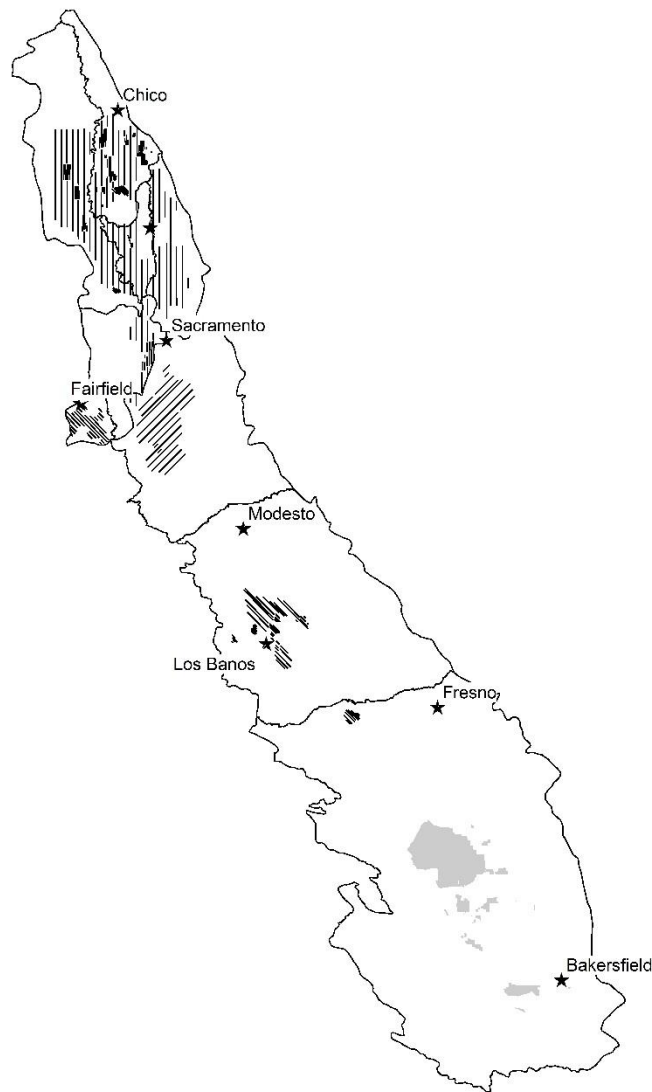


California Department of Fish and Wildlife
Waterfowl Program
Central Valley Midwinter Waterfowl Survey 2020 Results
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In cooperation with the United States Fish and Wildlife Service and the Central Valley Joint Venture.



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Abstract

The 2020 Midwinter Waterfowl Survey (MWS) was conducted 6 January to 30 January by two crews. Weather and staffing constraints created logistical problems throughout the month of January, which reduced survey coverage. The survey was 92% complete with minor loss in each region (range 2–10%). Total flight time for the survey was 32 hours. An estimate of 8.5 million waterfowl (i.e., ducks, coots and cranes) were estimated across the entire Central Valley Joint Venture planning area. The majority of waterfowl were observed in Sacramento Valley (68%), followed by Yolo-Delta (15%), San Joaquin Valley (13%), Suisun Marsh (2%) and Tulare Basin (1%). Dabbling ducks comprised 87% of total waterfowl observed, followed by American coots (10%) and diving ducks (3%). Northern pintail (*Anas acuta*) were the most abundant species comprising 31% of total waterfowl, followed by American wigeon (*Mareca americana*) at 27%, Northern shoveler (*Spatula clypeata*) at 13%, American coot (*Fulica americana*) at 10% and American green-winged teal (*Anas carolinensis*) at 10%. Mallards (*Anas platyrhynchos*) comprised 4% of waterfowl observed. Ruddy ducks (*Oxyura jamaicensis*) were the most numerous diving duck species observed, comprising 1.3% of total waterfowl.

Keywords: aerial waterfowl survey, Central Valley Joint Venture, Midwinter Waterfowl Survey, North American Waterfowl Management Plan

Introduction

The MWS has been conducted throughout the United States since 1935 (Olson 2019), with the goal of estimating the abundance and distribution of waterfowl species in their major wintering areas. This survey is one of the longest-running bird surveys in the United States and has been cited in numerous scientific publications (e.g., Nichols 1991, Takekawa et al. 2001, Afton and Anderson 2001, Johnson et al. 2011, Cramer et al. 2012). While the survey has provided valuable information about waterfowl populations and their status, it has also been criticized due to the lack of a standardized protocol in some of the survey areas (Donaldson 1978, Eggeman and Johnson 1989, Smith 1995, Heussman 1999, Sharpe et al. 1999).

Since 2015, constituents of the Central Valley Joint Venture (CVJV) made substantial changes to the MWS in the Central Valley of California that: 1) link results with specific habitat joint-venture implementation areas to support habitat management decisions; 2) improve sampling design and area coverage by standardization (i.e., transects); 3) excludes areas with low densities; and 4) improve safety.

Methods

Survey design.—The Central Valley Midwinter Waterfowl Survey [CVMWS] was designed using methodology similar to other published waterfowl surveys (United States Fish and Wildlife Service [USFWS] and Canadian Wildlife Service [CWS] 1987, Pearse et al. 2008, Lehnen 2013). The survey was stratified by CVJV Planning Basins to provide information at the basin-level, to implement control for regional differences in abundance and to aid in flight planning (CVJV 2020). For survey efficiency, only portions of each basin with potential waterfowl habitat (i.e., wetlands and flooded agriculture) were included in the design. Areas with known high waterfowl densities were isolated as substrata. These substrata are termed “high-density” (HD) and are defined as an area within a basin with greater mean abundance and variance in relation to the overall basin. Transects represent the sampling unit of the survey. The CVMWS does not address visibility correction bias (Pearse et al. 2007, Koneff et al. 2008); thus, the numbers reported here should be viewed as indices and not estimates of abundance.

Survey timing.—The CVMWS is conducted in the first or second week of January and continues until complete, or until 30 January, whichever comes first. This timeframe ensures all waterfowl have arrived from northern latitudes and densities are at their peak (Fleskes et al. 2005). Surveys after 30 January could be biased, as some species may begin spring migration to or from the Central Valley after this date. The survey can be completed in one week; however, winter weather conditions often prevent flights on consecutive days. The survey is intended to be completed in the shortest timeframe possible, weather permitting.

Survey procedure.—The survey is conducted only during Visual Flight Rules conditions (i.e., ceiling of 1000–3000 ft and visibility of at least 5 mi.) and in wind speeds below 20 miles per hour (32 km/hr). The pilot maintains an altitude of 150 feet (45 m), where

possible, and a flight speed between 90 and 110 miles per hour (145 to 180 km/hr; USFWS and CWS 1987). Front-right and rear-left observers record duck species, American coots and Sandhill cranes (*Grus canadensis*) to a distance of 0.125 miles (200 m) on their respective sides of the aircraft, for a total survey width of 0.25 miles (400 m). Geese are not recorded during the CVMWS since other surveys are used to estimate their wintering abundance (see Olson 2019).

Population estimates.—Within strata, a density of each species was calculated by summing the total number of birds observed on each transect and dividing by the total transect area surveyed. The transect area was subtracted from the total stratum area to obtain an expansion factor (Smith 1995). The remaining stratum area was then multiplied by the mean waterfowl density, by species, to estimate the abundance index.

Habitat and weather conditions.—Weather data were gathered from multiple sources for habitat-related context to survey results. National Oceanic and Atmospheric Administration (NOAA) weather stations in Willows, Sacramento, Fairfield, Los Banos and Wasco, California, have consistent long-term averages for precipitation and temperature dating back to 1960. Monthly precipitation data were downloaded and tabulated from the NOAA National Climatic Data Center for each of these stations.

The California Central Valley's agricultural canal infrastructure removes floodwater from the landscape quickly; therefore, it is necessary to characterize surface flooding at the time of the survey (data courtesy of Point Blue Conservation Science 2020). Freezing conditions in other areas of the Pacific Flyway may impact the number of waterfowl observed in the CVMWS. For example, eastern Washington State supports large numbers of waterfowl during their migration in the Pacific Flyway. Freezing temperatures in this area often occur in December and extend into February; therefore, temperature data from the Moses Lake weather station are included for reference.

Results

Survey results.—Two crews, composed of CDFW and USFWS biologists, conducted the CVMWS from 6–30 January 2020. The survey consisted of 32 flight hours and was 92% complete. Survey completion varied by basin (Table 1) and was largely affected by weather conditions. As such, some transects were randomly skipped to provide time to survey as much of the study area as possible.

The CVMWS was not conducted in 2019, due to the federal government shutdown, so comparisons of in-season estimates are made to averages from the four years the survey has been standardized (2016, 2017, 2018 and 2020). Amongst standardized survey areas, total waterfowl (i.e. ducks and coots) were 36% above the survey average (\bar{x} = 6.164 million), dabbling ducks were up 40%, diving ducks were up 1% and coots were up 20%.

Comparing all strata, including unstandardized areas, the majority of waterfowl were distributed in the Sacramento Valley (68%), followed by the Yolo-Delta (15%), San

Joaquin Valley (13%), Suisun Marsh (2%) and the Tulare Basin (1%; Table 2). Dabbling ducks comprised 87% of total waterfowl observed (7.377 million), followed by coots (10%; 847,000) and diving ducks (3%; 274,000). Of the five most numerous species, northern pintail were the most abundant (2.625 million) and comprised 31% of total waterfowl. The remaining top-five species, in order of abundance, were: American wigeon (27%), northern shoveler (13%), American coots (10%) and American green-winged teal (10%). Mallards were the sixth most numerous species, comprising 4% of total waterfowl observed. Ruddy ducks were the most abundant diving ducks, comprising 1.3% of total waterfowl observed.

Sandhill crane abundance has remained stable since 2016, with an average of 42,000 individuals estimated. In 2020, 41,000 were estimated and, similar to other years, the Yolo–Delta Region supported the largest population (62% of the total sandhill crane survey), followed by the Sacramento Valley (34%) and the San Joaquin Valley (4%; Table 2).

Habitat and weather conditions.—Rainfall during the July–January period of 2019–2020 was above average south of Sacramento (i.e., San Joaquin Valley and Tulare Basin) and below average north of Sacramento (NOAA 2020; Table 3). The Central Valley flood bypass system was not flowing in any part of the survey area during this period. Habitat flooding in the Central Valley was relatively low, compared to other years since 2013, particularly in parts of the Sacramento Valley (Point Blue Conservation Science 2020; Fig. 1). On 22 November 2019, a cold weather system occurred at Moses Lake, Washington, where minimum temperatures were at, or below, freezing for a period of 14 days (NOAA 2020, Fig. 2.).

Discussion

Similar to the 2017 CVMWS, cold conditions in eastern Washington appear to correlate with high abundance of dabbling ducks in the Central Valley. While northern pintail seem to be somewhat stable from year to year, species such as American wigeon, northern shoveler, American green-winged teal and mallards appear to move south as habitat conditions become suboptimal in northern areas.

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Table 1. Midwinter Survey hours, distances flow, area covered and percent completed by Central Valley Joint Venture planning Region and Basin, January 2020.

Region	Basin	Hours	Miles Flown	Total Area (sq-mi)	Area Flown (sq-mi)	Percent Complete
Sacramento Valley	American	2	147.1	364.81	364.81	100%
	Butte	5	249.3	397.68	364.88	92%
	Glenn-Colusa	5.5	306.6	689.00	586.17	85%
	Sutter	1.5	105.4	274.84	238.85	87%
Yolo-Delta	Yolo		68.4	101.00	96.95	100%
	Delta	3	179.4	245.90	241.71	93%
Suisun	Suisun	3	93.2	485.17	450.01	96%
San Joaquin	San Joaquin	4	198.1	133.86	133.86	98%
Tulare	Mendota WA		0.00			0%
	Kern NWR	8	450			100%
Total	-----	32	1,347.5	2692.26	2477.24	92%

Table 2. Total estimated waterfowl by species and Central Valley Joint Venture Region, January 2020.

Species	Sacramento Valley	San Joaquin Valley	Suisun	Yolo-Delta	Tulare	Total
Green-winged teal	351,331	188,531	38,023	254,668	15,955	848,508
American wigeon	1,947,078	126,072	19,742	203,091	4,052	2,300,035
Cinnamon teal	78	3,327	192	372	1,130	5,099
Gadwall	96,936	10,339	4,649	8,672	7,963	128,559
Mallard	103,958	34,190	1,426	170,244	4,918	314,737
Northern pintail	2,267,992	47,918	13,563	308,491	14,420	2,652,384
Northern shoveler	644,957	212,183	70,064	164,248	33,730	1,125,182
Wood duck	960	410	96	516	0	1,981
<i>Dabblers</i>	5,413,290	622,971	147,755	1,110,302	82,168	7,376,486
Bufflehead	5,792	2,971	4,902	6,285	890	20,840
Canvasback	373	19,905	1,461	42,455	851	65,044
Common merganser	531	0	0	75	204	810
Goldeneye	1,000	37	3,240	9,609	0	13,885
Hooded merganser	22	20	0	0	0	42
Redhead	112	790	0	0	427	1,329
Ring-necked duck	29,403	17,441	0	6,180	1	53,024
Ruddy duck	9,170	66,314	15,447	10,656	9,128	110,714
Scaup	1,251	298	0	6,665	1	8,215
<i>Divers</i>	47,653	107,775	25,050	81,924	11,502	273,903
Unidentified Duck	2,281	50	763	0	1,789	4,884
<i>Total Ducks</i>	5,463,225	730,797	173,567	1,192,225	95,459	7,655,273
Coots	311,958	373,689	31,303	107,726	22,343	847,019
<i>Total Waterfowl</i>	5,772,901	1,104,485	204,870	1,299,951	117,802	8,502,292
Sandhill cranes	14,185	1,615	0	25,330	659	41,788

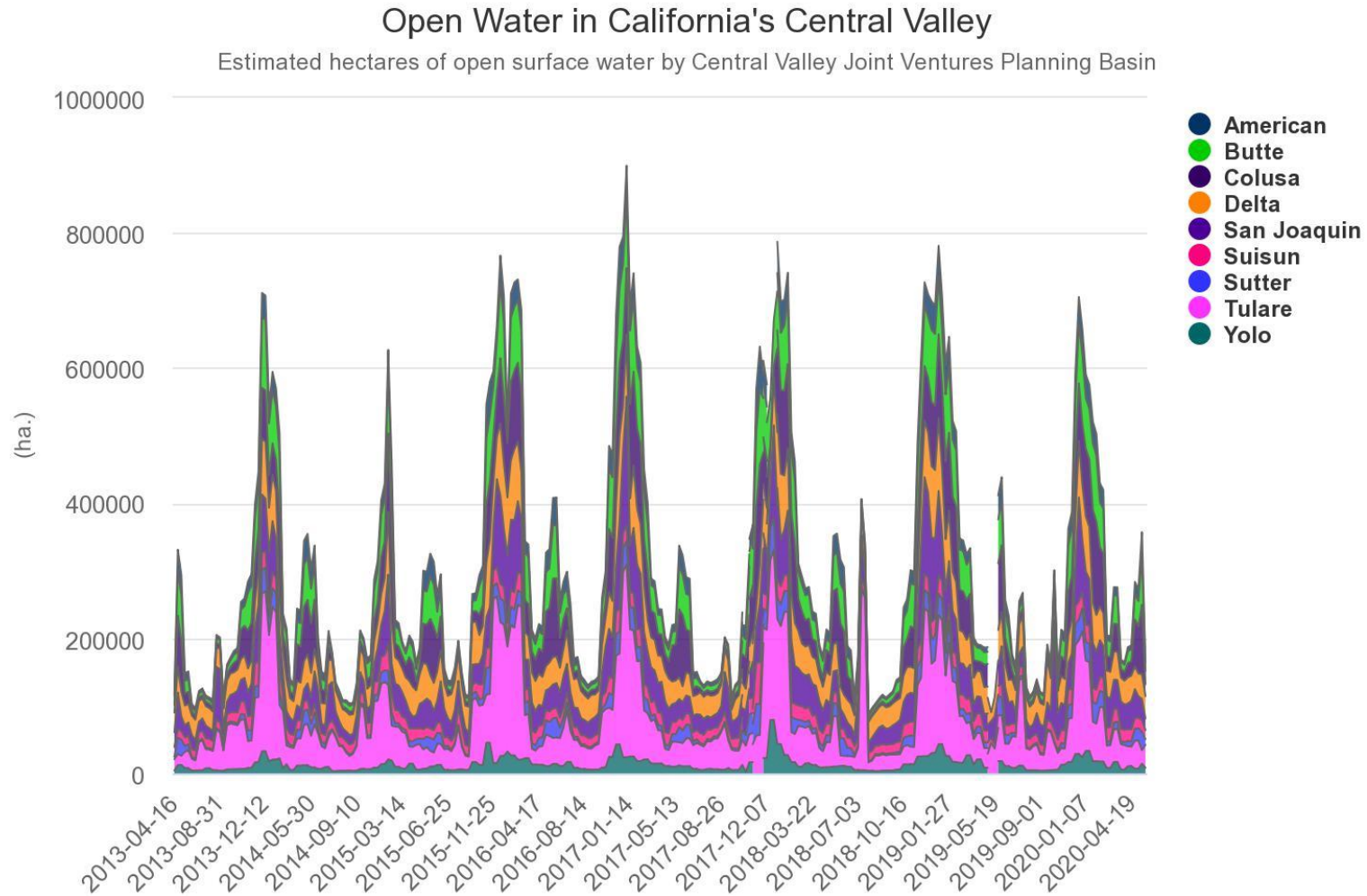
Table 3. July to January rainfall recorded at one weather station within each region, long-term average (LTA) since 1960, measure of deviance (z-score).

Station Location ^a	Region	2019		
		Rainfall	LTA	Z-Score
Willows	Sacramento Valley	6.49	10.42	-0.80
Sacramento	Delta	6.26	10.13	-0.89
Fairfield	Suisun Marsh	9.50	13.46	-0.63
Los Banos	San Joaquin	5.94	4.98	0.42
Wasco	Tulare Basin	4.63	3.30	0.78

^aData available at: <https://gis.ncdc.noaa.gov/maps/ncei/>

Figures

Figure 1. Estimated area of surface water (in hectares) by Central Valley Joint Venture planning basin 2013 – 2020. Available at: http://data.pointblue.org/apps/autowater/?page_id=201



Highcharts.com

Figure 2. Minimum temperatures from 1 November to 31 December at Moses Lake, Washington, during the past 4 survey years. November data not available for 2015.

