Final

CACHE SLOUGH MITIGATION BANK

Wildlife Hazard Analysis

Prepared for
Westervelt Ecological Services

November 2024

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EXECUTIVE SUMMARY

Environmental Science Associates (ESA) prepared this report on behalf of Westervelt Ecological Services, LLC (WES) to analyze potential wildlife hazards associated with the Cache Slough Mitigation Bank (CSMB) Project (Project or CSMB Project) in Solano County, California. WES proposes this Project, which would develop a private commercial mitigation bank on approximately 330 acres at the southern end of the Yolo Bypass. The purpose of the Project is to restore approximately 300 acres of tidal freshwater wetland and riparian floodplain habitats, which would provide habitat for out-migrating salmonids and other protected Delta fish and wildlife species.

As required by the Rio Vista Airport Land Use Compatibility Plan (ALUCP) (SCALUC 2018, Policies WH-1 and WH-2), this report provides a Wildlife Hazard Analysis (WHA) to evaluate existing and potential future conditions for wildlife hazards to aircraft as a result of the proposed Project. Objectives of the WHA include:

1. Characterize existing hazard potential by analyzing aircraft strike data for the Rio Vista Municipal Airport (Airport).
2. Identify habitat features that attract wildlife.
3. Identify wildlife species present in the Project 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.
5. Demonstrate how wildlife movement that may pose hazards to aircraft in flight will be minimized, including all reasonable mitigation measures that will be incorporated into the proposed Project.

For the past 30 years or more, the Project area has been managed as irrigated pasture for cattle grazing and as a managed marsh for waterfowl hunting. The Project area retains some natural topography, hydrology, and vegetation despite having been leveled in the past for flood irrigation. The lands surrounding the Airport have long been managed for agriculture. Within the past 10 years, only one bird strike at the Airport has been reported to the Federal Aviation Administration (FAA): a goose strike in October 2011 that caused repairable damage to the aircraft but no injury.

Under post-Project conditions, the project area would transition from managed marsh to tidal freshwater emergent marsh with a network of open water channels/sloughs and floodplain-associated riparian vegetation on higher elevations.

Based on the proposed Project design, general bird-habitat associations, and nearby sites with habitat conditions similar to the post-Project conditions, the potential changes in wildlife hazard from the Project could include:

- Reduced risk through elimination of prolonged standing or ponded water that is attractive to waterfowl as refuge and foraging habitat. Current water management practices will cease and there will be a reduction in the availability of forage (i.e., seeds) for ducks and geese associated with the inundation of areas that support annual plants. Conversion to a tidal hydrologic regime, with ebb and flow of tidal waters across the site, may still attract waterfowl, but in lower numbers than are currently present under the existing management regime.
- Reduced risk through changes in management activities and vegetation structure that will reduce foraging opportunities for geese. Conversion from managed marsh, seasonal wetlands, and grassland to tidal marsh will eliminate current management practices such as disking and grazing that promote new vegetative growth that provide forage for geese. The dense growth of emergent vegetation within a mature tidal marsh and riparian shrub/scrub will be less of an attractant to geese due to the reduction in forage and refuge areas.
- Reduced risk from terrestrial-foraging raptors (e.g., turkey vultures) due to conversion of grassland to riparian and tidal freshwater marsh.
- Slight potential increased risk from wading birds (e.g., herons, egrets) that use shallow fringes of open water and tule marshes.
- Potential increase in nesting raptors after riparian trees have matured. Any risk is likely to be negligible given the presence of other tree-nesting habitat in the vicinity of the Project area and the spatial limit of the number of raptor nesting territories the site could support.
- Potential hazards from blackbirds are likely to remain similar to current conditions in the Project area because they will continue foraging in grasslands and nearby fields during winter and nesting in emergent freshwater vegetation during spring and summer.

In summary, habitat restoration at CSMB will result in a transition from a landscape dominated by managed marsh, seasonal wetlands, and annual grassland to a landscape dominated by perennial marsh and riparian. Changes to the current water regime (non-tidal to tidal) and vegetation composition (seasonal to perennial) is expected to favor birds smaller in body size (e.g., passerines and icterids) and reduce the numbers of large migratory waterfowl (geese and ducks) that are currently supported by habitat in the Project area. The expected shift from migratory birds to smaller resident bird species as the primary occupants of the Project area is expected to reduce flight hazards for the airport. In general, resident birds are not likely to fly as high as migratory birds since their movements are focused on moving between nearby habitats, and they don't need to gain altitude for purposes of long-range flights.

Based on the current conceptual design, restoration on the CSMB is expected to lead to a significant reduction in large aggregations of waterfowl in the winter. During other times of year, hazards from birds at CSMB would not significantly change since the assemblage of resident breeding birds would remain the same. As such, habitat restoration at CSMB is not expected to increase or introduce new wildlife hazards to the Rio Vista Airport.

In accordance with policies of the Rio Vista ALUCP and guidance provided by FAA Advisory Circular 150/5200-33C, this report includes recommendations for design considerations and mitigation measures to be implemented pre-construction, during construction, and post-construction to minimize hazardous wildlife attractants that could pose risks to aircraft. These measures include design considerations to reduce vegetation characteristics that promote large congregations of birds, best management practices and deterrents to discourage use of the site by large flocks of birds during and post construction, periodic monitoring during construction to identify wildlife hazard concerns, vegetation management strategies post construction to minimize bird attractiveness, and post-construction surveys and adaptive management as needed to promote public safety.

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CHAPTER 1
Introduction

1.1 Project Purpose

Westervelt Ecological Services, Inc. (WES) is proposing the Cache Slough Mitigation Bank Project (CSMB Project) as a private commercial mitigation bank that would re-establish approximately 312 acres of tidal freshwater marsh and floodplain-associated vegetation communities in the north Sacramento-San Joaquin Delta (Delta) in Solano County, California. Mitigation credits generated by onsite restoration would offset unavoidable impacts on federally regulated aquatic resources and habitats of federally protected species in the Delta, particularly for salmonids (*Oncorhynchus* sp.), green sturgeon, and Delta and longfin smelt. The CSMB Project is being designed to (1) benefit imperiled native fish and wildlife species by providing suitable habitat and supporting ecological functions, and (2) minimize potential risks to sensitive species and habitats.

The CSMB property currently encompasses approximately 350 acres of existing diked agricultural land. This property is at the confluence of Cache Slough, the Sacramento River, and Steamboat Slough, and is downstream of several contributing waterways including Lindsey Slough, Miner Slough, and the Sacramento River Deep Water Ship Channel. This location is ideal for restoration because it lies immediately downstream from the streams that transport all out-migrating anadromous fish from the Sacramento River basin, and supports many native, resident fish species of the north Delta.

Historically, the Project site supported tidal freshwater marsh and riparian habitat until it was cut off from tidal influence by a farm levee, drained, and graded in the 1940s and 1950s to support agricultural uses. Returning the CSMB property to its historical habitat of tidal freshwater wetland would support many protected species and provide critical food support and rearing habitat for both native resident and out-migrating fish. Establishment of the CSMB would provide mitigation with full legal, financial, and ecological assurances necessary to address Clean Water Act Section 404 and federal Endangered Species Act permitting obligations for regional planning and infrastructure projects.

1.2 Project Area

The CSMB Project area is located south of the Yolo Bypass and immediately northeast of the City of Rio Vista. This property is located adjacent to the approximately 3,100-acre proposed Little Egbert Multi-Benefit Project (LEMBP). Both the CSMB Project and the LEMBP are on WES-owned properties. The LEMBP is being developed independently from the CSMB by the California Department of Water Resources (DWR) and the Little Egbert Joint Powers Agency (LEJPA). Both projects include restoration of tidal freshwater wetland habitat, but they are on

different timelines, have different purpose and need, and will function independently of each other as stand-alone projects.

The Rio Vista Municipal Airport (Airport) is located approximately 2 miles west of Cache Slough. As required by the Rio Vista Airport Land Use Compatibility Plan (ALUCP) (SCALUC 2018, Policies WH-1 and WH-2), this report provides a Wildlife Hazard Analysis (WHA) to evaluate existing and potential future conditions for wildlife hazards to aircraft as a result of the proposed Project. Travis Air Force Base (AFB) is located roughly 14 miles northwest of the CSMB property, which falls outside of the compatibility zone requiring a WHA.

The CSMB property is generally bounded on the north and northeast by Watson Hollow Slough, on the west by the Mellin Levee Extension, on the southwest by the Mellin Levee (a State Plan of Flood Control levee), and on the southeast by Solano County Levee 28, a restricted-height levee along Cache Slough and the Sacramento River (**Figure 1**). State Route 84 is situated on the top of the restricted-height levee.

1.3 Existing Land Use

For the past 30 years or more, the CSMB property has been managed as irrigated pasture for cattle grazing and as a managed marsh for waterfowl hunting. Approximately 200 acres of the site consist of grasslands, which are heavily used as foraging habitat by resident and migratory geese, and 85 acres consist of emergent marsh, which is managed to promote use by both geese and ducks.

Every year, millions of migratory waterfowl arrive to winter in the Sacramento–San Joaquin Delta. Migratory ducks and geese arrive on the CSMB property between October and November each year, with peak numbers occurring from December to February. To support wintering waterfowl and increase hunting opportunities on the property, flood-up of the managed marsh begins around October 1, with water management on the site controlled through screw/flap gates on Watson Hollow Slough. The vegetation in the marsh is currently managed to achieve approximately 50 percent open water/50 percent vegetative cover, with shallow water ponding between 6-12 inches in depth to provide favorable waterfowl foraging and resting conditions.

Winter rains, which begin in earnest in late November or early December, bring green growth to the grazed or disked grasslands, attracting thousands of greater white-fronted geese (*Anser albifrons*) and snow geese (*Anser caerulescens*) seeking forage. The geese continue to use the grasslands for foraging and the wetlands for roosting until spring migration. Waterfowl start leaving the property in mid-February to migrate north for breeding. Water draw-down activities are initiated around the same time to eliminate standing water in the managed marsh habitats. By late spring, virtually all waterfowl except for a few local mallards (*Anas platyrhynchos*) and Canada geese (*Branta canadensis*) have left the site. Throughout the summer, water is retained in the ditches for cattle, which typically graze the site from late winter through mid-summer. During late summer when the marsh is driest, mowing and disking activities are initiated to reduce the stands of tules (i.e., bulrush-dominated marsh), thereby increasing growth of waterfowl food plants and providing refuge areas within the marsh to attract wintering waterfowl to the property.

SOURCE: Google Earth Pro, 2022; ESA, 2023

Cache Slough Mitigation Bank Project

Figure 1
Cache Slough Project Area

ESA

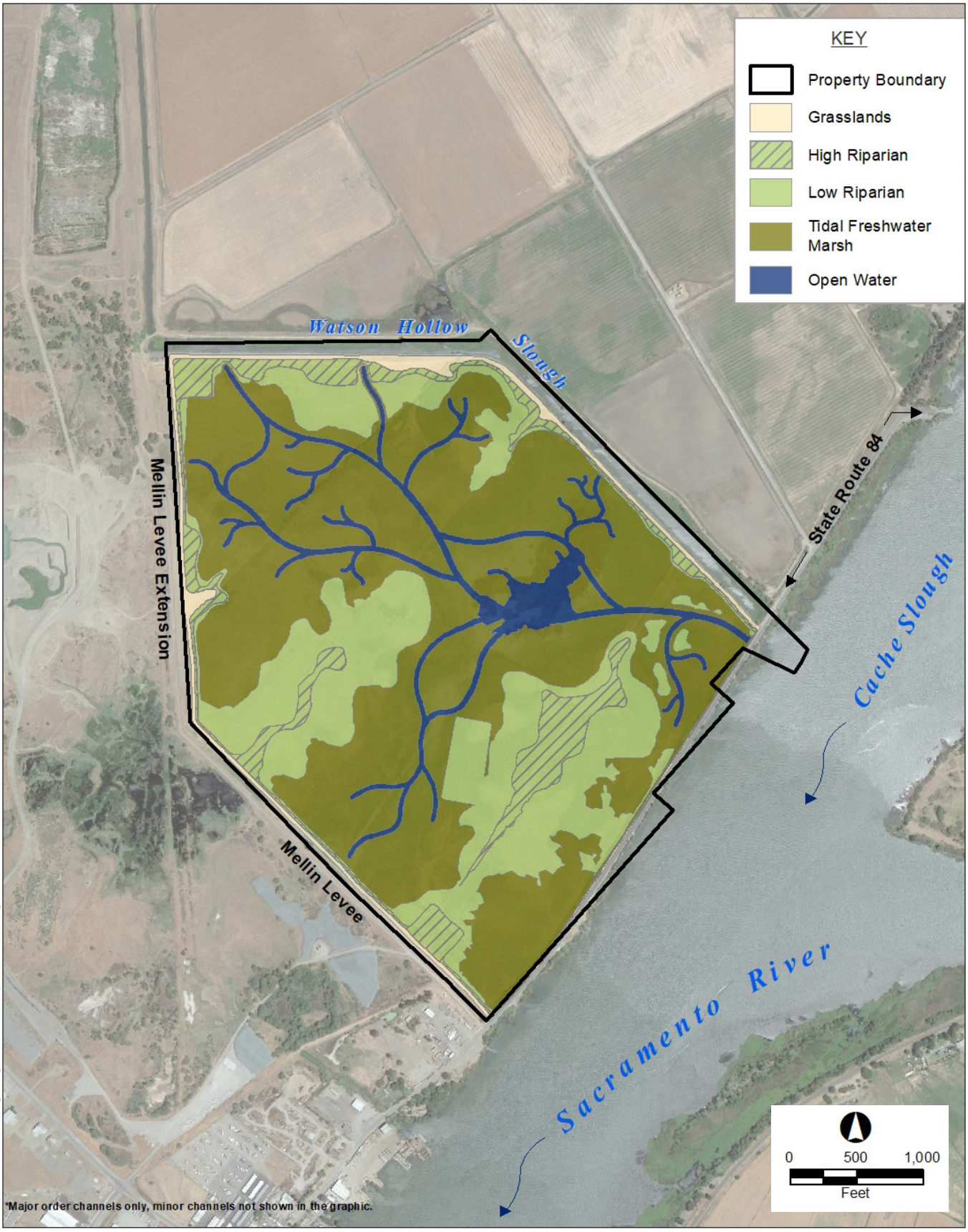
1.4 Project Design

The CSMB Project proposes to re-establish tidal freshwater marsh and floodplain-associated vegetation communities, which reflect the historic accounts of land cover on-site, as well as the habitats modeled by the San Francisco Estuary Institute's 2012 Sacramento-San Joaquin Delta Historical Ecology Investigation (**Figure 2**). To accomplish this, a series of open water/tidal dendritic channels (or backwater sloughs) would be excavated throughout the site, which would connect directly to Cache Slough/Sacramento River under SR 84. These channels would be sized to accommodate water flows associated with daily tidal fluctuations to prevent high scour velocities and avoid tidal muting. A direct hydraulic connection to tidal waters would be engineered to best allow full ecological functions and species access to the interior of the site.

Fill material generated from excavating interior dendritic channels would be used to create varying topography throughout the site, which would support zones of wetland, riparian and upland communities based on elevation and expected ecological benefits to the site and surrounding area. For example, by allowing full tidal exchange to occur throughout the emergent marsh areas, the Project would promote nutrient exchange, provide food-web support for aquatic species in adjacent waterways, and export organic carbon off-site into the Sacramento River and surrounding Delta waterways. In addition, riparian habitat would be enhanced and restored to create a broad mosaic of floodplains, upland refugia, and shaded riverine habitat that would support a mix of terrestrial, semi-aquatic, and aquatic species on the site.

Vegetation establishment would be accomplished through both natural recruitment and a variety of planting methods for trees and herbaceous species, including container plantings, cuttings, and seeding. The planting plan would favor perennial species that, once established, would discourage or prevent the growth of annual species that are attractive to geese for foraging. Plantings would be sourced from on-site or from the surrounding area, whenever possible, ensuring that plants are locally adapted to site conditions and would likely develop self-sustaining populations through natural recruitment. An invasive plant management plan is proposed, which would target both aquatic and upland areas.

Post-restoration conditions would reflect natural reference sites in the North Delta. As part of restored increased daily tidal exchange, water would flow through the constructed tidal opening into a series of subtidal and intertidal channels and onto the marsh plain dominated by tule (*Schoenoplectus* sp.). During the ebb of the tide, these waters would drain from the marsh plain through the tidal channels and back into Cache Slough/Sacramento River. On low tide, open water habitat would be limited to the primary channels. The Project has been designed to avoid persistent ponding on the marsh plain that could support large numbers of predatory fish and attract waterfowl loafing. As the topography rises above the daily influence of the tides, the site would transition to woody riparian scrub dominated by shrubby willow species (*Salix* sp.) with similar vegetation composition to the channel margins, levee banks, and in-channel islands within Cache Slough, Lindsey Slough, and Prospect Slough. Higher in the landscape, the riparian vegetation would shift to a woodland with multiple vegetation layers primarily characterized by a dense canopy of trees, vines, and shrubs. A description of each of the restored habitats including anticipated size, water depths, vegetation composition and densities, and management actions is provided below in **Table 1**.



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SOURCE: Westervelt Ecological Services, 2023

Cache Slough Mitigation Bank Project

Figure 2
Cache Slough Proposed Land **C**over Types

ESA

TABLE 1
PROPOSED RESTORED HABITAT

Credit Type/Habitat	Acreage[a]	Description	Water Depth	Typical Plant Species[b]	Typical Planting Densities	Anticipated Vegetation Management
Tidal Freshwater Wetland – Open water	25	Subtidal habitat – open water channels would meander throughout various elevations of this credit type.	7 to 11 feet during the daily tidal cycle	Mostly unvegetated; some submerged vegetation	N/A	Hand and mechanical removal of invasive aquatic species, as needed.
Tidal Freshwater Wetland – Emergent Marsh	181	Emergent marsh occupies intertidal elevations and is characterized by hydrophytic herbaceous vegetation, such as grasses, reeds, and sedges that are rooted in the substrate but emerge from the water.	Various levels of fluctuating inundation based on the daily tidal prism, from 0 to 4 feet	Dominated by tules (*Scirpus* sp.) and cattails (*Typha* sp.)	300 plants (plugs)/acre	Occasional hand harvesting by local Tribes
Floodplain Riparian – Low Elevation	80	These areas occupy elevations above the Mean Higher High Water and would be subject to seasonal flooding events of short duration (1-2 hours) during bi-monthly spring tides and bi-annual king tides. Lower floodplain habitat would support a mix of riparian trees and shrubs with a variable understory of grasses, sedges, and other hydrophytic forbs.	Shallow intermittent flooding for short durations, typically less than 2 feet	White alder (*Alnus rhombifolia*), sandbar willow (*Salix exigua*), black willow (*Salix nigra*), box elder (*Acer negundo*), ryegrasses (*Lolium* sp.), and meadow barley (*Hordeum brachyantherum*)	100 trees/acre	Intermittent grazing by sheep/goats
Floodplain Riparian – High Elevation	26	These areas occupy elevations subject to flooding during major storm events. This habitat would consist of multiple vegetation layers of trees, vines, and shrubs, as well as open grassland.	Shallow intermittent flooding for short durations, typically less than 1 foot	Oregon ash (*Fraxinus latifolia*), black walnut (*Juglans nigra*), sycamore (*Platanus* sp.), valley oak (*Quercus lobata*), live oak (*Quercus wislizeni*)	17 trees/acre	Intermittent grazing by sheep/goats and mowing in accessible areas

NOTES:
a. Habitat design acreages are preliminary and may be adjusted during final design.
b. Only native species will be incorporated into the planting palette.

The Project area currently supports approximately 84 acres of managed marsh and 131 acres of grasslands, which would be converted to approximately 236 acres of tidal emergent marsh. Tidal freshwater wetland habitat will provide both subtidal shallow-water aquatic and intertidal emergent marsh habitat that provides vital food and rearing habitat for juvenile fish and offers shelter and nesting sites for many species of migratory songbirds and waterfowl. The CSMB Project would restore historic tidal conditions and fish access to an area that has been separated from Cache Slough/Sacramento River for more than 80 years.

Inundated riparian floodplains provide important ecologic functions because they stimulate beneficial food web processes by enhancing plant growth, triggering aquatic invertebrate production, and exporting food that becomes available to downstream fish and wildlife. Floodplain riparian habitat would support fish rearing during winter and spring months when floodwaters are present.

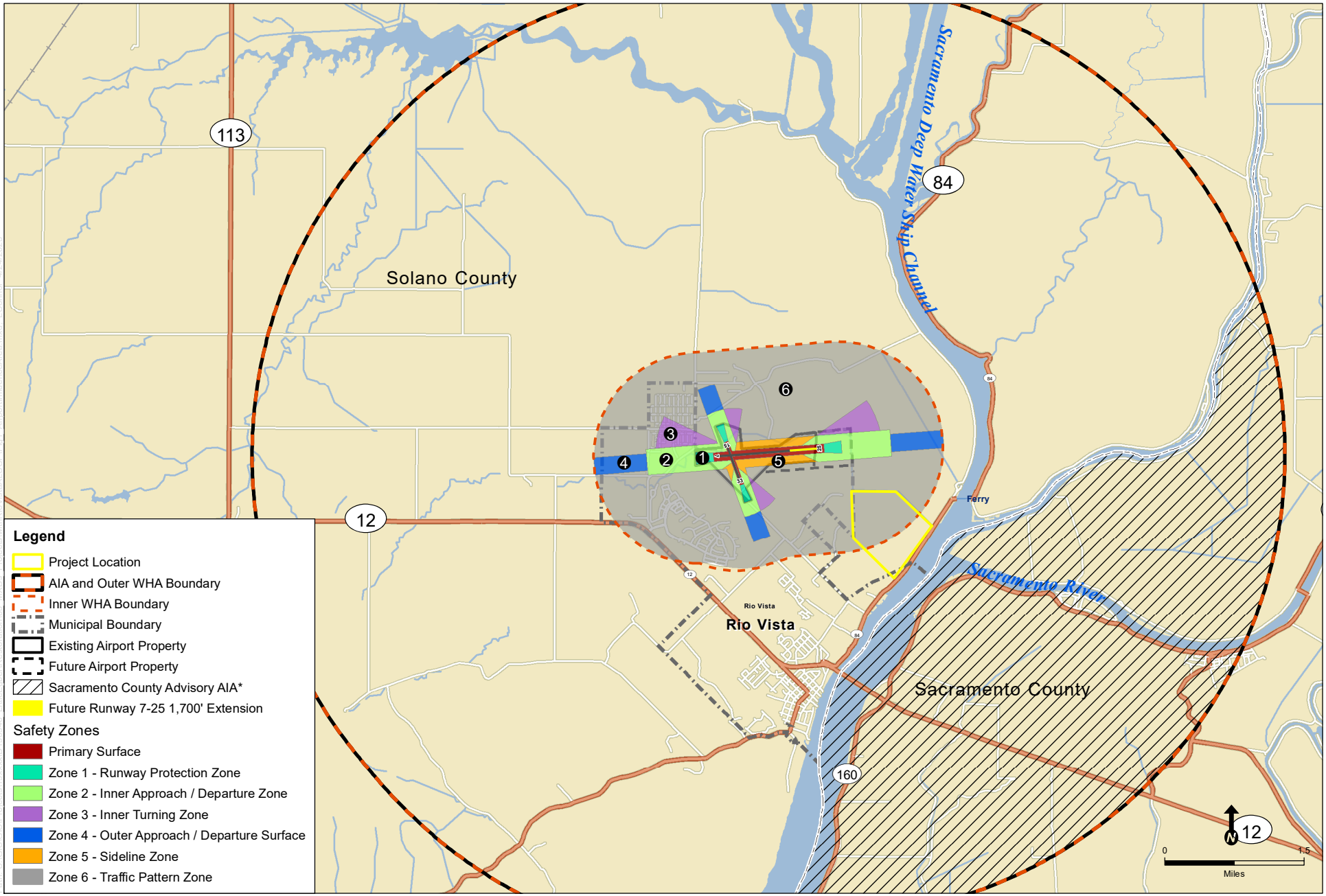
1.5 Airport Land Use Compatibility

The CSMB Project area and the Rio Vista Municipal Airport (Airport) are located in an important migratory and wintering area within the Pacific Flyway, utilized by millions of waterfowl every winter. Managed wildlife areas with heavy waterfowl use in the vicinity include Suisun Marsh (12 mi west of the Airport) and the Yolo Wildlife Management Area (16 mi north of the Airport).

The Solano County Airport Land Use Commission (SCALUC) may review certain discretionary projects located within an Airport Influence Area (AIA) for consistency with the applicable Airport Land Use Compatibility Plan (ALUCP). The CSMB Project area is located within the AIAs for Rio Vista Municipal Airport (**Figure 3**) and Travis AFB.[1] The Inner Wildlife Hazard Analysis (or WHA) Boundary is coterminous with Safety Zone 6, which encompasses the area within 6,000 feet of the runway centerline and requires all reasonably feasible mitigation measures be incorporated into planned land uses to avoid bird strikes. 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 (SCALUC 2018).

As delineated in the Rio Vista ALUCP (SCALUC 2018), the northwestern portion of the Project area (205 acres) overlaps with the Inner WHA Boundary (Figure 3). The entire Project area is located within the Outer WHA Boundary, as delineated in the Rio Vista ALUCP. The northwest portion of the CSMB Project area also falls within Rio Vista Airport Safety Zone 6 (the Traffic Pattern Zone). The safety compatibility criteria for the mapped safety zones reiterates the requirement to prepare a WHA for areas also within the Inner WHA Boundary, referring to the ALUCP wildlife hazard policies.

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



SOURCE: California Airport Land Use Planning Handbook, October 2011; ESA, 2023

*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

Cache Slough Mitigation Bank Project

Figure 3

Rio Vista Municipal Airport Influence Area and Safety Zones

ESA

Per the Travis ALUCP, a WHA is required for new land uses within the Bird Strike Hazard Zone/ Outer Perimeter that have potential to attract the movement of wildlife that could cause bird strikes (County of Solano 2015). As delineated in the ALUCP, the CSMB Project area is located outside of the Travis AFB Bird Strike Hazard Zone and the Outer Perimeter, and just within the boundary of Compatibility Zone D ("Other Airport Environs"), which does not require a WHA.

According to the Rio Vista ALUCP, the SCALUC shall apply the wildlife hazard policies to discretionary projects located within the Inner and Outer WHA Boundaries (**Table 2**). Therefore, the proponents of the proposed Project are required to prepare a WHA report (Policies WH-1 and WH-2) and to consider the findings as part of their California Environmental Quality Act (CEQA) environmental review process (Policy WH-3).

TABLE 2
RIO VISTA ALUCP WILDLIFE HAZARD POLICIES

Policy Number	Description
WH-1 Known Wildlife Hazards in Solano County - Inner WHA Boundary	Within the Inner WHA Boundary, new or expanded land uses involving discretionary review that have 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, any new or expanded land use involving discretionary review that has the potential to attract the movement of wildlife and cause bird strikes is 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 SCALUC (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 (SCALUC 2018)

1.6 Objectives of Wildlife Hazard Analysis

As required by the ALUCP Policies WH-1 and WH-2 (SCALUC 2018), this report provides a WHA to evaluate existing and potential future conditions for wildlife hazards to aircraft due to the proposed Project. Objectives include:

- Characterize existing hazard potential by analyzing aircraft strike data for the Rio Vista Municipal Airport (Airport);

- Identify habitat features that attract wildlife;
- Identify wildlife species present in the Project area, including numbers, locations, local movements, and daily and seasonal occurrences; and
- Analyze potential wildlife hazards under existing conditions and evaluate potential changes in hazard potential under the proposed Project.
- The WHA must demonstrate wildlife movement that may pose hazards to aircraft in flight will be minimized, including all reasonable mitigation measures that will be incorporated into the proposed Project.

A WHA is a report intended to focus on a single project in the airport environs to identify the types of wildlife hazards present in that project area (ESA 2022). The WHA should provide information sufficient to respond to relevant questions in the CEQA Guidelines, Appendix G, Environmental Checklist. The WHA report should include recommendations for minimizing and mitigating any potential hazards posed by a proposed land use action. This report 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 report is prepared by an airport as a precursor to inform the Wildlife Hazard Management Plan. A Wildlife Hazard Analysis is intended to be less complex than a Wildlife Hazard Assessment (SCALUC 2018, ESA 2022).

CHAPTER 2
Methods

2.1 Approach

The methods employed for this WHA are similar to the guidelines for Wildlife Hazard Site Visits provided for in FAA AC 150/5200-38. The intent of a Wildlife Hazard Site Visit is to analyze an airport's wildlife hazards, determine whether a more comprehensive Assessment is warranted, and provide recommended actions to mitigate the hazards. The 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. In addition, this analysis considers past wildlife airstrike data, presence of high-risk species, and expected future wildlife use of the proposed Project upon completion.

2.2 Land Use and Habitat Types

Existing habitat types were mapped for the CSMB Project area in 2020 and confirmed during subsequent wildlife surveys (**Figure 4**). Surrounding land use was assessed qualitatively using Google Earth imagery. Expected future habitat types were described based on the preliminary design of the proposed Project (**Figure 2**).

2.3 Aircraft Bird Strike Review

The FAA maintains a nationwide database of bird strikes reported since 1990 (FAA 2020a, 2023). This database was queried to identify the species most frequently struck, the species most likely to result in aircraft damage, and bird strikes documented at the Airport.

2.4 Wildlife Surveys

ESA conducted avian and mammalian surveys within the CSMB Project area as part of a larger survey effort that included the adjacent Westervelt-owned approximately 3,100-acre Little Egbert Tract (LET) property. Surveys were conducted during the spring and summer breeding season (April–August 2020) and fall and winter migration as well as the overwintering season (September 2021–March 2022) to characterize existing wildlife use (baseline conditions). A focused avian survey of only the CSMB Project area was also conducted in February 2023 (**Attachment A**).

To establish the most accurate baseline possible, the surveys were conducted using methods consistent with 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 survey 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 the 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. Note that this protocol exceeds the level of effort necessary for a Wildlife Hazard Analysis, which is the standard for evaluating new land uses that may attract wildlife, as specified in the Rio Vista ALUCP Wildlife Hazard Policies WH-1 and WH-2.

The 2020-2022 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 was 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. The 2023 survey followed the methods established during the 2020-2022 surveys and occurred over a single day (February 13) during the morning and midday time periods.

FAA guidance requires survey points approximately one-half mile apart. In 2020, survey points were strategically placed across the LET property and CSMB property (approximately 3,450 acres combined) and visited during each survey event, per the FAA guidance of placing vantage points such that 50 hectares are covered at each location. After the 2020 surveys, it was determined that five survey points (two within the CSMB Project area and three points previously established at the south end of the LET property just outside of the northern CSMB Project area boundary) provided a comprehensive view of the CSMB site and equal coverage over the various habitats; therefore, the 2021–2023 surveys of CSMB included those five points.

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.

ESA conducted a single nighttime survey during the 2020 spring season. The survey consisted of driving the survey 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 one stationary wildlife Browning Trail camera mounted on a wooden stake within the southern portion of the CSMB Project area.

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

The February 2023 single-day survey was conducted during the height of the winter waterfowl season and prior to drawdown of onsite water to obtain specific data relative to high waterfowl use. Waterfowl such as ducks and geese are large-bodied birds that move in large flocks, and they present a significant threat to flight safety because they can cause catastrophic damage to aircraft. The winter observation provided a baseline understanding of the present-day wildlife hazard risk when waterfowl density is at its peak, as the property has been managed to attract waterfowl for

hunting. The survey covered two periods: morning and midday. At each survey point, observers recorded all birds (species and number of individuals), their associated locations, and activities (such as foraging, loafing, or vocalizing on the ground). In addition to the data collected at the survey points, wildlife detected between points was also recorded.

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CHAPTER 3
Results

3.1 Land Use

The Airport is located in proximity to existing large waterbodies and is situated 2 miles west of Cache Slough and 2 miles north of the Sacramento River. Land use adjacent to the Airport includes:

- Agricultural lands to the north and east consisting primarily of hay and row crops;
- Open space to the southeast used for cattle grazing and supporting grassland and seasonal wetland habitats (including a 25-acre perennial pond);
- Active sand and rock quarry to the south supporting large areas of riparian vegetation and perennial wetlands; and
- Residential development to the west and southwest.

The Project area has mostly been out of crop production since the early 1990s, with the exception of the northern field, which was safflower for a short time in the early 2000s. Since the late 1990s, most of the site has been managed for cattle grazing and private waterfowl hunting, based on discussions with the previous landowner and a lessee of the previous owner (Lira family). The Project area is currently used for livestock grazing and waterfowl hunting and retains some natural topography, hydrology, and vegetation, despite having been leveled in the past for flood irrigation. Presently, the interior portion of the Project area is separated from the tidal waters of Cache Slough and the Sacramento River by SR 84 and from Watson Hollow Slough by a farm berm.

Upland grasslands occupying the higher elevations of the Project area receive only natural precipitation. The lower elevations and agricultural ditches are periodically and seasonally flooded with irrigation water from Watson Hollow Slough to grow feed for cattle and provide waterfowl habitat. In early October, water is drawn onto the Project area by gravity feed from Watson Hollow Slough through a water control structure on the north boundary. Water flows through a ditch, fills the wetland pond in the north, and then overflows into a ditch connected to the southeastern pond. In February, a drawdown begins with water being released back into Watson Hollow Slough through a water control structure along the southeast boundary. Not all of the water is drawn out; some remains in ditches and is used for cattle watering.

The livestock operator intentionally floods the low areas of the property through manual operation of passive tide gates in order to provide a water source for the livestock and forage plants throughout the summer and fall. In winter, the Project area is used for waterfowl hunting.

3.2 Habitat Types

Existing habitat types mapped for the Project area include aquatic, riparian, and upland vegetation communities (**Table 3** and **Figure 4**).

TABLE 3
CURRENT HABITAT TYPES WITHIN THE CSMB PROJECT AREA

Habitat Types	Acres	Percent
Grassland	204.63	58.5%
Managed Marsh	84.42	24.1%
Clay Flat	17.68	5.1%
Agricultural Ditch	14.31	4.1%
Ruderal	10.24	2.9%
Riparian	8.29	2.4%
Seasonal Wetland	3.88	1.1%
Open Water	3.22	0.9%
Emergent Marsh	1.65	0.5%
Developed	1.82	0.5%
Seep	0.004	>0.01%
Total	**350.10**	**100%**

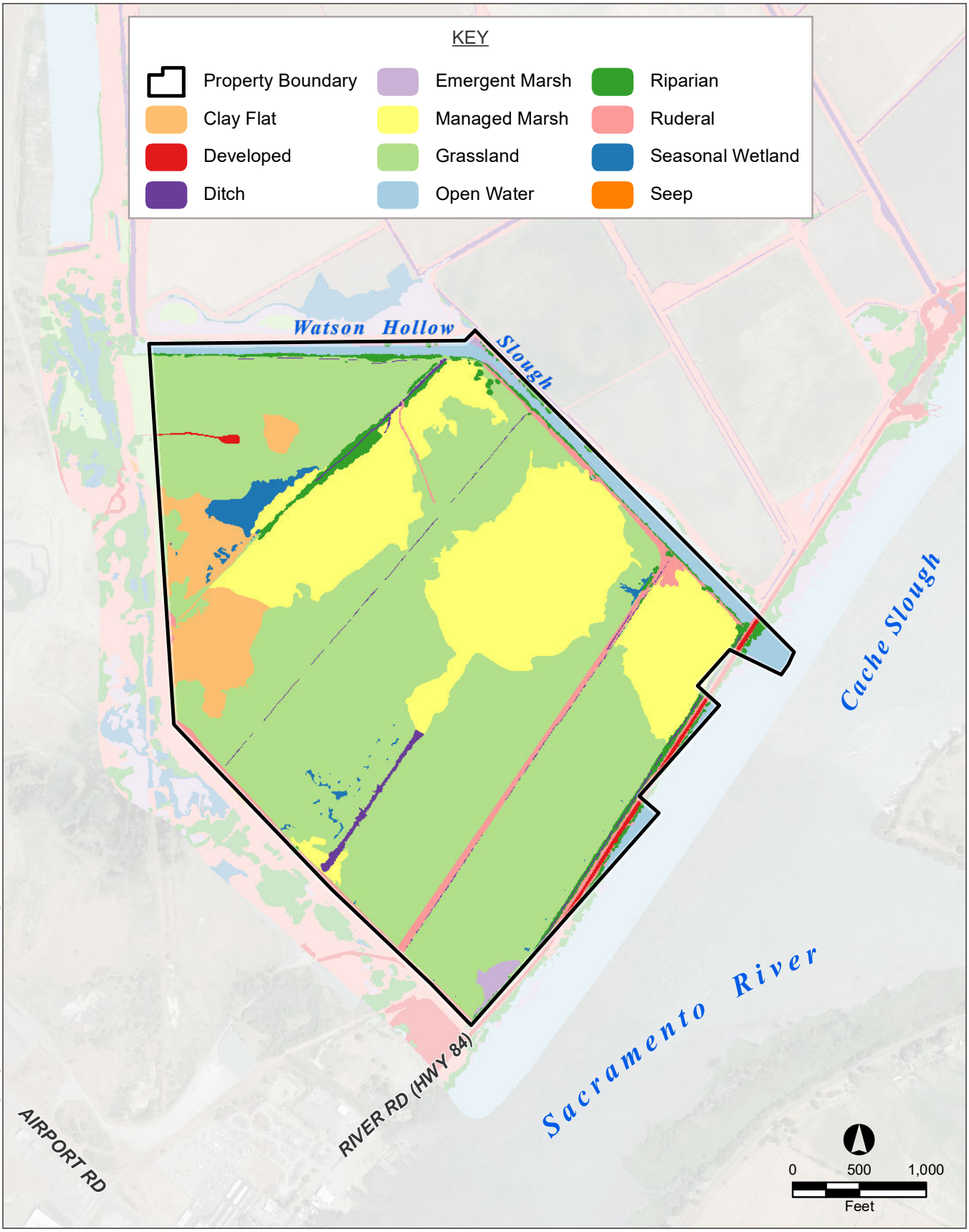
Aquatic

Aquatic habitats in the Project area include open water, agricultural ditches, emergent marsh, managed marsh, seasonal wetlands, and seep.

Open Water habitat occurs within Watson Hollow Slough, Cache Slough, and the Sacramento River. Open water includes areas that contain minimal to no vegetation with consistent deep water (greater than 3.5 feet).

Agricultural Ditch habitat is characterized by ditches excavated for conveying irrigation water or collecting tailwater for agricultural purposes. Vegetation is dominated by Bermuda grass (*Cynodon dactylon*), which extends into the adjacent grasslands.

Emergent Marsh occurs along the edges of Watson Hollow Slough and is characterized by a prevalence of perennial monocots that are rooted in soil and emerge from semi-permanent to permanently flooded or ponded water. Dominant species include tule (*Schoenoplectus acutus* var. *occidentalis*), California bulrush (*Schoenoplectus californicus*), and cattails (*Typha* spp.). Cocklebur (*Xanthium strumarium*), Dallis grass (*Paspalum dilatatum*), and perennial pepperweed (*Lepidium latifolium*) also occur at the fringes.



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SOURCE: Westervelt Ecological Services

Cache Slough Mitigation Bank Project

Figure 4
Habitat Types within the CSMB Project Area

ESA

Managed Marsh habitat comprises approximately 24% of the Project area (Table 2). Managed marsh is present in areas that receive water manually via tide and flap gates along Watson Hollow Slough and that are managed specifically for waterfowl. The water is generally less than 2 feet deep. Vegetation is comprised of a mosaic of tules and cattails, with shallower areas dominated by Pacific rush (*Juncus effuses* var. *pacificus*), tapertip flatsedge (*Cyperus acuminatus*), Baltic rush (*Juncus balticus*), common spikerush (*Eleocharis macrostachya*), marsh purslane (*Ludwigia palustris*), and common smartweed (*Persicaria hydropiper*). Other species present include Bermuda grass (*Cynodon dactylon*), curly dock (Rumex crispus), smaller duckweed (*Lemna minor*), hyssop loosestrife (*Lythrum hyssopifolia*), mosquito fern (*Azolla filiculoides*), water starwort (*Callitriche* sp.), and cursed buttercup (*Ranunculus sceleratus*).

Seep habitat in the project area is limited to a small area along Mellin Levee and is a result of water leaking through the levee. Dominant vegetation includes common spikerush (*Eleocharis macrostachya*), Baltic rush (*Juncus balticus*), and Santa Barbara sedge (*Carex barbarae*).

Seasonal Wetlands consist of four general types: farmed, managed, created by cattle, and alkali.

- Farmed seasonal wetlands occur in former agricultural fields and are dominated by hydrophytes including toad rush (*Juncus bufonius*), common spikeweed (*Centromadia pungens*), common smartweed, common knotweed (*Polygonum aviculare*), hyssop loosestrife, watergrass (*Echinochloa crus-galli*), alkali sacaton (*Sporobolus airoides*), and Italian ryegrass (*Festuca perrenis*).
- Seasonal wetlands managed for waterfowl are dominated by hydrophytic grasses including Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), rabbitsfoot grass (*Polypogon monspeliensis*), waxy mannagrass (*Glyceria declinata*), swamp timothy (*Cypsis schoenoides*), and Dallis grass, with salt grass (*Distchilus spicata*) and Bermuda grass at the fringe. Dominant forbs include marsh purslane (*Ludwigia palustris*), tapertip flatsedge, common smartweed, and cursed buttercup, with cocklebur, toad rush, narrow-leaved plantain (*Plantago lanceolata*), and dock species (*R. crispus* and *R. pulcher*) along the fringes.
- The presence of cattle onsite during wet conditions has resulted in seasonal wetlands created by ponding within depressions made by cattle hoof prints. These areas support a sparse assemblage of hydrophytic grasses including Mediterranean barley, rabbitsfoot grass, Italian ryegrass, and waxy mannagrass, as well as a few forbs such as common cocklebur, curly dock, and brass buttons (*Cotula coronopifolia*).
- Alkali seasonal wetlands differ from other seasonal wetlands in their vegetative composition. Alkali seasonal wetlands support wetland plant species that are tolerant of high soil salt concentrations (halophytes). Many of the alkaline seasonal wetlands onsite supported almost pure stands of alkali heath (*Frankenia salina*), with some Mediterranean barley.

Riparian

Riparian habitats are characterized by a dominance of woody tree and shrub species growing within or adjacent to seasonal or perennial waterbodies such as agricultural ditches or Watson Hollow Slough. Most of this habitat is dominated by a midstory of sandbar willow (*Salix exigua*), with a sparse overstory of arroyo willow (*Salix lasiolepis*) and the occasional Fremont cottonwood (*Populus fremontii*), with Himalayan blackberry (*Rubus armeniacus*) as a vine layer and a ruderal herbaceous layer.

Upland

Upland habitats in the Project area include grassland and ruderal areas.

Grassland habitat covers more than half of the Project area (Table 2). Grasslands are dominated by Bermuda grass, with birds' foot trefoil (*Lotus corniculatus*), bur clover (*Medicago polymorpha*), sand spikerush (*Eleocharis montevidensi*), and annual sunflower (*Helianthus annuus*) as subdominants. Most of the grasslands are artificially inundated or saturated to the surface for long durations during the growing season.

Clay Flat habitat is relatively flat land with heavy clay soils that support a prevalence of hydrophytes dominated by stalked popcornflower (*Plagiobothrys stipitatus* var. *micranthus*) and common spikeweed, with coyote thistle (*Eryngium vaseyi*) and bur clover (*Medicago polymorpha*) as subdominants. Much of the clay flat habitat appears to have been created by historic land leveling for agricultural purposes. However, a portion of clay flat habitat onsite has more alkaline soils and is approximately 1 to 2 feet higher in elevation. Except for some vehicular ruts and evidence of disking on historic aerial photographs, this alkaline clay flat appears to be a relict natural feature. The alkaline clay flat supports additional salt-tolerant plant species that include Fremont's goldfields (*Lasthenia fremontii*), Oregon wooly marbles (*Psilocarphus oregonus*), long leaf plantain (*Plantago elongata*), and net peppergrass (*Lepidium acutidens*).

Ruderal habitats are characterized by areas that are sparsely vegetated with weedy plant species that are adapted to routine human disturbances (i.e., herbicide spraying, disking, mowing, vehicular traffic, etc.). Ruderal habitat within the Project area generally occurs along the edges of levees, elevated berms of irrigation ditches, and edges of roads. This habitat is routinely cleared of vegetation by herbicides and is used by vehicles, mostly during the dry season.

3.3 Aircraft Bird Strike Review

Table 4 lists the 33 species of birds reported most frequently in aircraft strikes nationwide between 1990 and 2018 (FAA 2019), and of those, further identifies the species that were observed during the 2020-2022 CSMB surveys.

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

Rank	Bird Species	Strikes in US		Seasonal Occurrence at or near CSMB Project Area[1]	
		Total Number	% with Damage	Spring/Summer	Fall/Winter
1	Mourning dove	10,187	2.1	Present	Present
2	Killdeer	6,357	0.9	Present	Present
3	American kestrel	6,155	0.6	None observed	Present
4	Barn swallow	6,036	0.4	None observed	Present nearby
5	Horned lark	5,149	0.5	None observed	Present nearby
6	European starling	4,816	2.9	None observed	Present, top 10 most abundant
7	Rock dove (pigeon)	3,411	7.8	None observed	Present

Rank	Bird Species	Strikes in US		Seasonal Occurrence at or near CSMB Project Area[1]	
		Total Number	% with Damage	Spring/Summer	Fall/Winter
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
11	Ring-billed gull	1,783	7.5	None observed	None observed
12	Canada goose	1,781	48.7	None observed	Present
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	None observed
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 nearby
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 observed during 2020-2022 surveys of both the CSMB Project area.
SOURCE: U.S. Department of Transportation, Federal Aviation Administration (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 bird strikes identified by species. In California, there were 9,212 bird strikes between 2010 and 2020 (FAA 2020a). About 53 percent of bird strikes in California occur from July to October, when young birds have recently fledged from nests and fall migration occurs.

Larger birds, particularly waterfowl and raptors, 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 over half of strikes that cause aircraft damage (FAA 2019). In California, waterfowl (ducks and geese) accounted for only 5 percent of 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).

There has been only one bird strike at Rio Vista Municipal Airport reported to the FAA strike database; however, strike incidents may have occurred historically that were not reported to the database. 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. On June 8, 2023, a single-engine Steen Skybolt crashed near the Rio Vista Municipal Airport; however, the cause of the crash has not been confirmed (Flores 2023).

3.4 Wildlife Surveys

3.4.1 Bird Count Surveys

Daily Activity Patterns

Surveys conducted across the CSMB study area resulted in 5,094 birds counted on 11 survey days during the late spring–summer (April to August 2020) and 15,439 birds counted on 8 survey days during the fall–winter (September 2021 to March 2022). The number of bird observations was the greatest during dawn, decreased during midday, and was at the lowest during dusk.

From September through March, the highest densities of waterfowl observations (99 percent of all waterfowl observed during this time period) occurred in the managed marsh habitat during winter (November through February). Most icterids (blackbirds) were seen during fall and winter in the northeastern-most grids. Icterids were most abundant during dawn and dusk, and often counted in flocks of hundreds. Waterfowl was most abundant from morning through midday.

The focused avian survey conducted in February 2023 observed similar levels of bird activity during the morning and mid-day survey periods, where waterfowl were observed moving between the CSMB Project area and adjacent LET property, as well as from areas east of the Sacramento River (**Attachment A**).

Bird Species and Guilds

Late Spring–Summer 2020

During the spring–summer 2020 surveys, over one-third of all observed birds were red-winged blackbirds (32.5 percent), followed by cliff swallows and European starlings (both ~8.5 percent) (**Table 5**). The top 10 most abundant guilds represented 99 percent of all individual birds observed, led by icterids and sturnids (52.8 percent) and swallows (12.7 percent) (**Table 6**). Large birds identified by the FAA (2019) to cause the most damage in air collisions (raptors, gulls and

waterfowl), made up 12.7 percent of the guilds observed (raptors 8.1 percent, waterfowl 4.6 percent, and gulls <0.1 percent).

TABLE 5
TOP 10 SPECIES OBSERVED IN THE CSMB STUDY AREA IN SPRING/SUMMER BY NUMBER OF INDIVIDUALS (APRIL–AUGUST 2020)

Species	Federal/State Status	Number of Individuals	Percentage
Red-winged blackbird	--	1,657	32.5
Cliff swallow	--	434	8.5
European starling	--	430	8.4
Brewer's blackbird	--	281	5.5
Barn swallow	--	185	3.6
House finch	--	184	3.6
Turkey vulture	--	166	3.3
Mallard	--	149	2.9
American crow	--	147	2.9
Western meadowlark	--	139	2.7
Total		**3,772**	**74.0**
Other Species		1,322	26.0
Grand Total		**5,094**	**100.0**

TABLE 6
TOP 10 GUILDS OBSERVED IN THE CSMB STUDY AREA IN SPRING/SUMMER BY NUMBER OF INDIVIDUALS (APRIL–AUGUST 2020)

Guild	Species Observed in CSMB Study Area	Number of Individuals	Percentage
Icterids & Sturnids	Western meadowlark, red-winged blackbird, Brewer's blackbird, brown-headed cowbird, Bullock's oriole, hooded oriole, European starling, tricolored blackbird	2,690	52.8
Swallows	Barn swallow, cliff swallow, northern rough-winged swallow, tree swallow	645	12.7
Other Passerines	Black phoebe, northern mockingbird, western kingbird, house finch, white-crowned sparrow, horned lark, loggerhead shrike, bushtit, marsh wren, lesser goldfinch, American goldfinch, California towhee, dark-eyed junco, lark sparrow, purple finch	474	9.3
Raptors	Red-tailed hawk, Swainson's hawk, northern harrier, turkey vulture, American kestrel, osprey, red-shouldered hawk, Cooper's hawk	414	8.1
Waterfowl (ducks, geese, swans) & Pelicans	Mallard, American white pelican, double-crested cormorant, Canada goose	236	4.6
Corvids	American crow, common raven, California scrub jay, Steller's jay	227	4.5
Sparrows	Savannah sparrow, golden-crowned sparrow, song sparrow	146	2.9
Doves	Mourning dove, rock dove, Eurasian collared dove	107	2.1
Wading birds	Great egret, great blue heron, snowy egret	67	1.3
Shorebirds & Kingfishers	Killdeer, belted kingfisher, greater yellowlegs	414	8.1
	Total Top Guilds	**5,049**	**99.1**
Other Species	American robin, various gulls, Nuttall's woodpecker, ring-necked pheasant, wild turkey.	45	0.9
	Grand Total	**5,094**	**100.0**

Fall 2021–Winter 2022 and Winter 2023

During the fall–winter surveys of the CSMB study area, over 80 percent of all observed birds were red-winged blackbird (37.3 percent), snow goose (27.2 percent), and greater white-fronted goose (19.4 percent) (**Table 7**). The top 10 most abundant guilds represented 99.6 percent of all individual birds observed, led by icterids (primarily blackbirds and starlings, 48.0 percent) and waterfowl (45.4 percent) (**Table 8**). Large birds identified by the FAA (2019) as causing the most damage in air collisions (raptors, gulls, and waterfowl), make up approximately 46% of all guilds observed (waterfowl, 45.4 percent; raptors, 0.2 percent; and gulls, <0.1 percent). Unlike the spring-summer survey, geese (predominately greater white-fronted geese and snow geese) were present during the fall and winter, and they were the most abundant species of waterfowl, comprising almost half of the top ten species observed (Table 7).

During the February 13, 2023 survey, thousands of waterfowl were observed flying over the eastern CSMB Project area at dawn, originating from agricultural fields east of the Sacramento River. Flocks of blackbirds were also seen foraging in or flying over the Project area. Throughout the morning, ducks, geese, and shorebirds were seen foraging in ponded areas and along pond edges, and over 1,000 geese foraged in agricultural fields to the northeast and northwest of the CSMB Project area. By midday, large flocks of geese flew into the ponded portions of the Project area, mostly originating from the north. Thousands of geese and other waterfowl continued foraging in the CSMB Project area during the midday period. Overall, findings of the February 2023 CSMB survey were consistent with those of the fall/winter 2022 survey. In both surveys, more birds occurred in seasonal wetland and open water habitats, while fewer birds (mostly smaller passerines) were observed in grassland areas.

TABLE 7
TOP 10 SPECIES OBSERVED IN THE CSMB STUDY AREA IN FALL/WINTER BY NUMBER OF INDIVIDUALS (SEPTEMBER 2021-MARCH 2022)

Species	Federal/State Status	Number of Individuals	Percentage
Red-winged blackbird	--	5,492	37.3
Snow goose	--	4,005	27.2
Greater white-fronted goose	--	2,860	19.4
Brewer's blackbird	--	926	6.3
Tricolored blackbird	--/CA Threatened	500	3.4
European starling	--	275	1.9
Savannah sparrow	--	237	1.6
Western meadowlark	--	154	1.0
House finch	--	144	1.0
White-crowned sparrow	--	113	0.8
Total		**14,706**	**95.3**
Other Species		733	4.7
Grand Total		**15,439**	**100.0**

TABLE 8
TOP 10 GUILDS OBSERVED IN THE CSMB STUDY AREA IN FALL/WINTER BY NUMBER OF INDIVIDUALS (SEPTEMBER 2021-MARCH 2022)

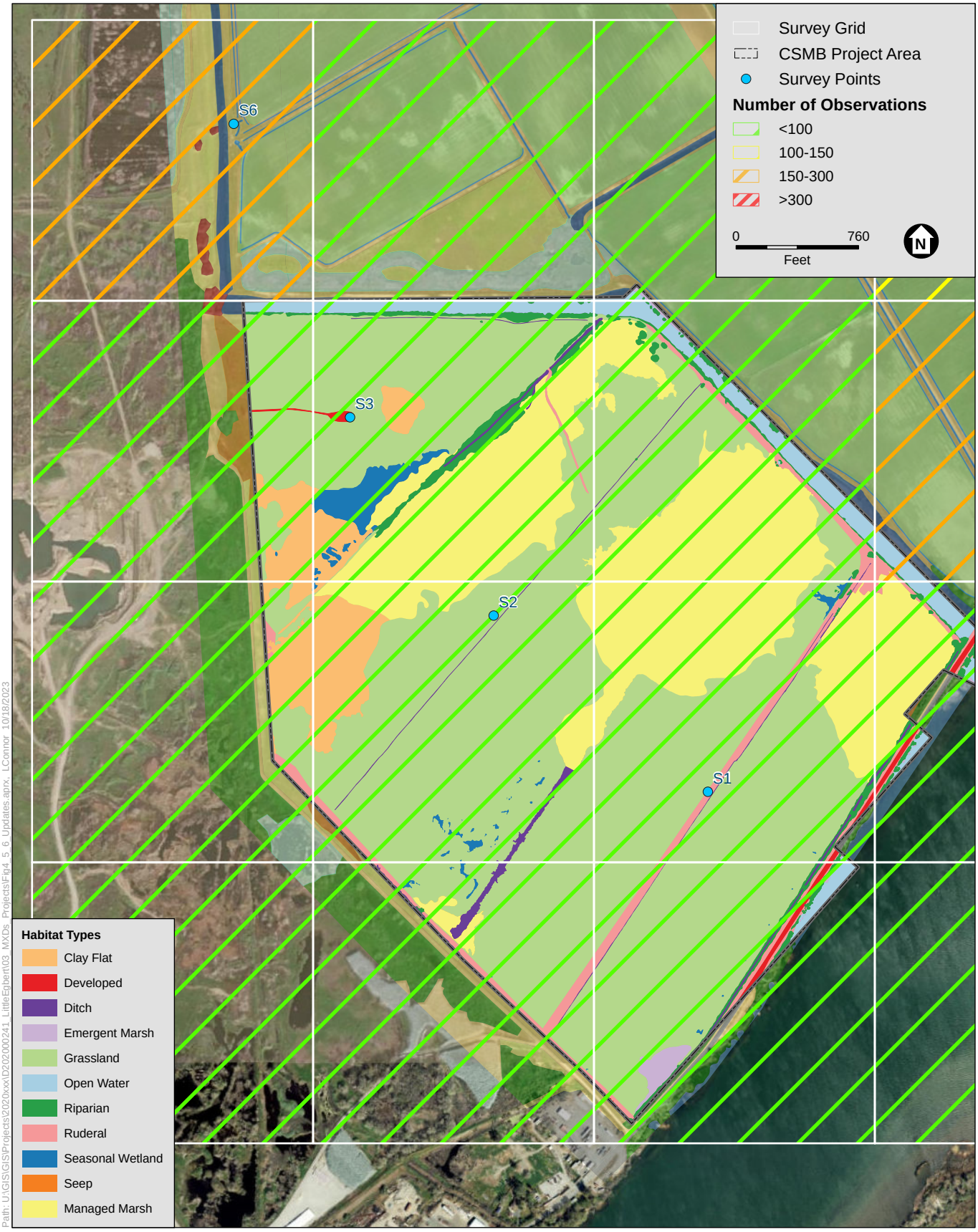
Guild	Species Observed in CSMB Study Area	Number of Individuals	Percent of Total Birds
Icterids & Sturnids	Western meadowlark, red-winged blackbird, Brewer's blackbird, tricolored blackbird, brown-headed cowbird, European starling	7,406	48.0
Waterfowl (ducks, geese, swans) & other waterbirds	American coot, bufflehead, Canada goose, common goldeneye, double-crested cormorant, greater white-fronted goose, mallard, northern shoveler, ruddy duck, snow goose, tundra swan, western grebe	7,012	45.4
Other Passerines	Black phoebe, northern mockingbird, western kingbird, house finch, white-crowned sparrow, loggerhead shrike, bushtit, marsh wren, dark-eyed junco, Say's phoebe, yellow-rumped warbler	371	2.4
Sparrows	Savannah sparrow, song sparrow, house sparrow, golden-crowned sparrow, spotted towhee	323	2.1
Corvids	American crow, California scrub jay, common raven	70	0.5
Doves	Mourning dove, rock dove, Eurasian collared dove	64	0.4
Wading birds	Great egret, great blue heron, snowy egret	64	0.4
Raptors	Red-tailed hawk, Swainson's hawk, northern harrier, turkey vulture, American kestrel, great-horned owl	38	0.2
Shorebirds & Kingfishers	Belted kingfisher, black-necked stilt, long-billed curlew, greater yellowlegs, killdeer	35	0.2
Swallows	Cliff swallow, northern rough-winged swallow.	24	0.2
	Total Top Guilds	**15,407**	**99.8**
Other Species	American robin, ring-necked pheasant, American pipit, western bluebird, acorn woodpecker, northern flicker, Nuttall's woodpecker, gull species.	32	0.2
	Grand Total	**15,439**	**100**

Seasonal Distribution and Density of Birds

Levels of bird activity during the spring and summer of 2020, fall and winter of 2021-2022, and winter of 2023 surveys were compared with the underlying land cover (**Figure 5** and **Figure 6**). High activity grids were categorized as those with greater than 300 observations over the survey season. Particular attention was paid to the distribution of larger birds that could pose a greater hazard for aircraft damage if struck, specifically raptors, large wading birds (herons, egrets), and waterfowl.

The number of birds within the Project area during spring and summer surveys was relatively low, with fewer than 100 birds observed in most grids. In fall and winter, high activity grids were associated with the managed marsh and grasslands, as well as the agricultural fields north of CSMB. Overall, more raptors were observed during the late spring and summer months compared to the fall and winter months. The highest number of raptors were documented outside of the Project area to the north-northwest and were associated with irrigated agriculture and ruderal vegetation on the levee. Low numbers of raptors were documented within the Project area and vicinity, associated with wetlands, irrigated agriculture, ditches, and canals. Low to moderate numbers of raptors were documented during all seasons. More waterfowl were documented in the late fall and winter months compared to the late spring and summer months, coinciding with the

winter migration season. Waterfowl were observed in seasonal wetland, freshwater emergent wetland and, to a lesser extent, in grassland habitats, which were occupied predominately by small passerines.

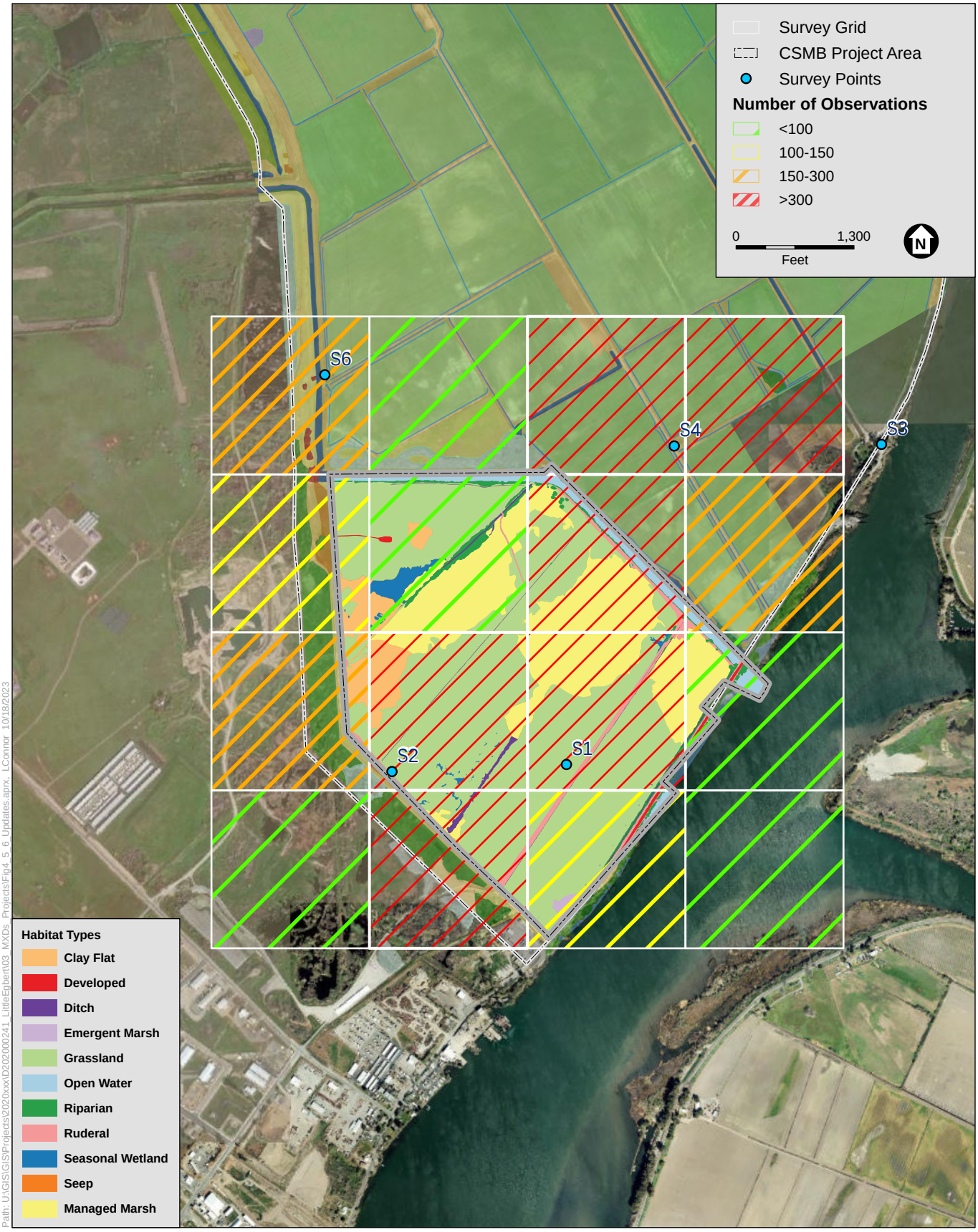


SOURCE: Westervelt, 2018; ESA, 2023

Cache Slough Mitigation Bank Project

Figure 5
Survey Locations and Bird Observations by Grid
April- August 2020

ESA



SOURCE: Westervelt, 2018; ESA, 2023

Cache Slough Mitigation Bank Project

Figure 6
Survey Locations and Bird Observations by Grid
September 2021- March 2022 and February 2023

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CHAPTER 4
Discussion

The Airport lies within the Pacific Flyway, amidst habitats and land uses that are currently used by a variety of wildlife, including large numbers of geese, ducks, and other birds that pose a risk to flight safety. This study provides baseline pre-Project data on bird activity east of the Airport in the CSMB Project area and immediate vicinity during the spring-summer resident and breeding seasons and the migratory and wintering seasons. According to FAA data, the highest number of bird strikes nationwide occurs from July to October when nestlings fledge. A portion of our surveys occurred within that fledgling period. The CSMB is currently managed to attract waterfowl. As such, the number of waterfowl present on-site was greatest during the fall and winter, when they migrate and overwinter 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 they relate 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 mitigation measures could the ALUC propose if they concluded mitigation was necessary?

4.1 Current Airport Safety

The Rio Vista Airport averages 96 aircraft operations per day[2] and is used for both transient and local general aviation (mostly by single-engine airplanes; AirNav 2023) and for flight training for Travis AFB. It does not currently have a wildlife hazard management plan. The Airport currently experiences potential wildlife hazards due to several influential factors, including its location in the Delta (an important area for birds within the Pacific Flyway), the adjacent existing land uses dominated by agriculture and wetlands, and the presence of large numbers of birds (especially larger, higher-hazard birds such as geese). All of these factors increase the probability of a bird strike.

Over half of the CSMB Project area falls within the Inner WHA boundary, and the Project area occurs entirely within the Outer WHA boundary. This analysis documented a high degree of bird activity already present within the CSMB Project area, especially during winter when waterfowl are attracted to the site. In the late spring and summer, bird activity was relatively low. The current risk of bird strikes at the Airport is likely greater during the overwintering and migration

[2] For the 12-month period ending December 31, 2021.

seasons. The most common birds observed in all seasons were blackbirds. The red-winged blackbird is among the most common species struck by commercial aircraft, but these small birds rarely cause damage (only 1 percent of blackbird strikes are damaging strikes) (FAA 2019) (Table 4). Swainson's hawk and other raptors were commonly observed outside of the CSMB Project area in summer but are infrequently observed within the Project area. Very large flocks of geese commonly move between the Project area and neighboring agricultural fields during fall and winter. These large birds are of greater concern and currently pose a significant risk to Airport safety because they can cause more damage to aircraft (48.7 percent for Canada goose) (FAA 2019).

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 movement through the area) in the Inner and Outer WHA Boundaries, and whether that potential difference significantly changes the level of risk exposure at the Airport.

ESA considered wildlife-habitat associations and reviewed nearby sites with habitat conditions similar to what is expected to develop after five years post-restoration to infer which bird species could occur at CSMB if the proposed Project were constructed according to the current conceptual design (Figure 2). **Table 9** lists species groups known to be attracted to various biological communities and land use types in Solano County according to the Rio Vista ALUCP (SCALUC 2018). Of particular interest are those species that pose the greatest risk of aircraft damage: raptors, waterfowl, and large wading birds. **Table 10** summarizes the land use types that are attractants (SCALUC 2018, Table 6) for those bird species and, thereby, result in the highest percent of damage to aircraft (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, turkeys, 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 and pelicans, herons, and shorebirds
Landfills	Gulls, blackbirds/starlings, and crows/ravens

* Based on our survey observations, although not listed here, agricultural lands in Solano County are also heavily used by migrating waterfowl

SOURCE: Rio Vista Airport Land Use Compatibility Plan (SCALUC 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. In the Delta region, cultivated agricultural lands that provide forage (remnant grains) in winter and grazed grasslands that provide new foliar growth in the spring.
Red-tailed hawk, turkey vulture (raptors)	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, SCALUC 2018

Rush Ranch, located in the northern portion of Suisun Marsh, provides suitable reference conditions for the proposed future CSMB habitat. In 2019, the Lower Spring Branch Creek and Suisun Hill Hollow sites (23 acres total) were restored to a natural tidal system by restoring flow into drainage channels that connect uplands, wetlands, and tidal marsh to improve habitat for plants, fish, and other wildlife. In 2016, prior to the restoration, a bird hazard assessment was prepared to address wildlife hazard concerns of the SCALUC and Travis AFB (Kohlmann 2016). Because Rush Ranch is a popular birding destination, this analysis used eBird (a popular online database of bird observations) to assess bird occurrence over 15 years (2000-2015). Like CSMB, blackbirds were the most abundant species group observed at Rush Ranch. The assessment concluded that "conversion of diked, managed marshes to tidal influence is a positive action for reducing bird strikes because tidal restoration tends to favor or promote a shift away from ducks, geese, and large-flocking shorebirds that prefer the more barren or open water typical of diked marshes to smaller birds that pose considerably less hazard risk."

Post-restoration (2020-2023) bird observation data at Rush Ranch show far fewer occurrences of large waterfowl such as Canada geese and ducks when compared with pre-restoration bird occurrence data (eBird 2023). Common raptors within the past three years include red-tailed hawk, northern harrier, white-tailed kite, American kestrel, and turkey vulture. Doves, starlings, and icterids (primarily blackbirds and starlings) continue to occur year-round in similar numbers. Large wading birds such as herons and egrets continue to be observed year-round, but in slightly smaller numbers. Smaller birds such as warblers, finches, and sparrows are common, and their occurrence has not changed appreciably.

The proposed restoration at CSMB would alter habitat conditions (i.e., non-tidal to tidal) and bird use in the Project area, but it is not expected to result in increased wildlife hazards to the Airport. Large birds such as geese and ducks, which are more likely to damage planes, prefer using non-tidal basins that provide persistent ponding during the winter. During this time, geese and ducks frequently leave and return to the basins in large flocks. Tidal areas are more attractive to solitary birds that range in size, and smaller birds that travel less frequently and in smaller numbers than waterfowl. The most significant change to habitat that would affect bird populations is the conversion of 84 acres of managed seasonal wetlands and semi-permanent marsh with expansive open water that is currently managed to attract waterfowl, to approximately 200 acres of tidal

freshwater wetland with subtidal channels that will be managed to support fish. This habitat change is expected to result in an overall shift in bird use from migratory waterfowl as the dominant guild to resident bird species dominated by passerines and icterids (e.g., blackbirds).

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

- Reduced risk through elimination of prolonged standing or ponded water that is attractive to waterfowl as refuge and foraging habitat. Current water management practices will cease and there will be a reduction in the availability of forage (i.e., seeds) for ducks and geese associated with the inundation of areas that support annual plants. Conversion to a tidal hydrologic regime, with ebb and flow of tidal waters across the site, may still attract waterfowl, but in lower numbers than are currently present under the existing management regime.
- Reduced risk through changes in management activities and vegetation structure that will reduce foraging opportunities for geese. Conversion from managed marsh, seasonal wetlands, and grassland to tidal marsh will eliminate current management practices such as disking and grazing that promote new vegetative growth that provide forage for geese. The dense growth of emergent vegetation within a mature tidal marsh and riparian shrub/scrub will be less of an attractant to geese due to the reduction in forage and refuge areas.
- Reduced risk from terrestrial-foraging raptors (e.g., turkey vultures) due to conversion of grassland to riparian and tidal freshwater marsh.
- Slight potential increased risk from wading birds (e.g., herons, egrets) that use shallow fringes of open water and tule marshes.
- Potential increase in nesting raptors after riparian trees have matured. Any risk is likely to be negligible given the presence of other tree-nesting habitat in the vicinity of the Project site and the spatial limit of the number of raptor nesting territories the site could support.
- Potential hazards from blackbirds are likely to remain similar to current conditions at CSMB because they will continue foraging in grasslands during winter and nesting in emergent freshwater vegetation during spring and summer.

In summary, habitat restoration at CSMB will result in a transition from a landscape dominated by managed marsh, seasonal wetlands, and annual grassland to a landscape dominated by perennial marsh and riparian. Changes to the current water regime (non-tidal to tidal) and vegetation composition (seasonal to perennial) is expected to favor birds smaller in body size (e.g., passerines and icterids) and reduce the numbers of large migratory waterfowl that are currently supported at the site.

As evidenced by post-restoration at nearby Rush Ranch, some larger and more solitary resident birds, such as raptors and wading birds, would be expected to use the CSMB restored habitat for foraging but are not expected to increase to a level that would increase flight hazards for the Airport. The current baseline level of potential flight hazards to the Airport from wildlife at CSMB is high in winter due to the substantial flocks of migratory geese and ducks that seasonally use the Project area. The expected shift from migratory birds to resident bird species as the primary occupants of the Project area is expected to reduce flight hazards for the airport. In

general, resident birds are not likely to fly as high as migratory birds since their movements are focused on moving between nearby habitats, and they don't need to gain altitude for purposes of long-range flights.

Based on the current conceptual design, the restoration is expected to lead to a significant reduction in large aggregations of waterfowl in the winter. During other times of year, hazards from birds at CSMB would not significantly change since the assemblage of resident breeding birds would remain the same. As such, habitat restoration at CSMB is not expected to increase or introduce new wildlife hazards to the Airport.

More than half of the CSMB Project area overlaps with a small portion of the Inner WHA Boundary's Traffic Pattern Zone, but it does not fall within the Airport's runway approach or departure zones, or other safety zones (Figure 3). Because overstory trees in new riparian woodland habitat post-Project could attract roosting or nesting by raptors and passerines, limiting the establishment of additional trees within the Traffic Pattern Zone may further reduce the risk of bird strikes. The riparian habitat presently found within the Project area and Inner WHA Boundary/Traffic Pattern Zone is dominated by willows and contains only sparse mature trees such as cottonwoods that are suitable for roosting and nesting. Although the planned restoration design would modestly increase the total amount of riparian habitat (Figure 2) and potentially add mature overstory trees to the landscape over time, the trees would be scattered across the riparian segments of the Project area within higher elevations. Due to the limited distribution and density of large overstory trees, the overall increase in riparian habitat post-Project is not likely to significantly increase the risk of bird strikes, particularly of larger raptors.

4.3 Recommended Mitigation Measures

The Rio Vista ALUCP wildlife hazard policies reflect guidance provided by the FAA in AC 150/5200-33B,[3] 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 mitigating potential impacts to flight safety from land uses such as wetland restoration that have the potential to attract wildlife hazards within 5,000 feet of airports serving piston-powered aircraft. 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 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*

[3] 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.

landowner or community should work with the airport sponsor, or a Qualified Airport Wildlife Biologist to reduce the hazard to aviation."[4]

The applicant will work with SCALUC during the CEQA process to evaluate potential impacts, specifically any change in risk relative to existing conditions. The following measures are consistent with recommended wildlife hazard reduction measures provided in *Considerations for Wildlife Hazard Management on Conservation Lands in Solano County, California*, a technical memorandum prepared for the Solano County Wildlife Hazard Task Force (SWCA 2023). Wildlife hazard reduction measures implemented as part of the Project must comply with all applicable state and federal laws and regulations.

4.3.1 Design Phase

- The project should be developed with the goal of reducing vegetation characteristics that promote large congregations of birds that pose the greatest hazard to aircraft. Specifically, the planting plan should conform to the following guidelines:
  - Tree planting should be limited to a minimum average of 20 feet on-center to promote an open tree canopy and reduce overlapping branches.
  - Riparian plantings should favor tree species that provide limited forage for birds, such as alders, cottonwoods, willows, and oaks.
  - Planted fruit and nut-bearing trees and shrubs such as elderberry, blackberry, dogwood, and walnut should be avoided.
  - Willow and dogwood plantings should be limited to no more than 10 percent of restoration area to minimize dense vegetation thickets that can be inhabited by large groups of songbirds.
- Subtidal channels should be designed to a depth of 7 feet or greater at high tide to discourage the growth of emergent vegetation within open water portions of the project site, limiting habitat for dense-nesting birds such as blackbirds.
- Aquatic features on the tidal marsh plain should be designed to drain to the subtidal channels on low tide to prevent the establishment of persistent ponds or basins.

4.3.2 Pre-Construction Phase

- Prior to initiating restoration activities, existing managed water levels onsite should be reduced to the extent practicable to minimize areas of standing water that could attract birds.

4.3.3 Construction Phase

- During construction, if a biological monitor is not already required by Project permits, a qualified biologist should conduct site visits on a bi-weekly basis to evaluate site conditions, identify potential attractants, and advise on wildlife management methods, as needed. Areas of concern (i.e., ongoing construction activities or conditions attracting large flocks of birds for extended periods) shall be brought to the attention of the construction manager and the Rio Vista ALUC representative for prompt action.

[4] FAA AC 150/5200-33C, Section 2.4.3.2

- Perform dewatering as needed to prevent ponding.
- Do not install other features that are designed to attract birds or other wildlife (e.g., nesting boxes) within the project area.
- Follow standard best management practices, such as properly disposing of trash to avoid attracting wildlife to the site.
- If large flocks of birds are attracted to the project site during grading or grubbing activities, a means of approved harassment (e.g., lasers, pyrotechnics) shall be used to disperse birds. Ultrasonic bird deterrents may be used within active construction areas where preconstruction bird surveys have confirmed the absence of nearby nesting activity.

4.3.4 Post-Construction Phase

- After initial seeding and outside of the nesting season, deploy deterrents (e.g., propane cannons) to haze birds such as geese, who may be attracted to new plant growth.
- Develop a long-term management strategy that includes ongoing wildlife hazard management, including but not limited to vegetation management actions such as pruning mature trees to maintain an open canopy and removing snags.
- Establish a chain of communication between Westervelt and the Rio Vista Airport related to public safety concerns in a memorandum of understanding (MOU) with the City of Rio Vista. The MOU should identify primary contacts, preferred methods of communication, and timelines for responses and remediation.
- Conduct a Wildlife Hazard Assessment (12-month continuous survey according to FAA protocols) for the Airport following Project implementation. Assess the degree of wildlife hazards, and whether each wildlife hazard is increased relative to baseline no-Project conditions.

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CHAPTER 5
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Attachment A

February 2023 Cache Slough Wildlife Survey Memorandum

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Memorandum

date	March 28, 2023
to	Angela Lagneaux, Chris McColl, Greg Webber, Charlotte Marks (Westervelt Ecological Services)
from	Leonard Liu, Ramona Swenson, Mandi McElroy
subject	2023 Winter Wildlife Survey for Cache Slough Mitigation Bank Project

This memorandum summarizes observations from a wildlife survey conducted on February 13, 2023 by Environmental Science Associates (ESA) for Westervelt Ecological Services (WES) for the proposed Cache Slough Mitigation Bank Project (Project). The objective of this survey was to characterize bird use/activity in the Project study area based on current land use, namely during the winter and prior to water drawdown (a seasonal agricultural operation). This baseline information will support an analysis of wildlife hazard potential to the Airport from this Project.

Study Area

The proposed Project is located immediately north and east of the City of Rio Vista in the eastern end of unincorporated Solano County, California, in the Sacramento River Delta region of the Central Valley. The Project study area consists of the proposed 350-acre Cache Slough Mitigation Bank property (Bank property) located immediately south of the Little Egbert Tract (LET) and the southern part of LET within about 0.5 mile of the Bank property. The Project study area is located approximately 0.5 miles southeast of the Rio Vista Municipal Airport (Airport) and approximately 12 miles east of Travis Air Force Base.

Land use is dominated by irrigated agriculture on LET, and a mix of annual grassland, irrigated pasture, and managed wetlands (freshwater emergent and seasonal) on the Bank property. The Project is bounded on the southeast by Cache Slough/Sacramento River, an open water tidal channel.

This region is 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), as well as agricultural lands on Ryer, Grand and Brannan Islands (3 miles east of the Airport).

Methods

The survey followed the methods established during avian and mammalian surveys conducted by ESA in support of the adjacent Little Egbert Multi-Benefit Project (LEMBP) during the spring-summer breeding season (April-August 2020) and fall-winter migration and overwintering season (September 2021-March 2022) (ESA 2023).

These methods are consistent with the Federal Aviation Administration (FAA) guidelines for a Wildlife Hazard Site Visit (WHSV) and more intensive methodologies for a Wildlife Hazard Assessment (FAA Advisory Circular (AC) 150/5200-38).

ESA senior biologist Leonard Liu and WES biologist Charlotte Marks conducted the survey on February 13, 2023. This single-day survey covered two periods: morning (four points within the Bank property and three points at the south end of LET) and midday (the same four points within the Bank property). The biologists revisited previously established (as part of the LEMBP analysis) survey points and grids (one-third mile by one-third mile grids) within and around the Project study area. At each survey point observers recorded all birds (species and number of individuals), their associated locations (including grid location), activities (such as foraging, loafing, or vocalizing on the ground), and any objects in the Project study area. In addition to the data collected at the survey points, wildlife detected between points were also recorded.

Results

Weather conditions during the survey events allowed for excellent viewing, with light wind and temperature ranging from 39°F to 58°F. Enormous flocks of waterfowl were observed around dawn flying over the eastern portion of the study area from agricultural fields east of the Sacramento River. Small flocks of blackbirds were observed foraging in or flying over the Project study area.

During the morning survey, about 1000 waterfowl (predominantly northern pintail [*Anas acuta*], American coot [*Fulica americana*], and northern shoveler [*Spatula clypeata*]) were counted in the central ponded area, and several hundred waterfowl (predominantly greater white-fronted goose [*Anser albifrons*], American coot, and American wigeon [*Mareca americana*]) and shorebirds (mostly least sandpiper [*Calidris minutilla*]) were counted in the western ponded area. Most of the ducks were feeding in shallow water, while geese foraged along the shoreline and short grasslands along the edges of the western pond. Many of the greater white-fronted geese flushed during biologists' approach to the survey point at the edge of the western ponded area and settled in different parts of LET and Bank property.

On LET during the morning survey, about 1100 snow geese (*Anser caerulescens*) and several hundred greater white-fronted geese were observed foraging in an agricultural field about 250 meters northeast of the Bank property. An additional several hundred greater white-fronted geese were observed foraging in another LET agricultural field just north of the northwest corner of the Bank property. Some of the greater white-fronted geese could have been birds that had flushed earlier in the morning from the Bank property.

During the midday survey, 600 snow geese and 100 greater white-fronted geese flew into the central ponded area from LET to join over 1000 foraging waterfowl (7200 greater white-fronted geese, 120 snow geese, 240 northern pintail, 110 American coot). Over 2000 snow geese and greater white-fronted geese were counted foraging in the western ponded area; many of these likely flew in at the same time as the large group that landed in the central ponded area.

Overall, the grassland areas on the Bank property harbored fewer birds than open water areas and seasonal wetlands. Most of the birds present were smaller passerine species in small flocks. Waterfowl in LET were not evenly distributed across agricultural fields during the survey event. Waterfowl were observed moving between LET and the Bank property, as well as from areas east of the Sacramento River. No significant aggregations of waterfowl were observed on the open water of the Sacramento River itself to the east of the Bank property.

Discussion

This survey during the late overwintering season documented a high degree of bird activity within the Project study area, particularly by waterfowl moving to and from agricultural fields on the adjacent LET. Much of the Project area is within the Inner Wildlife Hazard Analysis Area of the Rio Vista Municipal Airport (ESA 2023). The Airport lies within the Pacific Flyway, amidst biological communities and land uses that are currently used by a variety of wildlife. 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).

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