

Las Vegas Wash Coordination Committee

Las Vegas Wash Bird Census Summary Report, 2000-2003

January 2005



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**Las Vegas Wash Bird Census Summary Report,
2000-2003**

**SOUTHERN NEVADA WATER AUTHORITY
Las Vegas Wash Project Coordination Team**

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1.0 INTRODUCTION

1.1 Background

The Las Vegas Wash Coordination Committee (LVWCC) is charged with the stabilization and enhancement of the Las Vegas Wash (Wash), an environmentally important urban waterway in Southern Nevada. To guide enhancement activities, the LVWCC developed the Las Vegas Wash Comprehensive Adaptive Management Plan (LVWCAMP). The LVWCAMP recommends 44 action items that need to be achieved in order to accomplish the goals of stabilizing and enhancing the Wash. Among the recommended actions is the development of a long-term fish and wildlife management plan. In order to develop this plan, several biological monitoring programs have been, and are currently being, conducted along the Wash by the Las Vegas Wash Project Coordination Team (Project Team), the implementation arm of the LVWCC. These studies include reptile, small mammal, and fish surveys that have recently concluded, as well as bat and amphibian studies that have just begun. In addition to these studies, the LVWCC has been conducting a bird census since the fall of 2000.

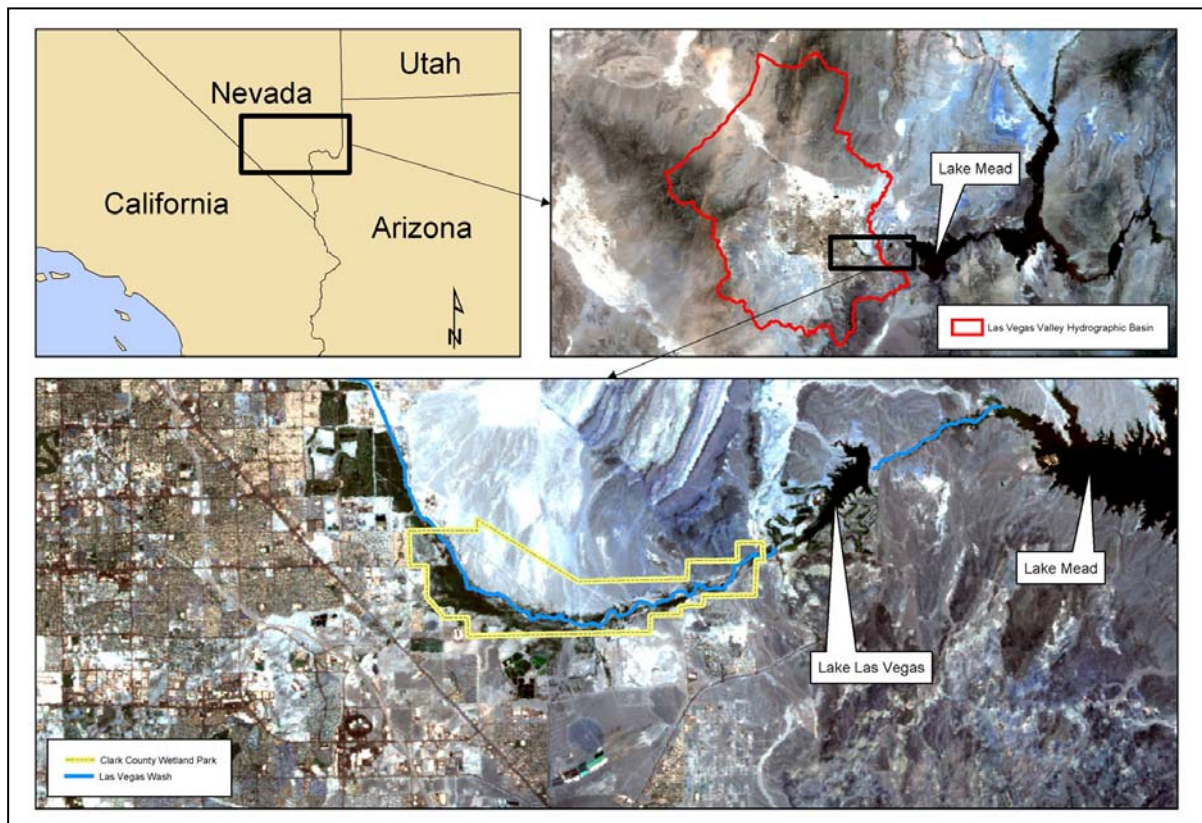


Figure 1: Wash location map.

The Wash is the primary drainage channel for the 1600-square mile Las Vegas Valley, draining treated wastewater, urban runoff, stormwater runoff, and shallow groundwater flows into Lake Mead at Las Vegas Bay (Figure 1). The Wash once supported over 2000 acres of wetlands. However, since the 1970s, erosion has stripped the wetlands to a fraction of their former extent. In 1998, at the beginning of the stabilization project, approximately 200 acres remained. The

erosion and wide-scale environmental disturbance also led to the colonization of salt cedar (*Tamarix ramosissima*), an invasive nonnative plant that now covers approximately 1400 acres along the Wash. Stabilization and enhancement activities, which include the construction of 22 erosion control structures, will help deter further erosion and reduce the amount of sediment being deposited in Lake Mead. The revegetation program will enhance wetland and riparian habitat through the removal of nonnative plants and revegetation with native species as a part of the construction mitigation requirements for the U.S. Army Corps of Engineers 404 permit.

Riparian habitat enhancement activities are expected to positively benefit birds and other wildlife. Research has shown riparian habitat to have higher bird diversity and density than neighboring upland habitat (Bub et al. 2004). Furthermore, over 50% of all breeding bird species in the region depend on riparian areas (Knopf and Samson 1994). Unfortunately, riparian habitat in the southwest has suffered widespread degradation, leading to declines in the bird populations that depend upon them (Powell and Steidl 2000; Kus and Beck 2001). Federally listed endangered species such as the southwestern willow flycatcher (*Empidonax trailli extimus*) are in decline because of riparian habitat loss (Skaggs et al. 1997), while the Yuma clapper rail (*Rallus longirostris yumanensis*), also a federally listed species, is disappearing as a result of loss of suitable wetland habitat (Elphick et al. 2001). Candidate species like the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) are also in decline due to fragmentation of riparian habitat in the western United States (Gaines 1974). The Yuma clapper rail and the yellow-billed cuckoo were detected once in the Wash in 1998 as a part of southwestern willow flycatcher surveys being conducted for the Clark County Wetlands Park environmental impact statement (Southwest Wetlands Consortium 1998). Endangered species surveys continue to be conducted along the Wash. Surveys for the yellow-billed cuckoo, southwestern willow flycatcher and Yuma clapper rail are conducted annually. None of the species have been detected in the Wash since 1998 (SWCA 2003).

Located on the Pacific Migratory Flyway, the Wash is an important riparian and wetland system in the Mojave Desert, and stabilization and enhancement activities both current and planned should benefit the avian community. Likewise, changes in the avian community can provide valuable information on how closely the enhanced riparian habitat mimics natural riparian habitat (Kus and Beck 2001). Bird surveys are a useful tool in monitoring the health of a riparian system because bird abundance and diversity are generally indicative of the abundance and diversity of other wildlife (Jaramillo and Hudson 2001). However, to determine whether birds are responding to changes in the environment, a baseline for the current population needs to be established. Inventories of bird species in the Wash were compiled in the 1970s (Lawson 1973; Bradley and Niles 1973), and the last field survey was performed by Miller (1974) when the Wash was primarily a 2000-acre cattail marsh and salt cedar had not invaded to its current extent. The Wash environment has changed significantly since the 1970s, and these changes are likely to have caused changes in the avian community, as well. More recent bird observations are included in Titus's (2004) "Red Rock Audubon Society Bird List of the Las Vegas Wash". Titus first compiled the list in 1997, using historical accounts (e.g., Miller 1974; Alcorn 1988; Henderson Christmas Bird Counts), her own field notes from more than 25 years of trips to the Wash, and other sources, including local birders. However, as Titus does not distinguish between birds identified in the past and those identified more recently, the current avian community in the Wash remains relatively undocumented.

Thus, to collect baseline avian data per recommendations outlined in the LVWCAMP, on November 14, 2000 the Project Team and the Red Rock Audubon Society (RRAS) began a census to document avian species in the Wash.

1.2 Census Goals

The goals of the census were to: 1) perform a thorough inventory of bird species in the Wash, including seasonal migrants, 2) record use of the Wash by birds during pre-construction, construction, and post-construction activities associated with erosion control structures (weirs), and 3) compare bird species present in revegetated habitat versus those present at the site before revegetation. This report provides a summary of three years of census data, collected from November 14, 2000 to October 7, 2003 and fulfills the first two goals of the census.

2.0 METHODS

2.1 Bird Monitoring

For the first study year (November 14, 2000 to October 30, 2001), bird censuses were conducted on a weekly to biweekly basis year-round at two sites, the future site of the Bostick Weir and the future site of the Sunrise Mountain Outfall Weir, using a modified area search method. The area search method is an intensive method where observers search for birds within a predefined area. The standard area search is conducted in a plot that has been broken into at least three search areas. Observers conduct the census by walking in each area for 20 minutes, identifying all birds seen or heard. The method has been widely used for monitoring avian communities, especially in programs where volunteers are conducting the monitoring (e.g., Australia used the method for its first nationwide volunteer bird count). Volunteers prefer the area search method because it mimics the method they would use when searching for birds on their own. Allowed to move freely through the search area, observers are able to immediately track down unfamiliar birds that are singing or calling and obtain a visual identification. It also allows observers greater opportunity to detect quiet birds. (Ralph et al. 1993).

The area search method was modified for the Wash bird census. A single search area was identified at each site, and a standard path was established for observers to follow when moving through the site. The search was space-limited, but not time-limited. In general, censuses began within two hours of sunrise and ended by 10:00 a.m. At each site, one to four volunteers walked the pre-established path for approximately one to two hours, identifying all birds heard or seen within the boundary of the search area. Birds detected outside the study area were noted, but not included in the analyses. Project Team staff accompanied the volunteers and recorded the data on a datasheet (Appendix A). Data reported include: species, location of the bird within the site, number of birds, habitat, age, plumage, sex, and activity. Birds flying over the study sites were noted as flyovers and are included in the analyses. Researchers originally sought to establish a pattern of behavior for the birds, so a single bird may have been counted more than once if it was seen using a new habitat or engaging in a different activity (see the Recommendations section for a revised method for counting birds).

At the end of the first study year, the census was evaluated, and the decision was made to continue the census at the Bostick Site only and reduce the census frequency to a monthly basis. The construction of the Bostick Weir had been delayed, allowing two years of pre-construction

data to be collected at the Bostick Site, which was sufficient to meet census goals. This would allow better comparison of the pre-, during-, and post-construction use of the site by birds than comparing the Sunrise Site to the Bostick Site. Censuses were then conducted on the first Tuesday of every month.

2.2 Study Area

Birds were monitored at two sites along the Wash (Figure 2), the future site of the Bostick Weir (Bostick Site) and the future site of the Sunrise Mountain Outfall Weir (Sunrise Site). The Bostick Site is located 5.4 miles upstream from Lake Mead (when lake elevation is 1220 feet), while the Sunrise Site is 7.1 miles upstream from the lake. The sites were selected based on their accessibility and weir construction schedule, rather than habitat similarity (accessible sites with similar habitat were sought but could not be found due to the widely varying hydrology along the Wash). The Bostick Weir was originally slated for construction in the winter of 2001. The imminence of construction activities would allow researchers to collect data on bird use of the Bostick Site both during and after weir construction within a few short years. Also, once the weir was complete, the site would be revegetated with native species to meet mitigation requirements. Once revegetated, any changes in avian species diversity or abundance could be compared with the Sunrise Site. However, construction of the weir was postponed until September 2002. The Sunrise Site was chosen because the weir was not scheduled for construction for several years. Thus, surveyors would be able to gather baseline data on the birds using the Wash for several years prior to the changes in habitat and hydrology that weir installation causes. Comparing data from the two sites would allow researchers to fulfill the second and third goals of the census.

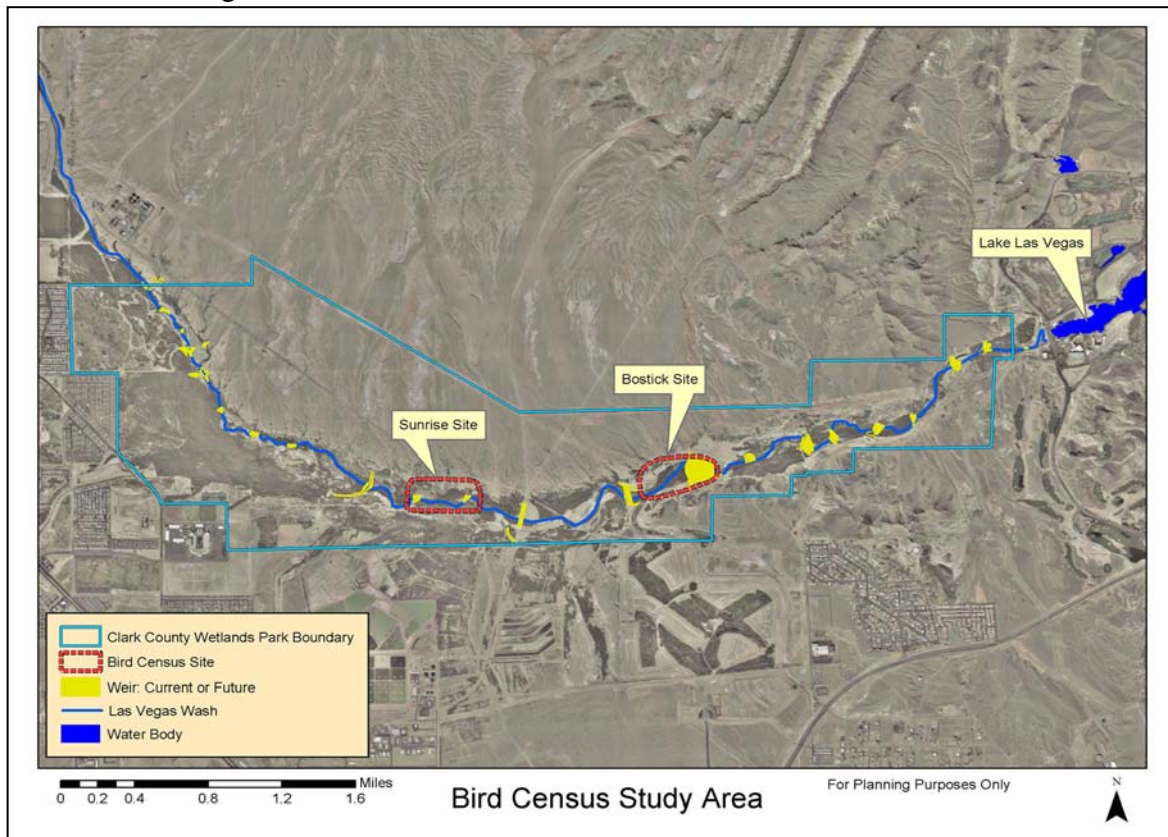


Figure 2: The Wash bird census study area.

2.2.1 Habitat Description

Bird diversity and abundance have been shown to increase with increasing plant species diversity and vegetation structure (Rosenberg et al. 1991; Powell and Steidl 2000). Thus, habitat for each Wash bird census site is described in terms of both plant species and structure to ensure that the descriptions include those aspects that appear to have the greatest influence on the avian community. Both vertical structure (e.g., quailbush understory) and horizontal structure (i.e., patchiness) are described where appropriate.

Habitat was analyzed with the use of aerial imagery, as well as notes of plant species taken while conducting the census. Images from flights on November 13, 2000 were used to delineate habitat types and calculate approximate percent coverage for both the Sunrise and Bostick Sites. Images taken on May 17, 2001; November 8, 2001; March 21, 2002; September 15, 2002; March 28, 2003; and September 27, 2003 were also used for the Bostick Site to track changes in habitat as site clearing and weir construction progressed. The Sunrise Site did not undergo significant change during the period that censuses were conducted there, so no further habitat analysis was needed.

2.2.1.1 The Bostick Site

The Bostick Site (Figure 3) and its census path changed several times over the course of the three

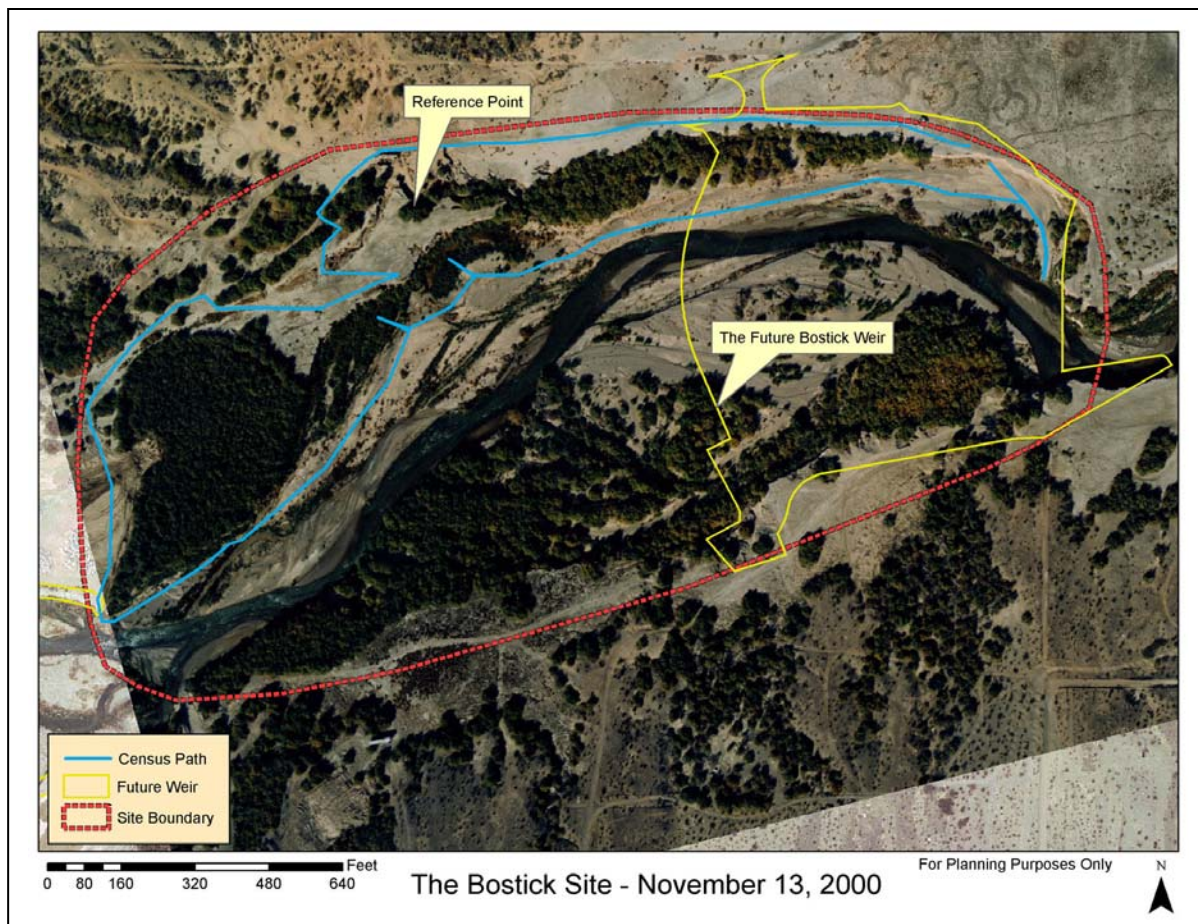


Figure 3: The Bostick Site census area on November 13, 2000.

years due to changes in hydrology from a 2001 flood event and then from weir construction activities. At the onset of the census in November 2000, the Wash ran through this 48-acre site in a narrow channel, covering less than 10% of the total site area. There was a low, wide floodplain on the south bank of the channel and a narrower plain on the north, bisected with small channels from occasional storm events. Salt cedar in dense stands with little or no understory covered 40% of the site. Another major habitat component was open floodplain with sparse cover from salt cedar, forbs (e.g., cocklebur [*Xanthium strumarium*]), quailbush (*Atriplex lentiformis*), and common reed (*Phragmites australis*) that covered another 30% of the site. Another 15% of the site was bare upland with little or no ground cover. Other minor, but important vegetation components included a linear patch of salt cedar that was interspersed with native riparian species, such as willow species (*Salix* spp.), arrowweed (*Pluchea sericea*), and cottonwood (*Populus fremontii*) within the floodplain on the north side. There were a few small sandbars in the center of the channel, which the 2001 flood event greatly enlarged. The census path (approximately 1.2 miles long) ran along the north bank, within the floodplain, providing many opportunities to view the Wash channel (Appendix B). The path also went up above the bank and through a two-acre patch of salt cedar interspersed with quailbush in the understory.

2.2.1.2 The Sunrise Site

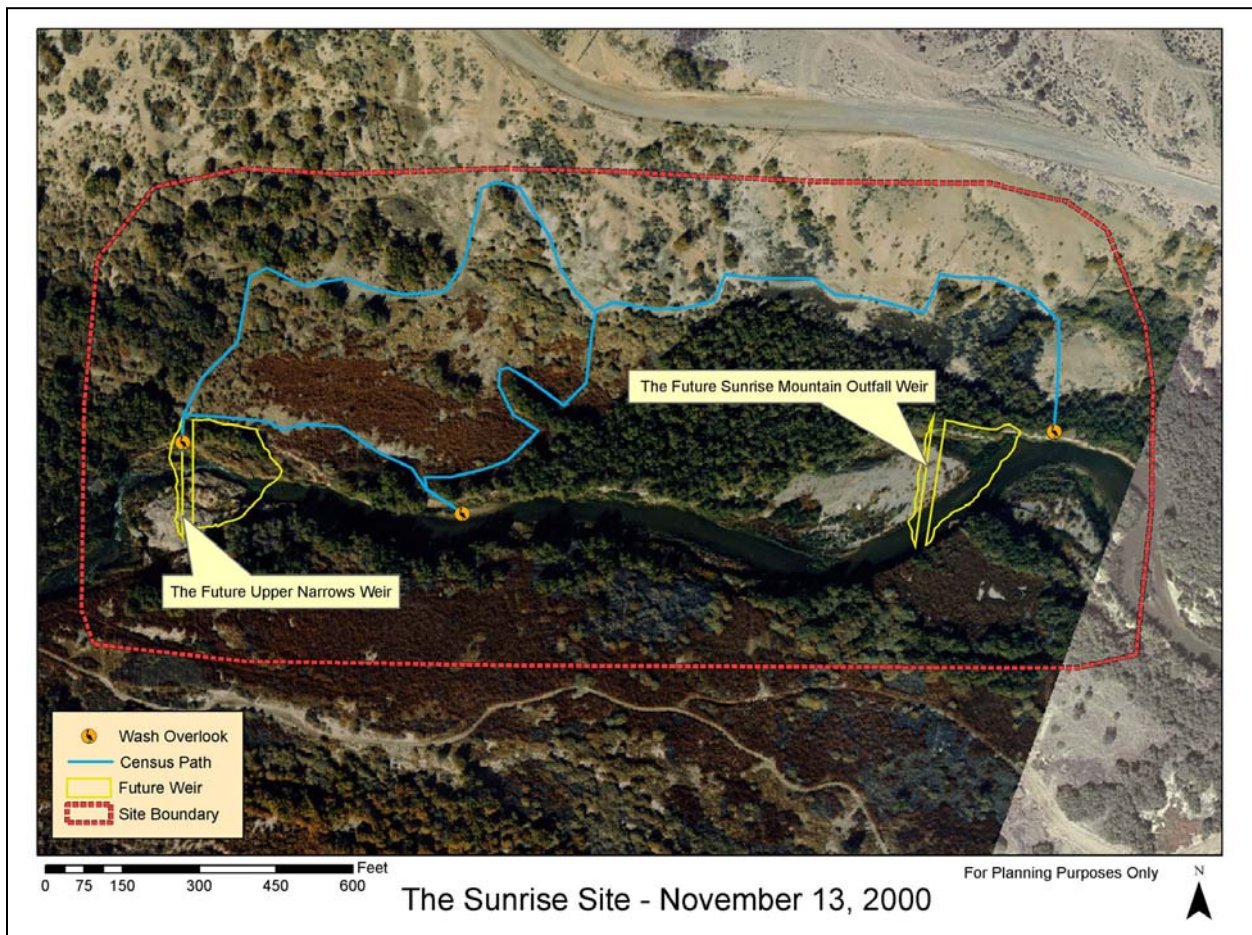


Figure 4: The Sunrise Site census area on November 13, 2000.

The Sunrise Site (Figure 4) changed little over the course of the census. Vegetation at this 45-acre site was composed of upland plants including fourwing saltbush (*Atriplex canescens*), creosote (*Larrea tridentata*), and catclaw acacia (*Acacia greggii*) and riparian related species, such as salt cedar and quailbush. Large portions of the upland areas were covered by dead, matted bassia (*Bassia hyssopifolia*), where nothing else grew. Black ash from an old burn was present on the ground in a few locations. Salt cedar lined the channel. The census path was approximately one-mile in length (including the areas where it doubles back upon itself) and was located on the north side of the Wash. The path cut through the salt cedar to three overlook points on the Wash. In between the overlooks, which were spread out along the channel, the path followed the edge of the salt cedar and then meandered through dense thickets of quailbush and shrubby upland growth, which covered over 50% of the site. Small, sporadic patches of salt cedar appeared among the quailbush. At each overlook point, the Wash flowed around a bend, and common reed and shrub-sized weeds bordered the channel. The channel itself was narrow with rapid flows and approximately 10-foot banks on the north side. The south bank ranged from approximately 10-feet to just a few feet high, as seen in Appendix C with the RRAS on the bird census.

2.3 Analyses

Once the bird data was collected, it needed to be analyzed using methods that would fulfill the goals of the census. A list of the species seen during the three-year census period was created to fulfill the first goal of the census. To determine bird use of the site before, during, and after weir construction (the second goal of the census) data analyses were focused on species and guild richness (the number of individuals recorded for a given species did not always represent discreet individuals, so relative abundance could not be calculated). Annual species richness was calculated as the number of species detected at the Bostick Site during each year, and at the Sunrise Site during the first year. Monthly species richness was calculated by totaling the number of species detected during each month. The number of species detected per month was then broken down by status (i.e., resident, summer visitant, winter visitant, and migrant) as found in Titus (2004) (Appendix D) to track seasonal fluctuations in the composition of the bird community and track changes related to weir construction.

In order to further define the avian community and analyze how it responded to weir construction, all of the species detected during the study were grouped into one of 15 foraging guilds (Table 1) using their primary foraging technique as described in Erhlich et al. (1988) (Appendix E). Guilds are groups of species that exploit environmental resources in similar ways, but are not necessarily closely related taxonomically (Ehrlich et al. 1988). The method a species uses to forage for food often determines in what type of habitat it will be found, making guild analysis a useful approach for determining habitat-related changes in a bird community over time. Additionally, simplifying species into guilds makes the data more manageable, allowing a large number of species to be reduced to a much smaller number of guilds for analysis (Kus and Beck 2001). Guild richness (how many guilds were present) was determined by counting the number of foraging guilds detected. Guild species richness was calculated by counting the number of species detected within each guild.

3.0 RESULTS

3.1 Year One

During year one (November 14, 2000 to October 30, 2001), censuses were conducted between two to four times a month at both the Bostick and Sunrise Sites. This section describes: number of species identified at both sites; the composition of those species by status; species unique to each site; foraging guild richness; variations in species richness; and salt cedar clearing and construction schedule at the Bostick Site.

Volunteers visited the Bostick Site 37 times and the Sunrise Site 30 times in year one. In those visits, a total of 114 species were identified. Overall species richness differed little between the two sites with 99 species detected at the Bostick Site and 88 species identified at the Sunrise Site (Appendix F; Sunrise Year 1, Bostick Year 1). Of the 99 species identified at the Bostick Site, 43 (43.4%) were

permanent residents, 15 (15.2%) were winter visitants, 22 (22.2%) were migrants, and 15 (15.2%) were summer visitants. Two accidental and two introduced species were also detected (“accidental” status is given to those species that are observed outside the boundaries of their

Foraging Guild	Species
Ground Glean:	Gambel's Quail, Killdeer, Spotted Sandpiper, Least Sandpiper, Ring-billed Gull, Rock Pigeon, White-winged Dove, Mourning Dove, Greater Roadrunner, Northern Flicker, Western Scrub-Jay, Pinyon Jay, Common Raven, Bewick's Wren, Marsh Wren, American Robin, Hermit Thrush, Northern Mockingbird, Crissal Thrasher*, European Starling, American Pipit, Palm Warbler, Spotted Towhee, Abert's Towhee, Chipping Sparrow, Brewer's Sparrow, Vesper Sparrow, Lark Sparrow, Black-throated Sparrow, Savannah Sparrow, Fox Sparrow, Song Sparrow, Lincoln's Sparrow, White-crowned Sparrow, Dark-eyed Junco, Blue Grosbeak, Lazuli Bunting, Red-winged Blackbird, Western Meadowlark, Yellow-headed Blackbird, Brewer's Blackbird, Great-tailed Grackle, Brown-headed Cowbird, House Finch, House Sparrow
Foliage Glean:	Warbling Vireo, Verdin, Bushtit, Rock Wren, Ruby-crowned Kinglet, Golden-crowned Kinglet, Blue-gray Gnatcatcher, Black-tailed Gnatcatcher, Cedar Waxwing, Phainopepla, Orange-crowned Warbler, Lucy's Warbler, Yellow Warbler, Yellow-rumped Warbler, MacGillivray's Warbler, Common Yellowthroat, Wilson's Warbler, Yellow-breasted Chat, Western Tanager, Black-headed Grosbeak, Indigo Bunting, Bullock's Oriole, Lesser Goldfinch
Hover and Glean:	Black-chinned Hummingbird, Anna's Hummingbird, Broad-tailed Hummingbird, Ash-throated Flycatcher
Hawks:	Western Wood-Pewee, Black Phoebe, Say's Phoebe, Cassin's Kingbird, Western Kingbird
Aerial Forage:	Vaux's Swift, White-throated Swift, Tree Swallow, Violet-Green Swallow, Northern Rough-winged Swallow, Bank Swallow, Cliff Swallow, Barn Swallow
Aerial Pursuit:	Sharp-shinned Hawk, Cooper's Hawk, Peregrine Falcon, Prairie Falcon
Swoops:	American Kestrel*, Northern Saw-whet Owl, Loggerhead Shrike
High Patrol:	Turkey Vulture, Red-tailed Hawk
Low Patrol:	Northern Harrier, Red-shouldered Hawk
High Dives:	Osprey, Belted Kingfisher
Surface Dives:	Common Goldeneye, Common Merganser, Pied-billed Grebe, Eared Grebe, Western Grebe, Clark's Grebe, Double-crested Cormorant
Surface Dips:	Canada Goose, Cinnamon Teal, Northern Shoveler, Common Moorhen, American Coot
Dabbles:	Wood Duck, Gadwall, Mallard, Northern Pintail, Green-winged Teal
Stalk and Strike:	Great Blue Heron, Great Egret, Snowy Egret, Green Heron, Black-crowned Night-Heron
Probes:	White-faced Ibis, Virginia Rail, American Avocet*, Black-necked Stilt, Greater Yellowlegs, Lesser Yellowlegs, Long-billed Dowitcher, Wilson's Snipe
	* simplified into one of the 15 guilds based on a secondary or similar foraging method for ease of analysis.

Table 1: Species by foraging guild.

normal range and only on very rare occasions, and “introduced” status is given to exotic, or nonnative, species). Of the 88 species identified at the Sunrise Site, 45 (51.1%) were permanent residents, 15 (17%) were winter visitants, 12 (13.6%) were migrants, and 13 (14.8%) were summer visitants. One accidental and two introduced species were also detected.

Only 64% (73 of 114 species) of the total number of species detected during year one were detected at both sites. Species unique to each site are highlighted in Table 2. A few of the species unique to the Bostick Site were rare birds, such as the palm warbler. The list of species unique to the Sunrise Site also included birds rarely detected in the Wash, including the Anna’s hummingbird. Charts showing monthly presence of each species during year one can be found in Appendix G (Bostick Site) and Appendix H (Sunrise Site).

The Bostick Site	The Sunrise Site
Canada Goose	Green-winged Teal
Northern Pintail	Common Goldeneye*
Black-necked Stilt	Eared Grebe
American Avocet	Turkey Vulture*
Greater Yellowlegs	Cooper's Hawk
Lesser Yellowlegs	Red-shouldered Hawk
Least Sandpiper	Rock Pigeon
Wilson's Snipe	Black-chinned Hummingbird
White-winged Dove	Anna's Hummingbird*
Northern Saw-Whet Owl	Cassin's Kingbird*
Pinyon Jay	American Robin*
Tree Swallow	Hermit Thrush*
Violet-green Swallow	Chipping Sparrow
Cedar Waxwing	Lark Sparrow*
Palm Warbler	Brewer's Blackbird*
MacGillivray's Warbler	
Wilson's Warbler	
Spotted Towhee	
Vesper Sparrow	
Black-throated Sparrow	
Fox Sparrow	
Lincoln's Sparrow	
Dark-eyed Junco	
Western Meadowlark	
Bullock's Oriole	*remained unique through
House Sparrow	the study

Table 2: Species unique to each site in the first year.

All of the 15 foraging guilds were detected at each site, with the exception of the hover and glean guild (i.e., hummingbirds), which was not detected at the Bostick Site. Figures 5 and 6 show species richness by guild for each month. The ground glean guild (e.g., doves, wrens, sparrows) was easily the most well-represented guild with at least 15 species detected in all but three months at the Bostick Site. Slightly fewer species were detected in the ground glean guild at the Sunrise Site, but, as with the Bostick Site, it still accounted for one third to more than one half of all detections. In general, the foliage gleaners (e.g., wood-warblers) were the next most abundant guild. However, the number of species from this guild fluctuated from as few as two, up to eight, and there were a few months at both sites when other guilds became the second most frequently detected guild. The stalk and strike guild (herons and egrets) was the most common to surpass the foliage gleaners in species richness. The remainder of the guilds were often represented by one or two species. At least one member of the hawks guild (e.g., black phoebe) and the stalk and strike guild were detected every month.

The number of species detected each month varied (Figures 5 and 6). When comparing species richness from one month to the next at each site, no clear trend emerged that described both sites. At the Bostick Site there were three distinct increases in species richness throughout the year: the number of species detected peaked in January, decreased to a low in March, climbed to another peak in May, dropped again over the summer months, and then rose to another peak in October. At the Sunrise Site, detections fluctuated from month to month.

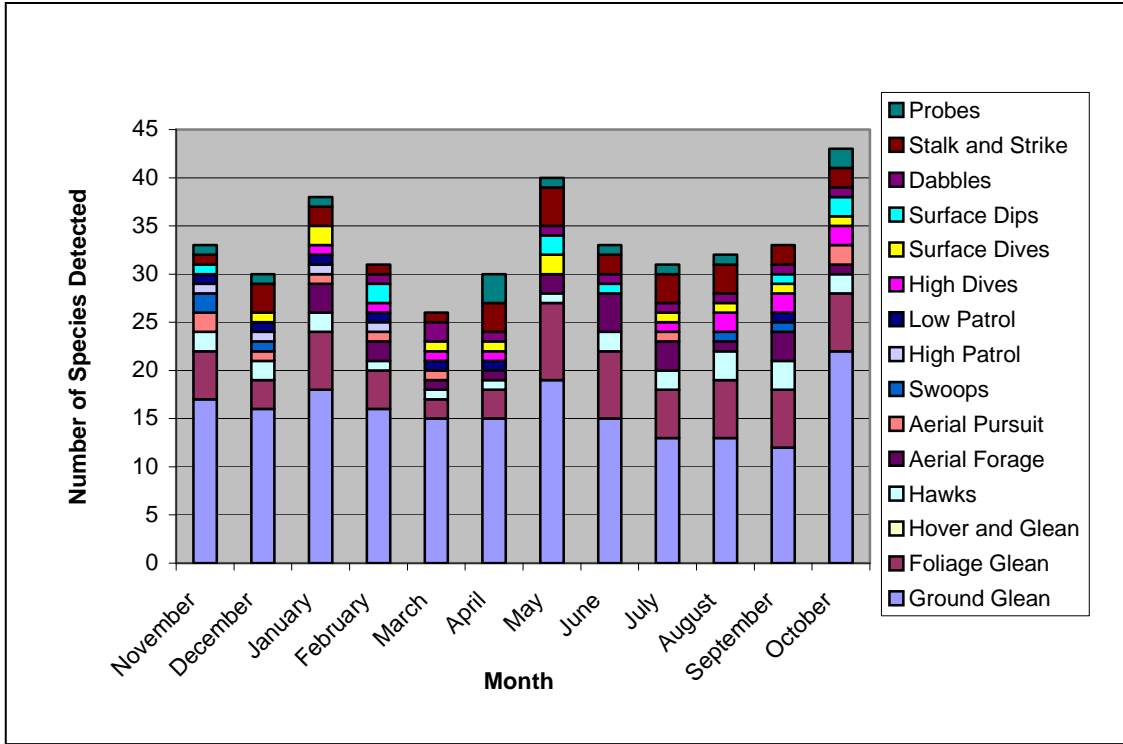


Figure 5: Monthly species detections by foraging guild at the Bostick Site in year one (November 2000 – October 2001).

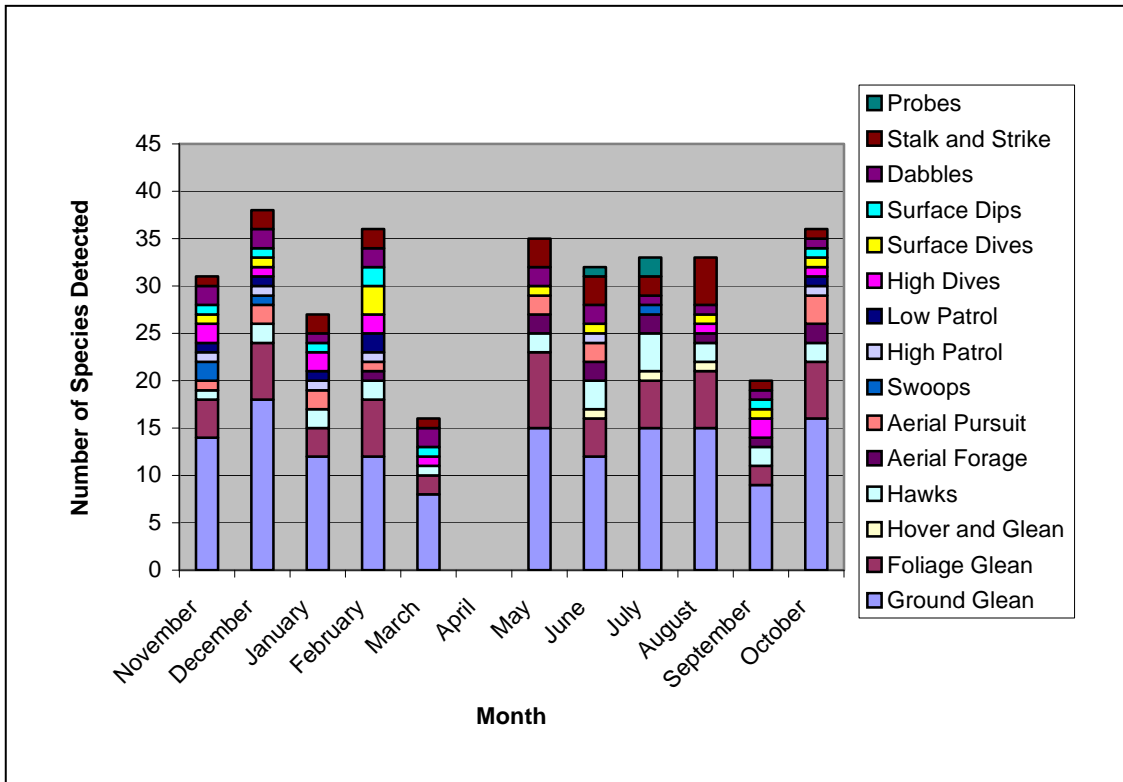


Figure 6: Monthly species detections by foraging guild at the Sunrise Site in year one (November 2000 – October 2001). No census visits were made to the site in April.

In preparation for weir construction, seven acres, most of which were covered in salt cedar, were cleared from the Bostick Site in early March 2001 (compare Figure 7 below to Figure 3). However, by the end of the first study year, construction of the Bostick Weir had been postponed until September 2002 due to an increase in the cost of construction materials. At that time, the census was reevaluated, and the decision was made to continue the census only at the Bostick Site and reduce the frequency to a monthly basis. One of the goals of the census was to compare bird use before, during, and after weir construction. With the postponed construction schedule of the Bostick Weir, it became possible to obtain two years of pre-construction data at the site, which was considered sufficient for the purposes of the study.

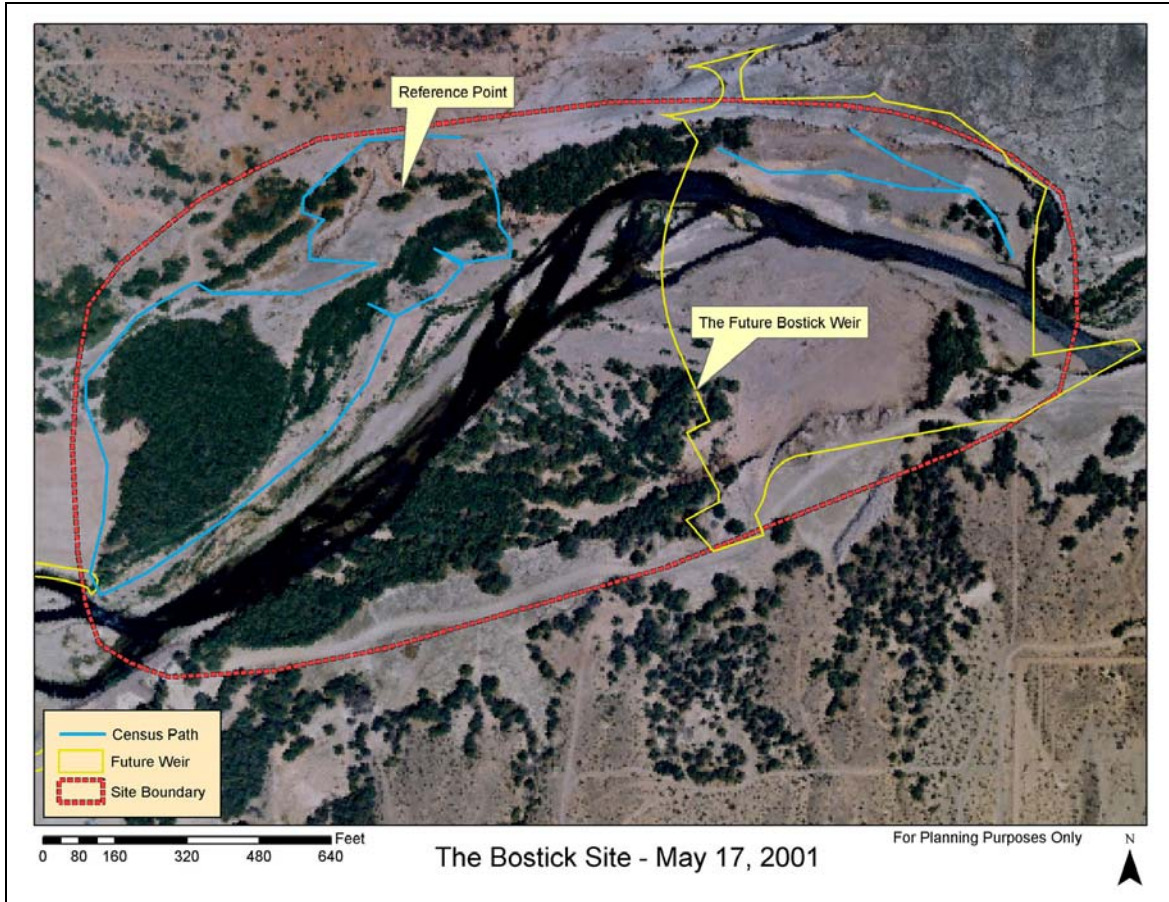


Figure 7: The Bostick Site in May 2001. The area that was cleared in March is visible in the eastern portion of the site on both the north and south banks.

3.2 Year Two

Year two (December 4, 2001 through October 1, 2002) was different from year one in that censuses were no longer conducted at the Sunrise Site and census frequency at the Bostick Site was reduced to a monthly basis. Additionally, site clearing was performed in the spring and construction on the Bostick Weir began at the end of the study year. This section describes: number of species identified in the second year; composition of those species by status; number and percentage of species detected in both years of censuses at the Bostick Site; foraging guild richness; variations in species richness; and salt cedar clearing and weir construction activities.

During 11 visits in the second year, 83 species were identified. Of these, nine had not previously been detected on the census, including the wood duck, ash-throated flycatcher, and black-headed grosbeak (Appendix F; Bostick Year 2). Of the 83 species, 38 (45.8%) were permanent residents, 10 (12.0%) were winter visitants, 17 (20.5%) were migrants, and 14 (16.9%) were summer visitants. One accidental and three introduced species were also detected. After two years of censuses, 108 species had been detected at the Bostick Site. Of those species, 69 (63.9%) were identified in both the first and the second year.

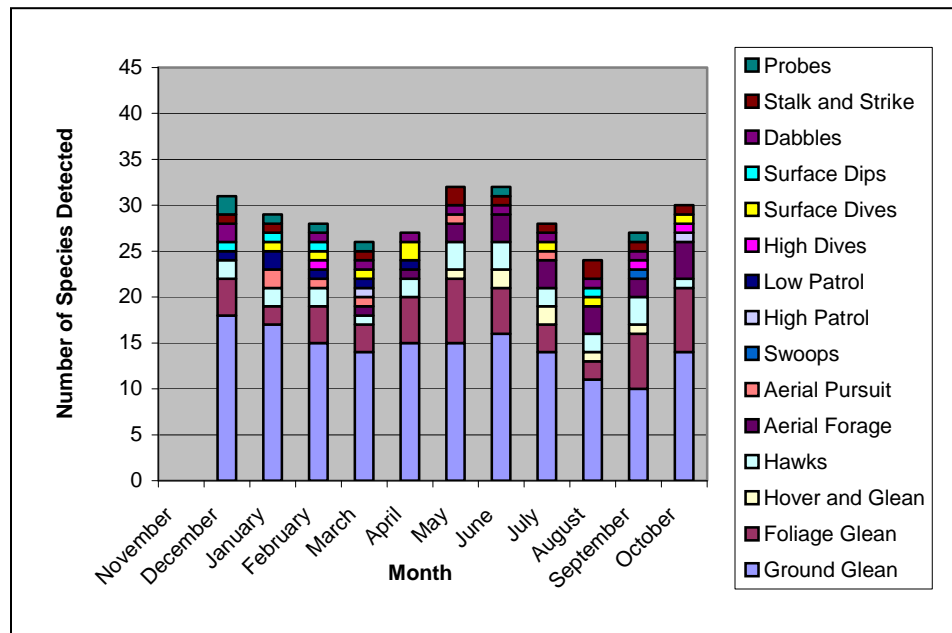


Figure 8: Monthly species detections by foraging guild at the Bostick Site in year two (December 2001 – October 2002). No census was performed in November.

All 15 foraging guilds were detected at the Bostick Site, including the hover and glean guild, which had previously been missing. Both the black-chinned and broad-tailed hummingbirds were detected. Figure 8 shows species richness by guild during each site visit over the course of the year. Once again, ground glean was the most commonly detected guild representing

about the same proportion of the total species as the previous year, between one third to over one half of all detections. In general, the foliage gleaners were again present in the next greatest numbers (still in the same range, from two to eight per month). Aerial foragers (swifts and swallows) equaled or surpassed the foliage gleaners for the second densest guild in both July and August. Similar to the previous year, the remainder of the guilds were generally represented by one or two species. Hawking species were the only other guild represented in all months.

The number of species identified per month was generally lower than in the first year at this site. It declined gradually from December through April, peaked in May and June, decreased to a low in August and increased again through October (somewhat similar to the previous year at this site). The October peak was not as high as the previous year. The variation between the maximum and minimum number of species was relatively small, just eight species. Charts showing monthly presence of each species over the course of year two can be found in Appendix I.

Salt cedar clearing in preparation for weir construction continued in the spring of 2002 (Figure 9). Another seven acres were cleared in March 2002 and then four additional acres were cleared

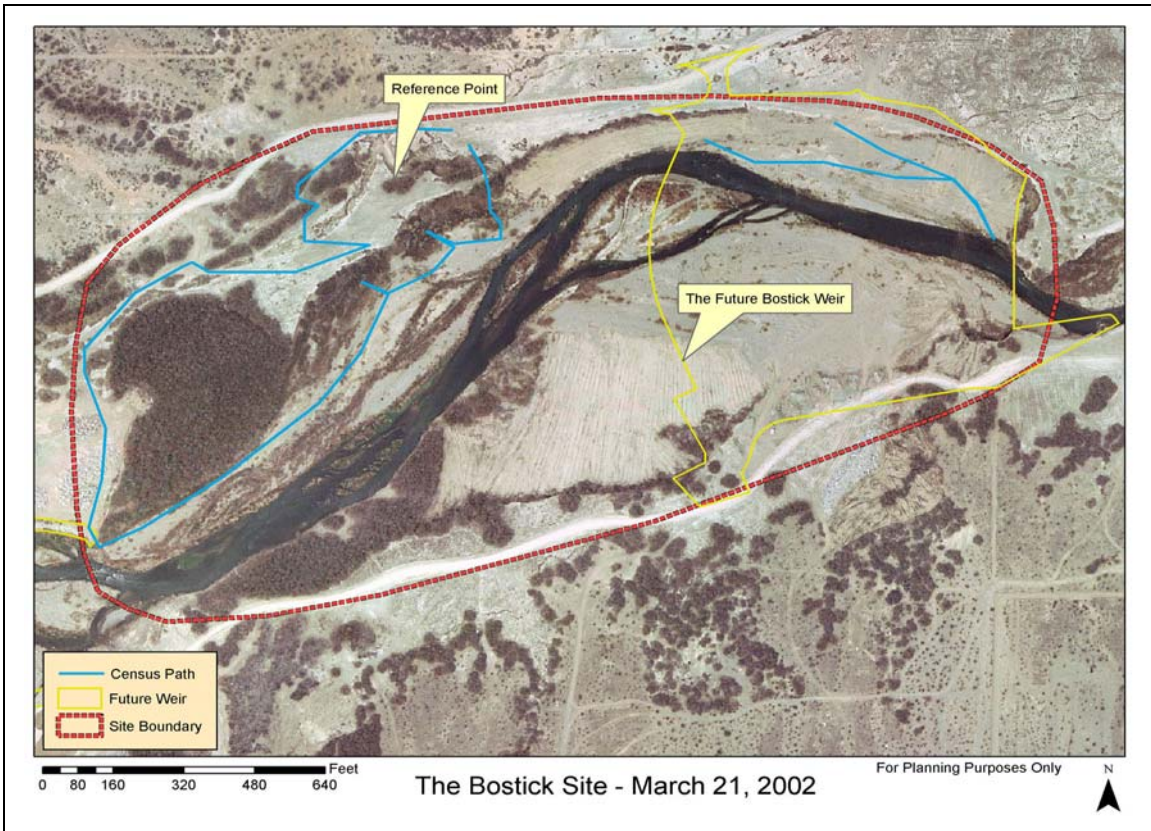


Figure 9. The Bostick Site after additional acres of salt cedar were cleared in March 2002.

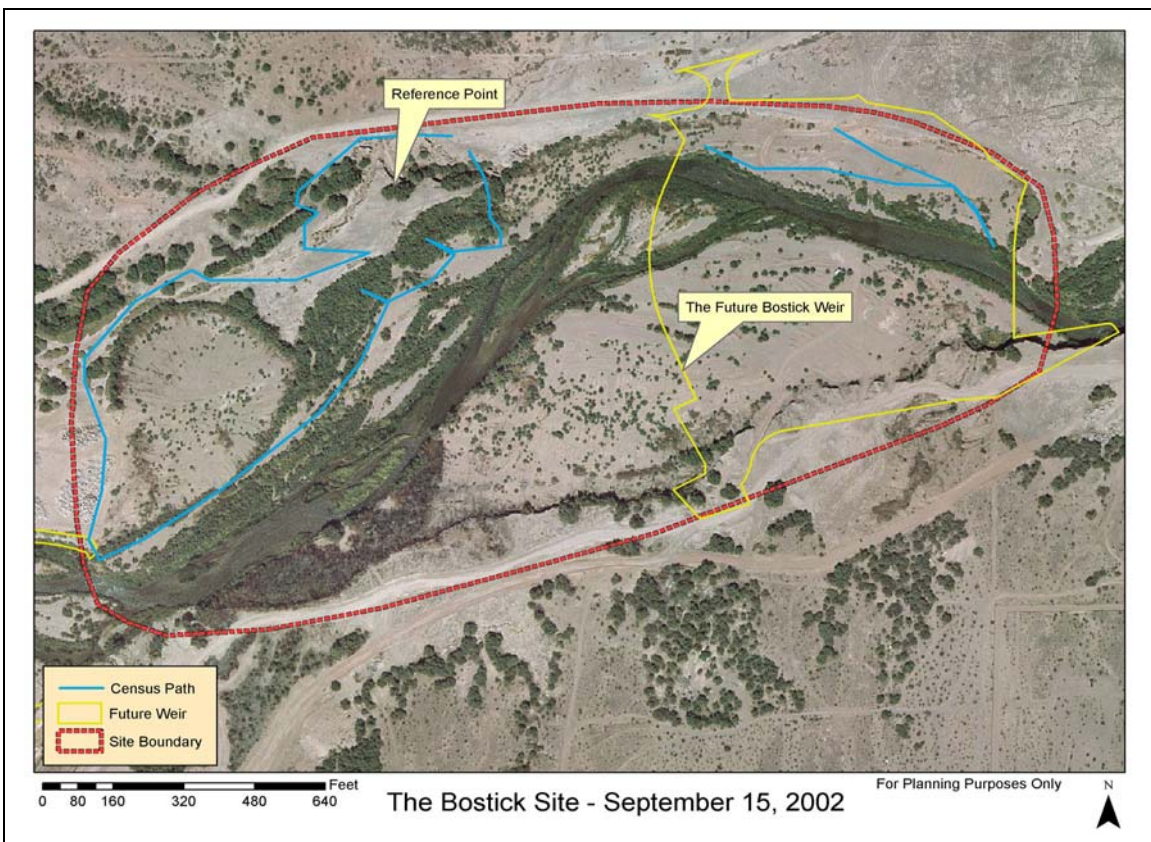


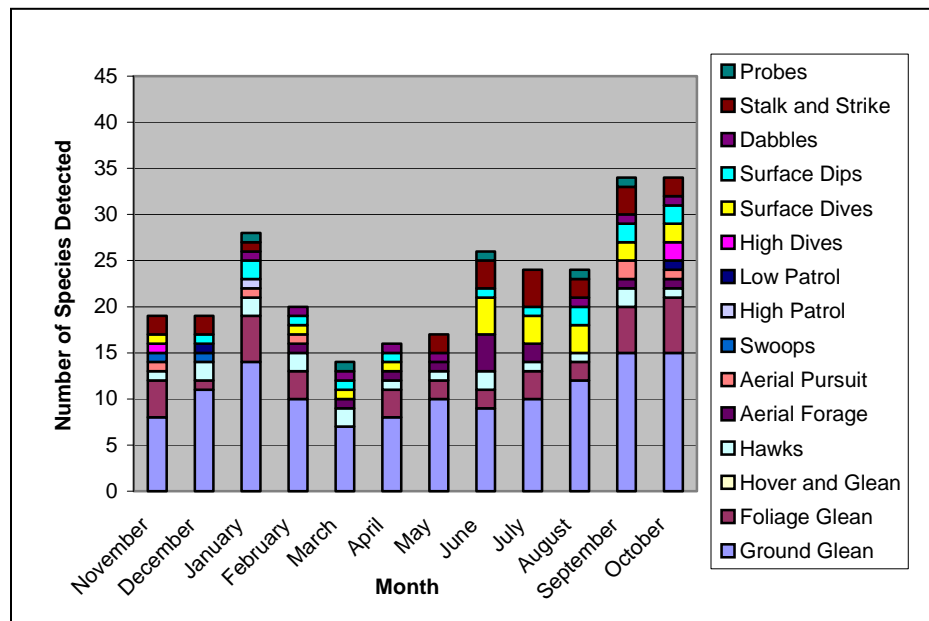
Figure 10: The appearance of the Bostick site as construction began on the Bostick Weir. The four-acre patch of salt cedar that was cleared in April 2002 is in the western portion of the site (compare Figures 9 and 10).

in April (Figure 10). Clearing and grading activities removed 90% of the vegetation that had been within, and adjacent to, the floodplain when the bird census commenced in 2000 (compare Figures 10 and 3). Forbs such as cocklebur appeared in the cleared areas between the time that the salt cedar was cleared and actual construction began, providing limited ground cover (compare Figures 9 and 10). Major construction began on the weir on September 13, 2002, after the September census visit was conducted. A diversion channel was constructed in October 2002 (after the October census visit), and the Wash was diverted further towards the north bank, away from the construction area. The weir was predominantly constructed from the south bank.

3.3 Year Three

In year three (November 5, 2002 through October 7, 2003), censuses continued at the Bostick Site and on the same monthly basis as in year two. However, year three differs from the previous year because the site was under construction for the Bostick Weir from November 2002 until August 2003. This section describes: number of species identified in the third year; composition of those species by status; number and percentage of species that were also detected in previous years at the Bostick Site; foraging guild richness; weir construction activities; and variations in species richness. Unlike years one and two, construction activities are presented before variations in species richness.

The Bostick Site was visited 12 times in year three. During those visits, 78 species were identified. Five of these species had not appeared on the census before: northern shoveler, Virginia rail, Clark’s grebe, western grebe, and bank swallow (Appendix F; Bostick Year 3). Of the 78 species, 41 (52.5%) were permanent residents, 13 (16.7%) were winter visitants, 13 (16.7%) were migrants, and 9 (11.5%) were summer visitants. Two introduced species were also detected. Of the 101 species identified in years two and three, 60 (59.4%) were shared (i.e., identified in both years). Comparing species from the third year with the first year, 65 of 112 (58.0%) species were shared. By the end of year three, 120 species had been identified at the Bostick Site, and 54 (45.0%) of those species were identified at the site in all three years.



As in the second year, all 15 foraging guilds were detected. Figure 11 shows species richness by guild during each site visit over the course of the year. Ground gleaners continued to be present in the greatest numbers relative to other guilds. In the month of March, no foliage gleaners were detected for the first time in the entire

Figure 11: Monthly species detections by foraging guild at the Bostick Site in year three (November 2002 – October 2003).

census. Also, foliage gleaners while still an important guild, were equaled if not surpassed by surface divers, as the second most common guild in the months of June, July, and August. Representation of aquatic foraging guilds, especially surface dive and stalk and strike, increased in general during the summer months, accounting for one third of all species detected for the first time in the census.

Throughout most of the year (November to August), the site was under construction, which dramatically changed its topography. From November through May, the site was predominantly bare ground covered with piles of large-diameter rock (Figure 12). Heavy equipment constantly rolled through the site, creating noise and ground disturbance. When the weir was 75% complete in mid-May, the Wash was diverted over the structure. At that time, a large impoundment formed behind the partially completed weir. Construction activities switched to the north bank to finish the remainder of the structure. The Bostick Weir was officially completed on August 6,

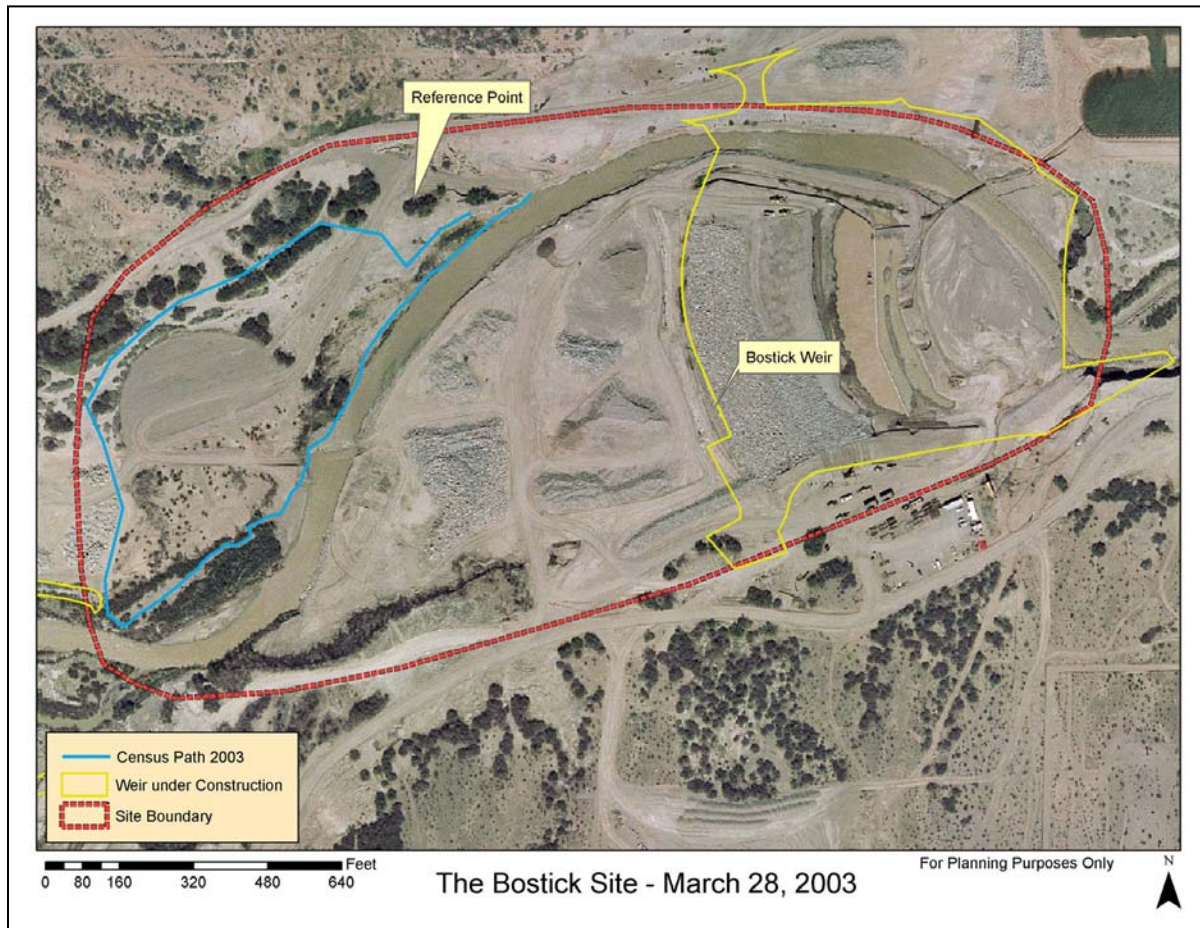


Figure 12. The Bostick Site while weir construction was ongoing in the spring of 2003.

2003 (Figure 13). The weir and the impoundment together covered 50% of the site. Most of the remaining area was bare ground. Two cottonwoods were inundated in the center of the impoundment, making ideal perches for herons and other birds. Only a few small patches of salt

cedar remained. A patch in the floodplain on the north bank was inundated, and reeds filled in the understory. Salt cedar overlooking the impoundment on the south bank burned, leaving behind snags that made excellent perches for raptors. Prairie and peregrine falcons were detected there. The two-acre patch of salt cedar interspersed with quailbush remained untouched, and was a consistent source of verdin and black-tailed gnatcatcher detections throughout the three years of the study.

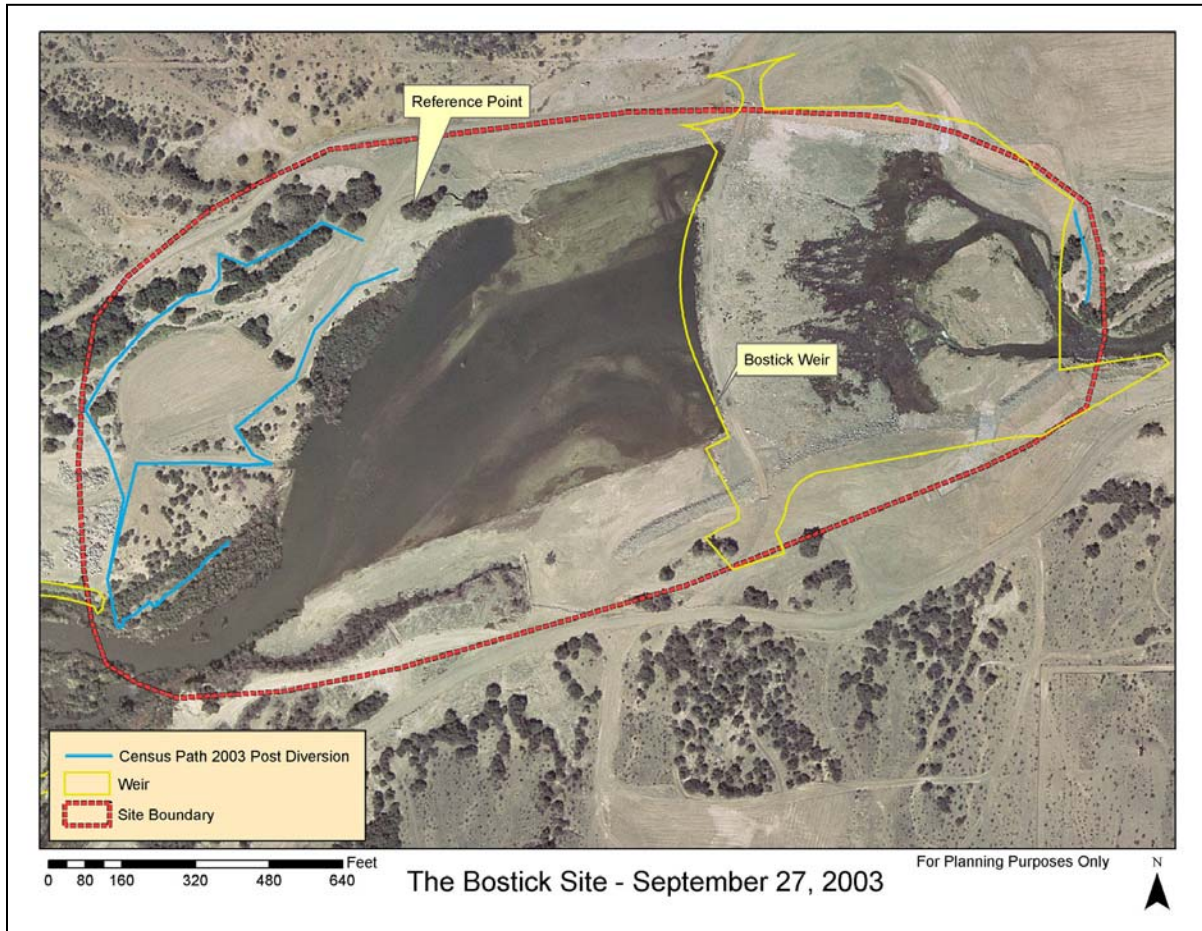


Figure 13. The Bostick Site after completion of the Bostick Weir.

From November through May, the number of species detected per month was significantly lower in year three than in the two prior years at the site (with the exception of January) (Figure 14). Only 14 species were detected in March, the lowest number of species detected during the study. Species richness increased sharply in June, and increased again in September. Charts showing monthly presence of each species can be found in Appendix J.

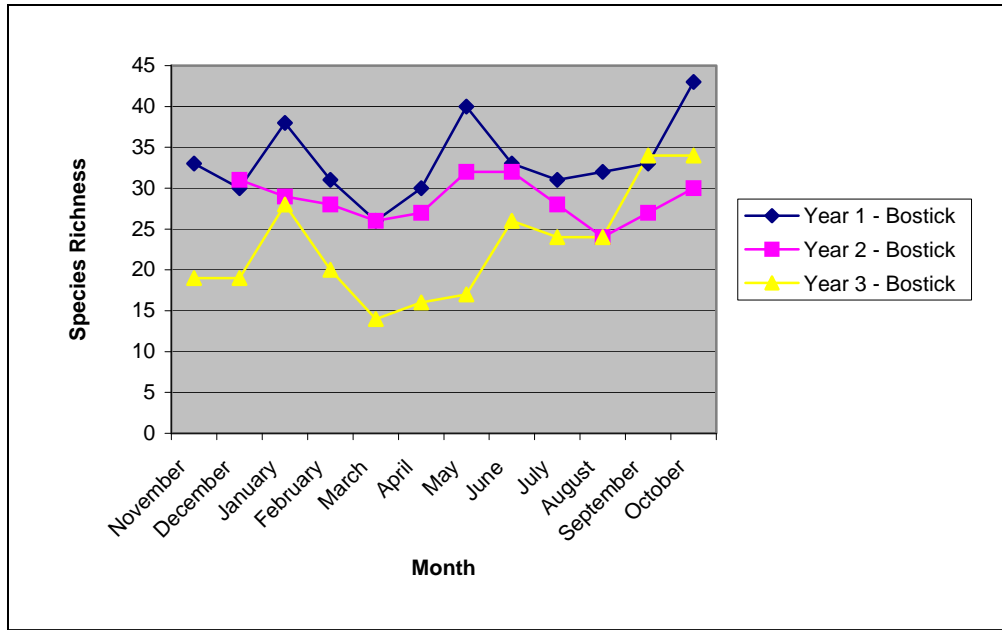


Figure 14: The number of species detected at the Bostick Site each month during the three-year study period. Construction of Bostick Weir occurred from September 2002 (after the September census visit) until August 2003.

3.4 Summary of the Three Years

In the three years of data collection, 128 species from 43 families were identified. Of the 128 species, 49 (38.3%) were permanent residents, 24 (18.8%) were winter visitants, 31 (24.2%) were migrants, 19 (14.8%) were summer visitants, two (1.6%) were accidental, and 3 (2.3%) were introduced. Fifty of the 128 species (39.1%) were identified at both sites during the first year and at the Bostick Site in the following two years (Table 3).

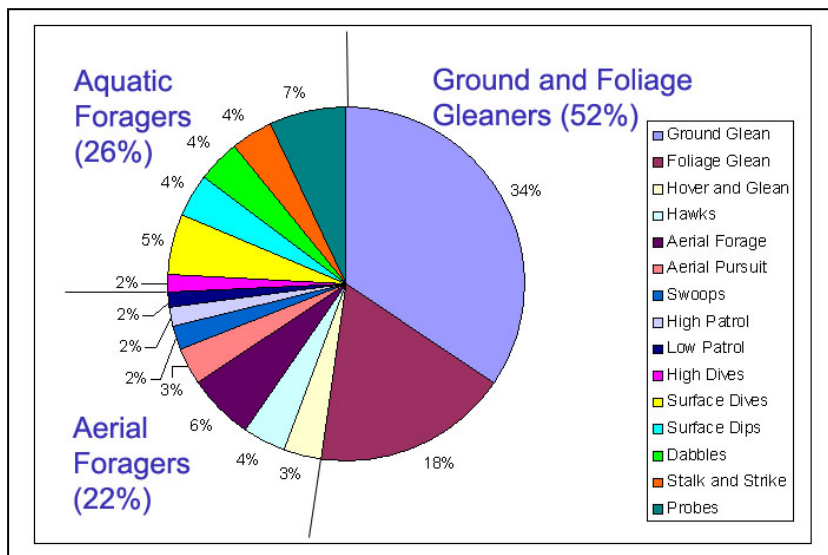


Figure 15: Foraging guild composition of the species identified during the three-year period. Chart includes data from the Sunrise Site for year one and from the Bostick Site for all three years.

Species from the ground glean guild accounted for approximately one third of all species identified (Figure 15). Together with the foliage glean guild, the two guilds represent more than 50% of the bird species detected during the three years. More than one quarter of the species come from aquatic foraging guilds, (e.g., probes and stalk and strikes). The remaining 22% are from flying foraging guilds, such as aerial forage, hawking, and low patrol.

4.0 DISCUSSION

As directed by the LVWCAMP, data collected during the three-year census of the avian community provides essential information for the development of the long-term fish and wildlife management plan. The first goal of the census was to obtain baseline data on bird species currently using the Wash, including seasonal migrants, and that goal was accomplished through the generation of a list of 128 species identified during three years of censuses (Appendix F). The second goal of the census was to provide information on bird use of the Bostick Site before, during, and after weir construction activities, which was accomplished through analysis of species richness, seasonal composition and foraging guild structure, which also provided further information on the avian community in general. Revegetation efforts at the Bostick Site began after the end of the three-year period summarized here, so this document is unable to fulfill the third goal of the census, to compare bird species present in revegetated habitat versus an unvegetated site.

4.1 Year One

Approximately 90% of the species detected during the study were identified in the first year. Comparing the Bostick and Sunrise Sites in year one, species and guild richness and the number of residents and summer and winter visitants were comparable. The one noticeable difference between the two sites is that the number of migrants detected at the Sunrise Site was significantly lower than the number detected at the Bostick Site. Many of the migrants that were unique to the Bostick Site are shorebirds (e.g., black-necked stilt, American avocet, Wilson's snipe) that are predominantly from the probe foraging guild. This may signal that the Bostick Site provided better habitat for probing foragers than did the Sunrise Site. By the end of February 2001, two large sandbars had developed in the Wash channel at the Bostick Site. With the diurnal fluctuation in daily flows, these sandbars

Bird Species	Scientific Name
Year-round Residents	
Mallard	<i>Anas platyrhynchos</i>
Gambel's Quail	<i>Callipepla gambelii</i>
Double-crested Cormorant	<i>Phalacrocorax auritus</i>
Great Blue Heron	<i>Ardea herodias</i>
Great Egret	<i>Ardea alba</i>
Snowy Egret	<i>Egretta thula</i>
Green Heron	<i>Butorides virescens</i>
Northern Harrier	<i>Circus cyaneus</i>
Sharp-shinned Hawk	<i>Accipiter striatus</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
Peregrine Falcon	<i>Falco peregrinus</i>
American Coot	<i>Fulica americana</i>
Killdeer	<i>Charadrius vociferans</i>
Ring-billed Gull	<i>Larus delawarensis</i>
Mourning Dove	<i>Zenaida macroura</i>
Greater Roadrunner	<i>Geococcyx californianus</i>
Black Phoebe	<i>Sayornis nigricans</i>
Say's Phoebe	<i>Sayornis saya</i>
Common Raven	<i>Corvus corax</i>
Verdin	<i>Auriparus flaviceps</i>
Bewick's Wren	<i>Thryomanes bewickii</i>
Marsh Wren	<i>Cistothorus palustris</i>
Northern Mockingbird	<i>Mimus polyglottos</i>
Crissal Thrasher	<i>Toxostoma crissale</i>
European Starling	<i>Sturnus vulgaris</i>
Abert's Towhee	<i>Pipilo aberti</i>
Song Sparrow	<i>Melospiza melodia</i>
Red-winged Blackbird	<i>Agelaius phoeniceus</i>
Great-tailed Grackle	<i>Quiscalus mexicanus</i>
Brown-headed Cowbird	<i>Molothrus ater</i>
Summer Visitants	
Spotted Sandpiper	<i>Actitis macularia</i>
White-throated Swift	<i>Aeronautes saxatalis</i>
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>
Yellow Warbler	<i>Dendroica petechia</i>
Common Yellowthroat	<i>Geothlypis trichas</i>
Yellow-breasted Chat	<i>Icteria virens</i>
Blue Grosbeak	<i>Passerina caerulea</i>
Winter Visitants	
Northern Flicker	<i>Colaptes auratus</i>
Ruby-crowned Kinglet	<i>Regulus calendula</i>
American Pipit	<i>Anthus rubescens</i>
Orange-crowned Warbler	<i>Vermivora celata</i>
Savannah Sparrow	<i>Passerculus sandwichensis</i>
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>
Migrants	
White-faced Ibis	<i>Plegadis chihi</i>
Osprey	<i>Pandion haliaetus</i>
Belted Kingfisher	<i>Ceryle alcyon</i>
Western Wood-Pewee	<i>Contopus sordidulus</i>
Barn Swallow	<i>Hirundo rustica</i>
Yellow-rumped Warbler	<i>Dendroica coronata</i>

Table 3: Species detected at both sites and in all years, organized by status.

provided ideal habitat for these species, which probe shallow waters and forage in the mud for macroinvertebrates and crustaceans. At the Sunrise Site, most of the census path was in the upland habitat among quailbush, patchy salt cedar and dead bassia. When the path did overlook the Wash, the channel was generally narrow with rapid flows, which is not favorable shorebird habitat. The differences in habitat between the two sites may also explain the relatively low percentage of species (64%) that were detected at both sites. Several other migrants that were seen exclusively at the Bostick Site were rare birds, such as the palm warbler, MacGillivray's warbler and northern saw-whet owl and were detected only once at the site during the three-year period.

4.2 Year Two

In year two, censuses were no longer conducted at the Sunrise Site and census frequency at the Bostick Site was reduced to a monthly basis. However, although the number of census visits to the Bostick Site decreased from 37 to 11, 83 species from 15 guilds were still detected, compared with 99 species from 14 guilds in the first year. Adjusting for the difference in number of site visits, more species were detected per month in the second year. This is interesting, considering the amount of habitat removal that occurred on the site during year two. Salt cedar clearing was conducted in March of the first year and March and April of the second year. Approximately 90% of the vegetative cover originally present at the site was removed by the end of April 2002 in preparation for weir construction. Yet, the data presents no observable trend on whether the number of species detected or any particular foraging guild was affected by the salt cedar clearing. It is possible that the birds were less affected by the loss of habitat because the majority of the vegetation that was removed was salt cedar. Salt cedar generally provides less habitat value than native riparian plants, as avian studies on the lower Colorado River have shown (Rosenberg et al. 1991).

The percent of species that were detected at the Bostick Site in both year one and year two was just under 64% (the percentage of species detected in both the second and third year was approximately 59%). Though this may appear low, it is similar to the findings of Rosenberg et al. (1991) on avian communities along the lower Colorado River. They examined turnover rates of bird species over a four-year period and they reported that as few as 60% of the species at a given site were the same from one year to the next. They concluded that the presence or absence of a species at a specific site from year to year appeared to be almost random, suggesting that a large stochastic component is at work within the avian communities.

4.3 Year Three

In year three, censuses continued at the Bostick Site and on the same monthly basis as in year two. However, year three differs from the previous year because the weir was under construction from November through August, impacting the site with noise and ground disturbance. Data from the Bostick Site in year three, when compared with years one and two documents how bird use of the site changed from pre-construction to during- and post-construction, fulfilling the second goal of the census. As a result of weir construction, the census site changed from a salt cedar-bordered channel, to a bare expanse of earth undergoing heavy construction, and, finally, to a large, shallow open body of water.

The impact of construction activities is apparent when examining the number of species detected and foraging guild species richness per month in year three (Figures 16 and 17). When the site was under heavy construction from November 2002 through May 2003, the number of species detected each month dropped 28% – 47% relative to years one and two (with the exception of January). Species richness of the ground glean guild, which was the most commonly detected of all guilds in the Wash, was consistently lower during construction (Figures 16 and 17). This decline often accounted for more than 50% of the total decrease in the number of species detected per month when compared to the previous years. Also during the construction period, a census visit was conducted during which no foliage gleaners were detected for the first and only time during the study. However, while there was an occasional decline in foliage gleaners during the remainder of construction, it was not consistent and was possibly due to normal variations in the avian community. The Wash was diverted over the Bostick Weir on May 20, 2003, creating the Bostick impoundment. At that time, number of species detected per census

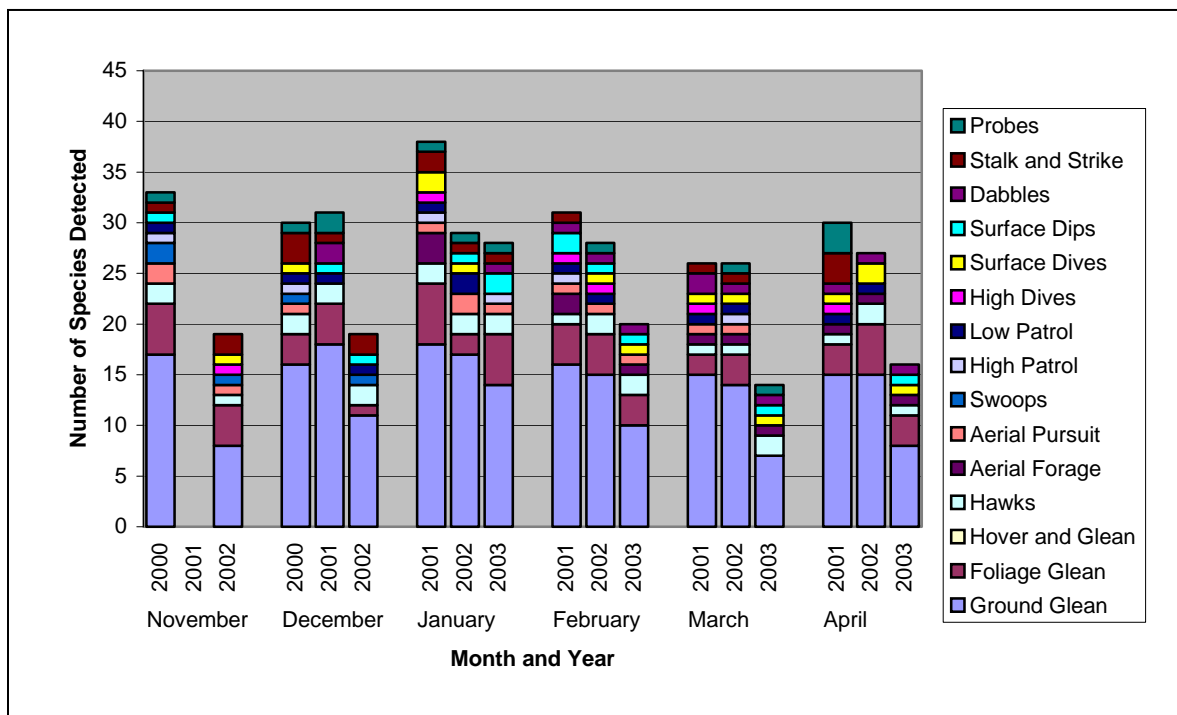


Figure 16: Monthly species detections by foraging guild during the three-year study at the Bostick Site (November through April).

rose (Figure 17). Shifts in foraging guild structure were also observed. Species richness of the aquatic foraging guilds (e.g., surface dives and stalk and strike) increased. Species of waterbird, such as the western and Clark’s grebes, appeared that had not been observed on the census previously. During the summer months (June – July), aquatic foragers accounted for at least one third of the birds found at the Bostick Site, a first for the census. The weir was completed in August, and from then on, ground glean guild species richness met or exceeded year two levels. Species detected per census also met or exceeded year two levels once the weir was complete.

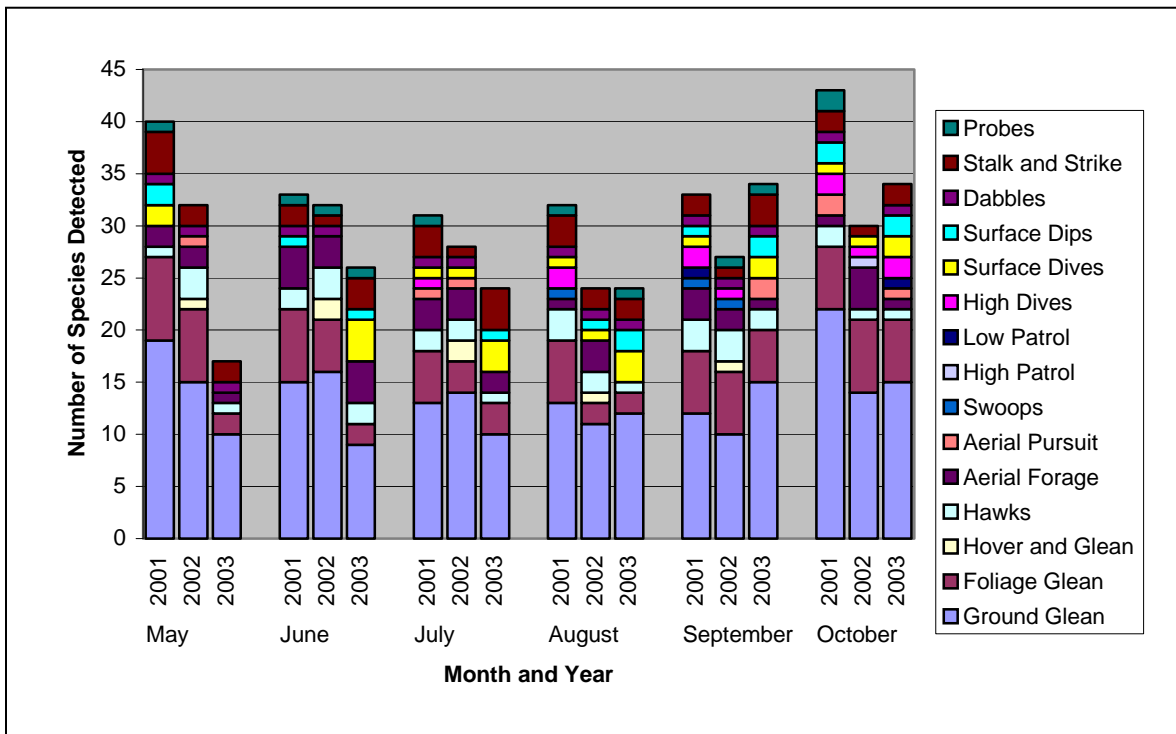


Figure 17: Monthly species detections by foraging guild during the three-year study at the Bostick Site (May through October). The Bostick impoundment was created when the Wash was diverted over the Bostick Weir on May 20, 2003.

In addition to foraging guilds, other avian community parameters were analyzed over the course of monitoring at the Bostick Site, including status composition (e.g., resident, summer visitant). Figures 18 and 19 show the number of species detected each month of the study, broken down by status. The number of species identified each month fluctuates, and a large portion of this fluctuation may be a result of seasonal changes in the bird community. Approximately 75% of all bird species in North America migrate to some extent (Elphick et al. 2001). Thus, avian communities tend to experience seasonal shifts. Examples of general seasonal shifts at the Bostick Site can be seen upon examining Figures 18 and 19. At the Bostick Site, winter visitants arrive in October and November and generally remain until March. In March, winter visitants begin departing for their breeding grounds and very few migrants or summer visitants are present. In May, summer visitants arrive and resident species increase for the nesting season. Migrant diversity generally reaches its peak in September and October, as species depart their breeding grounds and head south to warmer climates for the winter. Status composition of the bird community may have been affected by weir construction. In 2003, winter visitants left in February, and only one migrant was detected from March through May of 2003, months that encompass peak migration time for both shorebirds and passerines. Summer visitants were also reduced in number compared to previous years.

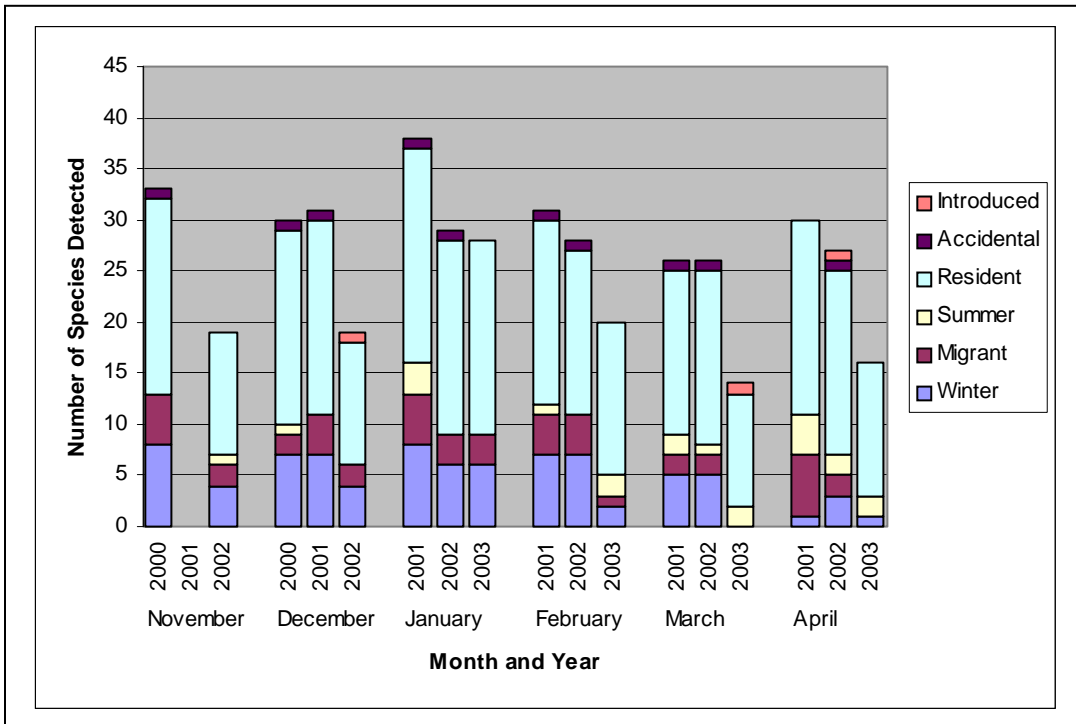


Figure 18: Status composition of monthly detections at the Bostick Site for the three-year census period (November through April).

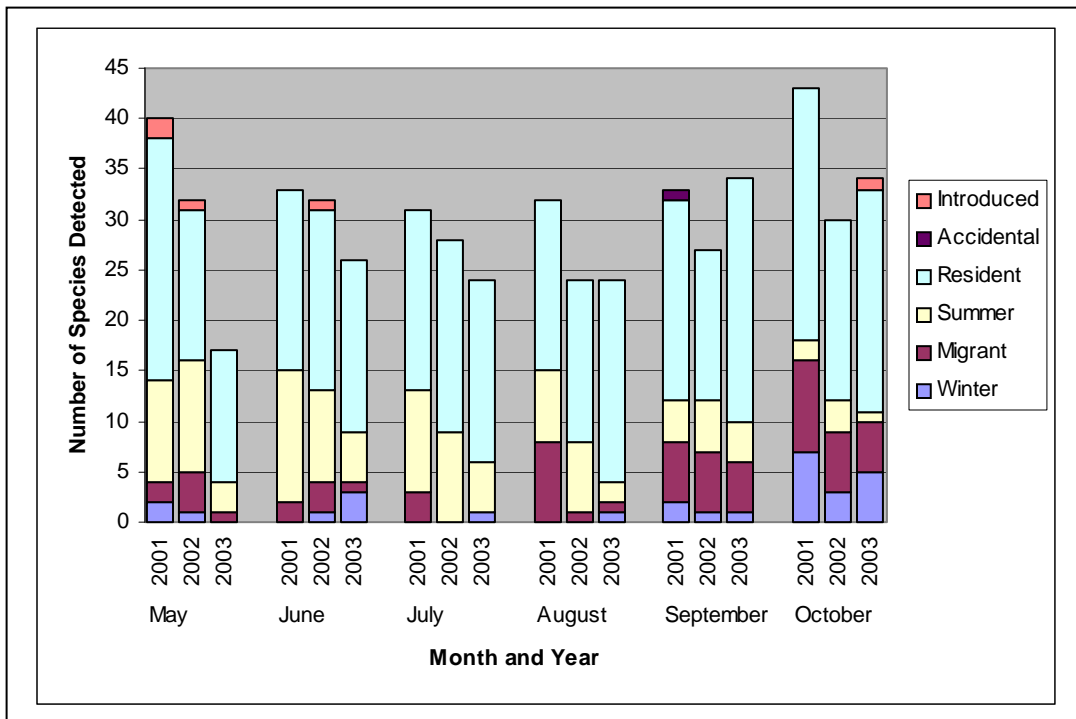


Figure 19: Status composition of monthly detections at the Bostick Site for the three-year census period (May through October).

Species richness was also examined to provide further information on the avian community of the Wash. Species richness decreased by 16.2% from year one to year two and decreased by 6.0% from year two to year three. Considering that three times the number of censuses were conducted in year one compared to years two and three and that the site changed so dramatically during the study, these decreases in species richness seem small. This may highlight one of the potential drawbacks to using species richness to examine changes in a site over time. When calculating species richness, each species, regardless of the number of individuals detected, is weighted equally. Consequently, if relative abundance is not measured, sizeable increases or decreases in the number of individuals of a given species can go undetected. Relative abundance was not measured during this study. Thus, as vegetative cover was removed and weir construction occurred, numbers of individuals of species may have changed over the course of the three-year period, but were not documented.

4.4 Summary of the Three Years

The purpose of the Wash bird census was to provide baseline data on bird species that are currently using the Wash, as no comprehensive avian studies had been conducted since the 1970s. As the Wash had changed significantly since that time, it was likely that the bird community had changed as well. To determine the extent of that change, the list of species detected in the Wash from November 2000 to October 2003 was compared to Miller (1974) (Appendix K). Miller's study is the most comparable to the Project Team census of the historical surveys because his species list includes only those birds that were observed during consecutive years of field data collection. Miller defined the Wash as an area 32 miles long that began at Tule Springs and continued to North Shore Road and spread his censusing stations throughout that area. He used the line transect method and censused four types of habitat: desert scrub, shrub-mesquite woodland, riparian, and shrub woodland marsh. In 18 months of censusing on a bi-weekly to monthly basis, Miller developed a list of 158 bird species (adjusted to conform with the current American Ornithologists Union (A.O.U.) check-list (1998) and supplements 42 – 44). Several families of birds, such as the herons, grebes, swallows, wood-warblers, and emberizids were the same or similar between the two studies in both species richness and composition. There has been a noticeable decrease in species of certain aquatic foraging families, such as the waterfowl and shorebirds (plovers and sandpipers). Species richness in these families declined by 38% or more. However, this is to be expected considering the significant decrease in wetland habitat at the Wash. The increase in open water habitat (as seen after the construction of the Bostick Weir) that will occur as erosion control structures are constructed along the Wash is likely to result in an increase in waterfowl richness and abundance. Likewise, if more impounded, shallow water habitats are created, shorebirds species could also increase. Census findings also augment other historical avifaunal inventories, including Lawson (1973) and Bradley and Niles (1973) (Appendix L) and resulted in the addition of 12 species to Titus (2004) (Table 4).

Comparing Project Team census data to Titus (2004) (Appendix D), it appears that the status of a few species may have changed. The statuses listed in Titus were determined using historical data from the Wash area and take into account long-term observations of the species. However, data collected for a few species during the Project Team census consistently conflict with the status in Titus. For instance, the green heron, although listed as a permanent resident was detected at all sites, in all applicable years, but was never detected outside of the summer season (April –

September). The same pattern was seen for the brown-headed cowbird, which is also listed as a year-round resident. If this trend continues into the future, the status for these species should be changed.

Although no endangered or threatened bird species were identified in the three-year study, several species of local conservation interest were detected, including species covered under the Clark County Multiple Species Habitat Conservation Plan (MSHCP) (Appendix M), Nevada Revised Statute (NRS) 501, and the Nevada Partners in Flight Bird Conservation Plan. Some examples include: the blue grosbeak (MSHCP), which was seen frequently during the summer months; the phainopepla (MSHCP, NRS), which is endemic to the southwest United States, and was identified in the first year at both sites; and the peregrine falcon (MSHCP, NRS), and white-faced ibis (MSHCP – watch list, NRS), which were detected at both sites and in all years of the census. Nevada Partners in Flight (NPIF) (1999) identified 11 species of conservation concern in lowland riparian habitats. Six of these species were detected on the Wash census: ash-throated flycatcher, bank swallow, Lucy’s warbler, and yellow-breasted chat, as well as the already mentioned phainopepla and blue grosbeak. The detection of these species reinforces the environmental value of the Wash to the avian community in the Mojave Desert. As the stabilization of the Wash and the enhancement of native riparian vegetation continue, the abundance and diversity of these and other riparian dependent birds is likely to increase, which is an important consideration to take into account as work begins on the long-term fish and wildlife management plan.

Common Name	Scientific Name
Red-shouldered Hawk	<i>Buteo lineatus</i>
Northern Saw-whet Owl	<i>Aegolius acadicus</i>
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>
Pinyon Jay	<i>Gymnorhinus cyanocephalus</i>
Golden-crowned Kinglet	<i>Regulus satrapa</i>
Hermit Thrush	<i>Catharus guttatus</i>
Lucy's Warbler	<i>Vermivora luciae</i>
Spotted Towhee	<i>Pipilo maculatus</i>
Lark Sparrow	<i>Chondestes grammacus</i>
Dark-eyed Junco	<i>Junco hyemalis</i>
Indigo Bunting	<i>Passerina cyanea</i>
Lesser Goldfinch	<i>Carduelis tristis</i>

Table 4: Birds added to Titus (2004) as a result of the Project Team census.

Another species detection that may have long-term management implications is the brown-headed cowbird, a brood parasite that was detected during every breeding season visit in the three-year period. Instead of building its own nest, a brown-headed cowbird female lays her eggs in the nests of other species. Cowbirds tend to hatch before the host species, giving them a competitive advantage if the host species is smaller. The host young often starve because their parent is spending most of its time feeding the larger, louder cowbird hatchling. Cowbirds have been blamed for the decline of many songbird species (Elphick et al. 2001), including the endangered southwestern willow flycatcher, for which the Wash is potential habitat.

5.0 RECOMMENDATIONS

5.1 Long-Term Fish and Wildlife Management Plan

The data collected over the three-year period accomplished two of the three original goals of the census. There were 128 bird species identified, and bird use of the Wash before, during, and after weir construction was recorded. Using this information, the Project Team is moving forward with the development of the long-term fish and wildlife management plan required by

the LVWCAMP. One of the recommendations that will be put forth in the management plan as a result of the Wash census is that large-scale site clearing (i.e., removal of salt cedar and grading) should be done in early March, if possible, after winter visitants have left and before migrants and summer visitants appear. Species richness was consistently low (relative to the rest of the year) during March. Thus clearing at that time should have the least impact on the bird community, being conducted before migration and the establishment of breeding territories begins. Also, several MSHCP species, Nevada State species of concern, and NPIF species of conservation concern were identified over the course of the census. While some of the species, such as the phainopepla, were only detected a few times, others such as the blue grosbeak and peregrine falcon were identified frequently. The Wash clearly provides suitable habitat for these species and this should be taken into account as Project Team staff move forward with the creation of the long-term plan. Methods for managing brown-headed cowbirds should also be considered in the long-term management plan. The frequency with which the brown-headed cowbird was detected during the breeding season may require management action in the future, especially if the yellow-billed cuckoo or southwestern willow flycatcher ever develop breeding colonies in the Wash. In addition to these two species, brown-headed cowbirds are known to parasitize several of the sensitive species that have been detected during this study. Thus, cowbird management measures, such as entrapment and removal, should be examined and discussed in the plan.

5.2 The Bostick Site Census

It is recommended that the census continue at the Bostick Site so that bird use of the site, now that it has been revegetated with native plants, can be compared with bird use of the site before construction began. Census frequency can be reduced to a bi-monthly to quarterly basis while still capturing the fall and spring migrations, as well as documenting winter and summer visitants.

5.3 Current Method Refinement

As the Bostick Site census continues into the future, it is recommended that the method used to conduct avian monitoring be further standardized. Project Team staff consulted with the Great Basin Bird Observatory (GBBO), a non-profit group that has been coordinating a statewide volunteer avian monitoring program in Nevada since 2001. Based on the research described in this document, as well as the consultation with the GBBO, it is recommended that the area search method be revised so that volunteers spend as much time at the site as is necessary to detect, identify, and count all bird species and individuals within the boundary of the Bostick Site (as delineated on aerial imagery). Additionally, every effort should be made to count individual birds only once. As previously discussed, changes in relative abundance provide important information about how birds are responding to changes in habitat (Kus and Beck 2001).

However, the assumption behind relative abundance calculations is that every bird recorded on a site visit represents a distinct individual (meaning the same bird cannot be counted twice). The goal of environmental monitoring on the Wash is to collect data that will be used to develop a long-term management plan for fish and wildlife. Information on changes in relative abundance of species of birds will be necessary to the development of the avian portion of the plan. Also, counting birds that are flying over the study site should be reduced to those birds that are actively using the habitat, such as swallows catching insects or a peregrine falcon hunting ducks in the

Bostick impoundment. This will allow us to better determine habitat-related changes in the bird community as the restoration project progresses.

5.4 Future Bird Census

A significant amount of data was collected in the first three years of the Wash bird census. From these data, a list of 128 bird species was developed. This provides a baseline of species currently found in the Wash. Now more detailed information on the avian community is needed and thus it is recommended that an additional layer of avian monitoring be added to the Wash census. Research conducted by Project Team staff suggests that the point count method would better enable us to answer the question of how the avian community responds to native plant revegetation efforts (one of the three goals of the census) across several sites at varying stages of development. The point count method, where an observer stands at a fixed point and counts all birds seen and heard within a predetermined radius during a restricted time period (generally 3-10 minutes), is more easily replicated and more consistently implemented than the current method, which is a modified type of area search (Ammon, pers. comm.). The point count method has been proposed as a standardized avian monitoring technique and is considered by many to be the most efficient, data-rich method of counting birds (Ralph et al. 1993). In their report to the Army Corps of Engineers, Fischer and Fischenich (2000) recommend establishing permanent point count stations along the Wash riparian corridor to gather data on how avian distribution and abundance are changing in response to the changes in land use, hydrology, and vegetation caused by the Wash stabilization project. This method would give the Project Team the ability to study annual changes in bird populations, differences in species composition between habitats, and species abundance patterns (Ralph et al. 1993) at fixed points along the Wash. Additionally, point counts will enable the Project Team to share data with the various local, regional, and national bird monitoring programs that use this method, which include the Great Basin Bird Observatory's Nevada Bird Count and the North American Breeding Bird Survey.

Another benefit of the point count method is that it allows a large area to be covered with minimal effort. Thus coverage of the census can be extended to include sites along the entire Wash. The LVWCC plans to construct several weirs over the next few years. Censusing birds at several sites along the length of the channel would offer the Project Team the opportunity to document how the avian community of the Wash responds to changes in hydrology and plant community over the entire system. The increase in number of sites will also increase the sample size of the study for statistical purposes.

Consistent with Ralph (1993), it is recommended that the study be conducted as revised for at least 3 to 5 years. Performing the study over multiple years will increase the amount of data collected, thus increasing the sample size. This will enable us to accomplish the goals of the study with greater statistical confidence. More extensive coverage of the project area will also help us rapidly detect any threatened, endangered, or sensitive species that move into the Wash, giving us the opportunity to respond quickly. In a summary report on the 2003 southwestern willow flycatcher survey conducted on the Wash, SWCA (2003) stated that the species may breed in the Wash within the next several years, as the stabilization and enhancement project continues and riparian habitat improves.

The point count census is recommended to provide a needed *additional* layer to avian monitoring on the Wash, but it is also recommended that the census with the RRAS be continued at the Bostick Site. The census conducted with RRAS is an intensive survey where birders walk the site for hours, recording all the birds they see or hear. Point counts, while excellent for obtaining extensive information over a large study only collect a few-minute snapshot of the bird community. Consequently, if a particular species is a quiet or shy species, it may go undetected, whereas during the modified area search, there is greater opportunity to seek out such birds. As well as the benefit of involving members of the local conservation community in the Wash project, long-term monitoring of Bostick Site using the same method (with the recommended adjustments) and the same observers will create a strong dataset for how species composition changes at a site before, during, and after weir construction and revegetation.

6.0 LITERATURE CITED

- Alcorn, J.R. 1988. The birds of Nevada. Fallon, NV: Fairview West Publishing. 418 p.
- Ammon, E. Great Basin Bird Observatory. August 18, 2003. Personal Communication.
- American Ornithologists Union (A.O.U). 1998. A.O.U check-list of North American birds. Seventh edition, includes supplements 42 – 44 as published in *The Auk*, 117: 847-858 (2000); 119:897-906 (2002); 120:923-932 (2003).
- Bradley, W.G. and Niles, W.E. 1973. Study of the impact on the ecology of Las Vegas Wash under alternative actions in water quality management. Final report to the Las Vegas Valley Water District, Las Vegas, NV, prepared by W. Glen Bradley and Wesley E. Niles, University of Nevada, Las Vegas.
- Bub, B.R., Flaspohler, D.J., and Huckins, C.J.F. 2004. Riparian and upland breeding-bird assemblages along headwater streams in Michigan's upper peninsula. *Journal of Wildlife Management*, 68(2): 383-392.
- Ehrlich, R. P., Dobkin, S. D., and Wheye, D. 1988. *The birder's handbook, a field guide to the natural history of North American Birds*. New York, NY: Simon & Schuster Inc. 785 p.
- Elphick, C., Dunning, Jr., B. J., and Sibley, A. D, editors. 2001. *The Sibley guide to bird life and behavior*. New York, NY: Alfred A. Knopf. 587 p.
- Fischer, R. A. and Fischenich, J. C. 2000. Ecological considerations during restoration of the Las Vegas Wash. Final report to the U.S. Army Engineer District, Los Angeles, CA, prepared by Richard A. Fischer and J. Craig Fischenich, U.S. Army Engineer Research and Development Center Environmental Laboratory, Vicksburg, MS.
- Gaines, D. 1974. Review of the status of the yellow-billed cuckoo in California: Sacramento Valley populations. *The Condor*, 76: 204-209.
- Jaramillo, A. and Hudson, S. 2001. Riparian restoration: long-term trends and habitat association of birds. In: Faber, P.M., editor. *California riparian systems: processes and floodplain management, ecology, and restoration*. 2001 Riparian habitat and floodplains conference proceedings. Sacramento, CA: Riparian Joint Habitat Venture. p 426-436.
- Knopf, F.L. and Samson, F.B. 1994. Scale perspectives on avian diversity in western riparian ecosystems. *Conservation Biology*, 8(3): 669-676.
- Kus, B.E. and Beck, P.P. 2001. An approach for monitoring bird communities to assess development of restored riparian habitat. In: Faber, P.M., editor. *California riparian systems: processes and floodplain management, ecology, and restoration*. 2001 Riparian habitat and floodplains conference proceedings. Sacramento, CA: Riparian Joint Habitat Venture. p 396-406.

- Lawson, C. S. estimated 1973. A survey of the avifauna of Las Vegas Wash and Las Vegas Bay, Lake Mead, Clark County, Nevada. Final report to Jones and Stokes Associates, Sacramento, CA, prepared by C.S. Lawson, Lahontan Audubon Society, Reno, NV.
- Miller, J. S. The avian community structure of Las Vegas Wash, Clark County, Nevada [thesis]. Las Vegas, NV: University of Nevada, Las Vegas; 1974. Available from: Lied Library, Las Vegas, NV.
- Neel, L.A., editor. 1999. Nevada Partners in Flight Bird Conservation Plan. Available from: <http://www.blm.gov/wildlife/plan/pl-nv-10.pdf>. Accessed 2004 December 8.
- Powell, B.F. and Steidl, R.J. 2000. Nesting habitat and reproductive success of southwest riparian birds. *The Condor*, 102(4): 823-831.
- Ralph, C. J., Geupel, G. R., Pyle, P.; Martin, T. E. and DeSante, D. F. 1993. Handbook of field methods for monitoring landbirds. Gen. Tech. Rep. PSW-GTR-144-www. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 41 p.
- Rosenberg, K.V., Ohmart, R.D., Hunter, W.C., and Anderson, B.W. 1991. Birds of the lower Colorado River valley. Tucson, AZ: The University of Arizona Press. 416 p.
- Skaggs, M.K., Marshall, R.M., Sferra, S.J., and Tibbitts, T.J. 1997. A southwestern willow flycatcher natural history summary and survey protocol. Gen. Tech. Rep. NPS/NAUCPRS/NRTR – 97/12. National Park Service, Colorado Plateau Research Station, U.S. Department of Interior; 35 p.
- Southwest Wetlands Consortium. 1998. A survey for southwestern willow flycatchers along Las Vegas Wash, Clark County Wetlands Park, Nevada. Final report to the Clark County Department of Parks and Recreation, Las Vegas, NV, prepared by SWCA, Inc., Environmental Consultants, Salt Lake City, UT.
- SWCA Environmental Consultants. 2003. Survey for Yuma clapper rails, yellow-billed cuckoos, and southwestern willow flycatchers along Las Vegas Wash, Clark County, Nevada. Final report to the Southern Nevada Water Authority, Las Vegas, NV, prepared by SWCA Environmental Consultants, Salt Lake City, UT.
- Titus, C. K. 2004. Red Rock Audubon Society bird list of the Las Vegas Wash. Red Rock Audubon Society, Las Vegas, NV.

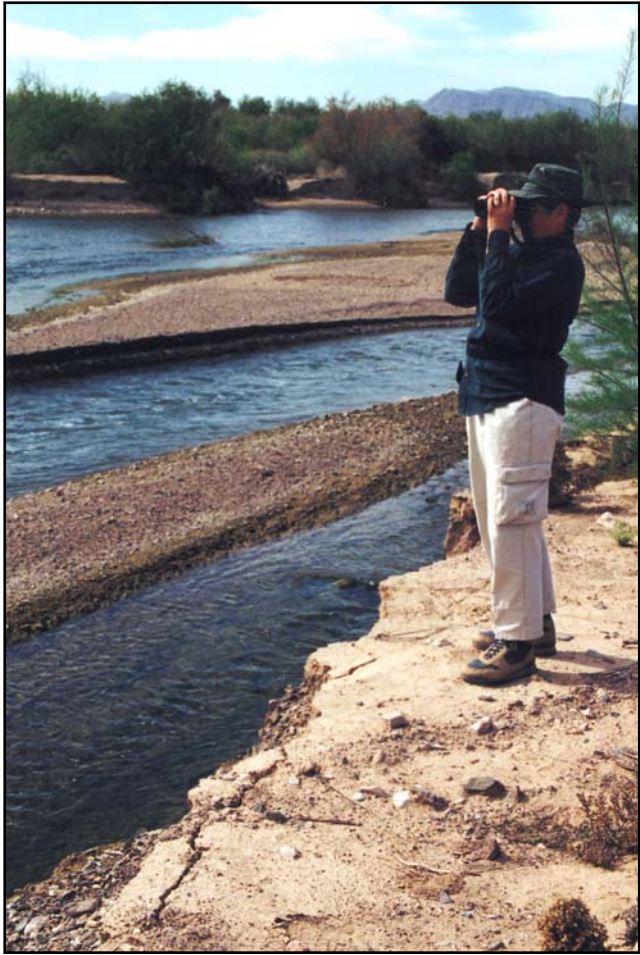
Appendix A
Bird Census Datasheet

Appendix B

Bostick Site Pictures with Red Rock Audubon Society Volunteers
(April 3, 2001)

**Bostick Site Pictures with
Red Rock Audubon Society Volunteers**
(April 3, 2001)





Appendix C

Sunrise Site Pictures with Red Rock Audubon Society Volunteers
(February 13, 2001)

**Sunrise Site Pictures with
Red Rock Audubon Society Volunteers
(February 13, 2001)**



Appendix D

Red Rock Audubon Society Bird List of the Las Vegas Wash
(Compiled by Carolyn Kitchel Titus)

Red Rock Audubon Society Bird List of the Las Vegas Wash

Compiled by: Carolyn Kitchel Titus

Revised March 2004



Status	
R	Resident
S	Summer Visitant
W	Winter Visitant
M	Migrant
A	Accidental
I	Introduced
*	Nesting Species

Abundance	
a	Abundant - Always found in suitable habitat
c	Common - Usually found in suitable habitat
u	Uncommon - Occasionally found in suitable habitat
r	Rare - Infrequently found in suitable habitat

List order follows the

AOU Checklist of North American Birds, 7th Edition, 1998 and all supplements to date

Common Name/Family Name	Genus	Species	Status	Abundance
WATERFOWL/Anatidae				
Black-bellied whistling-duck	<i>Dendrocygna</i>	<i>autumnalis</i>	A	n/a
Greater white-fronted goose	<i>Anser</i>	<i>albifrons</i>	W	r
Snow goose	<i>Chen</i>	<i>caerulescens</i>	W	r
Ross's goose	<i>Chen</i>	<i>rossii</i>	W	r
Canada goose	<i>Branta</i>	<i>canadensis</i>	W	r
Tundra swan	<i>Cygnus</i>	<i>columbianus</i>	W	r
Wood duck	<i>Aix</i>	<i>sponsa</i>	W	r
Gadwall	<i>Anas</i>	<i>strepera</i>	W	c
American wigeon	<i>Anas</i>	<i>americana</i>	W	c
Mallard*	<i>Anas</i>	<i>platyrhynchos</i>	R	c
Blue-winged teal*	<i>Anas</i>	<i>discors</i>	R	r
Cinnamon teal*	<i>Anas</i>	<i>cyanoptera</i>	R	c
Northern shoveler	<i>Anas</i>	<i>clypeata</i>	W	u
Northern pintail	<i>Anas</i>	<i>acuta</i>	W	u
Green-winged teal	<i>Anas</i>	<i>carolinensis</i>	W	c
Canvasback	<i>Aythya</i>	<i>valisineria</i>	W	c
Redhead*	<i>Aythya</i>	<i>americana</i>	W	c
Ring-necked duck	<i>Aythya</i>	<i>collaris</i>	W	c
Greater scaup	<i>Aythya</i>	<i>marila</i>	M	r
Lesser scaup	<i>Aythya</i>	<i>affinis</i>	W	c
Surf scoter	<i>Melanitta</i>	<i>perspicillata</i>	M	r
White-winged scoter	<i>Melanitta</i>	<i>fusca</i>	M	r
Black scoter	<i>Melanitta</i>	<i>nigra</i>	A	n/a
Long-tailed duck (Old squaw)	<i>Clangula</i>	<i>hyemalis</i>	W	r
Bufflehead	<i>Bucephala</i>	<i>albeola</i>	W	c

Common Name/Family Name	Genus	Species	Status	Abundance
Common goldeneye	<i>Bucephala</i>	<i>clangula</i>	W	c
Hooded merganser	<i>Lophodytes</i>	<i>cucullatus</i>	W	r
Common merganser	<i>Mergus</i>	<i>merganser</i>	W	c
Red-breasted merganser	<i>Mergus</i>	<i>serrator</i>	W	c
Ruddy duck*	<i>Oxyura</i>	<i>jamaicensis</i>	R	c
NEW WORLD QUAIL/Odontophoridae				
Gambel's quail*	<i>Callipepla</i>	<i>gambelii</i>	R	c
LOONS/Gaviidae				
Common loon	<i>Gavia</i>	<i>immer</i>	W	r
GREBES/Podicipedidae				
Pied-billed grebe*	<i>Podilymbus</i>	<i>podiceps</i>	R	c
Horned grebe	<i>Podiceps</i>	<i>auritus</i>	W	r
Eared grebe*	<i>Podiceps</i>	<i>nigricollis</i>	W	c
Western grebe	<i>Aechmophorus</i>	<i>occidentalis</i>	W	r
Clark's grebe	<i>Aechmophorus</i>	<i>clarkii</i>	W	r
PELICANS/Pelicanidae				
American white pelican	<i>Pelecanus</i>	<i>erythrorhynchos</i>	M	r
Brown pelican	<i>Pelecanus</i>	<i>occidentalis</i>	A	n/a
CORMORANTS/Phalacrocoracidae				
Double-crested cormorant	<i>Phalacrocorax</i>	<i>auritus</i>	R	u
BITTERN & HERONS/Ardeidae				
American bittern	<i>Botaurus</i>	<i>lentiginosus</i>	M	r
Least bittern	<i>Ixobrychus</i>	<i>exilis</i>	M	r
Great blue heron	<i>Ardea</i>	<i>herodias</i>	R	c
Great egret	<i>Ardea</i>	<i>alba</i>	R	u
Snowy egret	<i>Egretta</i>	<i>thula</i>	R	u
Little blue heron	<i>Egretta</i>	<i>caerulea</i>	A	n/a
Cattle egret	<i>Bubulcus</i>	<i>ibis</i>	W	u
Green heron*	<i>Butorides</i>	<i>virescens</i>	R	u
Black-crowned night-heron	<i>Nycticorax</i>	<i>nycticorax</i>	R	u
IBISES/Threskiornithidae				
White-faced ibis	<i>Plegadis</i>	<i>chihi</i>	M	c
NEW WORLD VULTURES/Cathartidae				
Turkey vulture	<i>Cathartes</i>	<i>aura</i>	S	c
HAWKS/Accipitridae				
Osprey	<i>Pandion</i>	<i>haliaetus</i>	M	r
Mississippi Kite	<i>Ictinia</i>	<i>mississippiensis</i>	A	n/a
Bald eagle	<i>Haliaeetus</i>	<i>leucocephalus</i>	W	r
Northern harrier	<i>Circus</i>	<i>cyaneus</i>	R	c
Sharp-shinned hawk	<i>Accipiter</i>	<i>striatus</i>	R	u
Cooper's hawk	<i>Accipiter</i>	<i>cooperii</i>	R	r
Red-shouldered hawk	<i>Buteo</i>	<i>lineatus</i>	W	r
Swainson's hawk	<i>Buteo</i>	<i>swainsoni</i>	M	r
Red-tailed hawk	<i>Buteo</i>	<i>jamaicensis</i>	R	c
Golden eagle	<i>Aquila</i>	<i>chrysaetos</i>	R	r

Common Name/Family Name	Genus	Species	Status	Abundance
FALCONS/Falconidae				
American kestrel	<i>Falco</i>	<i>sparverius</i>	R	c
Merlin	<i>Falco</i>	<i>columbarius</i>	M	r
Peregrine falcon	<i>Falco</i>	<i>peregrinus</i>	R	r
Prairie falcon	<i>Falco</i>	<i>mexicanus</i>	R	c
RAILS, GALLINULES & COOTS/Rallidae				
Clapper rail	<i>Rallus</i>	<i>longirostris</i>	A	n/a
Virginia rail*	<i>Rallus</i>	<i>limicola</i>	R	u
Sora	<i>Porzana</i>	<i>carolina</i>	M	u
Common moorhen*	<i>Gallinula</i>	<i>chloropus</i>	R	u
American coot*	<i>Fulica</i>	<i>americana</i>	R	a
CRANES/Gruidae				
Sandhill crane	<i>Grus</i>	<i>canadensis</i>	M	r
PLOVERS/Charadriidae				
Black-bellied plover	<i>Pluvialis</i>	<i>squatarola</i>	M	u
American golden-plover	<i>Pluvialis</i>	<i>dominica</i>	M	r
Snowy plover	<i>Charadrius</i>	<i>alexandrinus</i>	M	u
Semipalmated plover	<i>Charadrius</i>	<i>semipalmatus</i>	M	u
Killdeer*	<i>Charadrius</i>	<i>vociferus</i>	R	c
STILTS & AVOCETS/Recurvirostridae				
Black-necked stilt*	<i>Himantopus</i>	<i>mexicanus</i>	S	c
American avocet*	<i>Recurvirostra</i>	<i>americana</i>	M	c
SANDPIPERS & PHALAROPES/Scolopacidae				
Greater yellowlegs	<i>Tringa</i>	<i>melanoleuca</i>	M	c
Lesser yellowlegs	<i>Tringa</i>	<i>flavipes</i>	M	u
Solitary sandpiper	<i>Tringa</i>	<i>solitaria</i>	M	u
Willet	<i>Catoptrophorus</i>	<i>semipalmatus</i>	M	u
Spotted sandpiper	<i>Actitis</i>	<i>macularia</i>	S	c
Whimbrel	<i>Numenius</i>	<i>phaeopus</i>	M	r
Long-billed curlew	<i>Numenius</i>	<i>americanus</i>	M	u
Marbled godwit	<i>Limosa</i>	<i>fedoa</i>	M	u
Ruddy turnstone	<i>Arenaria</i>	<i>interpres</i>	M	r
Red knot	<i>Calidris</i>	<i>canutus</i>	M	r
Sanderling	<i>Calidris</i>	<i>alba</i>	M	u
Semipalmated sandpiper	<i>Calidris</i>	<i>pusilla</i>	M	r
Western sandpiper	<i>Calidris</i>	<i>mauri</i>	M	c
Red-necked stint	<i>Calidris</i>	<i>ruficollis</i>	A	n/a
Least sandpiper	<i>Calidris</i>	<i>minutilla</i>	M	c
Baird's sandpiper	<i>Calidris</i>	<i>bairdii</i>	M	u
Pectoral sandpiper	<i>Calidris</i>	<i>melanotos</i>	M	u
Dunlin	<i>Calidris</i>	<i>alpina</i>	M	r
Stilt sandpiper	<i>Calidris</i>	<i>himantopus</i>	M	r
Short-billed dowitcher	<i>Limnodromus</i>	<i>griseus</i>	M	r
Long-billed dowitcher	<i>Limnodromus</i>	<i>scolopaceus</i>	M	c
Wilson's snipe	<i>Gallinago</i>	<i>delicata</i>	M	c
Wilson's phalarope	<i>Phalaropus</i>	<i>tricolor</i>	M	c
Red-necked phalarope	<i>Phalaropus</i>	<i>lobatus</i>	M	c

Common Name/Family Name	Genus	Species	Status	Abundance
GULLS, TERNS & SKIMMERS /Laridae				
Franklin's gull	<i>Larus</i>	<i>pipixcan</i>	M	u
Bonaparte's gull	<i>Larus</i>	<i>philadelphia</i>	M	u
Mew gull	<i>Larus</i>	<i>canus</i>	A	n/a
Ring-billed gull	<i>Larus</i>	<i>delawarensis</i>	R	c
California gull	<i>Larus</i>	<i>californicus</i>	R	u
Herring gull	<i>Larus</i>	<i>argentatus</i>	W	r
Sabine's gull	<i>Xema</i>	<i>sabini</i>	M	r
Caspian tern	<i>Sterna</i>	<i>caspia</i>	M	u
Common tern	<i>Sterna</i>	<i>hirundo</i>	M	r
Forster's tern	<i>Sterna</i>	<i>forsteri</i>	M	c
Least tern	<i>Sterna</i>	<i>antillarum</i>	A	n/a
Black tern	<i>Chlidonias</i>	<i>niger</i>	M	u
Black skimmer	<i>Rynchops</i>	<i>niger</i>	A	n/a
DOVES/Columbidae				
Rock pigeon	<i>Columba</i>	<i>livia</i>	I	c
Band-tailed pigeon	<i>Patagioenas</i>	<i>fasciata</i>	A	n/a
White-winged dove	<i>Zenaida</i>	<i>asiatica</i>	S	r
Mourning dove*	<i>Zenaida</i>	<i>macroura</i>	R	c
Inca dove	<i>Columbina</i>	<i>inca</i>	R	r
ROADRUNNERS/Cuculidae				
Yellow-billed cuckoo	<i>Coccyzus</i>	<i>americanus</i>	S	r
Greater roadrunner*	<i>Geococcyx</i>	<i>californianus</i>	R	c
BARN OWLS/Tytonidae				
Barn owl	<i>Tyto</i>	<i>alba</i>	M	r
TYPICAL OWLS/Strigidae				
Great horned owl	<i>Bubo</i>	<i>virginianus</i>	A	n/a
Burrowing owl*	<i>Athene</i>	<i>cunicularia</i>	S	u
Short-eared owl	<i>Asio</i>	<i>flammeus</i>	W	r
Northern saw-whet owl	<i>Aegolius</i>	<i>acadicus</i>	M	r
NIGHTJARS/Caprimulgidae				
Lesser nighthawk*	<i>Chordeiles</i>	<i>acutipennis</i>	S	c
Common nighthawk	<i>Chordeiles</i>	<i>minor</i>	M	r
SWIFTS/Apodidae				
Vaux's swift	<i>Chaetura</i>	<i>vauxi</i>	M	u
White-throated swift	<i>Aeronautes</i>	<i>saxatalis</i>	S	c
HUMMINGBIRDS/Trochilidae				
Black-chinned hummingbird*	<i>Archilochus</i>	<i>alexandri</i>	S	u
Anna's hummingbird	<i>Calypte</i>	<i>anna</i>	R	r
Broad-tailed hummingbird	<i>Selasphorus</i>	<i>platycercus</i>	M	r
Rufous hummingbird	<i>Selasphorus</i>	<i>rufus</i>	M	r
KINGFISHERS/Alcedinidae				
Belted kingfisher	<i>Ceryle</i>	<i>alcyon</i>	M	u
WOODPECKERS/Picidae				
Northern flicker	<i>Colaptes</i>	<i>auratus</i>	W	c
Gilded flicker	<i>Colaptes</i>	<i>chrysoides</i>	W	r

Common Name/Family Name	Genus	Species	Status	Abundance
TYRANT FLYCATCHERS/Tyrannidae				
Olive-sided flycatcher	<i>Contopus</i>	<i>cooperi</i>	M	r
Western wood-pewee	<i>Contopus</i>	<i>sordidulus</i>	M	r
Western-type flycatcher	<i>Empidonax</i>	<i>difficilis</i>	M	r
Willow flycatcher	<i>Empidonax</i>	<i>traillii</i>	M	r
Black phoebe*	<i>Sayornis</i>	<i>nigricans</i>	R	u
Say's phoebe*	<i>Sayornis</i>	<i>saya</i>	R	c
Vermilion flycatcher	<i>Pyrocephalus</i>	<i>rubinus</i>	W	r
Ash-throated flycatcher*	<i>Myiarchus</i>	<i>cinerascens</i>	S	u
Brown-crested flycatcher	<i>Myiarchus</i>	<i>tyrannulus</i>	S	r
Cassin's kingbird	<i>Tyrannus</i>	<i>vociferans</i>	M	r
Thick-billed kingbird	<i>Tyrannus</i>	<i>crassirostris</i>	A	n/a
Western kingbird*	<i>Tyrannus</i>	<i>verticalis</i>	S	c
Eastern kingbird	<i>Tyrannus</i>	<i>tyrannus</i>	A	n/a
SHRIKES/Laniidae				
Loggerhead shrike	<i>Lanius</i>	<i>ludovicianus</i>	W	c
VIREOS/Vireonidae				
Plumbeous vireo	<i>Vireo</i>	<i>plumbeus</i>	M	r
Warbling vireo	<i>Vireo</i>	<i>gilvus</i>	M	r
CROWS & JAYS/Corvidae				
Western scrub-jay	<i>Aphelocoma</i>	<i>californica</i>	A	n/a
Pinyon jay	<i>Gymnorhinus</i>	<i>cyanocephalus</i>	A	n/a
Common raven	<i>Corvus</i>	<i>corax</i>	R	c
LARKS/Alaudidae				
Horned lark*	<i>Eremophila</i>	<i>alpestris</i>	R	c
SWALLOWS/Hirundinidae				
Purple martin	<i>Progne</i>	<i>subis</i>	M	r
Tree swallow	<i>Tachycineta</i>	<i>bicolor</i>	M	c
Violet-green swallow	<i>Tachycineta</i>	<i>thalassina</i>	M	c
Northern rough-winged swallow*	<i>Stelgidopteryx</i>	<i>serripennis</i>	S	c
Bank swallow	<i>Riparia</i>	<i>riparia</i>	M	u
Cliff swallow*	<i>Petrochelidon</i>	<i>pyrrhonota</i>	S	c
Barn swallow	<i>Hirundo</i>	<i>rustica</i>	M	c
VERDINS/Remizidae				
Verdin*	<i>Auriparus</i>	<i>flaviceps</i>	R	c
BUSHTITS/Aegithalidae				
Bushtit	<i>Psaltriparus</i>	<i>minimus</i>	R	u
WRENS/Troglodytidae				
Rock wren*	<i>Salpinctes</i>	<i>obsoletus</i>	R	c
Bewick's wren*	<i>Thryomanes</i>	<i>bewickii</i>	R	c
Marsh wren*	<i>Cistothorus</i>	<i>palustris</i>	R	c
KINGLETS/Regulidae				
Golden-crowned kinglet	<i>Regulus</i>	<i>satrapa</i>	W	r
Ruby-crowned kinglet	<i>Regulus</i>	<i>calendula</i>	W	c

Common Name/Family Name	Genus	Species	Status	Abundance
GNATCATCHERS/Sylviidae				
Blue-gray gnatcatcher*	<i>Polioptila</i>	<i>caerulea</i>	R	c
Black-tailed gnatcatcher*	<i>Polioptila</i>	<i>melanura</i>	R	u
THRUSHES/Turdidae				
Mountain Bluebird	<i>Sialia</i>	<i>currucoides</i>	W	r
Swainson's thrush	<i>Catharus</i>	<i>ustulatus</i>	M	r
Hermit thrush	<i>Catharus</i>	<i>guttatus</i>	M	u
American robin	<i>Turdus</i>	<i>migratorius</i>	W	u
MOCKINGBIRDS&THRASHERS/Mimidae				
Gray catbird	<i>Dumatella</i>	<i>carolinensis</i>	A	n/a
Northern mockingbird*	<i>Mimus</i>	<i>polyglottos</i>	R	c
Sage thrasher	<i>Oreoscoptes</i>	<i>montanus</i>	M	r
Bendire's thrasher	<i>Toxostoma</i>	<i>bendirei</i>	S	r
Crissal thrasher*	<i>Toxostoma</i>	<i>crissale</i>	R	c
STARLINGS/Sturnidae				
European starling*	<i>Sturnus</i>	<i>vulgaris</i>	I	c
PIPITS/Motacillidae				
American pipit	<i>Anthus</i>	<i>rubescens</i>	W	c
WAXWINGS/Bombycillidae				
Cedar waxwing	<i>Bombycilla</i>	<i>cedrorum</i>	W	r
SILKY FLYCATCHERS/Ptilonotidae				
Phainopepla*	<i>Phainopepla</i>	<i>nitens</i>	R	c
WOOD-WARBLERS/Parulidae				
Orange-crowned warbler	<i>Vermivora</i>	<i>celata</i>	W	u
Nashville warbler	<i>Vermivora</i>	<i>ruficapilla</i>	M	r
Virginia's warbler	<i>Vermivora</i>	<i>virginiae</i>	M	r
Lucy's warbler	<i>Vermivora</i>	<i>luciae</i>	S	c
Yellow warbler*	<i>Dendroica</i>	<i>petechia</i>	S	c
Chestnut-sided warbler	<i>Dendroica</i>	<i>pensylvanica</i>	A	n/a
Yellow-rumped warbler	<i>Dendroica</i>	<i>coronata</i>	M	c
Black-throated gray warbler	<i>Dendroica</i>	<i>nigrescens</i>	M	r
Townsend's warbler	<i>Dendroica</i>	<i>townsendi</i>	M	r
Hermit warbler	<i>Dendroica</i>	<i>occidentalis</i>	M	r
Palm warbler	<i>Dendroica</i>	<i>palmarum</i>	M	r
Black-and-white warbler	<i>Mniotilta</i>	<i>varia</i>	M	r
Ovenbird	<i>Seiurus</i>	<i>aurocapillus</i>	M	r
Northern waterthrush	<i>Seiurus</i>	<i>noveboracensis</i>	M	r
MacGillivray's warbler	<i>Oporornis</i>	<i>tolmiei</i>	M	r
Common yellowthroat*	<i>Geothlypis</i>	<i>trichas</i>	S	c
Wilson's warbler	<i>Wilsonia</i>	<i>pusilla</i>	M	c
Yellow-breasted chat	<i>Icteria</i>	<i>virens</i>	S	u
TANAGERS/Thraupidae				
Summer tanager	<i>Piranga</i>	<i>rubra</i>	S	r
Western tanager	<i>Piranga</i>	<i>ludoviciana</i>	M	r

Common Name/Family Name	Genus	Species	Status	Abundance
EMBERIZIDS/Emberizidae				
Green-tailed towhee	<i>Pipilo</i>	<i>chlorurus</i>	M	r
Spotted towhee	<i>Pipilo</i>	<i>maculatus</i>	W	r
Abert's towhee*	<i>Pipilo</i>	<i>aberti</i>	R	c
American tree sparrow	<i>Spizella</i>	<i>arborea</i>	W	r
Chipping sparrow	<i>Spizella</i>	<i>passerina</i>	M	r
Brewer's sparrow	<i>Spizella</i>	<i>breweri</i>	R	c
Vesper sparrow	<i>Pooecetes</i>	<i>gramineus</i>	M	r
Lark sparrow	<i>Chondestes</i>	<i>grammacus</i>	M	u
Black-throated sparrow	<i>Amphispiza</i>	<i>bilineata</i>	S	r
Savannah sparrow	<i>Passerculus</i>	<i>sandwichensis</i>	W	c
Fox sparrow	<i>Passerella</i>	<i>iliaca</i>	M	r
Song sparrow*	<i>Melospiza</i>	<i>melodia</i>	R	c
Lincoln's sparrow	<i>Melospiza</i>	<i>lincolnii</i>	M	c
Swamp sparrow	<i>Melospiza</i>	<i>georgiana</i>	M	r
White-throated sparrow	<i>Zonotrichia</i>	<i>albicollis</i>	M	r
White-crowned sparrow	<i>Zonotrichia</i>	<i>leucophrys</i>	W	c
Dark-eyed junco	<i>Junco</i>	<i>hyemalis</i>	W	u
CARDINALS, GROSBEAKS & BUNTINGS/Cardinalidae				
Black-headed grosbeak	<i>Pheucticus</i>	<i>melanocephalus</i>	M	r
Blue grosbeak*	<i>Passerina</i>	<i>caerulea</i>	S	u
Lazuli bunting	<i>Passerina</i>	<i>amoena</i>	M	r
Indigo bunting	<i>Passerina</i>	<i>cyanea</i>	S	r
BLACKBIRDS/Icteridae				
Bobolink	<i>Dolichonyx</i>	<i>oryzivorus</i>	M	r
Red-winged blackbird*	<i>Agelaius</i>	<i>phoeniceus</i>	R	a
Western meadowlark*	<i>Sturnella</i>	<i>neglecta</i>	R	u
Yellow-headed blackbird*	<i>Xanthocephalus</i>	<i>xanthocephalus</i>	S	c
Brewer's blackbird	<i>Euphagus</i>	<i>cianocephalus</i>	W	a
Great-tailed grackle*	<i>Quiscalus</i>	<i>mexicanus</i>	R	c
Brown-headed cowbird*	<i>Molothrus</i>	<i>ater</i>	R	u
Hooded oriole	<i>Icterus</i>	<i>cucullatus</i>	S	r
Bullock's oriole	<i>Icterus</i>	<i>bullockii</i>	S	r
FINCHES/Fringillidae				
Cassin's finch	<i>Carpodacus</i>	<i>cassinii</i>	M	r
House finch*	<i>Carpodacus</i>	<i>mexicanus</i>	R	a
Lesser goldfinch	<i>Carduelis</i>	<i>tristis</i>	R	u
OLD WORLD SPARROWS/Passeridae				
House sparrow*	<i>Passer</i>	<i>domesticus</i>	I	a

Appendix E
Description of Foraging Techniques
(Adapted from Ehrlich et al. 1988)

Description of Foraging Techniques

Techniques for picking food from ground surface or plants while walking or clinging:

Ground Glean: Picking up items from the surface of soil, turf, sand, etc. Includes scavenging dead aquatic organisms from shoreline.

Foliage Glean: Gleaning from foliage and occasionally from branches. Takes invertebrates and/or fruit from vegetation, not from the surface of the ground.

Flying Techniques:

Hover and Glean: Takes nectar, insects or berries from plants above the ground while hovering.

Hawks: Sallies from perch on short flights to capture flying insects.

Aerial Forage: Captures flying insects while in prolonged continuous flight.

Aerial Pursuit: Chases and catches birds in midair, stoops (drops on flying birds from above, killing them in midair with a blow from talons), or snatches them from their perches.

Swoops: Snatches up prey from ground in talons after gliding descent from perch with wings spread.

High Patrol: Soars at high altitude in search of carrion or prey.

Low Patrol: Seeks prey in low searching flight.

Aquatic Techniques:

High Dives: Drops from height into water, usually to catch fish, but sometimes to take waterfowl or other prey.

Surface Dives: Floats and then dives; swims underwater using feet and/or wings.

Surface Dips: Takes food from the water's surface or from just below while floating or swimming on the surface.

Dabbles: Floating on surface in shallow water, pivots headfirst downward while raising hindquarters above water to reach submerged plants or animals on or near substrate (mud, sand).

Stalk and Strike: Hunting by standing motionless on bank or in water and spearing fish, frogs, etc.

Probes: Probes below surface. Foraging for food beneath surface of substrate (mud, sand) either in or near shallow water. Also often includes taking food from within the water column.

Adapted from Ehrlich et al. 1988

Appendix F

Total Bird Species Detected During the Three-Year Study
(Follows the A.O.U. Check-list (1998), including supplements 42-44)

Bird Species Detected During the Three-Year Study			Sunrise	Bostick	Bostick	Bostick
Common Name	Scientific Name	Status	Year 1 (30 visits)	Year 1 (37 visits)	Year 2 (11 visits)	Year 3 (12 visits)
Canada Goose	<i>Branta canadensis</i>	W		x		x
Wood Duck	<i>Aix sponsa</i>	W			x	
Gadwall	<i>Anas strepera</i>	W	x	x		
Mallard	<i>Anas platyrhynchos</i>	R	x	x	x	x
Cinnamon Teal	<i>Anas cyanoptera</i>	R	x	x		x
Northern Shoveler	<i>Anas clypeata</i>	W				x
Northern Pintail	<i>Anas acuta</i>	W		x		
Green-winged Teal	<i>Anas carolinensis</i>	W	x		x	x
Common Goldeneye	<i>Bucephala clangula</i>	W	x			
Common Merganser	<i>Mergus merganser</i>	W	x	x	x	
Gambel's Quail	<i>Callipepla gambelii</i>	R	x	x	x	x
Pied-billed Grebe	<i>Podilymbus podiceps</i>	R	x	x		x
Eared Grebe	<i>Podiceps nigricollis</i>	W	x			x
Western Grebe	<i>Aechmophorus occidentalis</i>	W				x
Clark's Grebe	<i>Aechmophorus clarkii</i>	W				x
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	R	x	x	x	x
Great Blue Heron	<i>Ardea herodias</i>	R	x	x	x	x
Great Egret	<i>Ardea alba</i>	R	x	x	x	x
Snowy Egret	<i>Egretta thula</i>	R	x	x	x	x
Green Heron	<i>Butorides virescens</i>	R	x	x	x	x
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	R	x	x		x
White-faced Ibis	<i>Plegadis chihi</i>	M	x	x	x	x
Turkey Vulture	<i>Cathartes aura</i>	S	x			
Osprey	<i>Pandion haliaetus</i>	M	x	x	x	x
Northern Harrier	<i>Circus cyaneus</i>	R	x	x	x	x
Sharp-shinned Hawk	<i>Accipiter striatus</i>	R	x	x	x	x
Cooper's Hawk	<i>Accipiter cooperii</i>	R	x			x
Red-shouldered Hawk	<i>Buteo lineatus</i>	W	x		x	
Red-tailed Hawk	<i>Buteo jamaicensis</i>	R	x	x	x	x
American Kestrel	<i>Falco sparverius</i>	R	x	x	x	
Peregrine Falcon	<i>Falco columbarius</i>	R	x	x	x	x
Prairie Falcon	<i>Falco peregrinus</i>	R	x	x		x
Virginia Rail	<i>Falco mexicanus</i>	R				x
Common Moorhen	<i>Gallinula chloropus</i>	R			x	x
American Coot	<i>Fulica americana</i>	R	x	x	x	x
Killdeer	<i>Charadrius vociferous</i>	R	x	x	x	x
Black-necked Stilt	<i>Himantopus mexicanus</i>	S		x		x
American Avocet	<i>Recurvirostra americana</i>	M		x		
Greater Yellowlegs	<i>Tringa melanoleuca</i>	M		x	x	x
Lesser Yellowlegs	<i>Tringa flavipes</i>	M		x	x	
Spotted Sandpiper	<i>Actitis macularia</i>	R	x	x	x	x
Least Sandpiper	<i>Calidris minutilla</i>	M		x		x
Long-billed Dowitcher	<i>Numenius americanus</i>	M	x	x		
Wilson's Snipe	<i>Gallinago delicata</i>	M		x	x	
Ring-billed Gull	<i>Larus delawarensis</i>	R	x	x	x	x
Rock Pigeon	<i>Columbia livia</i>	I	x		x	x
White-winged Dove	<i>Zenaida asiatica</i>	S		x		x
Mourning Dove	<i>Zenaida macroura</i>	R	x	x	x	x
Greater Roadrunner	<i>Geococcyx californianus</i>	R	x	x	x	x
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	M		x		
Vaux's Swift	<i>Chaetura vauxi</i>	M			x	
White-throated Swift	<i>Aeronautes saxatalis</i>	S	x	x	x	x
Black-chinned Hummingbird	<i>Archilochus alexandri</i>	S	x		x	
Anna's Hummingbird	<i>Calypte anna</i>	R	x			
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>	S			x	

Bird Species Detected During the Three-Year Study			Sunrise	Bostick	Bostick	Bostick
Common Name	Scientific Name	Status	Year 1 (30 visits)	Year 1 (37 visits)	Year 2 (11 visits)	Year 3 (12 visits)
Belted Kingfisher	<i>Ceryle alcyon</i>	M	x	x	x	x
Northern Flicker	<i>Colaptes auratus</i>	W	x	x	x	x
Western Wood-Pewee	<i>Contopus sordidulus</i>	M	x	x	x	x
Black Phoebe	<i>Sayornis nigricans</i>	R	x	x	x	x
Say's Phoebe	<i>Sayornis saya</i>	R	x	x	x	x
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	S			x	
Cassin's Kingbird	<i>Tyrannus vociferans</i>	M	x			
Western Kingbird	<i>Tyrannus verticalis</i>	S	x	x	x	
Loggerhead Shrike	<i>Lanius ludovicianus</i>	W	x	x		x
Warbling Vireo	<i>Vireo gilvus</i>	M			x	
Western Scrub-Jay	<i>Aphelocoma californica</i>	A	x	x	x	
Pinyon Jay	<i>Gymnorhinus cyanocephalus</i>	A		x		
Common Raven	<i>Corvus corax</i>	R	x	x	x	x
Tree Swallow	<i>Tachycineta bicolor</i>	M		x		
Violet-green Swallow	<i>Tachycineta thalassina</i>	M		x	x	
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	S	x	x	x	x
Bank Swallow	<i>Riparia riparia</i>	M				x
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	S	x	x	x	x
Barn Swallow	<i>Hirundo rustica</i>	M	x	x	x	x
Verdin	<i>Auriparus flaviceps</i>	R	x	x	x	x
Bushtit	<i>Psaltriparus minimus</i>	R	x	x		
Rock Wren	<i>Salpinctes obsoletus</i>	R			x	x
Bewick's Wren	<i>Thryomanes bewickii</i>	R	x	x	x	x
Marsh Wren	<i>Cistothorus palustris</i>	R	x	x	x	x
Ruby-crowned Kinglet	<i>Regulus calendula</i>	W	x	x	x	x
Golden-crowned Kinglet	<i>Regulus satrapa</i>	W	x	x		
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	R	x	x		x
Black-tailed Gnatcatcher	<i>Polioptila melanura</i>	R	x	x	x	x
Hermit Thrush	<i>Catharus guttatus</i>	M	x			
American Robin	<i>Turdus migratorius</i>	W	x			
Northern Mockingbird	<i>Mimus polyglottos</i>	R	x	x	x	x
Crissal Thrasher	<i>Toxostoma crissale</i>	R	x	x	x	x
European Starling	<i>Sturnus vulgaris</i>	I	x	x	x	x
American Pipit	<i>Anthus rubescens</i>	W	x	x	x	x
Cedar Waxwing	<i>Bombycilla cedrorum</i>	W		x		
Phainopepla	<i>Phainopepla nitens</i>	R	x	x		
Orange-crowned Warbler	<i>Vermivora celata</i>	W	x	x	x	x
Lucy's Warbler	<i>Vermivora luciae</i>	S	x	x		
Yellow Warbler	<i>Dendroica petechia</i>	S	x	x	x	x
Yellow-rumped Warbler	<i>Dendroica auduboni</i>	M	x	x	x	x
Palm Warbler	<i>Dendroica palmarum</i>	M		x		
MacGillivray's Warbler	<i>Oporornis tolmiei</i>	M		x		
Common Yellowthroat	<i>Geothlypis trichas</i>	S	x	x	x	x
Wilson's Warbler	<i>Wilsonia pusilla</i>	M		x	x	
Yellow-breasted Chat	<i>Icteria virens</i>	S	x	x	x	x
Western Tanager	<i>Piranga ludoviciana</i>	M			x	
Spotted Towhee	<i>Pipilo maculatus</i>	W		x		
Abert's Towhee	<i>Pipilo aberti</i>	R	x	x	x	x
Chipping Sparrow	<i>Spizella passerina</i>	M	x		x	x
Brewer's Sparrow	<i>Spizella breweri</i>	R	x	x	x	
Vesper Sparrow	<i>Poocetes gramineus</i>	M		x		
Lark Sparrow	<i>Chondestes grammacus</i>	M	x			
Black-throated Sparrow	<i>Amphispiza bilineata</i>	S		x	x	
Savannah Sparrow	<i>Passerculus sandwichensis</i>	W	x	x	x	x
Fox Sparrow	<i>Passerella iliaca</i>	M		x		

Bird Species Detected During the Three-Year Study			Sunrise	Bostick	Bostick	Bostick
Common Name	Scientific Name	Status	Year 1 (30 visits)	Year 1 (37 visits)	Year 2 (11 visits)	Year 3 (12 visits)
Song Sparrow	<i>Melospiza melodia</i>	R	x	x	x	x
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	M		x	x	x
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	W	x	x	x	x
Dark-eyed Junco	<i>Junco hyemalis</i>	W		x		
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	M			x	x
Blue Grosbeak	<i>Passerina caerulea</i>	S	x	x	x	x
Lazuli Bunting	<i>Passerina amoena</i>	M	x	x		x
Indigo Bunting	<i>Passerina cyanea</i>	S	x	x		
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	R	x	x	x	x
Western Meadowlark	<i>Sturnella neglecta</i>	R		x	x	x
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	S	x	x	x	
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	R	x			
Great-tailed Grackle	<i>Quiscalus mexicanus</i>	R	x	x	x	x
Brown-headed Cowbird	<i>Molothrus ater</i>	R	x	x	x	x
Bullock's Oriole	<i>Icterus bullockii</i>	S		x	x	
House Finch	<i>Carpodacus mexicanus</i>	R	x	x	x	
Lesser Goldfinch	<i>Carduelis psaltria</i>	R	x	x	x	
House Sparrow	<i>Passer domesticus</i>	I		x	x	
Total Species			88	99	83	78

* The list follows the A.O.U. Check-list of North American Birds (1998), including supplements 42 - 44

** Status: R = Resident; S = Summer Visitant; W = Winter Visitant; M = Migrant; A = Accidental; I = Introduced

Appendix G

Bostick Site Year One (2000/2001): Monthly Presence of Each Species

Bostick Site Year One (2000/2001): Monthly Presence of Each Species

Bird Species	November	December	January	February	March	April	May	June	July	August	September	October
Canada Goose	x											
Wood Duck												
Gadwall					x							
Mallard					x	x	x	x	x	x	x	x
Cinnamon Teal							x	x			x	x
Northern Shoveler												
Northern Pintail				x								
Green-winged Teal												
Common Goldeneye												
Common Merganser		x	x	x			x					
Gambel's Quail						x	x	x	x	x	x	x
Pied-billed Grebe			x									
Eared Grebe												
Western Grebe												
Clark's Grebe												
Double-crested Cormorant					x	x	x		x	x	x	x
Great Blue Heron		x	x	x	x	x	x	x	x	x	x	x
Great Egret	x	x	x			x	x		x	x		x
Snowy Egret						x	x		x			
Green Heron							x			x	x	
Black-crowned Night-Heron		x						x				
White-faced Ibis								x		x		
Turkey Vulture												
Osprey			x	x					x	x	x	x
Northern Harrier	x	x	x	x	x	x					x	
Sharp-shinned Hawk	x	x	x		x							x
Cooper's Hawk												
Red-shouldered Hawk												
Red-tailed Hawk	x	x	x	x								
American Kestrel										x	x	
Peregrine Falcon									x			x
Prairie Falcon	x			x								
Virginia Rail												
Common Moorhen												
American Coot				x			x					x
Killdeer	x	x	x	x	x	x	x	x	x	x	x	x
Black-necked Stilt							x					
American Avocet						x						
Greater Yellowlegs						x						x
Lesser Yellowlegs									x			
Spotted Sandpiper		x	x		x	x	x	x	x	x	x	x
Least Sandpiper						x			x	x		
Long-billed Dowitcher												x
Wilson's Snipe	x	x	x			x						

Bostick Site Year One (2000/2001): Monthly Presence of Each Species

Bird Species	November	December	January	February	March	April	May	June	July	August	September	October
Ring-billed Gull		x	x	x	x	x		x				
Rock Pigeon												
White-winged Dove							x	x				
Mourning Dove		x		x	x	x	x	x	x	x	x	x
Greater Roadrunner		x			x		x					
Northern Saw-whet Owl	x											
Vaux's Swift												
White-throated Swift			x				x	x	x			
Black-chinned Hummingbird												
Anna's Hummingbird												
Broad-tailed Hummingbird												
Belted Kingfisher					x	x				x	x	x
Northern Flicker	x	x	x		x							x
Western Wood-Pewee										x	x	
Black Phoebe	x	x	x	x	x	x	x	x		x	x	x
Say's Phoebe	x	x	x					x	x		x	x
Ash-throated Flycatcher												
Cassin's Kingbird												
Western Kingbird									x	x		
Loggerhead Shrike	x	x										
Warbling Vireo												
Western Scrub-Jay	x	x	x	x	x							
Pinyon Jay											x	
Common Raven	x	x	x		x	x	x			x		x
Tree Swallow			x	x							x	
Violet-green Swallow								x				
Northern Rough-winged Swallow			x	x	x	x	x	x	x	x		
Bank Swallow												
Cliff Swallow								x	x		x	
Barn Swallow											x	x
Verdin	x	x	x	x				x	x	x	x	x
Bushtit			x									
Rock Wren												
Bewick's Wren	x		x	x	x	x	x	x	x	x	x	x
Marsh Wren	x	x	x	x		x						x
Ruby-crowned Kinglet	x	x	x	x	x							x
Golden-crowned Kinglet			x									
Blue-gray Gnatcatcher	x			x								
Black-tailed Gnatcatcher	x		x		x		x		x			x
Hermit Thrush												
American Robin												
Northern Mockingbird	x											
Crissal Thrasher	x		x				x				x	x
European Starling							x					

Bostick Site Year One (2000/2001): Monthly Presence of Each Species

Bird Species	November	December	January	February	March	April	May	June	July	August	September	October
American Pipit	x	x	x	x								x
Cedar Waxwing							x					
Phainopepla								x				
Orange-crowned Warbler											x	x
Lucy's Warbler						x	x	x	x			
Yellow Warbler							x	x			x	
Yellow-rumped Warbler	x	x	x	x		x	x					x
Palm Warbler	x											
MacGillivray's Warbler										x		
Common Yellowthroat						x	x	x	x	x	x	x
Wilson's Warbler										x	x	
Yellow-breasted Chat							x	x	x	x		
Western Tanager												
Spotted Towhee	x		x	x								x
Abert's Towhee	x	x	x	x	x	x	x	x	x	x	x	x
Chipping Sparrow												
Brewer's Sparrow												x
Vesper Sparrow												x
Lark Sparrow												
Black-throated Sparrow								x				
Savannah Sparrow					x							x
Fox Sparrow												x
Song Sparrow	x	x	x	x	x	x	x	x		x	x	x
Lincoln's Sparrow	x		x	x	x							x
White-crowned Sparrow	x	x	x	x	x	x					x	x
Dark-eyed Junco	x	x	x	x								
Black-headed Grosbeak												
Blue Grosbeak							x	x	x	x		
Lazuli Bunting							x			x		
Indigo Bunting								x				
Red-winged Blackbird	x	x	x	x		x	x	x	x	x	x	x
Western Meadowlark		x	x	x								x
Yellow-headed Blackbird								x	x			
Brewer's Blackbird												
Great-tailed Grackle				x	x	x	x	x	x			
Brown-headed Cowbird						x	x	x	x	x		
Bullock's Oriole										x		
House Finch							x		x		x	x
Lesser Goldfinch							x				x	
House Sparrow							x					
Total Species	33	30	38	31	26	30	40	33	31	32	33	43

Appendix H

Sunrise Site Year One (2000/2001): Monthly Presence of Each Species

Sunrise Site Year One (2000/2001): Monthly Presence of Each Species

Bird Species	November	December	January	February	March	April	May	June	July	August	September	October
Ring-billed Gull		x		x								
Rock Pigeon					x					x		x
White-winged Dove												
Mourning Dove	x	x		x	x		x	x	x	x	x	x
Greater Roadrunner								x		x		
Northern Saw-whet Owl												
Vaux's Swift												
White-throated Swift				x				x				
Black-chinned Hummingbird								x		x		
Anna's Hummingbird									x			
Broad-tailed Hummingbird												
Belted Kingfisher	x	x	x	x							x	x
Northern Flicker	x	x										x
Western Wood-Pewee							x					
Black Phoebe	x	x	x	x	x		x	x	x	x	x	x
Say's Phoebe		x	x	x				x	x			
Ash-throated Flycatcher												
Cassin's Kingbird									x			
Western Kingbird								x	x	x	x	x
Loggerhead Shrike	x	x										
Warbling Vireo												
Western Scrub-Jay	x	x									x	
Pinyon Jay												
Common Raven	x	x	x	x	x		x		x		x	x
Tree Swallow												
Violet-green Swallow												
Northern Rough-winged Swallow							x	x	x	x	x	x
Bank Swallow												
Cliff Swallow							x		x			
Barn Swallow												x
Verdin	x	x	x	x	x		x	x	x	x	x	x
Bushtit		x										
Rock Wren												
Bewick's Wren		x	x	x	x		x	x	x	x		x
Marsh Wren	x	x	x	x	x				x		x	x
Ruby-crowned Kinglet	x	x	x	x								
Golden-crowned Kinglet				x								x
Blue-gray Gnatcatcher	x	x		x			x			x		
Black-tailed Gnatcatcher		x	x	x	x		x	x	x	x	x	x
Hermit Thrush	x											x
American Robin	x											
Northern Mockingbird									x	x	x	
Crissal Thrasher		x		x			x	x		x		x
European Starling							x	x				

Sunrise Site Year One (2000/2001): Monthly Presence of Each Species

Bird Species	November	December	January	February	March	April	May	June	July	August	September	October
American Pipit	x	x	x	x								
Cedar Waxwing												
Phainopepla												x
Orange-crowned Warbler				x								
Lucy's Warbler							x		x			
Yellow Warbler							x			x		
Yellow-rumped Warbler	x	x										x
Palm Warbler												
MacGillivray's Warbler												
Common Yellowthroat							x	x	x	x		
Wilson's Warbler												
Yellow-breasted Chat							x	x	x	x		
Western Tanager												
Spotted Towhee												
Abert's Towhee	x	x	x	x	x		x	x	x	x	x	x
Chipping Sparrow												x
Brewer's Sparrow			x									
Vesper Sparrow												
Lark Sparrow							x					
Black-throated Sparrow												
Savannah Sparrow											x	
Fox Sparrow												
Song Sparrow	x	x	x	x			x	x	x	x		x
Lincoln's Sparrow		x	x		x				x			x
White-crowned Sparrow	x	x	x	x								x
Dark-eyed Junco												
Black-headed Grosbeak												
Blue Grosbeak							x	x	x	x		
Lazuli Bunting										x		
Indigo Bunting							x					
Red-winged Blackbird	x	x	x					x	x	x		x
Western Meadowlark												
Yellow-headed Blackbird							x					
Brewer's Blackbird										x		x
Great-tailed Grackle							x	x	x			
Brown-headed Cowbird							x	x	x	x	x	
Bullock's Oriole												
House Finch							x			x		
Lesser Goldfinch												x
House Sparrow												
Total Species	31	38	27	36	16	0	36	32	33	33	20	36

Appendix I

Bostick Site Year Two (2001/2002): Monthly Presence of Each Species

Bostick Site Year Two (2001/2002): Monthly Presence of Each Species

Bird Species	November	December	January	February	March	April	May	June	July	August	September	October
Canada Goose												
Wood Duck		x										
Gadwall												
Mallard		x		x	x	x	x	x	x	x	x	
Cinnamon Teal												
Northern Shoveler												
Northern Pintail												
Green-winged Teal			x	x	x							
Common Goldeneye												
Common Merganser				x		x						
Gambel's Quail		x			x	x	x	x	x	x		x
Pied-billed Grebe												
Eared Grebe												
Western Grebe												
Clark's Grebe												
Double-crested Cormorant			x		x	x			x	x		x
Great Blue Heron		x	x		x		x	x		x	x	x
Great Egret										x		
Snowy Egret							x					
Green Heron									x			
Black-crowned Night-Heron												
White-faced Ibis		x										
Turkey Vulture												
Osprey												x
Northern Harrier			x	x	x	x						
Sharp-shinned Hawk			x	x	x		x					
Cooper's Hawk												
Red-shouldered Hawk		x	x									
Red-tailed Hawk					x							x
American Kestrel											x	
Peregrine Falcon			x						x			
Prairie Falcon												
Virginia Rail												
Common Moorhen										x		
American Coot		x	x	x								
Killdeer		x	x	x	x	x					x	
Black-necked Stilt												
American Avocet												
Greater Yellowlegs				x								
Lesser Yellowlegs					x							
Spotted Sandpiper							x	x	x	x		
Least Sandpiper												
Long-billed Dowitcher												
Wilson's Snipe		x	x					x			x	

Bostick Site Year Two (2001/2002): Monthly Presence of Each Species

Bird Species	November	December	January	February	March	April	May	June	July	August	September	October
Ring-billed Gull		x	x	x	x							
Rock Pigeon							x					
White-winged Dove												
Mourning Dove		x				x	x	x	x	x	x	x
Greater Roadrunner		x	x					x	x			x
Northern Saw-whet Owl												
Vaux's Swift								x				
White-throated Swift							x	x	x			
Black-chinned Hummingbird								x	x		x	
Anna's Hummingbird												
Broad-tailed Hummingbird										x		
Belted Kingfisher				x							x	
Northern Flicker		x	x	x								x
Western Wood-Pewee							x				x	
Black Phoebe		x	x	x		x	x	x	x	x	x	x
Say's Phoebe		x	x	x		x		x	x			
Ash-throated Flycatcher							x	x	x			
Cassin's Kingbird												
Western Kingbird							x	x		x	x	
Loggerhead Shrike												
Warbling Vireo												x
Western Scrub-Jay		x	x	x		x						
Pinyon Jay												
Common Raven		x	x	x		x	x		x			x
Tree Swallow												
Violet-green Swallow										x		x
Northern Rough-winged Swallow					x	x	x	x	x	x	x	x
Bank Swallow												
Cliff Swallow									x	x		x
Barn Swallow											x	x
Verdin		x		x		x		x			x	x
Bushtit												
Rock Wren												x
Bewick's Wren		x	x	x		x	x	x	x	x	x	x
Marsh Wren		x	x	x				x		x	x	x
Ruby-crowned Kinglet		x		x								
Golden-crowned Kinglet												
Blue-gray Gnatcatcher												
Black-tailed Gnatcatcher		x				x		x	x	x	x	x
Hermit Thrush												
American Robin												
Northern Mockingbird							x	x		x		
Crissal Thrasher			x						x		x	
European Starling								x				

Bostick Site Year Two (2001/2002): Monthly Presence of Each Species

Bird Species	November	December	January	February	March	April	May	June	July	August	September	October
American Pipit		x	x	x	x							
Cedar Waxwing												
Phainopepla												
Orange-crowned Warbler			x	x							x	x
Lucy's Warbler												
Yellow Warbler							x				x	x
Yellow-rumped Warbler		x	x	x	x	x	x					x
Palm Warbler												
MacGillivray's Warbler												
Common Yellowthroat						x	x	x	x	x	x	
Wilson's Warbler							x					
Yellow-breasted Chat							x		x			
Western Tanager											x	
Spotted Towhee												
Abert's Towhee		x	x	x	x	x	x	x	x	x	x	x
Chipping Sparrow												x
Brewer's Sparrow						x	x				x	x
Vesper Sparrow												
Lark Sparrow												
Black-throated Sparrow							x					
Savannah Sparrow		x				x		x				
Fox Sparrow												
Song Sparrow		x	x	x	x	x	x	x	x	x	x	x
Lincoln's Sparrow		x	x	x		x					x	
White-crowned Sparrow		x	x	x	x	x	x					x
Dark-eyed Junco												
Black-headed Grosbeak							x	x				
Blue Grosbeak							x	x	x	x		
Lazuli Bunting												
Indigo Bunting												
Red-winged Blackbird		x	x	x		x		x	x	x	x	x
Western Meadowlark		x	x	x	x							
Yellow-headed Blackbird								x				
Brewer's Blackbird												
Great-tailed Grackle						x	x	x	x			
Brown-headed Cowbird							x	x	x	x		
Bullock's Oriole												
House Finch									x			x
Lesser Goldfinch						x		x				
House Sparrow						x						
Total Species	0	31	29	28	26	27	32	32	28	24	27	30

Appendix J

Bostick Site Year Three (2002/2003): Monthly Presence of Each Species

Bostick Site Year Three (2002/2003): Monthly Presence of Each Species

Bird Species	November	December	January	February	March	April	May	June	July	August	September	October
Ring-billed Gull		x	x	x		x						
Rock Pigeon												x
White-winged Dove									x			
Mourning Dove		x				x	x	x	x	x	x	x
Greater Roadrunner											x	x
Northern Saw-whet Owl												
Vaux's Swift												
White-throated Swift								x	x			
Black-chinned Hummingbird												
Anna's Hummingbird												
Broad-tailed Hummingbird												
Belted Kingfisher	x											x
Northern Flicker	x											
Western Wood-Pewee											x	
Black Phoebe	x	x	x	x	x	x	x	x	x	x	x	x
Say's Phoebe		x	x	x	x			x				
Ash-throated Flycatcher												
Cassin's Kingbird												
Western Kingbird												
Loggerhead Shrike	x	x										
Warbling Vireo												
Western Scrub-Jay												
Pinyon Jay												
Common Raven			x	x	x			x	x	x		x
Tree Swallow												
Violet-green Swallow												
Northern Rough-winged Swallow				x	x	x	x	x			x	
Bank Swallow								x				
Cliff Swallow								x	x			
Barn Swallow												x
Verdin	x		x	x		x	x	x	x	x	x	x
Bushtit												
Rock Wren	x		x			x						x
Bewick's Wren			x	x	x	x				x	x	x
Marsh Wren	x	x	x		x			x			x	x
Ruby-crowned Kinglet	x	x	x	x								
Golden-crowned Kinglet												
Blue-gray Gnatcatcher						x			x			
Black-tailed Gnatcatcher				x				x			x	x
Hermit Thrush												
American Robin												
Northern Mockingbird										x		
Crissal Thrasher	x		x			x				x		
European Starling		x			x							

Bostick Site Year Three (2002/2003): Monthly Presence of Each Species

Bird Species	November	December	January	February	March	April	May	June	July	August	September	October
American Pipit	x	x	x	x		x						x
Cedar Waxwing												
Phainopepla												
Orange-crowned Warbler			x									x
Lucy's Warbler												
Yellow Warbler											x	
Yellow-rumped Warbler	x		x									x
Palm Warbler												
MacGillivray's Warbler												
Common Yellowthroat									x	x	x	x
Wilson's Warbler												
Yellow-breasted Chat							x					
Western Tanager												
Spotted Towhee												
Abert's Towhee		x	x	x		x	x	x	x	x	x	x
Chipping Sparrow		x										
Brewer's Sparrow												
Vesper Sparrow												
Lark Sparrow												
Black-throated Sparrow												
Savannah Sparrow		x										
Fox Sparrow												
Song Sparrow			x	x	x		x		x	x	x	x
Lincoln's Sparrow		x	x	x			x					
White-crowned Sparrow			x									x
Dark-eyed Junco												
Black-headed Grosbeak											x	
Blue Grosbeak							x	x	x	x		
Lazuli Bunting											x	
Indigo Bunting												
Red-winged Blackbird	x	x	x	x	x		x	x	x	x	x	x
Western Meadowlark	x		x									
Yellow-headed Blackbird												
Brewer's Blackbird												
Great-tailed Grackle							x	x	x	x	x	x
Brown-headed Cowbird							x	x	x	x	x	
Bullock's Oriole												
House Finch												
Lesser Goldfinch												
House Sparrow												
Total Species	19	19	28	20	14	16	17	26	24	24	34	34

Appendix K

Comparison of Miller (1974) to Project Team Census Data

Comparison of Miller (1974) to Project Team Census Data

Common Name	Scientific Name	1974 - Miller	2003 - Project Team
Waterfowl	Anatidae		
Canada Goose	<i>Branta canadensis</i>	x	x
Wood Duck	<i>Aix sponsa</i>		x
Gadwall	<i>Anas strepera</i>	x	x
American Wigeon	<i>Anas americana</i>	x	
Mallard	<i>Anas platyrhynchos</i>	x	x
Blue-winged Teal	<i>Anas discors</i>	x	
Cinnamon Teal	<i>Anas cyanoptera</i>	x	x
Northern Shoveler	<i>Anas clypeata</i>	x	x
Northern Pintail	<i>Anas acuta</i>	x	x
Green-winged Teal	<i>Anas carolinensis</i>	x	x
Canvasback	<i>Aythya valisineria</i>	x	
Redhead	<i>Aythya americana</i>	x	
Lesser Scaup	<i>Aythya affinis</i>	x	
Bufflehead	<i>Bucephala albeola</i>	x	
Common Goldeneye	<i>Bucephala clangula</i>		x
Hooded Merganser	<i>Lophodytes cucullatus</i>	x	
Common Merganser	<i>Mergus merganser</i>	x	x
Ruddy Duck	<i>Oxyura jamaicensis</i>	x	
New World Quail	Odontophoridae		
Gambel's Quail	<i>Callipepla gambelii</i>	x	x
Loons	Gaviidae		
Common Loon	<i>Gavia immer</i>	x	
Grebes	Podicipedidae		
Pied-billed Grebe	<i>Podilymbus podiceps</i>	x	x
Eared Grebe	<i>Podiceps nigricollis</i>	x	x
Western Grebe	<i>Aechmophorus occidentalis</i>	x	x
Clark's Grebe	<i>Aechmophorus clarkii</i>	x	x
Cormorants	Phalacrocoracidae		
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	x	x
Bitterns & Herons	Ardeidae		
Great Blue Heron	<i>Ardea herodias</i>	x	x
Great Egret	<i>Ardea alba</i>	x	x
Snowy Egret	<i>Egretta thula</i>	x	x
Green Heron	<i>Butorides virescens</i>	x	x
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	x	x
Ibises	Threskiornithidae		
White-faced Ibis	<i>Plegadis chihi</i>	x	x
New World Vultures	Cathartidae		
Turkey Vulture	<i>Cathartes aura</i>	x	x

Comparison of Miller (1974) to Project Team Census Data

Common Name	Scientific Name	1974 - Miller	2003 - Project Team
Hawks	Accipitridae		
Osprey	<i>Pandion haliaetus</i>		X
Northern Harrier	<i>Circus cyaneus</i>	X	X
Sharp-shinned Hawk	<i>Accipiter striatus</i>	X	X
Cooper's Hawk	<i>Accipiter cooperii</i>	X	X
Red-shouldered Hawk	<i>Buteo lineatus</i>		X
Red-tailed Hawk	<i>Buteo jamaicensis</i>	X	X
Falcons	Falconidae		
American Kestrel	<i>Falco sparverius</i>	X	X
Merlin	<i>Falco columbarius</i>		X
Peregrine Falcon	<i>Falco peregrinus</i>		X
Prairie Falcon	<i>Falco mexicanus</i>	X	X
Rails, Gallinules & Coots	Rallidae		
Virginia Rail	<i>Rallus limicola</i>	X	X
Sora	<i>Porzana carolina</i>	X	
Common Moorhen	<i>Gallinula chloropus</i>	X	X
American Coot	<i>Fulica americana</i>	X	X
Plovers	Charadriidae		
Snowy Plover	<i>Charadrius alexandrinus</i>	X	
Semipalmated Plover	<i>Charadrius semipalmatus</i>	X	
Killdeer	<i>Charadrius vociferous</i>	X	X
Stilts & Avocets	Recurvirostridae		
Black-necked Stilt	<i>Himantopus mexicanus</i>	X	X
American Avocet	<i>Recurvirostra americana</i>	X	X
Sandpipers	Scolopacidae		
Greater Yellowlegs	<i>Tringa melanoleuca</i>	X	X
Lesser Yellowlegs	<i>Tringa flavipes</i>	X	X
Solitary Sandpiper	<i>Tringa solitaria</i>	X	
Spotted Sandpiper	<i>Actitis macularia</i>	X	X
Long-billed Curlew	<i>Numenius americanus</i>	X	
Marbled Godwit	<i>Limosa fedoa</i>	X	
Western Sandpiper	<i>Calidris mauri</i>	X	
Least Sandpiper	<i>Calidris minutilla</i>	X	X
Baird's Sandpiper	<i>Calidris bairdii</i>	X	
Pectoral Sandpiper	<i>Calidris melanotos</i>	X	
Stilt Sandpiper	<i>Calidris himantopus</i>	X	
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	X	X
Wilson's Snipe	<i>Gallinago delicata</i>	X	X
Wilson's Phalarope	<i>Phalaropus tricolor</i>	X	
Red-necked Phalarope	<i>Phalaropus lobatus</i>	X	
Gulls	Laridae		
Ring-billed Gull	<i>Larus delawarensis</i>	X	X
California Gull	<i>Larus californicus</i>	X	
Herring Gull	<i>Larus argentatus</i>	X	
Forster's Tern	<i>Sterna forsteri</i>	X	
Doves	Columbidae		

Comparison of Miller (1974) to Project Team Census Data

Common Name	Scientific Name	1974 - Miller	2003 - Project Team
Rock Pigeon	<i>Columbia livia</i>		X
White-winged Dove	<i>Zenaida asiatica</i>		X
Mourning Dove	<i>Zenaida macroura</i>	X	X
Roadrunners	Cuculidae		
Greater Roadrunner	<i>Geococcyx californianus</i>	X	X
Typical Owls	Strigidae		
Great Horned Owl	<i>Bubo virginianus</i>	X	
Short-eared Owl	<i>Asio flammeus</i>	X	
Northern Saw-whet Owl	<i>Aegolius acadicus</i>		X
Nightjars	Caprimulgidae		
Lesser Nighthawk	<i>Chordeiles acutipennis</i>	X	X
Swifts	Apodidae		
Vaux's Swift	<i>Chaetura vauxi</i>		X
White-throated Swift	<i>Aeronautes saxatalis</i>	X	X
Hummingbirds	Trochilidae		
Black-chinned Hummingbird	<i>Archilochus alexandri</i>		X
Anna's Hummingbird	<i>Calypte anna</i>		X
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>	X	X
Kingfishers	Alcedinidae		
Belted Kingfisher	<i>Ceryle alcyon</i>	X	X
Woodpeckers	Picidae		
Ladder-backed Woodpecker	<i>Picoides scalaris</i>	X	
Northern Flicker	<i>Colaptes auratus</i>	X	X
Tyrant Flycatchers	Tyrannidae		
Olive-sided Flycatcher	<i>Contopus cooperi</i>	X	
Western Wood-Pewee	<i>Contopus sordidulus</i>	X	X
Hammond's Flycatcher	<i>Empidonax hammondi</i>	X	
Dusky Flycatcher	<i>Empidonax oberholseri</i>	X	
Western Flycatcher	<i>Empidonax difficilis</i>	X	
Black Phoebe	<i>Sayornis nigricans</i>	X	X
Say's Phoebe	<i>Sayornis saya</i>	X	X
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	X	X
Cassin's Kingbird	<i>Tyrannus vociferans</i>	X	X
Western Kingbird	<i>Tyrannus verticalis</i>	X	X
Scissor-tailed Flycatcher	<i>Tyrannus forficatus</i>	X	
Shrikes	Laniidae		
Loggerhead Shrike	<i>Lanius ludovicianus</i>	X	X

Comparison of Miller (1974) to Project Team Census Data

Common Name	Scientific Name	1974 - Miller	2003 - Project Team
Vireos	Vireonidae		
Solitary Vireo	<i>Vireo solitarius</i>	x	
Warbling Vireo	<i>Vireo gilvus</i>	x	x
Crows & Jays	Corvidae		
Western Scrub-Jay	<i>Aphelocoma californica</i>	x	x
Pinyon Jay	<i>Gymnorhinus cyanocephalus</i>		x
Clark's Nutcracker	<i>Nucifraga columbiana</i>	x	
Common Raven	<i>Corvus corax</i>	x	x
Larks	Alaudidae		
Horned Lark	<i>Eremophila alpestris</i>	x	
Swallows	Hirundinidae		
Tree Swallow	<i>Tachycineta bicolor</i>	x	x
Violet-green Swallow	<i>Tachycineta thalassina</i>	x	x
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	x	x
Bank Swallow	<i>Riparia riparia</i>	x	x
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	x	x
Barn Swallow	<i>Hirundo rustica</i>	x	x
Verdins	Remizidae		
Verdin	<i>Auriparus flaviceps</i>	x	x
Bushtits	Aegithalidae		
Bushtit	<i>Psaltriparus minimus</i>	x	x
Creepers	Certhiidae		
Brown Creeper	<i>Certhia americana</i>	x	
Wrens	Troglodytidae		
Cactus Wren	<i>Campylorhynchus brunneicapillus</i>	x	
Rock Wren	<i>Salpinctes obsoletus</i>	x	x
Bewick's Wren	<i>Thryomanes bewickii</i>	x	x
House Wren	<i>Troglodytes aedon</i>	x	
Winter Wren	<i>Troglodytes troglodytes</i>	x	
Marsh Wren	<i>Cistothorus palustris</i>	x	x
Kinglets	Regulidae		
Golden-crowned Kinglet	<i>Regulus satrapa</i>		x
Ruby-crowned Kinglet	<i>Regulus calendula</i>	x	x
Gnatcatchers	Sylviidae		
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	x	x
Black-tailed Gnatcatcher	<i>Polioptila melanura</i>	x	x
Thrushes	Turdidae		
Western Bluebird	<i>Sialia mexicana</i>	x	
Mountain Bluebird	<i>Sialia currucoides</i>	x	
Townsend's Solitaire	<i>Myadestes townsendi</i>	x	

Comparison of Miller (1974) to Project Team Census Data

Common Name	Scientific Name	1974 - Miller	2003 - Project Team
Hermit Thrush	<i>Catharus guttatus</i>	x	x
American Robin	<i>Turdus migratorius</i>	x	x
Mockingbirds & Thrashers	Mimidae		
Northern Mockingbird	<i>Mimus polyglottos</i>	x	x
Sage Thrasher	<i>Oreoscoptes montanus</i>	x	
Crissal Thrasher	<i>Toxostoma crissale</i>	x	x
Starlings	Sturnidae		
European Starling	<i>Sturnus vulgaris</i>	x	x
Pipits	Motacillidae		
American Pipit	<i>Anthus rubescens</i>	x	x
Waxwings	Bombycillidae		
Cedar Waxwing	<i>Bombycilla cedrorum</i>	x	x
Silky Flycatchers	Ptilonotidae		
Phainopepla	<i>Phainopepla nitens</i>	x	x
Wood-Warblers	Parulidae		
Orange-crowned Warbler	<i>Vermivora celata</i>	x	x
Lucy's Warbler	<i>Vermivora luciae</i>	x	x
Yellow Warbler	<i>Dendroica petechia</i>	x	x
Yellow-rumped Warbler	<i>Dendroica coronata</i>	x	x
Townsend's Warbler	<i>Dendroica townsendi</i>	x	
Palm Warbler	<i>Dendroica palmarum</i>		x
MacGillivray's Warbler	<i>Oporornis tolmiei</i>	x	x
Common Yellowthroat	<i>Geothlypis trichas</i>	x	x
Wilson's Warbler	<i>Wilsonia pusilla</i>	x	x
Yellow-breasted Chat	<i>Icteria virens</i>	x	x
Tanagers	Thraupidae		
Western Tanager	<i>Piranga ludoviciana</i>	x	x
Emberizids	Emberizidae		
Green-tailed Towhee	<i>Pipilo chlorurus</i>	x	
Spotted Towhee	<i>Pipilo maculatus</i>		x
Abert's Towhee	<i>Pipilo aberti</i>	x	x
Chipping Sparrow	<i>Spizella passerina</i>	x	x
Brewer's Sparrow	<i>Spizella breweri</i>	x	x
Vesper Sparrow	<i>Poocetes gramineus</i>	x	x
Lark Sparrow	<i>Chondestes grammacus</i>		x
Black-throated Sparrow	<i>Amphispiza bilineata</i>	x	x
Sage Sparrow	<i>Amphispiza belli</i>	x	
Savannah Sparrow	<i>Passerculus sandwichensis</i>	x	x
Fox Sparrow	<i>Passerella iliaca</i>		x
Song Sparrow	<i>Melospiza melodia</i>	x	x
Lincoln's Sparrow	<i>Melospiza lincolni</i>	x	x
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	x	x
Dark-eyed Junco	<i>Junco hyemalis</i>	x	x
Cardinals, Grosbeaks & Buntings	Cardinalidae		

Comparison of Miller (1974) to Project Team Census Data

Common Name	Scientific Name	1974 - Miller	2003 - Project Team
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	x	x
Blue Grosbeak	<i>Passerina caerulea</i>	x	x
Lazuli Bunting	<i>Passerina amoena</i>	x	x
Indigo Bunting	<i>Passerina cyanea</i>		x
Blackbirds	Icteridae		
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	x	x
Western Meadowlark	<i>Sturnella neglecta</i>	x	x
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	x	x
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	x	x
Great-tailed Grackle	<i>Quiscalus mexicanus</i>		x
Brown-headed Cowbird	<i>Molothrus ater</i>	x	x
Bullock's Oriole	<i>Icterus bullockii</i>	x	x
Scott's Oriole	<i>Icterus parisorum</i>	x	
Finches	Fringillidae		
House Finch	<i>Carpodacus mexicanus</i>	x	x
Pine Siskin	<i>Carduelis pinus</i>	x	
Lesser Goldfinch	<i>Carduelis psaltria</i>	x	x
Old World Sparrows	Passeridae		
House Sparrow	<i>Passer domesticus</i>	x	x
Total Species		158*	128

* Miller states that he discovered 170 species in the Wash, but he only listed those described here.

Order and nomenclature follow the A.O.U. Checklist (1998), including supplements 42 - 44, for all birds that were common to both studies. Species from Miller's survey that were not shared may follow the naming of the A.O.U. checklist from 1957.

Appendix L

Comparison of Project Team Census Data to Historical Avian Inventories

Comparison of Project Team Census Data to Historical Avian Inventories

Common Name	Scientific Name	1973 - Lawson	1973 - Bradley & Niles	2003 - Project Team
Waterfowl	Anatidae			
Canada Goose	<i>Branta canadensis</i>	x	x	x
Tundra Swan	<i>Cygnus columbianus</i>	x		
Wood Duck	<i>Aix sponsa</i>	x		x
Gadwall	<i>Anas strepera</i>	x	x	x
American Wigeon	<i>Anas americana</i>	x	x	x*
Mallard	<i>Anas platyrhynchos</i>	x	x	x
Blue-winged Teal	<i>Anas discors</i>	x	x	
Cinnamon Teal	<i>Anas cyanoptera</i>	x	x	x
Northern Shoveler	<i>Anas clypeata</i>	x	x	x
Northern Pintail	<i>Anas acuta</i>	x	x	x
Green-winged Teal	<i>Anas carolinensis</i>	x	x	x
Canvasback	<i>Aythya valisineria</i>	x	x	
Redhead	<i>Aythya americana</i>	x	x	x*
Ring-necked Duck	<i>Aythya collaris</i>	x	x	
Lesser Scaup	<i>Aythya affinis</i>	x	x	
White-winged Scoter	<i>Melanitta fusca</i>	x		
Bufflehead	<i>Bucephala albeola</i>	x	x	
Common Goldeneye	<i>Bucephala clangula</i>	x	x	x
Common Merganser	<i>Mergus merganser</i>	x	x	x
Red-breasted Merganser	<i>Mergus serrator</i>	x	x	
Ruddy Duck	<i>Oxyura jamaicensis</i>	x	x	x*
New World Quail	Odontophoridae			
Gambel's Quail	<i>Callipepla gambelii</i>	x	x	x
Loons	Gaviidae			
Common Loon	<i>Gavia immer</i>		x	
Grebes	Podicipedidae			
Pied-billed Grebe	<i>Podilymbus podiceps</i>	x	x	x
Horned Grebe	<i>Podiceps auritus</i>	x		
Eared Grebe	<i>Podiceps nigricollis</i>	x	x	x
Western Grebe	<i>Aechmophorus occidentalis</i>	x	x	x
Clark's Grebe	<i>Aechmophorus clarkii*</i>	x	x	x
Pelicans	Pelecanidae			
American White Pelican	<i>Pelecanus erythrorhynchos</i>	x	x	x*

Comparison of Project Team Census Data to Historical Avian Inventories

Common Name	Scientific Name	1973 - Lawson	1973 - Bradley & Niles	2003 - Project Team
Cormorants	Phalacrocoracidae			
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	x	x	x
Bitterns & Herons	Ardeidae			
American Bittern	<i>Botaurus lentiginosus</i>	x		
Great Blue Heron	<i>Ardea herodias</i>	x	x	x
Great Egret	<i>Ardea alba</i>	x	x	x
Snowy Egret	<i>Egretta thula</i>	x	x	x
Little Blue Heron	<i>Egretta caerulea</i>	x	x	
Green Heron	<i>Butorides virescens</i>	x	x	x
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	x	x	x
Ibises	Threskiornithidae			
White-faced Ibis	<i>Plegadis chihi</i>	x	x	x
New World Vultures	Cathartidae			
Turkey Vulture	<i>Cathartes aura</i>	x	x	x
Hawks	Accipitridae			
Osprey	<i>Pandion haliaetus</i>	x		x
Northern Harrier	<i>Circus cyaneus</i>	x	x	x
Sharp-shinned Hawk	<i>Accipiter striatus</i>	x	x	x
Cooper's Hawk	<i>Accipiter cooperii</i>	x	x	x
Northern Goshawk	<i>Accipiter gentilis</i>	x		
Red-shouldered Hawk	<i>Buteo lineatus</i>			x
Swainson's Hawk	<i>Buteo swainsoni</i>	x		
Red-tailed Hawk	<i>Buteo jamaicensis</i>	x	x	x
Ferruginous Hawk	<i>Buteo regalis</i>	x		
Rough-legged Hawk	<i>Buteo lagopus</i>	x		
Golden Eagle	<i>Aquila chrysaetos</i>	x		
Falcons	Falconidae			
American Kestrel	<i>Falco sparverius</i>	x	x	x
Merlin	<i>Falco columbarius</i>			x*
Peregrine Falcon	<i>Falco peregrinus</i>	x		x
Prairie Falcon	<i>Falco mexicanus</i>	x	x	x

Comparison of Project Team Census Data to Historical Avian Inventories

Common Name	Scientific Name	1973 - Lawson	1973 - Bradley & Niles	2003 - Project Team
Rails, Gallinules & Coots	Rallidae			
Virginia Rail	<i>Rallus limicola</i>	x	x	x
Sora	<i>Porzana carolina</i>	x	x	x*
Common Moorhen	<i>Gallinula chloropus</i>	x	x	x
American Coot	<i>Fulica americana</i>	x	x	x
Plovers	Charadriidae			
Black-bellied Plover	<i>Pluvialis squatarola</i>	x		
American Golden-Plover	<i>Pluvialis dominica</i>	x		
Snowy Plover	<i>Charadrius alexandrinus</i>	x	x	
Semipalmated Plover	<i>Charadrius semipalmatus</i>	x	x	
Killdeer	<i>Charadrius vociferous</i>	x	x	x
Mountain Plover	<i>Charadrius montanus</i>	x		
Stilts & Avocets	Recurvirostridae			
Black-necked Stilt	<i>Himantopus mexicanus</i>	x	x	x
American Avocet	<i>Recurvirostra americana</i>	x	x	x
Sandpipers	Scolopacidae			
Greater Yellowlegs	<i>Tringa melanoleuca</i>	x	x	x
Lesser Yellowlegs	<i>Tringa flavipes</i>	x	x	x
Solitary Sandpiper	<i>Tringa solitaria</i>	x	x	x*
Willet	<i>Catoptrophorus semipalmatus</i>	x	x	
Spotted Sandpiper	<i>Actitis macularia</i>	x	x	x
Upland Sandpiper	<i>Bartramia longicauda</i>	x		
Whimbrel	<i>Numenius phaeopus</i>	x		
Long-billed Curlew	<i>Numenius americanus</i>	x	x	
Marbled Godwit	<i>Limosa fedoa</i>	x	x	
Red Knot	<i>Calidris canutus</i>	x		
Semipalmated Sandpiper	<i>Calidris pusilla</i>	x		
Western Sandpiper	<i>Calidris mauri</i>	x	x	x*
Least Sandpiper	<i>Calidris minutilla</i>	x	x	x
Baird's Sandpiper	<i>Calidris bairdii</i>	x	x	
Pectoral Sandpiper	<i>Calidris melanotos</i>	x	x	
Dunlin	<i>Calidris alpina</i>	x		
Stilt Sandpiper	<i>Calidris himantopus</i>	x		
Short-billed Dowitcher	<i>Limnodromus griseus</i>	x		
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	x	x	x
Wilson's Snipe	<i>Gallinago delicata</i>	x	x	x

Comparison of Project Team Census Data to Historical Avian Inventories

Common Name	Scientific Name	1973 - Lawson	1973 - Bradley & Niles	2003 - Project Team
Wilson's Phalarope	<i>Phalaropus tricolor</i>	x	x	
Red-necked Phalarope	<i>Phalaropus lobatus</i>	x	x	
Gulls	Laridae			
Franklin's Gull	<i>Larus pipixcan</i>	x		
Bonaparte's Gull	<i>Larus philadelphia</i>	x	x	
Mew Gull	<i>Larus canus</i>	x		
Ring-billed Gull	<i>Larus delawarensis</i>	x	x	x
California Gull	<i>Larus californicus</i>	x		
Herring Gull	<i>Larus argentatus</i>	x		
Glaucous-winged Gull	<i>Larus glaucescens</i>	x		
Caspian Tern	<i>Sterna caspia</i>	x		
Common Tern	<i>Sterna hirundo</i>	x		
Forster's Tern	<i>Sterna forsteri</i>	x		
Least Tern	<i>Sterna antillarum</i>	x		
Black Tern	<i>Chlidonias niger</i>	x		
Doves	Columbidae			
Rock Pigeon	<i>Columbia livia</i>			x
White-winged Dove	<i>Zenaida asiatica</i>	x		x
Mourning Dove	<i>Zenaida macroura</i>	x	x	x
Common Ground-Dove	<i>Columbina passerina</i>	x		
Roadrunners	Cuculidae			
Greater Roadrunner	<i>Geococcyx californianus</i>	x	x	x
Barn Owls	Tytonidae			
Barn Owl	<i>Tyto alba</i>	x		x*
Typical Owls	Strigidae			
Great Horned Owl	<i>Bubo virginianus</i>	x	x	
Burrowing Owl	<i>Athene cunicularia</i>	x		
Short-eared Owl	<i>Asio flammeus</i>	x	x	
Northern Saw-whet Owl	<i>Aegolius acadicus</i>			x
Nightjars	Caprimulgidae			
Lesser Nighthawk	<i>Chordeiles acutipennis</i>	x	x	x*
Common Nighthawk	<i>Chordeiles minor</i>	x		

Comparison of Project Team Census Data to Historical Avian Inventories

Common Name	Scientific Name	1973 - Lawson	1973 - Bradley & Niles	2003 - Project Team
Swifts	Apodidae			
Vaux's Swift	<i>Chaetura vauxi</i>	x		x
White-throated Swift	<i>Aeronautes saxatalis</i>	x	x	x
Hummingbirds	Trochilidae			
Black-chinned Hummingbird	<i>Archilochus alexandri</i>	x		x
Anna's Hummingbird	<i>Calypte anna</i>			x
Costa's Hummingbird	<i>Calypte costae</i>	x		
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>	x	x	x
Rufous Hummingbird	<i>Selasphorus rufus</i>	x		
Kingfishers	Alcedinidae			
Belted Kingfisher	<i>Ceryle alcyon</i>	x	x	x
Woodpeckers	Picidae			
Lewis's Woodpecker	<i>Melanerpes lewis</i>	x		
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	x		
Ladder-backed Woodpecker	<i>Picoides scalaris</i>	x	x	
Northern Flicker	<i>Colaptes auratus</i>	x	x	x
Tyrant Flycatchers	Tyrannidae			
Olive-sided Flycatcher	<i>Contopus cooperi</i>	x	x	
Western Wood-Pewee	<i>Contopus sordidulus</i>	x	x	x
Willow Flycatcher	<i>Empidonax traillii</i>	x		
Hammond's Flycatcher	<i>Empidonax hammondii</i>		x	
Gray Flycatcher	<i>Empidonax wrightii</i>	x		
Dusky Flycatcher	<i>Empidonax oberholseri</i>	x	x	
Western Flycatcher	<i>Empidonax difficilis</i>	x	x	
Black Phoebe	<i>Sayornis nigricans</i>	x	x	x
Say's Phoebe	<i>Sayornis saya</i>	x	x	x
Vermilion Flycatcher	<i>Pyrocephalus rubinus</i>	x		
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	x		x
Cassin's Kingbird	<i>Tyrannus vociferans</i>	x	x	x
Western Kingbird	<i>Tyrannus verticalis</i>	x	x	x
Eastern Kingbird	<i>Tyrannus tyrannus</i>	x		
Scissor-tailed Flycatcher	<i>Tyrannus forficatus</i>	x	x	

Comparison of Project Team Census Data to Historical Avian Inventories

Common Name	Scientific Name	1973 - Lawson	1973 - Bradley & Niles	2003 - Project Team
Shrikes	Laniidae			
Loggerhead Shrike	<i>Lanius ludovicianus</i>	x	x	x
Northern Shrike	<i>Lanius excubitor</i>	x	x	
Vireos	Vireonidae			
Bell's Vireo	<i>Vireo bellii</i>	x		
Solitary Vireo	<i>Vireo solitarius</i>	x	x	
Hutton's Vireo	<i>Vireo huttoni</i>	x		
Warbling Vireo	<i>Vireo gilvus</i>	x		x
Red-eyed Vireo	<i>Vireo olivaceus</i>	x		
Crows & Jays	Corvidae			
Western Scrub-Jay	<i>Aphelocoma californica</i>	x	x	x
Pinyon Jay	<i>Gymnorhinus cyanocephalus</i>	x		x
Common Raven	<i>Corvus corax</i>	x	x	x
Larks	Alaudidae			
Horned Lark	<i>Eremophila alpestris</i>	x	x	x*
Swallows	Hirundinidae			
Purple Martin	<i>Progne subis</i>	x	x	
Tree Swallow	<i>Tachycineta bicolor</i>	x	x	x
Violet-green Swallow	<i>Tachycineta thalassina</i>	x	x	x
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	x	x	x
Bank Swallow	<i>Riparia riparia</i>	x	x	x
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	x	x	x
Barn Swallow	<i>Hirundo rustica</i>	x	x	x
Verdins	Remizidae			
Verdin	<i>Auriparus flaviceps</i>	x	x	x
Bushtits	Aegithalidae			
Bushtit	<i>Psaltriparus minimus</i>	x	x	x
Nuthatches	Sittidae			
Red-breasted Nuthatch	<i>Sitta canadensis</i>	x		
White-breasted Nuthatch	<i>Sitta carolinensis</i>	x		

Comparison of Project Team Census Data to Historical Avian Inventories

Common Name	Scientific Name	1973 - Lawson	1973 - Bradley & Niles	2003 - Project Team
Creepers	Certhiidae			
Brown Creeper	<i>Certhia americana</i>	x		
Wrens	Troglodytidae			
Cactus Wren	<i>Campylorhynchus brunneicapillus</i>	x	x	
Rock Wren	<i>Salpinctes obsoletus</i>		x	x
Bewick's Wren	<i>Thryomanes bewickii</i>	x	x	x
House Wren	<i>Troglodytes aedon</i>	x	x	
Winter Wren	<i>Troglodytes troglodytes</i>	x		
Marsh Wren	<i>Cistothorus palustris</i>	x	x	x
Kinglets	Regulidae			
Golden-crowned Kinglet	<i>Regulus satrapa</i>	x	x	x
Ruby-crowned Kinglet	<i>Regulus calendula</i>	x	x	x
Gnatcatchers	Sylviidae			
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	x	x	x
Black-tailed Gnatcatcher	<i>Polioptila melanura</i>	x	x	x
Thrushes	Turdidae			
Western Bluebird	<i>Sialia mexicana</i>	x	x	
Mountain Bluebird	<i>Sialia currucoides</i>	x	x	x*
Townsend's Solitaire	<i>Myadestes townsendi</i>	x	x	
Swainson's Thrush	<i>Catharus ustulatus</i>	x		
Hermit Thrush	<i>Catharus guttatus</i>	x	x	x
American Robin	<i>Turdus migratorius</i>	x	x	x
Mockingbirds & Thrashers	Mimidae			
Northern Mockingbird	<i>Mimus polyglottos</i>	x	x	x
Sage Thrasher	<i>Oreoscoptes montanus</i>	x	x	
Crissal Thrasher	<i>Toxostoma crissale</i>	x	x	x
Le Conte's Thrasher	<i>Toxostoma lecontei</i>	x		
Starlings	Sturnidae			
European Starling	<i>Sturnus vulgaris</i>	x	x	x
Pipits	Motacillidae			
American Pipit	<i>Anthus rubescens</i>	x	x	x

Comparison of Project Team Census Data to Historical Avian Inventories

Common Name	Scientific Name	1973 - Lawson	1973 - Bradley & Niles	2003 - Project Team
Waxwings	Bombycillidae			
Bohemian Waxwing	<i>Bombycilla garrulus</i>	x	x	
Cedar Waxwing	<i>Bombycilla cedrorum</i>	x		x
Silky Flycatchers	Ptilonotidae			
Phainopepla	<i>Phainopepla nitens</i>	x	x	x
Wood-Warblers	Parulidae			
Orange-crowned Warbler	<i>Vermivora celata</i>	x	x	x
Nashville's Warbler	<i>Vermivora ruficapilla</i>	x		
Virginia's Warbler	<i>Vermivora virginiae</i>	x		
Lucy's Warbler	<i>Vermivora luciae</i>	x	x	x
Yellow Warbler	<i>Dendroica petechia</i>	x	x	x
Yellow-rumped Warbler	<i>Dendroica coronata</i>	x	x	x
Black-throated Gray Warbler	<i>Dendroica nigrescens</i>	x		
Townsend's Warbler	<i>Dendroica townsendi</i>	x	x	
Palm Warbler	<i>Dendroica palmarum</i>			x
American Redstart	<i>Setophaga ruticilla</i>	x		
MacGillivray's Warbler	<i>Oporornis tolmiei</i>	x	x	x
Common Yellowthroat	<i>Geothlypis trichas</i>	x	x	x
Wilson's Warbler	<i>Wilsonia pusilla</i>	x	x	x
Yellow-breasted Chat	<i>Icteria virens</i>	x	x	x
Tanagers	Thraupidae			
Summer Tanager	<i>Piranga rubra</i>	x		
Western Tanager	<i>Piranga ludoviciana</i>	x	x	x
Emberizids	Emberizidae			
Green-tailed Towhee	<i>Pipilo chlorurus</i>	x	x	
Spotted Towhee	<i>Pipilo maculatus</i>			x
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	x		
Abert's Towhee	<i>Pipilo aberti</i>	x	x	x
American Tree Sparrow	<i>Spizella arborea</i>	x		
Chipping Sparrow	<i>Spizella passerina</i>	x	x	x
Brewer's Sparrow	<i>Spizella breweri</i>	x	x	x
Vesper Sparrow	<i>Pooecetes gramineus</i>	x		x
Lark Sparrow	<i>Chondestes grammacus</i>	x		x
Black-throated Sparrow	<i>Amphispiza bilineata</i>	x	x	x

Comparison of Project Team Census Data to Historical Avian Inventories

Common Name	Scientific Name	1973 - Lawson	1973 - Bradley & Niles	2003 - Project Team
Sage Sparrow	<i>Amphispiza belli</i>	x	x	
Savannah Sparrow	<i>Passerculus sandwichensis</i>	x	x	x
Fox Sparrow	<i>Passerella iliaca</i>	x		x
Song Sparrow	<i>Melospiza melodia</i>	x	x	x
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	x	x	x
Swamp Sparrow	<i>Melospiza georgiana</i>	x		
White-throated Sparrow	<i>Zonotrichia albicollis</i>	x		
Harris's Sparrow	<i>Zonotrichia querula</i>	x		
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	x	x	x
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>	x		
Dark-eyed Junco	<i>Junco hyemalis</i>	x		x
Lapland Longspur	<i>Calcarius lapponicus</i>	x		
Cardinals, Grosbeaks & Buntings	Cardinalidae			
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	x	x	x
Blue Grosbeak	<i>Passerina caerulea</i>	x	x	x
Lazuli Bunting	<i>Passerina amoena</i>	x	x	x
Indigo Bunting	<i>Passerina cyanea</i>	x		x
Blackbirds	Icteridae			
Bobolink	<i>Dolichonyx oryzivorus</i>	x		
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	x	x	x
Western Meadowlark	<i>Sturnella neglecta</i>	x	x	x
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	x	x	x
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	x	x	x
Great-tailed Grackle	<i>Quiscalus mexicanus</i>	x		x
Brown-headed Cowbird	<i>Molothrus ater</i>	x	x	x
Hooded Oriole	<i>Icterus cucullatus</i>	x		
Bullock's Oriole	<i>Icterus bullockii</i>	x		x
Scott's Oriole	<i>Icterus parisorum</i>	x	x	
Finches	Fringillidae			
House Finch	<i>Carpodacus mexicanus</i>	x	x	x
Pine Siskin	<i>Carduelis pinus</i>	x		
Lesser Goldfinch	<i>Carduelis psaltria</i>	x	x	x
American Goldfinch	<i>Carduelis tristis</i>	x		

Comparison of Project Team Census Data to Historical Avian Inventories

Common Name	Scientific Name	1973 - Lawson	1973 - Bradley & Niles	2003 - Project Team
Old World Sparrows	Passeridae			
House Sparrow	<i>Passer domesticus</i>	x	x	x

* Species was not identified during the census, but was detected by Project Team staff or licensed consultants while conducting other work along the Wash.

Order and nomenclature follow the A.O.U. Checklist (1998), including supplements 42 - 44, for all species that were shared by the Lawson, Bradley and Niles, and Project Team lists. Species from Lawson and Bradley and Niles that were not also identified by the Project Team may follow the naming of the A.O.U. checklist from 1957.

Appendix M
Clark County Multiple Species Habitat Conservation Plan:
Bird Species Detected during the Project Team Census

Clark County Multiple Species Habitat Conservation Plan:

Bird Species Detected during the Project Team Census

Covered Species

Peregrine Falcon

Phainopepla

Blue Grosbeak

Evaluation Species

Loggerhead Shrike

Crissal Thrasher

Watch List Species

Green Heron

White-faced Ibis

Northern Saw-whet Owl