Final

LITTLE EGBERT MULTI-BENEFIT PROJECT

Wildlife Hazard Analysis

Prepared for
Westervelt Ecological Services

February 2023

ESA

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EXECUTIVE SUMMARY

The Little Egbert Multi-Benefit Project (Project) is proposed for the Little Egbert Tract property in Solano County. The Project Area is east of the Rio Vista Municipal Airport (Airport) and within the Airport's Wildlife Hazard Analysis (or WHA) Boundary as delineated in the Rio Vista Airport Land Use Compatibility Plan (ALUCP) (Solano County ALUC 2018). The Project is proposed to improve existing levees along the landward (western) boundary, grade areas to create landforms for wetland and aquatic habitat, and construct breaches in the outboard (eastern) levee along Cache Slough to restore tidal inundation to the site.

As required by the Rio Vista ALUCP (Policies WH-1 and WH-2), this report provides a Wildlife Hazard Analysis to evaluate existing and potential future conditions for wildlife hazards to aircraft as a result of the proposed Project. Objectives include:

1. Characterize existing hazard potential by analyzing aircraft strike data for the Rio Vista Municipal Airport.
2. Identify habitat features that attract wildlife at the study area.
3. Identify wildlife species at the study area, including numbers, locations, local movements, and daily and seasonal occurrences.
4. Analyze potential wildlife hazards under existing conditions and evaluate potential changes in hazard potential under the proposed Project.

The Little Egbert Tract property is currently cultivated in row crops and alfalfa. The lands surrounding the Airport have long been managed in agriculture. Over the last 10 years, only one bird strike was recorded at the Airport (a goose strike in October 2011 that caused repairable damage to the aircraft but no injury). In general, large birds such as geese, ducks, and gulls are most hazardous.

Field surveys were conducted in two periods: (1) late-spring and summer (April–August 2020) during crop cultivation and bird breeding season, and (2) fall and winter (September 2021–March 2022) during the harvest and fallow period, when birds migrate and overwinter. During the summer, blackbirds were the most common birds observed. During the fall and winter, waterfowl were common, often in large flocks foraging in the post-harvest fields. Once in March 2021, a flock of several hundred snow geese were observed foraging and flying across the approach zone for the runway while a small aircraft flew low over adjacent fields to the west.

Under post-Project conditions, the site would become mostly open water, with intertidal emergent marsh and riparian vegetation around the perimeter. These wetlands and aquatic habitat can be used by waterbirds, but the total number and densities will be much lower than those that currently occur. Therefore, the wildlife hazard risk would be no greater and would likely lessen with the Project.

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CHAPTER 1
Introduction

1.1 Project Information

1.1.1 Project Goals

The Little Egbert Joint Powers Agency[1] (LEJPA) and the California Department of Water Resources (DWR) are collaborating to develop a multi-benefit project in the lower Yolo Bypass and Cache Slough Complex. The purpose of the proposed Little Egbert Multi-Benefit Project (Project) is to meet multiple state and local policy goals in an open and transparent manner with ample opportunity for public input. The goals of the proposed Project, in no order of importance, include the following:

- **Enhance Public Safety:** Enhance public safety, health, and quality of life for the state's citizens as outlined in State and local planning efforts (Central Valley Flood Protection Plan [CVFPP], Lower Sac Delta North Regional Flood Management Plan, and Solano County planning efforts). Reduce local and regional flood risk to agricultural and urbanizing areas while improving flood flow capacity by providing flood stage reductions and increased flood flow capacity within the Lower Yolo Bypass.
- **Protect and Enhance Natural Ecosystem Processes to Increase Habitat and Support Species:** Provide ecosystem and habitat restoration, as well as preserve and enhance riparian and other native habitats to contribute to the recovery and sustainability of native species, where compatible with construction, operation, and maintenance of flood risk–reduction infrastructure, and consistent with adopted State and local plans. Create opportunities for environmental offsets and habitat restoration as outlined in local resource planning efforts (CVFPP Conservation Strategy, Delta Plan, Solano Habitat Conservation Plan, and Cache Slough Habitat Conservation Plan).
- **Protect and Enhance Opportunities for Recreation:** Provide improved or new public outdoor recreation and open space opportunities, where compatible with construction, operation, and maintenance of flood risk–reduction infrastructure, and consistent with adopted State and local plans.

1.1.2 Project Area and Study Area

The Project Area is on a 3,480-acre property known as the Little Egbert Tract (Property), located in the legal Sacramento-San Joaquin River Delta.[2] The Property is located at the downstream

[1] The Little Egbert Joint Powers Agency (LEJPA) was created in October 2020 between Reclamation District (RD) 2084 and RD 536 for the purpose of advancing and implementing the LEMBP. RD 2084 encompasses the Little Egbert Tract; RD 536 encompasses the Egbert Tract and lies directly west of RD 2084.

[2] The Sacramento-San Joaquin Delta is defined in Water Code section 12220.

(southern) end of the Yolo-Bypass in Solano County, California, and north of the city of Rio Vista, California. The Property is bordered by Lindsey Slough on the north, Cache Slough on the north and east, State Highway 84 on the southeast, a State Plan of Flood Control levee (Project Levee) on the west, farm berms and state levees on the southwest, and a Project Levee (Mellin) to the south (Sacramento Area Flood Control Agency 2018). The Project Area is also located just upstream of the confluence of Cache Slough, Steamboat Slough, and the Sacramento River. The Property is currently under agricultural cultivation, and most of the Property has a restricted-height levee under flowage easements on the north and east along Cache Slough to allow high flows to flood and pass through the site.

The Project Area is located approximately one mile northeast of the City of Rio Vista, approximately 0.4 miles east of the Rio Vista Municipal Airport (Airport), and approximately 12 miles east of Travis Air Force Base.

The study area (3,830 acres) for the Project includes the Little Egbert Tract (3,480 acres) and the Powell Property (350 acres), which lies to the south (**Figure 1**).

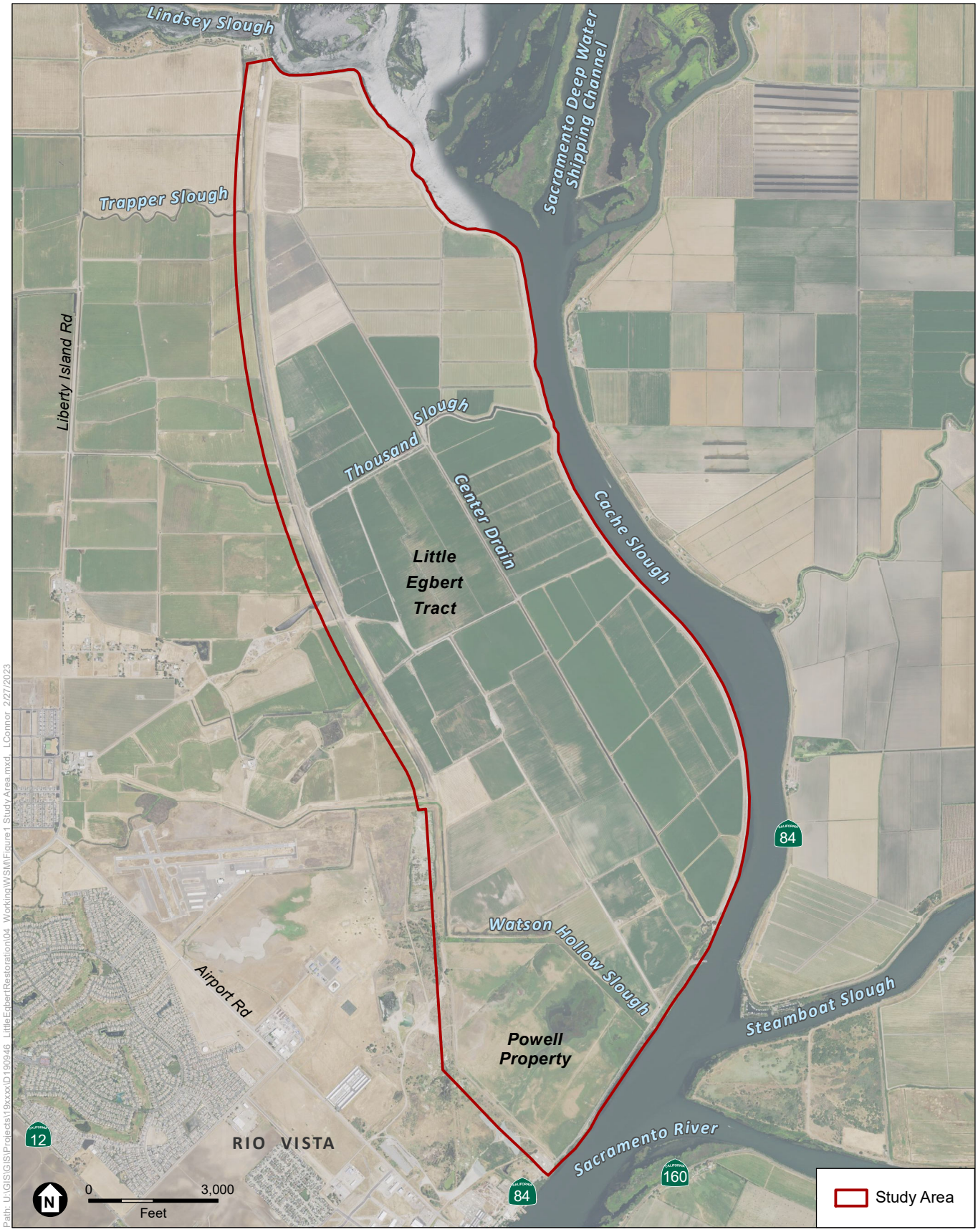
1.1.3 Project Overview

The proposed Project would convert existing agricultural land to tidal wetlands, open water, and riparian habitat. The proposed Project is currently in the feasibility study and planning phase. The preliminary design concept alternatives include the following components:

- De-grade portions of the existing restricted-height levee that separates the Property from Cache Slough (along the north) and construct inflow and outflow openings along Cache Slough to connect the floodplain and improve conveyance during flood events.
- Improve and/or repair existing levees and construct new levees impacted by the Project to current U.S. Army Corps of Engineers standards.
- Construct a meandering subtidal swale to provide rearing habitat for fisheries (certain alternatives).
- Construct habitat berms and contour grades to establish tidal marsh subtidal habitats.
- Plant native trees, shrubs, and marsh plant species to establish native terrestrial habitats.
- Stabilize portions of the restricted-height levee and plant with native riparian trees and shrubs to provide shaded riverine habitat and nesting bird habitat.
- Provide new or enhanced opportunities for recreation consistent with flood protection and habitat restoration goals.

1.2 Airport Land Use Compatibility

The study area and Airport are located in an important migratory and wintering area within the Pacific Flyway. Known localities of wildlife use include Suisun Marsh (approximately 12 miles west of the Airport) and the Yolo Wildlife Management Area (16 miles north of the Airport).



SOURCE: USDA, 2018; Westervelt, 2019; ESA, 2019

Little Egbert Multi-Benefit Project

Figure 1
Little Egbert Wildlife Hazard Analysis Study Area

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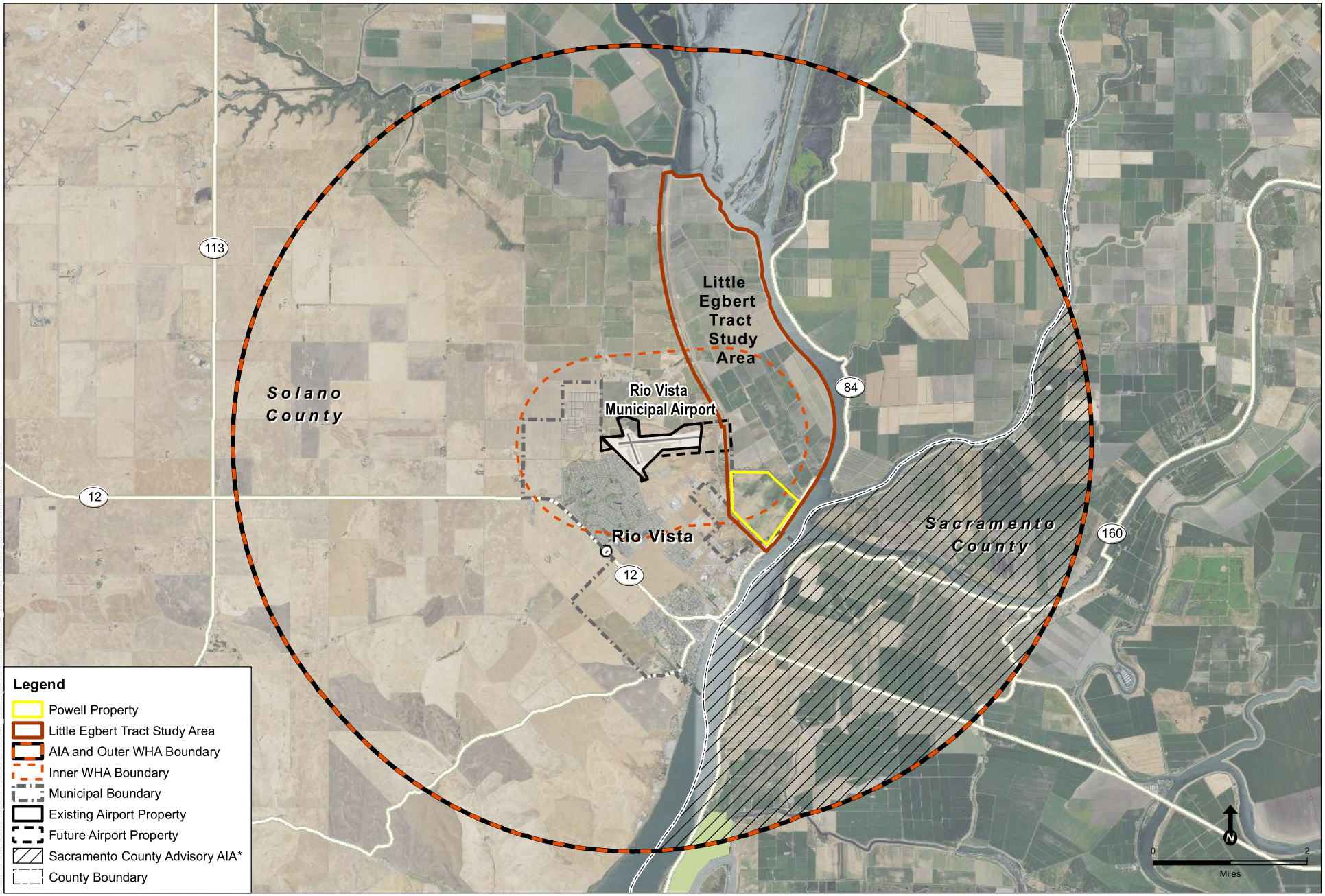
The Solano County Airport Land Use Commission (ALUC) may review certain discretionary projects located within an Airport Influence Area (AIA) for consistency with the applicable Airport Land Use Compatibility Plan (ALUCP). The Project area is located within the AIAs for Rio Vista Municipal Airport (**Figure 2**) and Travis Air Force Base.[3] The Inner Wildlife Hazard Analysis (or WHA) Boundary encompasses the area within 6,000 feet of the runway centerline. The Outer WHA Boundary is located 5 miles from the farthest edge of the Airport's Air Operations Area (AOA), which is the distance the Federal Aviation Administration (FAA) recommends for any hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace (Solano County ALUC 2018). As delineated in the Rio Vista ALUCP (Solano County ALUC 2018), the Inner WHA Boundary covers the southern half of the study area, except for the eastern areas close to Cache Slough (**Figure 3**). The entire study area is located within the Outer WHA Boundary, as delineated in the Rio Vista ALUCP. The southwest part of the study area also falls within Rio Vista Airport Safety Zones 2, 3, 4, and 6 (the inner approach/departure, inner turning, outer approach/departure, and traffic pattern zones, respectively). The safety compatibility criteria for these safety zones reiterates the requirement to prepare a Wildlife Hazard Analysis for areas also within the Inner WHA Boundary, referring to the ALUCP wildlife hazard policies.

As delineated in the Travis ALUCP, the study area is located within the Outer WHA Boundary as well as Compatibility Zone E (which restricts tall buildings) but outside the Travis Air Force Base Inner WHA Boundary.

According to the Rio Vista ALUCP, the ALUC shall apply the wildlife hazard policies to discretionary projects located within the WHA Boundary (**Table 1**). The proposed Project is required to prepare a Wildlife Hazard Analysis (Policies WH-1 and WH-2) and to consider the findings as part of the environmental review process required by the California Environmental Quality Act (CEQA) (Policy WH-3).

A Wildlife Hazard Analysis is a report focused on a single project in the airport environs to identify the types of wildlife hazards present in that project area (ESA 2022). The Wildlife Hazard Analysis should provide information sufficient to respond to relevant questions in the CEQA Guidelines, Appendix G, Environmental Checklist. The analysis report should include recommendations for minimizing and mitigating any potential hazards posed by a proposed land use action. This is distinct from a Wildlife Hazard Assessment, as described by the FAA in Advisory Circular (AC) 150/5200-38, *Protocol for the Conduct and Review of Wildlife Hazard Site Visits, Wildlife Hazard Assessments, and Wildlife Hazard Management Plans*. A Wildlife Hazard Assessment is prepared by an airport as a precursor to a Wildlife Hazard Management Plan. A Wildlife Hazard Site Visit is preliminary to a Wildlife Hazard Assessment. A Wildlife Hazard Analysis is intended to be less complex than a Wildlife Hazard Assessment (Solano County ALUC 2018, ESA 2022).

[3] The AIA for Travis Air Force Base constitutes the entirety of Solano County and portions of Contra Costa, Napa, and Yolo Counties.



Little Egbert Multi-Benefit Project

SOURCE: California Airport Land Use Planning Handbook, October 2011; ESA, 2020

*NOTE: Crosshatched areas are in Sacramento County, outside the jurisdiction of the Solano County Airport Land Use Commission. The Rio Vista ALUCP is advisory only in these areas

Figure 2
Rio Vista Municipal Airport
Wildlife Hazard Analysis Boundaries

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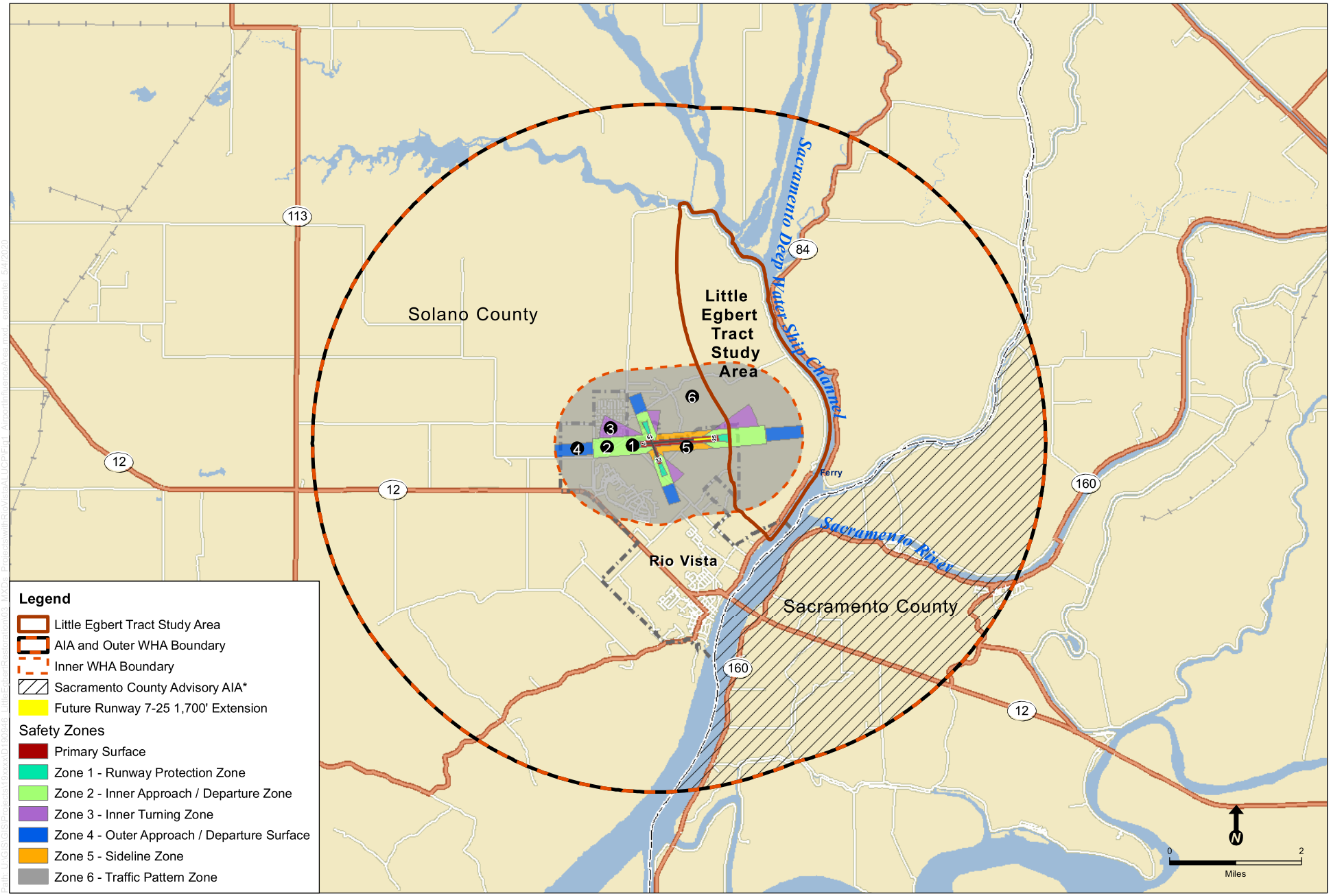

SOURCE: California Airport Land Use Planning Handbook, October 2011; ESA, 2020

*NOTE: Crosshatched areas are in Sacramento County, outside the jurisdiction of the Solano County Airport Land Use Commission. The Rio Vista ALUCP is advisory only in these areas

Little Egbert Multi-Benefit Project

Figure 3

Rio Vista Municipal Airport Safety Zones

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TABLE 1
RIO VISTA ALUC WILDLIFE HAZARD POLICIES

Policy Number	Description
WH-1 Known Wildlife Hazards in Solano County - Inner WHA Boundary	Within the Inner WHA Boundary as shown on Figure 2, new or expanded land uses involving discretionary review that has the potential to attract wildlife and cause bird strikes are required to prepare a wildlife hazard analysis (WHA). Reviewing agencies shall prepare a WHA for projects that have the potential to attract wildlife that could cause bird strikes. Expansion of existing wildlife attractants includes newly created areas and increases in enhanced or restored areas. The WHA must demonstrate wildlife attractants that may pose hazards to aircraft in flight will be minimized.
WH-2 Known Wildlife Hazards in Solano County - Outer WHA Boundary	Outside the Inner WHA Boundary but within the Outer WHA Boundary, as shown on Figure 2, any new or expanded land use involving discretionary review that has the potential to attract the movement of wildlife and cause bird strikes are required to prepare a WHA. Expansion of existing wildlife attractants includes newly created areas and increases in enhanced or restored areas. All reasonably feasible mitigation measures must be incorporated into the planned land use. The WHA must demonstrate wildlife movement that may pose hazards to aircraft in flight will be minimized.
WH-3 Environmental Review Compliance	All discretionary projects located within the Inner WHA Boundary or Outer WHA Boundary are required to consider the potential for the project to attract hazardous wildlife, wildlife movement, or bird strike hazards as part of the environmental review process required by the California Environmental Quality Act (CEQA). Because biological and hazard impacts are required to be examined in the context of CEQA compliance, it is anticipated that most projects will develop the information necessary to prepare a WHA and demonstrate compliance with Policy WH-3 as part of the CEQA process, and that separate documentation will not be needed. Proposed projects within the Inner WHA Boundary that have the potential to cause a significant adverse impact under Policy WH-1, with or without mitigation, shall be reviewed by the ALUC (including but not limited to projects requiring an environmental impact report, mitigated negative declaration, or equivalent document).

SOURCE: Appendix H, Rio Vista Airport Land Use Compatibility Plan (Solano County ALUC 2018)

1.3 Objectives of Wildlife Hazard Analysis

Environmental Science Associates (ESA) has prepared this Wildlife Hazard Analysis for the Little Egbert Joint Powers Agency (LEJPA) and Westervelt Ecological Services (WES) to evaluate existing and potential future conditions of wildlife hazards to aircraft as a result of the proposed Project, as required of the Rio Vista ALUCP Policies WH-1 and WH-2. The objectives of this Wildlife Hazard Analysis include:

1. Characterize existing hazard potential by analyzing aircraft strike data for the Rio Vista Municipal Airport
2. Identify habitat features that attract wildlife at the study area
3. Identify wildlife species at the study area, including numbers, locations, local movements, and daily and seasonal occurrences.
4. Analyze potential wildlife hazards under existing conditions and evaluate potential changes in hazard potential under the proposed Project.

The methods employed for this Wildlife Hazard Analysis follow the guidelines for Wildlife Hazard Site Visits provided for in FAA AC 150/5200-38. The Wildlife Hazard Site Visit methods are appropriate for evaluating the proposed Project because they provide guidelines, procedures,

and recommendations for assessing wildlife attractants and movements near airfields. ESA mapped land cover and natural communities at the study area to identify wildlife attractants and conducted a reconnaissance visit in March 2021. In addition, this Wildlife Hazard Analysis includes surveys consistent with methodologies for a more intensive Wildlife Hazard Assessment (FAA AC 150/5200-38). ESA conducted avian and mammalian surveys during the spring–summer breeding season (April–August 2020) and fall–winter migration and overwintering season (September 2021–March 2022) to characterize existing wildlife use (baseline conditions). Finally, this analysis considers past wildlife airstrike data, presence of high-risk species, and expected future wildlife use of the proposed Project upon completion.

CHAPTER 2
Methodology

2.1 Land Cover and Biological Communities

Existing biological communities were previously mapped for the study area (ESA 2019). Surrounding land use was assessed qualitatively using Google Earth imagery. Expected future biological communities were described based on the preliminary design of the proposed Project.

2.2 Aircraft Bird Strike Review

The FAA maintains a nationwide database of bird strikes reported since 1990 (FAA 2020a). This database was queried to identify the types of species most frequently struck, the species most likely to result in aircraft damage, and bird strikes documented at the Airport.

2.3 Wildlife Surveys

The surveys were conducted using methodology similar to the protocol provided in FAA AC 150/5200-38, *Protocol for the Conduct and Review of Wildlife Hazard Site Visits, Wildlife Hazard Assessments, and Wildlife Hazard Management Plans*. The FAA protocol (14 CFR Part 139.337 (c)(2)) requires the "identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences." This generally requires a 12-month assessment to document the seasonal patterns of birds and other wildlife using an airport and surrounding area during an annual cycle. Birds should be surveyed during the diurnal periods of morning, midday, and evening hours while appropriate nocturnal surveys and/or tracking indices are incorporated to sample mammals.

The surveys were designed by and conducted under the direct supervision of FAA-qualified airport wildlife biologist Brendon Quinton. Each survey event consisted of three data collection periods: dawn, midday, and dusk. Data were collected at each of these time periods for every established survey point. Surveys in 2020 were conducted on 2 days a month, as per FAA protocol. Surveys in 2021–2022 were limited to 1 day a month, consisting of seven data collection periods. **Table 2** lists the date and timing of surveys conducted and identifies the biologists for each survey.

FAA guidance requires survey points approximately one-half mile apart across a study area. In 2020, 28 survey points were strategically placed and visited during each survey event over the 3,830-acre study area per the FAA's guidance of placing vantage points such that 50 hectares are covered at each location (**Figure 4**). After the 2020 surveys, it was determined that 16 of those 28 survey points provided a comprehensive view of the site and equal coverage over the various

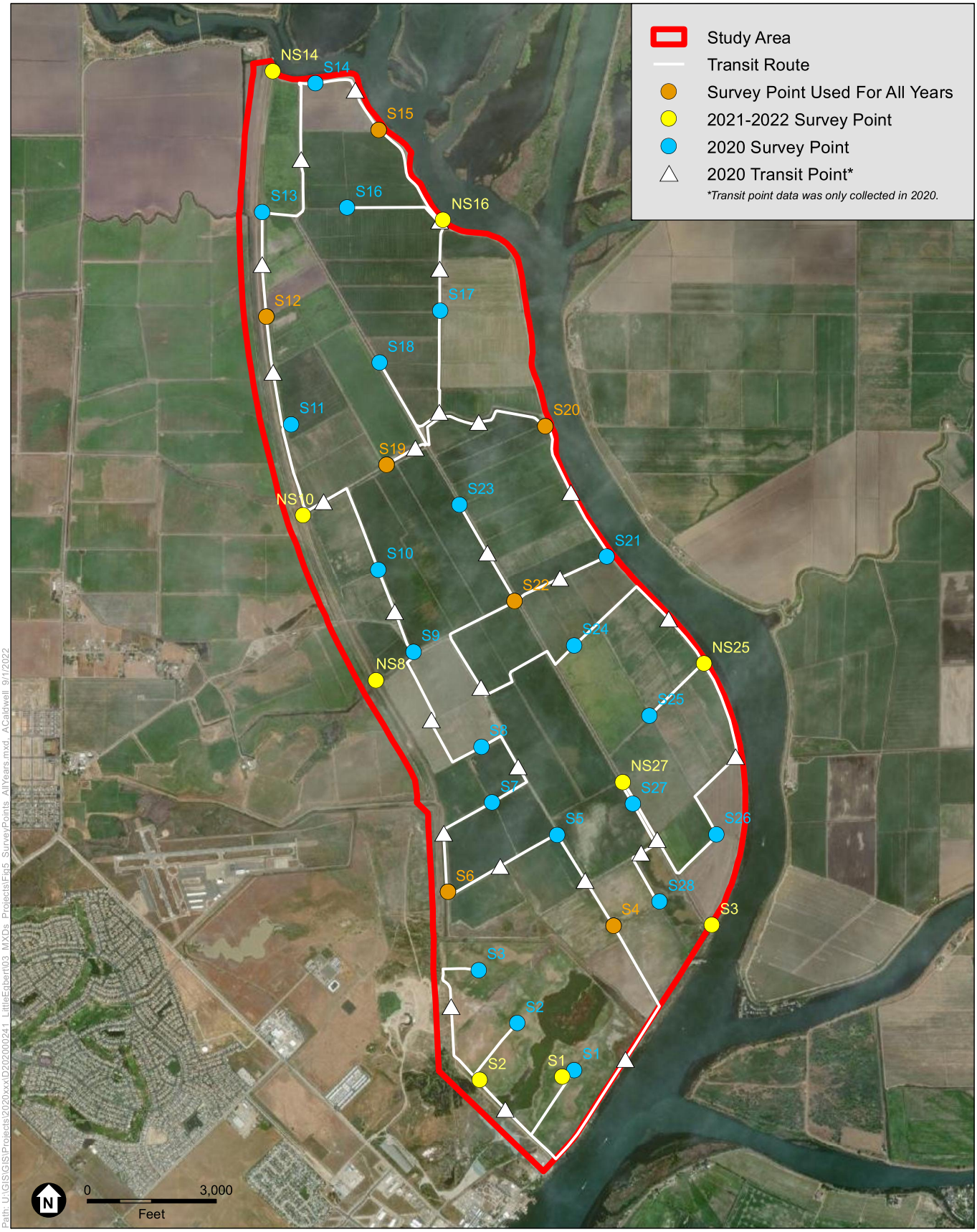
habitats (Figure 4). Therefore, the 2021–2022 surveys were limited to those 16 points. One-third mile by one-third mile grids were generated within and around the study area.

All avian species observed and their associated locations and activities were recorded for 3-minute intervals at each survey point. All birds were documented by species and number of individuals present and their activity was noted, including whether they were foraging, loafing, or vocalizing on the ground or on any objects in the study area. In addition, the grid location of where the individual was observed was documented.

TABLE 2
SURVEY DATES, TIMING, TASKS, AND BIOLOGISTS

Year	Date	Bird Count and Wildlife Survey Timing	Other Work Performed	Biologist(s)
2020	April 22	Dawn, Midday, and Dusk	Camera Install	KB, JH
2020	April 29	Dawn, Midday, and Dusk	Camera Card Replaced, Photo Review	JH, JD
2020	May 12	Dawn, First Half Midday	Camera Card Replaced, Photo Review	KB, JH
		Second Half Midday, First Half Dusk	Set Small Mammal Traps	EW, JD, JH, KB
2020	May 13	Dawn	Checked Small Mammal Traps	EW, KB
2020	May 19	Second Half Dusk	Nighttime Wildlife Spotlighting	KB, JH
		Dawn and First Half Midday	Camera Card Replaced, Photo Review	
2020	May 21	Second Half Midday and Dusk	Second Half Midday and Dusk	EW, JD
2020	June 8	Dawn and First Half Midday	Camera Card Replaced, Photo Review	KB, LD
		Second Half Midday and Dusk		EW, JD
2020	June 24	Dawn and First Half Midday	Camera Card Replaced, Photo Review	KB, LD
		Second Half Midday and Dusk	Second Half Midday and Dusk	EW, JD
2020	July 8	Dawn and First Half Midday	Camera Card Replaced, Photo Review	KB, JH
		Second Half Midday and Dusk		EW, JD
2020	July 22	Dawn and First Half Midday	Camera Card Replaced, Photo Review	KB, LD
		Second Half Midday and Dusk		EW, JD
2020	August 6	Dawn and First Half Midday	Camera Card Replaced, Photo Review	KB, JD
		Second Half Midday and Dusk		EW, JD
2021	September 16	Dawn, Midday, Dusk	Camera Install	KB, JH
2021	October 13	Dawn, Midday, Dusk	Camera Card Replaced, Photo Review	KB, LD
2021	November 17	Dawn, Midday, Dusk	Camera Card Replaced, Photo Review	KB, JD
2021	December 14	First Half Dawn	Camera Card Replaced, Photo Review	KB, JH
2021	December 30	Second Half Dawn, Midday, Dusk	Camera Card Replaced, Photo Review	JH, JD
2022	January 19	Dawn, Midday, Dusk	Camera Card Replaced, Photo Review	JH, LD
2022	February 17	Dawn, Midday, Dusk	Camera Card Replaced, Photo Review	JH, AC
2022	March 30	Dawn, Midday, Dusk	Camera Card Replaced, Photo Review	JH, JD

BIOLOGISTS: AC – Alyssa Caldwell; EW - Erika Walther; JH – Joseph Huang; JD – Jacky Daley; KB – Kelly Bayne; LD – Laura Dodson



SOURCE: Westervelt, 2018; ESA, 2021

Little Egbert Multi-Benefit Project

Figure 4
Survey Points

ESA

In addition to these systematic surveys, anecdotal observations were made during a site visit on March 17, 2021.

ESA conducted a single nighttime survey during the spring season (March–May 2020). The survey consisted of driving around the study area after sunset with a spotlight. Because of the low likelihood of a single seasonal nighttime spotlight survey yielding an abundance of nocturnal animal sightings, ESA supplemented the seasonal nighttime spotlight surveys with three stationary wildlife Browning Trail cameras mounted on wooden stakes or poles within the northern, central, and southern portions of the study area. SD memory cards were inserted into the cameras. The cameras took photographs at 1-minute intervals, or more frequently if triggered by movement. The SD memory cards were swapped out with clean memory cards during each site visit. Photographs were taken seasonally throughout the duration of surveys. The photographs were viewed on the computer between site visits, and any wildlife species present were noted. Representative photographs of the wildlife present are provided in **Attachment A**.

CHAPTER 3
Results

3.1 Land Use and Biological Communities

The Airport is located 2 miles west of the Sacramento River. The vicinity around the Airport is characterized by agricultural land use (irrigated agriculture, rangeland), tidal open water (Cache Slough and Liberty Island), and pockets of residential and urban development. Land use adjacent to the Airport includes agricultural lands to the north and east (including Little Egbert Tract), open space to the southeast (grassland, including a seasonal pond), a patch of apparent scrubland to southeast, and residential development to the west and southwest.

Upland biological communities within the study area include riparian, grassland, agricultural, ruderal/disturbed, and developed (**Figure 5** and **Table 3**) (ESA 2019). Disturbed/ruderal areas include dirt and gravel roads and staging areas for farm equipment throughout the study area, along with roadsides and levee slopes. Developed areas include paved roads. Aquatic biological communities within the study area include seasonal wetland, freshwater emergent wetland, swale, agricultural ditch, irrigation canal, and riverine.

Agricultural land uses account for 78 percent of the study area (ESA 2019). Within Little Egbert Tract, the dominant use is irrigated agriculture (2,519.3 acres, 71 percent of the study area) and two patches of farmed wetland (3.6 acres). The agricultural land has been leveled and undergoes frequent, generally seasonal cycles of tillage, seedbed preparation, seeding, crop growth, and harvesting, along with applications of irrigation water, fertilizers, and pesticides. The majority of Little Egbert Tract is used for row crops and alfalfa, while the southern portion is used for livestock grazing. Other land use in the study area (but west of the Liberty Island Road levee and hence outside the Project area) include dry-farmed agriculture (60.9 acres, winter wheat) and irrigated pasture (79.7 acres).

Biological communities immediately surrounding the study area include open water to the north and east, agricultural land to the south, followed by residential and commercial development associated with the city of Rio Vista, development associated with the Rio Vista Municipal Airport to the southwest, and agricultural land to the west.

TABLE 3
LAND COVER AND BIOLOGICAL COMMUNITIES

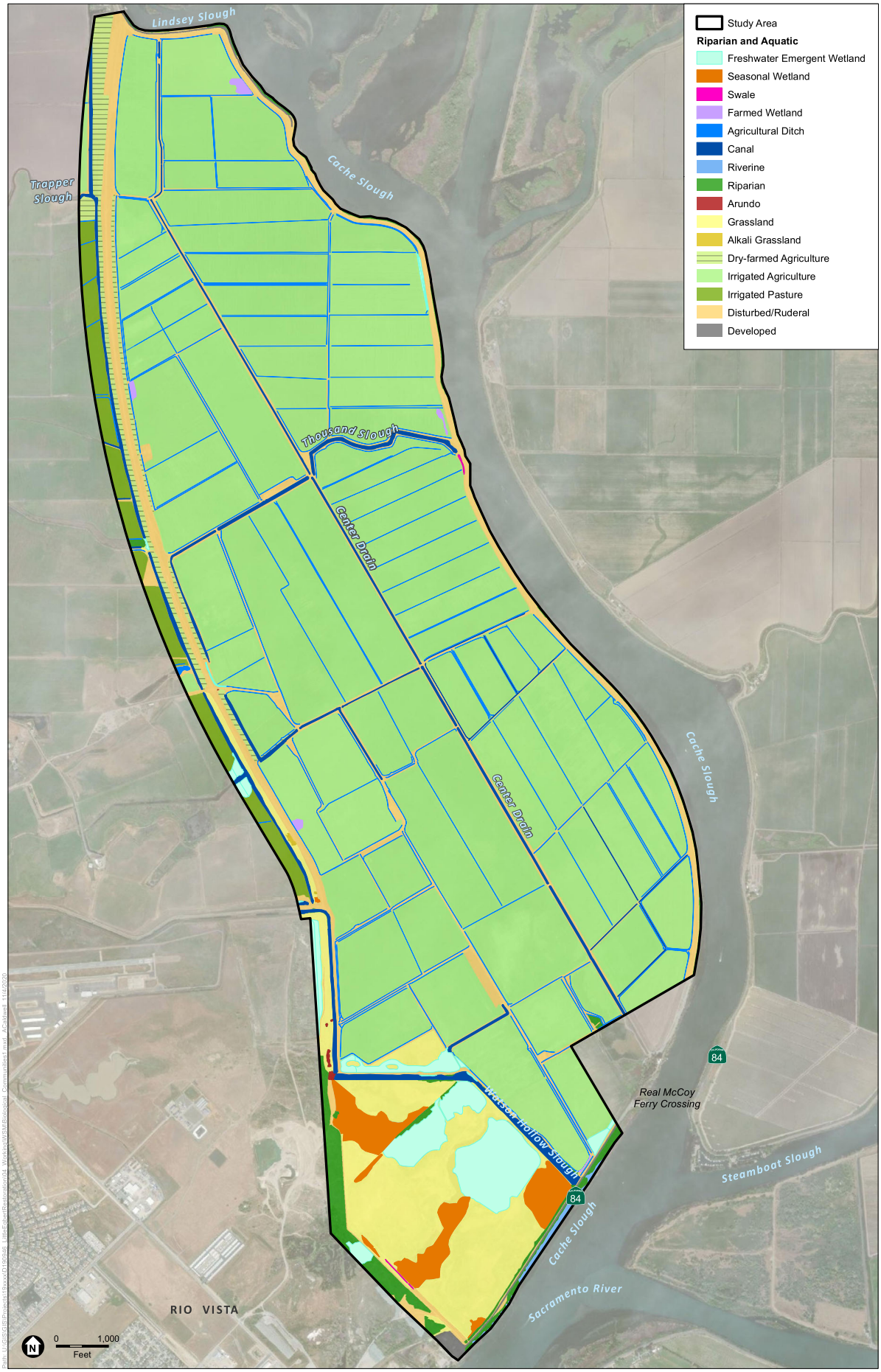
Land Cover	Acres	Percent
Biological Communities		
Freshwater Emergent Wetland	96.0	2.7%
Seasonal Wetland	57.2	1.6%
Swale	0.4	<0.1%
Riparian	59.8	1.7%
Grassland	243.1	6.9%
Alkali Grassland	0.6	<0.1%
Disturbed/Ruderal	309.0	8.7%
Arundo	1.1	<0.1%
Riverine	9.6	0.3%
Agricultural Land Use		
Irrigated Agriculture	2,519.3	71.0%
Irrigated Pasture	79.7	2.3%
Dry-farmed Agriculture	60.9	1.7%
Farmed Wetland	3.6	0.1%
Canal	68.0	1.9%
Agricultural Ditch	28.6	0.8%
Developed	10.8	0.3%
TOTAL	**3,547.7**	**100.0%**

SOURCE: ESA (2019)

3.2 Aircraft Bird Strike Review

Table 4 lists the 33 species of birds reported most frequently in aircraft strikes nationwide between 1990–2018 (FAA 2019). Mourning dove, American kestrel, killdeer, barn swallow, and horned lark were the top five most frequently struck species. Mourning doves are the most common species of bird struck by civil aircraft in the U.S., accounting for 11 percent of the birds identified by species. In California, there were 9,212 bird strikes between 2010 and 2020 (FAA 2020a). About 53 percent of bird strikes occur from July to October, which is when young birds have recently fledged from nests and fall migration occurs.

Larger birds, particularly waterfowl and raptors, are found to cause more damage to aircraft (FAA 2020b). Nationally, strikes involving Canada goose, red-tailed hawk, mallard, turkey vulture, great blue heron, and osprey resulted in aircraft damage more often (14 to 50 percent of strikes) than strikes involving other bird species (FAA 2019). In California, waterfowl (ducks and geese) accounted for only 5 percent of the strikes but were responsible for 28 percent of the strikes that caused damage to the aircraft between 1990 and 2019 (FAA 2020b). Other large species in California that cause higher damage include white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), domestic dog (*Canis lupus familiaris*), bald eagle *(Haliaeetus leucocephalus*), and American white pelican (*Pelecanus erythrorhynchos*) (FAA 2020a).



SOURCE: Westervelt, 2019; ESA, 2019

Little Egbert Multi-Benefit Project

Figure 5
Biological Communities within the Little Egbert Tract Study Area

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TABLE 4
MOST COMMON BIRD SPECIES STRUCK BY CIVIL AIRCRAFT IN THE U.S. (1990–2018) AND OCCURRENCE AT STUDY AREA

Rank	Bird Species	Strikes in US		Presence or Potential to Occur at Study Area[1]	
		Number	% with Damage	Apr–Aug 2020	Sep 2021–Mar 2022
1	Mourning dove	10,187	2.1	None observed	Present
2	Killdeer	6,357	0.9	None observed	Present
3	American kestrel	6,155	0.6	None observed	Present
4	Barn swallow	6,036	0.4	None observed	Present
5	Horned lark	5,149	0.5	None observed	Present
6	European starling	4,816	2.9	None observed	Present
7	Rock dove (pigeon)	3,411	7.8	None observed	Present
8	Red-tailed hawk	2,947	13.7	None observed	Present
9	Eastern meadowlark	2,605	0.5	None observed, outside species range	None observed, outside species range
10	Cliff swallow	1,988	0.3	Present, Top 10 most abundant	Present, Top 10 most abundant
11	Ring-billed gull	1,783	7.5	None observed	None observed
12	Canada goose	1,781	48.7	None observed	Top 10
13	Western meadowlark	1,604	1.5	Present	Present
14	Barn owl	1,475	3.5	None observed	None observed
15	Herring gull	1,443	9.1	None observed	Gulls observed, but not specified. Herring gull not present in spring/summer
16	American robin	1,439	7.4	Present	Present
17	Pacific golden-plover	1,126	1.2	None observed. Rare in Solano County	None observed. Rare in Solano County
18	Mallard	1,064	20.4	Present	Present
19	Chimney swift	936	0.9	None observed, outside species range	None observed, outside species range
20	Tree swallow	872	0.0	Present	Present
21	Savannah sparrow	830	1.0	Present	Present
22	Turkey vulture	825	49.9	Present	Present
23	Common nighthawk	799	0.6	None observed, outside species range	None observed, outside species range
24	Short-eared owl	614	2.1	None observed,	None observed
25	Laughing gull	583	3.6	None observed, outside species range	None observed, outside species range
26	Bank swallow	555	0.4	None observed. Rare in Solano County	None observed. Rare in Solano County
27	Cattle egret	543	7.7	None observed	None observed
28	American crow	518	7.1	Present	Present
29	Red-winged blackbird	485	1.0	Present, Top 10 most abundant	Present, Top 10 most abundant
30	Great blue heron	462	18.8	Present	Present
31	Peregrine falcon	433	6.2	None observed	None observed
32	Osprey	427	23.2	Present	Present
33	Yellow-rumped warbler	378	0.2	Present	Present

NOTE:
1 Top 10 – The ten most abundant species during each of the two survey seasons, provided in Tables 5 and 6.

SOURCE: U.S. Department of Transportation, Federal Aviation Administration (FAA) 2019

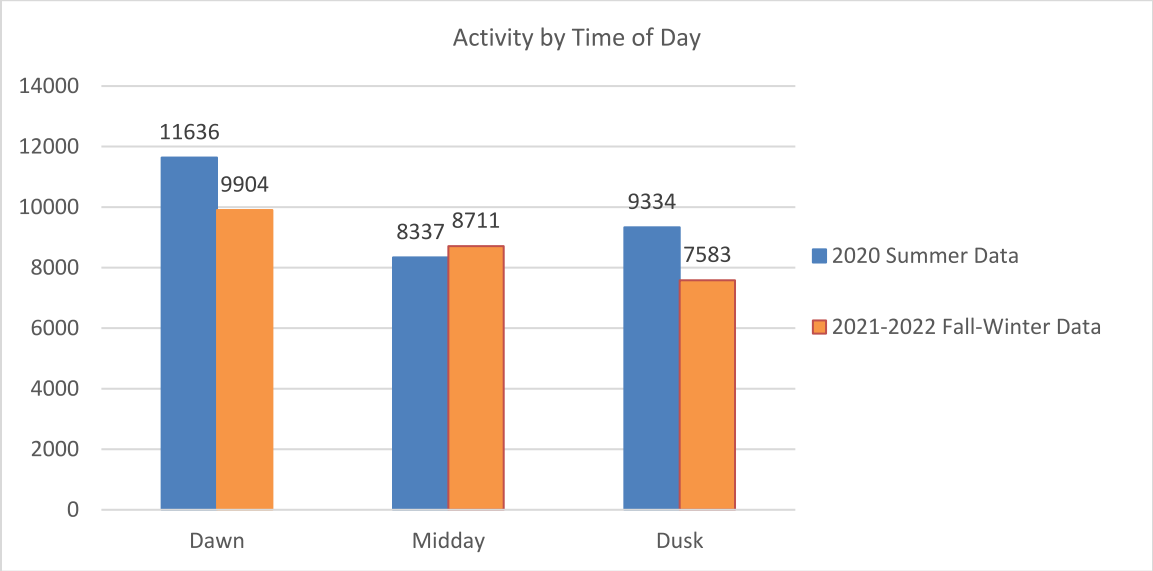
There has been only one reported bird strike at Rio Vista Municipal Airport in the last decade. A bird strike involving a Canada goose was reported on October 30, 2011; the pilot landed safely and the strike resulted in substantial but repairable damage.

3.3 Wildlife Surveys

3.3.1 Bird Count Surveys

Daily Activity Patterns

During the late spring–summer study (April to August 2020), a total of 29,641 individual birds were counted in the study area on 11 survey days. During the fall–winter study (September 2021 to March 2022), a total of 26,198 individual birds were counted on 8 survey days. The number of bird observations was the greatest during dawn, decreased during midday, and was at the lowest during dusk (**Figure 6**).



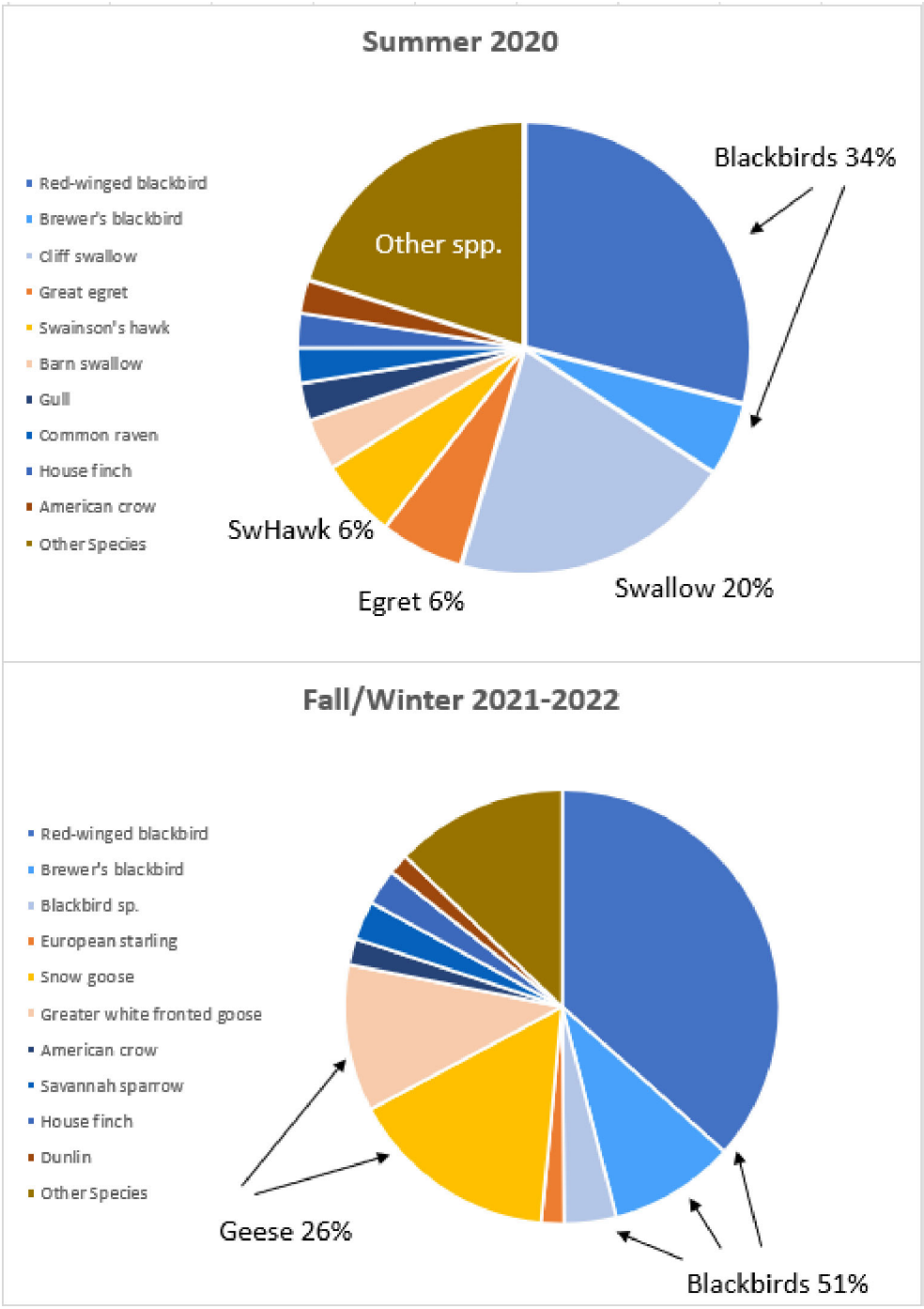
Little Egbert Multi-Benefit Project

Figure 6
Bird Observations (Number of Individuals) by Time of Day Summer (April to August 2020) Versus Fall-Winter (September 2021 to March 2022)

Bird Species and Guilds

Late Spring–Summer 2020

During the spring–summer 2020 surveys, the top 10 most abundant species represented 79.8 percent of all birds observed (**Table 5**). Nearly half of all observed birds were red-winged blackbird (*Agelaius phoeniceus*) (29 percent) and cliff swallow (*Petrochelidon pyrrhonota*) (20.3 percent) (**Figure 7**). The top 10 most abundant guilds represented 97.7 percent of all individual birds observed, led by icterids (blackbirds, 38.1 percent) and swallows (25.0 percent) (**Table 6**). Large birds, identified by the FAA (2019) to cause the most damage in air collisions (that is raptors, gulls, and waterfowl), make up 15.4 percent of the total species observed (raptors 8.9 percent, gulls 2.7 percent, waterfowl 3.8 percent) (Table 5).



Little Egbert Multi-Benefit Project

Figure 7
Top 10 Most Abundant Bird Species Observed

TABLE 5
TOP 10 SPECIES OBSERVED BY NUMBER OF INDIVIDUALS (APRIL–AUGUST 2020)

Species	Federal/State Status	Number of Individuals	Percentage
Red-winged blackbird	--	8,605	29.0
Cliff swallow	--	6,010	20.3
Great egret	--	1,767	6.0
Swainson's hawk	--/CA Threatened	1,669	5.6
Brewer's blackbird	--	1,550	5.2
Barn swallow	--	1,091	3.7
Gull	--	792	2.7
Common raven	--	745	2.5
House finch	--	732	2.5
American crow	--	699	2.4
Total		**23,660**	**79.8**
Other Species		5,981	20.2
Grand Total		**29,641**	**100.0**

TABLE 6
TOP 10 GUILDS OBSERVED BY NUMBER OF INDIVIDUALS (APRIL-AUGUST 2020)

Guild	Species Observed at Little Egbert Tract	Number of Individuals	Percentage
Icterids	Western meadowlark, red-winged blackbird, Brewer's blackbird, brown-headed cowbird, Bullock's oriole, California scrub-jay, European starling, common grackle, and tri-colored blackbird.	11,300	38.1
Swallows	Barn swallow, cliff swallow, northern rough-winged swallow, tree swallow.	7,423	25.0
Raptors	Red-tailed hawk, Swainson's hawk, northern harrier, turkey vulture, short-eared owl, American kestrel, great-horned owl, prairie falcon, osprey, red-shouldered hawk, peregrine falcon, and Cooper's hawk.	2,630	8.9
Wading birds	Great egret, great blue heron, snowy egret, white-faced ibis, long-billed curlew, American bittern, lesser yellowlegs, black-crowned night heron, greater yellowlegs, long-billed dowitcher, short-billed dowitcher, and white ibis.	2,415	8.2
Passerines	Black phoebe, northern mockingbird, western kingbird, house finch, white-crowned sparrow, hooded oriole, loggerhead shrike, golden-crowned sparrow, bushtit, marsh wren, lesser goldfinch, American goldfinch, California towhee, dark-eyed junco, lark sparrow, and purple finch.	1,261	4.3
Corvids	American crow, common raven, and blue jay.	1,445	4.9
Waterfowl	Mallard, American white pelican, double-crested cormorant, Canada goose, western grebe, northern shoveler, greater white-fronted goose, gadwall, American coot, and pied-billed grebe.	1,115	3.8
Gulls	Gulls.	792	2.7
Doves	Mourning dove, rock dove, and Eurasian collared dove.	320	1.1
Sparrows	Savannah sparrow and song sparrow.	263	0.9
	Total Top Guilds	**28,964**	**97.7**
Other Species	American robin, belted kingfisher, Caspian tern, downy woodpecker, horned lark, killdeer, northern flicker, Nuttall's woodpecker, ring-necked pheasant, and wild turkey.	677	2.3
	Grand Total	**29,641**	**100.0**

Fall 2021–Winter 2022

During the fall–winter surveys, the top 10 most abundant species represented 87 percent of all birds observed (**Table 7**). Over half of all observed birds were red-winged blackbird (36.6 percent), snow goose (*Anser caerulescens*) (15.6 percent), and greater white fronted goose (*Anser albifrons*) (10.9 percent) (Figure 7). The top 10 most abundant guilds represented 99.6 percent of all individual birds observed, led by icterids (blackbirds, 50.1 percent) and waterfowl (31.2 percent) (**Table 8**). Large birds, identified by the FAA (2019) to cause the most damage in air collisions (that is raptors, gulls, and waterfowl), make up 31.8% of the total species observed (raptors 0.3 percent, gulls 0.2 percent, waterfowl 31.2 percent) (Table 5).

TABLE 7
TOP 10 SPECIES OBSERVED BY NUMBER OF INDIVIDUALS (SEPTEMBER 2021-MARCH 2022)

Species	Federal/State Status	Number of Individuals	Percentage
Red-winged blackbird	--	9,591	36.6
Snow goose	--	4,097	15.6
Greater white fronted goose	--	2,865	10.9
Brewer's blackbird	--	2,454	9.4
Tricolored blackbird	--/CA Threatened	1,020	3.9
Savannah sparrow	--	754	2.9
House finch	--	705	2.7
American crow	--	515	2.0
European starling	--	438	1.7
Dunlin	--	400	1.5
Total		**22,839**	**87**
Other Species		3,359	13
Grand Total		**26,198**	**100.0**

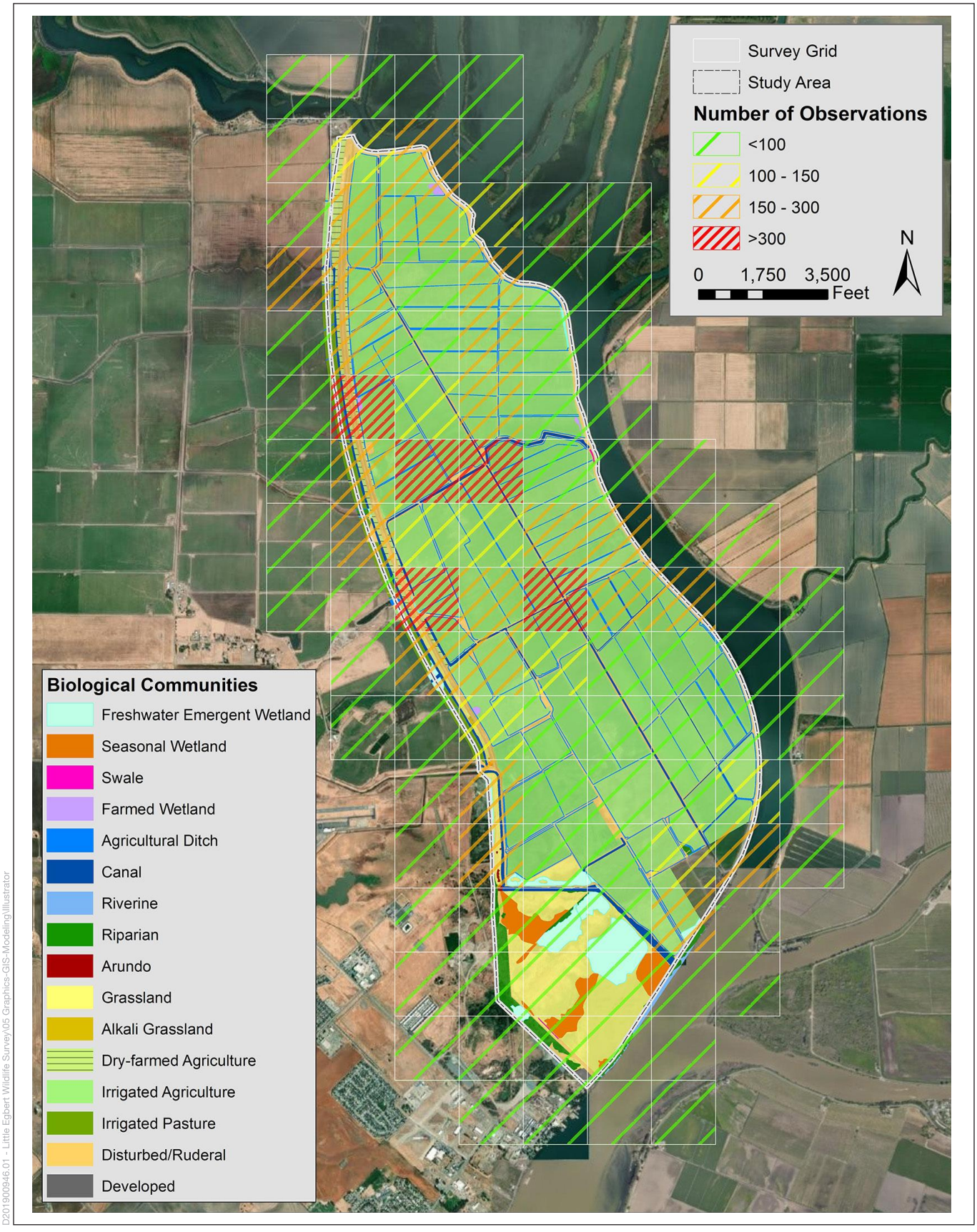
TABLE 8
TOP 10 GUILDS OBSERVED BY NUMBER OF INDIVIDUALS (SEPTEMBER 2021-MARCH 2022)

Guild	Species Observed at Little Egbert Tract	Number of Individuals	Percent of Total Birds
Icterids	Western meadowlark, red-winged blackbird, Brewer's blackbird, tricolored blackbird, brown-headed cowbird, Bullock's oriole, California scrub-jay, European starling, great-tailed grackle.	13,131	50.1
Waterfowl	Mallard, American white pelican, double-crested cormorant, Canada goose, western grebe, northern shoveler, greater white-fronted goose, American coot, bufflehead, common goldeneye, hooded merganser, mute swan, ruddy duck, snow goose, tundra swan, pied-billed grebe.	8,180	31.2
Passerines	Black phoebe, northern mockingbird, western kingbird, house finch, white-crowned sparrow, loggerhead shrike, golden-crowned sparrow, bushtit, marsh wren, lesser goldfinch, American goldfinch, dark-eyed junco, Say's phoebe, tri-colored blackbird, yellow-rumped warbler, purple finch.	2,361	9.0
Sparrows	Savannah sparrow, song sparrow, house sparrow, and spotted towhee.	862	3.3
Shore birds	Belted kingfisher, black-necked stilt, Caspian tern, dunlin, greater yellowlegs, killdeer, Wilson's snipe.	537	2.0
Wading birds	Great egret, great blue heron, snowy egret, white-faced ibis, long-billed curlew, lesser yellowlegs, black-crowned night heron, long-billed dowitcher, long-billed curlew, green heron.	415	0.7
Raptors	Red-tailed hawk, Swainson's hawk, northern harrier, turkey vulture, American kestrel, great-horned owl, osprey, burrowing owl, white-tailed kite, Cooper's hawk.	175	0.3
Corvids	American crow and common raven.	163	0.3
Gulls	Various gull species.	143	0.2
Doves	Mourning dove, rock dove, band-tailed pigeon, Eurasian collared dove.	132	0.2
	Total Top Guilds	**26,099**	**99.6**
Other Species	American robin, ring-necked pheasant, wild turkey, Barn swallow, cliff swallow, northern rough-winged swallow, and tree swallow, horned lark, American Pipit, western bluebird, acorn woodpecker, northern flicker, Nuttall's woodpecker, least tern.	99	0.4
	Grand Total	**26,198**	**100**

Spatial Distribution of Bird Activity

Late Spring–Summer 2020

Figure 8 presents the number of bird observations per grid and overlapping biological communities, to associate bird activities with groundcover. Most bird observations for the late spring–summer months occurred within irrigated agriculture, canals, and ditches in the north and western areas of the Little Egbert property. The highest density of bird observations occurred along the mid-west segment of the Little Egbert Tract. These high-density areas are primarily north of the inner WHA Boundary, although a portion overlaps the northernmost edge of the boundary. No observations of 300 or more individual birds were made at any points within the Powell Property.



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SOURCE: ESA, 2020

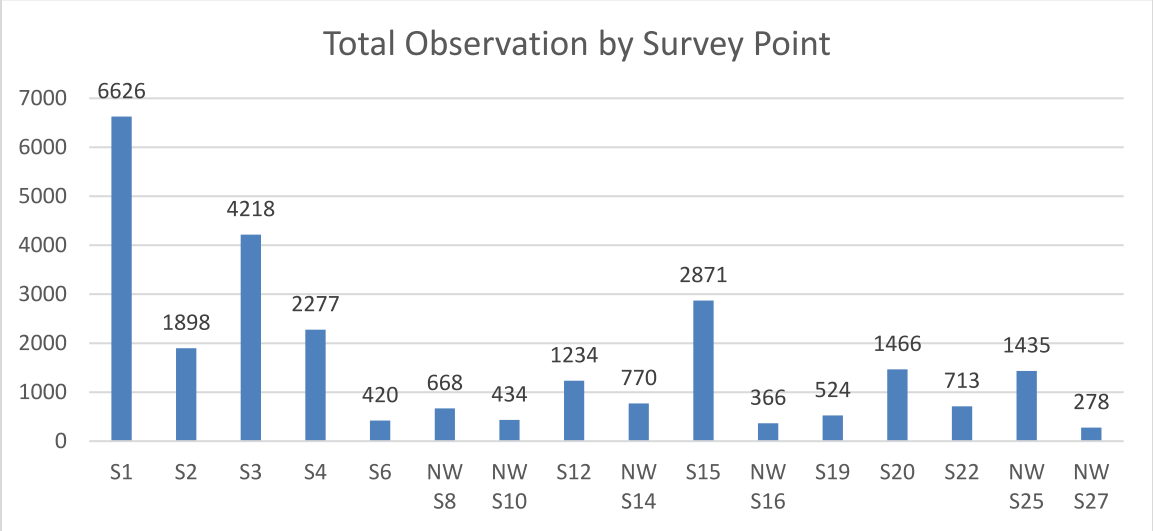
Little Egbert Multi-Benefit Project

Figure 8
Bird Observations by Grid Location and Biological Community (April-August 2020)

ESA

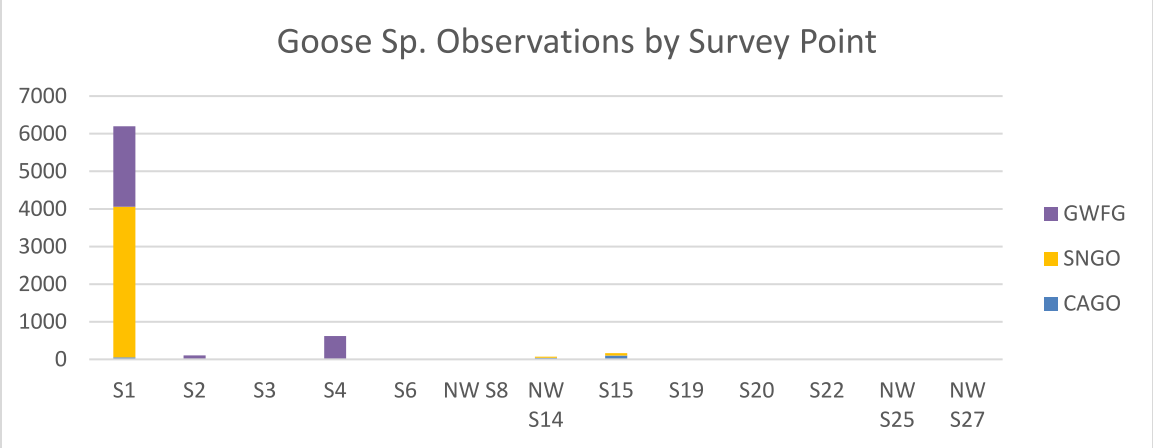
Fall 2021–Winter 2022

Figure 9 illustrates the total number of birds observed at each survey point during the fall-winter. The highest number of bird observations were in the south on Powell (S1 and S2) and southern portion of the Little Egbert Tract (S3, S4, and S6), with the next highest numbers near the northern boundary next to Cache Slough (S14 and S15). Unlike the spring-summer survey, geese (greater white-fronted goose, snow goose, and Canada goose) were present during the fall–winter, particularly snow geese (**Figure 10**). Snow geese were numerous on the Powell Property, which is largely within the Inner WHA Boundary.



Little Egbert Multi-Benefit Project

Figure 9
All Bird Observations by Survey Point (September 2021-March 2022)



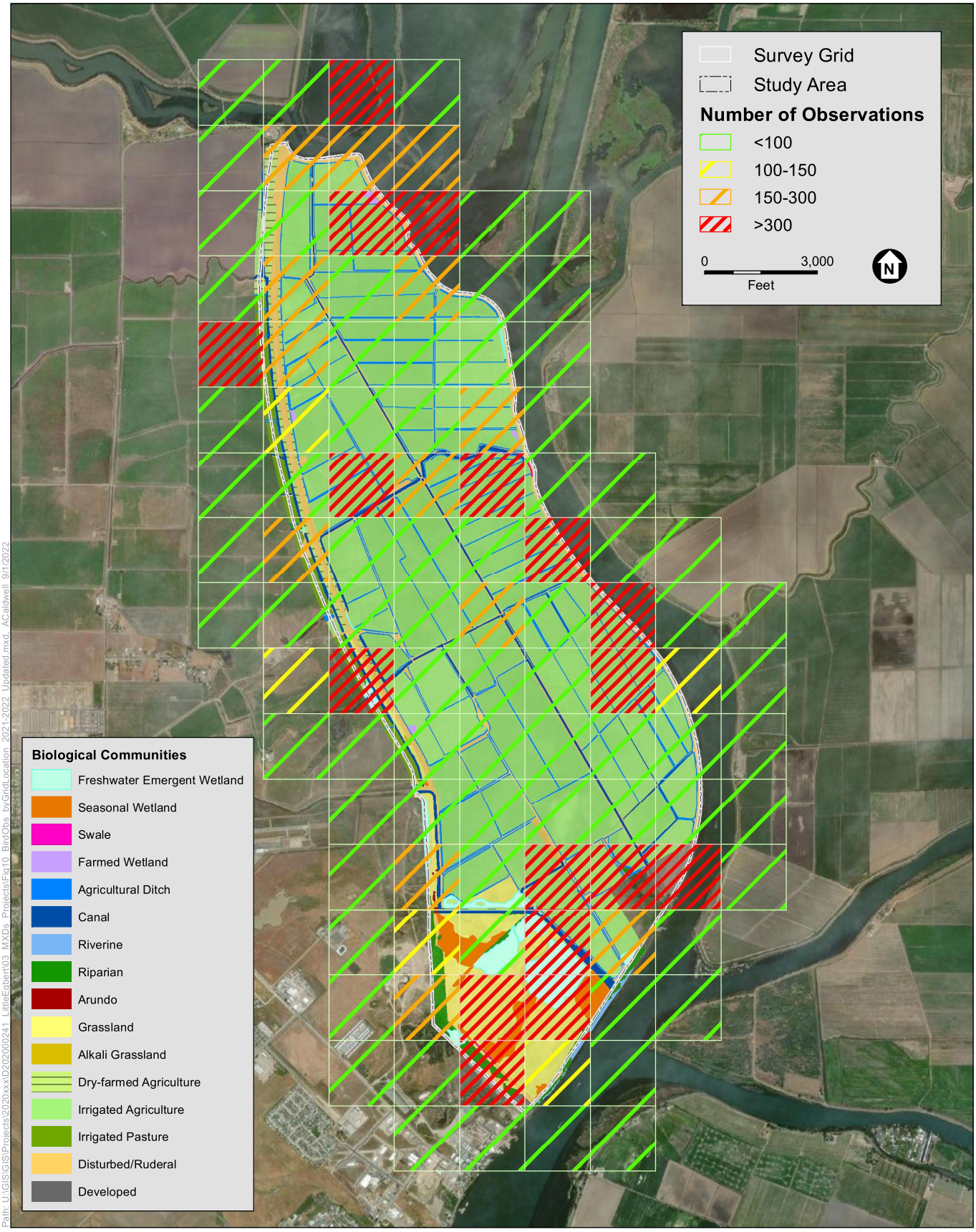
Little Egbert Multi-Benefit Project

Figure 10
All Goose Observations by Survey Point (September 2021–March 2022)

Levels of bird activity in the fall-winter were compared with the underlying land cover (**Figure 11**). High activity grids were categorized as those with greater than 300 observations over the survey season. The grids with the highest activity occurred primarily within the southern portions of the study area and along Cache Slough. Land cover in these areas included seasonal wetland, freshwater emergent wetland, annual grassland, agricultural ditches and canals, and irrigated agriculture. High activity grids were also dispersed throughout the central portion of the site, associated with irrigated agriculture and agricultural ditches and canals. The southern portion of the study area, which is associated with annual grassland, irrigated pasture, freshwater emergent wetland, and seasonal wetland, contained grids where some of the highest numbers of birds were observed.

Particular attention was paid to the distribution of larger birds that could pose a greater hazard for aircraft damage if struck, specifically raptors and waterfowl. **Figures 12 and 13** illustrate the numeric range of raptor individuals observed by location and biological community within the study area. Overall, more raptors were observed within the study area during the late spring-summer months (**Figure 14**) compared to the fall-winter months (**Figure 15**). The highest number of raptors were documented along the northwestern boundary (Figures 12 and 13), associated with irrigated agriculture and with ruderal vegetation on the levee. Low and moderate numbers of raptors were documented within much of the central and southern portions of the study area, associated with wetlands, irrigated agriculture, ditches, and canals. Low to moderate numbers of raptors were documented during all seasons within the inner WHA boundary.

Figures 14 and 15 illustrate the numeric range of waterfowl individuals observed by location and biological community within the study area. More waterfowl were documented in the late fall-winter months (Figure 15) compared to the late spring-summer months (Figure 14). The highest number of waterfowl were documented during the winter migration season within the Powell property, associated with seasonal wetland, freshwater emergent wetland, and grassland. A majority of the Powell Property is located within the inner WHA boundary. During the fall-winter, high numbers of waterfowl were also documented along the northern and eastern edges of the study area, adjacent to open water. Lower numbers of waterfowl were documented during the late spring-summer and areas associated with irrigated agriculture.

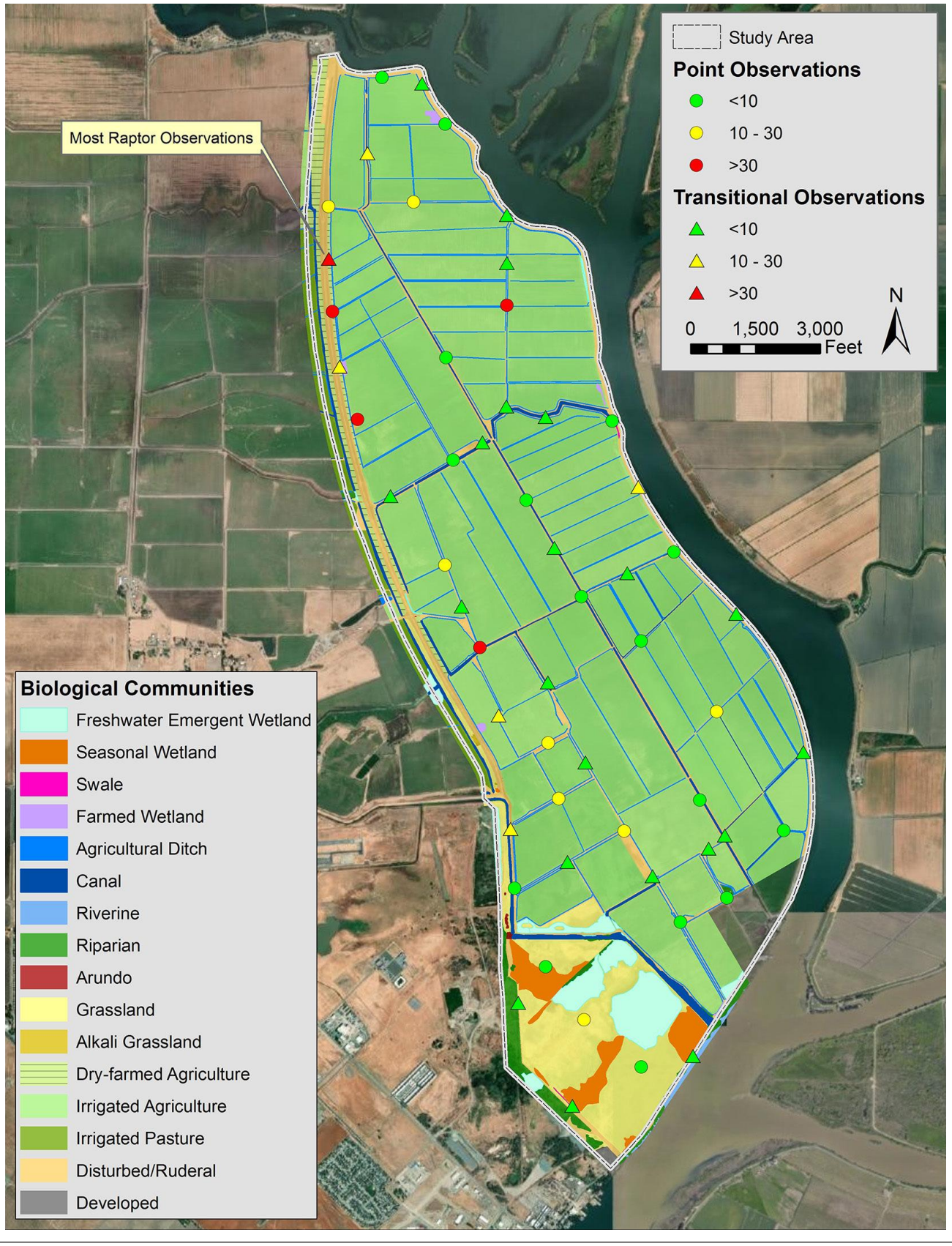


SOURCE: Westervelt, 2018; ESA, 2021

Little Egbert Multi-Benefit Project

Figure 11
Bird Observations by Grid Location and Bological Communities
September 2021- March 2022

ESA



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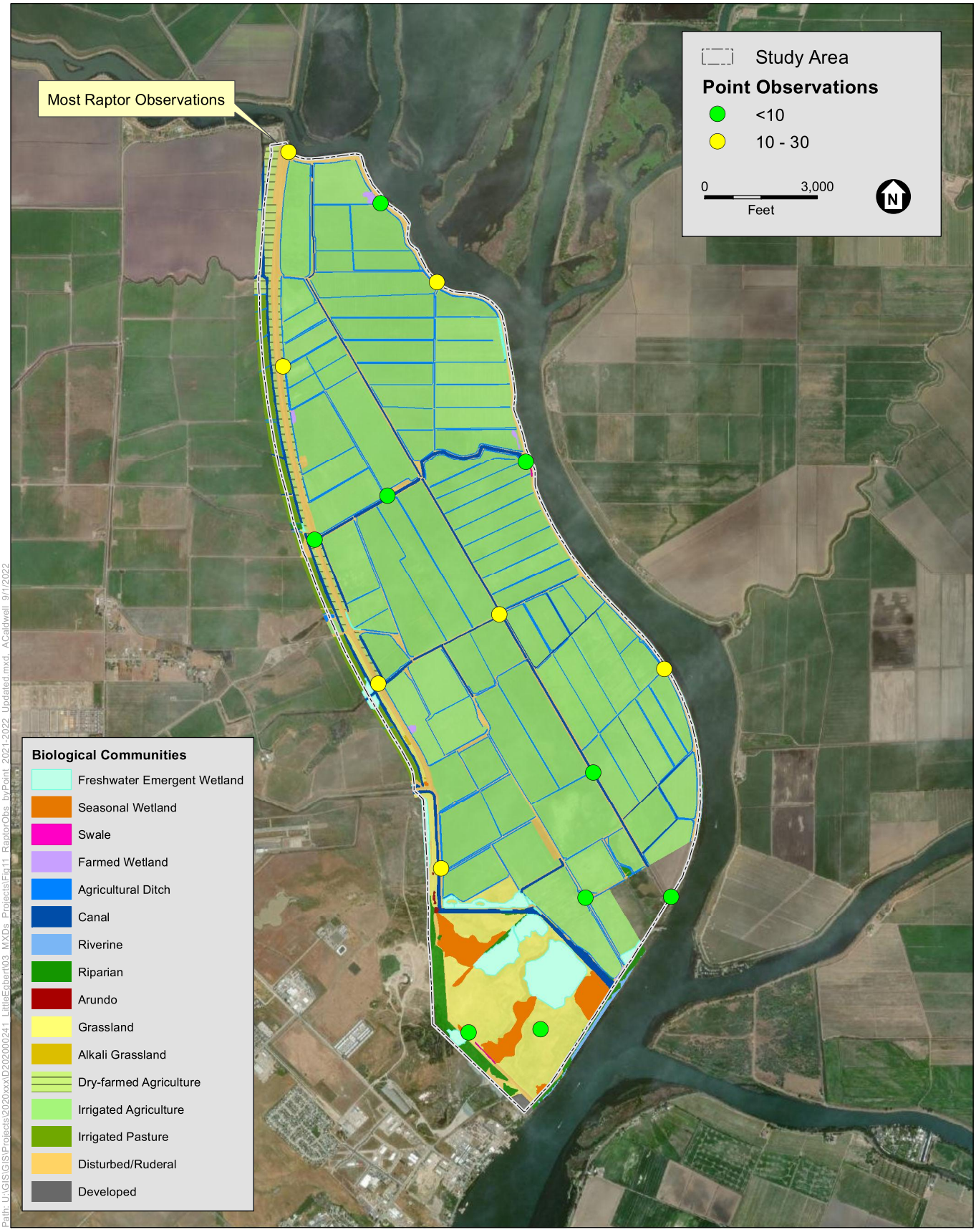
SOURCE: ESA, 2020

Little Egbert Multi-Benefit Project

Figure 12
Raptor Observations by Point and Biological Community (April-August 2020)

ESA

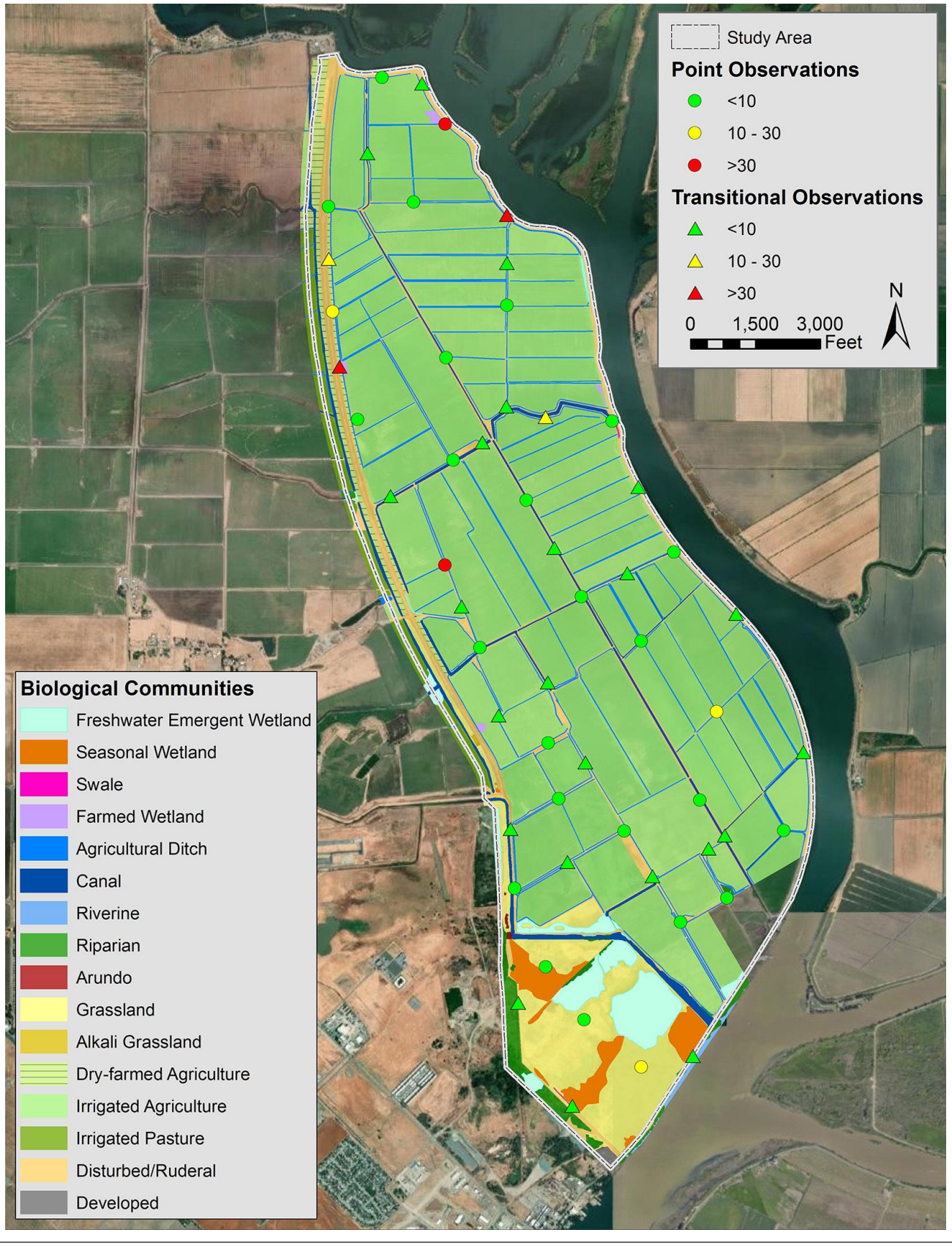


SOURCE: Westervelt, 2018; ESA, 2021

Little Egbert Multi-Benefit Project

Figure 13
Raptor Observations by Point and Biological Communities
September 2021- March 2022

ESA



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SOURCE: ESA, 2020

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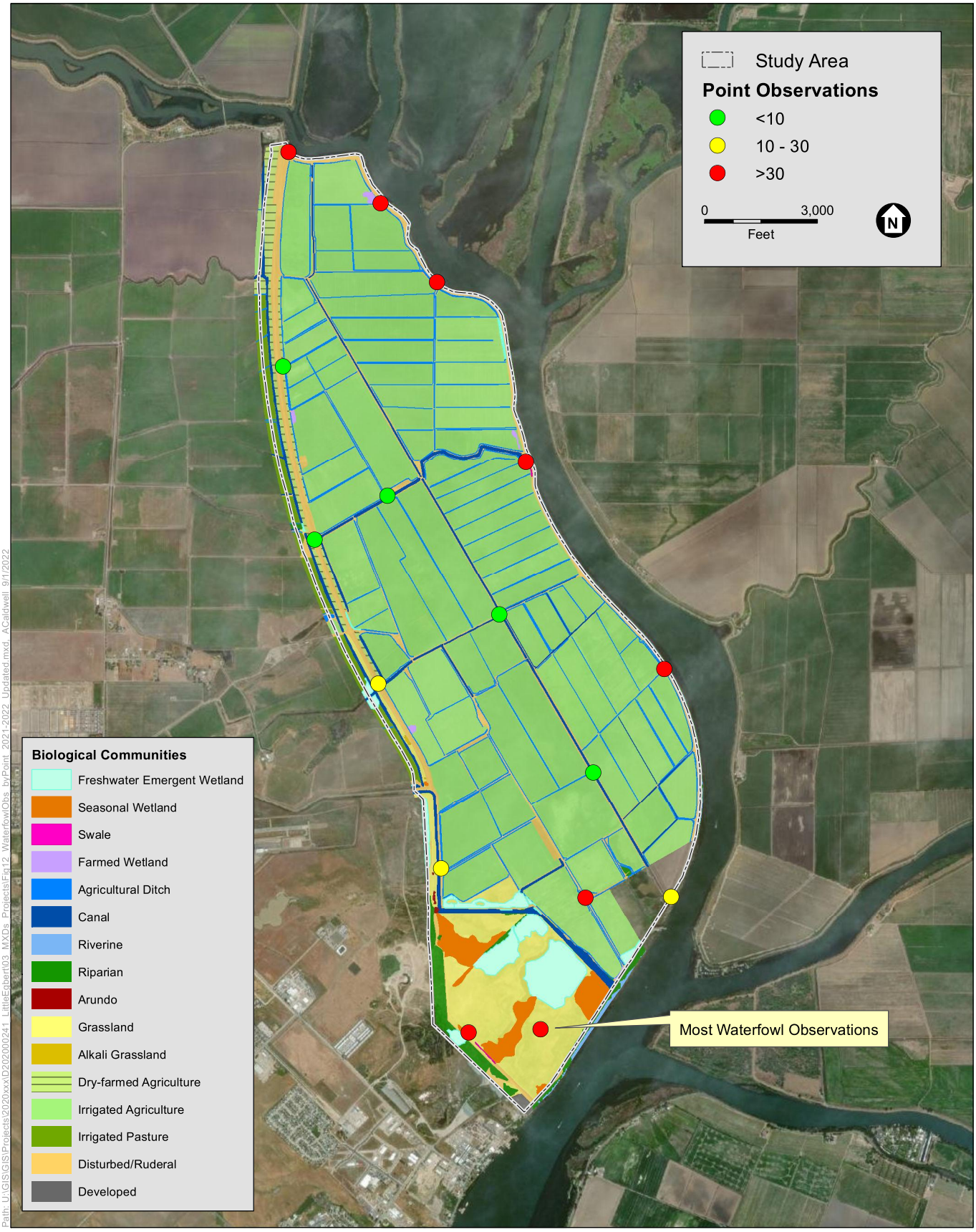
Figure 14
Waterfowl Observations by Point and Biological Community
(April-August 2020)

ESA



SOURCE: Westervelt, 2018; ESA, 2021

Little Egbert Multi-Benefit Project

Figure 15
Waterfowl Observations by Point and Biological Communities
September 2021- March 2022

ESA

Site Visit – March 17, 2021

Bird observations were made during a general site visit on March 17, 2021 (9:00 a.m.–1:00 p.m.). A large flock of snow geese was observed foraging or loafing in agricultural fields near the eastern levee in the southeast corner of the Little Egbert Tract. This flock, which numbered well over a thousand based on a video taken at 10:27 am (**Figure 16**), lifted off and flew across the southeast portion of the Inner WHA/Safety Zone 6 toward the Powell Property. Approximately 35 common egret were observed concentrated in another field along the central road that runs northward through the Little Egbert Tract. A small yellow plane was seen repeatedly landing/ taking off from the Airport around 10:45 a.m. and flying low ("cropdusting") over the agricultural fields west of the study area; geese were also present on the ground in the area between the plane's flight path and the US Army Corps of Engineers' levee.

3.3.2 Wildlife Camera Photographs

The majority of wildlife observed within the photographs were Brewer's blackbird (*Euphagus cyanocephalus*) and red-winged blackbird (*Agelaius phoeniceus*). Other wildlife documented by the cameras included: black-tailed jackrabbit (*Lepus californicus*), racoon (*Procyon lotor*), cottontail rabbit (*Sylvilagus bachmani*), brown-headed cowbird (*Molothrus ater*), coyote (*Canis latrans*), western meadowlark (*Sturnella neglecta*), great horned owl (*Bubo virginianus*), American crow (*Corvus brachyrhynchos*), European starling (*Sturnus vulgaris*), and black phoebe (*Sayornis nigricans*). In addition to wildlife, domestic cows were also observed. Representative photographs of the species documented within the study area are provided in Attachment A. Small prey mammals including California ground squirrel (*Otospermophilus beecheyi*), striped skunk (*Mephitis mephitis*), and black-tailed rabbit (*Lepus californicus*) were documented, but were not included within the analysis. Since the proposed Project does not extend onto Rio Vista Municipal Airport property, there would be no potential for aircraft wildlife strikes in the study area involving small mammals. Domestic mammals including grazing cattle and sheep for vegetation management were noted but not included in the analysis since livestock are typically managed and located away from the Airport.

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SOURCE: Google, 2022; ESA, 2022

Little Egbert Multi-Benefit Project

Figure 16
Snow geese flying across Little Egbert Tract and Inner WHA (March 17, 2021)

ESA

CHAPTER 4
Discussion

The Rio Vista Municipal Airport lies within the Pacific Flyway, amidst biological communities and land uses that are currently used by a variety of wildlife. This study provides baseline pre-Project data on bird activity east of the Airport at the Project site and the Powell Property during the spring-summer resident or breeding season (April through August 2020) and the migratory and wintering seasons (September 2021 through March 2022). According to FAA records, nationwide the highest number of bird strikes occurs from July to October when nestlings fledge. A portion of the data collected during these surveys fall within that fledgling period. The number of waterfowl and shorebirds present on-site was greatest during the fall-winter survey, when they migrate and arrive to winter in the Delta region.

The following sections discuss several questions regarding wildlife hazards at the proposed Project site:

1. What do the survey results indicate as it relates to current airport safety?
2. What is the potential future wildlife usage (and associated wildlife hazard potential) given the proposed preliminary design?
3. Are there any land use changes that would increase (or decrease) hazards?
4. What are the range of mitigation measures that the ALUC might propose if they concluded mitigation was necessary?

4.1 Current Airport Safety

This study documented a high degree of bird activity already existing within the WHA boundaries east of the Airport. Bird activity varied seasonally. In the late spring and summer, bird activity was concentrated in the central portion of the study area. Bird activity during the fall and winter was concentrated in the southern portion of the study area and along open water. The northern half of the study area is within the Outer WHA boundary, while most of the southern half falls within this the Inner WHA boundary, with portions to the east in the Outer WHA boundary. Land use at the study area is currently dominated by irrigated agriculture (71 percent), with a mix of annual grassland, irrigated pasture, and wetlands (freshwater emergent and seasonal) on the southern area. Of the survey grids with high activity during all seasons (more than 300 total bird observations) (Figures 9 and 12), 20 percent were within the Inner WHA Boundary (northeast edge). At the southern end of the Project area, which is within the Inner WHA Boundary, bird observations during the winter were relatively high, especially with waterfowl species (Figure 16).

The most common birds observed in both seasons were blackbirds. The red-winged blackbird is among the most common species struck by commercial aircraft, but these small birds rarely cause damage (1 percent of blackbird strikes) (FAA 2019). Swainson's hawk and other raptors were common in summer and geese were common in fall–winter. These large birds are of greater concern because they can cause great damage to aircraft (FAA 2019). The three locations that had the highest waterfowl numbers were associated with freshwater emergent and seasonal wetland. The areas with the greatest waterfowl and raptor occurrence (combined) were in the southern part of the study area, which is on the boundary of and within the Inner WHA Boundary. The current risk of bird strikes at the Airport is likely greater during the wintering and migratory seasons.

The Airport does not currently have a wildlife hazard management plan.

4.2 Risk Potential of Proposed Project

Given that the Airport currently experiences some degree of wildlife hazard due to its location in the Delta, adjacent existing land uses, and presence of birds (especially geese), the key question is how the proposed Project's change in land use would change bird abundance and activity (i.e., foraging, loafing, nesting, and/or movements through) in the Inner and Outer WHA Boundaries, and whether that difference significantly changes the level of risk exposure at the Airport.

The proposed Project would alter habitat conditions for most of the Project area (3,480 acres) (see Figure 2). Major changes to habitat that would affect bird populations include:

- Elimination of agricultural land uses within the Little Egbert Tract, which is predominately irrigated crops (2,519 acres alfalfa and corn, 72 percent of the Project site)
- Creation of open water habitat similar to existing open water adjacent to the site in Cache Slough and lower Liberty Island
- Creation of tidal emergent wetlands along the western and southern edges
- Creation of riparian habitat on the habitat benches on the water side of the west levees
- Creation of tidal wetlands in south

ESA considered wildlife-habitat associations to infer which bird species could occur at the Little Egbert Tract if the proposed Project were constructed similarly to what is currently conceptualized. **Table 9** lists species groups known to be attracted to various biological communities and land use types in Solano County as provided in the Rio Vista ALUCP (ESA 2018).

Of particular interest are those species that pose the greatest risk of aircraft damage: raptors, waterfowl, and large herons. **Table 10** summarizes the land use types that are attractants (ESA 2018, Table 6) for those bird species resulting in the highest percent of damage to aircrafts (FAA 2019, Table 5).

TABLE 9
SPECIES GROUPS KNOWN TO BE ATTRACTED TO LAND USE TYPES IN SOLANO COUNTY

Land Use Type/Habitat Features	Species Group(s) Known to Be Attracted to Land Use Type/Habitat Feature
Agricultural Lands	Hawks, vultures, blackbirds/starlings, and crows/ravens
Rivers and Creeks	Egrets, songbirds, geese, and ducks; mammals include raccoons
Estuarine/Wetland Habitat	Shorebirds, blackbirds, geese and ducks, egrets, cormorants, and pelicans
Open Space	Hawks, swallows, kestrels, owls, turkey/pheasants, osprey, eagles, and vultures; mammals include coyote
Public Parks	Swallows, sparrows, blackbirds/starlings, crows/ravens, doves, pigeons, geese, and ducks
Golf courses	Geese, ducks, blackbirds/starlings, sparrows, and swallows
Water Treatment Plants	Geese, ducks, cormorants/pelicans, herons, and shorebirds
Landfills	Gulls, blackbirds/starlings, and crows/ravens

SOURCE: Rio Vista Airport Land Use Compatibility Plan (ESA 2018).

TABLE 10
LAND USE ATTRACTANTS FOR HIGHLY DAMAGING BIRD SPECIES

Bird Species Resulting in Highest Amounts of Aircraft Damage	Land Use Type Attractant
Canada goose, mallard (waterfowl)	Golf courses, water treatment plants, rivers and creeks, estuarine/wetland habitats
Red-tailed hawk, turkey vulture (raptor)	Agricultural lands and open space
Osprey (raptor)	Estuarine/wetland habitat
Great blue heron (wading bird)	Water treatment plants, rivers and creeks, estuarine/wetland habitat

SOURCE: FAA 2019, ESA 2018

Based on the current proposed design and general bird-habitat associations, the potential changes in wildlife hazard from the constructed Project include:

- Greatly reduced risk from large waterfowl species (e.g., Canada goose, snow goose, and white-fronted goose) that are of highest concern for bird strikes (especially Canada goose) due to conversion of irrigated agriculture and pasture to open water. Canada geese and snow geese were observed traversing, congregating, and loafing on irrigated pasture and agricultural lands in the study area. Geese do use open water, but flocks resting on the water are typically less concentrated (i.e., fewer birds) than feeding flocks that aggregate on agricultural fields. Bird species that prefer open water, such as diving ducks (e.g., bufflehead) and cormorants, would have more habitat, but these species do not aggregate in as high concentrations as birds foraging in fields.
- Greatly reduced risk from icterids and swallows (abundant but minimally damaging) due to conversion of irrigated agriculture (foraging habitat) to open water. Restoration of tall emergent wetland vegetation (in a smaller portion of the Project area) would increase potential nesting habitat.

- Greatly reduced risk from terrestrial-foraging raptors (e.g., Swainson's hawks, turkey vultures) due to conversion of agriculture to open water.
- Increased risk from wading birds (e.g., herons, egrets) that use wetlands and shallow margins of open water (western edge of study area).
- Increased risk from fish-eating raptors (osprey) that forage over open water; however, their overall numbers are lower than waterfowl.

Overall, the Project area would shift from predominantly irrigated agriculture to open water. Waterfowl and water birds do use open water, but the expected densities would likely be no greater than that on agriculture lands or Cache Slough currently. Bird activity observed in spring–summer on Cache Slough grids was relatively low. Open water habitat would be closer to the Airport than under current conditions.

4.3 Project Design Considerations

A substantial portion of the Project area overlaps the Inner WHA Boundary. Of particular note is the approach/departure area east of the runway. Trees in riparian zones within this area could attract roosting or nesting by raptors and passerines. Limiting or removing trees from within the approach/departure zones and turning zones would reduce this risk. Note that post-Project needs for raptor nesting habitat could be lower due to the proposed reduction of nearby foraging habitat (irrigated agriculture).

Wetlands could provide nesting or foraging habitat for waterfowl, wading birds, and blackbirds. Focusing these enhancements away from the runway approach zones could reduce risk. Further information would be required to incorporate these considerations into the next phase of design for the proposed Project.

4.4 Potential Mitigation Measures and Next Steps

The Rio Vista ALUCP wildlife hazard policies reflect guidance provided by the FAA in AC 150/5200-33B,[4] the advisory circular in effect at the time the latest ALUCP was prepared. AC 150/5200-33B and its replacement, AC 150/5200-33C, provide guidance on land uses that have the potential to attract wildlife hazards on or near airports. Section 2.4.3.2 of AC 150/5200-33C provides guidance on mitigating potential impacts associated with wetlands projects like the proposed Project. In summary, "*the FAA recommends that wetland mitigation projects that may attract hazardous wildlife be sited outside*" of the areas reflected by the WHA Boundaries identified in the Rio Vista ALUCP. "*The FAA also encourages landowners or communities supporting the restoration or enhancement of wetlands to do so only after critically analyzing how those activities would affect aviation safety…To do so, landowners or communities should contact the affected airport sponsor, FAA, and/or a Qualified Airport Wildlife Biologist…(These) parties should work cooperatively to develop restoration or enhancement plans that would not worsen existing wildlife hazards or create such hazards…If parties develop a mutually*

[4] AC 150/5200-33B was canceled on February 21, 2020, and replaced by AC 150/5200-33C, which is currently in effect. Current wildlife hazard policies in the Rio Vista ALUCP reflect guidance in AC 150/5200-33B.

acceptable restoration or enhancement plan, the landowner or community proposing the restoration or enhancement must monitor the restored or enhanced site. This monitoring must verify that efforts have not worsened or created hazardous wildlife attraction or activity. If such attraction or activity occurs, the landowner or community should work with the airport sponsor, or a Qualified Airport Wildlife Biologist to reduce the hazard to aviation."[5]

The applicant will work with Solano County ALUC during the CEQA process to evaluate potential impacts, specifically any change in risk relative to existing conditions. Based on this guidance and the 2021 and 2022 surveys, below are possible pre- or post-Project options to document conditions and minimize effects of Project implementation as well as potential measures that could be included as mitigation or adaptive management tools to reduce the potential for a significant increase in hazardous wildlife risk:

1) Assess regional land use for wildlife attractants that could lead to bird movement across the Project area (e.g., daily roosting to foraging habitat movement) should land use within the study area change.

2) For bird species observed at the site or within range, evaluate habitat uses and preferences to inform design (e.g., patch size of wetlands or vegetation height used by nesting or loafing waterfowl).

3) Conduct a second Wildlife Hazard Assessment (12-month continuous survey according to FAA protocols) for the airport property following Project implementation. Assess the degree of wildlife hazards, and whether each wildlife hazard is increased relative to baseline no-Project conditions.

5 FAA AC 150/5200-33C, Section 2.4.3.2

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CHAPTER 5
References

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Attachment A
Photographs

LIST OF PHOTOGRAPHS

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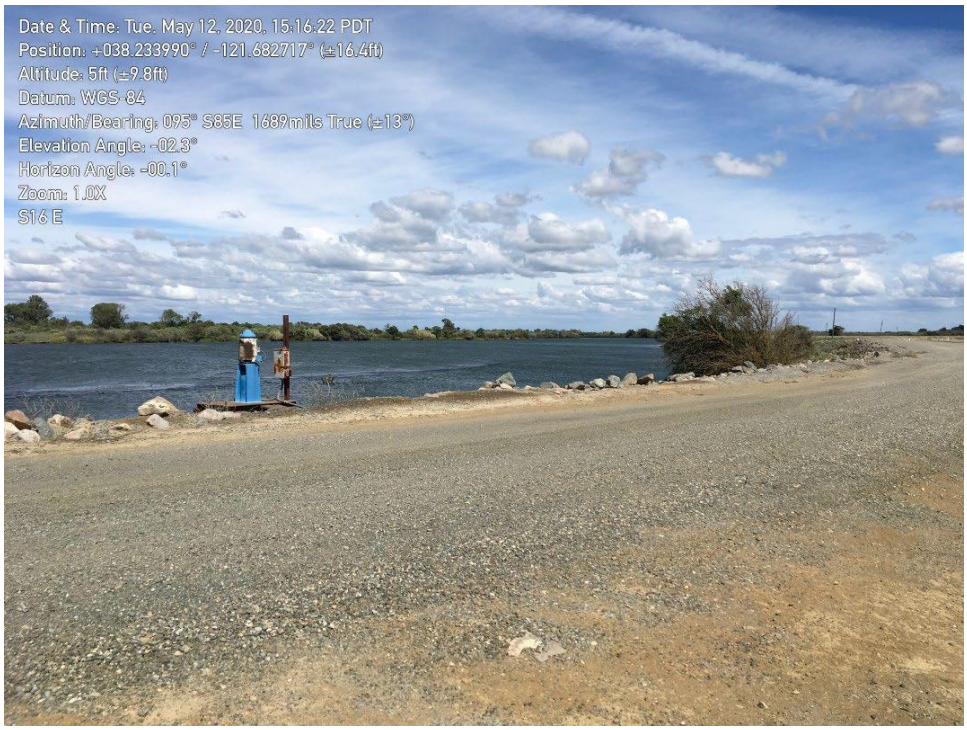
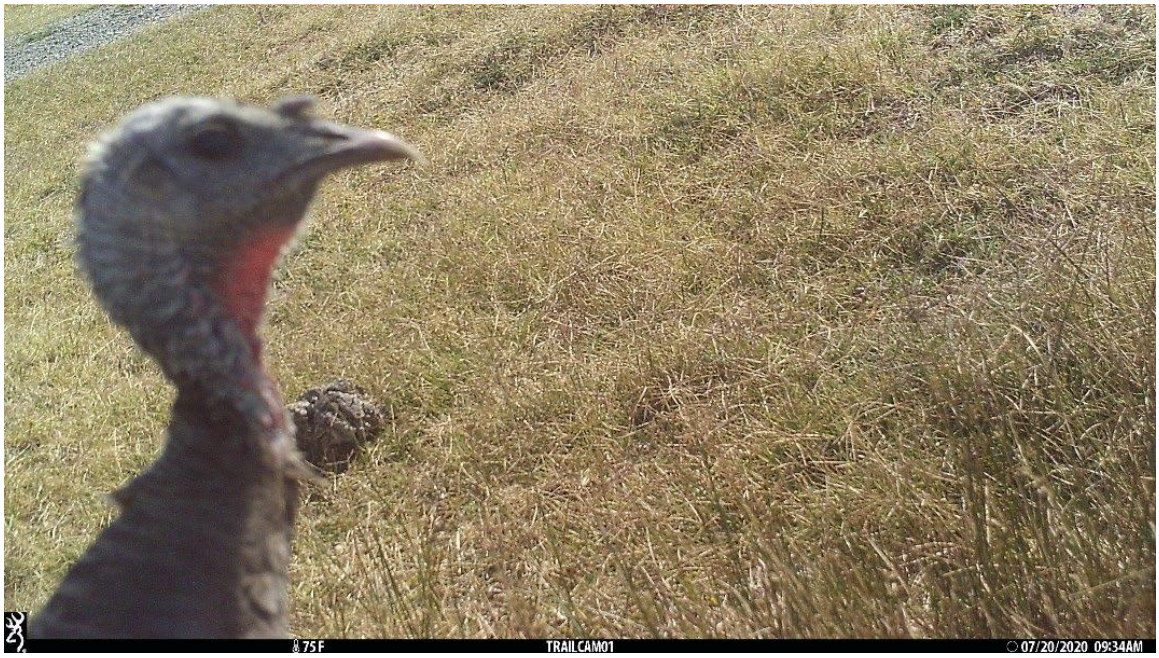
Photograph 1
View south of the graded levee road and open water to the east of the study area and of the agricultural land to the west within the study area from S21.
May 12, 2020



Photograph 2
View of open water just north of the study area from S14.
May 12, 2020.

Photograph 3
View west of riparian habitat surrounding an irrigation canal from S6.
May 12, 2020.

Photograph 4
View east of disturbed, irrigation canal, and agricultural land from S13.
May 12, 2020



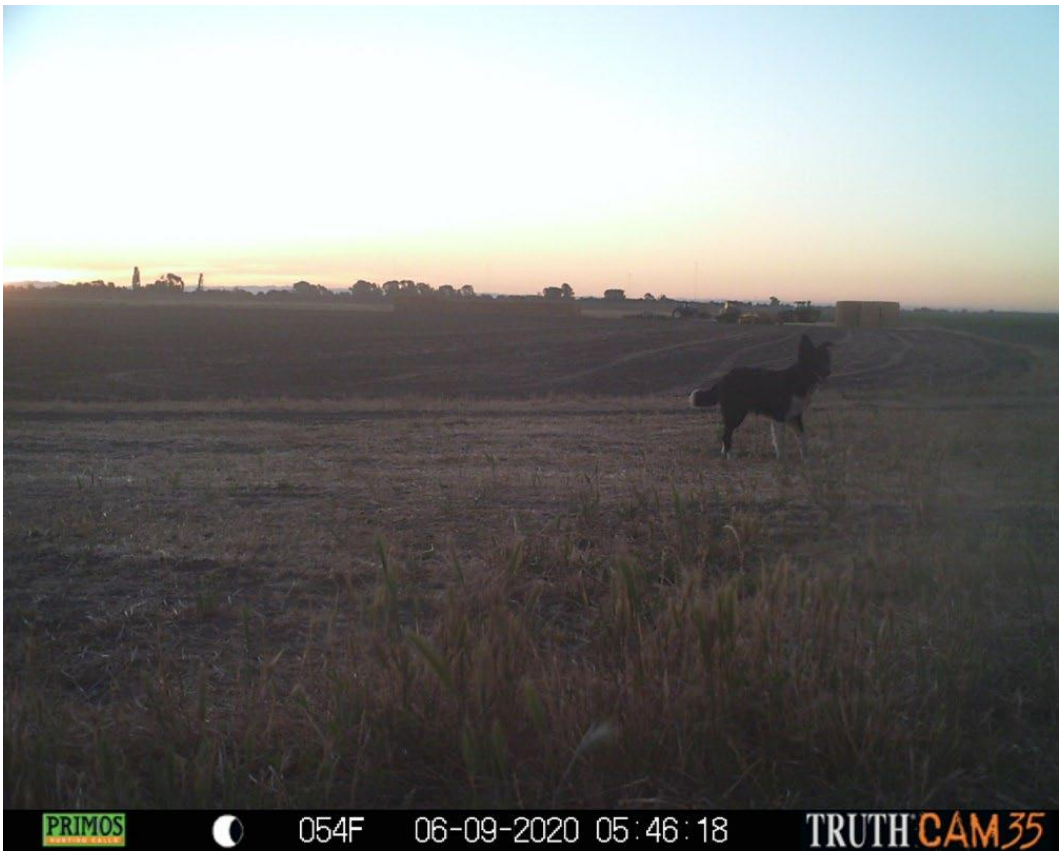
Photograph 5
Wild turkey.
Camera 1 – July 22, 2020

Photograph 6
Jackrabbit.
Camera 1 – July 22, 2020

Photograph 7
Brewer's blackbird.
Camera 1 – June 23, 2020

Photograph 8
Common raven.
May 21, 2020

Photograph 9
Skunk.
Camera 2 – July 22, 2020



Photograph 10
Domestic dog.
Camera 3 - July 22, 2020

Photograph 11
Brewer's blackbird.
Camera 1 – October 3, 2021

Photograph 12
Black-tailed jackrabbit.
Camera 1 – September 20, 2021

Photograph 13
American crow.
Camera 1 – September 26, 2021

Photograph 14
Raccoon.
Camera 1 - September 26, 2021

Photograph 15
Black-tailed jackrabbit.
Camera 2 - January 1, 2022

Photograph 16
Black-tailed jackrabbit.
Camera 2 - January 1, 2022

Photograph 17
Black phoebe.
Camera 2 - January 4, 2022

Photograph 18
Cow.
Camera 2 - January 5, 2022

Photograph 19
Western meadowlark.
Camera 2 - January 6, 2022

Photograph 20
Black cow.
Camera 2 - January 6, 2022

Photograph 21
Red winged blackbird.
Camera 2 - January 13, 2022

Photograph 22
Great horned owl.
Camera 2 - January 18, 2022

Photograph 23
Western meadowlark.
Camera 2 - January 18, 2022