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Archiving California's Historical Duck Nesting Data

Open–File Report 2015–1131

U.S. Department of the Interior
U.S. Geological Survey

Cover: Recently hatched ducklings in a mallard nest at Grizzly Island Wildlife Area, California. Photograph taken by Andrea Mott, U.S. Geological Survey, 2015.

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SALLY JEWELL, Secretary

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Archiving California's Historical Duck Nesting Data

By Joshua T. Ackerman[1], Mark P. Herzog[1], Caroline Brady[2], John M. Eadie[3], and Greg S. Yarris[4]

Introduction

The U.S. Geological Survey (USGS), in partnership with the California Waterfowl Association (CWA) and other organizations, have compiled large datasets on the nesting ecology and management of dabbling ducks and associated upland nesting birds (Northern Harriers [*Circus cyaneus*], Short-eared Owls [*Asio flammeus*], Ring-necked Pheasants [*Phasianus colchicus*], and American Bitterns [*Botaurus lentiginosus*]) throughout California on Federal Refuges, State Wildlife Areas, and private lands, some participating in State and Federal habitat programs. These datasets encompass several long-term monitoring programs at multiple sites throughout California, and include data from more than 26,000 nests and span nearly 30 years.

These historical datasets represent some of the longest term datasets on nesting ducks in North America, if not the world. They are extremely valuable for ongoing waterfowl management and habitat conservation efforts in California, as well as throughout the world. However, without organization and electronic access, these data are an untapped resource and are not being used to the full extent possible. Prior to this project, these datasets were scattered among various agencies and organizations, and original paper nest cards were being stored in cardboard boxes in attics and storage containers that were not suitable for long-term archival storage. In addition, most of these data had not been entered into a computerized database and thus were at high risk for permanent data loss.

To protect this irreplaceable dataset, we submitted a series of proposals to obtain funds to complete this data archival project over the past 5 years. The Central Valley Joint Venture, USGS Data Rescue Program, and USGS Ecosystems Mission Area funded this data archival project. In addition, we leveraged other USGS projects on nesting shorebirds, songbirds, and seabirds to use further resources to more fully develop the nest database structure for use on nesting waterfowl. Specifically, this large dataset on ducks was archived by USGS, but the dataset is owned and managed by a consortium of organizations. Therefore, any access and use of this data must occur through the principal investigators, who contributed data and resources to this archival project, as detailed in section, "Data Availability."

With the conclusion of this project, most duck nest data have been entered, but all nest-captured hen data and other breeding waterfowl data that were outside the scope of this project have still not been entered and electronically archived. Maintaining an up-to-date archive will require additional resources to archive and enter the new duck nest data each year in an iterative process. Further, data proofing should be conducted whenever possible, and also should be considered an iterative process as there was sometimes missing data that could not be filled in without more direct knowledge of specific projects. Despite these disclaimers, this duck data archive represents a massive and useful dataset to inform future research and management questions.

[1]U.S. Geological Survey.
[2]California Waterfowl Association.
[3]University of California, Davis.
[4]Central Valley Joint Venture.

Objectives

The objectives of this project were to:

1. Work with various organizations to locate, obtain, and organize all data on nesting ducks in California.
2. Build an electronic archival system for long-term storage, and electronically scan all nesting data.
3. Build an enterprise-level nesting database in a relational database management system to enter and store these data with a Microsoft® Access user interface.
4. Enter the archived data into the nesting database.
5. Summarize available waterfowl nesting data in California.

Archival Process

Objective 1—Initial Data Rescue and Archive

We searched for all available waterfowl nesting datasets in California, including the California Waterfowl Association, USGS, and University of California-Davis (UC Davis) offices and field stations. Much of the data were found in storage rooms, garages, and attics of buildings and stored in lightweight cardboard boxes. All data and documents were collected, consolidated into a single location, and reviewed and organized according to project and data type. Currently, all original nesting files have been organized and filed in metal file cabinets at the USGS Dixon Field Station.

Objective 2—Electronic Archival System

After data were organized, we electronically scanned all waterfowl nest data and saved as Adobe® Acrobat® pdf files. During the process of organizing and scanning the data, we developed a spreadsheet inventory for all existing data (appendix A). The inventory documents the data type, physical file location, electronic file location, data entry status, and additional metadata for each piece of data.

Objective 3—Relational Nesting Database

Database Structure

The primary data of interest were nesting waterfowl data. To make these nesting data more accessible, we developed a relational database to store nest data (fig. 1). Briefly, this database collects all nest information including specific information on nest visits, nest attributes, spatial location of nest, depredation events, individual eggs, and vegetation at the nest. In addition to nest data, the database also stores data on female ducks that were captured on the nest and banded (although these data have not been entered into the database). The properties and structure of the database allows for rigorous proofing routines to be performed for ensuring the integrity of the data. Given the structure of the relational database, these tables can be queried and merged together by a trained user to develop complex datasets for statistical analysis.

Database Entry Forms

The data entry program provides a structured environment where the data can be entered and accessed simultaneously by multiple users, facilitating rapid entry if staff and resources are available (fig. 2). Within the nest database, structured forms and subforms (figs. 3–5) enforce quality control and reduce the number of data entry errors. The database environment also allows for easy data revision and quality control. To avoid errors, access to the nest database is restricted to approved and trained users only, and roles define whether users can enter, edit, or only view data. Approved users are trained and provided an instruction manual that fully describes the components of the nest database as well as detailed standard procedures for data entry and specific data entry activities, such as nest fate determination.

Objective 4—Nest Data Entry

Over a period of 4 years, most of the waterfowl nest data were entered into the nest database. We have entered nest data from 1985 to 2014, which includes more than 26,500 nests from 118 site-years. More nest data are still available for entry but entering these additional nest data is beyond the scope of this project. Original nest data also should be continually proofed as resources become available, as part of an iterative process of data management. Sample sizes of nests monitored by study site, cooperators involved in the data collection, number of years sampled, and availability of associated metadata are shown in figure 6.

Objective 5—California Waterfowl Nest Data Summary

From 1985 to 2014, a total of 26,578 duck and associated upland nesting bird nests were monitored (fig. 6). The species of nesting bird by study region is shown in figure 7. The most duck nest monitoring data are from the Grizzly Island Wildlife Area (17,685 nests), Sacramento National Wildlife Area (1,923 nests), Conaway Ranch (1,374 nests), Mendota Wildlife Area (1,258 nests), Northeastern California (1,063 nests), and Gray Lodge Wildlife Area (492 nests). Although the subsites are more dispersed, a substantial amount of nest data comes from various Sacramento Valley sites (such as Conservation Reserve Enhancement Program [CREP] sites [579 nests] and Fendt [350 nests]). In particular, Grizzly Island Wildlife Area (26 years) and Conaway Ranch (13 years) have been the primary study sites for nesting ducks in California, and have the longest time series of nest data (fig. 8). No other study site has more than 8 years of nest data, but other moderately sized datasets include Gray Lodge (8 years), Thermalito Afterbay (6 years), Mendota (5 years), Sacramento Valley (5 years), CREP Colusa County (5 years), CREP Yolo County (5 years), Fendt (5 years), Kalfsbeek (5 years), Beale Air Force Base (4 years), Los Banos (4 years), Delevan National Wildlife Refuge (3 years), Palm Tract (3 years), and Yolo Bypass (3 years; fig. 8). The number of nests monitored by year and subsite for each study region is shown in appendix B.

Grizzly Island Wildlife Area

By far, the most duck nest data have been collected at the Grizzly Island Wildlife Area study site, which has been a long-term collaboration between CWA, USGS, and UC Davis. CWA started monitoring this site in 1985 (McLandress and Yarris, oral commun., 2015), and UC Davis (Ackerman and Eadie, authors unpublished) began collaborating in 1997. Since then, CWA, USGS, and UC Davis have tried to maintain this annual nesting program. This dataset has been used to generate several scientific publications describing duck nesting ecology (Mclandress and others, 1996; Ackerman and others, 2003a, 2014), molt migration movements (Yarris and others, 1994), density dependent nest survival (Ackerman and others, 2004; Ringelman and others, 2012, 2013), influence of alternate prey on duck nest survival (Ackerman, 2002), and parental investment behaviors of nesting ducks (Ackerman and Eadie, 2003; Ackerman and others, 2003b).

Grizzly Island Wildlife Area has been monitored almost continuously from 1985 to 2014, except for 2005–07 and 2014 (fig. 8). The most nests monitored at Grizzly Island Wildlife Area was in 1996 (1,259 nests) and the fewest nests in 2004 (178 nests; fig. 8). In general, fewer nests have been found at Grizzly Island Wildlife Area in recent years (after 2001) primarily because of substantially reduced nest monitoring efforts (namely, fewer fields searched each year) because of limited resources. There was a substantial increase in nests monitored at Grizzly Island Wildlife Area from 2010 to 2012 during the Wildlife Conservation Board grant obtained by CWA and USGS to improve the habitat in the nesting fields, which provided additional resources for nest monitoring. The number of nests monitored by year within each of the nesting fields at Grizzly Island Wildlife Area are shown in figure 9. This extensive nesting database has been useful in guiding habitat management and restoration plans in Suisun Marsh (Ackerman and others, 2014).

Conaway Ranch

One of the more successful partnerships with the private sector has been the collaboration with Conaway Ranch. CWA has monitored duck nesting every year from 1995 to 2007 at Conaway Ranch, finding between 52 and 187 nests each year.

Data Backup

The nest database and the scanned pdf files of the raw data are stored on a USGS network server in Dixon, California that is regularly backed up to hard drives in Sacramento, California. A copy of the data also is stored on an external hard drive and regularly updated.

Data Availability

Waterfowl nesting data collected in California are the result of a number of organizations and cooperators dedicated to understanding and guiding the management of breeding waterfowl in California and represent tens of millions of dollars spent on research and data management over the past 30 years. Those interested in using these data should contact the curators of *Archiving California's Historical Duck Nesting Data* at USGS (Josh Ackerman and Mark Herzog) with the proposed collaboration, data request, and summary of the proposed products. The proposed collaboration will then be circulated among cooperators for further discussion about collaboration, individual responsibilities, and co-authorship on developed products.

Future Directions

As part of this archival process, we also identified additional breeding waterfowl datasets that were outside the scope and funding of the current project. The breeding waterfowl data that have not been entered into the archival system includes recent nest data, several types of metadata (maps, nest coordinates produced on maps, extra vegetation surveys, brood surveys, predator surveys, egg size measurements, and other metadata), summer bait-trapped banded ducks (body condition and banding data), and nest-captured hen database (approximately 3,000 individual hens captured on nests from 1985 to 2014). These additional breeding waterfowl data should be entered as resources become available, especially the valuable nest-captured hen database. Additionally, this dataset will require continued maintenance, and upkeep of entry of new nest data.

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Yarris, G., McLandress, M., and Perkins, A., 1994, Molt migration of postbreeding female Mallards from Suisun Marsh, California: Condor, v. 96, p. 36–45.

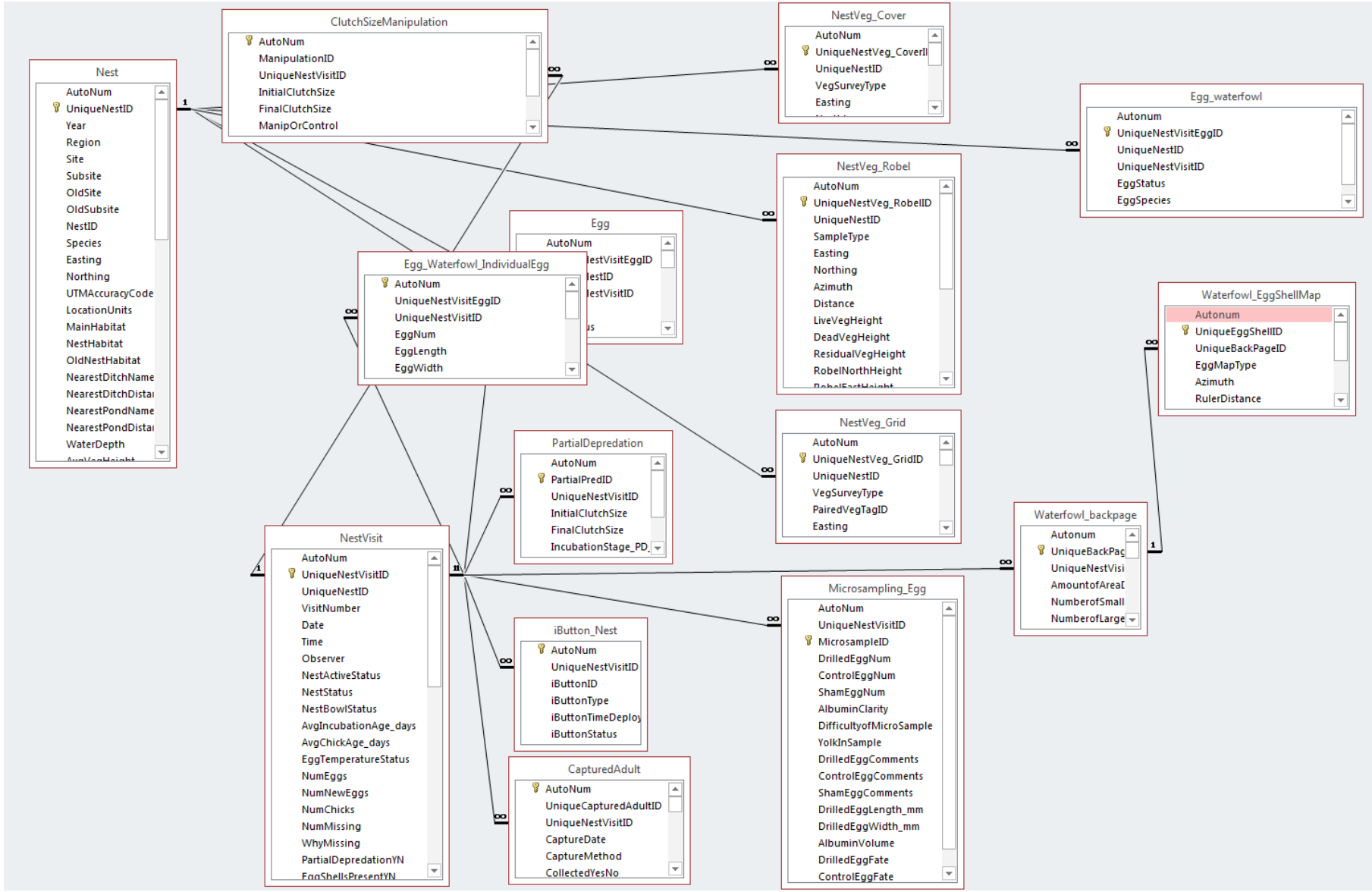

Figure 1. Nest database structure, including relationships between data entry tables.

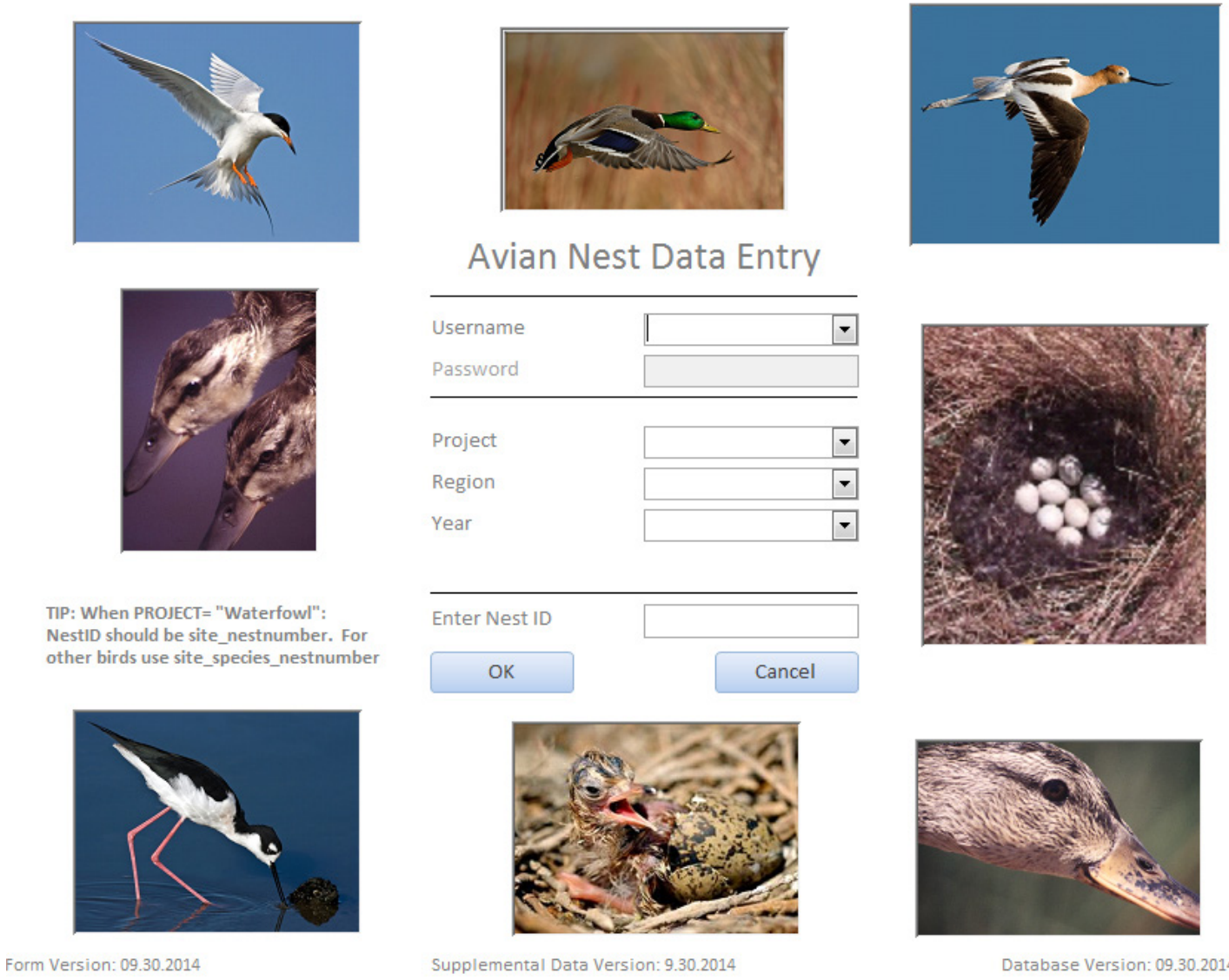

Figure 2. Nest database entry login screen for the *California Avian Nesting Database Entry Archive* (*CANDE Archive*), which contains the data for this current project, *Archiving California's Historical Duck Nesting Data*.

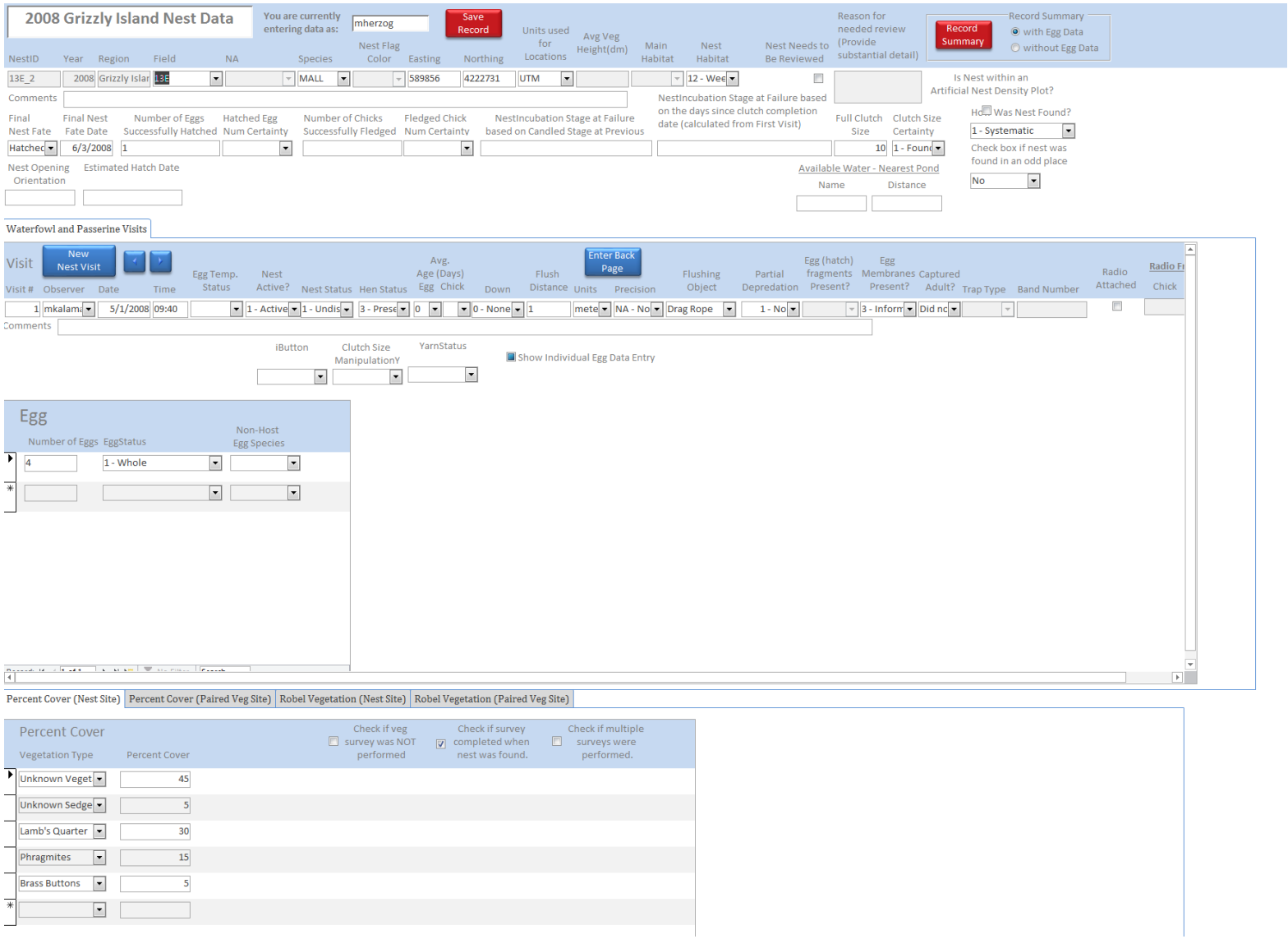

Figure 3. Example of main nest database entry page, showing entry of visit number 1 for nest number 2 in field 13E at Grizzly Island Wildlife Area in 2008.

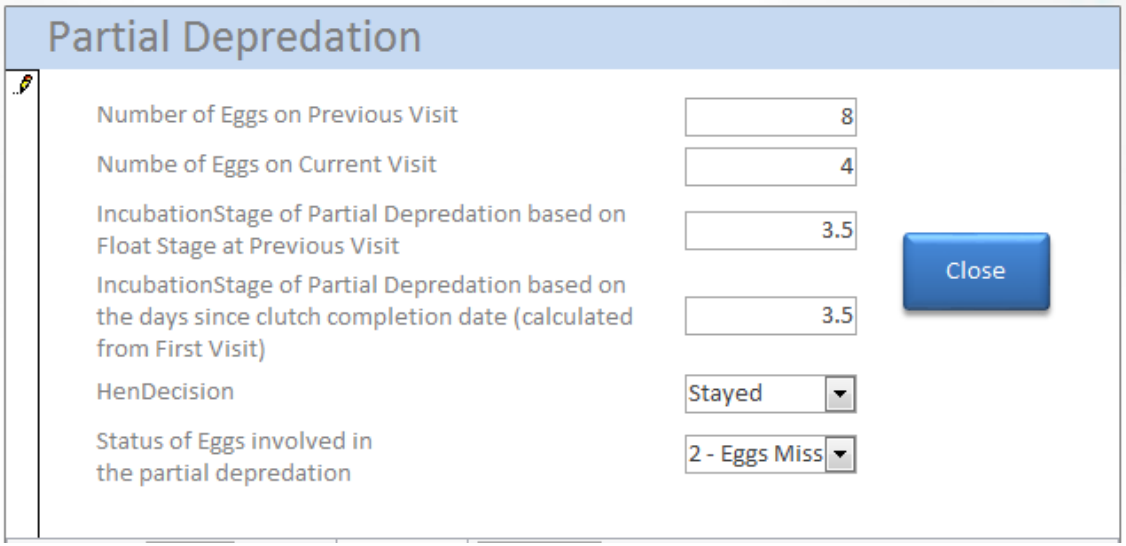

Figure 4. Example of nest database entry page for the partial nest depredation subform.

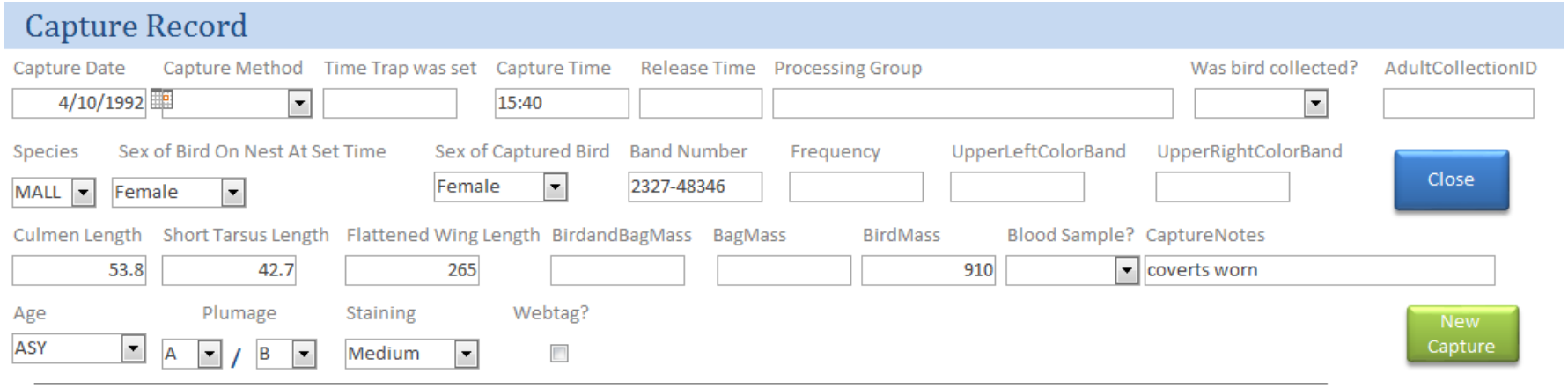

Figure 5. Example of nest database entry page for the nest-captured hen data subform. Although the nest-captured hen subform was developed, the hen data has not been entered as it was beyond the scope of this project.

Study Site	Landowner	Cooperators[1]	Study Period	Number of Years	Number of Nests	Bird Banding Data: Nest Trapped Hens	Bird Banding Data: Bait Trapped	Other Data
Grizzly Island WA	State	USGS/CWA/UC Davis/CDFW/WCB	1985-2004;2008-2013	26	17,685	Yes	Yes	Brood, predator, and vegetation surveys
Conaway Ranch	Private	Private Landowner/CWA Collaboration	1995-2007	13	1,374	Yes	Yes	Vegetation surveys
Butte Valley WA	State	CWA/CDFW	1988	1	45	Yes	Yes	Vegetation surveys
Gray Lodge WA	State	CWA/CDFW	1986-2001	8	492	Yes	Yes	Brood, predator, and vegetation surveys
Honey Lake/Ash Creek WA	State	CWA/CDFW	1987-1989	3	1063	Yes	Yes	Brood, predator, and vegetation surveys
Los Banos WA	State	CWA/CDFW	1989-1990; 1992-1993	4	189	No	No	None
Mendota WA	State	CWA/CDFW	1987-1989	5	1258	Yes	Yes	Brood, predator, and vegetation surveys
Napa-Sonoma Marsh WA	State	CWA/CDFW	1994	1	13	No	No	Vegetation surveys
North Grasslands WA	State	CWA/CDFW	1992-1993	2	84	No	No	Hunting results
Thermalito Afterbay	State	CSU San Jose/CDFW/CWA/DWR Waterfowl Monitoring Program	1987-1994	6	403	No	No	Vegetation surveys
Yolo Bypass	State	CWA/CDFW	1986; 1988; 2008	3	91	No	No	None
Beale Air Force Base	Federal	USDoD/CWA Waterfowl and Habitat Evaluation Project	1994-1997	4	101	No	No	Vegetation surveys
Colusa NWR	Federal	CWA/USFWS	1986-1988	3	72	No	No	Breeding pair and vegetation surveys
Delevan NWR	Federal	CWA/USFWS	1986-1988	4	276	No	No	None
Sacramento NWR	Federal	CWA/USFWS	1986-1991	5	1923	Yes	Yes	Brood, predator, and vegetation surveys
Tule Lake NWR	Federal	CWA/USFWS	1988	1	122	Yes	No	Vegetation surveys
Davis Water Treatment Ponds	Private	CWA/City of Davis	1992	1	26	No	No	Vegetation surveys
Denverton	Private	CWA	2013	1	2	No	No	None
Fendt	Private	CWA/Private Landowner	2002-2007	5	350	No	No	Vegetation surveys
Garibaldi	Private	CWA/Private Landowner (and now CDFW property at GIWA)	1988	1	5	No	No	None
Kalfsbeek	Private	CWA/Private Landowner	2002-2006	5	116	No	No	None
Mandeville Island	Private	CWA/Private Landowner	1988; 1991; 2004	3	122	No	Yes	Vegetation surveys
Mountain Meadows Reservoir	Private	CWA/Private Landowner/WCB Upland Enhancement Evaluation	1997; 1999; 2001	3	11	No	No	Vegetation surveys
Palm Tract	Private	CWA/Private Landowner/CDFW/COTP Mitigation Evaluation	1996-1998	3	88	No	No	Vegetation surveys
Riley Farms	Private	CWA/Private Landowner (winter wheat next to Gray Lodge WA)	1986	1	25	No	No	None
Sacramento Valley Ag. Habitats	Private	USDA-CWA Conservation Reserve Enhancement Program	2002-2006	5	579	Yes	Yes	Breeding pair and vegetation surveys
Winters	Private	CWA/Private Landowner (Rominger or John Anderson/Hedgerow Farms)	1988	1	5	No	No	None
			TOTAL = 118 site-years & 26,578 nests					

Figure 6. Summary of all waterfowl and associated species nest data, California, 1985–2014. Cooperators include U.S. Geological Survey (USGS), California Department of Fish and Wildlife (CDFW), California Waterfowl Association (CWA), Wildlife Conservation Board (WCB), University of California, Davis (UC Davis), U.S. Fish and Wildlife Service (USFWS), U.S. Department of Agriculture (USDA), California State University (CSU), Department of Water Resources (DWR), and U.S. Department of Defense (DOD).

Region	AMAV	AMBI	AMWI	BNST	CAGO	CANV	CITE	GADW	KILL	LBCU	MALL	MODO	NOHA	NOPI	NSHO	REDH	RNDU	RPHE	SACR	SEOW	SORA	WEME	WILL	WIPH	WISN	WITU	WTKI	UNKNOWN	Total
Beale AFB	0	1	0	0	0	0	7	4	0	0	76	0	6	0	0	0	0	1	0	0	0	0	0	2	0	4	0	0	**101**
Butte Valley SWA	0	0	0	0	0	0	7	19	0	0	15	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	**45**
China Island WA	0	0	0	0	0	0	9	15	0	0	24	0	9	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	**59**
Colusa NWR	0	0	0	0	0	0	6	3	0	0	52	0	0	1	0	0	0	10	0	0	0	0	0	0	0	0	0	0	**72**
Conaway Ranch	0	12	0	0	0	0	205	203	0	0	925	0	15	4	7	0	0	2	0	0	0	0	0	0	0	0	0	1	**1374**
CREP - Colusa County	0	32	0	0	0	0	17	9	0	0	227	0	8	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	**295**
CREP - Placer County	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**5**
CREP - Yolo County	0	15	0	0	0	0	9	11	0	0	195	39	8	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	**279**
CREP - Butte County	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Davis Water Treatment Ponds	0	0	0	0	0	0	0	1	0	0	24	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**26**
Delevan NWR	0	5	0	0	0	0	28	2	0	0	205	0	0	2	0	0	0	34	0	0	0	0	0	0	0	0	0	0	**276**
Denverton	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**
Fendt	0	14	0	0	0	0	8	11	0	0	311	0	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**350**
Garibaldi	0	0	0	0	0	0	1	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**5**
Gray Lodge WA	0	14	0	0	0	0	50	8	0	0	382	0	3	1	0	0	0	34	0	0	0	0	0	0	0	0	0	0	**492**
Grizzly Island WA	0	39	0	0	0	0	233	3188	1	0	12714	2	436	779	107	0	0	115	0	51	0	1	0	0	0	0	10	9	**17685**
Honey Lake / Ash Creek WA	26	0	14	9	132	2	69	243	1	9	327	2	37	119	33	0	0	16	1	14	1	0	8	5	6	0	0	3	**1077**
Kalfsbeek	0	7	0	0	0	0	3	4	0	0	95	0	5	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	**116**
Los Banos WA	0	3	0	0	0	0	17	60	0	0	99	0	9	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	**191**
Mandeville Island	0	5	0	0	0	0	6	7	0	0	97	0	4	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	**122**
Mendota WA	11	16	0	20	0	0	156	321	20	0	589	0	45	69	2	0	0	8	0	1	0	2	0	0	0	0	2	4	**1266**
Mountain Meadows	0	0	0	0	0	0	2	1	0	0	4	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	**11**
Napa-Sonoma Marsh	0	0	0	0	0	0	0	5	0	0	7	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**13**
Palm Tract	0	10	0	0	0	0	1	0	0	0	72	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**88**
Riley Farms	0	0	0	0	0	0	2	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**25**
Sacramento NWR	0	80	0	0	0	0	142	21	0	0	1527	0	63	3	2	0	0	80	0	4	0	0	0	0	0	1	0	0	**1923**
Salt Slough Unit	0	0	0	0	0	0	2	6	0	0	14	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**25**
Thermalito Afterbay	0	3	0	1	0	0	7	0	0	0	389	0	26	1	0	0	0	8	0	0	0	0	0	0	0	0	0	1	**436**
Tule Lake NWR	0	0	0	0	0	0	8	10	0	0	78	0	9	0	0	2	0	12	0	2	0	0	0	0	0	0	0	1	**122**
Winters	0	1	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**5**
Yolo Bypass	0	0	0	0	0	0	17	19	0	0	44	1	0	0	1	0	0	8	0	0	0	1	0	0	0	0	0	0	**91**
Total	**37**	**257**	**14**	**30**	**132**	**2**	**1012**	**4174**	**22**	**9**	**18526**	**44**	**697**	**983**	**156**	**2**	**2**	**340**	**1**	**72**	**1**	**4**	**8**	**7**	**9**	**5**	**12**	**20**	**26578**

Figure 7. Summary of all waterfowl and associated species nest data by study region and nesting bird species, California, 1985–2014. Species are American Avocet (AMAV), American Bittern (AMBI), Black-necked Stilt (BNST), Canada Goose (CAGO), Canvasback (CANV), Cinnamon Teal (CITE), Gadwall (GADW), Killdeer (KILL), Long-billed Curlew (LBCU), Mallard (MALL), Mourning Dove (MODO), Northern Harrier (NOHA), Northern Pintail (NOPI), Northern Shoveler (NSHO), Redhead Duck (REDH), Ring-necked Duck (RNDU), Ring-necked Pheasant (RPHE), Sandhill Crane (SACR), Short-eared Owl (SEOW), Sora (SORA), Western Meadowlark (WEME), Willet (WILL), Wilson's Phalarope (WIPH), Wilson's Snipe (WISN), Wild Turkey (WITU), and White-tailed Kite (WTKI).

Region	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Beale AFB	0	0	0	0	0	0	0	0	0	31	13	27	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Butte Valley WA	0	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45
China Island WA	0	0	0	0	0	0	0	35	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59
Colusa NWR	0	37	12	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	72
Conaway Ranch	0	0	0	0	0	0	0	0	0	0	167	187	89	135	76	66	63	81	82	106	186	84	52	0	0	0	0	0	0	0	1374
CREP - Colusa County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	26	39	132	86	0	0	0	0	0	0	0	0	295
CREP - Placer County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5
CREP - Yolo County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	31	128	38	64	0	0	0	0	0	0	0	0	279
CREP - Butte County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Davis	0	0	0	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26
Delevan NWR	0	87	79	109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	276
Denverton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Fendt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	80	29	76	122	0	0	0	0	0	0	0	0	350
Garibaldi	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Gray Lodge WA	0	99	167	105	0	0	0	0	0	0	0	0	22	43	29	17	10	0	0	0	0	0	0	0	0	0	0	0	0	0	492
Grizzly Island WA	587	758	812	724	746	483	716	890	549	1176	1129	1259	945	764	533	614	452	309	401	178	0	0	0	337	385	937	1010	544	447	0	17685
Honey Lake / Ash Creek WA	0	0	403	274	400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1077
Kalfsbeek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	14	13	42	42	0	0	0	0	0	0	0	0	116
Los Banos SWA	0	0	0	0	92	13	0	36	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	191
Mandeville Island	0	0	0	6	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	113	0	0	0	0	0	0	0	0	0	0	122
Mendota WA	0	0	454	113	378	215	106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1266
Mountain Meadows	0	0	0	0	0	0	0	0	0	0	0	0	6	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	11
Napa-Sonoma Marsh	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
Palm Tract	0	0	0	0	0	0	0	0	0	0	0	27	35	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	88
Riley Farms	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25
Sacramento NWR	0	108	150	118	0	724	823	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1923
Salt Slough	0	0	0	0	0	0	0	23	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25
Thermalito	0	0	56	25	35	48	0	0	68	204	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	436
Tule Lake NWR	0	0	0	122	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	122
Winters	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Yolo Bypass	0	27	0	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	91
Total	587	1141	2133	1727	1651	1483	1648	1010	693	1424	1309	1500	1127	968	642	697	526	474	634	606	474	398	52	349	385	937	1010	544	449	0	26578

Figure 8. Summary of all waterfowl and associated species nest data by study region, California, 1985–2014.

Site	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3
10	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
10C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
10D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
10E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
10F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
10N	0	0	0	0	0	0	0	0	0	0	0	0	0	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39
10S	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
10SS	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	40	0	0	0	0	0	0	44
11N	35	34	0	0	0	0	0	0	0	0	0	0	0	194	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	264
11R	0	60	41	0	29	7	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	176
11S	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
12A	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12B	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
13C	56	0	1	0	0	1	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63
13D	61	34	41	24	0	2	60	26	29	52	68	38	63	17	11	13	11	21	56	0	0	0	0	10	31	51	25	0	19	0	763
13E	0	3	0	0	1	0	0	0	0	1	0	0	0	15	0	0	0	0	0	19	0	0	0	15	24	36	27	15	23	0	179
13F	0	2	0	0	67	63	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	40	51	8	0	33	0	322
13G	62	0	0	0	3	41	0	0	0	247	205	80	60	28	16	19	17	7	18	0	0	0	0	30	64	72	25	0	54	0	1048
13H	80	73	82	88	53	30	27	64	92	140	106	98	97	17	8	21	17	23	25	14	0	0	0	15	0	40	24	25	0	0	1259
13I	0	3	0	0	0	0	118	122	104	203	139	103	159	41	10	0	0	0	0	0	0	0	0	6	14	60	75	47	0	0	1204
13J	40	0	2	0	2	0	80	79	0	0	91	0	64	25	15	0	22	14	32	1	0	0	0	7	0	9	85	27	24	0	619
13K	45	61	64	20	24	17	24	24	45	74	0	74	0	0	0	0	0	0	0	0	0	0	0	0	0	24	24	0	0	0	520
13L	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	6	0	0	0	0	16
13M	0	0	0	0	0	5	0	0	0	0	0	0	0	28	0	27	0	0	0	17	0	0	0	25	47	61	80	55	77	0	422
13N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	8	0	11	19	20	14	0	99
13P	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
14	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
14 Pond	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
14A	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
14B	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
14C	47	21	2	20	12	21	20	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	91	54	56	11	0	381
14D	0	0	43	35	32	15	18	35	0	1	122	0	0	0	31	1	0	0	0	0	0	0	0	24	0	34	63	50	38	0	542
14E	0	0	0	84	98	37	48	42	0	0	138	257	143	0	112	108	78	67	86	59	0	0	0	33	31	57	71	55	42	0	1646
14F	59	75	0	65	73	24	20	50	0	0	162	208	169	0	37	83	35	28	35	36	0	0	0	18	0	2	35	17	16	0	1247
14G	0	0	0	0	0	1	13	37	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	13	16	40	30	0	0	0	153
14H	0	0	61	0	0	24	28	44	74	74	0	0	0	0	13	0	0	0	0	6	0	0	0	9	0	53	82	37	15	0	520
14I	44	0	61	40	21	17	32	61	32	77	98	159	110	0	80	98	63	48	54	10	0	0	0	3	0	47	41	4	0	0	1200
14J	0	16	39	0	0	0	0	0	0	8	0	0	0	0	44	69	51	0	47	16	0	0	0	17	11	28	39	28	20	0	433
14K	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	7	10	0	0	0	0	31
14L	17	74	69	57	44	12	5	0	0	0	0	0	0	0	17	0	25	0	0	0	0	0	0	5	0	42	82	28	10	0	487
14M	0	48	118	85	67	51	75	44	82	159	0	0	0	0	34	0	82	79	48	0	0	0	0	33	10	59	91	59	31	0	1255
14N	0	92	40	90	91	0	2	157	0	3	0	128	22	0	30	50	0	0	0	0	0	0	0	12	11	39	16	0	12	0	795
14O	0	46	119	73	90	62	53	83	91	135	0	114	53	6	38	41	44	22	0	0	0	0	0	14	0	0	14	5	3	0	1106
14P	0	0	7	0	0	0	1	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	11	14	0	0	0	0	41
15	0	66	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0	0	0	96
15A	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
15mid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
15N	0	0	0	0	0	0	0	0	0	0	0	0	0	87	15	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	127
15N Levee	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
15N mid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
15NN	0	0	0	0	0	0	0	0	0	0	0	0	0	82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	82
15NN Levee	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
15S	0	0	0	0	0	0	0	0	0	0	0	0	0	71	7	14	1	0	0	0	0	0	0	0	0	0	0	0	0	0	93
15W	0	0	0	0	0	0	0	0	0	0	0	0	0	60	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	72
17A	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
17D	0	0	0	11	5	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34
17E	0	0	0	0	10	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	4
22A	1	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
23A	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
23B	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
3E	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	17
4	0	0	0	0	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	10
5	0	0	0	6	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	14
6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8	0	0	0	6	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
8B	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Crescent Unit	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Dike	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
DUA	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
GRA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
GRB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Incidental	0	6	0	1	0	11	13	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37
ISD	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
JOI	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	587	758	812	724	746	483	716	890	549	1176	1129	1259	945	764	533	614	452	309	401	178	0	0	0	337	385	937	1010	544	447	0	17685

Figure 9. Summary of all waterfowl and associated species nest data collected by field at Grizzly Island Wildlife Area, California, 1985–2014.

Appendix A. Archival Metadata, Including File Names, Location of Data, Site Names, and Years

Appendix A is a Microsoft® Excel file that can be downloaded at http://pubs.usgs.gov/of/2015/1131/.

Appendix B. Summary of All Duck Nest Data Collected by Study Region, Field, and Year, California, 1985–2014

"0" either means the field was searched but no nests were found, or that the field was not searched in that specific year.

Beale Air Force Base

	Year			
Site	1994	1995	1996	1997
Goose Pond A	5	2	7	0
Goose Pond B	9	8	5	1
Hutchinson Creek	6	0	0	4
Hutchinson Creek South	0	0	6	0
Incidental	0	1	0	0
Lower Miller	3	0	2	3
Mad Dog North	0	1	0	0
MD	0	0	1	0
Parks Lake	0	0	0	22
Pheasant Farm	0	1	1	0
Upper Black Welder	8	0	5	0

Butte Valley Wildlife Area

	Year
Site	1988
4A	45

China Island

	Year	
Site	1992	1993
Alfalfa	0	11
C-1	19	0
C-2	16	0
Pasture	0	13

Colusa

	Year		
Site	1986	1987	1988
23E	22	0	0
23W	10	0	0
Canal Bank	0	0	1
T16	0	2	0
T23	0	0	19
T9	5	0	0
T9B	0	2	2
T9U	0	8	1

Conaway Ranch

	Year												
Site	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
12-3	0	0	0	0	0	0	0	0	18	19	0	6	0
12-3E	0	0	0	0	0	0	0	0	0	0	10	0	0
12-3W	0	0	0	0	0	0	0	0	0	0	5	0	0
12-5	0	0	0	0	0	0	0	1	0	0	0	0	0
13-1	66	121	49	30	33	17	10	0	6	0	2	18	0
18-6	0	0	0	0	0	22	0	0	0	0	0	0	0
28-2	8	34	24	0	0	0	0	0	0	0	0	0	0
28-3	7	0	0	0	0	0	0	0	0	0	0	0	0
28-5	31	32	16	105	43	27	51	73	58	81	154	60	52
31-4	55	0	0	0	0	0	0	0	0	0	0	0	0
EOF	0	0	0	0	0	0	0	7	0	0	0	0	0
OBP	0	0	0	0	0	0	0	0	0	6	15	0	0
Vetch Field	0	0	0	0	0	0	2	0	0	0	0	0	0

CREP - Colusa County

Site	Year 2002	2003	2004	2005	2006
4 mile Road	0	0	15	0	0
Buckhorn	0	2	0	7	2
Colusa NWR	0	11	20	25	0
Finch East	0	0	0	27	0
Finch West	0	0	0	20	19
Kise	2	8	0	5	6
La Grange	0	0	0	16	0
Rogers Wheat	0	0	0	22	0
Ryan	0	0	0	0	56
Traynham Ranch	0	0	0	0	3
White Road	0	5	4	10	0
White Road East	4	0	0	0	0
White Road West	6	0	0	0	0

CREP - Placer County

Site	Year 2002
Koshman	4
Lakeview	1

CREP - Yolo County

Site	Year 2002	2003	2004	2005	2006
Dyer	0	0	0	0	8
Dyer Wheat	0	3	0	0	0
Keeley	0	0	55	0	0
Lillard	0	0	20	18	20
Long	0	5	4	5	0
Long Wheat	0	0	0	0	20
Newman	4	22	0	0	6
Newman N	0	0	10	14	0
Newman S	0	0	21	1	0
Olevario	0	1	0	0	6
Ottenwalter	0	0	18	0	0
Van Tram	0	0	0	0	4
Wallace	14	0	0	0	0

CREP - Butte County

Site	Year 2002
AMBA	1

Davis Water Treatment Ponds

Site	Year 1992
4	5
5	6
6	5
7	8
Davis S. Ponds	2

Delevan National Wildlife Refuge

Site	Year 1986	1987	1988	2008
3/4	53	0	9	0
35	0	0	13	0
37	34	43	19	0
41	0	36	56	1
D43	0	0	6	0
Incidental	0	0	1	0
T9	0	0	5	0

Denverton

Site	Year 2013
T3	1
T4	1

Fendt

Site	Year 2002	2003	2004	2005	2006
1	0	80	29	0	0
East	0	0	0	11	0
Fallow	36	0	0	0	0
Rice	7	0	0	0	0
West	0	0	0	65	76
Wheat	0	0	0	0	46

Garibaldi

Site	Year 1988
1	2
2	3

Gray Lodge Wildlife Area

Site	Year 1986	1987	1988	1997	1998	1999	2000	2001
13	0	0	5	0	0	0	0	0
19	6	7	3	0	0	0	0	0
22	2	0	0	0	0	0	0	0
28	0	0	1	0	0	0	0	0
31	1	0	0	0	0	0	0	0
39	1	0	0	0	0	0	0	0
42	0	14	12	0	0	0	0	0
45	1	0	0	0	0	0	0	0
51	0	15	20	0	0	0	4	0
52	0	0	3	5	0	0	0	1
52A	0	6	7	0	0	0	0	0
52B	0	2	0	0	0	0	0	0
57	1	9	0	0	0	0	0	0
57N	4	0	0	0	0	0	0	0
57S	3	0	0	0	0	0	0	0
58	15	26	4	0	0	0	0	0
62W	6	0	0	0	0	0	0	0
63	0	7	2	0	0	0	0	0
63N	9	0	0	0	0	0	0	0
63S	10	0	0	0	0	0	0	0
66	6	0	0	0	0	0	0	0
67	0	0	1	0	0	0	0	0
74	0	0	0	0	10	10	4	0
79	0	0	0	0	0	4	0	0
81	7	0	0	0	0	0	0	0
82	0	35	47	10	28	15	9	8
84	7	3	0	0	1	0	0	0
85	0	4	0	0	0	0	0	0
90	12	9	0	0	0	0	0	0
91	1	0	0	0	0	0	0	0
92	0	0	0	0	0	0	0	1
BP-52	0	0	0	7	0	0	0	0
BPA	0	0	0	0	2	0	0	0
BPB	0	0	0	0	2	0	0	0
Incidental	7	24	0	0	0	0	0	0
Justeson	0	6	0	0	0	0	0	0

Grizzly Island Wildlife Area

Site	Year 1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2008	2009	2010	2011	2012	2013
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
10	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
10D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
10E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
10F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
10N	0	0	0	0	0	0	0	0	0	0	0	0	0	39	0	0	0	0	0	0	0	0	0	0	0	0
10S	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0
10SS	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	40	0	0	0	0
11N	35	34	0	0	0	0	0	0	0	0	0	0	0	194	1	0	0	0	0	0	0	0	0	0	0	0
11R	0	60	41	0	29	7	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11S	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0
12A	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12B	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13C	56	0	1	0	0	1	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0
13D	61	34	41	24	0	2	60	26	29	52	68	38	63	17	11	13	11	21	56	0	10	31	51	25	0	19
13E	0	3	0	0	1	0	0	0	0	1	0	0	0	15	0	0	0	0	0	19	15	24	36	27	15	23
13F	0	2	0	0	67	63	39	0	0	0	0	0	0	0	0	0	0	0	0	0	19	40	51	8	0	33
13G	62	0	0	0	3	41	0	0	0	247	205	80	60	28	16	19	17	7	18	0	30	64	72	25	0	54
13H	80	73	82	88	53	30	27	64	92	140	106	98	97	17	8	21	17	23	25	14	15	0	40	24	25	0
13I	0	3	0	0	0	0	118	122	104	203	139	103	159	41	10	0	0	0	0	0	6	14	60	75	47	0
13J	40	0	2	0	2	0	80	79	0	0	91	0	64	25	15	0	22	14	32	1	7	0	9	85	27	24
13K	45	61	64	20	24	17	24	24	45	74	0	74	0	0	0	0	0	0	0	0	0	0	24	24	0	0
13L	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	6	0	0	0
13M	0	0	0	0	0	5	0	0	0	0	0	0	0	28	0	27	0	0	0	17	25	47	61	80	55	77
13N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	8	0	11	19	20	14
13P	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 Pond	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14A	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14B	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14C	47	21	2	20	12	21	20	16	0	0	0	0	0	0	0	0	0	0	0	0	10	0	91	54	56	11
14D	0	0	43	35	32	15	18	35	0	1	114	0	0	0	31	1	0	0	0	0	24	0	34	63	50	38
14E	0	0	0	84	98	37	48	42	0	0	138	257	143	0	112	108	78	67	86	59	33	31	57	71	55	42
14F	59	75	0	65	73	24	20	50	0	0	162	208	169	0	37	83	35	28	35	36	18	0	2	35	17	16
14G	0	0	0	0	0	1	13	37	0	2	0	0	1	0	0	0	0	0	0	0	13	16	40	30	0	0
14H	0	0	61	0	0	24	28	44	74	74	0	0	0	0	13	0	0	0	0	6	9	0	53	82	37	15
14I	44	0	61	40	21	17	32	61	32	77	98	159	110	0	80	98	63	48	54	10	3	0	47	41	4	0
14J	0	16	39	0	0	0	0	0	0	8	0	0	0	0	44	69	51	0	47	16	17	11	28	39	28	20
14K	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	11	7	10	0	0	0
14L	17	74	69	57	44	12	5	0	0	0	0	0	0	0	17	0	25	0	0	0	5	0	42	82	28	10
14M	0	48	118	85	67	51	75	44	82	159	0	0	0	0	34	0	82	79	48	0	33	10	59	91	59	31
14N	0	92	40	90	91	0	2	157	0	3	0	128	22	0	30	50	0	0	0	0	12	11	39	16	0	12
14O	0	46	119	73	90	62	53	83	91	135	0	114	53	6	38	41	44	22	0	0	14	0	0	14	5	3
14P	0	0	7	0	0	0	1	0	0	0	0	0	0	8	0	0	0	0	0	0	0	11	14	0	0	0
15	0	66	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0	0
15A	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15mid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
15N	0	0	0	0	0	0	0	0	0	0	0	0	0	87	15	25	0	0	0	0	0	0	0	0	0	0

Grizzly Island Wildlife Area (continued)

Site	Year 1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2008	2009	2010	2011	2012	2013
15N Levee	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0
15N mid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0
15NN	0	0	0	0	0	0	0	0	0	0	0	0	0	82	0	0	0	0	0	0	0	0	0	0	0	0
15NN Levee	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0
15S	0	0	0	0	0	0	0	0	0	0	0	0	0	71	7	14	1	0	0	0	0	0	0	0	0	0
15W	0	0	0	0	0	0	0	0	0	0	0	0	0	60	12	0	0	0	0	0	0	0	0	0	0	0
17A	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17D	0	0	0	11	5	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17E	0	0	0	0	10	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
22A	1	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23A	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23B	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3E	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4	0	0	0	0	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
5	0	0	0	6	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	6	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8B	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crescent Unit	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dike	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DUA	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
GRB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Incidental	0	6	0	1	0	11	13	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ISD	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JOI	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Honey Lake / Ash Creek WAs

Site	Year 1987	1988	1989
1	19	5	107
11R	0	3	0
13	0	4	0
14-2	0	3	0
15	0	9	0
15-16	0	0	3
16	0	2	0
18	0	10	0
2	7	0	7
2E	0	4	0
3	8	4	1
4	33	26	29
5	5	0	2
5A	1	7	2
5A/5B	0	0	3
5A2	14	0	0
5C	0	7	0
5C/5B	0	1	1
6	4	7	0
6A2	0	0	17
6C	4	1	0
6C1	0	0	4
6C2	0	0	38
6F	0	3	0
6G	0	5	0
6L	0	3	0
7	0	35	0
8	1	0	0
A4	1	0	0
AHB	0	0	1
D1B	0	0	1
D1C	0	0	1
D3A	41	0	0
D3B	41	0	16
D4B	0	1	10
D5A	0	0	2
D6A	33	42	0
D6B	21	6	0
D6C	107	27	4
D6E	0	3	1
D6F	0	0	3
D6G	0	0	34
D6H	41	0	11
DGG	3	0	0
DL6	0	13	0
F11	0	0	9
F12	0	0	52
F16	0	0	3
F18	0	0	10
F5A	1	0	9
F6B	7	11	0
F6C	0	3	0
F7A	0	0	17
F7C	0	6	0
F8A	6	0	0
H Res	0	12	1
Incidental	5	0	1
L6	0	7	0

Kalfsbeek

Site	Year 2002	2003	2004	2005	2006
1	5	14	0	0	0
N	0	0	4	13	0
None provided	0	0	0	0	15
S	0	0	4	17	0
Wheat	0	0	5	12	27

Los Banos Wildlife Area

Site	Year 1989	1990	1992	1993
26A	0	0	13	0
26B	0	0	14	0
41	0	0	0	12
56	92	0	0	0
57	0	0	3	0
63	0	0	0	1
64	0	0	0	25
640D1	0	0	6	0
HOL	0	13	0	0
SW64	0	0	0	12

Mandeville Island

Site	Year 1988	1991	2004
1	3	0	3
15	0	0	12
19	0	0	63
29M	0	0	12
29N	0	0	6
29S	0	0	4
3	2	0	0
3E	0	0	5
3W	0	0	8
CD1	0	3	0
IN1	1	0	0

Mendota Wildlife Area

Site	Year 1987	1988	1989	1990	1991
1	0	13	0	0	0
1.2	0	0	22	27	6
1.4	0	0	14	0	0
11	3	0	0	0	0
11.4	0	0	4	19	9
11A	5	0	1	0	0
12	1	0	0	0	0
12A	1	0	0	0	0
13.1	0	0	5	0	0
13.4	0	0	4	0	0
13A	1	0	0	0	0
13D	3	0	0	0	0
13E	12	0	0	0	0
14.1	0	0	0	14	2
14A	1	0	0	0	0
17.7	0	0	25	0	0
17.8	0	10	18	4	1
17A	15	0	0	0	0
17B	46	0	0	0	0
17D	1	0	0	0	0
19	0	1	0	0	0
19.4	0	27	0	0	0
19A	14	0	0	0	0
19D	0	0	8	0	0
19G	0	0	4	0	0
1A	16	0	0	0	0
2.1	0	0	10	5	0
21.4	0	10	7	0	0
22.1	0	0	4	0	0
24.1	0	0	4	0	0
24.1A	0	0	0	7	0
24.1B	0	0	0	6	7
24.4	0	0	9	0	0
24.5	0	0	0	50	10
25	1	0	0	0	1
28	1	2	0	0	0
28.2	0	0	22	0	0
28.3	0	0	20	8	0
28.4	0	2	0	0	2
28.5	0	22	10	0	0
28.7	0	0	0	15	0
28A	23	0	0	0	0
29	1	0	0	0	0

Mendota Wildlife Area

Site	Year 1987	1988	1989	1990	1991
29.6	0	0	13	0	0
29A	10	0	0	0	0
29B	1	0	0	0	0
2A	2	0	0	0	0
3	0	1	0	0	0
3.4	0	4	5	0	0
30	0	1	0	0	0
30.1	0	13	11	0	0
30.3	0	0	13	0	0
30A	9	0	0	0	0
31	1	0	0	0	0
31A	6	0	0	0	0
33.1	0	1	0	0	0
33A	15	0	6	0	0
33B	1	0	0	0	0
34.3	0	0	14	0	0
34.9	0	0	0	0	1
34A	5	0	0	0	0
4.7	0	0	1	0	0
45	11	0	0	0	0
45.2A	0	0	0	0	2
46A	9	0	0	0	0
46B	15	0	0	0	0
46C	13	0	0	0	0
4A	1	0	0	0	0
8.2	0	0	3	1	0
8.3	0	0	25	32	8
8A	5	0	0	0	0
9	0	2	0	0	0
9.2	0	3	5	0	0
HQ	1	0	0	0	0
Incidental	14	1	19	5	0
Fresno Slough Island	16	0	61	0	0
PRA	7	0	0	0	0
PRB	40	0	0	0	0
PRC	68	0	0	0	0
PRD	34	0	0	0	0
PRE	25	0	0	0	0
T47	0	0	11	22	7
T50	0	0	0	0	4
T50A	0	0	0	0	15
T50B	0	0	0	0	20
T50C	0	0	0	0	11

Mountain Meadows Reservoir

Site	Year 1997	1999	2001
Mid	2	0	1
MMB	1	0	0
MMC	1	0	0
North	2	0	0
WL-Mid	0	2	0
WL-North	0	1	0
WL-South	0	1	0

Napa-Sonoma Marsh

Site	Year 1994
1	10
2	3

Palm Tract

Site	Year 1996	1997	1998
1-1	1	0	0
1-2	3	2	0
1-3	3	1	1
1-4	0	1	1
1-6	4	5	0
2-1	0	0	1
2-2	3	1	0
2-3	2	4	3
2-4	1	3	2
2-5	1	1	3
3-1	0	2	2
3-2	4	1	1
3-3	0	1	0
L2	0	0	10
L3	0	0	1
Levee	4	0	0
Levee 2	0	9	0
Levee 3	0	2	0
North Field	0	2	0
Season Wetland	1	0	0
SW3	0	0	1

Riley Farms

Site	Year 1986
Riley	25

Sacramento National Wildlife Refuge

Site	Year 1986	1987	1988	1990	1991
1	0	0	7	0	0
14	0	0	2	0	0
1S	0	0	0	0	1
1S1	0	0	0	0	3
25	63	81	35	0	0
31R	0	0	1	0	0
36R	0	0	1	0	0
41	0	0	2	0	0
42	0	2	2	0	0
43	43	60	40	0	0
51	0	0	2	0	0
57	0	1	0	0	0
58	0	2	1	0	0
82	0	1	2	0	0
A1	0	0	0	42	0
Bpa	0	0	0	0	12
BPb	0	0	0	0	1
BPc	0	0	0	0	10
C1	0	0	0	0	43
C2A	0	0	0	0	12
C3	0	0	0	0	24
D1	0	0	0	2	0
D2	0	0	0	0	7
F1	0	0	0	2	3
F2	0	0	0	31	5
FS1	0	0	0	0	37
G1	0	0	0	7	0
GR1	0	0	0	0	3
H1	0	0	0	28	0
H2	0	0	0	299	0
H3	0	0	0	3	0
INC	2	0	1	0	4
J1	0	0	0	27	48
J2	0	0	0	10	0
J3	0	0	0	28	0
J4	0	0	0	43	0
JM2	0	0	0	0	3

Sacramento National Wildlife Refuge

Site	Year 1986	1987	1988	1990	1991
JS1	0	0	0	0	1
JS2	0	0	0	0	21
JS3	0	0	0	0	27
JUS	0	2	0	0	0
L1	0	0	0	89	0
L2	0	0	0	58	0
L6	0	0	0	0	25
L7	0	0	0	0	41
M2	0	0	0	33	190
M3	0	0	0	6	3
M4	0	0	0	1	0
ME1	0	0	0	0	24
ME2	0	0	0	0	4
ME3	0	0	0	0	20
P1	0	0	0	2	0
P2	0	0	0	1	0
PD1	0	0	0	0	80
RM1	0	0	0	0	7
S1	0	0	0	4	10
S4	0	0	0	8	0
SB1	0	0	0	0	4
SB2	0	0	0	0	2
SB3	0	0	0	0	2
T16	0	1	0	0	0
T1A	0	0	0	0	21
T1B	0	0	0	0	14
T1C	0	0	0	0	15
T2A	0	0	0	0	11
T2C	0	0	0	0	1
T3	0	0	0	0	1
T4b	0	0	0	0	28
TG	0	0	13	0	0
TV1	0	0	0	0	21
TV2	0	0	0	0	19
TV3	0	0	0	0	14
Y06	0	0	1	0	0
Y07	0	0	2	0	0
zum	0	0	6	0	0

Salt Slough

Site	Year 1992	1993
1	1	0
2	10	0
3	12	0
N21	0	1
W21	0	1

Thermalito Afterbay

Site	Year 1987	1988	1989	1990	1993	1994
1E	0	0	3	0	0	0
1E1	0	0	0	2	2	18
1E10	0	0	0	0	0	1
1E1A	0	0	0	12	6	8
1E1B	0	0	0	2	4	19
1E2	0	0	2	3	0	6
1E2A	0	0	0	0	4	2
1E2B	0	0	0	0	1	2
1E3	0	0	1	0	1	0
1E4	0	0	1	1	0	4
1E4A	0	0	0	0	1	3
1E5	0	0	10	5	0	0
1E5A	0	0	0	5	1	8
1E5B	0	0	0	0	1	1
1E5C	0	0	0	0	1	1
1E6	0	0	0	0	8	28
1E7	0	0	0	0	4	29
1E8	0	0	0	0	11	47
1N1a	0	0	0	0	1	5
1N2	0	0	0	13	0	0
1N2A	0	0	0	0	2	1
1N2B	0	0	0	0	2	2
1N3	0	0	0	3	2	0
1N4	0	0	0	0	1	0
1N5	0	0	0	0	7	6
1N6	0	0	0	0	5	2
1N7	0	0	0	0	0	1
1S2	0	0	0	0	3	0
4E	19	1	4	0	0	0
4N	18	6	6	0	0	0
4N1	0	1	0	0	0	0
4N1A	0	0	0	1	0	0
4N2	0	3	2	0	0	0
4N3	0	0	2	0	0	0
4N4	0	0	3	0	0	0
4SW	7	0	0	0	0	0
4W	6	0	1	1	0	0
5N	6	0	0	0	0	0
5N1	0	4	0	0	0	0
B1	0	0	0	0	0	5
B2	0	0	0	0	0	2
C1	0	0	0	0	0	1
C2	0	0	0	0	0	2
E1	0	8	0	0	0	0
TP2	0	2	0	0	0	0

Tule Lake National Wildlife Refuge

Site	Year 1988
B1	13
B1A	36
E01	10
E02	27
Incidental	1
M2	34

Winters

Site	Year 1988
1	1
3	4

Yolo Bypass

Site	Year 1986	1988	2008
C2	0	0	8
IN1	0	1	0
Parker 1	0	0	3
Senator Outing 1	11	0	0
Senator Outing 2	11	0	0
YO1	0	8	0
YO2	0	3	0
YO5	0	16	0
YO6	0	8	0
YO7	0	17	0
Yolo Flyway	5	0	0

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