rumped warbler	✓	✓			✓	✓			✓
Zone-tailed hawk		✓				✓			✓
Total number of species	153	145	80	52	92	69	44	33	86

Note: Species that are bold and italicized are either subspecies, super-species, or unidentified species, not a separate species, and they are not included in the species total.

ATTACHMENT 4

List of All Area Search Survey Plots

List of all area search survey plots surveyed for project component 1 in 2015
(Xs indicates plots surveyed in 2015.)

Plot/section	System-wide plots (n = 80)	Conservation area plots (n = 82)	Intensive area search survey plots (n = 12)
C1501		X	
C1502		X	
C1503		X	X
C1504		X	
C2101		X	
C2102		X	
C2103		X	
C2104		X	
C2105		X	
C2304		X	
C2305		X	
C2306		X	X
C2307		X	
C2308		X	
C2309		X	X
C2311		X	
C2312		X	X
C2313		X	
C2314		X	
C2315		X	
C2316		X	
C2317		X	
C2318		X	
C2319		X	
C2321		X	
C2322		X	
C2323		X	
C2324		X	
C2325		X	
C2326		X	
C2328		X	
C2329		X	
C2330		X	
C2332		X	
C2333		X	
C2335		X	
C2501		X	
C2502		X	
C2504		X	
C2506		X	
C2507		X	
C2508		X	
C2509		X	

List of all area search survey plots surveyed for project component 1 in 2015
(Xs indicates plots surveyed in 2015.)

Plot/section	System-wide plots (n = 80)	Conservation area plots (n = 82)	Intensive area search survey plots (n = 12)
C2510		X	
C2511		X	
C2512		X	
C2513		X	
C2516		X	
C2517		X	
C2518		X	
C2520		X	
C2521		X	
C2522		X	
C2523		X	
C2701		X	
C2702		X	
C2704		X	
C2705		X	
C2706		X	
C2707		X	
C2720		X	
C2722		X	
C2723		X	
C2725		X	
C2726		X	
C2727		X	
C2728		X	
C4702		X	
C4703		X	
C4704		X	
C4705		X	
C4706		X	
C4709		X	
C4711		X	
C5901		X	
S1645	X		
S2118	X		
S2176	X		
S2183	X		
S2219	X		
S2323	X		
S2335	X		X
S2400	X		
S2559	X		
S2638	X		X
S2715	X		

List of all area search survey plots surveyed for project component 1 in 2015
(Xs indicates plots surveyed in 2015.)

Plot/section	System-wide plots (n = 80)	Conservation area plots (n = 82)	Intensive area search survey plots (n = 12)
S2716		X	
S2738		X	
S2746		X	
S2747		X	
S2756		X	
S2757		X	
S2816	X		
S2820	X		
S2821	X		
S2864	X		
S2877	X		X
S2926	X		
S2931	X		
S3120	X		
S3374	X		
S5254	X		
S5290	X		
S5331	X		
S5392	X		
S5469	X		
S5557	X		
S5645	X		
S5810	X		
S6216	X		
S6231	X		X
S6352	X		
S6349	X		
S6401	X		
S6415	X		
S6436	X		
S6448	X		
S6469	X		
S6508	X		
S6536	X		
S6597	X		
S6683	X		
S6732	X		X
S6787	X		
S7054	X		
S7107	X		
S7179	X		
S7196	X		
S7335	X		X

List of all area search survey plots surveyed for project component 1 in 2015
(Xs indicates plots surveyed in 2015.)

Plot/section	System-wide plots (n = 80)	Conservation area plots (n = 82)	Intensive area search survey plots (n = 12)
S7337	X		
S7340	X		
S7365	X		
S7369	X		
S7527		X	
S7605	X		
S7608	X		
S7643	X		
S7733	X		
S7742	X		
S7837	X		
S7869	X		
S7932	X		
S7960	X		
S7986	X		
S8026	X		
S8028	X		
S8082	X		
S8224	X		
S8232	X		X
S8253	X		
S8506	X		
S8641	X		
S8668	X		
S9065	X		
S9077	X		
S9151	X		
S9268	X		
S9385	X		
S9401	X		
S9413	X		X
S9429	X		
S9485	X		

ATTACHMENT 5

Number of Pairs of Non-Territorial Breeding Species

Attachment 5a – Number of pairs of non-territorial breeding species on all system-wide and conservation area rapid survey plots, 2015

Plot	Brown-headed cowbird	Cliff swallow	Eurasian collared-dove	European starling	Gambel's quail	Great blue heron	Great egret	Greater roadrunner	Great-tailed grackle	House finch	House sparrow	Mourning dove	Red-winged blackbird	Ring-necked pheasant	Rock pigeon	Snowy egret	White-winged dove	Yellow-headed blackbird	Total
C1501	3	0	0	0	4	0	0	0	2	1	0	2	5	0	0	0	4	4	25
C1502	1	0	0	0	1	0	0	0	0	0	0	6	0	0	0	0	8	0	16
C1503	3	0	0	0	2	0	0	0	0	0	0	6	0	0	0	0	9	0	20
C1504	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
C2101	6	0	0	0	0	0	0	0	0	8	0	10	0	0	0	0	10	0	34
C2102	3	0	0	0	0	0	0	0	0	8	0	10	0	0	0	0	10	0	31
C2103	4	0	0	0	0	0	0	0	20	2	0	7	0	0	0	0	3	0	36
C2104	14	0	1	0	1	0	0	0	0	1	0	4	0	0	0	0	30	0	51
C2105	4	0	0	0	3	0	0	0	0	6	0	5	0	0	0	0	6	0	24
C2304	6	0	0	0	0	0	0	0	0	0	0	3	7	0	0	0	7	0	23
C2305	5	0	0	0	1	0	0	1	0	2	0	0	6	0	0	0	0	2	17
C2306	3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	3	0	8
C2307	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	4	0	6
C2308	7	0	0	0	0	0	0	1	0	0	0	5	10	0	0	0	5	0	28

Attachment 5a – Number of pairs of non-territorial breeding species on all system-wide and conservation area rapid survey plots, 2015

Plot	Brown-headed cowbird	Cliff swallow	Eurasian collared-dove	European starling	Gambel's quail	Great blue heron	Great egret	Greater roadrunner	Great-tailed grackle	House finch	House sparrow	Mourning dove	Red-winged blackbird	Ring-necked pheasant	Rock pigeon	Snowy egret	White-winged dove	Yellow-headed blackbird	Total
C2309	4		0	0	0	0	0	0	0	0	0	8	0	0	0	0	12	0	24
C2311	3	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	4	0	10
C2312	5	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	9	0	19
C2313	2	0	0	0	0	0	0	0	0	1	0	4	18	0	0	0	6	0	31
C2314	3	0	0	0	0	0	0	0	0	2	0	3	0	0	0	0	5	0	13
C2315	6	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	6	0	18
C2316	3	0	0	0	0	0	0	1	0	1	0	2	0	0	0	0	5	0	12
C2317	4	0	0	0	0	0	0	0	0	2	0	7	0	0	0	0	8	0	21
C2318	6	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	16	0	25
C2319	3	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	4	0	12
C2321	7	0	0	0	0	0	0	0	0	3	0	1	1	0	0	0	40	0	52
C2322	6	0	0	0	1	0	0	0	0	0	0	10	0	0	0	0	15	0	32
C2323	2	0	0	0	0	0	0	0	0	4	0	2	0	0	0	0	10	0	18
C2324	3	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	15	0	24

Attachment 5a – Number of pairs of non-territorial breeding species on all system-wide and conservation area rapid survey plots, 2015

Plot	Brown-headed cowbird	Cliff swallow	Eurasian collared-dove	European starling	Gambel's quail	Great blue heron	Great egret	Greater roadrunner	Great-tailed grackle	House finch	House sparrow	Mourning dove	Red-winged blackbird	Ring-necked pheasant	Rock pigeon	Snowy egret	White-winged dove	Yellow-headed blackbird	Total
C2325	5	0	0	0	0	0	0	1	0	1	0	10	0	0	0	0	10	0	27
C2326	2	0	0	0	1	0	0	0	0	1	0	3	0	0	0	0	15	0	22
C2328	3	0	0	0	0	0	0	0	0	3	0	4	0	0	0	0	10	0	20
C2329	2	0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	20	0	26
C2330	3	0	0	0	0	0	0	1	0	0	0	6	0	0	0	0	8	0	18
C2332	3	0	0	0	0	0	0	0	0	1	0	4	0	0	0	0	7	0	15
C2333	3	0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	10	0	17
C2335	10	0	0	0	3	0	0	0	0	0	0	8	46	0	0	0	2	0	69
C2501	10	0	0	0	0	0	0	0	0	1	0	5	0	0	0	0	8	0	24
C2502	3	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5	0	13
C2504	2	0	1	0	0	0	0	0	0	0	0	6	0	0	0	0	7	0	16
C2506	10	0	0	0	1	0	0	1	0	1	0	9	0	0	0	0	5	0	27
C2507	3	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	11	0	28
C2508	2	0	0	1	0	0	0	0	0	0	0	17	0	0	0	0	10	0	30

Attachment 5a – Number of pairs of non-territorial breeding species on all system-wide and conservation area rapid survey plots, 2015

Plot	Brown-headed cowbird	Cliff swallow	Eurasian collared-dove	European starling	Gambel's quail	Great blue heron	Great egret	Greater roadrunner	Great-tailed grackle	House finch	House sparrow	Mourning dove	Red-winged blackbird	Ring-necked pheasant	Rock pigeon	Snowy egret	White-winged dove	Yellow-headed blackbird	Total
C2509	10	0	0	0	1	0	0	1	0	0	0	6	0	0	0	0	15	0	33
C2510	4	0	0	0	1	0	0	0	0	0	0	15	0	0	0	0	23	0	43
C2511	10	0	0	0	5	0	0	0	0	0	0	20	0	0	0	0	21	0	56
C2512	5	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	15	0	36
C2513	9	0	0	0	2	0	0	2	0	0	0	7	0	0	0	0	12	0	32
C2516	5	0	0	0	5	0	0	1	0	0	0	3	0	0	0	0	5	0	19
C2517	1	0	0	0	8	0	0	1	0	0	0	2	0	0	0	0	4	0	16
C2518	1	0	0	0	3	0	0	1	0	0	0	2	0	0	0	0	0	0	7
C2520	2	0	0	0	6	0	0	1	0	1	0	6	0	0	0	0	20	0	36
C2521	2	0	0	0	10	0	0	1	0	0	0	2	0	0	0	0	5	0	20
C2522	3	0	0	0	20	0	0	2	0	0	0	18	0	0	0	0	14	0	57
C2523	4	0	0	0	8	0	0	1	0	0	0	5	0	0	0	0	7	0	25
C2701	12	0	0	0	1	0	0	0	0	2	0	15	0	0	0	0	8	0	38
C2702	6	0	1	0	1	0	0	0	0	5	0	8	0	0	0	0	8	0	29

Attachment 5a – Number of pairs of non-territorial breeding species on all system-wide and conservation area rapid survey plots, 2015

Plot	Brown-headed cowbird	Cliff swallow	Eurasian collared-dove	European starling	Gambel's quail	Great blue heron	Great egret	Greater roadrunner	Great-tailed grackle	House finch	House sparrow	Mourning dove	Red-winged blackbird	Ring-necked pheasant	Rock pigeon	Snowy egret	White-winged dove	Yellow-headed blackbird	Total
C2704	2	0	1	0	0	0	0	0	0	2	0	5	0	0	0	0	4	0	14
C2705	5	0	0	2	2	0	0	0	0	2	0	20	0	0	0	0	10	0	41
C2706	11	0	2	0	4	0	0	0	0	0	0	21	0	0	0	0	45	0	83
C2707	3	0	1	0	0	0	0	0	0	0	0	6	0	0	0	0	2	0	12
C2720	6	0	0	0	0	0	0	1	0	0	0	6	17	0	0	0	3	0	33
C2722	7	0	0	0	2	0	0	0	0	0	0	30	0	0	0	0	30	0	69
C2723	2	0	0	0	2	0	0	0	0	0	0	3	2	0	0	0	2	0	11
C2725	10	0	0	0	4	0	0	1	0	1	0	10	0	0	0	0	15	0	41
C2726	6	0	2	0	0	0	0	0	0	0	0	5	7	0	0	0	3	0	23
C2727	5	0	4	0	0	0	0	0	0	0	0	4	5	0	0	0	10	0	28
C2728	4	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0	9
C4702	9	0	2	0	0	0	0	1	0	0	0	5	0	0	0	0	0	0	17
C4703	4	0	0	0	1	0	0	0	0	1	0	10	0	0	0	0	7	0	23
C4704	3	0	2	0	0	0	0	1	0	2	0	13	0	0	0	0	0	0	21

Attachment 5a – Number of pairs of non-territorial breeding species on all system-wide and conservation area rapid survey plots, 2015

Plot	Brown-headed cowbird	Cliff swallow	Eurasian collared-dove	European starling	Gambel's quail	Great blue heron	Great egret	Greater roadrunner	Great-tailed grackle	House finch	House sparrow	Mourning dove	Red-winged blackbird	Ring-necked pheasant	Rock pigeon	Snowy egret	White-winged dove	Yellow-headed blackbird	Total
C4705	3	0	2	0	1	0	0	1	0	1	0	7	0	0	0	0	3	0	18
C4706	6	0	3	0	1	0	0	1	2	3	0	18	0	0	0	0	3	0	37
C4709	0	0	0	0	0	0	0	0	0	4	0	9	0	0	0	0	4	0	17
C4711	6	42	3	0	0	0	0	0	4	3	0	2	0	0	8	0	12	0	80
C5901	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S1645	0	0	0	0	1	0	0	1	0	0	0	4	0	0	0	0	7	0	13
S2118	0	0	0	0	2	0	0	0	0	0	0	5	0	0	0	0	0	0	7
S2176	2	0	0	0	6	0	0	0	0	0	0	6	0	0	0	0	8	0	22
S2183	3	0	0	0	6	0	0	2	0	0	0	5	0	0	0	0	1	0	17
S2219	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S2323	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	3
S2335	1	0	0	0	3	0	0	1	0	0	0	6	0	0	0	0	12	0	23
S2400	3	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	13	0	20
S2559	6	0	0	0	0	0	0	0	10	0	0	1	0	0	0	0	3	0	20

Attachment 5a – Number of pairs of non-territorial breeding species on all system-wide and conservation area rapid survey plots, 2015

Plot	Brown-headed cowbird	Cliff swallow	Eurasian collared-dove	European starling	Gambel's quail	Great blue heron	Great egret	Greater roadrunner	Great-tailed grackle	House finch	House sparrow	Mourning dove	Red-winged blackbird	Ring-necked pheasant	Rock pigeon	Snowy egret	White-winged dove	Yellow-headed blackbird	Total
S2638	1	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	6	0	10
S2715	2	0	0	0	0	0	0	0	5	0	0	1	7	0	0	0	4	0	19
S2716	0	0	3	0	6	0	0	1	4	0	0	1	0	0	0	0	0	0	15
S2738	1	0	1	0	2	0	0	1	6	3	0	2	0	0	0	0	1	0	17
S2746	1	0	0	0	1	0	0	1	0	0	0	2	0	0	0	0	0	0	5
S2747	0	0	1	0	2	0	0	1	3	0	0	2	0	0	0	0	1	0	10
S2756	1	0	0	0	2	0	0	1	0	0	0	1	0	0	0	0	2	0	7
S2757	1	0	1	0	2	0	0	0	0	0	0	1	0	0	0	0	2	0	7
S2816	1	1	0	0	0	0	0	0	7	0	0	0	4	0	0	0	0	0	13
S2820	2	0	0	0	0	0	0	0	4	0	0	5	7	0	0	0	5	0	23
S2821	3	0	0	0	0	0	0	0	10	0	0	0	8	0	0	0	10	3	34
S2864	3	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	5	0	10
S2877	3	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	2	0	8
S2926	4	0	0	0	1	0	0	1	0	0	0	3	0	0	0	0	5	0	14

Attachment 5a – Number of pairs of non-territorial breeding species on all system-wide and conservation area rapid survey plots, 2015

Plot	Brown-headed cowbird	Cliff swallow	Eurasian collared-dove	European starling	Gambel's quail	Great blue heron	Great egret	Greater roadrunner	Great-tailed grackle	House finch	House sparrow	Mourning dove	Red-winged blackbird	Ring-necked pheasant	Rock pigeon	Snowy egret	White-winged dove	Yellow-headed blackbird	Total
S2931	5	10	0	0	0	0	0	1	0	1	0	8	0	0	0	0	7	0	32
S3120	3	0	5	6	3	0	0	0	11	12	6	1	0	0	0	0	8	0	55
S3374	0	0	0	0	3	0	0	1	0	1	0	3	0	0	0	0	1	0	9
S5254	0	0	0	13	0	0	0	2	0	0	0	3	35	0	0	0	0	0	53
S5290	1	0	0	0	3	0	0	1	0	3	0	4	0	0	0	0	2	0	14
S5331	0	0	0	0	4	0	0	0	0	0	0	3	0	0	0	0	6	0	13
S5392	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	8
S5469	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S5557	2	0	0	1	0	0	0	0	0	0	0	2	10	0	0	0	0	0	15
S5645	0	0	0	0	3	0	0	1	0	0	0	3	2	0	0	0	0	0	9
S5810	1	0	0	0	3	0	0	1	0	0	0	2	0	0	0	0	2	0	9
S6216	2	0	0	0	0	0	0	0	3	0	0	5	0	0	0	0	3	0	13
S6231	2	0	0	0	4	0	0	1	0	1	0	15	0	0	0	0	26	0	49
S6349	2	0	1	0	0	0	0	1	5	0	0	1	0	0	0	0	2	2	14

Attachment 5a – Number of pairs of non-territorial breeding species on all system-wide and conservation area rapid survey plots, 2015

Plot	Brown-headed cowbird	Cliff swallow	Eurasian collared-dove	European starling	Gambel's quail	Great blue heron	Great egret	Greater roadrunner	Great-tailed grackle	House finch	House sparrow	Mourning dove	Red-winged blackbird	Ring-necked pheasant	Rock pigeon	Snowy egret	White-winged dove	Yellow-headed blackbird	Total
S6352	2	0	0	0	3	0	0	0	2	0	0	1	1	0	0	0	1	0	10
S6401	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
S6415	1	0	0	0	1	0	0	0	5	1	0	2	0	0	0	0	3	0	13
S6436	7	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	29	0	43
S6448	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
S6469	2	0	1	2	0	0	0	0	5	0	0	10	0	0	0	0	2	0	22
S6508	2	0	0	0	0	0	0	0	7	0	0	2	1	0	0	0	12	0	24
S6536	2	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	6	0	11
S6597	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	2
S6683	3	0	0	0	3	0	0	1	0	0	0	2	5	0	0	0	3	0	17
S6732	2	0	0	0	0	0	0	1	0	8	0	18	0	0	0	0	22	0	51
S6787	2	0	0	0	2	0	0	0	0	0	0	6	4	1	0	0	0	0	15
S7054	4	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	3	0	10
S7107	7	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	12	0	23

Attachment 5a – Number of pairs of non-territorial breeding species on all system-wide and conservation area rapid survey plots, 2015

Plot	Brown-headed cowbird	Cliff swallow	Eurasian collared-dove	European starling	Gambel's quail	Great blue heron	Great egret	Greater roadrunner	Great-tailed grackle	House finch	House sparrow	Mourning dove	Red-winged blackbird	Ring-necked pheasant	Rock pigeon	Snowy egret	White-winged dove	Yellow-headed blackbird	Total
S7179	6	0	0	0	1	1	0	1	1	1	0	2	1	0	0	0	4	0	18
S7196	2	0	0	0	2	0	0	1	0	0	0	4	3	0	0	0	10	14	36
S7335	3	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0	7	0	14
S7337	4	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	5	0	13
S7340	1	0	1	0	4	0	0	1	0	0	0	20	0	0	0	0	4	0	31
S7365	13	0	0	0	8	0	0	0	0	14	0	6	0	0	0	0	1	0	42
S7369	2	0	0	0	1	0	0	0	0	1	0	5	0	0	0	0	5	0	14
S7527	1	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	5
S7605	4	0	2	1	0	0	0	0	3	2	0	1	0	0	0	0	5	0	18
S7608	3	0	4	0	2	0	0	0	0	1	0	6	0	0	0	0	7	0	23
S7643	0	0	0	0	2	0	0	1	1	0	0	2	3	0	0	0	2	0	11
S7733	2	0	0	0	2	1	0	1	2	3	0	5	8	0	0	0	4	0	28
S7742	0	0	0	0	0	0	0	0	0	0	0	6	14	0	0	0	0	0	20
S7837	1	0	1	0	1	0	0	0	3	0	0	5	0	0	0	0	4	0	15

Attachment 5a – Number of pairs of non-territorial breeding species on all system-wide and conservation area rapid survey plots, 2015

Plot	Brown-headed cowbird	Cliff swallow	Eurasian collared-dove	European starling	Gambel's quail	Great blue heron	Great egret	Greater roadrunner	Great-tailed grackle	House finch	House sparrow	Mourning dove	Red-winged blackbird	Ring-necked pheasant	Rock pigeon	Snowy egret	White-winged dove	Yellow-headed blackbird	Total
S7869	2	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	10	0	14
S7932	3	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5	0	13
S7960	1	0	0	0	1	0	0	1	2	0	0	2	75	0	0	0	0	200	282
S7986	5	0	0	0	1	0	0	0	0	0	0	8	0	0	0	0	27	0	41
S8026	5	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0	3	0	12
S8028	5	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	9	0	16
S8082	1	0	1	0	1	0	0	0	0	0	0	6	0	0	0	0	1	0	10
S8224	3	0	0	0	1	0	0	1	0	0	0	3	0	0	0	0	10	0	18
S8232	4	0	1	0	0	0	0	0	0	10	0	4	10	0	0	0	8	1	38
S8253	7	0	0	0	4	0	0	1	10	6	0	5	20	0	0	0	10	3	66
S8506	4	0	1	0	1	0	0	1	0	0	0	9	0	0	0	0	5	1	22
S8641	0	70	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0	110
S8668	3	0	0	0	1	0	0	0	0	1	0	2	0	0	0	0	5	0	12
S9065	2	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	21	0	27

Attachment 5a – Number of pairs of non-territorial breeding species on all system-wide and conservation area rapid survey plots, 2015

Plot	Brown-headed cowbird	Cliff swallow	Eurasian collared-dove	European starling	Gambel's quail	Great blue heron	Great egret	Greater roadrunner	Great-tailed grackle	House finch	House sparrow	Mourning dove	Red-winged blackbird	Ring-necked pheasant	Rock pigeon	Snowy egret	White-winged dove	Yellow-headed blackbird	Total
S9077	1	0	0	0	0	0	0	0	0	5	0	4	3	0	0	0	1	0	14
S9151	3	0	0	0	4	0	0	1	0	1	0	15	2	0	0	0	10	0	36
S9268	1	0	0	0	2	0	0	1	0	0	0	3	0	0	0	0	2	0	9
S9385	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	5	0	8
S9401	3	1	0	1	0	0	6	0	2	0	0	3	0	0	0	12	5	0	33
S9413	2	6	0	0	3	0	0	1	0	1	0	10	0	0	0	0	11	0	34
S9429	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	3	5
S9485	3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	5	0	11
Total	**537**	**131**	**51**	**27**	**232**	**2**	**6**	**62**	**141**	**159**	**6**	**832**	**396**	**1**	**8**	**12**	**1,145**	**233**	**3,981**

Attachment 5b – Number of pairs of non-territorial breeding species on all intensive survey plots, 2015

Plot	Brown-headed cowbird	Cliff swallow	Eurasian collared-dove	European starling	Gambel's quail	Greater roadrunner	Great-tailed grackle	House finch	Mourning dove	Red-winged blackbird	White-winged dove	Yellow-headed blackbird	Total
C1503	1	0	0	0	1	1	0	0	1	0	1	0	5
C2306	1	0	0	0	0	0	0	1	1	1	1	0	5
C2309	1	0	0	0	0	1	0	1	1	1	1	0	6
C2312	1	0	0	1	0	1	1	1	1	1	1	0	8
S2335	1	0	0	0	1	1	0	0	1	0	1	0	5
S2638	1	0	0	0	1	1	1	1	1	1	1	0	8
S2877	1	0	0	0	1	1	0	1	1	0	1	0	6
S6231	1	0	0	0	1	0	0	1	1	0	1	0	5
S6732	1	0	0	0	0	0	0	1	1	0	1	0	4
S7335	1	0	0	0	1	1	0	1	1	0	1	0	6
S8232	1	0	1	0	1	0	1	1	1	1	1	1	9
S9413	1	1	1	1	1	1	1	1	1	0	1	0	10
Total	**12**	**1**	**2**	**2**	**8**	**8**	**4**	**10**	**12**	**5**	**12**	**1**	**77**

ATTACHMENT 6

Crosswalk of Conservation Area Plots Surveyed by Site and Phase

Attachment 6a – Random selection of plots in the Palo Verde Ecological Reserve by phase/site

Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
C2304	C2305	C2308	C2312	C2321	C2328	C2335
	C2306	C2309	C2313	C2322	C2329	
	C2307	C2311	C2314	C2323	C2330	
			C2315	C2324	C2332	
			C2316	C2325	C2333	
			C2317	C2326		
			C2318			
			C2319			

Attachment 6b – Random selection of plots in the Cibola Valley Conservation Area by phase/site

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
C2501	C2506	C2509	C2513	C2520	C2521
C2502	C2507	C2510	C2516		C2522
C2504	C2508	C2511	C2517		C2523
		C2512	C2518		

Attachment 6c – Random selection of plots in Cibola National Wildlife Refuge Unit #1 Conservation Area by site

Cibola Area 1	Crane's Roost	Nature Trail North	Nature Trail South
C2701	C2720	C2706	C2705
C2702	C2722		
C2704	C2723		
C2707	C2725		
C2726			
C2727			
C2728			

Attachment 6d – Random selection of plots in Yuma East Wetlands by phase/site

D	F	G	I	J	South AC
C4704	C4705	C4709	C4702	C4703	C4711
	C4706				

ATTACHMENT 7

Species Used in SAS to Calculate Detection Ratios in 2015

Species

Abert's towhee
Anna's hummingbird
Ash-throated flycatcher
Bell's vireo
Bewick's wren
Black-chinned hummingbird
Black-tailed gnatcatcher
Blue grosbeak
Brown-crested flycatcher
Bullock's oriole
Canyon wren
Common yellowthroat
Costa's hummingbird
Crissal thrasher
Gila woodpecker
Gilded flicker
Hooded oriole
Ladder-backed woodpecker
Least bittern
Lesser goldfinch
Lesser nighthawk
Lucy's warbler
Marsh wren
Northern mockingbird
Phainopepla
Song sparrow
Summer tanager
Verdin
Vermilion flycatcher
Western kingbird
Yellow warbler
Yellow-breasted chat