Recent Status of Wintering Swainson's Hawks in the Sacramento-San Joaquin River Delta Region, California

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ABSTRACT

Swainson's Hawks (*Buteo swainsoni*) breed in California's Central Valley, and most migrate from there south to spend the winter from central Mexico to central South America. Prior to 1978, there were no confirmed winter records for Swainson's Hawks in central or northern California. Beginning in the early 1980s, however, one to several were found to be wintering annually in the Central Valley. From 1987 to 1994, winter numbers increased, especially in the Sacramento-San Joaquin Delta. Almost 30 hawks were observed in the winters 1991–1992 and 1993–1994 at an evening roost on Andrus Island. The large, flat agricultural islands in the west-central part of the Delta near the confluence of central California's two largest rivers appear to be the main area where these hawks gathered to forage and to roost. On 4 January 2025, birders participating in the Sherman Island Christmas Bird Count on the west side of the Delta counted up to 23 Swainson's Hawks. This was the highest count since 1994, and it motivated us to document recent numbers, examine and summarize previous winter records of Swainson's Hawks in the Delta, and to consider factors that might explain why the Delta is a key wintering location in the Central Valley.

Before the 1980s, the Swainson's Hawk (*Buteo swainsoni*) was not known to winter in northern California. No authenticated winter records of Swainson's Hawks existed for California as of the 1940s (Grinnell and Miller 1944) and this status did not change for the next three decades, with no accepted winter records for northern California as of 1977 (McCaskie et al. 1979). In the 1960s and 1970s, observers occasionally reported wintering Swainson's Hawks in northern California, however, these reports were considered to be misidentified juvenile Red-tailed Hawks and were not accepted by regional sighting compilers or records committees (McCaskie et al. 1979).

Swainson's Hawks nest in the Central Valley and elsewhere throughout the West in grassland, agricultural, and shrub-steppe habitats (Bechard et al. 2020). In autumn, most of the species' North America population migrates south to winter in southern Argentina (Sarasola et al. 2008, Bechard et al. 2020) although Central Valley breeding birds are known to winter farther north between central Mexico and Bolivia (Airola et al. 2019). Swainson's Hawks are late fall and early spring migrants; some linger into early December, and the first spring arrivals appear as early as 15 February (Browning 1974, McCaskie et al. 1979; Airola et al. 2019, eBird 2025). Thus, it is difficult to definitively ascertain whether late or early individuals are migrants or overwintering. By 1980, however, the species' status was changing in California as regional experts began to suspect that some hawks were overwintering in the Delta and adjacent Central Valley.

On 4 January 2025, observers participating in the Sherman Island Christmas Bird Count in western Sacramento and eastern Contra Costa counties in California counted up to 23 Swainson's Hawks (*Buteo swainsoni*). This unusually large number of wintering Swainson's Hawks at one Delta location motivated us to summarize other winter observations made in this region over the past 40 years. Therefore, we examined seasonal reports in ornithological journals and eBird (2025), as well as museum specimen records, for records of Swainson's Hawks wintering in the Sacramento-San Joaquin Delta.

STUDY AREA

The Sacramento-San Joaquin Delta is an expansive tidal estuary and agricultural region covering 2,800 km^2 in northern California (Figure 1). It sits at the western edge of the Central Valley at the confluence of the Sacramento and San Joaquin rivers and is spread over five counties (Contra Costa, Sacramento, San Joaquin, Solano, and Yolo). The Delta has been transformed and altered over the last 145 years from one of the largest wetlands on the Pacific coast by river channelization, levee construction, clearing of riparian forests, and conversion to agriculture (Whipple et al. 2012, Arax 2019). Levee construction created conditions for year-round agriculture. Only about 3% of the historic wetlands remain and the area is now crisscrossed with agricultural ditches that have replaced more than 1,600 km of tidal channels (Whipple et al. 2019). Pasture and field crops such as corn and alfalfa are the most important crops by acreage, but wheat, tomatoes, rice, wine grapes, and fruit are also grown (Center for Business and Policy Research 2020).

The Sherman Island Christmas Bird Count (CBC) circle (with a standard radius of 12.1 km and area of 45,760 ha) is centered on the edge of Brannan Island on the Sacramento River (Figure 1). About two thirds of the circle includes Delta islands and channels, and one third includes uplands (e.g., the

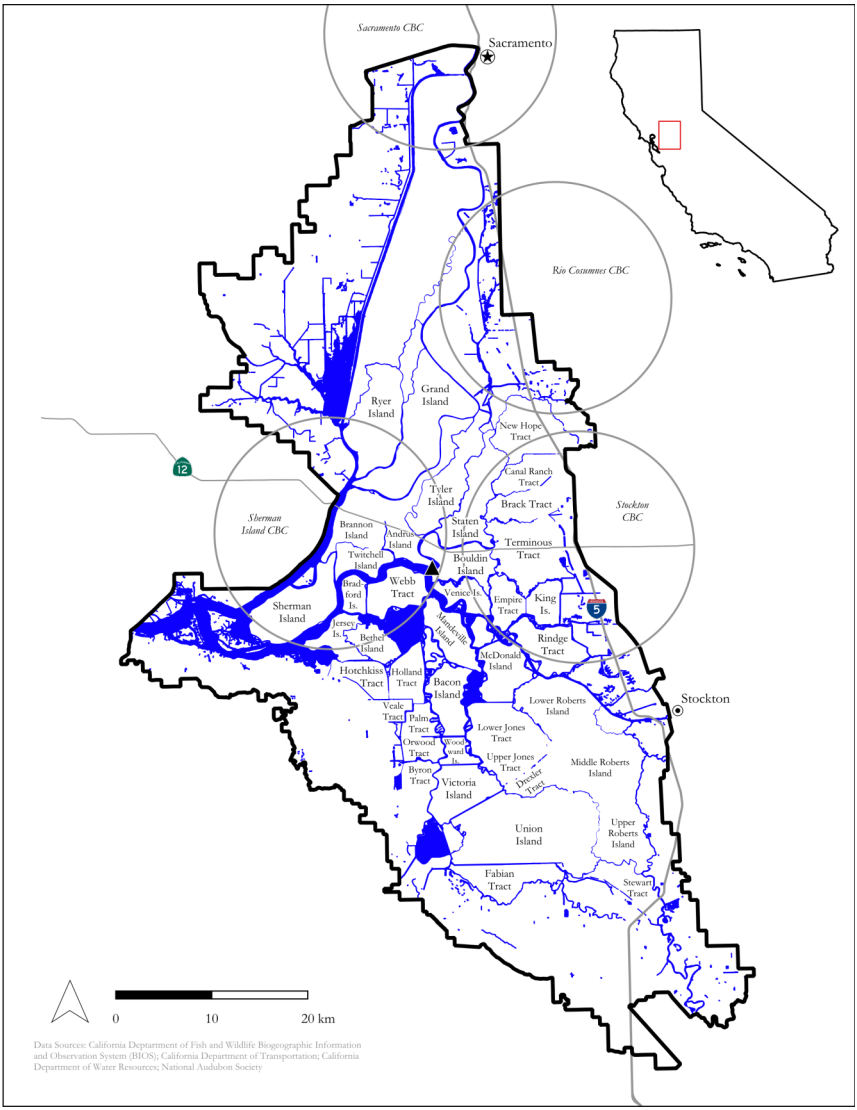

Figure 1. Sacramento-San Joaquin Delta region, showing major water features and islands and Christmas Bird Count circles.

Montezuma Hills) northwest of the Sacramento River. Four other CBC circles also include parts of the Delta (Figure 1). Pasture and field crops dominate agricultural use in the Sherman Island CBC circle (Center for Business and Policy Research 2020). Several wetland and ecological restoration projects are underway or have been completed within and near the CBC circle. The California Department of Water Resources has restored 300 ha on nearby Twitchell Island. The Nature Conservancy is restoring 172 ha on Staten Island

to create climate-responsive agricultural practices, and the John Muir Institute has acquired 243 ha on Bethel Island for environmental protection and stewardship.

METHODS

We searched for and reviewed winter records of Swainson's Hawks in the Delta and nearby Central Valley locales in the ornithological literature including regional reports from *American Birds* (1971–1994), *National Audubon Society Field Notes* (1994–1998), and *North American Birds* (1999–2008), as well as regional CBC results. We also examined five decades of California eBird records, from 1973 through February 2025 (eBird 2025), for winter Swainson Hawk sightings. We checked for any winter-collected Swainson's Hawks in collections at the Museum of Vertebrate Zoology, University of California, Berkeley, and the California Academy of Sciences. In this report, we arbitrarily defined a flock as consisting of six or more birds.

RESULTS

Historical Records of Wintering Swainson's Hawks in the Central Valley

The earliest confirmed late-fall/early-winter Central Valley record of a Swainson's Hawk was a specimen (adult male) collected on 2 December 1932 in Merced County by famed collector Rollo Beck (Browning 1974). Presumably Grinnell and Miller (1944) were aware of this specimen, but must have considered it a late-fall migrant rather than a wintering bird, as they did not mention this record in their book. Thus, their absence in winter in California prior to about 1980, is supported by the lack any winter-collected specimens from the Central Valley in the museum collections we examined.

Throughout the 1970s and most of the 1980s, the handful of late-February records from the Central Valley were still considered to be early spring migrants. One of the first such sightings on 25 February 1973 in Merced County was labeled "very early" (DeSante et al. 1973). Two well-documented birds on 24 February 1980 in San Joaquin County in the Sacramento-San Joaquin Delta were also described as early spring migrants–not wintering individuals–even though they were "a month earlier than the average first arrival date" (Laymon and Shuford 1980). Annual sightings throughout the 1980s of up to five possible wintering birds in the Central Valley were reported in *American Birds* (LeValley and Rosenberg 1984, Morlan et al. 1987, Campbell et al. 1988, Yee et al 1989). Sightings of two birds on 25 December 1987 (Campbell et al. 1988) on Bouldin Island and nine on 15 January 1989 on King Island (Yee et al. 1989) prompted speculation that "this species may now winter in the Delta" (Yee et al. 1989). Table 1 lists the significant records of wintering Swainson's Hawk flocks in the Delta and northern San Joaquin Valley.

Winter records of Swainson's Hawks in the Delta increased from 1989 to 1992. Seven were seen on 10 December 1989 on Venice Island, and singles were seen in this same area on 16 December 1989, and 18 and 26 February 1990 (Erickson et al. 1990). During the 1990–1991 winter, 28 hawks were observed in the Sacramento-San Joaquin River Delta (Yee et al. 1991) and another 28 were together on 16 February 1992 on Venice Island (Yee et al. 1992). By this time, communal evening roost sites had been discovered among tall bluegum eucalyptus (*Eucalyptus globulus*) trees on Venice and Andrus Islands in San Joaquin County. The late 1980s and early 1990s appeared to be the point when sizeable numbers of hawks were consistently spending the entire winter in the area. Co-compilers of seasonal reports wrote about sightings made in this area in the 1990–1991 winter (Yee et al. 1991):

> "With numerous December–February reports of Swainson's Hawks in the Delta region of San Joaquin (county) in recent years, it has been suggested that some actually winter in this area (AB 43:362 & AB 44:323). This was confirmed in 1990–1991, primarily on Venice and Bouldin Is., and also in portions of Sacramento and Contra Costa (counties) (DGY and WRH). Most startling was 28 birds flying into an evening roost on Andrus Is., Sacramento (county), Dececember 1. While this number was not seen subsequently, up to 15 birds were consistently observed scattered over various Delta islands through mid -February. Curiously, over 90% of the birds were dark morph adults. Many questions arise; From where do these birds come and how long have they been wintering? A clue to the latter question may be in their noted behavior of feeding on small rodents behind tractors discing corn fields. Local farmers stated that this winter farming procedure was started in the late 1960s, when Delta farmers switched to corn-wheat farming rotation."

The *American Birds* regional reports and the discoveries made by D. Yee and W. Holt, may have inspired a study of Swainson's Hawks in the Delta during the winter of 1993–1994 (Herzog 1996). From mid-October to late February, Herzog conducted 2–6 surveys per week of 23 Delta islands, focusing primarily on Andrus Island where he had a maximum count of 29 roosting birds on 28 January 1994. The birds roosted in tall eucalyptus trees on a levee near Korth's Pirate's Lair Marina at the south tip of Andrus Island (Figure 1). The extensive field work by Yee, Holt, and Herzog in the early 1990s firmly established Delta islands as winter roost sites for Swainson's Hawks.

Table 1. Winter Swainson's Hawk records in the Delta and adjacent Central Valley.

Period	Number	Location[a]	Source	Notes
25 Dec 1987–20 Feb 1988	7	SJ	Campbell et al. 1988	Number observed over two winter months
15 Jan 1989	9	King Island, SJ	Yee et al. 1989	
10 Dec 1989	7	Empire Tract and Venice Island, SAC & SJ	Erickson et al. 1990	
Dec 1990–Feb 1991	15	SJ	Yee et al. 1991	Number observed over three winter months
1 Dec 1991	28	Andrus Island, SAC, SJ	Yee et al. 1991	All at evening roost
16 Feb 1992	28	Venice Island, SJ	Yee et al. 1992	W. Holt survey
Nov 1993–Feb 1994	13-29	SAC, SJ	Herzog 1996	Numbers observed over three winter months
28 Jan 1994	29	Andrus Island, SJ	Herzog 1996	High count at evening roost
3 Feb 2001	10	Frank's Tract, CC	eBird 2025	Foraging birds; T. Jackson observation

[a] County abbreviations: San Joaquin = SJ, Sacramento = SAC, and Contra Costa = CC. See Figure 1 for mapped locations.

Table 1a (cont.). Winter Swainson's Hawk records in the Delta and adjacent Central Valley.

Period	Number	Location[a]	Source	Notes
28 Dec 2011	8	Tinsley Island, SJ	eBird 2025	At evening roost; L. Kahle observation
26 Dec 2014	6	Terminous Tract, SJ	eBird 2025	M. Dodder observation
28 Dec 2016	7	Jackson Slough Rd. & Tyler Is., SAC	eBird 2025	F. Toldi observation
26 Dec 2017	11	SJ	eBird 2025	At evening roost; L. Kahle observation
9 Feb 2018	17	Jackson Slough Rd., SAC	eBird 2025	
31 Dec 2019	7	Sherman Island, SJ	eBird 2025	Sherman Island CBC; various observers
18 Jan 2020	10	SAC	eBird 2025	Foraging; D. Yee and S. Moriwaki observation
4 Jan 2025	23	Sherman Island, SAC	eBird 2025	Sherman Island CBC; various observers
21 Jan 2025	34	Lower Jones Tract, SAC	D. Yee, pers. comm.	Foraging; following tractors in freshly plowed fields

[a] County abbreviations: San Joaquin = SJ, Sacramento = SAC, and Contra Costa = CC. See Figure 1 for mapped locations.

Surprisingly, from 1994 to 2011 no groups of foraging birds nor Delta roosts were reported in the regional reports in *American Birds* or *North American Birds*. It is not known if hawks no longer used the Andrus Island roost after 1994 or if birders no longer surveyed this location. Holt (1999) monitored winter occurrences in the Central Valley and encouraged birders to send him any sightings, but no such sightings were subsequently published in *Central Valley Birds*. During this 17-year period, the annual regional reports and eBird sightings consisted of only a few scattered individuals across the entire Central Valley. One notable exception was an eBird report of 10 birds foraging on Frank's Tract in Contra Costa County on 3 February 2001. Otherwise, only infrequent individual birds continued to be reported throughout the Delta in winter (Sterling 2006).

Interestingly, in the late 1990s two Swainson's Hawks were found wintering on the coast. A light-morph immature spent the 1998/1999 winter at Half Moon Bay (Terrill et al. 1999), and a dark-morph adult spent two consecutive winters at Harken Slough in Santa Cruz County (Terrill et al. 2000). The Santa Cruz bird was first observed in 1999 (21 January–1 February) and presumably the same bird (though not banded or otherwise uniquely marked) was also present from 11 November 1999 to 5 January 2000.

Reports of sizeable numbers of wintering Swainson's Hawks appeared in eBird again in 2011. An evening roost with eight hawks was discovered on 28 December 2011 in willows on tiny Tinsley Island, 10 km south of the Andrus Island roost, and 11 hawks were observed in the same locale on 26 December 2017 (L. Kahle pers. comm.). On 9 February 2018, 17 birds were observed foraging over an unplowed field on Jackson Slough Road in Sacramento County, and 10 hawks were seen in the same area on 18 January 2020 (D. Yee pers. comm). Seven Swainson's Hawks were observed on the 2019 Sherman Island CBC, but counts there in 2021 and 2024 revealed only single hawks. The other three Central Valley CBC circles that include parts of the Delta (see Figure 1) did not report any concentrations of Swainson's Hawks (National Audubon Society CBC database; https://netapp.audubon.org/cbcobservation/).

2024–2025 Survey Results

The tally of 23 Swainson's Hawks on the Sherman Island CBC on 4 January 2025 (Table 1) was the highest hawk count in the Central Valley since 1994. More than 10 observers collectively recorded seven groups of Swainson's Hawks during this CBC, which encompassed parts of four Delta islands (i.e., Andrus, Venice, Bouldin, Twitchell) where wintering hawks had been seen previously. Although the tally may have included some duplicate sightings, the teams were well spaced across the count circle and at least 12 hawks were observed simultaneously by two teams (Table 2). None of the hawks observed

that day were at a roost, although a group of nine seen in the morning was near the historic roost on Andrus Island.

On 21 January 2025, several weeks after the 2025 Sherman Island CBC, D. Yee observed 34 Swainson's Hawks in plowed fields on Lower Jones Tract. Then, on 28 January, we saw six hawks on Lower Jones Tract and Union Island, but that same evening we found only a single hawk at the historic Andrus Island roost.

Table 2. Numbers of Swainson's Hawks observed by location and time of day during the Sherman Island Christmas Bird Count; 4 January 2025.

	Number Observed			
Location[a]	Morning	Afternoon	Total	Observers
Korth's Pirate's Lair Marina, Andrus Island	9	1	10	D. Mosur
Twitchell Island		4	4	A. and I. Engilis, C. Swarth, P. Bacchetti, F. Oliver
Poverty Rd.	3		3	E. Schoening
Webb Tract	3		3	J. Benningfield
Sherman Island	2		2	L. Stevenson
Tyler Island	1		1	D. Heins
TOTAL	18	5	23	

DISCUSSION

Our records review and recent CBC results confirm that Swainson's Hawks continue to regularly winter in the Central Valley and flocks are concentrated primarily or exclusively in the Sacramento-San Joaquin Delta. Wintering was first suspected in the Delta in the 1980s when a few hawks were seen almost every winter and by 1989, wintering was confirmed as flock size increased substantially over three successive winters (1991 to 1994) when 28 to 29 hawks were observed annually. After that, flock size apparently decreased and in some winters no birds were recorded. From 2001 to 2020, flock size varied from 6 to 17 individuals and flocks were only reported on 8 of 18 winters (Table 1). Then, in January 2025, high counts of 23 and 34 hawks were made. California is not unique in supporting relatively small numbers of Swainson's Hawks in winter; small irregular numbers are also seen in winter in Florida, coastal Louisiana and Texas, and elsewhere in the southern part of the United States (eBird 2025).

Does the lack of observations over 11 winters between 2001 and 2020 indicate that there were no wintering flocks in the Delta? Or had birders stopped visiting the likely places where flocks could be observed and counted? Did flocks winter every year, but birders were unable to document them because the hawks forage widely and roost in inaccessible or remote areas? The expansive Delta region includes over 50 islands and hundreds of kilometers of waterways. Many islands are private and are difficult or impossible to access. Winter rains can make roads impassable. Furthermore, hawks may abandon roost sites if conditions become unfavorable (J. Estep, pers. comm.). The lack of consistent winter observations across the Delta prevents us from arriving at definite conclusions about the size and regularity of winter flocks.

The source population of the wintering birds is not known. Some could certainly be from the population that breeds in the Central Valley. On the other hand, cold-hardy birds that breed in the Great Basin or Great Plains could migrate to the Delta to spend the winter. At least one Swainson's Hawk breeding in the Great Basin region of northeastern California migrated through the Central Valley (Kochert et al. 2014).

As outlined below, we have identified four factors that may help explain the changes in the numbers of Swainson's Hawks wintering in the Delta: changes in foraging habitat, changes in prey availability, altered roosting locations, and growth of the breeding population In California.

Foraging Habitat

In California and on wintering grounds in Mexico and Central and South America, Swainson's Hawks often forage where farmers are actively working their fields (Airola et al. 2019, Bechard et al. 2020). The preferred foraging habitats for Swainson's Hawks in California consist of mostly flat irrigated pasturelands, fallow fields, alfalfa fields, and some row crops where plowing, discing, or harvesting are actively occurring (Estep and Dinsdale 2012). Of these crops, alfalfa is recognized as having especially high value for foraging hawks because of its low vegetation structure, lack of seasonal discing or cultivation, repeated harvesting, and flood-irrigating during the breeding season. Alfalfa fields are harvested up to six times a year but are not plowed or disced for 4-5 years (M. Bacchetti, pers. comm.). Machines cut stalks and leaves that remain in furrows to dry. Small rodents and insects are flushed during cutting and baling. During the summer, flood irrigation after cutting and baling also flushes rodents (Kross et al. 2025). Farming practices on these croplands can expose and concentrate the small rodent and insect prey taken by Swainson's Hawks during the breeding season (Estep and Dinsdale 2012). During fall and winter, hawks are also able to take further advantage of harvested row crops such as corn and tomatoes, fields that provide minimal

foraging habitat for Swainson's Hawks during the breeding season (Estep and Dinsdale 2012).

Herzog's (1996) winter surveys of seven Delta islands observed 36 hawks foraging over flooded fields and where farmers plowed or tilled corn stubble and wheat residue. Swainson's Hawks commonly take advantage of active discing, plowing, flooding, and harvesting operations to capture displaced rodents and large insects (Estep 1989, Bechard et al. 2020; Airola pers. obs.). These farming practices vary seasonally so suitable fields are not always available. The intermittent sightings of hawks on different islands and areas of the Delta year-to-year and within seasons could be related to the timing of field cultivation. Swainson's Hawks may travel up to 16 km from the nest in search of prey to feed their young (Estep and Dinsdale 1989), and likely sometimes travel even farther between nonbreeding/winter roost sites and suitable foraging croplands.

We found no information to suggest that changes in Delta farming practices or changes in alfalfa or corn acreage have occurred in recent years that might explain changes in wintering Swainson's Hawks. Field-crop acreage (i.e., corn and alfalfa) in the Delta has declined in recent years; from 2009 to 2016, corn acreage declined by 22% to about 33,000 ha, and alfalfa acreage declined by 16% to about 31,000 ha (Center for Business and Policy Research 2020). Farmers have been shifting from field crops to higher revenue perennial crops such as nut trees and vineyards. Recently 688 ha of croplands were converted to natural habitats on three islands near the Andrus Island roost as part of an ecological restoration project. The high numbers of hawks observed during winter 2024/2025 in the Delta, however, suggest that recent reductions in the availability of favorable cropland foraging habitats may not have affected the abundance of wintering Swainson's Hawks there. In addition, today most of California's alfalfa is grown in the southern San Joaquin Valley (Geisseler and Howarth 2016), yet there are few records of wintering flocks in that area (eBird 2025).

Prey Populations

Swainson's Hawks feed on rodents, including ground squirrels (*Ammospermophilus and Otospermophilus* spp.), gophers (*Thomomys* spp.), mice (*Mus*, *Perognathus*, and *Peromyscus* spp.), and voles (*Microtus* spp.), and take large insects during the breeding season (Estep 1989, Bechard et al. 2020). Small rodents are common around irrigated lands in California (Howard and Childs 1959, Cypher 2001) and when alfalfa fields are flooded during the growing season in the Sacramento Valley, a variety of predatory birds (including Swainson's Hawks) concentrate there to take advantage of the rodents that become exposed (Kross et al. 2025). Voles are favored prey and they are abundant on the edges of alfalfa fields (Estep 1989, Smallwood et al.

1995). Hay harvesting, flood irrigation, discing, and plowing expose rodents making them vulnerable to predation.

Rodent populations, especially voles, are well known for undergoing population boom and bust cycles (Ernest and Brown 2001, Previtali 2009). Perhaps winter 2024/2025 was one such period when rodents were especially abundant in the Delta. Wetlands in the Delta that are restored or in the process of undergoing restoration may have replaced croplands, but they still support rodent prey for Swainson's Hawks. Golet et al. (2011) found that vole populations were higher in recently restored wetlands along the Sacramento River near Colusa than in nearby agricultural fields, although numbers declined again as the restored wetlands matured. Perhaps the restored wetlands near the Andrus Island roost hold higher vole populations than in neighboring croplands, thus attracting foraging Swainson's Hawks. Alternatively, if rodent prey are more abundant or accessible today than they were previously, perhaps owing to farming practices that make them more available, this could attract Swainson's Hawks to increasingly winter in the Delta. We are not aware of studies that have addressed such prey population dynamics in the Delta.

Tree Roosts

Swainson's Hawks are gregarious, especially outside of the breeding season, and are known to gather and roost by the thousands in eucalyptus trees in southern Argentina (Woodbridge et al. 1995, Bechard et al. 2020). Korth's Marina on Andrus Island, the roost studied by Herzog (1994), also consisted of a grove of dense, tall eucalyptus trees. There are many such eucalyptus groves planted as windbreaks in the Delta. These trees provide protection and space for the communal roosting needs of Swainson's Hawks. At some point after 1994, many of the trees on Andrus Island were damaged, trimmed, or removed, which caused hawks to abandon this roost (J. Estep, pers. comm.). In 2025, however, this grove again consisted of dozens of tall eucalyptus trees. Could the availability of suitable evening tree roosts limit the distribution of wintering hawks in the Central Valley? If so, this might explain fluctuations in flock observations year to year, and could also be one explanation for the lack of wintering flocks in the San Joaquin Valley south of the Delta. The San Joaquin Valley appears to have fewer groves of tall trees (roadside tree rows or windbreaks) than does the Delta (C. Swarth, pers. obs.).

Population Size

The changes in winter occupancy may be a function of the recent expansion of the wider Swainson's Hawk breeding population in California (Battistone et al. 2019, Furnas et al. 2022). California populations had become much reduced by the first half of the 20th century "as a result of human

influences" (Grinnell and Miller 1944), and by 1979 the population reached a low point when only 375 pairs were found on their breeding grounds (Bloom 1979). Shortly thereafter, in 1983, they were listed as Threatened under the California Endangered Species Act. Concerns about the future of the species in California soon led to a number of investigations of their breeding ecology, habitat use, and migratory patterns (Estep 1989, Estep and Dinsdale 2012, Airola et al. 2019, Battistone et al. 2019). A comprehensive state-wide monitoring effort revealed a regular annual increase in nesting Swainson's Hawk numbers statewide beginning in 2005 until 2018 when their estimated population exceeded 18,000 pairs (Furnas et al. 2022). The causes for the rapid population growth are not clearly known; Furnas et al. (2022) suggested riparian restoration efforts in the Central Valley as a possible reason.

It is likely that the fluctuating numbers of wintering Swainson's Hawks are caused by several factors, perhaps working together. We hope that birders can continue to play a role in documenting the size and location of winter flocks, and contribute to a better overall understanding of this interesting hawk in the Central Valley.

Priorities for Future Research

We suggest the following research priorities.

- Conduct organized winter surveys to discover and monitor winter roost sites used by Swainson's Hawks in the Delta.
- Determine if farming practices have changed to make agricultural fields more attractive as foraging sites and/or if other habitat changes (e.g., wetland restoration and conservation easements) have contributed to supporting more wintering Swainson's Hawks in the Delta region.
- Determine if the Swainson's Hawks that winter in the Delta are the same individuals that breed there or could they be migrants from elsewhere?

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