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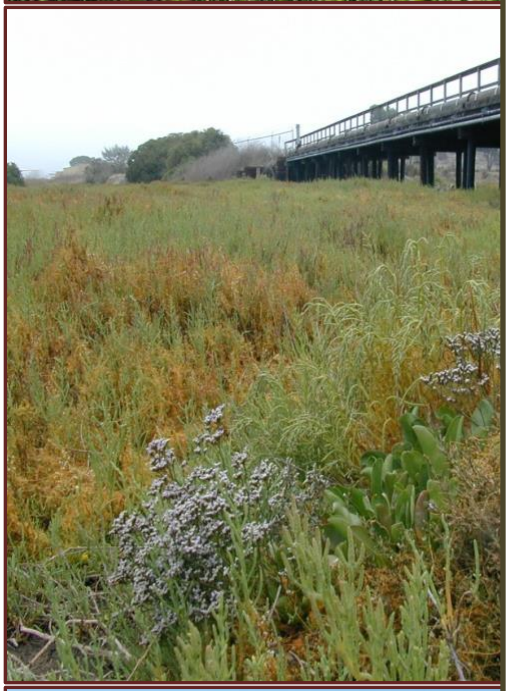
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North Campus Open Space

Ocean Meadows Golf Course
Wetland Restoration Project
Baseline Bird Survey Database

Prepared by
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October, 2014

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PROJECT OVERVIEW

The *North Campus Open Space* project (the "NCOS Project") seeks to restore the historic functions of a riparian-to-estuary transition that will enhance the quality of existing wetlands and effectively double the wetland habitat in the Devereux Slough system at the site of what used to be the Ocean Meadows Golf Course ("OMGC"). A crucial component of the restoration project is to develop a Research and Monitoring Plan. The overarching goals and objectives of the Research and Monitoring Plan are to aid scientists and stakeholders in assessing the success of the NCOS Project and assist managers in developing adaptive management strategies as the restoration progresses through its various phases (Stratton, 2013). By considering this early, assumptions can be incorporated explicitly to improve project design and allow for pre-project monitoring.

Bunn et al. (2007) offer insight into developing data quality assurance and data management, analysis, and reporting strategies. They suggest that a new monitoring program should not underestimate the importance and cost of data handling, analysis, and reporting. Good data management should maximize the utility of the data, making it available for queries by managers and scientists addressing new issues and research questions while also providing information for long-term monitoring. A well-designed data management system also improves the level of quality assurance and provides strong incentives to all program participants to standardize and coordinate protocols.

The initial phase of monitoring for the NCOS Project necessitates the development of a baseline database (a collection of historical data on coastal flora and fauna that could potentially be supported by the NCOS Project's habitat restoration). This project focused on compiling bird survey data for this baseline database from various sources.

STUDY AREA

The study area includes 58 locations that represent habitats with the potential to support various bird species in and around the project area (Table 1). The habitats representative of each location are divided into dominant and subdominant wetland and upland types designated using CCBER staff expertise, as well as references from Cowardin (1979) and Ferren (1987). Smaller sub-locations used to delineate specific habitat types are also coded into broader location categories to serve instances where locations identified by observers do not break out a smaller area (e.g., Area I is considered part of the Santa Barbara Airport as a broader location).

TABLE 1. STUDY AREA LOCATIONS

Location Code	Location Description
AI	AREA I
AJ	AREA J
AK	AREA K
AL	AREA L
AM	AREA M
BX	BASIN X
CB	CAMPUS BEACH
CBA	CAMPUS BEACH AREAS
CCO	CAMINO CORTO OPEN SPACE

Location Code	Location Description
CG	CCBER GREENHOUSES AND NURSERY[1]
CL	CAMPUS LAGOON
CLU	CAMPUS LAGOON UPLAND
COP	COAL OIL POINT RESERVE (AKA WEST DEVEREUX)
CP	CAMPUS POINT (AKA GOLETA POINT)
CVP	CREATED VERNAL POOLS (COAL OIL POINT RESERVE)
DA	DELCO AREA (FORMERLY KNOWN AS)
DB	DEVEREUX BEACH
DD	DEVEREUX DUNES
DP	DUNE POND (WEST OF DEVEREUX SLOUGH)
DS	DEVEREUX SLOUGH (AKA EAST OR LOWER DEVEREUX)
DSO	DEL SOL OPEN SPACE
EM	ELLWOOD MESA
EMB	ELLWOOD MESA BEACH
ESCW	EAST STORKE CAMPUS WETLAND
FGER	FISH AND GAME ECOLOGICAL RESERVE
FGW	FISH AND GAME WETLANDS (LOS CARNEROS RD)
FT	FRANCISCO TORRES TOWERS (TOWERS ONLY)
FTW	FRANCISCO TOWERS WETLAND
GB	GOLETA BEACH
GS	GOLETA SLOUGH (INCLUDES SANTA BARBARA AIRPORT
GSDP	GOLETA SANITARY DISTRICT PONDS
GSM	GOLETA SLOUGH MOUTH
IV	ISLA VISTA
IVB	ISLA VISTA BEACH
IVS	ISLA VISTA SEWAGE
KN	KNOLL (COAL OIL POINT RESERVE)
LI	LAGOON ISLAND
MSH	MARRIED STUDENT HOUSING[2]
MT	GOLETA SOUTH MASTER TALLY[3]
MV	MANZANITA VILLAGE -
NB	NORTH BLUFF
NF	NORTH FINGER (OF DEVEREUX SLOUGH)
NP	NORTH PARCEL
OMG	OCEAN MEADOWS GOLF COURSE
PD	PHELPS DITCH (INCLUDES PHELPS CRK & ENCANTO CRK)
PGE	PACIFIC GAS & ELECTRIC

[1] Also includes a "Student Gardens" adjacent to the greenhouses/nursery
[2] Also includes "Student Gardens" North of Devereux Rd
[3] Pertains only to Christmas Bird Count

Location Code	Location Description
SBA	SANTA BARBARA AIRPORT
SC	STORKE CAMPUS
SCE	SOUTHERN CALIFORNIA EDISON
SCF	STORKE CAMPUS FIELD -
SCOP	SAN CLEMENTE OPEN SPACE
SF	SOUTH FINGER (OF DEVEREUX SLOUGH)
SP	SOUTH PARCEL
SRW	STORKE RANCH WETLANDS
UCSB	UCSB (MAIN CAMPUS ONLY)
UDS	UPPER DEVEREUX SLOUGH (FORMERLY OMG - USE ONLY FOR DATA POSTED AFTER 05/2013)
WCB	WEST CAMPUS BLUFFS
WSCW	WEST STORKE CAMPUS WETLANDS (AKA WEST STORKE CAMPUS)

LOCATOR MAP

THESE LOCATIONS WERE CODED AND PLOTTED ON A MAP USING ARCGIS. THE LOCATOR MAP BELOW DELINEATES EACH OF THE SURVEY LOCATIONS IN THE STUDY AREA (

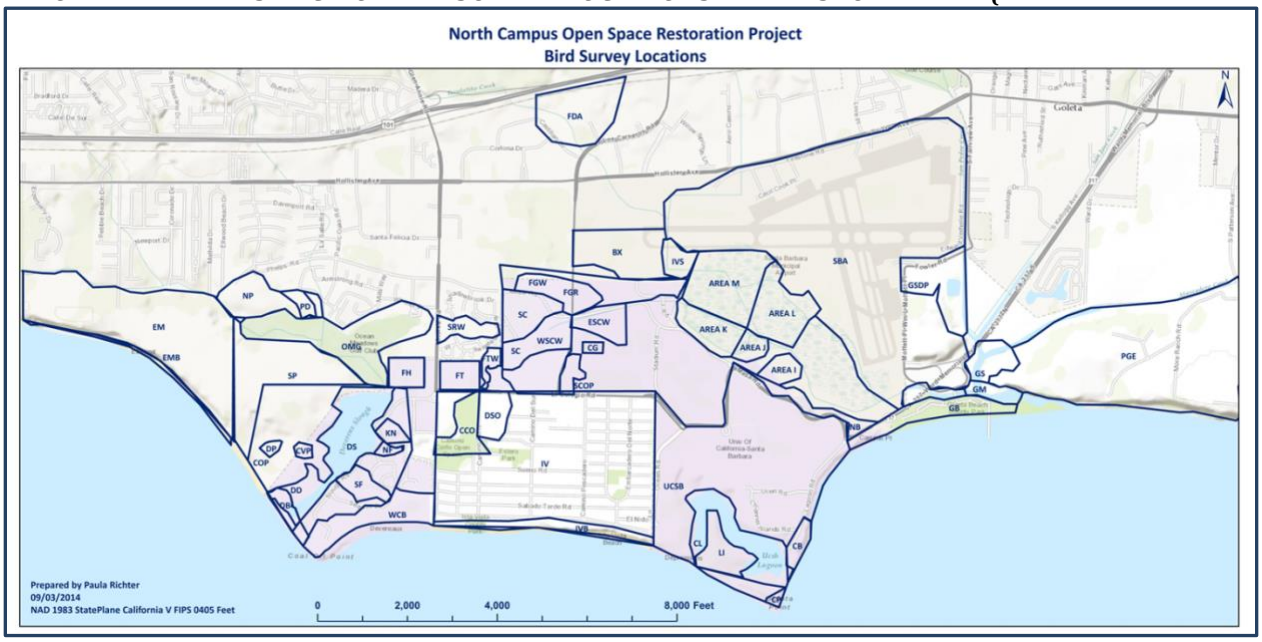


Figure 1).

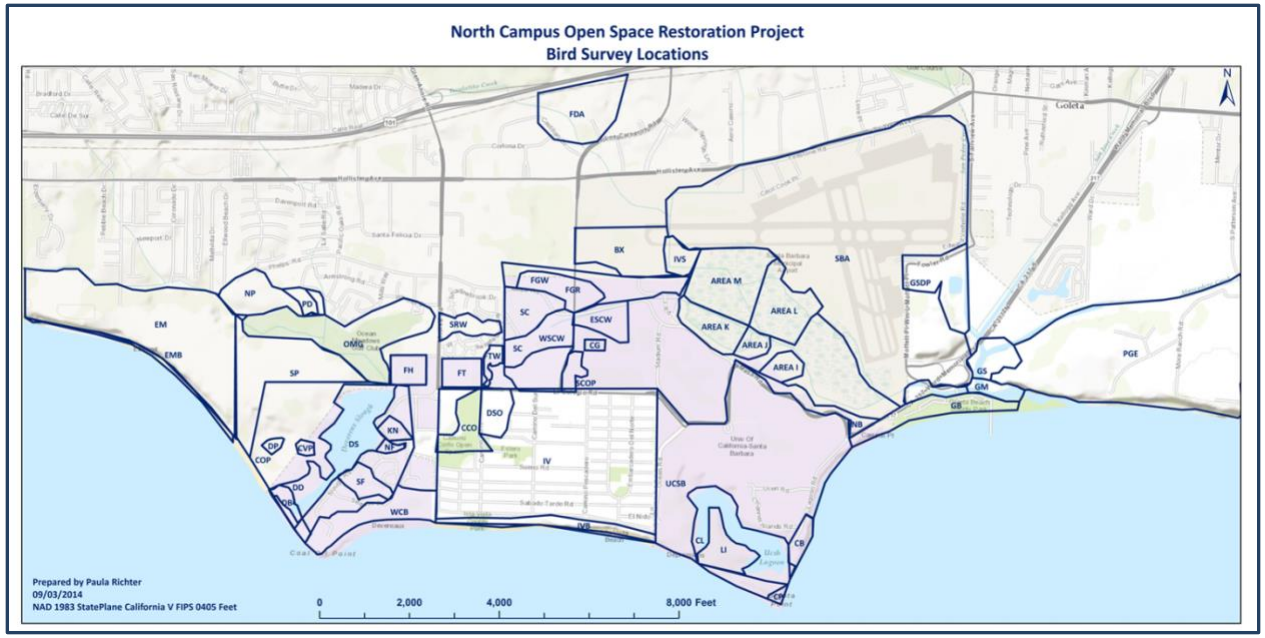


FIGURE 1. BIRD SURVEY DATABASE LOCATOR MAP

DATA REPRESENTATION

Data was collected from four data sources for this project over the time period from 1966 to 2014:

- **CBBER (MSE) Field Notes**

  Handwritten and typed field notes conducted by various observers, compiled by Mark Holmgren, of bird observations for the study area.

- **CCBER Bird Surveys**

  Bird surveys conducted by CCBER staff at West Storke Campus Wetlands, Francisco Towers Wetland, South Parcel, and Ocean Meadows Golf Course.

- **E-bird.org Bird Survey Data**

  A comprehensive dataset for the County of Santa Barbara of individual bird observations by numerous observers was parsed to the study area.

- **Santa Barbara Museum of Natural History (SBMNH) Christmas Bird Counts**

  Handwritten and typed field notes of bird observations conducted during the annual Christmas Bird Count sponsored by the Audubon Society was also parsed to the study area.

Overall, 4,202 survey records were compiled, with a total of 90,265 individual bird observation records, and more than 1 million individual species counts. A brief description of the data, total number of observations and survey records is provided below in

Table 2

Table 2 the unique identification (UniqueID) reference is included in this table to facilitate further parsing of the dataset, as analyses may require. This unique identification alphanumeric series stays with each observation record to provide an easy way to validate a record from the original raw data.

TABLE 2. DATA SUMMARY

SOURCE	DATES	# OF OBSERVATION RECORDS	# OF SURVEYS	MEAN # OF OBSERVATION RECORDS PER SURVEY	MEDIAN # OF OBSERVATION RECORDS PER SURVEY
MSE Field Notes UniqueID: OBS_MSE_020000000 series	1985-2014	7,611	366	20.80	17
Christmas Bird Count (CBC) UniqueID: OBS_CBC_100000 series	1966-2012[4]	10,594	140	75.67	71
CCBER Bird Surveys UniqueID: OBS_CCBER[years-00000 series]	1996-2014	14,752	840	36.67	39
E-bird (geoprocessed to study area)[5] UniqueID: OBS100000000)	1967-2014	69,016	3,613	19.10	18
TOTALS		**101,973**	**4,959**	**38**	**29**

DATA STORAGE

All of the raw data for this project has been populated with all four datasets on the CCBER Samba server, in a main folder titled *NCOS Bird Survey Data*.

The database that has been developed is stored as an Excel file titled *NCOS Bird Survey Database* as well as an Access file with the same title. The data summary analyses spreadsheets are also stored on the CCBER Samba server in the NCOS Bird Survey Data folder.

QUANTITATIVE ANALYSIS

The ultimate goal of the project was to compile these four main datasets into one database and perform summary analyses to ascertain bird species type and relative abundance over time and by habitat preference. These analyses will inform the project manager concerning species that would be expected to benefit from habitat restoration. In addition, the database will serve as a baseline to assess key success indicators for the restoration project as it moves through its various phases, and inform key adaptive management strategies.

DATA GAPS

CHRISTMAS BIRD COUNT DATA

The Christmas Bird Count data was obtained in two ways. First, an undergraduate student intern was charged with visiting the Santa Barbara Museum of Natural History and entering the data from handwritten field notes for the period from 1965 through 2004 (survey years, not survey dates). Second, the data from 2006 through 2013 was obtained from volunteers working under the direction of the Audubon Society in the form of Excel summary spreadsheets. This has proven

[4] Survey years – not survey dates (Christmas Bird Counts are conducted annually around the end of December or early part of January)

[5] Includes Campus Lagoon surveys conducted by CCBER staff between ~1995 to the present, with some missing data (retained original E-bird UniqueID without preceding alpha digits)

problematic in terms of matching up spatial observation information due to the protocols used for the Christmas Bird Count (i.e., the survey areas are generally broader than the locations chosen for this database).

In particular, the survey years of 1997 and 2004 only yielded data for the entire survey (i.e., a "Master Tally) which covers the very broad area designated as Goleta South (a total of 284 observation records). In addition, six survey years (1973, 1975, 1978, 1981, 1985, and 1999) are missing from the surveys entered by the student intern. It is possible that these survey records do not exist, but an effort might be made to obtain them. Finally, the survey locations for fifteen survey years (1966, 1968, 1969, 1971, 1972, 1981, 1983, 1984, 1987, 1999, 2000, 2006, 2008, 2009, and 2010) do not match up with the survey names (a protocol designed to ensure a cross-check of survey location, dates, source was available).

In summary, the Christmas Bird Count data is in need of further refinement. It is recommended that the data be obtained in its raw form (field notes, if possible) and re-entered into the data base.

DATA SKEW

The database is clearly skewed to more recent years (2005 to 2014). This is not something that can be addressed through the addition of more data as it is most likely simply not available for these earlier periods. Care should be taken when performing statistical analyses to account for the extreme skew of the data toward more recent years.

DATABASE MODEL

A database model was created to graphically illustrate the linkages between the various components of the database (see Appendix A). This model was used to guide database development and allow for future inputs to the database as the project moves forward in support of ongoing monitoring efforts.

METADATA

Metadata has been developed for the database (see Appendix B). This metadata is also incorporated into the Bird Survey Database Excel spreadsheet in a separate tab entitled, "Metadata."

LOOK-UP TABLES

Look-up tables have been developed with codes designed to streamline data entry.
A detailed description of each look-up table is provided in Appendix C).

ORIGINAL SURVEY RECORDS

MSE FIELD NOTES

The original Museum of Systematics and Ecology (MSE) field notes (housed at the Cheadle Center for Biodiversity and Ecological Restoration) are in digitized format.

CHRISTMAS BIRD COUNT DATA

The original Christmas Bird Count field notes (housed at the Santa Barbara Museum of Natural History) were not available for scanning due to security concerns, as well as the fact that many of the earlier records were generated on large-size paper which exceeds the capacity of standard printers and copiers).

CCBER DATA

The original field notes and data sets from surveys collected by CCBER staff (housed at the Cheadle Center for Biodiversity and Ecological Restoration) are in digitized format.

E-BIRD DATA

The original field notes and data sets from surveys uploaded to the E-bird database would need to be obtained from the original observer (or the person responsible for uploading them).

QUALITY ASSURANCE/QUALITY CONTROL

Every effort was made to ensure the highest quality of data entry and coding in the compilation of this database; however, the majority of this work relied on data sets generated from multiple sources across more than five decades. In some instances, handwritten field notes had to be interpreted and coded (i.e., the MSE field notes). In other instances, more specific information had to be condensed to conform to more generalized parameters to create a workable database. Appendix C contains detailed information with respect to coding, assumptions, and other relevant information that describes the database and its compilation.

Data entries were spot checked throughout the process of compiling the database, but every single entry has not been checked. In the event that a particular data point or points seem skewed or out of the ordinary, the data sources have been adequately identified to make it possible to check for errors. With more than 4,200 surveys, 90,000 individual observation records, and multiple data sources, field note interpretation, and data coding, the potential for error exists and wherever possible, questionable data points should be cross-checked.

DATA ANALYSES

The datasets that have been compiled and uploaded to this database will be used to conduct statistical analysis to inform the project restoration design and adaptive management strategies as the restoration moves through its various phases, as well as to serve as a baseline against which to assess identified key success indicators, and inform adaptive management strategies.

DATA DESCRIPTION

The datasets has been summarized to provide detailed baseline information to include the total number of surveys by location and season, the total number of observations, as well as the mean and median number of observations. Analysis also includes a summary of observations for key wetland types to determine whether there is enough information to establish certain trends in species usage of specific habitat-types, their relative abundance in these habitat types, and other information that would inform the restoration project.

SURVEYS

The database contains a total of 4,202 surveys conducted across various locations in the study area and the four seasons.

SURVEY LOCATIONS

Figure 2 depicts the top ten survey locations and the percentage of surveys in each of those locations.

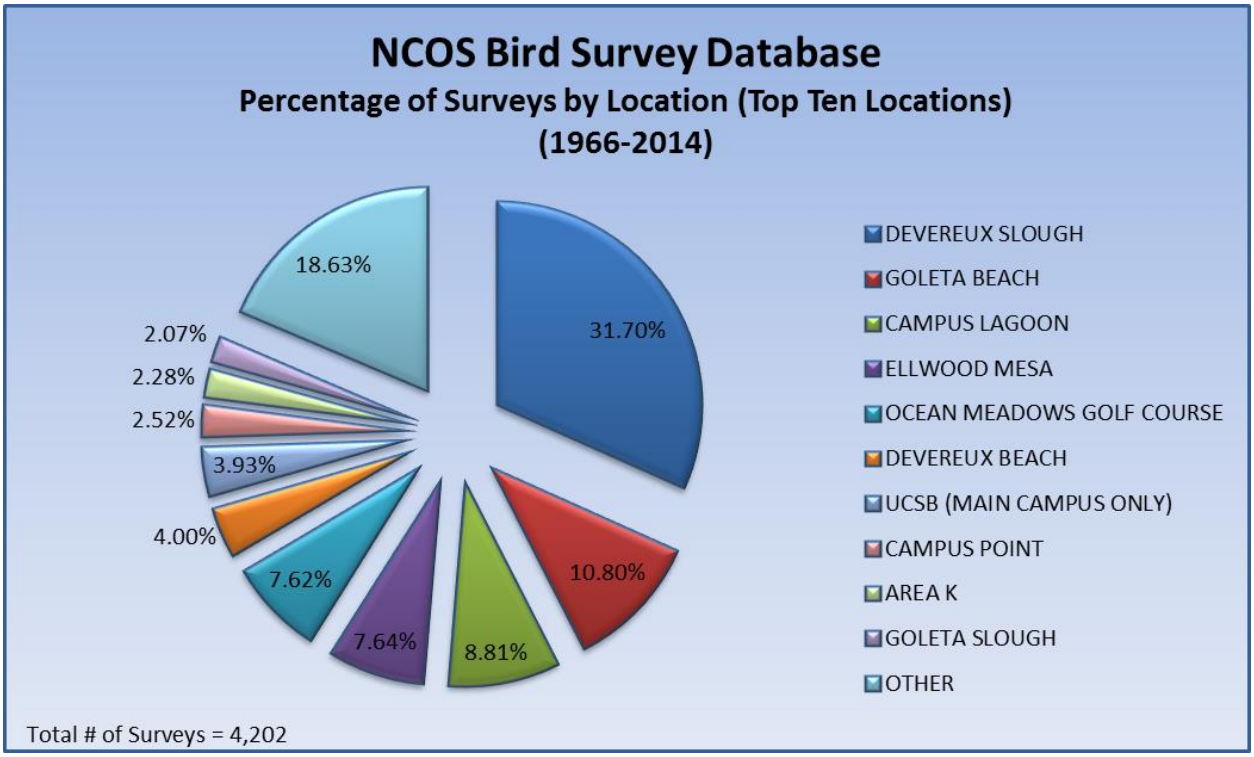


FIGURE 2. PERCENTAGE OF SURVEYS BY LOCATION

Figure 3 reflects the total number of surveys conducted in the top ten locations within the study area.

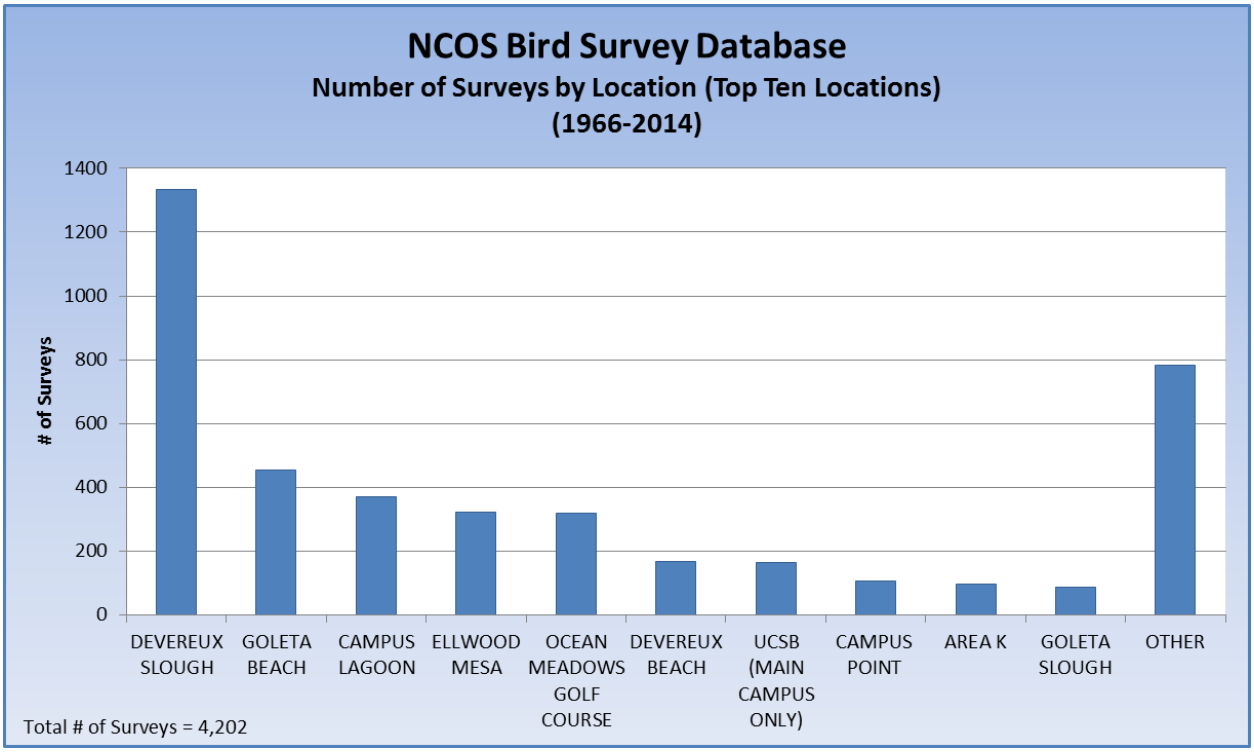


FIGURE 3. NUMBER OF SURVEYS BY LOCATION

SURVEY SEASONALITY

The four seasons that reflect the climatic conditions of the study region are distinguished in Table 3.

TABLE 3. SURVEY SEASONS

Winter	December | January |February
Spring	March | April | May
Summer	June | July | August
Fall	September | October | November

Figure 4 reflects the top ten survey locations by these seasons across the entire period covered by the database (1966-2014).

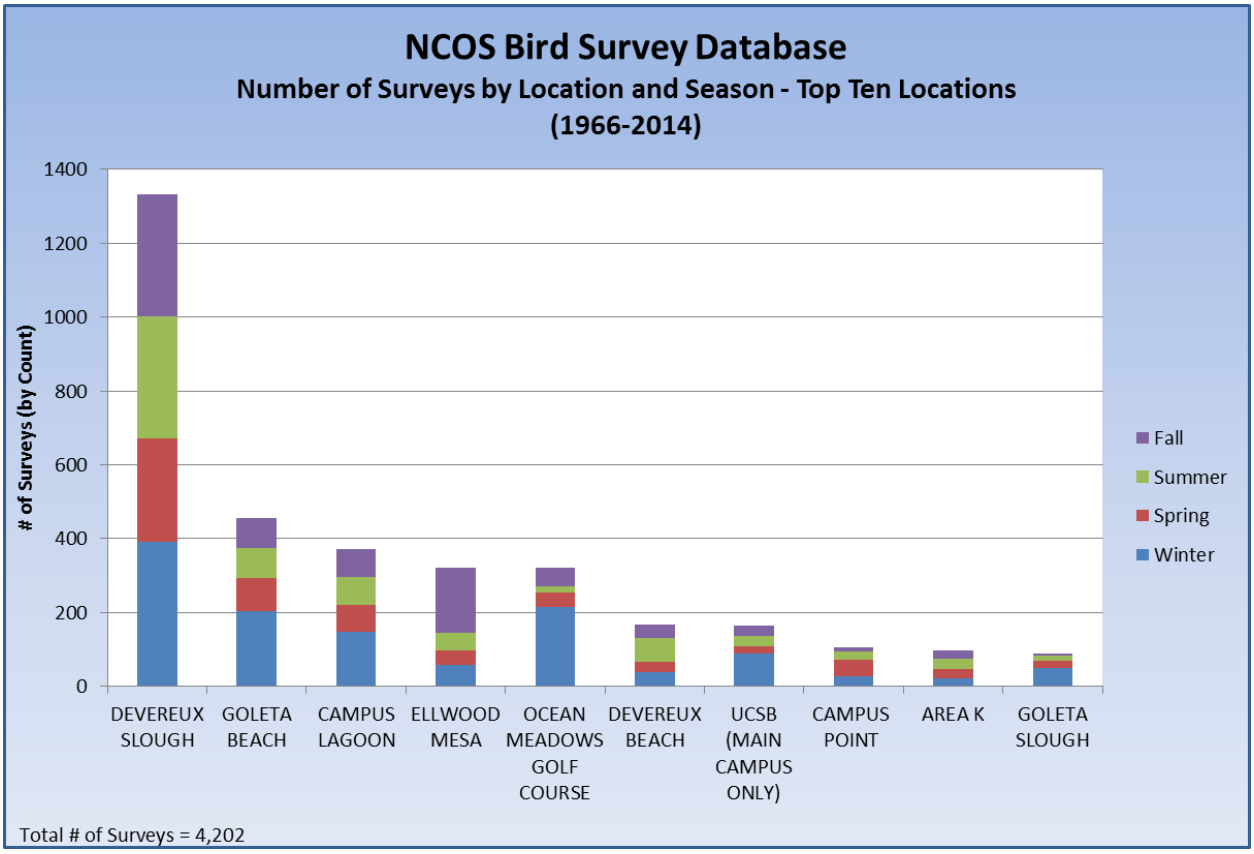


FIGURE 4. NUMBER OF SURVEYS BY LOCATION BY SEASON

The seasonality of the data is also a factor of the period over which data has been collected. First, it should be noted that 2014 represents only a partial year of data collection. Second, far more surveys have been conducted, and therefore far more data has been collected, over the past 15 years than in the past, as reflected in Figure 5, below.

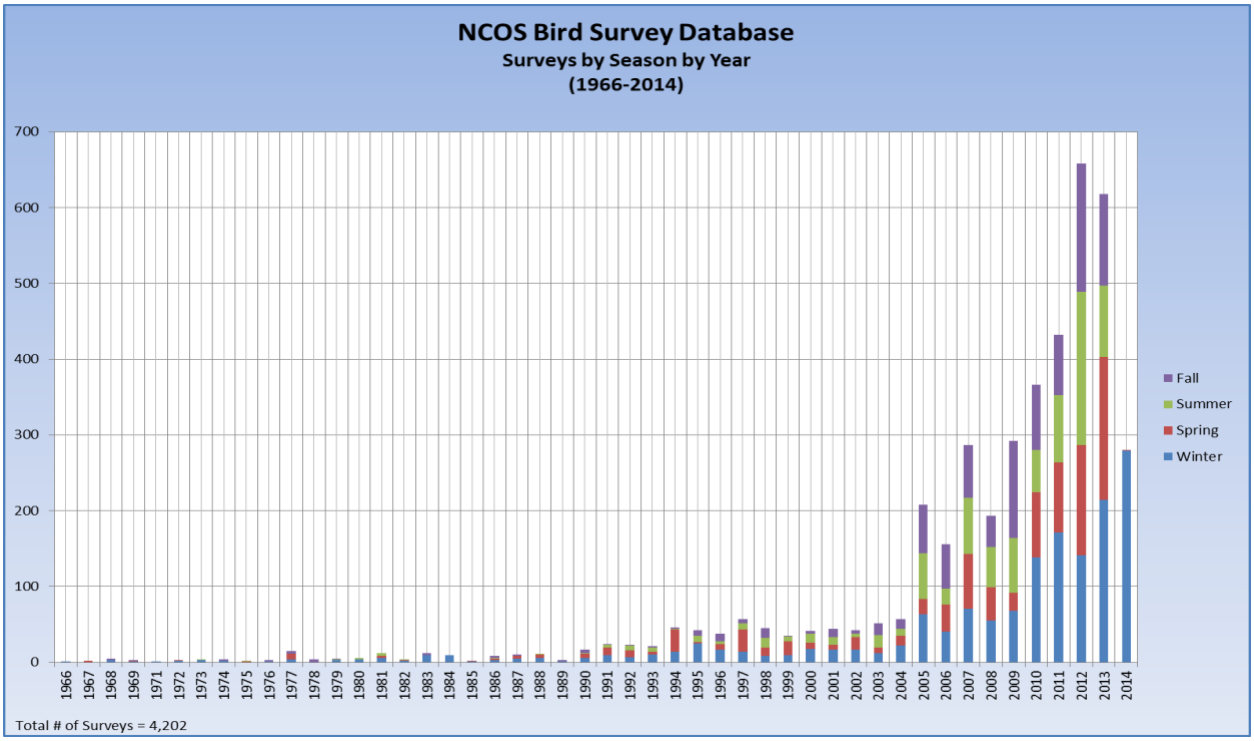


FIGURE 5. SURVEYS BY SEASON BY YEAR

This is further illustrated when surveys are assessed over decadal time periods, as reflected in Figure 6.

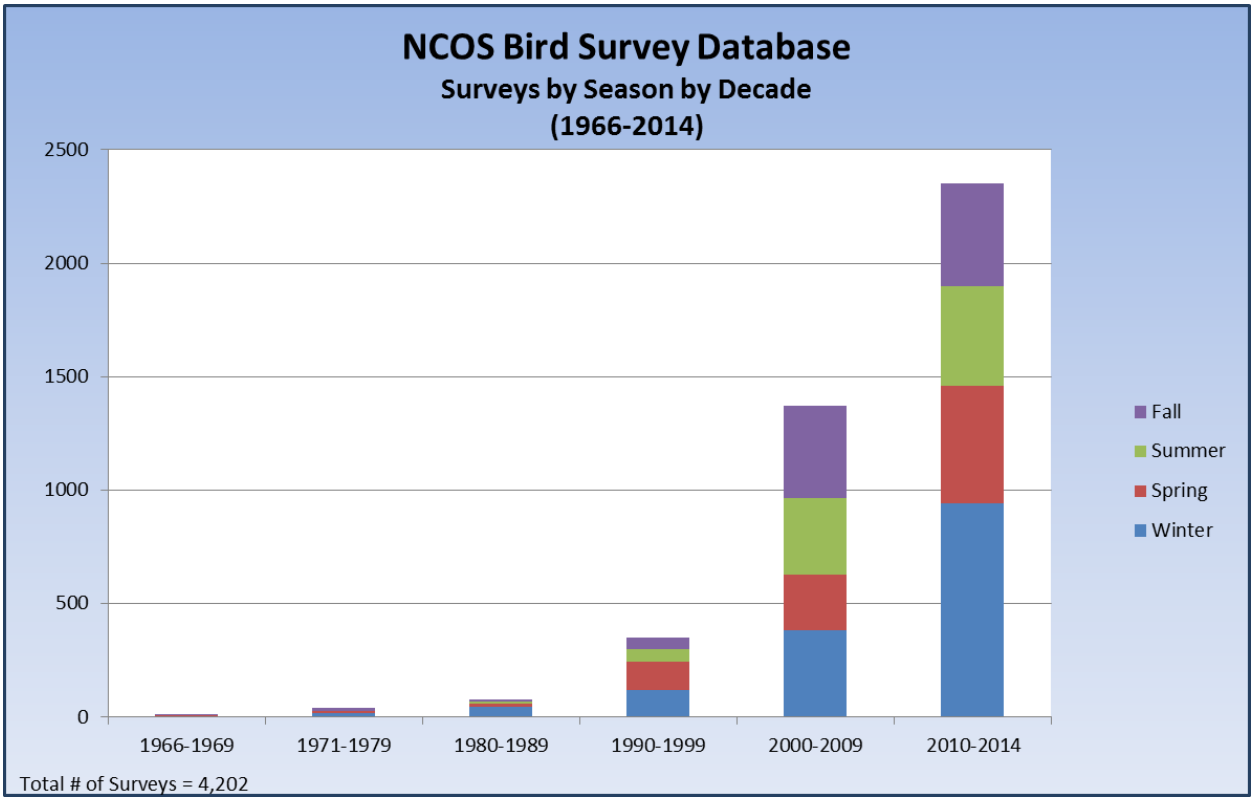


FIGURE 6. SURVEYS BY SEASON BY DECADE

SURVEY SOURCE

The data is dominated by surveys from E-bird. The pie-chart in Figure 7 reveals that more than 85% of the surveys collected for this database came from observational data submitted by observers to E-bird.

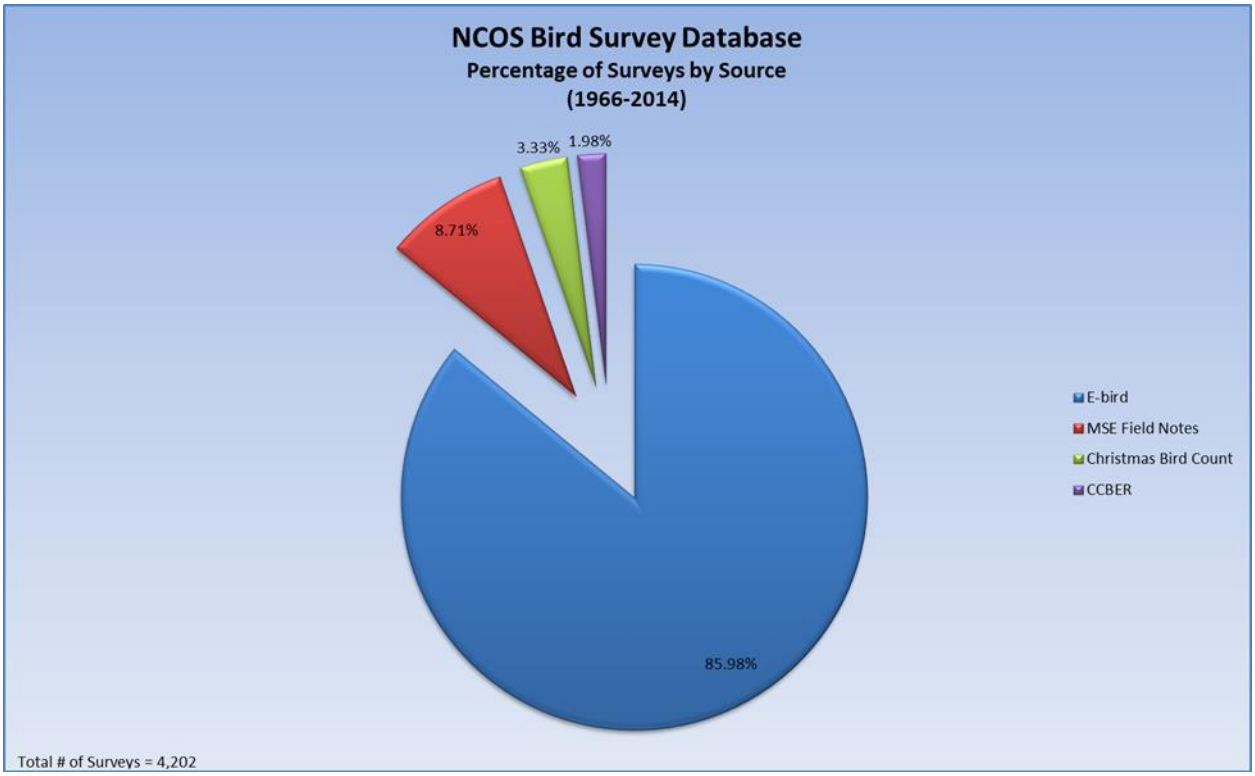


FIGURE 7. PERCENTAGE OF SURVEYS BY SOURCE

SURVEY PURPOSE - BROAD

The data is broadly dominated by informal bird surveys, as reflected in Figure 8. Detailed metadata on survey purpose is provided in Appendix C. Informal bird surveys, for the purpose of this database, are generally characterized as non-exclusive, comprehensive surveys of an area.

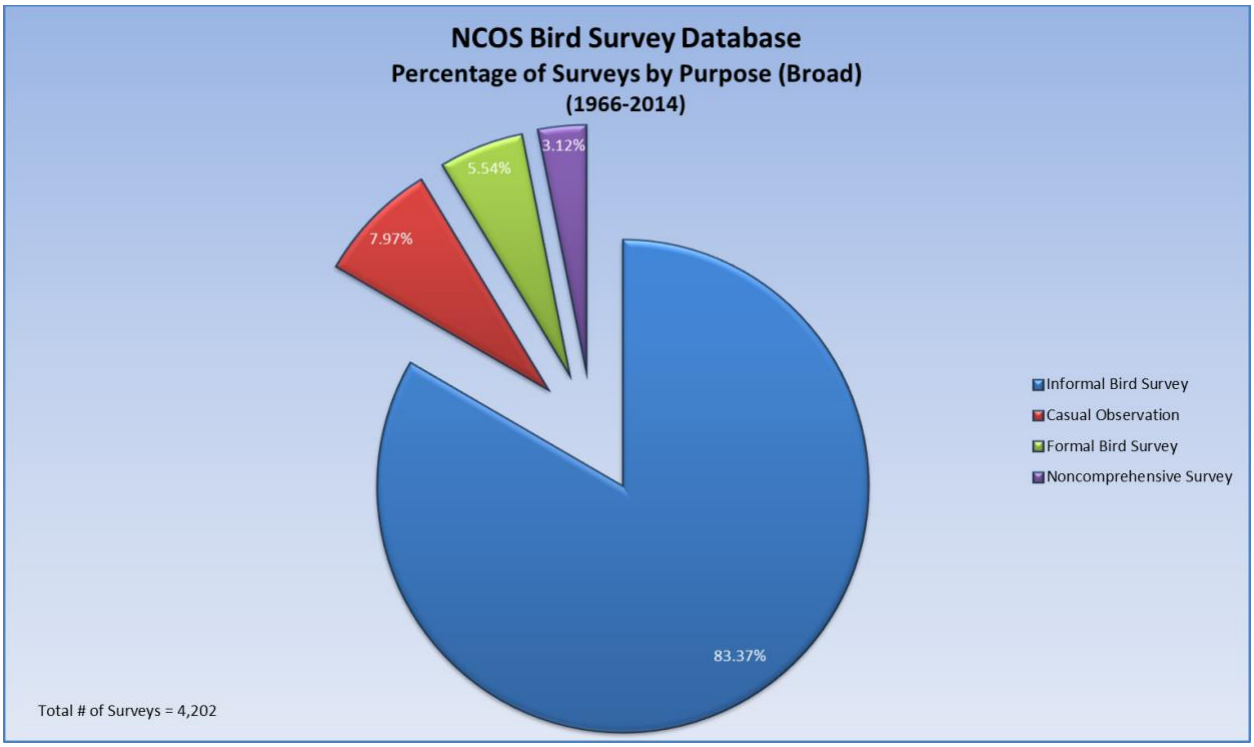


FIGURE 8. PERCENTAGE OF SURVEYS BY TYPE (BROAD)

SURVEY PURPOSE - NARROW

In an effort to more fully distinguish survey types, more narrow definitions were also included. These definitions derive from comments relating to the purpose for a particular survey, combined with coding used in the E-bird dataset. Within these more narrow definitions, traveling counts dominate, as reflected in Figure 9. A traveling count is E-bird terminology, defined as observations made over a known period of time while traveling a known distance.

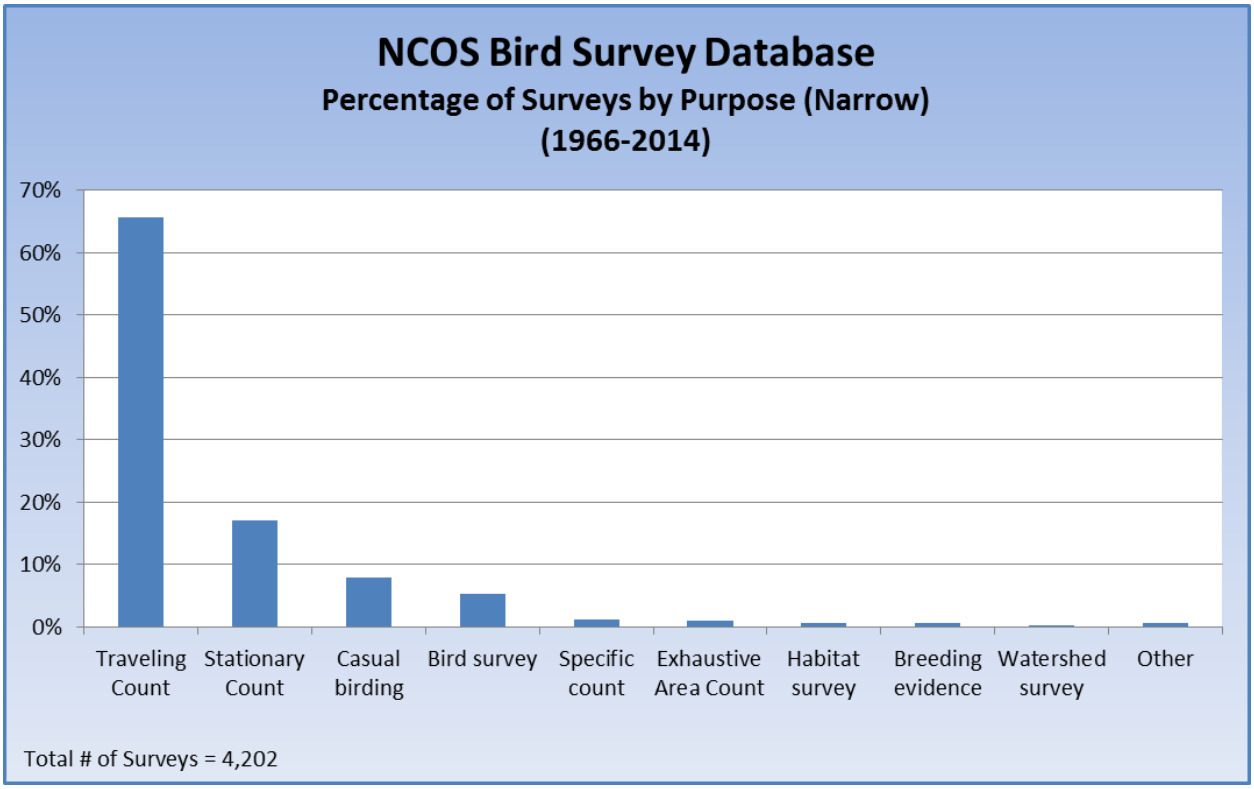


FIGURE 9. PERCENTAGE OF SURVEYS BY TYPE (NARROW)

OBSERVATIONS

It is important to recognize the significant skew of the data toward one particular season (winter), one source (E-bird), as well as the purpose for conducting the survey (informal bird surveys) when interpreting the observational data. It should also be noted that the total count of a particular species should not be deemed to be an accurate representation of population size or even abundance. As such, the presence of a species may be a more accurate representation of the value of an area as habitat for a species. In Figure 10, the observations of total count and presence of all species across locations and season in the study area are compared.

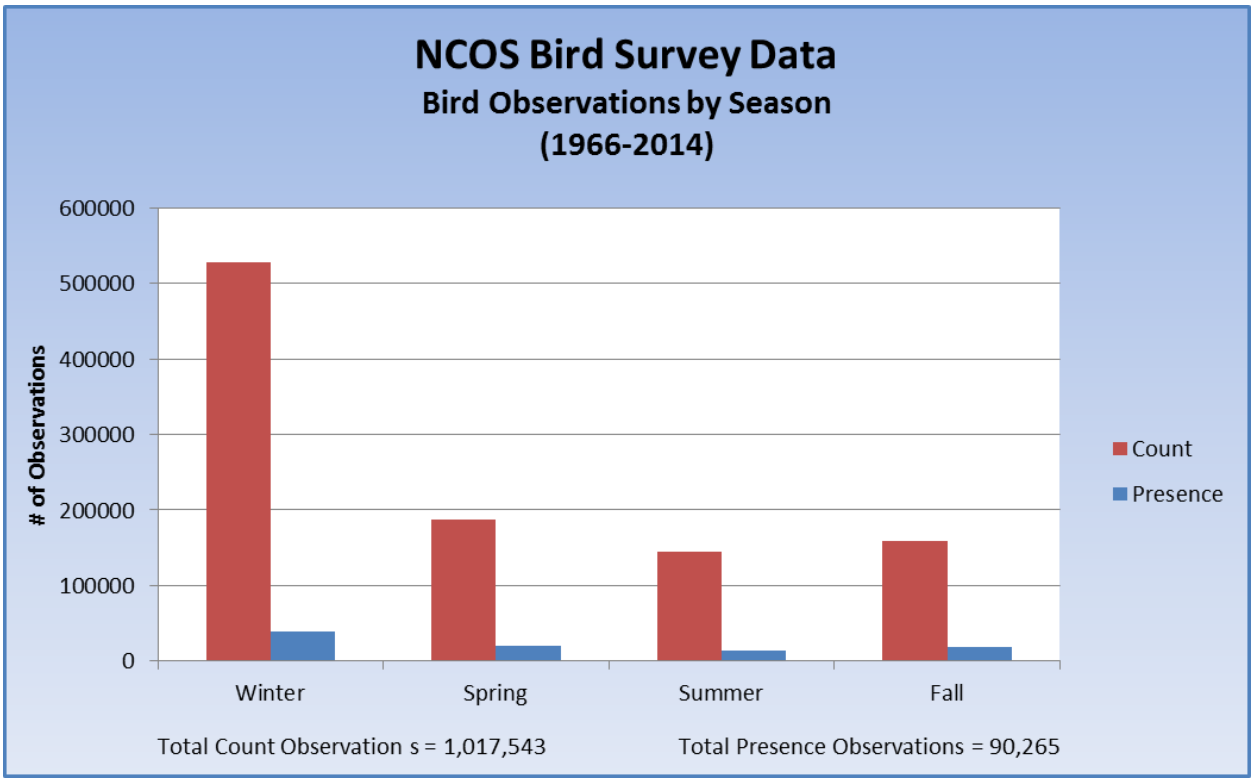


FIGURE 10. BIRD OBSERVATIONS BY SEASON

OBSERVATIONS – BY COUNT

Total bird counts by season reflect the high observation rates in the winter season across the entire study period (Figure 11). The winter season constituted nearly 52% of total observations by count (Table 4).

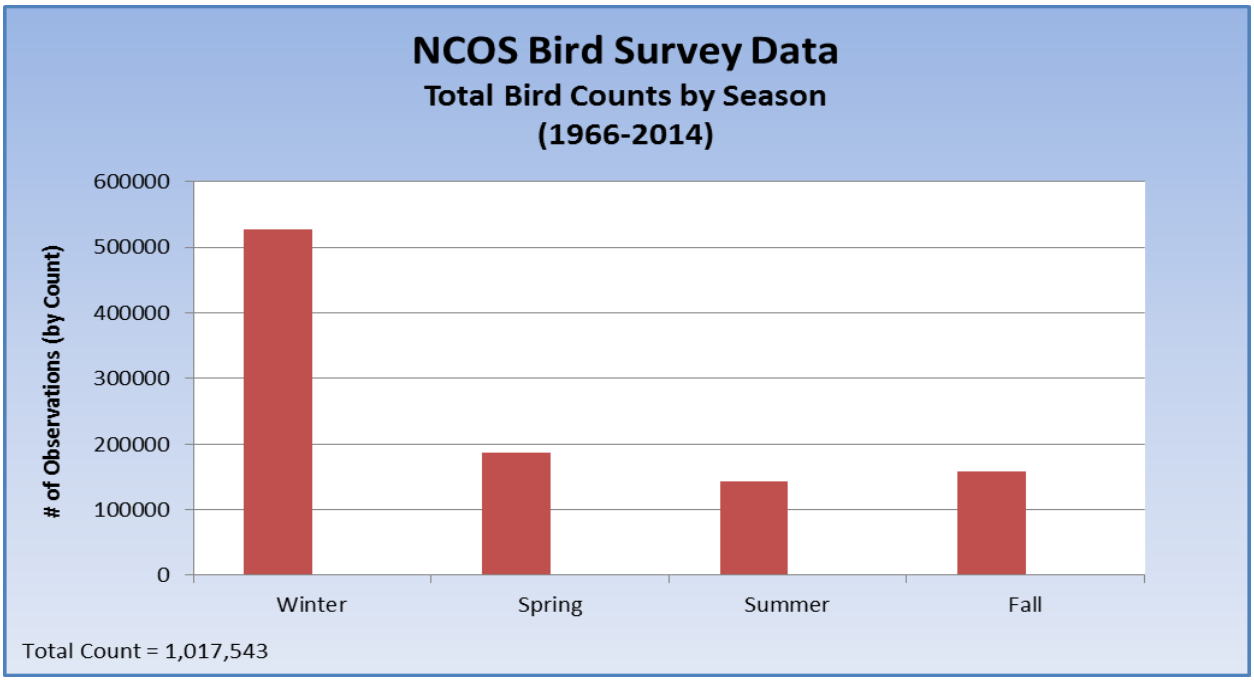


FIGURE 11. TOTAL BIRD COUNTS BY SEASON

TABLE 4. TOTAL OBSERVATIONS BY COUNT

Season	# of Total Observations	% of Total Observations
Winter	527,778	51.87
Spring	187,727	18.45
Summer	143,849	14.14
Fall	158,189	15.55
Total	**1,017,543**	

Figure 12 reflects observations by count, season, and year for all locations across the entire study period.

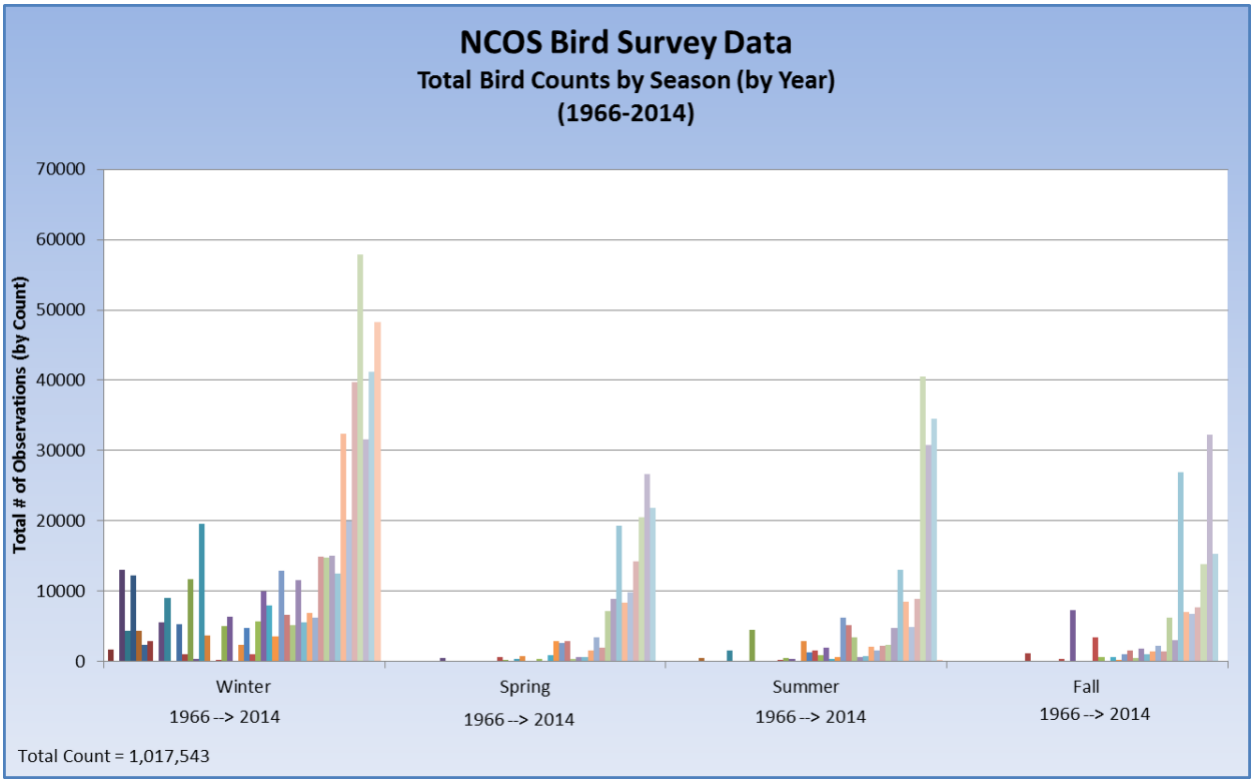


FIGURE 12. TOTAL BIRD COUNTS BY SEASON (AND YEAR)

In Figure 13, the top 25 bird species are identified, constituting more than half of the total observations by count (56.7%).

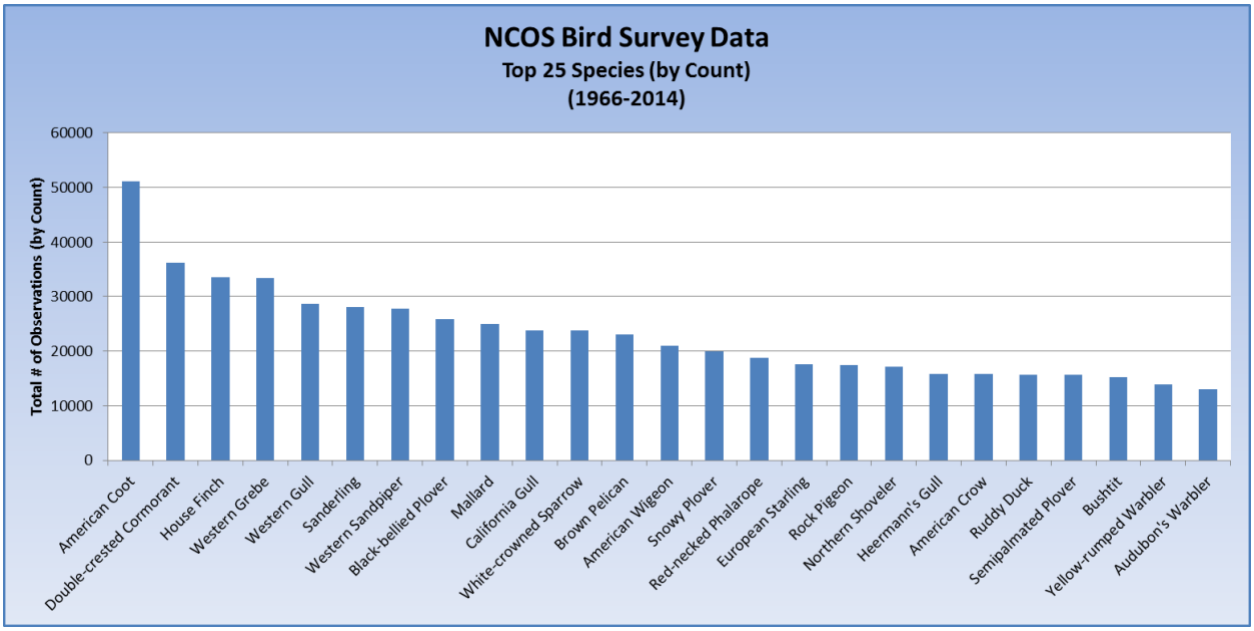


FIGURE 13. TOP 25 BIRD SPECIES BY COUNT

Table 5 ranks the top 25 bird species in terms of percentage of total count in the study region across all locations.

TABLE 5. PERCENTAGE RANKINGS OF TOP 25 BIRD SPECIES (BY COUNT)

Species (Common Name)	Total Count	% of Total Count
American Coot	51,103	5.02
Double-crested Cormorant	36,274	3.56
House Finch	33,594	3.30
Western Grebe	33,327	3.28
Western Gull	28,687	2.82
Sanderling	28,097	2.76
Western Sandpiper	27,730	2.73
Black-bellied Plover	25,889	2.54
Mallard	24,989	2.46
California Gull	23,758	2.33
White-crowned Sparrow	23,750	2.33
Brown Pelican	22,984	2.26
American Wigeon	21,023	2.07
Snowy Plover	19,992	1.96
Red-necked Phalarope	18,735	1.84
European Starling	17,533	1.72
Rock Pigeon	17,500	1.72
Northern Shoveler	17,189	1.69
Heermann's Gull	15,837	1.56

Species (Common Name)	Total Count	% of Total Count
American Crow	15,797	1.55
Ruddy Duck	15,694	1.54
Semipalmated Plover	15,668	1.54
Bushtit	15,270	1.50
Yellow-rumped Warbler	13,911	1.37
Audubon's Warbler	12,944	1.27

The majority of bird observations by count occurred in just ten of the 54 total locations within the study area (Figure 14), constituting 88% of all of the surveys in the database. The top three survey locations (Devereux Slough, Campus Lagoon, and Goleta Beach) constituted more than half of the total observations by count (53.5%).

Devereux Slough ranked highest with just under 265,000 observations (26%). It should be noted; however, that Devereux Slough was a primary target location for the purposes of compiling this database.

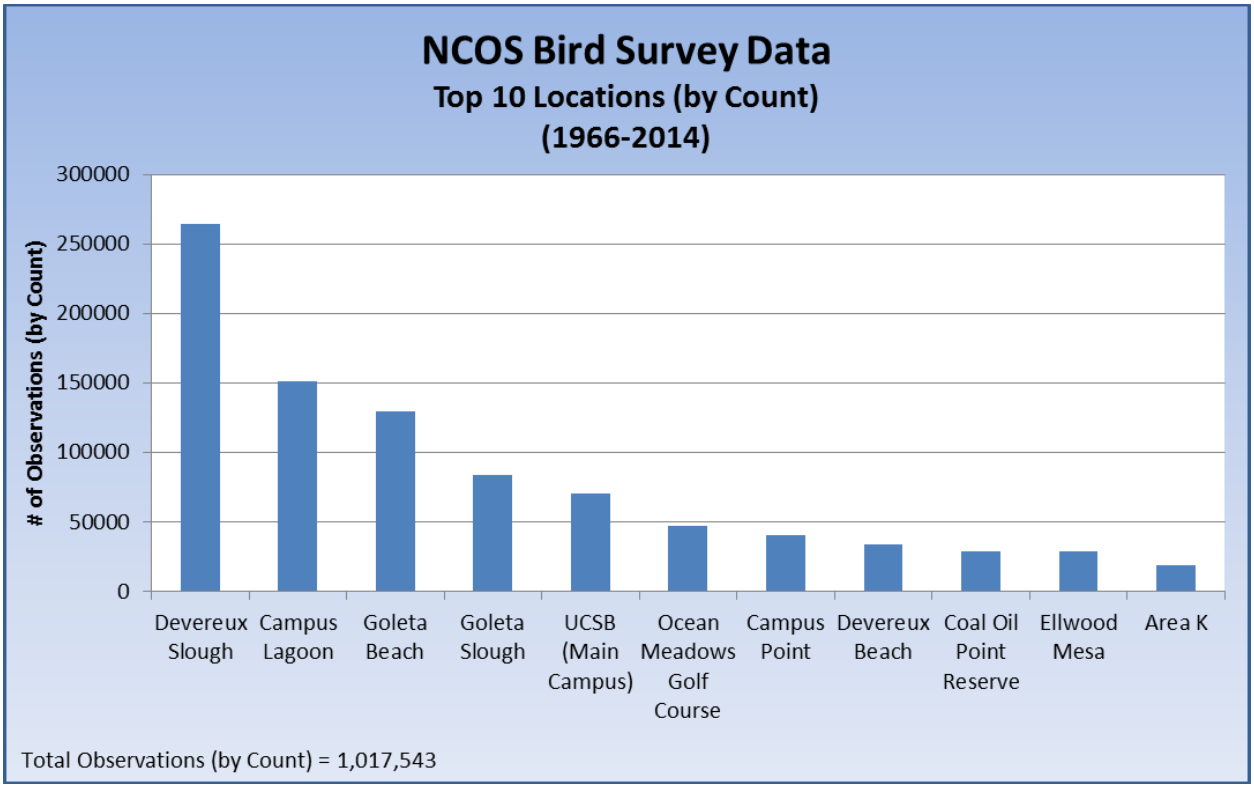


FIGURE 14. TOP TEN SURVEY LOCATIONS (BY COUNT)

The percentage rankings and total observation counts for the top ten survey locations are reflected in

Table 6.

TABLE 6. PERCENTAGE RANKINGS AND TOTAL COUNT OBSERVATIONS (TOP TEN SURVEY LOCATIONS)

Location	Total Count	% of Total Count
Devereux Slough	264,438	25.99
Campus Lagoon	150,953	14.84
Goleta Beach	129,378	12.71
Goleta Slough	84,065	8.26
UCSB (Main Campus)	70,713	6.95
Ocean Meadows Golf Course	46,829	4.60
Campus Point	40,474	3.98
Devereux Beach	34,152	3.36
Coal Oil Point Reserve	29,094	2.86
Ellwood Mesa	28,656	2.82
Area K	18,521	1.82

OBSERVATIONS – BY PRESENCE

Total bird presence by season still reflects the high observation rates in the winter season across the entire study period (Figure 15). The winter season constituted nearly 43% of total observations by presence (Table 7).

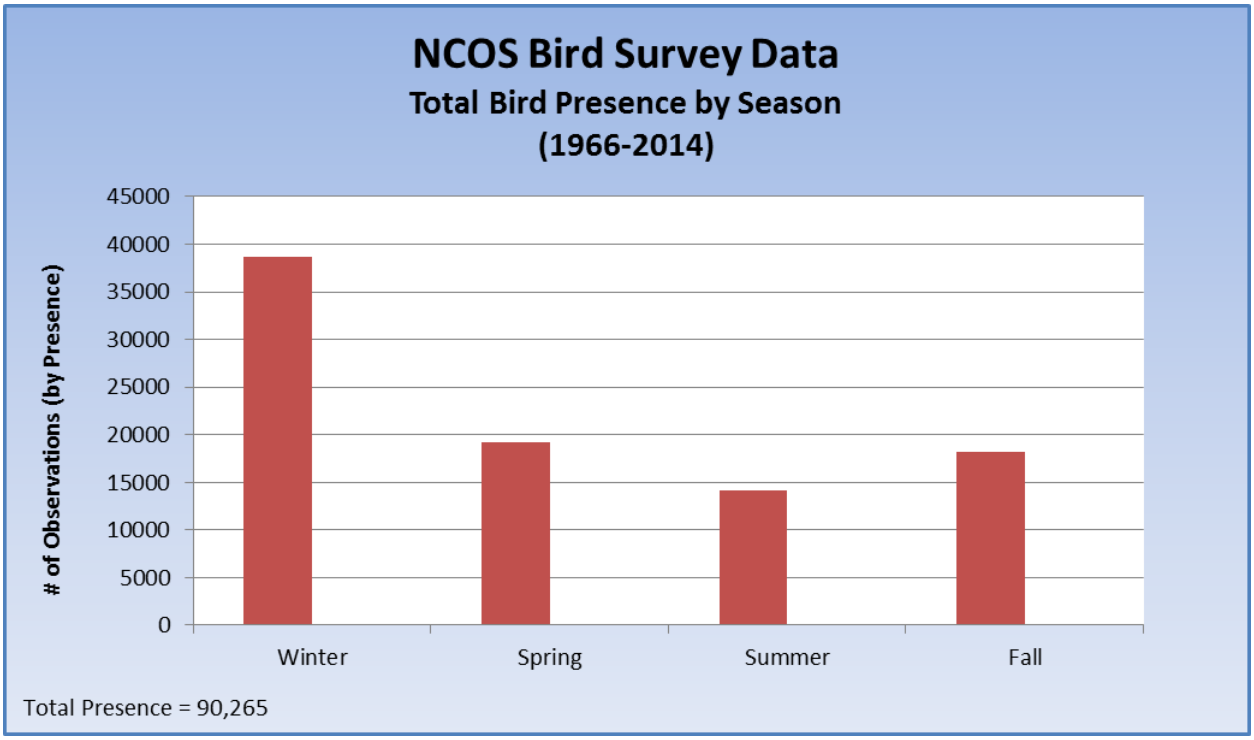


FIGURE 15. TOTAL BIRD PRESENCE BY SEASON

TABLE 7. TOTAL OBSERVATIONS BY PRESENCE

Season	# of Total Observations	% of Total Observations
Winter	38,723	42.90
Spring	19,192	21.26
Summer	14,140	15.66
Fall	18,210	20.17
Total	**90,265**	

Figure 16 reflects observations by presence and season for all locations across the entire study period.

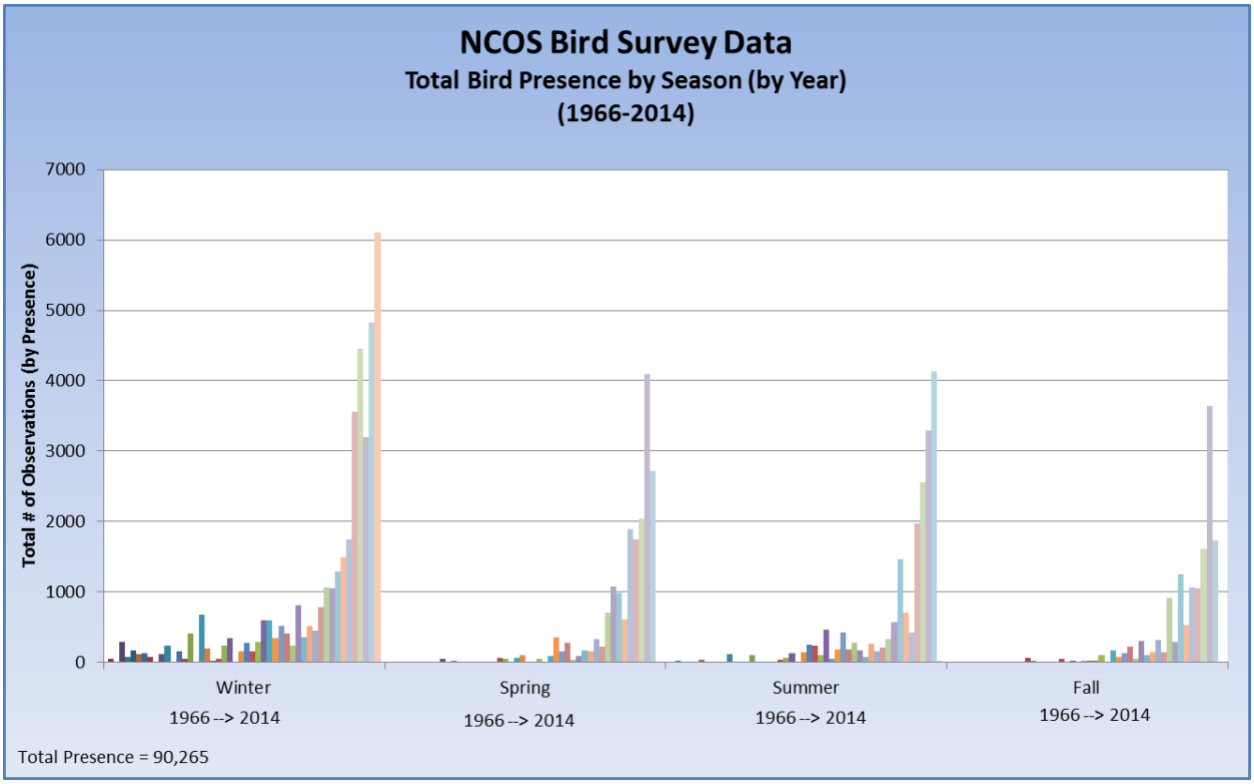


FIGURE 16. TOTAL BIRD PRESENCE BY SEASON (AND YEAR)

A total of 425 bird species have been observed as present in the study area over the entire study period. In Figure 17, the top 25 bird species are identified, constituting more than one-third of the total presence observations (39%).

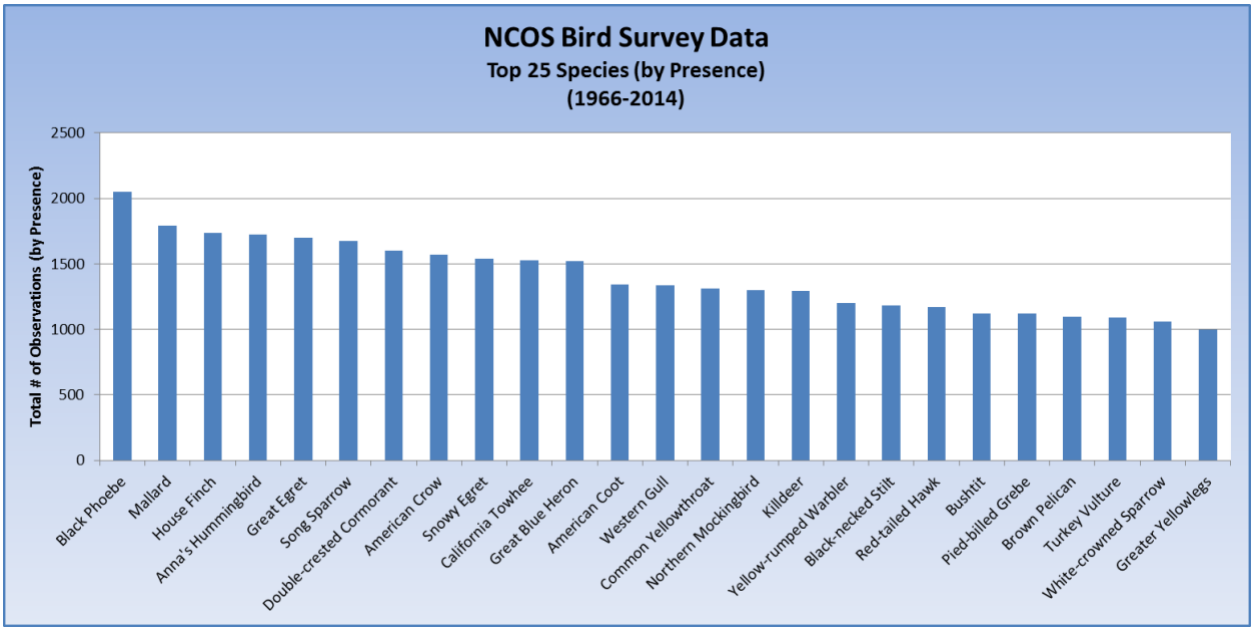


FIGURE 17. TOP 25 BIRD SPECIES BY PRESENCE

Table 8 ranks the top 25 bird species in terms of percentage of total presence observations in the study region across all locations.

TABLE 8. PERCENTAGE RANKINGS OF TOP 25 BIRD SPECIES (BY PRESENCE)

Species (Common Name)	Total Presence Observations	% of Total Presence Observations
Black Phoebe	2,052	2.27
Mallard	1,793	1.99
House Finch	1,739	1.93
Anna's Hummingbird	1,726	1.91
Great Egret	1,697	1.88
Song Sparrow	1,677	1.86
Double-crested Cormorant	1,599	1.77
American Crow	1,570	1.74
Snowy Egret	1,539	1.70
California Towhee	1,525	1.69
Great Blue Heron	1,522	1.69
American Coot	1,344	1.49
Western Gull	1,337	1.48
Common Yellowthroat	1,311	1.45
Northern Mockingbird	1,301	1.44
Killdeer	1,293	1.43
Yellow-rumped Warbler	1,198	1.33
Black-necked Stilt	1,181	1.31

Species (Common Name)	Total Presence Observations	% of Total Presence Observations
Red-tailed Hawk	1,172	1.30
Bushtit	1,119	1.24
Pied-billed Grebe	1,118	1.24
Brown Pelican	1,094	1.21
Turkey Vulture	1,091	1.21
White-crowned Sparrow	1,062	1.18
Greater Yellowlegs	995	1.10

THE MAJORITY OF BIRD OBSERVATIONS BY PRESENCE OCCURRED IN JUST TEN OF THE 54 TOTAL LOCATIONS WITHIN THE STUDY AREA (

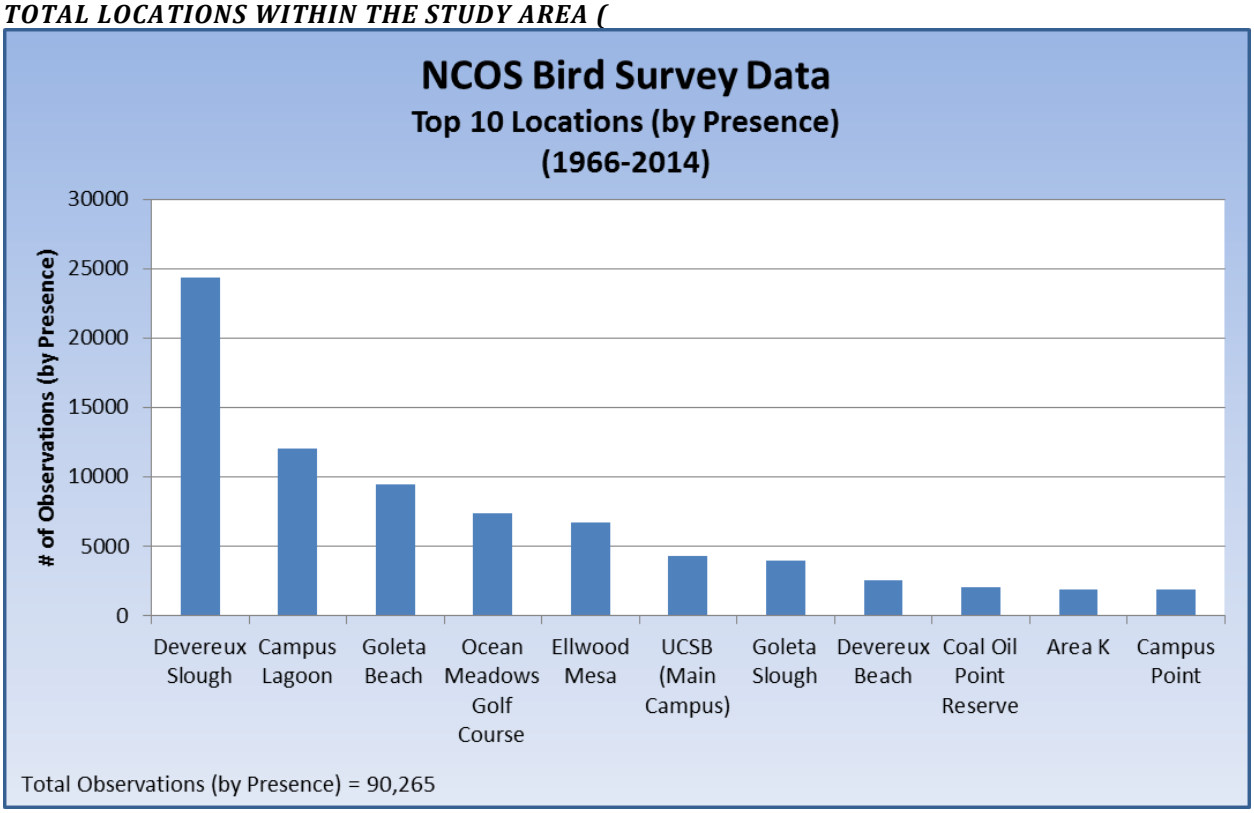


Figure 18) constituting 85% all surveys in the database. The top three survey locations (Devereux Slough, Campus Lagoon, and Goleta Beach) constituted half of the total observations by presence (51%).

Devereux Slough ranked highest with just under 25,000 observations by presence (27%). It should be noted; however, that Devereux Slough was a primary target location for the purposes of compiling this database.

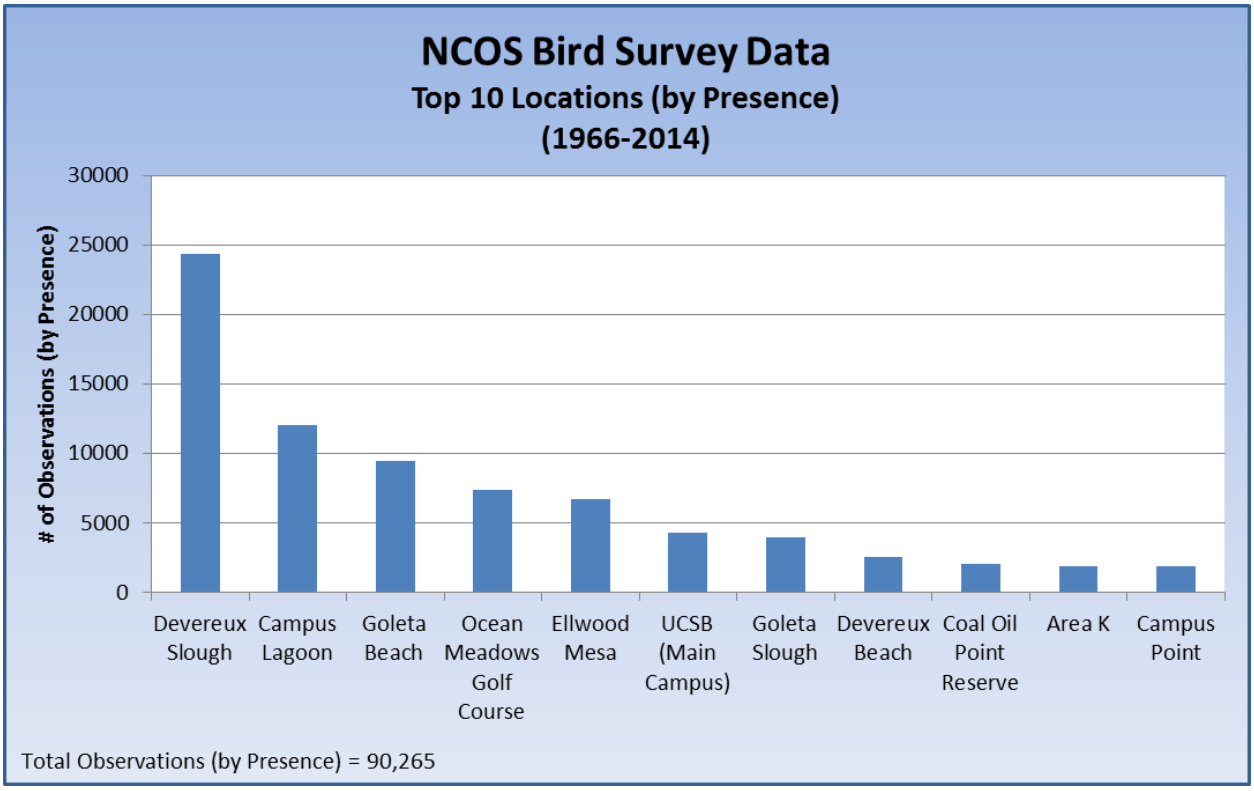


FIGURE 18. TOP TEN SURVEY LOCATIONS (BY PRESENCE)

The percentage rankings of total presence observations for the top ten survey locations are reflected in Table 9.

TABLE 9. PERCENTAGE RANKINGS OF TOTAL PRESENCE OBSERVATIONS (TOP TEN SURVEY LOCATIONS)

Location	Total Count	% of Total Count
Devereux Slough	24,356	26.98
Campus Lagoon	12,015	13.31
Goleta Beach	9,486	10.51
Ocean Meadows Golf Course	7,386	8.18
Ellwood Mesa	6,668	7.39
UCSB (Main Campus)	4,265	4.72
Goleta Slough	3,941	4.37
Devereux Beach	2,547	2.82
Coal Oil Point Reserve	2,063	2.29
Area K	1,869	2.07
Campus Point	1,847	2.05

CONFIDENCE LEVELS

Observational records often contain notations as to whether a bird was visually observed, a call was heard (but the species was not visually observed), and in some instances an estimate of the total count of a particular species is indicated with a range or a comment such as few, lots, or many. This was coded in the database using integer values ranking confidence in the observation from zero to two. This methodology is explained in greater detail in the metadata contained in Appendix C.

Confidence levels in the observational data are high, with more than 98% of all observations (both by count and presence) identified as deriving from visual observation (Table 10).

TABLE 10. CONFIDENCE LEVEL RANKINGS

	% of Confidence (Count)	% of Confidence (Presence)
Visual Observation	98.11	98.38
Range of Count	1.86	1.27
Heard, But Not Seen	0.03	0.35

BREEDING SUPPORT

Although a diligent effort was made to capture observational notes regarding breeding support, these records are sparse in the database. As reflected in Table 11 below, less than one percent of the entire database coding records contain references to evidence of breeding support (either by total count or presence observations). Metadata describing the methodology for coding and assessing breeding support evidence is provided in Appendix C.

It may be possible to glean further breeding support evidence from the database through a search of the observational comments; however, it is believed that this would still yield far too few observations to justify any robust data analysis.

TABLE 11. EVIDENCE OF BREEDING SUPPORT

Breeding Evidence	% of Total Count	% of Presence
No Breeding Evidence Noted	99.91%	99.84%
Evidence of Nesting	0.05%	0.10%
Evidence of Breeding Support	0.02%	0.04%
Visual Observation of Juveniles or Pairs	0.01%	0.01%
Evidence of Courtship	0.01%	0.01%

RELATIVE ABUNDANCE OF SPECIES RANKINGS

Rankings of relative abundance for the species identified within the study region were obtained using Birds of Santa Barbara by Lehman (2014). The relative abundance terms used by Lehman (2014) are briefly delineated in Table 12. Appendix C contains detailed information on this coding and the descriptions used in the database.

TABLE 12. RELATIVE ABUNDANCE RANKING DESCRIPTIONS (PER LEHMAN, 2014)

Term	Lehman's Definitions

Term	Lehman's Definitions
Accidental	1 record (and future records are not expected for a substantial period of time
Casual	2 to 10 records
Common to Abundant	15 or more individuals per day in proper habitat
Erratic	Not defined in Lehman (dictionary definition: lacking consistency, regularity, or uniformity)
Fairly common	1 to 15 individuals per day in proper habitat
Irregular	Not defined in Lehman (dictionary definition: not conforming to the usual pattern)
Rare	1 to 15 individuals per season in proper habitat or infrequent
Uncommon	1 to 15 individuals per day in proper habitat
Very common	Not defined in Lehman
Very rare	Average of fewer than 1 record per season or very infrequent
Very uncommon	Not defined in Lehman

It should be noted that out of the 425 species observed in the study area, only 359 represent unique species that were identified and described with respect to relative abundance in Lehman 2014. The remaining 66 species were either identified only to the genera level (e.g.., Hummingbird sp.), were observations where the exact species was unknown (e.g., Greater/Lesser Yellowlegs), or were not included in Lehman's work.

Over the five decades of data collection, approximately 30% of all unique species observed in the study area were ranked as common to fairly common, nearly 16% ranked uncommon to very uncommon, and notably, almost 24% ranked as rare or very rare (Table 13).

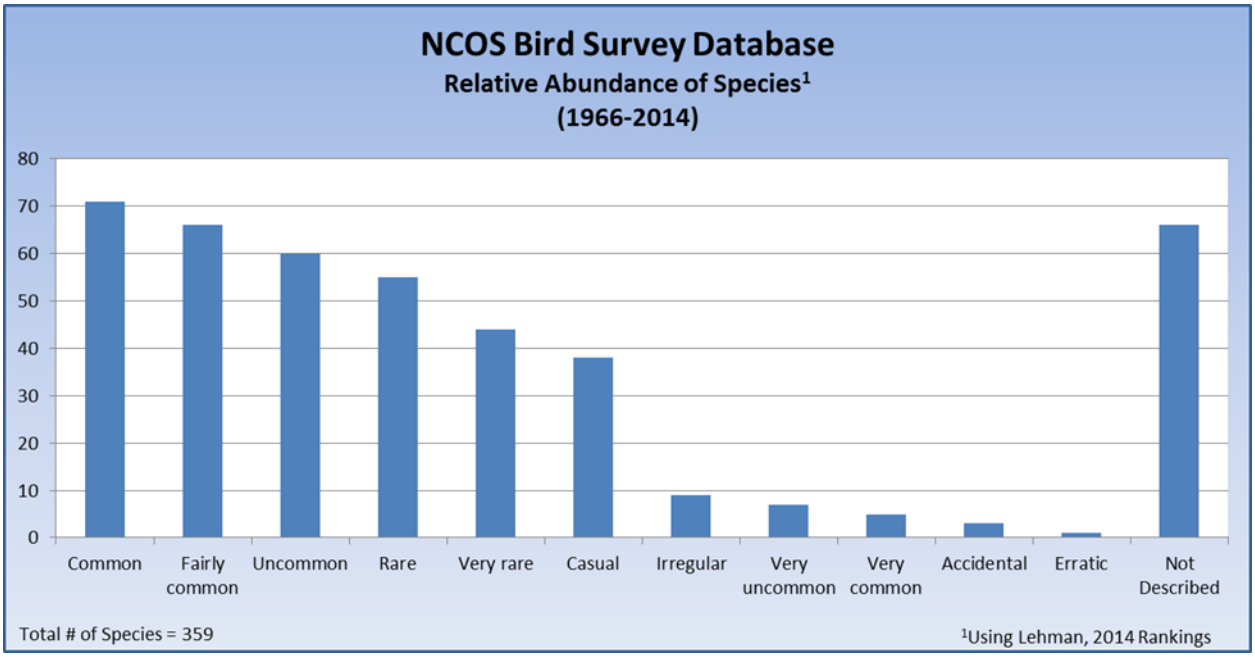


FIGURE 19. RELATIVE ABUNDANCE OF SPECIES (RANKED PER LEHMAN, 2014)

TABLE 13. RELATIVE ABUNDANCE SPECIES RANKINGS (PER LEHMAN, 2014)

Relative Abundance Species Rankings (per Lehman, 2014)	% of Total Unique Species
Common to Very Common	33.41
Uncommon to Very Uncommon	15.76

Rare to Very Rare	23.29
Casual	8.94
Irregular, Accidental, Erratic	3.06
Not Described	15.53

SEASONAL OCCURRENCE OF SPECIES RANKINGS

Rankings of the seasonal occurrence for the species identified within the study region were obtained using Birds of Santa Barbara by Lehman (2014), as described in Table 14.

TABLE 14. SEASONAL OCCURRENCE SPECIES RANKINGS (PER LEHMAN, 2014)

Type	Definition
Migrant (aka Transient)	A species or individual passing through a given area in migration
Vagrant	A species or individual well outside its normal range (some are difficult to distinguish from rare migrants)
Resident	A species or individual that is non-migratory

Some species are known to occur in different seasons throughout the year resulting in species falling into multiple categories. For example, the Arctic Tern is known to occur as a migrant in spring, summer, and fall. Lehman (2014) also categorizes some species as being migrants in one season and residents in another. The result of this is that the column for spring/summer in Figure 20 is reflecting resident species for that season. Lehman had no such rankings of residents for fall or winter. Appendix C contains detailed information on this coding and the descriptions used in the database.

It should be noted that out of the 425 species observed in the study area, only 356 represent unique species that were identified and described with respect to seasonal occurrence and type in Lehman 2014. The remaining 69 species are either identified only to the genera level (i.e., Hummingbird sp.) or were not included in Lehman's work.

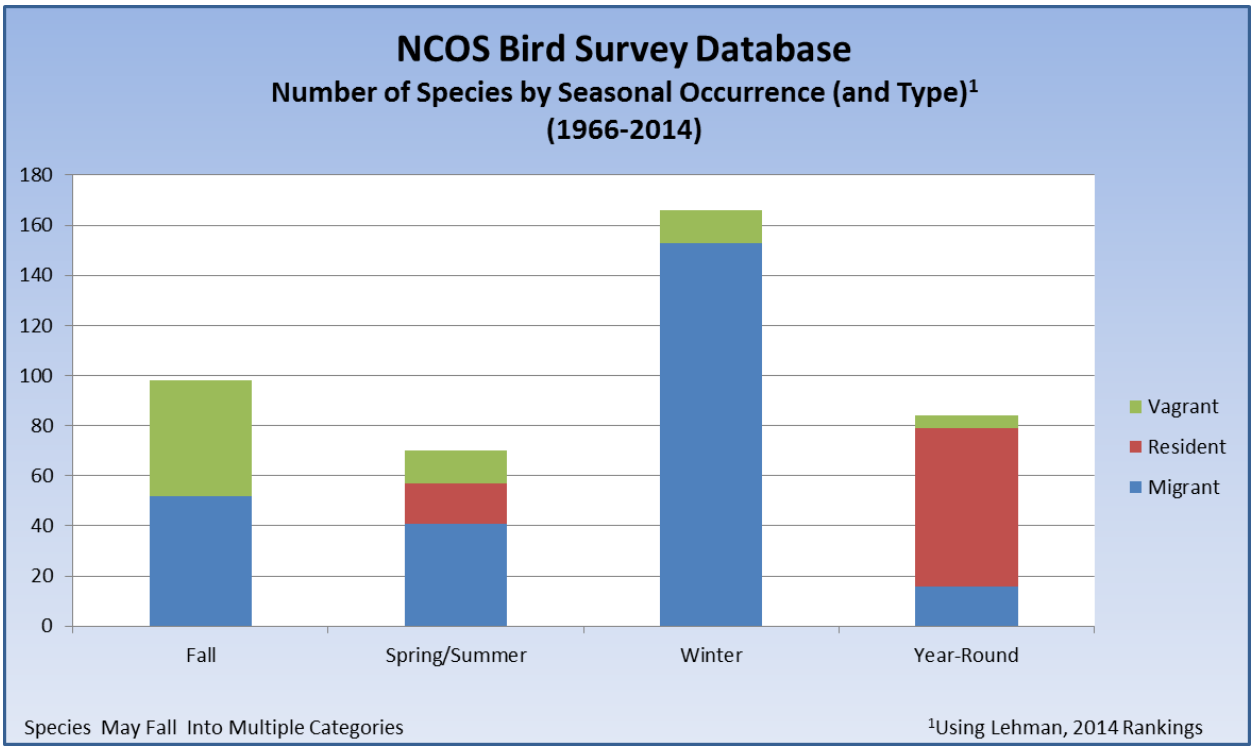


FIGURE 20. SEASONAL OCCURRENCE OF SPECIES BY SEASON AND TYPE (RANKED PER LEHMAN, 2014)

AVERAGE NUMBER OF SPECIES PER SURVEY LOCATION

The average number of species per survey location across the entire period of data collection for the database is reflected in Figure 21 for the top ten locations.

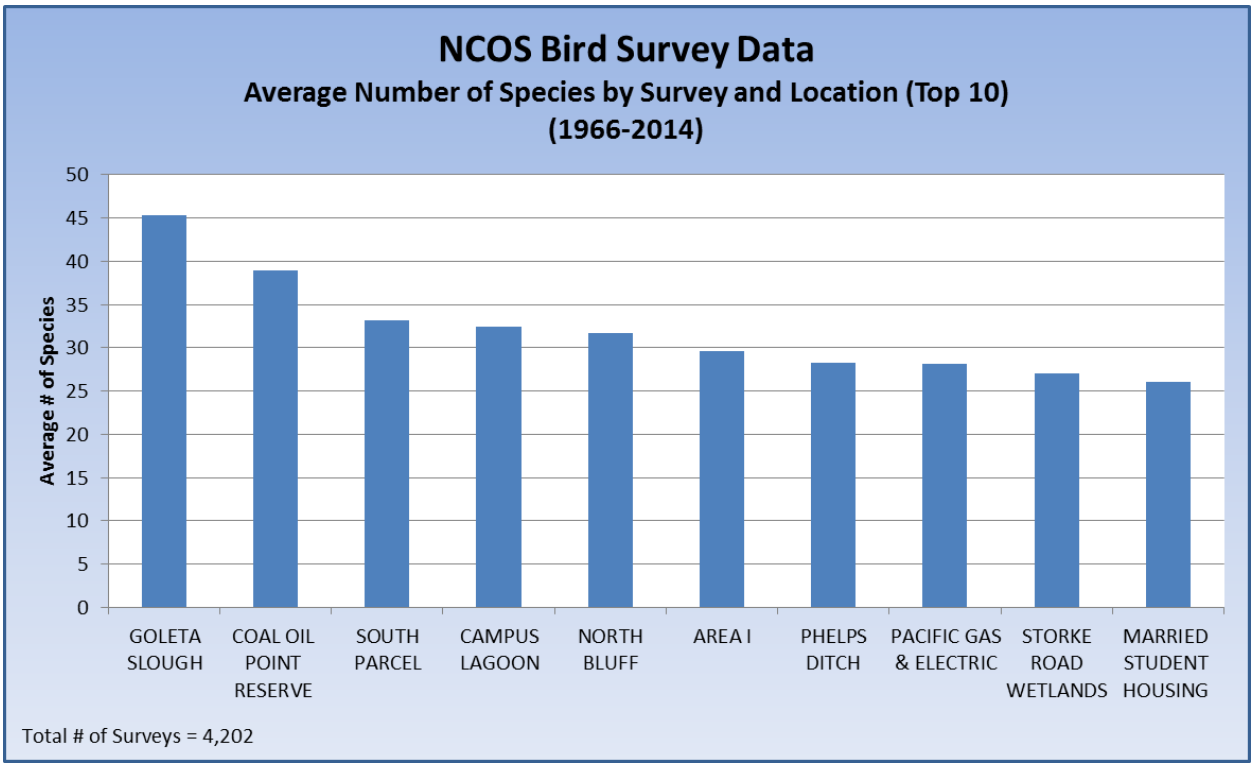


FIGURE 21. AVERAGE NUMBER OF SPECIES BY SURVEY AND LOCATION (TOP TEN)

The overall average number of species per survey and location is 21.48. Table 15 reflects the average number of species per survey and location for the entire study area.

TABLE 15. AVERAGE NUMBER OF SPECIES BY SURVEY AND LOCATION

Location	Average # of Species per Survey Location
GOLETA SLOUGH	45.30
COAL OIL POINT RESERVE	38.92
SOUTH PARCEL	33.20
CAMPUS LAGOON	32.47
NORTH BLUFF	31.67
AREA I	29.67
PHELPS DITCH	28.31
PACIFIC GAS & ELECTRIC	28.12
STORKE ROAD WETLANDS	27.00
MARRIED STUDENT HOUSING	26.00
UCSB (MAIN CAMPUS ONLY)	25.85
AREA L	24.88
GOLETA SLOUGH MOUTH	24.33
OCEAN MEADOWS GOLF COURSE	23.08
FRANCISCO TOWERS WETLAND	23.00
WEST CAMPUS BLUFFS	21.74
BASIN X	21.00
GOLETA BEACH	20.89

Location	Average # of Species per Survey Location
ELLWOOD MESA	20.77
SANTA BARBARA AIRPORT	20.36
FISH AND GAME ECOLOGICAL RESERVE	20.00
EAST STORKE CAMPUS WETLAND	19.81
AREA K	19.47
LAGOON ISLAND	19.00
DELCO AREA	18.86
DEVEREUX SLOUGH	18.29
DUNE POND	18.02
CAMPUS BEACH	18.00
NORTH FINGER (OF DEVEREUX SLOUGH)	18.00
CAMPUS POINT	17.42
ELLWOOD MESA BEACH	17.00
ISLA VISTA SEWAGE	17.00
CAMINO CORTO OPEN SPACE	16.41
ISLA VISTA	16.00
AREA M	15.94
SOUTH FINGER (OF DEVEREUX SLOUGH)	15.50
WEST STORKE CAMPUS WETLANDS (AKA WEST STORKE CAMPUS)	15.42
DEVEREUX DUNES	15.33
DEVEREUX BEACH	15.16
NORTH PARCEL	14.75
FISH AND GAME WETLANDS (LOS CARNEROS RD)	14.46
GOLETA SANITARY DISTRICT PONDS	12.41
STORKE CAMPUS	11.38
CCBER GREENHOUSES AND NURSERY	10.75
ISLA VISTA BEACH	10.71
AREA J	10.50
SAN CLEMENTE OPEN SPACE	10.00
KNOLL (COAL OIL POINT RESERVE)	8.00
STORKE CAMPUS FIELD	6.00
FRANCISCO TORRES TOWERS (TOWERS ONLY)	5.00
CREATED VERNAL POOLS (COAL OIL POINT RESERVE)	2.50
DEL SOL OPEN SPACE	1.00

SEASONAL SPECIES COUNTS BY MAIN WETLAND AREAS

Figure 22 reflects total species counts across all survey years for fall and winter (the primary migration seasons) for the four main wetland locations in the study area: Goleta Slough (which includes the Goleta Slough mouth), Los Carneros Wetland (which includes East Stock Campus Wetlands, West Storke Campus Wetlands, Storke Campus, and the Fish and Game Wetlands), Devereux Slough (which does not include the area that was formerly known as the Ocean Meadows Golf Course), Campus Lagoon, and Area K.

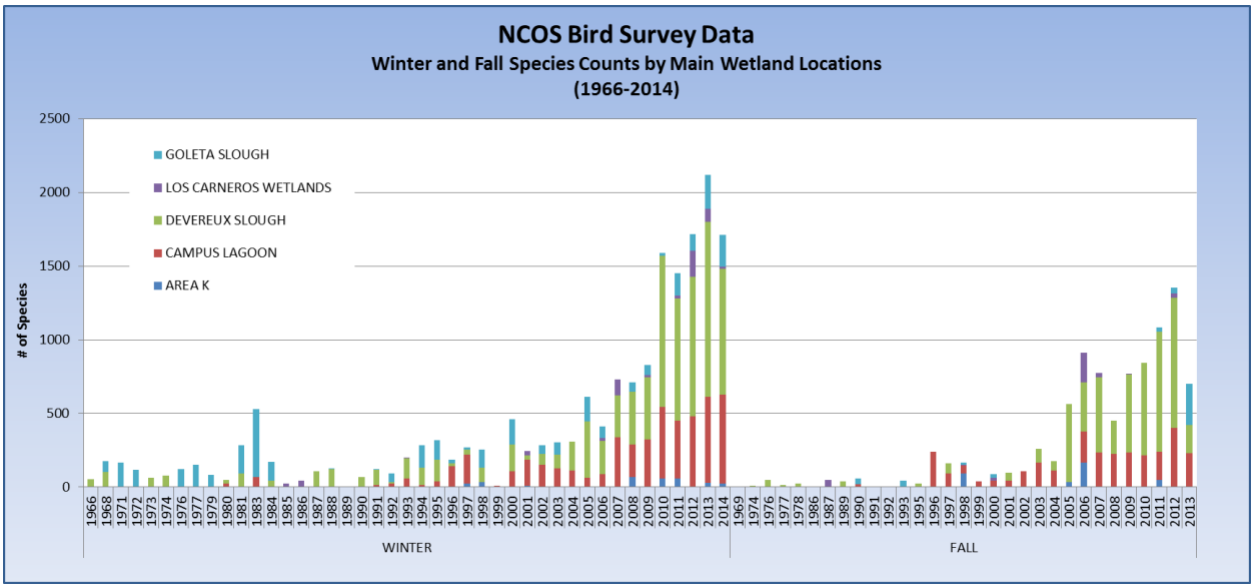


FIGURE 22. WINTER AND FALL SPECIES COUNTS BY MAIN WETLAND LOCATIONS

APPENDIX A – DATABASE MODEL

The database model (Figure 23) describes the relationships between species, observations, and surveys using Access software. The database consists up of three main tables: species, observations, and surveys. Each of these tables is linked through unique identifiers, i.e., the species is uniquely identified by its common name, observations are uniquely identified by a computer-generated alphanumeric code assigned to each observation record as it is entered, and each survey is also uniquely identified by an alphanumeric code.

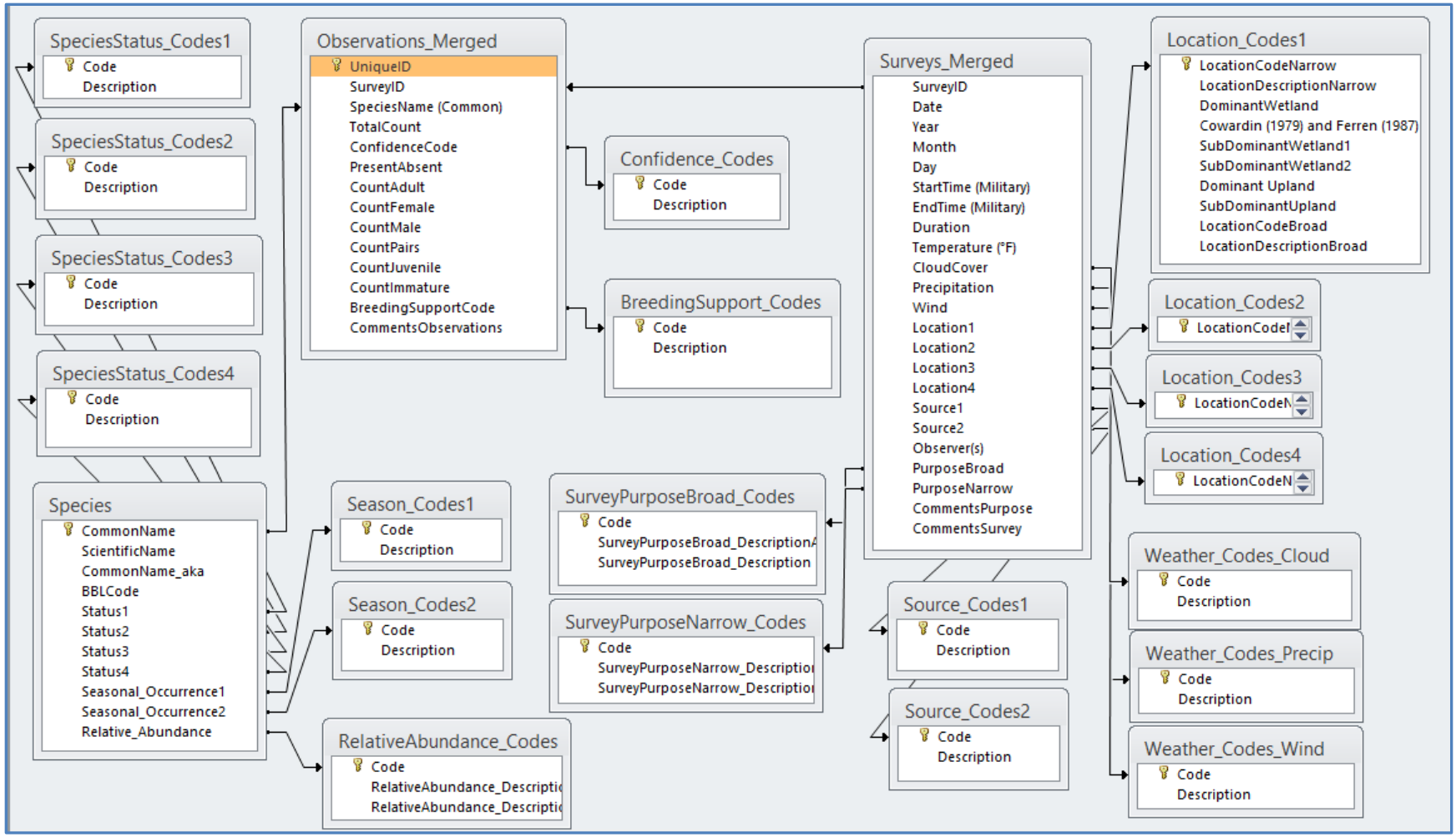


FIGURE 23. BIRD SURVEY DATABASE MODEL

Once a survey is entered into the database, its unique alphanumeric code is linked to the observations table (and all of the individual species identified as present and/or counted in that particular survey). Each observation is linked both to a unique survey, as well as the species listed by its common name in the species table. All of the associated attributes from each of the tables follows these links such that a record of a particular species, observed during a particular survey, will contain all of the associated information about the survey (i.e., the date and time it was conducted, the weather conditions, etc.) as well as the associated information for that particular species (i.e., its common and scientific names, BBL code, status, etc.).

Each of these main tables is linked to "look-up" tables that establish the values assigned to different parameters. For example, the Species Status Code table is a list of species status designations at the federal, state, and local level. The Breeding Support codes provide details that have been collected on breeding evidence for a particular species in a single observation. Appendix C provides detailed explanations of the coding for each of these "look-up" tables.

APPENDIX B – DATABASE METADATA

DATABASE

location: CCBER Samba Server

creator: Paula Richter (prichter@bren.ucsb.edu), Bren School of Environmental Science & management; and Lisa Stratton (stratton@ccber.ucsb.edu), Cheadle Center for Biodiversity and Ecological Restoration, University of California, Santa Barbara, California.

title: NCOS Bird Survey Database

publisher: Lisa Stratton (stratton@ccber.ucsb.edu), Cheadle Center for Biodiversity and Ecological Restoration, University of California, Santa Barbara, California.

date: Created on 06/11/2013

description: Tables will be incorporated into this database for statistical analysis. The database will contain the results of field observations of bird species abundance at the restoration site ("Upper Devereux Slough") and adjacent regions (the "study area") conducted since the early 1960's through the present to establish a baseline record. Additional survey records will continue to be added as the restoration efforts proceed through various phases on at least an annual basis to inform adaptive management decisions related to the restoration.

SPECIES TABLE

- **species:** a class of individuals or objects grouped by virtue of their common attributes and assigned a unique common (and scientific name); a division subordinate to a genus
  - **common name**: the common name ascribed to a species that stays with it through database revisions, updates, and edits
    - unique text (e.g., acorn woodpecker)
  - **scientific name**: the scientific (taxonomic) name ascribed to a species
    - unique text (e.g., melanerpes formicivorus)
  - **BBL code**: the alphabetic identifier for each species established by the United States Geological Survey Bird Banding Laboratory
    - unique four-digit alphabetic code assigned to each species (e.g., ACWO=acorn woodpecker)
  - **status:** text to describe species of special conservation concern
    - unique alphabetical code (e.g., fe=federally endangered)
  - **seasonal occurrence**: the status of the species with respect to its temporal preference for the study area
    - unique alphabetical code (e.g., r=resident, f=fall)
  - **relative abundance**: the evenness of distribution of individuals among species in a community
    - unique alphabetical code (e.g., c=common, r=rare)

OBSERVATION TABLE

- **observation:** the action or process of observing something or someone carefully or in order to gain information
  - **unique identifier**: unique identifier for each individual observation record that stays with it through database revisions, updates, and edits
    - numerical identifier automatically assigned by the database management software
  - **common name**: the unique common name ascribed to a species
    - unique text (e.g., Acorn Woodpecker)
  - **survey name**: unique identifier for each individual survey record that stays with the observation through database revisions, updates, and edits
    - expressed as year_month_day_location(s)_source (e.g., 2001_05_01_DS_MSE)
  - **count:** total number of observations of a particular species recorded during an observation
    - integer (e.g., 23)
  - **presence/absence**: an indicator of whether a species is present or absent in the survey location (absent a specific count); at times an observer notes a species is present or absent but is not able to provide an actual physical count
    - unique alphabetical code (p=present, a=absent)
  - **confidence code:** numerical code used to weight the confidence in the observation record
    - single digit code from 0 to 2 (e.g., 0=heard, but not seen)
  - **sex:** the sex of the species
    - unique text (e.g., male)
  - **age:** the age of the species
    - unique text (e.g., adult)
  - **pairs:** a set of one male and one female of the same species that cooperate over time to produce offspring in the form of a bond between them
    - integer (e.g., 2)
  - **breeding support code:** numerical code that ranks the evidence of breeding from weak to strong
    - single digit code from 0 to 4 (e.g., 0=parasite activity or 4=evidence of courtship)
  - **comments:** short narrative describing any additional observations recorded in the field
    - text (e.g., rarely observed in study area)

SURVEY TABLE

- **survey:** a general view, examination, or description of someone or something
  - **survey name**: unique identifier for each individual survey record that stays with it through database revisions, updates, and edits
    - expressed as year_month_day_location(s)_source (e.g., 2001_05_01_DS_MSE)
  - **date:** the date a single survey was conducted
    - expressed in the form of a calendar date (e.g., yyyy.mm.dd)
  - **start time:** the time of day a single survey was started

    - expressed in the form of Coordinated Universal Time (UTC) (e.g., 12:00)
- **end time:** the time of day a single survey was started
    - expressed in the form of Coordinated Universal Time (UTC) (e.g., 12:00)
- **weather conditions:** the state of the atmosphere, to the degree that it is hot or cold, wet or dry, calm or stormy, clear or cloudy at the time of the survey
    - alphabetical code (e.g., c=clear)
- **location:** code of geographical locations found within and adjacent to the study region
    - unique, up to four digit code assigned for each location within the study area (e.g., DS = Devereux Slough)
    - up to four locations may be specified for a survey
- **source:** identifies the original entity that compiled a single survey
    - alphabetical code (e.g., cbc=christmas bird count)
- **observer(s):** the people who made the observations in a single survey
    - alphabetical code (e.g., mh=mark holmgren)
- **purpose**: the expressed intent for conducting the survey
    - text (e.g., to look for White-tailed Kite nests)
- **comments:** short narrative describing any additional observations recorded in the field
    - text (e.g., water level was high for the season)

APPENDIX C – LOOK-UP TABLES

The coding used to identify certain attributes of the database is broken out into look-up tables, as outlined below.

SPECIES

SPECIES TABLE

The species list is broken out by common name, scientific name, a third category (common mane, aka) which includes prior names used for a species, as well as the BBL (Bird Banding Laboratory) code. The list also includes fields that indicate the designation status of a species (i.e., exotic, unlisted, federally endangered, etc.), the seasonal occurrence of a species (i.e., resident, migrant, vagrant – along with the season of its occurrence, i.e., fall, winter, spring, summer).

SPECIES TABLE			
CommonName	**ScientificName**	**CommonName_aka**	**BBLCode**
Acorn Woodpecker	Melanerpes formicivorus		ACWO
Allen's Hummingbird	Selasphorus sasin		ALHU
Amazon Parrot sp.	Amazona sp.		
American Avocet	Recurvirostra americana		AMAV
American Bittern	Botaurus lentiginosus		AMBI
American Coot	Fulica americana		AMCO
American Crow	Corvus brachyrhynchos	Common Crow	AMCR
American Golden-Plover	Pluvialis fulva		AGPL
American Goldfinch	Spinus tristis		AMGO
American Kestrel	Falco sparverius		MAKE
American Oystercatcher	Haematopus palliatus		AMOY
American Pipit	Anthus rubescens	Water Pipit	AMPI
American Redstart	Setophaga ruticilla		AMRE
American Robin	Turdus migratorius	Robin	AMRO
American White Pelican	Pelecanus erythrorhynchos	White Pelican	AWPE
American Wigeon	Anas americana		AMWI
American/Pacific Golden-Plover	Pluvialis fulva/Pluvialis dominica	Lesser Golden-Plover	AMGP/PAGP
Ancient Murrelet	Synthliboramphus antiquus		ANMU
Anna's Hummingbird	Calypte anna		ANHU
Arctic Loon	Gavia arctica		ARLO
Arctic Tern	Sterna paradisaea		ARTE
Ash-throated Flycatcher	Myiarchus cinerascens		ATFL
Audubon's Warbler	Setophaga coronata auduboni	Yel.rumped (Audubon's) Warbler	AUWA
Baird's Sandpiper	Calidris bairdii		BASA
Bald Eagle	Haliaeetus leucocephalus		BAEA
Baltimore Oriole	Icterus galbula		BAOR
Band-tailed Pigeon	Patagioenas fasciata		BTPI
Bank Swallow	Hirundo rustica		BARS
Barn Owl	Tyto alba		BNOW

SPECIES TABLE			
CommonName	**ScientificName**	**CommonName_aka**	**BBLCode**
Barn Swallow	Hirundo rustica		BANS
Belding's Savannah Sparrow	Passerculus sandwichensis beldingi		BSSP
Bell's Vireo	Vireo bellii		BEVI
Belted Kingfisher	Megaceryle alcyon		BEKI
Bewick's Wren	Thryomanes bewickii		BEWR
Black Oystercatcher	Haematopus bachmani		BLOY
Black Phoebe	Sayornis nigricans		BLPH
Black Scoter	Melanitta americana	Common Scoter	BLSC
Black Skimmer	Rynchops niger		BLSK
Black Tern	Chlidonias niger		BLTE
Black Turnstone	Arenaria melanocephala		BLTU
Black Vulture	Coragyps atratus		BLVU
Black-and-white Warbler	Mniotilta varia		BAWW
Black-bellied Plover	Pluvialis squatarola		BBPL
Blackbird sp.	Euphagus sp		
Black-chinned Hummingbird	Archilochus alexandri		BCHU
Black-chinned Sparrow	Spizella atrogularis		BCSP
Black-crowned Night-Heron	Nycticorax nycticorax		BCNH
Black-footed Albatross	Phoebastria nigripes		BFAL
Black-headed Grosbeak	Pheucticus melanocephalus		BHGR
Black-headed Gull	Chroicocephalus ridibundus		BHGU
Black-legged Kittiwake	Rissa tridactyla		BLKI
Black-necked Stilt	Himantopus mexicanus		BNST
Blackpoll Warbler	Setophaga striata		BLPW
Black-throated Gray Warbler	Setophaga nigrescens		BTYW
Black-vented Shearwater	Puffinus opisthomelas		BVSH
Blue Grosbeak	Passerina caerulea		BLGR
Blue-footed Booby	Sula nebouxii		BFBO
Blue-gray Gnatcatcher	Polioptila caerulea		BGGN
Blue-winged Teal	Anas discors		BWTE
Blue-winged x Cinnamon Teal (hybrid)	Anas sp.		
Blue-winged/Cinnamon Teal	Anas discors/Anas cyanoptera		BWTE/CITE
Bonaparte's Gull	Chroicocephalus philadelphia		BOGU
Brandt's Cormorant	Phalacrocorax penicillatus		BRAC
Brant	Branta bernicla	Black Brant	BRAN
Brewer's Blackbird	Euphagus cyanocephalus		BRBL
Brewer's Sparrow	Spizella breweri		BRSP
Broad-tailed Hummingbird	Selasphorus platycercus		BTLH
Brown Creeper	Certhia americana		BRCR
Brown Pelican	Pelecanus occidentalis		BRPE
Brown Thrasher	Toxostoma rufum		BRTH
Brown-headed Cowbird	Molothrus ater		BHCO
Budgerigar	Melopsittacus undulatus		

SPECIES TABLE			
CommonName	**ScientificName**	**CommonName_aka**	**BBLCode**
Bufflehead	Bucephala albeola		BUFF
Bullock's Oriole	Icterus bullockii		BUOR
Burrowing Owl	Athene cunicularia		BUOW
Bushtit	Psaltriparus minimus	Common Bushtit	BUSH
Cackling Goose	Branta hutchinsii		CACG
California Gull	Larus californicus		CAGU
California Quail	Callipepla californica		CAQU
California Thrasher	Toxostoma redivivum		CATH
California Towhee	Melozone crissalis	Brown Towhee	CALT
Calliope Hummingbird	Selasphorus calliope		CAHU
Canada Goose	Branta canadensis		CAGO
Canada Warbler	Cardellina canadensis		CAWA
Canvasback	Aythya valisineria		CANV
Canyon Wren	Catherpes mexicanus		CANW
Cape May Warbler	Setophaga tigrina		CMWA
Caspian Tern	Hydroprogne caspia		CATE
Cassin's Kingbird	Tyrannus vociferans		CAKI
Cassin's Vireo	Vireo cassinii		CAVI
Cassin's/Western Kingbird	Tyrannus vociferans/Tyrannus verticalis		CAKI/WEKI
Cattle Egret	Bubulcus ibis		CAEG
Cedar Waxwing	Bombycilla cedrorum		CEDW
Chestnut-backed Chickadee	Poecile rufescens		CBCH
Chestnut-sided Warbler	Setophaga pensylvanica		CSWA
Chipping Sparrow	Spizella passerina		CHSP
Cinnamon Teal	Anas cyanoptera		CITE
Clark's Grebe	Aechmophorus clarkii		CLGR
Clark's/Western Grebe	Aechmophorus clarkii/Aechmophorus occidentalis		CLGR/WEGR
Clay-colored Sparrow	Spizella pallida		CCSP
Cliff Swallow	Petrochelidon pyrrhonota		CLSW
Common Gallinule	Gallinula galeata	Common Moorhen	COGA
Common Goldeneye	Bucephala clangula		COGO
Common Ground-Dove	Columbina passerina		COGD
Common Loon	Gavia immer		COLO
Common Merganser	Mergus merganser		COME
Common Murre	Uria aalge		COMU
Common Nighthawk	Chordeiles minor		CONI
Common Poorwill	Phalaenoptilus nuttallii		COPO
Common Raven	Corvus corax		CORA
Common Tern	Sterna hirundo		COTE
Common Yellowthroat	Geothlypis trichas	Yellowthroat	COYE
Cook's Petrel	Pterodroma cookii		COPE
Cooper's Hawk	Accipiter cooperii		COHA

SPECIES TABLE			
CommonName	**ScientificName**	**CommonName_aka**	**BBLCode**
Coot sp.	Fulica sp.		
Cormorant sp.	Phalacrocoracidae sp.		
Costa's Hummingbird	Calypte costae		COHU
Curlew Sandpiper	Calidris ferruginea		CUSA
Curlew sp.	Numenius sp.		
Dabbling Duck sp.	Anas sp.		
Dark-eyed Junco	Junco hyemalis		DEJU
Double-crested Cormorant	Phalacrocorax auritus		DCCO
Dowitcher sp.	Scolopacidae sp.		
Downy Woodpecker	Picoides pubescens		DOWO
Downy/Hairy Woodpecker	Picoides pubescens/Picoides villosus		
Duck sp.	Anatinae sp.	Includes Domestic Duck sp.	
Dunlin	Calidris alpina		DUNL
Dusky-capped Flycatcher	Myiarchus tuberculifer		DCFL
Eared Grebe	Podiceps nigricollis		EAGR
Eastern Kingbird	Tyrannus tyrannus		EAKI
Eastern Phoebe	Sayornis phoebe		EAPH
Eastern Yellow Wagtail	Motacilla tschutschensis		EYWA
Elegant Tern	Thalasseus elegans		ELTE
Empidonax sp.	Empidonax sp.		
Eurasian Collared-Dove	Streptopelia decaocto		ECDO
Eurasian Wigeon	Anas penelope		EUWI
Eurasian x American Wigeon (hybrid)	Anas penelope/Anas americana hybrid		
Eurasian Sparrowhawk	Accipiter nisus		
European Starling	Sturnus vulgaris		EUST
Falcon sp.	Falconidae sp.		
Ferruginous Hawk	Buteo regalis		FEHA
Flicker sp.	Colaptes sp.		
Flycatcher sp	Myiarchus sp		
Forster's Tern	Sterna forsteri		FOTE
Fox Sparrow	Passerella iliaca		FOSP
Franklin's Gull	Leucophaeus pipixcan		FRGU
Fulvous Whistling-Duck	Dendrocygna bicolor		FUWD
Gadwall	Anas strepera		GADW
Glaucous Gull	Larus hyperboreus		GLGU
Glaucous-winged Gull	Larus glaucescens		GWGU
Golden Eagle	Aquila chrysaetos		GOEA
Golden-crowned Kinglet	Regulus satrapa		GCKI
Golden-crowned Sparrow	Zonotrichia atricapilla		GCSP
Goldeneye sp.	Bucephala sp.		
Goldfinch sp	Spinus sp		
Goldfinch sp.	Spinus sp.		

SPECIES TABLE			
CommonName	**ScientificName**	**CommonName_aka**	**BBLCode**
Grace's Warbler	Setophaga graciae		GRWA
Grasshopper Sparrow	Ammodramus savannarum		GRSP
Gray Flycatcher	Empidonax wrightii		GRFL
Gray-headed Junco	Junco hyemalis		GHJU
Great Blue Heron	Ardea herodias		GBHE
Great Egret	Ardea alba	Common Egret	GREG
Great Horned Owl	Bubo virginianus		GHOW
Greater Roadrunner	Geococcyx californianus		GRRO
Greater Scaup	Aythya marila		GRSC
Greater White-fronted Goose	Anser albifrons	White-fronted Goose	GWFG
Greater Yellowlegs	Tringa melanoleuca		GRYE
Greater Yellowlegs/Lesser Yellowlegs	Tringa melanoleuca/Tringa flavipes		GYRE/LEYE
Greater/Lesser Scaup	Aythya marila/Aythya affinis		GRSC/LESC
Great-tailed Grackle	Quiscalus mexicanus		GTGR
Green Heron	Butorides virescens		GRHE
Green-winged Teal	Anas crecca		GWTE
Gull sp.	Laridae sp.		
Gull-billed Tern	Gelochelidon nilotica		GBTE
Hairy Woodpecker	Picoides villosus		HAWO
Hammond's Flycatcher	Empidonax hammondii		HAFL
Harris's Sparrow	Zonotrichia querula		HASP
Hawk sp.	Accipiter sp.		
Heermann's Gull	Larus heermanni		HEEG
Hermit Thrush	Catharus guttatus		HETH
Hermit Warbler	Setophaga occidentalis		HEWA
Herring Gull	Larus argentatus		HERG
Herring x Glaucous Gull (hybrid)	Larus argentatus/Larus hyperboreus		HERG/GLGU
Herring x Glaucous-winged Gull (hybrid)	Larus argentatus/Larus glaucescens		
Hooded Merganser	Lophodytes cucullatus		HOME
Hooded Oriole	Icterus cucullatus		HOOR
Horned Grebe	Podiceps auritus		HOGR
Horned Lark	Eremophila alpestris		HOLA
House Finch	Haemorhous mexicanus		HOFI
House Sparrow	Passer domesticus		HOSP
House Wren	Troglodytes aedon		HOWR
House/Purple Finch	Haemorhous mexicanus/Haemorhous purpureus		HOFI/PUFI
Hummingbird sp.	Trochilidae sp.		
Hutton's Vireo	Vireo huttoni		HUVI
Indigo Bunting	Passerina cyanea		INBU
Jaeger sp.	Stercorarius sp.		
Kentucky Warbler	Geothlypis formosa		KEWA

SPECIES TABLE			
CommonName	**ScientificName**	**CommonName_aka**	**BBLCode**
Killdeer	Charadrius vociferus		KILL
Lapland Longspur	Calcarius lapponicus		LALO
Lark Bunting	Calamospiza melanocorys		LARB
Lark Sparrow	Chondestes grammacus		LASP
Larus sp.	Larus sp.		
Laughing Gull	Leucophaeus atricilla		LAGU
Lawrence's Goldfinch	Spinus lawrencei		LAGO
Lazuli Bunting	Passerina amoena		LAZB
Least Bittern	Ixobrychus exilis		LEBI
Least Flycatcher	Empidonax minimus		LEFL
Least Sandpiper	Calidris minutilla		LESA
Least Tern	Sternula antillarum	California Least Tern	LETE
Lesser Goldfinch	Spinus psaltria		LEGO
Lesser Nighthawk	Chordeiles acutipennis		LENI
Lesser Scaup	Aythya affinis		LESC
Lesser Yellowlegs	Tringa flavipes		LEYE
Lincoln's Sparrow	Melospiza lincolnii		LISP
Little Blue Heron	Egretta caerulea		LBHE
Little Gull	Hydrocoloeus minutus		LIGU
Loggerhead Shrike	Lanius ludovicianus		LOSH
Long-billed Curlew	Numenius americanus		LBCU
Long-billed Dowitcher	Limnodromus scolopaceus		LBDO
Long-tailed Duck	Clangula hyemalis	Oldsquaw	LTDU
Loon sp.	Gaviidae sp.		
Lucy's Warbler	Oreothlypis luciae		LUWA
MacGillivray's Warbler	Geothlypis tolmiei		MGWA
Magnolia Warbler	Setophaga magnolia		MAWA
Mallard	Anas platyrhynchos		MALL
Mallard (Domestic type)	Anas platyrhynchos (domestic type)		
Manx Shearwater	Puffinus puffinus		MASH
Marbled Godwit	Limosa fedoa		MAGO
Marsh Wren	Cistothorus palustris	Long-billed Marsh Wren	MAWR
Merlin	Falco columbarius	Pigeon Hawk	MERL
Mew Gull	Larus canus		MEGU
Mountain Chickadee	Poecile gambeli		MOCH
Mountain Plover	Charadrius montanus		MOPL
Mourning Dove	Zenaida macroura		MODO
Mute Swan	Cygnus olor		MUSW
Myrtle Warbler	Dendroica coronata coronata		MYWA
Nashville Warbler	Oreothlypis ruficapilla		NAWA
Nighthawk sp.	Caprimulgidae		
Northern Fulmar	Fulmarus glacialis	Fulmar	NOFU
Northern Harrier	Circus cyaneus	Marsh Hawk	NOHA

SPECIES TABLE			
CommonName	**ScientificName**	**CommonName_aka**	**BBLCode**
Northern Mockingbird	Mimus polyglottos	Mockingbird	NOMO
Northern Parula	Setophaga americana		NOPA
Northern Pintail	Anas acuta	Pintail	NOPI
Northern Rough-winged Swallow	Stelgidopteryx serripennis	Rough-winged Swallow	NRWS
Northern Shoveler	Anas clypeata	Shoveler	NSHO
Nutmeg Mannikin	Lonchura punctulata		NUMA
Nuttall's Woodpecker	Picoides nuttallii		NUWO
Nuttall's x Downy Woodpecker (hybrid)	Picoides nuttallii/Picoides pubescens		
Oak Titmouse	Baeolophus inornatus	Plain Titmouse	OATI
Olive-sided Flycatcher	Contopus cooperi		OSFL
Orange-crowned Warbler	Oreothlypis celata		OCWA
Orchard Oriole	Icterus spurius		OROR
Oregon Junco	Junco hyemalis oreganus	Dark-eyed (Oregon) Junco	ORJU
Oriole sp.	Icterus sp		
Osprey	Pandion haliaetus		OSPR
Pacific Golden Plover	Pluvialis dominica		PAGP
Pacific Loon	Gavia pacifica		PALO
Pacific Wren	Troglodytes pacificus		PAWR
Pacific-slope Flycatcher	Empidonax difficilis		PSFL
Pacific-slope/Cordilleran Flycatcher	Empidonax difficilis/Empidonax occidentalis	Western Flycatcher	PSFL/
Painted Redstart	Myioborus pictus		PARE
Palm Warbler	Dendroica palmarum		PAWA
Parasitic Jaeger	Stercorarius parasiticus		PAJA
Pectoral Sandpiper	Calidris melanotos		PESA
Sandpiper sp.	Calidris sp.	Peep sp.	
Pelagic Cormorant	Phalacrocorax pelagicus		PECO
Pelican sp	Pelecanus sp		
Peregrine Falcon	Falco peregrinus		PEFA
Phainopepla	Phainopepla nitens	Black Cardinal	PHAI
Phalarope sp.	Phalarope sp.		
Pied-billed Grebe	Podilymbus podiceps		PBGR
Pigeon Guillemot	Cepphus columba		PIGU
Pine Siskin	Spinus pinus		PISI
Pink-footed Shearwater	Puffinus creatopus		PFSH
Piping Plover	Charadrius melodus		PIPL
Pomarine Jaeger	Stercorarius pomarinus		POJA
Prairie Falcon	Falco mexicanus		PRFA
Prairie Warbler	Setophaga discolor		PRAW
Purple Finch	Haemorhous purpureus		PUFI
Purple Martin	Progne subis		PUMA
Pygmy Nuthatch	Sitta pygmaea		PYNU

SPECIES TABLE			
CommonName	**ScientificName**	**CommonName_aka**	**BBLCode**
Red Crossbill	Loxia curvirostra		RECR
Red Knot	Calidris canutus		REKN
Red Phalarope	Phalaropus fulicarius		REPH
Red-breasted Merganser	Mergus serrator		RBME
Red-breasted Nuthatch	Sitta canadensis		RBNU
Red-breasted Sapsucker	Sphyrapicus ruber		RBSA
Reddish Egret	Egretta rufescens		REEG
Redhead	Aythya americana		REDH
Red-naped Sapsucker	Sphyrapicus nuchalis		RNSA
Red-necked Grebe	Podiceps grisegena		RNGR
Red-necked Phalarope	Phalaropus lobatus		RNPH
Red-shafted Flicker	Coloptes auratus cafer	Northern Flicker, Common Flicker	RSFL
Red-shouldered Hawk	Buteo lineatus		RSHA
Red-tailed Hawk	Buteo jamaicensis		RTHA
Red-throated Loon	Gavia stellata		RTLO
Red-winged Blackbird	Agelaius phoeniceus		RWBL
Rhinoceros Auklet	Cerorhinca monocerata		RHAU
Ring-billed Gull	Larus delawarensis		RBGU
Ring-necked Duck	Aythya collaris		RNDU
Rock Pigeon	Columba livia	Rock Dove	ROPI
Rock Wren	Salpinctes obsoletus		ROWR
Roseate Spoonbill	Platalea ajaja		ROSP
Rose-breasted Grosbeak	Pheucticus ludovicianus		RBGR
Ross's Goose	Chen rossii		ROGO
Royal Tern	Thalasseus maximus		ROYT
Royal/Elegant Tern	Thalasseus maximus/Thalasseus elegans		ROYT/ELTE
Ruby-crowned Kinglet	Regulus calendula		RCKI
Ruddy Duck	Oxyura jamaicensis		RUDU
Ruddy Turnstone	Arenaria interpres		RUTU
Ruff	Philomachus pugnax		RUFF
Rufous Hummingbird	Selasphorus rufus		RUHU
Rufous/Allen's Hummingbird	Selasphorus rufus/Selasphorus sasin		RUHU/ALHU
Rufous-crowned Sparrow	Peucaea carpalis		RWSP
Rusty Blackbird	Euphagus carolinus		RUBL
Sabine's Gull	Xema sabini		SAGU
Sage Sparrow	Amphispiza belli		SAGS
Sage Thrasher	Oreoscoptes montanus		SATH
Sanderling	Calidris alba		SAND
Sandhill Crane	Grus canadensis		SACR
Sapsucker sp.	Picidae		
Savannah Sparrow	Passerculus sandwichensis		SAVS
Say's Phoebe	Sayornis saya		SAPH

SPECIES TABLE			
CommonName	**ScientificName**	**CommonName_aka**	**BBLCode**
Scissor-tailed Flycatcher	Tyrannus forficatus		STFL
Scoter sp.	Anatidae		
Sedge Wren	Cistothorus platensis		SEWR
Selasphorus hummingbird	Selasphorus hummingbird	Rufous/Allen's sp.	
Semipalmated Plover	Charadrius semipalmatus		SEPL
Semipalmated Sandpiper	Calidris pusilla		SESA
Sharp-shinned Hawk	Accipiter striatus		SSHA
Sharp-shinned/Cooper's Hawk	Accipiter striatus/Accipiter cooperii		SSHA/COHA
Sharp-tailed Sandpiper	Calidris acuminata		SHAS
Shearwater sp.	Procellariidae sp.		
Shorebird sp.	Charadriiform sp.		
Short-billed Dowitcher	Limnodromus griseus		SBDO
Short-billed/Long-billed Dowitcher	Limnodromus griseus/Limnodromus scolopaceus		SBDO/LBDO
Short-eared Owl	Asio flammeus		SEOW
Slate-colored Junco	Junco hyemalis hyemali		SCJU
Snow Goose	Chen caerulescens		SNGO
Snow/Ross's Goose	Chen caerulescens/Chen rossii		SNGO/ROGO
Snowy Egret	Egretta thula		SNEG
Snowy Plover	Charadrius nivosus nivosus	Western Snowy Plover	SNPL
Solitary Sandpiper	Tringa solitaria		SOSA
Song Sparrow	Melospiza melodia		SOSP
Sooty Shearwater	Puffinus griseus		SOSH
Sora	Porzana carolina		SORA
Sparrow sp.	Emberizidae		
Spotted Dove	Streptopelia chinensis		SPDO
Spotted Sandpiper	Actitis macularius		SPSA
Spotted Towhee	Pipilo maculatus	Rufous-sided Towhee	SPTO
Stilt Sandpiper	Calidris himantopus		STSA
Sulphur-bellied Flycatcher	Myiodynastes luteiventris		SBFL
Summer Tanager	Piranga rubra		SUTA
Surf Scoter	Melanitta perspicillata		SUSC
Surf/Black Scoter	Melanitta perspicillata/Melanitta americana		SUSC/BLSC
Surfbird	Aphriza virgata		SURF
Swainson's Thrush	Catharus ustulatus	Olive-backedThrush	SWTH
Swallow sp.	Hirundindae		
Swamp Sparrow	Melospiza georgiana		SWSP
Teal sp.	Anas sp		
Tennessee Warbler	Oreothlypis peregrina		TEWA
Tern sp.	Laridae sp.		
Thayer's Gull	Larus thayeri		THGU
Townsend's Warbler	Setophaga townsendi		TOWA

SPECIES TABLE			
CommonName	**ScientificName**	**CommonName_aka**	**BBLCode**
Townsend's x Hermit Warbler (hybrid)	Setophaga townsendi/Setophaga occidentalis		THWH
Tree Swallow	Tachycineta bicolor		TRES
Tricolored Blackbird	Agelaius tricolor		TRBL
Tricolored Heron	Egretta tricolor		TRHE
Tropical Kingbird	Tyrannus melancholicus		TRKI
Trumpeter Swan	Cygnus buccinator		TRUS
Tufted Duck	Aythya fuligula		TUDU
Tundra Swan	Cygnus columbianus		TUSW
Turkey Vulture	Cathartes aura		TUVU
Varied Thrush	Ixoreus naevius		VATH
Vaux's Swift	Chaetura vauxi		VASW
Vermilion Flycatcher	Pyrocephalus rubinus		VEFL
Vesper Sparrow	Pooecetes gramineus		VESP
Violet-green Swallow	Tachycineta thalassina		VGSW
Virginia Rail	Rallus limicola		VIRA
Virginia's Warbler	Oreothlypis virginiae		VIWA
Wandering Tattler	Tringa incana		WATA
Warbler sp.	Wilsonia sp		
Warbling Vireo	Vireo gilvus		WAVI
Western Bluebird	Sialia mexicana		WEBL
Western Grebe	Aechmophorus occidentalis		WEGR
Western Gull	Larus occidentalis		WEGU
Western Kingbird	Tyrannus verticalis		WEKI
Western Meadowlark	Sturnella neglecta		WEME
Western Sandpiper	Calidris mauri		WESA
Western Scrub-Jay	Aphelocoma californica	Scrub-Jay, American Jay	WESJ
Western Tanager	Piranga ludoviciana		WETA
Western Wood-Pewee	Contopus sordidulus		WEWP
Western x Glaucous-winged Gull (hybrid)	Larus occidentalis x glaucescens		GHGU
Western/Clark's Grebe	Larus occidentalis/Aechmophorus clarkii		WCGR
Whimbrel	Numenius phaeopus		WHIM
White Wagtail	Motacilla alba		WHWA
White-breasted Nuthatch	Sitta carolinensis		WBNU
White-crowned Sparrow	Zonotrichia leucophrys		WCSP
White-eyed Vireo	Vireo griseus		WEVI
White-faced Ibis	Plegadis chihi		WFIB
White-tailed Kite	Elanus leucurus	Black-shouldered Kite	WTKI
White-throated Sparrow	Zonotrichia albicollis		WTSP
White-throated Swift	Aeronautes saxatalis		WTSW
White-winged Dove	Zenaida asiatica		WWDO

SPECIES TABLE			
CommonName	**ScientificName**	**CommonName_aka**	**BBLCode**
White-winged Scoter	Melanitta fusca		WWSC
Wild Turkey	Meleagris gallopavo		WITU
Willet	Tringa semipalmata		WILL
Williamsen's Sapsucker	Sphyrapicus thyroideus		WISA
Willow Flycatcher	Empidonax traillii		WIFL
Wilson's Phalarope	Phalaropus tricolor		WIPH
Wilson's Snipe	Gallinago delicata	Common Snipe	WISN
Wilson's Warbler	Cardellina pusilla		WIWA
Winter Wren	Troglodytes hyemalis		WIWR
Wood Duck	Aix sponsa		WODU
Woodpeckers sp	Melanerpes sp		
Worm-eating Warbler	Helmitheros vermivorum		WEWA
Wren sp.	Troglodytidae sp.		
Wrentit	Chamaea fasciata		WREN
Yellow Warbler	Setophaga petechia		YWAR
Yellow-bellied Sapsucker	Sphyrapicus varius		YBSA
Yellow-billed Loon	Gavia adamsii		YBLO
Yellow-billed Magpie	Pica nuttalli		YBMA
Yellow-breasted Chat	Icteria virens		YBCH
Yellow-headed Blackbird	Xanthocephalus xanthocephalus		YHBL
Yellow-rumped Warbler	Setophaga coronata	Yellow-rumped Warbler (Audubon) (Myrtle)	YRWA
Yellow-shafted Flicker	Colaptes auratus auratus	Northern (yel.-shftd) Flicker	YSFL
Yellow-throated Vireo	Vireo flavifrons		YTVI
Zone-tailed Hawk	Buteo albonotatus		ZTHA

SEASONAL OCCURRENCE

The seasonal occurrence for each species was designated using Lehman (2014) and guidance from CCBER staff.

SEASONAL OCCURRENCE	
Code	**Description**
M	Migrant (aka Transient) - a species or individual passing through a giv en area in migration
R	Resident - Local species
V	Vagrant - An individual well outside its normal range (some are difficult to distinguish from rare migrants)
MF	Migrant - Fall
MOS	Migrant - Offshore
MS	Migrant - Spring/Summer

SEASONAL OCCURRENCE	
MW	Migrant - Winter
MWOS	Migrant - Winter - Offshore
MY	Migrant - Year Round
RS	Resident - Summer
RW	Resident - Winter
RY	Resident - Year Round
VF	Vagrant - Fall
VS	Vagrant - Summer
VW	Vagrant - Winter
VY	Vagrant - Year Round

NOTE: In using Lehman, 2013 judgments were made as to how to code relative abundance, for example spring and summer were combined as seasons as there was often overlap. In some cases, a species may have been rare in one season and uncommon in another, so the lesser of the two was used. It is unclear how Lehman distinguishes between a resident and a migrant, for example, at times he states that a species is a migrant in summer and a resident. Alternatively, he may state that a species is a resident in one season and a migrant in another. Caution should be exercised in using these seasonal occurrences and relative abundance codes except broadly and a more thorough review of his comments may be warranted.

RELATIVE ABUNDANCE

The relative abundance of a species was determined using Lehman (2014) and input from CCBER staff.

Code	Description	Definition (per Lehman 2014)
ACC	Accidental	1 record (and future records are not expected for a substantial period of time
CAS	Casual	2 to 10 records
COM	Common	15 or more individuals per day in proper habitat
ERR	Erratic	Records lacking consistency, regularity or uniformity
FAC	Fairly common	8 to 15 individuals per day in proper habitat
IRR	Irregular	Not conforming to the usual pattern in the records
RAR	Rare	1 to 15 individuals per season in proper habitat or infrequent
UNC	Uncommon	4 to 7 individuals per day in proper habitat
VEC	Very common	Not defined in Lehman
VER	Very rare	Average of fewer than 1 record per season or very infrequent
VUN	Very uncommon	1 to 3 individuals per day in proper habitat

DESIGNATION STATUS

The designation status of a species was determined using Federal and State listing documents, a report prepared by the Santa Barbara County Flood Control and Water Conservation District relating to Goleta Slough, as well as input from CCBER staff.

Code	Description
EX	Exotic
FE	Federally Endangered
FT	Federally Threatened
LE	Locally Endangered
LT	Locally Threatened
SE	State Endangered (CA)
SLC	Species of Local Concern (Santa Barbara County)
SSC	Species of Special Concern (CA)
ST	State Threatened (CA)
UL	Unlisted

SURVEYS

SURVEY SOURCE

DATASET SOURCE	
MSE	MSE Field Notes, Holmgren, Mark. Field notes from bird surveys housed at CCBER
CBC	Santa Barbara Museum of Natural History, Christmas Count bird surveys
EB	E-Bird, another site with postings on bird sightings
CCBER	CCBER Annual Bird Surveys. Field data from bird surveys housed at CCBER.

SURVEY LOCATIONS

The survey locations were developed using a geographic information system to delineate both narrow and broad survey locations. If an observed specified that a particular observation or observations were made at a more narrow location, the survey was split up and assigned a location code to the most narrow extent possible.

In addition, CCBER staff was consulted to identify the dominant wetland and upland habitat types for each survey location. Finally, Cowardin (1979) and Ferren (1987) habitat designations for the survey locations are delineated as well.

Code	Location	Dominant Wetland	**Cowardin (1979) and Ferren (1987) Terms**	Subdominant Wetland1	Subdominant Wetland2	Dominant Upland	Subdominant Upland	Code – Broad	Description - Broad
AI	AREA I	Seasonal wetland	Seasonal palustrine emergent wetland			Coastal sage scrub		GS	Goleta Slough
AJ	AREA J	Freshwater marsh	Persistent palustrine emergent wetland					GS	Goleta Slough
AK	AREA K	Brackish marsh	Persistent palustrine mergent*					GS	Goleta Slough
AL	AREA L	Tidal marsh	Persistent estuarine emergent wetland					GS	Goleta Slough
AM	AREA M	Tidal Marsh	Persistent estuarine emergent wetland					GS	Goleta Slough
BX	BASIN X	Tidal Marsh	Persistent estuarine emergent wetland					GS	Goleta Slough
CB	CAMPUS BEACH	Coastal strand	Coastal strand					CL	Campus Lagoon
CBA	CAMPUS BEACH AREAS	Coastal strand	Coastal strand					CL	Campus Lagoon
CCO	CAMINO CORTO OPEN SPACE	Vernal Pool	Seasonal palustrine wetland			Non-native annual grassland		IV	Isla Vista
CG	CCBER GREENHOUSES AND NURSERY [6]	Eucalyptus woodland				Eucalyptus woodland		SC	Storke Campus
CL	CAMPUS LAGOON	Brackish pond	Salt marsh	Coastal sage scrub		Non-native annual grassland		CL	Campus Lagoon
CLU	CAMPUS LAGOON UPLAND							CL	Campus Lagoon
COP	COAL OIL POINT RESERVE (AKA WEST DEVEREUX)	Brackish pond	Esturarine system	Seasonal palustrine wetland	Vernal pools	Coastal sage scrub	Non-native annual grassland	GDA	Greater Devereux Area
CP	CAMPUS POINT (AKA GOLETA POINT)	Rocky intertidal	Seasonal palustrine wetland					CL	Campus Lagoon
CVP	CREATED VERNAL POOLS (COAL OIL POINT RESERVE)	Vernal pool	Seasonal palustrine wetland			Non-native annual grassland		GDA	Coal Oal Point Reserve
DA	DELCO AREA (FORMERLY KNOWN AS)							DA	Delco Area
DB	DEVEREUX BEACH	Coastal strand	Coastal strand					GDA	Greater Devereux Area
DD	DEVEREUX DUNES	Coastal strand	Coastal strand			Coastal dunes		GDA	Greater Devereux Area

[6] Also includes a "Student Gardens" adjacent to the greenhouses/nursery

Code	Location	Dominant Wetland	**Cowardin (1979) and Ferren (1987) Terms**	Subdominant Wetland1	Subdominant Wetland2	Dominant Upland	Subdominant Upland	Code – Broad	Description - Broad
DP	DUNE POND (WEST OF DEVEREUX SLOUGH)	Freshwater marsh	Persistent palustrine emergent wetland					GDA	Greater Devereux Area
DS	DEVEREUX SLOUGH (AKA EAST OR LOWER DEVEREUX)	Brackish pond	Estuarine system					GDA	Greater Devereux Area
DSO	DEL SOL OPEN SPACE	Vernal pool	Seasonal palustrine wetland			Non-native annual grassland		IV	Isla Vista
EM	ELLWOOD MESA	Vernal pool	Seasonal palustrine wetland			Non-native annual grassland		GDA	Greater Devereux Area
EMB	ELLWOOD MESA BEACH	Coastal strand	Coastal strand					GDA	Greater Devereux Area
ESCW	EAST STORKE CAMPUS WETLAND	Brackish marsh	Persistent palustrine mergent wetland[7]	Freshwater marsh		Eucalyptus woodland		SC	Storke Campus
FGER	FISH AND GAME ECOLOGICAL RESERVE	Brackish marsh	Persistent palustrine mergent wetland (note same term but vegetation is actually remnant salt marsh versus emergent freshwater marsh)			Coastal sage scrub		GS	Goleta Slough
FGW	FISH AND GAME WETLANDS (LOS CARNEROS RD)	Brackish marsh	Persistent palustrine mergent wetland (note same term but vegetation is actually remnant salt marsh versus emergent freshwater marsh)	Freshwater marsh		Coastal sage scrub		GS	Goleta Slough
FT	FRANCISCO TORRES TOWERS (TOWERS ONLY)					Developed		SC	Storke Campus
FTW	FRANCISCO TOWERS WETLAND	Brackish marsh	Persistent palustrine mergent wetland (note same term but vegetation is actually remnant salt marsh versus emergent freshwater marsh)			Non-native woodland		SC	Storke Campus
GB	GOLETA BEACH	Coastal strand	Coastal strand					GS	Goleta Slough
GS	GOLETA SLOUGH[8]	Tidal marsh	Estuarine system					GS	Goleta Slough

[7] Note that same term but vegetation is actually remnant salt marsh versus emergent freshwater marsh
[8] Includes Santa Barbara Airport and only used if separate locations with Goleta Slough are not specified

Code	Location	Dominant Wetland	**Cowardin (1979) and Ferren (1987) Terms**	Subdominant Wetland1	Subdominant Wetland2	Dominant Upland	Subdominant Upland	Code – Broad	Description - Broad
GSDP	GOLETA SANITARY DISTRICT PONDS	Freshwater marsh	Persistent estuarine emergent wetland					GS	Goleta Slough
GSM	GOLETA SLOUGH MOUTH	Tidal wetland	Esturarine system			Eucalyptus woodland		GS	Goleta Slough
IV	ISLA VISTA	Vernal Pool	Seasonal palustrine wetland			Non-native woodland		IV	Isla Vista
IVB	ISLA VISTA BEACH	Coastal strand	Coastal strand					IV	Isla Vista
IVS	ISLA VISTA SEWAGE	Tidal wetland	Persistent estuarine emergent wetland					GS	Goleta Slough
KN	KNOLL (COAL OIL POINT RESERVE)					Eucalyptus woodland		COP	Coal Oal Point Reserve
LI	LAGOON ISLAND					Coastal sage scrub	Non-native annual grassland	CL	Campus Lagoon
MSH	MARRIED STUDENT HOUSING[9]					Ruderal	Developed	GDA	Greater Devereux Area
MT	GOLETA SOUTH MASTER TALLY[10]	Tidal marsh	Estuarine system			Eucalyptus woodland		GS	Goleta Slough
MV	MANZANITA VILLAGE -	Vernal pool	Seasonal palustrine wetland			Coastal sage scrub		CL	Campus Lagoon
NB	NORTH BLUFF	Riparian woodland	Forested persistent palustrine wetland			Oak Woodland	Coastal sage scrub	GS	Goleta Slough
NF	NORTH FINGER (OF DEVEREUX SLOUGH)	Brackish marsh	Persistent palustrine mergent wetland (note same term but vegetation is actually remnant salt marsh versus emergent freshwater marsh)			Eucalyptus woodland		GDA	Greater Devereux Area
NP	NORTH PARCEL	Vernal pool	Seasonal palustrine wetland			Native grassland	Non-native grassland	GDA	Greater Devereux Area
OMG	OCEAN MEADOWS GOLF COURSE	Freshwater marsh	Persistent palustrine emergent wetland			Irrigated lawn (previously)		GDA	Greater Devereux Area
PD	PHELPS DITCH (INCLUDES PHELPS CRK & ENCANTO CRK)	Riparian woodland	Forested persistent palustrine wetland			Coastal sage scrub		GDA	Greater Devereux Area
PGE	PACIFIC GAS & ELECTRIC					Eucalyptus	Non-native	PGE	Pacific Gas

[9] Also includes "Student Gardens" north of Devereux Rd

[10] Pertains only to Christmas Bird Count if not separated out by location (e.g., older surveys)

Code	Location	Dominant Wetland	**Cowardin (1979) and Ferren (1987) Terms**	Subdominant Wetland1	Subdominant Wetland2	Dominant Upland	Subdominant Upland	Code – Broad	Description - Broad
						woodland	annual grassland		and Electric
SBA	SANTA BARBARA AIRPORT	Tidal wetland	Estuarine system			Developed		GS	Goleta Slough
SC	STORKE CAMPUS	Brackish marsh	Persistent palustrine mergent wetland*	Freshwater marsh				SC	Storke Campus
SCE	SOUTHERN CALIFORNIA EDISON							SCE	Southern California Edison
SCF	STORKE CAMPUS FIELD -					Irrigated lawn		SC	Storke Campus
SCOP	SAN CLEMENTE OPEN SPACE	Freshwater marsh	Persistent palustrine emergent wetland	Vernal pool	Seasonal palustrine wetland	Coastal sage scrub	Native grassland	SC	Storke Campus
SF	SOUTH FINGER (OF DEVEREUX SLOUGH)	Brackish marsh	Persistent palustrine mergent wetland*			Eucalyptus woodland		GDA	Greater Devereux Area
SP	SOUTH PARCEL	Vernal pool	Seasonal palustrine wetland*			Ruderal	Non-native annual grassland	GDA	Greater Devereux Area
SRW	STORKE RANCH WETLANDS	Brackish marsh	Persistent palustrine mergent wetland*	Freshwater marsh	Persistent palustrine emergent wetland			SC	Storke Campus
UCSB	UCSB (MAIN CAMPUS ONLY)							UCSB	UCSB Main Campus
UDS	UPPER DEVEREUX SLOUGH[11]	Freshwater marsh	Persistent palustrine emergent wetland			Non-native woodland		GDA	Greater Devereux Area
WCB	WEST CAMPUS BLUFFS	Vernal pool	Seasonal palustrine wetland			Non-native annual grassland		GDA	Greater Devereux Area
WSCW	WEST STORKE CAMPUS WETLANDS (AKA WEST STORKE CAMPUS)	Brackish marsh	Persistent palustrine mergent wetland*	Freshwater marsh	Persistent palustrine emergent wetland	Non-native grassland		SC	Storke Campus

[11] Formerly known as OMG (Ocean Meadows Golf Course) used only for data posted after 05/2013

SURVEY WEATHER CONDITIONS

WEATHER CONDITIONS	
C	CLEAR
NW	NO WIND
OC	OVERCAST
P	PRECIPITATION
	TEMP (Degrees Fahrenheit)
W	WIND

SURVEY PURPOSE – BROAD AND NARROW

In an effort to establish survey effort levels, both broad and narrow categories were defined which identify the type of survey conducted.

SURVEY PURPOSE BROAD (INCLUDES LOOK-UP TABLE FOR SURVEY PURPOSE NARROW)			
CodeNarrow	CodeBroad	DescriptionAbbreviated	DescriptionExpanded
ABS	FBS	Formal Bird Survey	Repeated, formal survey with a route and standards for comprehensive surveys
BBLS	NCS	Noncomprehensive Survey	Survey/observations not necessarily comprehensive
BRE	NCS	Noncomprehensive Survey	Survey/observations not necessarily comprehensive
CAS	CAS	Casual Observation	Casual observations with no stated purpose or intent
EAC	NCS	Noncomprehensive Survey	Survey/observations not necessarily comprehensive
EXP	NCS	Noncomprehensive Survey	Survey/observations not necessarily comprehensive
GCT	IBS	Informal Bird Survey	Generally characterized as comprehensive surveys of an area, non-exclusive
HAB	IBS	Informal Bird Survey	Generally characterized as comprehensive surveys of an area, non-exclusive
MIG	NCS	Noncomprehensive Survey	Survey/observations not necessarily comprehensive
OTH	CAS	Casual Observation	Casual observations with no stated purpose or intent
ROO	NCS	Noncomprehensive Survey	Survey/observations not necessarily comprehensive
SC	IBS	Informal Bird Survey	Generally characterized as comprehensive surveys of an area, non-exclusive
SCT	NCS	Noncomprehensive Survey	Survey/observations not necessarily comprehensive
TC	IBS	Informal Bird Survey	Generally characterized as comprehensive surveys of an area, non-exclusive
WS	FBS	Formal Bird Survey	Repeated, formal survey with a route and standards for comprehensive surveys

OBSERVATIONS

CONFIDENCE CODES	
0	HEARD, BUT NOT SEEN
1	VISUAL OBSERVATION WITH A QUESTION MARK (?) / RANGE
2	VISUAL OBSERVATION

RANGE OF BIRD COUNT (CONFIDENCE CODE=1)
WHERE A RANGE IS GIVEN, USE AN AVERAGE (AS AN INTEGER) FOR TOTAL COUNT
WHERE "FEW" OR "SEVERAL" OR "FAMILY" IS NOTED - USE 3 FOR TOTAL COUNT
WHERE "MANY" OR "LOTS" IS NOTED - USE 10 FOR TOTAL COUNT WHERE “BUNCHES” IS NOTED – USE 50 FOR TOTAL COUNT

OBSERVATION – BEHAVIOR	
AD	ADULT
C	CALL
CF	CARRYING FOOD
CNM	CARRYING NEST MATERIAL
F	FEMALE
FL	FLEDGLING
FO	FLYING OVER
JC	JUVENILE COLLECTED
JP	JUVENILE SEEN WITH PRESUMED PARENT
JUV	JUVENILE
M	MALE
MS	TERRITORIAL MALE SINGING
PR	PAIR
S	SONG HEARD
UPC	UNDER PARENTAL CARE
V	VISUAL

Note that there is some cross-over between observations of behavior listed above and the breeding codes listed below. The codes used for observation of behavior were derived from the MSE field notes, but are commonly used by many observers.

BREEDING SUPPORT CODES		
BreedingCodes	**BreedingSupportCode**	**Description**
A	1	EVIDENCE OF NESTING
AF	2	EVIDENCE OF BREEDING SUPPORT
C	4	EVIDENCE OF COURTSHIP
F	2	EVIDENCE OF BREEDING SUPPORT
JI	3	VISUAL OBSERVATION OF JUVENILES OR PAIRS
JP	3	VISUAL OBSERVATION OF JUVENILES OR PAIRS

JS	3	VISUAL OBSERVATION OF JUVENILES OR PAIRS
MS	4	EVIDENCE OF COURTSHIP
NB	1	EVIDENCE OF NESTING
NE	1	EVIDENCE OF NESTING
NY	1	EVIDENCE OF NESTING
P	0	PARASITE OR PREDATOR ACTIVITY
T	4	EVIDENCE OF COURTSHIP

BREEDING CODES USED IN OBSERVATION NOTES - USE CODE IN RIGHT-MOST COLUMN FOR DATA ENTRY	**DESCRIPTION**	**CODE**
C	COURTSHIP BEHAVIOR	4
MS	TERRITORIAL MALE SINGING	4
JS	JUVENILE SPECIMEN	3
JI	JUVENILE INDEPENDENT SEEN	3
JP	JUVENILE WITH PRESUMED PARENT	3
F	FLEDGLING UNDER PARENTAL CARE	2
AF	ADULT CARRYING FOOD	2
NB	NEST BUILDING	1
NE	NEST WITH EGGS	1
NY	NEST WITH YOUNG	1
P	PARASITE EGG FOUND IN HOST NEST	0
A	ADULT FEMALE COLLECTED WITH DISTENDED OVIDUCT OR EGG	1
T	TERRITORY	4

PRESENCE/ABSENCE	
P	PRESENCE (Coded as 1 in Total Count to represent either 1 observed or that the species was present during the suryey)
A	ABSENCE (coded as 0 in Total Count to represent a species that was conspicuously absent from a location during the survey

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