

IDAHO NATIONAL LABORATORY 2005 BREEDING BIRD SURVEYS

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February 2006**

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EXECUTIVE SUMMARY

Annual breeding bird surveys have been conducted on the INL since 1985 to monitor changes in bird populations. Surveys were conducted during 2005 from June 3 to June 27. A total of 6,726 individuals representing 71 species of birds were recorded along 14 permanent routes. Horned lark (N=2077), western meadowlark (N=1087), Brewer's sparrow (N=661), sage thrasher (N=598), and sage sparrow (N=389) continue to be the top five most abundant species on the INL. American white pelican, rough-legged hawk, and canvasback were recorded this year for the first time during these surveys. Species with a state rank of rare or uncommon, imperiled, or critically imperiled recorded in 2005 include American white pelican (N=6), ferruginous hawk (N=15), long-billed curlew (N=9), Franklin's gull (N=123), ring-billed gull (N=2), western burrowing owl (N=4), loggerhead shrike (N=40), northern mockingbird (N=1), and lark bunting (N=4).



Long-billed Curlew

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Appendix

Appendix A - Summary of Species by Route

Acronyms

| | |
|-------|---|
| BBS | Breeding Bird Survey |
| BLR | Big Lost River |
| CB | Circular Butte |
| CFA | Central Facilities Area |
| DOE | Department of Energy |
| INL | Idaho National Laboratory |
| INTEC | Idaho Nuclear Technology and Engineering Center |
| KC | Kyle Canyon |
| MFC | Materials and Fuels Complex |
| NRF | Naval Reactor Facility |
| PBF | Power Burst Facility |
| RWMC | Radioactive Waste Management Complex |
| TAN | Test Area North |
| TB | Twin Butte |
| TF | Tractor Flats |
| TRA | Test Reactor Area |
| USGS | United States Geological Survey |
| WTF | Wastewater Treatment Facility |

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INTRODUCTION



The Breeding Bird Survey (BBS) is a large-scale survey of North American birds. It is a roadside route survey of avifauna designed to monitor abundance and distribution of birds primarily covering the continental United States and southern Canada, although survey routes have recently been initiated in Alaska and northern Mexico (Sauer et al. 2003). The BBS was started in the eastern U.S. in 1966 with over 3,500 routes currently surveyed each June by experienced birders (USGS

2001).

The primary objective of the BBS is the estimation of population change for songbirds. However, the data have many potential uses, and investigators have used the data to address a variety of research and management objectives.

The Idaho National Laboratory (INL), located in southeastern Idaho, is comprised of large expanses of relatively undisturbed shrub-steppe and grassland habitat. This area was designated as a National Environmental Research Park in 1975 and serves as an outdoor laboratory to assess environmental impacts of nuclear energy development technologies. Since 1985, official BBS and unofficial facility routes have been surveyed at the INL. These surveys yield useful information about population dynamics, effects of weather and fire on avian abundance, effects of INL facilities on avifauna, and the breeding status of a number of bird species of concern, including sagebrush obligate species and other species exhibiting declines throughout their range (e.g., see Belthoff and Ellsworth 1996, 1999 and 2000, Belthoff et al. 1998, and Ellsworth 2001).

This report summarizes results of surveys conducted in 2005 at the INL and compares findings to those from previous years.

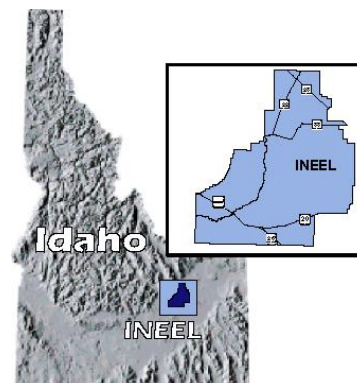
STUDY AREA

The 2,315-km² INL is located approximately 48 km west of Idaho Falls on the upper Snake River Plain in southeastern Idaho, and occupies portions of Bingham, Bonneville, Butte, Clark, and Jefferson counties. The area is a semi-arid, cold desert with an elevation of approximately 1500 m above sea level. Anderson et al. (1996)

detailed the climate, geology, and vegetation of the INL. Briefly, vegetation in the study area is typical of shrub-steppe ecosystems and is dominated by woody, mid-height shrubs and perennial bunchgrasses. Big sagebrush (*Artemisia tridentata*) dominates much

of the vegetation on the site, but other primary shrubs include green rabbitbrush (*Chrysothamnus viscidiflorus*), shadscale (*Atriplex confertifolia*), and winterfat (*Krascheninnikovia lanata*).

Native grasses that are dominant throughout the site are bottlebrush squirreltail (*Elymus elymoides*), thickspike wheatgrass (*Elymus lanceolatus*), needle-and-thread grass (*Hesperostipa comata*), Indian ricegrass (*Achnatherum hymenoides*), and bluebunch wheatgrass (*Pseudoroegneria spicata*). Basalt lava flows dominate the geology of the region, and the topography is flat to gently rolling, with the exception of East and Middle Buttes, which protrude



from the southern portion of the area. The southern extensions of two of the largest mountain ranges in Idaho (Lost River and Lemhi Mountains) rise above the INL site and Snake River Plain to the north and west. The area experiences hot, dry summers and cold winters (Short 1986). Annual precipitation averages approximately 20 cm, and most of this occurs during the spring. Surface water in the summer is limited to residual flows of the Big Lost River and Birch Creek, each of which are diverted upstream of the site for agriculture and flood prevention. During the spring, the Big Lost River may flow into an ephemeral wetland known as the Lost River Sinks, which can provide nesting and migratory stopover habitat for waterfowl and shorebirds. Several human-made wastewater treatment ponds are located near research facilities which attract birds that prefer aquatic habitats.

METHODS

Fourteen Breeding Bird Survey routes were surveyed June 3-27, 2005 (Figure 1). Five remote routes are standard 40-km BBS routes, data from which are reported to the USGS Biological Resources Division annually. These routes traverse the remote areas of the INL and include major habitat types throughout the site. Eight facility routes are located in and around major INL facility complexes. An additional survey route was established in 1997 around the CFA Wastewater Treatment Facility (WTF) as part of an experiment designed to monitor how wastewater application affects flora and fauna.

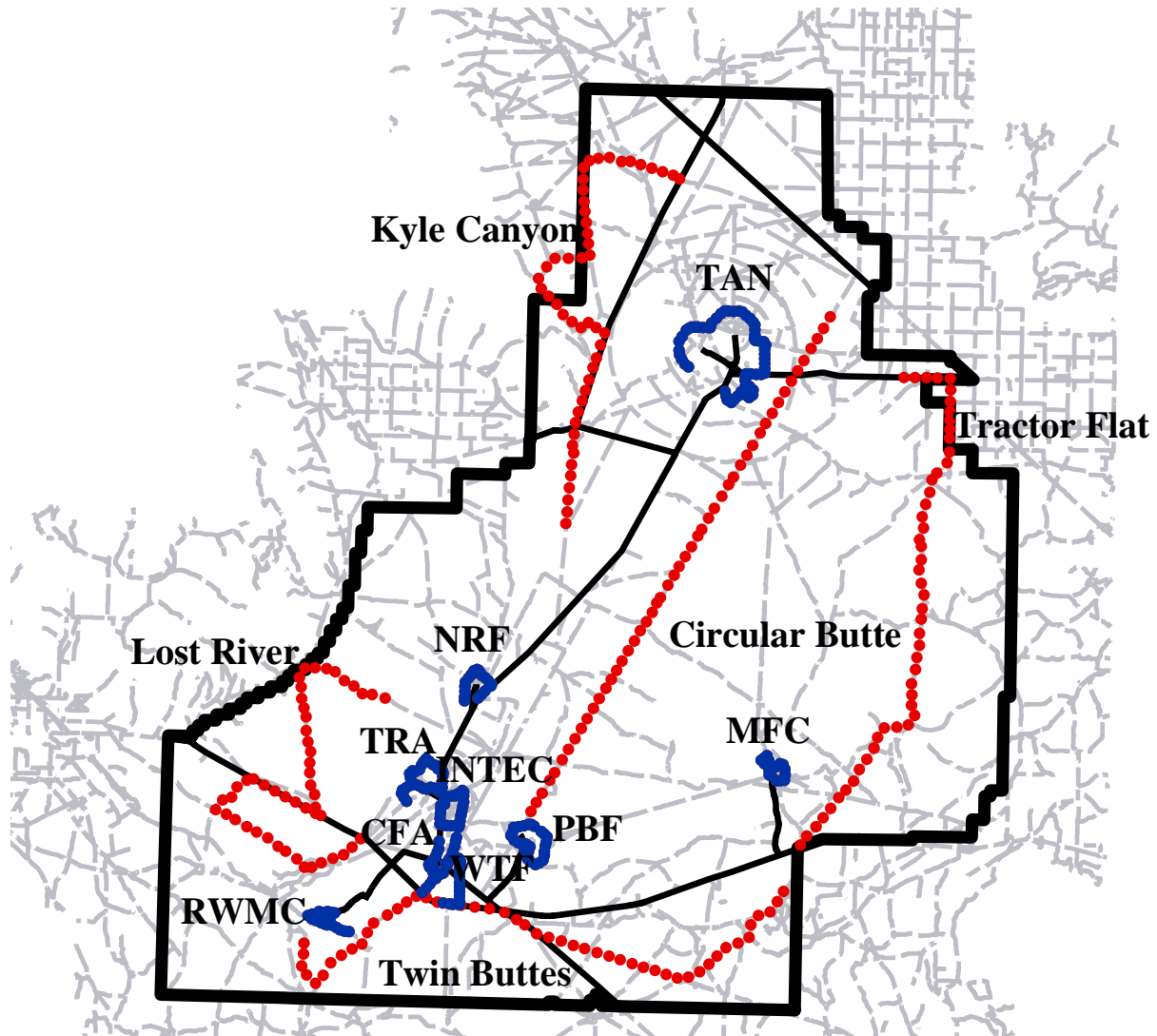


Figure 1. Facility (blue) and remote (red) breeding bird survey routes on the INL.

The North American Breeding Bird Survey protocol (USGS 2001), provided by USGS Patuxent Wildlife Research Center, was followed in completing each of these surveys. For remote routes we located 50 stops at approximately 0.5-mile (0.8 km) intervals and counted all individual birds (except dependent young) of all species seen or heard during a 3-minute period within 0.25-mile (0.4 km) of the stop. Facility routes consist of 18–60 stop locations at approximately 0.2-mile (0.32 km) intervals and individual birds were recorded if they were within 0.1-mile (0.16 km) from the observer (i.e., half the distance between stops). Individuals known or strongly suspected to have been counted at a previous stop were not counted. Surveys began approximately ½ hour



Sage Grouse Hen

before official sunrise as given by the Astronomical Applications Department, U.S. Naval Observatory (2005). A certified Breeding Bird Survey observer relayed counts verbally from outside the vehicle to an assistant who recorded the information on an official data sheet. Each route took approximately 1- 6 hours to complete.

Temperature, wind speed, and cloud cover were recorded at the start and end of each survey route. Surveys were conducted only under satisfactory weather conditions including good visibility, little or no precipitation, and light winds in order to be comparable to previous years. Survey dates for each route can be found in Appendix A.

Trends for selected species were calculated by using least squares. Trend data is used to display what populations of selected species have been doing over time and their responses to habitat change.

RESULTS AND DISCUSSION

Bird abundance and species richness

Abundance — A total of 6,726 individual birds were recorded along the 14 survey routes (Figure 2). This is above the annual mean of 4,917 birds (no surveys were conducted in 1992 or 1993).

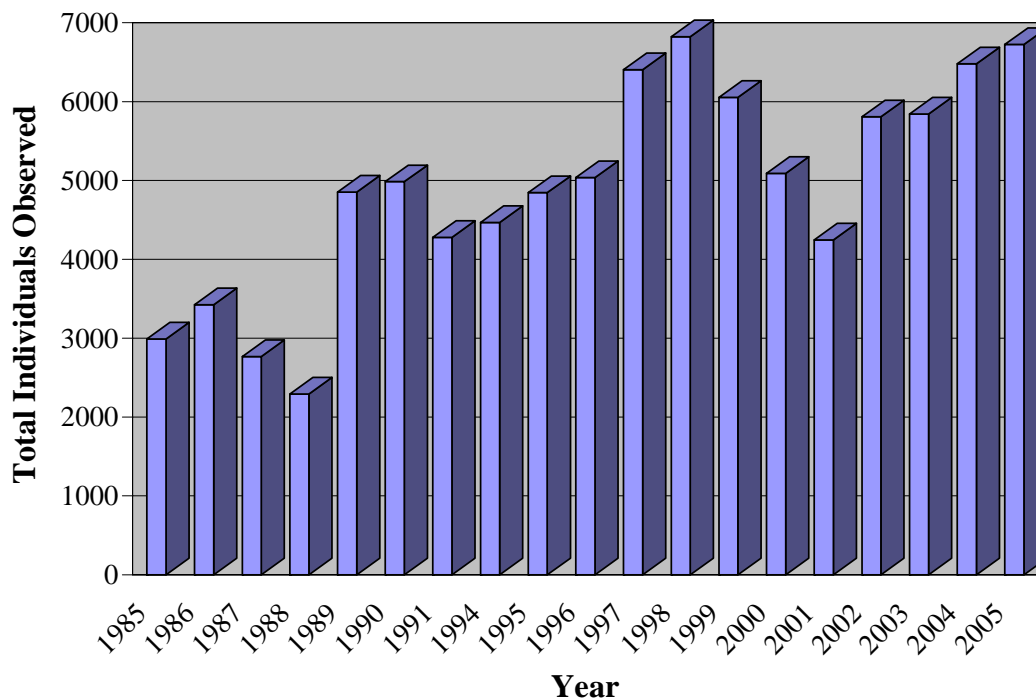


Figure 2. Total number of birds recorded by year (1985-2005) along 14 permanent routes at the INL.

Horned larks (*Eremophila alpestris*) were the most abundant species recorded on the INL during 2005. Horned larks comprised of more than 30 percent of all birds counted, occurred on all routes, and on 87 percent of stops (Table 1).

Table 1. Species and number of birds observed along all 14 Breeding Bird Survey routes at the Idaho National Laboratory during the 2005 census.

| Common Name | Scientific Name | N | percent Routes¹ | Stops² | percent |
|------------------------------|--------------------------------------|----------|-----------------------------------|--------------------------|----------------|
| Horned Lark | <i>Eremophila alpestris</i> | 2077 | 30.9 | 5,9 | 436 87.0 |
| Western Meadowlark | <i>Sturnella neglecta</i> | 1087 | 16.2 | 5,9 | 383 76.4 |
| Brewer's Sparrow | <i>Spizella breweri</i> | 661 | 9.8 | 5,9 | 311 62.1 |
| Sage Thrasher | <i>Oreoscoptes montanus</i> | 598 | 8.9 | 5,9 | 363 72.5 |
| Sage Sparrow | <i>Amphispiza belli</i> | 389 | 5.8 | 5,8 | 253 50.5 |
| Brown-headed Cowbird | <i>Molothrus ater</i> | 234 | 3.5 | 5,9 | 121 24.1 |
| Vesper Sparrow | <i>Pooecetes gramineus</i> | 218 | 3.2 | 5,7 | 124 24.7 |
| Brewer's Blackbird | <i>Euphagus cyanocephalus</i> | 183 | 2.7 | 3,7 | 55 11.0 |
| Grasshopper Sparrow | <i>Ammodramus savannarum</i> | 177 | 2.6 | 4,8 | 116 23.1 |
| Mourning Dove | <i>Zenaida macroura</i> | 140 | 2.1 | 5,9 | 80 16.0 |
| Franklin's Gull ³ | <i>Larus pipixcan</i> | 123 | 1.8 | 1,1 | 10 2.0 |
| Chipping Sparrow | <i>Spizella passerina</i> | 92 | 1.4 | 5,8 | 80 16.0 |
| Common Raven | <i>Corvus corax</i> | 89 | 1.3 | 5,8 | 58 11.6 |
| Barn Swallow | <i>Hirundo rustica</i> | 70 | 1.0 | 2,7 | 29 5.8 |
| Killdeer | <i>Charadrius vociferus</i> | 51 | 0.7 | 2,7 | 39 7.8 |
| Loggerhead Shrike | <i>Lanius ludovicianus</i> | 40 | 0.6 | 5,2 | 26 5.2 |
| Black-billed Magpie | <i>Pica pica</i> | 35 | 0.5 | 3,2 | 15 3.0 |
| House Finch | <i>Carpodacus mexicanus</i> | 32 | 0.5 | 2,6 | 18 3.6 |
| Rock Wren | <i>Salpinctes obsoletus</i> | 31 | 0.5 | 5,5 | 26 5.2 |
| Gray Flycatcher | <i>Empidonax wrightii</i> | 31 | 0.5 | 3,0 | 16 3.2 |
| European Starling | <i>Sturnus vulgaris</i> | 29 | 0.4 | 1,4 | 15 3.0 |
| Common Nighthawk | <i>Chordeiles minor</i> | 22 | 0.3 | 1,6 | 18 3.6 |
| Yellow-head Blackbird | <i>Xanthocephalus xanthocephalus</i> | 22 | 0.3 | 0,3 | 7 1.4 |
| Gadwall | <i>Anas strepera</i> | 21 | 0.3 | 0,5 | 7 1.4 |
| Red-tailed Hawk | <i>Buteo jamaicensis</i> | 19 | 0.3 | 5,3 | 16 3.2 |
| Say's Phoebe | <i>Sayornis saya</i> | 18 | 0.3 | 0,8 | 16 3.2 |

Table 1. Species and number of birds observed along all 14 Breeding Bird Survey routes at the Idaho National Laboratory during the 2005 census. (Continued)

| Common Name | Scientific Name | N | percent | Routes ¹ | Stops ² | percent |
|-------------------------------------|-----------------------------------|----|---------|---------------------|--------------------|---------|
| Wilson's Phalarope | <i>Phalaropus tricolor</i> | 16 | 0.2 | 0,3 | 4 | 0.8 |
| American Robin | <i>Turdus migratorius</i> | 16 | 0.2 | 0,5 | 11 | 2.2 |
| Ferruginous Hawk | <i>Buteo regalis</i> | 15 | 0.2 | 2,2 | 11 | 2.2 |
| Mallard | <i>Anas platyrhynchos</i> | 13 | 0.2 | 0,3 | 3 | 0.6 |
| Short-eared Owl | <i>Asio flammeus</i> | 13 | 0.2 | 3,3 | 12 | 2.4 |
| Violet-green Swallow | <i>Tachycineta thalassina</i> | 12 | 0.2 | 2,1 | 6 | 1.2 |
| Lesser Scaup | <i>Aythya affinis</i> | 10 | 0.1 | 0,2 | 2 | 0.4 |
| Cliff Swallow | <i>Hirundo pyrrhonota</i> | 10 | 0.1 | 1,3 | 7 | 1.4 |
| Rough-winged Swallow | <i>Stelgidopteryx serripennis</i> | 9 | 0.1 | 1,2 | 6 | 1.2 |
| Long-billed Curlew | <i>Numenius americanus</i> | 9 | 0.1 | 2, | 6 | 1.2 |
| Red-winged Blackbird | <i>Agelaius phoeniceus</i> | 8 | 0.1 | 0,2 | 5 | 1.0 |
| Rock Pigeon | <i>Columba livia</i> | 6 | <0.1 | 0,2 | 3 | 0.6 |
| American Crow | <i>Corvus brachyrhynchos</i> | 6 | <0.1 | 1,0 | 3 | 0.6 |
| Northern Harrier | <i>Circus cyaneus</i> | 6 | <0.1 | 2,2 | 6 | 1.2 |
| Lazuli Bunting | <i>Passerina amoena</i> | 6 | <0.1 | 1,1 | 2 | 0.4 |
| Western Tanager | <i>Piranga ludoviciana</i> | 6 | <0.1 | 2,1 | 4 | 0.8 |
| American White Pelican ³ | <i>Pelecanus erythrorhynchos</i> | 6 | <0.1 | 1,0 | 1 | 0.2 |
| Western Kingbird | <i>Tyrannus verticalis</i> | 5 | <0.1 | 1,2 | 4 | 0.8 |
| American Kestrel | <i>Falco sparverius</i> | 5 | <0.1 | 1,2 | 5 | 1.0 |
| Prairie Falcon | <i>Falco mexicanus</i> | 5 | <0.1 | 2,2 | 5 | 1.0 |
| Lark Bunting | <i>Calamospiza melanocorys</i> | 4 | <0.1 | 2,0 | 4 | 0.8 |
| Eared Grebe | <i>Podiceps nigricollis</i> | 4 | <0.1 | 0,1 | 1 | 0.2 |
| Pine Siskin | <i>Carduelis pinus</i> | 4 | <0.1 | 1,0 | 2 | 0.4 |
| Burrowing Owl | <i>Athene cunicularia</i> | 4 | <0.1 | 2,1 | 3 | 0.6 |
| Cinnamon Teal | <i>Anas cyanoptera</i> | 3 | <0.1 | 0,1 | 1 | 0.2 |
| American Coot | <i>Fulica americana</i> | 3 | <0.1 | 0,2 | 2 | 0.4 |

Table 1. Species and number of birds observed along all 14 Breeding Bird Survey routes at the Idaho National Laboratory during the 2005 census. (Continued)

| Common Name | Scientific Name | N | percent | Routes ¹ | Stops ² | percent |
|--------------------------------|----------------------------------|---|---------|---------------------|--------------------|---------|
| Rough-legged Hawk ³ | <i>Buteo lagopus</i> | 3 | <0.1 | 2,0 | 2 | 0.4 |
| Swainson's Hawk | <i>Buteo swainsoni</i> | 2 | <0.1 | 1,1 | 2 | 0.4 |
| Common Poorwill | <i>Phalaenoptilus nuttallii</i> | 2 | <0.1 | 0,2 | 2 | 0.4 |
| Lark Sparrow | <i>Chondestes grammacus</i> | 2 | <0.1 | 1,1 | 2 | 0.4 |
| Sage Grouse | <i>Centrocercus urophasianus</i> | 2 | <0.1 | 0,1 | 2 | 0.4 |
| House Sparrow | <i>Passer domesticus</i> | 2 | <0.1 | 0,1 | 1 | 0.2 |
| Savannah Sparrow | <i>Passerculus sandwichensis</i> | 2 | <0.1 | 1,0 | 2 | 0.4 |
| Green-tailed Towhee | <i>Pipio chlorurus</i> | 2 | <0.1 | 1,0 | 2 | 0.4 |
| Redhead | <i>Aythya americana</i> | 2 | <0.1 | 0,1 | 1 | 0.2 |
| Ruddy Duck | <i>Oxyura jamaicensis</i> | 2 | <0.1 | 0,1 | 1 | 0.2 |
| Blue-wing Teal | <i>Anas discors</i> | 2 | <0.1 | 0,1 | 1 | 0.2 |
| Ring-billed Gull ³ | <i>Larus delawarensis</i> | 2 | <0.1 | 1,0 | 1 | 0.2 |
| Canvasback | <i>Aythya valisineria</i> | 2 | <0.1 | 0,1 | 1 | 0.2 |
| Northern Flicker | <i>Colaptes auratus</i> | 1 | <0.1 | 1,0 | 1 | 0.2 |
| Green-wing Teal | <i>Anas crecca</i> | 1 | <0.1 | 0,1 | 1 | 0.2 |
| Spotted Sandpiper | <i>Actitis macularia</i> | 1 | <0.1 | 0,1 | 1 | 0.2 |
| Northern Mockingbird | <i>Mimus polyglottos</i> | 1 | <0.1 | 1,0 | 1 | 0.2 |
| Mountain Bluebird ³ | <i>Sialia currucoides</i> | 1 | <0.1 | 1,0 | 1 | 0.2 |
| House Wren | <i>Troglodytes aedon</i> | 1 | <0.1 | 0,1 | 1 | 0.2 |
| TOTAL | 6,726 Individuals | | | | | |
| | 71 Species | | | | | |

¹ Number of remote routes along which species occurred, number of facility routes along which species occurred.

² Number of stops at which species were detected; total stops =501.

³ Species not known to actively nest on the INL.

Other common species were western meadowlark (*Sturnella neglecta*), Brewer's sparrow (*Spizella breweri*), and sage thrashers (*Oreoscoptes montanus*), each of which occurred at more than 300 stops along all 14 routes (Table 1). These four species account for approximately 65 percent of all birds counted. Mourning doves (*Zenaida macroura*) and brown-headed cowbirds

(*Molothrus ater*) also occurred along each of the 14 routes but in smaller numbers than the preceding species. Although sage sparrows (*Amphispiza belli*) were the fifth most abundant bird recorded during 2005, it only occurred on 13 of the 14 routes.

The high numbers of birds counted in 2005, however, does not necessarily reflect large numbers of birds counted among all taxa. Many species observed were neither widespread nor abundant. Of the 71 species recorded in 2005, 20 species (28 percent) occurred along only one of the 14 routes, and 37 species (52 percent) were represented by fewer than ten individuals (Table 1). Additionally, many species were at or below long-term averages and a few species observed in six or more previous years were absent in 2005 including: bank swallow (*Riparia riparia*), northern shoveler (*Anas clypeata*), and American avocet (*Recurvirostra americana*). Instead, the total count was inflated by high counts of horned lark and western meadowlark. Several species recorded during 2005 do not actively nest on the INL. These include American white pelican (*Pelecanus erythrorhynchos*), Franklin’s gull (*Larus pipixcan*), ring-billed gull (*Larus delawarensis*), mountain bluebird (*Sialia currucoides*), and rough-legged hawk (*Buteo lagopus*).



Western Meadowlark



Idaho National Laboratory

Overall, 14 routes were surveyed on the INL with approximately 180 km² total area surveyed (Table 2). This represents about 8 percent of the INL. Each remote route surveyed an area of approximately 25 km² with an average of 27.9 birds observed per km². The Tractor Flat route continues to have the highest density of birds with 33.3 birds observed per km². The area surveyed on the nine facility complex routes ranged from 3 km² at WTF to more than 12 km² at TAN. This is a total of approximately 55 km² surveyed at the facilities. The highest density of birds observed on a facility route was at MFC which averaged 101 birds

observed per km². This number was inflated due to the large number of Franklin’s gulls observed during the survey using the man-made ponds at MFC. The area surveyed at each stop on remote routes is greater than the area surveyed at each stop on the facility routes, so comparisons between facility and remote routes are not analogous. Appendix A contains a list of species observed and their relative abundance along the 14 survey routes.

Overall, the five most numerous species in order of abundance were horned larks, western meadowlarks, Brewer’s sparrows, sage thrasher, and sage sparrows. More than 70 percent of all birds detected in 2005 are the above five species, which are typically the most frequently counted species on the INL.



Sage Sparrow

Table 2. Number of species, number of individual birds, and average number of individuals per km² along Remote Routes (N = 5) and Facility Complex Routes (N = 9) at the INEEL in 2005.

| Route | Stops | Area Surveyed (km²) | Species | N | Birds/ km² |
|--------------------------------|--------------|---------------------------------------|----------------|-------------|------------------------------|
| <i>Remote Routes</i> | | | | | |
| Circular Butte | 50 | 25 | 16 | 686 | 27.4 |
| Kyle Canyon | 50 | 25 | 25 | 555 | 22.2 |
| Big Lost River | 50 | 25 | 23 | 682 | 27.3 |
| Tractor Flats | 50 | 25 | 31 | 833 | 33.3 |
| Twin Buttes | 50 | 25 | 29 | 732 | 29.3 |
| Subtotal | 250 | 125 | 51* | 3488 | 27.9 |
| <i>Facility Complex Routes</i> | | | | | |
| CFA | 42 | 10 | 24 | 481 | 48.1 |
| MFC | 18 | 4 | 24 | 404 | 101 |
| INTEC | 25 | 5 | 22 | 266 | 53.2 |
| WTF | 6 | 3 | 24 | 120 | 40.0 |
| NRF | 20 | 4 | 23 | 321 | 80.2 |
| PBF | 28 | 6 | 18 | 338 | 56.3 |
| RWMC | 20 | 4 | 26 | 235 | 58.7 |
| TAN | 60 | 12 | 18 | 639 | 53.3 |
| TRA | 32 | 7 | 36 | 434 | 62.0 |
| Subtotal | 251 | 55 | 58* | 3238 | 58.9 |
| TOTAL | 501 | 180 | 71* | 6726 | 37.4 |

* Many similar species are observed on multiple routes, thus this number reflects one documented occurrence of each species observed.

Species Richness - In 2005, 71 species were detected during the surveys. This is the greatest number of species recorded during a breeding bird survey at the INL (Figure 3) and is well above the average of 57 ± 4 recorded from 1985-2004. In 2005, there were 24 ± 3 species per route, with many similar species recorded along remote routes (25 ± 7) and facility routes (24 ± 4). The fewest number of species (N=16) was observed along the Circular Butte route while TRA had the greatest number of species (N=36).

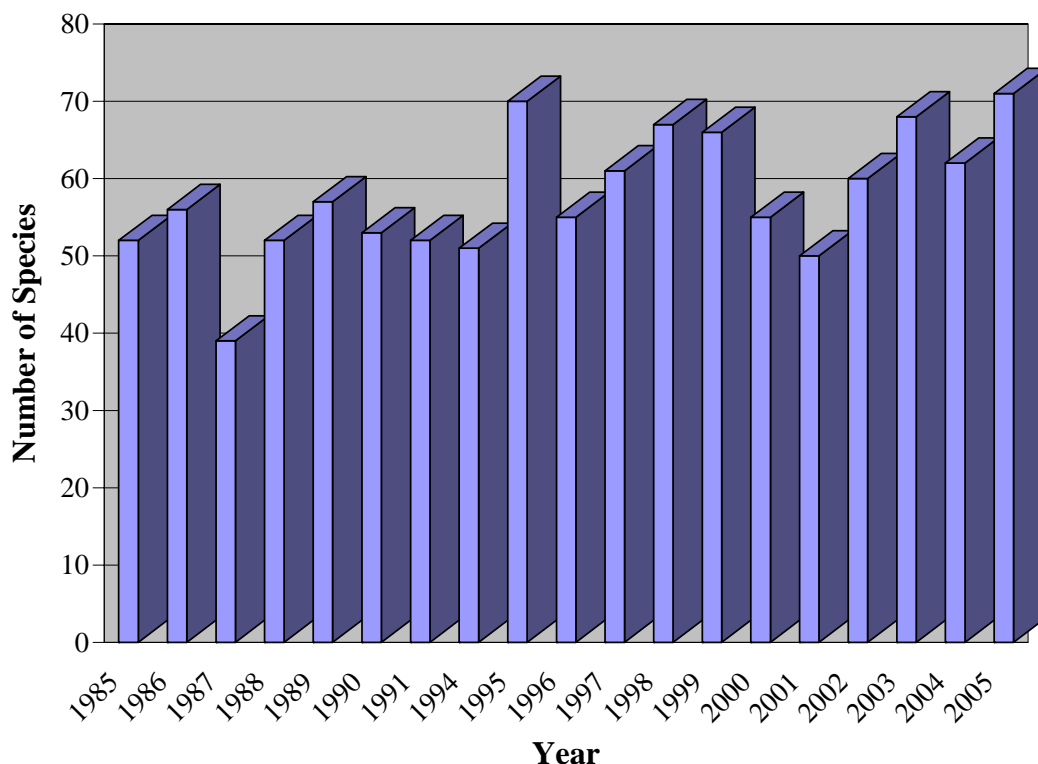


Figure 3. Total number of species recorded by year (1985-2005) along 14 permanent survey routes at the Idaho National Laboratory.

Species assemblages - In addition to the density of individuals and the number of species recorded on the INL, the composition of species in relation to habitat is an important indicator to ecological health.

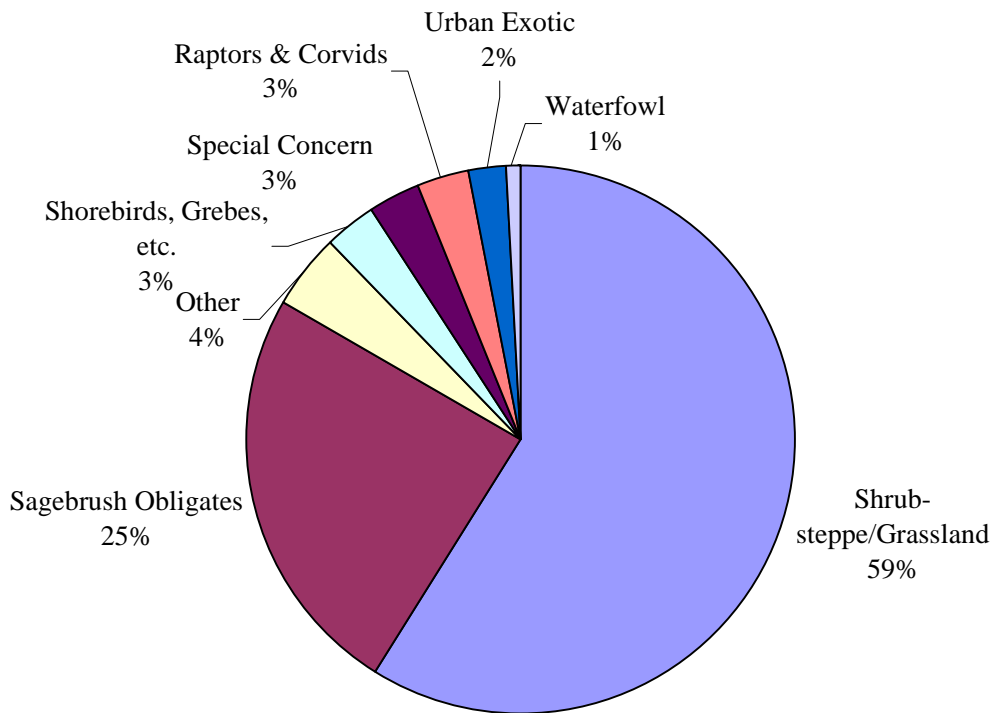


Figure 4. Percentage of species assemblages observed during 2005 BBS.

Waterfowl - Nine species of waterfowl (order Anseriformes, family Anatidae) were observed during the 2005 survey which contributed <1 percent (Figure 4) to the total individuals observed. Gadwall (*Anas Strepera*) was the most abundant species and occurred along five of nine facility routes. Waterfowl have limited distribution on the INL and occur either in natural areas along the Big Lost River or in man-made ponds near facilities. Waterfowl counts at the INL were slightly below the long term average and only observed at the facility wastewater treatment ponds. Natural waterways located on the INL (The Big Lost River, Sinks and Spreading Areas) have not contained water since summer of 1999, thus reducing the number of birds that would otherwise use these areas.



Gadwall

Shorebirds, Grebes, Gulls, Pelicans and Waders – Eight species of shorebirds/gulls and terns/grebes/pelicans and wading birds were observed (Table 1). Of these, only three were observed on remote routes, three were only observed on facility routes, and the other two occurred along both types of routes. The most abundant was Franklin’s gull which was observed along one remote and one facility route. This was the first time the American white pelican was documented on the INL during the annual BBS.



Franklin’s Gull

Pelicans typically nest on a low mound of earth and debris on a marshy island and occasionally on rocky islands in desert lakes. Therefore these birds were most likely migrating through the INL. No wading birds were observed during the 2005 survey.

Like waterfowl, many shorebirds and wading birds are closely tied to water, which is currently only available at waste-water ponds near facilities or adjacent agricultural fields. Shorebirds/gulls and terns/grebes/pelicans and wading birds represent 3 percent of all individual birds observed (Figure 4). This number is inflated due to the large number of Franklin’s gulls observed migrating through the INL.

Raptors and Corvids - Nine species of raptors (eagles, falcons, hawks, and owls) were observed along the survey routes. One percent of all birds counted were raptors (Figure 4). Red-tailed hawk (*Buteo Jamaicensis*) and ferruginous hawk (*Buteo regalis*) were the most abundant species on both facility (N=6 and 5) and remote routes (N=13 and 10). Although common during the winter, rough-legged hawks were observed for the first time during the 2005 BBS. We presume that these individuals were just passing through to the breeding grounds farther north.

Corvidae is a family of birds which contains the ravens and crows (Genus *Corvus*), magpies (Genus *Pica*), and jays (Genus *Perisoreus*, *Gymnorhinus*, and *Nucifraga*). Common ravens (*Corvus corax*) were the most abundant corvid (N=89) and were observed on all routes. More ravens were observed on remote routes and raven populations continue to increase across the INL (Figure 5). Raptors and corvids constituted 2 percent of the total individuals observed (Figure 4).



American Crow

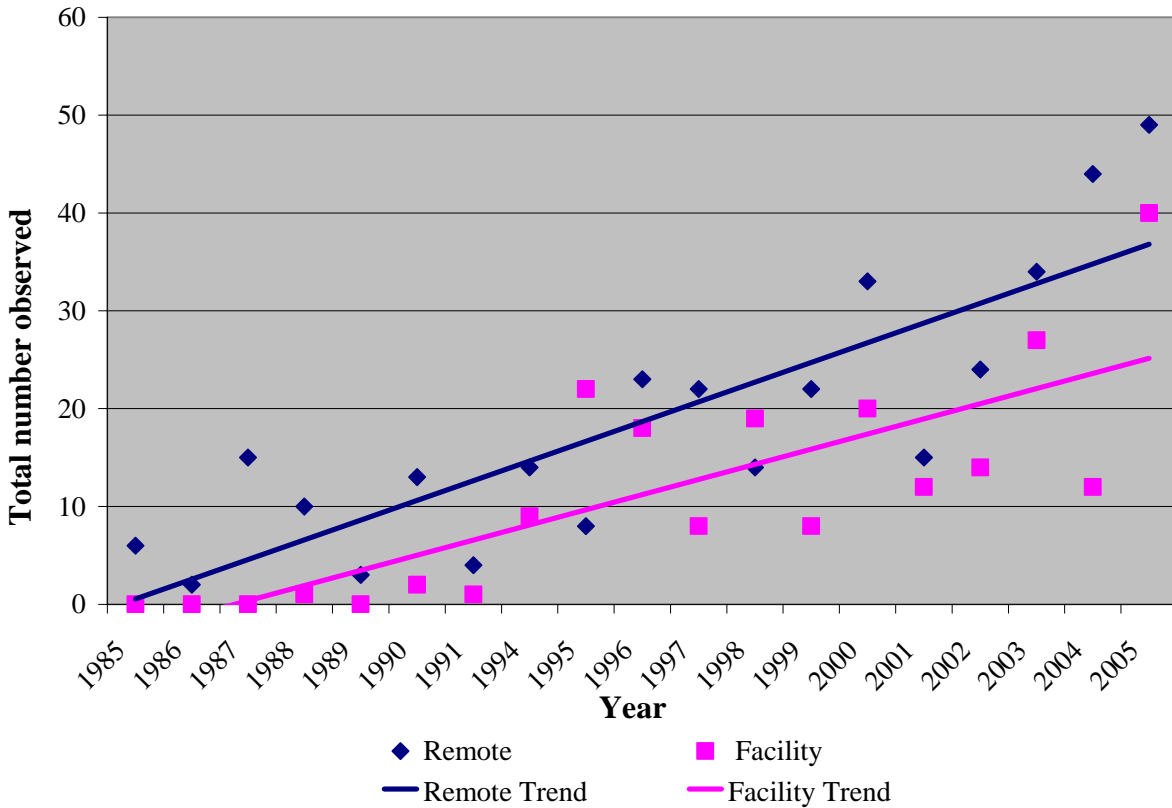


Figure 5. Total number of ravens observed during yearly surveys on both remote and facility routes.

Urbanized and Exotic Species - Species associated with human activities (introduced species, or species associated with human-altered landscapes) typically occur on facility routes rather than remote routes. House sparrow (*Passer domesticus*), house wren (*Troglodytes aedon*), American robin (*Turdus migratorius*), and rock pigeon (*Columba livia*) were only observed on facility routes. Although barn swallow (*Hirundo rustica*), house finch (*Carpodacus mexicanus*), and European starlings (*Sturnus vulgaris*) were observed on both facility and remote routes they occurred in much smaller numbers on the remote routes. Urbanized and exotic species made up 2 percent of all individual birds observed during the 2005 survey (Figure 4).



Rock Pigeon

Sagebrush Obligates - Even though sagebrush obligate numbers continue to be below the long term average, the trend in population abundance remains stable for both facility and remote routes (Figure 6). On remote routes, sagebrush obligates were most often observed (per km²) on the Tractor Flat route during the 2005 survey. Over the long term, sagebrush obligates occurred most often on the Big Lost River route, but since the 2000 Tin Cup fire their populations have

dramatically declined. Brewer’s sparrow was the most abundant sagebrush-obligate species on both remote and facility routes (Table 3). Twenty-four percent of the total number of birds observed during the 2005 Breeding Bird Survey were sagebrush obligates (Figure 4).

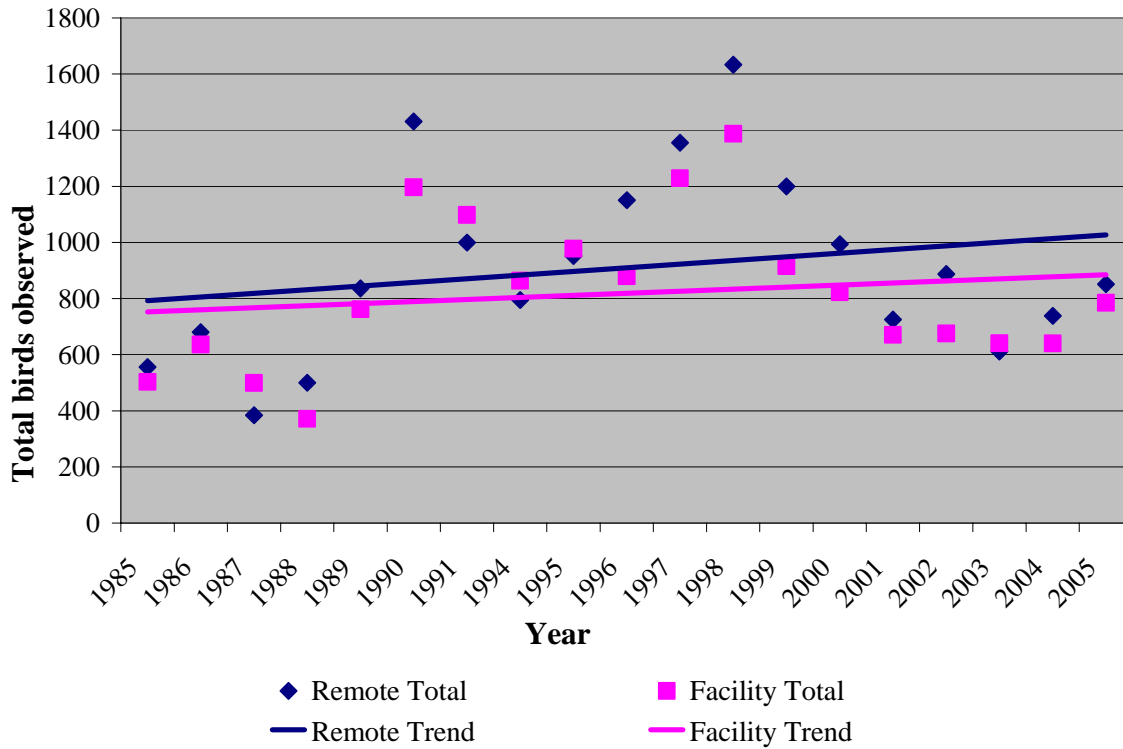


Figure 6. Total number of sage brush obligates and their population trend since 1985.



Burrowing Owl

Table 3. Species abundance per route for selected species at the INL. For each species, the 1st line represents the total number recorded during 2005 on that route, the 2nd line is the number recorded per km² during 2005, and the 3rd line is the total number recorded since 1985 (no counts were conducted during 1992 and 1993).

| Species | Remote routes | | | | | Total | Facility complex routes | | | | | | | | Total | |
|---|---------------|--------|-------|--------|-------|-------|-------------------------|--------|--------|--------|--------|--------|--------|-------|-------|--|
| | BLR | CB | KC | TB | TF | | CFA | INTEC | MFC | NRF | PBF | RWMC | TAN | TRA | | |
| <i>Sagebrush Obligates</i> | | | | | | | | | | | | | | | | |
| Brewer's Sparrow | 33 | 86 | 64 | 61 | 102 | 346 | 30 | 47 | 18 | 17 | 64 | 28 | 53 | 53 | 310 | |
| | (1.3) | (3.4) | (2.6) | (2.4) | (4.0) | | (3.0) | (9.4) | (4.5) | (4.2) | (10.7) | (7.0) | (4.4) | (0.7) | | |
| | 1472 | 1343 | 970 | 1519 | 1023 | 6327 | 762 | 1012 | 395 | 470 | 964 | 440 | 947 | 1079 | 6069 | |
| Sage Sparrow | 27 | 33 | 60 | 41 | 51 | 212 | 29 | 20 | 4 | 19 | 25 | 4 | 60 | 16 | 177 | |
| | (1.1) | (1.3) | (2.4) | (1.6) | (2.0) | | (2.9) | (4.0) | (1.0) | (4.7) | (4.2) | (1.0) | (5.0) | (2.3) | | |
| | 1399 | 1209 | 1202 | 1157 | 1269 | 6236 | 698 | 503 | 349 | 440 | 719 | 328 | 1225 | 813 | 5075 | |
| Sage Thrasher | 37 | 77 | 60 | 59 | 60 | 293 | 48 | 24 | 17 | 30 | 50 | 20 | 86 | 21 | 296 | |
| | (1.5) | (3.0) | (2.4) | (2.4) | (2.4) | | (4.8) | (4.8) | (4.2) | (7.5) | (8.3) | (5.0) | (7.2) | (3.0) | | |
| | 954 | 925 | 831 | 912 | 921 | 4543 | 657 | 515 | 290 | 330 | 636 | 368 | 955 | 582 | 4333 | |
| Sage Grouse | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | |
| | - | - | - | - | - | | (0.2) | - | - | - | - | - | - | - | | |
| | 10 | 33 | 1 | 120 | 8 | 172 | 12 | 0 | 2 | 0 | 2 | 4 | 0 | 23 | 43 | |
| <i>Other Common Shrubsteppe/Grassland Species</i> | | | | | | | | | | | | | | | | |
| Horned Lark | 341 | 249 | 131 | 258 | 220 | 1199 | 93 | 65 | 73 | 81 | 55 | 17 | 309 | 173 | 866 | |
| | (13.6) | (10.0) | (5.2) | (10.3) | (8.8) | | (9.3) | (13.0) | (18.2) | (20.2) | (9.2) | (4.2) | (25.7) | (8.7) | | |
| | 1825 | 2073 | 1319 | 3293 | 1828 | 10338 | 727 | 746 | 539 | 685 | 410 | 423 | 2680 | 1014 | 7224 | |
| Western Meadowlark | 112 | 145 | 78 | 193 | 174 | 702 | 51 | 24 | 16 | 41 | 66 | 40 | 6 | 61 | 305 | |
| | (4.5) | (5.8) | (3.1) | (7.7) | (7.0) | | (5.1) | (4.8) | (4.0) | (10.2) | (11.0) | (10.0) | (0.5) | (8.7) | | |
| | 1467 | 2012 | 1268 | 2051 | 1758 | 8556 | 1048 | 779 | 843 | 688 | 1023 | 597 | 612 | 1195 | 6785 | |
| Brown-headed Cowbird | 12 | 27 | 4 | 25 | 32 | 100 | 22 | 3 | 28 | 19 | 19 | 11 | 2 | 29 | 133 | |
| | (0.5) | (1.1) | (0.2) | (1.0) | (1.3) | | (2.2) | (0.6) | (7.0) | (4.7) | (3.2) | (2.7) | (0.2) | (4.1) | | |
| | 320 | 404 | 68 | 483 | 344 | 1619 | 483 | 160 | 279 | 176 | 306 | 87 | 167 | 280 | 1938 | |
| Brewer's Blackbird | 3 | 2 | 0 | 10 | 0 | 15 | 89 | 11 | 31 | 0 | 9 | 5 | 0 | 5 | 150 | |
| | (0.1) | (0.1) | - | (0.4) | - | | (8.9) | (2.2) | (7.7) | - | (1.5) | (1.2) | - | (0.7) | | |
| | 108 | 40 | 67 | 51 | 80 | 346 | 671 | 112 | 257 | 110 | 139 | 50 | 130 | 243 | 1712 | |

Table 3. Species abundance per route for selected species at the INL. For each species, the 1st line represents the total number recorded during 2005 on that route, the 2nd line is the number recorded per km² during 2005, and the 3rd line is the total number recorded since 1985 (no counts were conducted during 1992 and 1993). (Continued)

| Species | Remote routes | | | | | Facility complex routes | | | | | | | | | |
|---|---------------|-------|-------|-------|-------|-------------------------|-------|-------|--------|-------|-------|-------|-------|-------|-------|
| | BLR | CB | KC | TB | TF | Total | CFA | INTEC | MFC | NRF | PBF | RWMC | TAN | TRA | Total |
| <i>Other Common Shrubsteppe Species</i> | | | | | | | | | | | | | | | |
| Vesper Sparrow | 24 | 5 | 37 | 22 | 8 | 96 | 13 | 5 | 2 | 29 | 1 | 0 | 64 | 8 | 122 |
| | (1.0) | (0.2) | (1.5) | (0.9) | (0.3) | | (1.3) | (1.0) | (0.5) | (7.5) | (0.2) | - | (5.3) | (1.1) | |
| | 96 | 75 | 688 | 348 | 66 | 1273 | 29 | 25 | 22 | 114 | 42 | 9 | 838 | 60 | 1139 |
| Common Nighthawk | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 5 | 0 | 5 | 4 | 0 | 3 | 0 | 18 |
| | - | - | - | - | - | | (0.1) | (1.0) | - | (1.2) | (0.7) | - | (0.2) | - | |
| | 104 | 170 | 28 | 154 | 241 | 697 | 69 | 53 | 111 | 89 | 58 | 89 | 19 | 37 | 525 |
| Mourning Dove | 7 | 13 | 18 | 40 | 14 | 92 | 5 | 5 | 1 | 5 | 6 | 19 | 0 | 3 | 44 |
| | (0.3) | (0.5) | (0.7) | (1.6) | (0.6) | | (0.5) | (1.0) | (0.2) | (1.2) | (1.0) | (4.7) | - | (0.4) | |
| | 323 | 440 | 480 | 966 | 662 | 2871 | 181 | 53 | 104 | 156 | 181 | 162 | 369 | 210 | 1416 |
| <i>Species of Special Concern</i> | | | | | | | | | | | | | | | |
| Ferruginous Hawk | 1 | 0 | 9 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 5 |
| | - | - | (0.4) | - | - | | - | - | - | - | - | - | (0.2) | (0.4) | |
| | 21 | 24 | 140 | 6 | 28 | 219 | 3 | 2 | 1 | 0 | 3 | 0 | 15 | 4 | 28 |
| Loggerhead Shrike | 5 | 1 | 17 | 0 | 7 | 30 | 8 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| | 0.2 | - | (0.7) | - | (0.3) | | (0.8) | - | - | - | (0.2) | - | - | - | |
| | 40 | 59 | 146 | 0 | 140 | 385 | 39 | 3 | 28 | 7 | 51 | 50 | 12 | 16 | 167 |
| Long-billed Curlew | 0 | 0 | 1 | 8 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | - | - | - | (0.3) | - | | - | - | - | - | - | - | - | - | |
| | 0 | 0 | 2 | 33 | 0 | 35 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Franklin's Gull | 0 | 0 | 0 | 35 | 0 | 35 | 0 | 0 | 88 | 0 | 0 | 0 | 0 | 0 | 88 |
| | - | - | - | (1.4) | - | | - | - | (22.0) | - | - | - | - | - | |
| | 0 | 10 | 62 | 1308 | 0 | 1380 | 54 | 0 | 88 | 0 | 0 | 2 | 487 | 0 | 577 |
| Burrowing Owl | 0 | 0 | 0 | 1 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | - | - | - | - | - | | - | - | - | - | - | - | - | (0.1) | |
| | 1 | 1 | 0 | 10 | 4 | 16 | 1 | 1 | 6 | 0 | 0 | 0 | 8 | 1 | 17 |
| Lark Bunting | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | - | - | - | (0.1) | - | | - | - | - | - | - | - | - | - | |
| | 15 | 63 | 2 | 44 | 0 | 124 | 4 | 5 | 6 | 27 | 14 | 0 | 3 | 0 | 59 |

Other Common Shrub-steppe/Grassland Species
 - Common shrub-steppe/grassland species that occur on the INL include horned lark, western meadowlark, Brewer's blackbird (*Euphagus cyanocephalus*), brown-headed cowbird, common nighthawk (*Chordeiles minor*), mourning dove and vesper sparrow (*Pooecetes gramineus*). Of all individual birds observed during the 2005, more than 54 percent are shrub-steppe/grassland species (Figure 4). Although more shrub-steppe/grassland species were observed on remote routes, the number per km² was much greater on facility routes with the most species observed per km² at MFC.



Mourning Dove

Horned lark and western meadowlark were the most common species recorded and occurred on all routes. Although horned lark populations appear to be stabilizing they continue to increase across the INL and have reached record numbers on both facility and remote routes (Figure 7). This increase is likely the result of a land cover change from shrub-steppe to grasslands caused by wildfires.

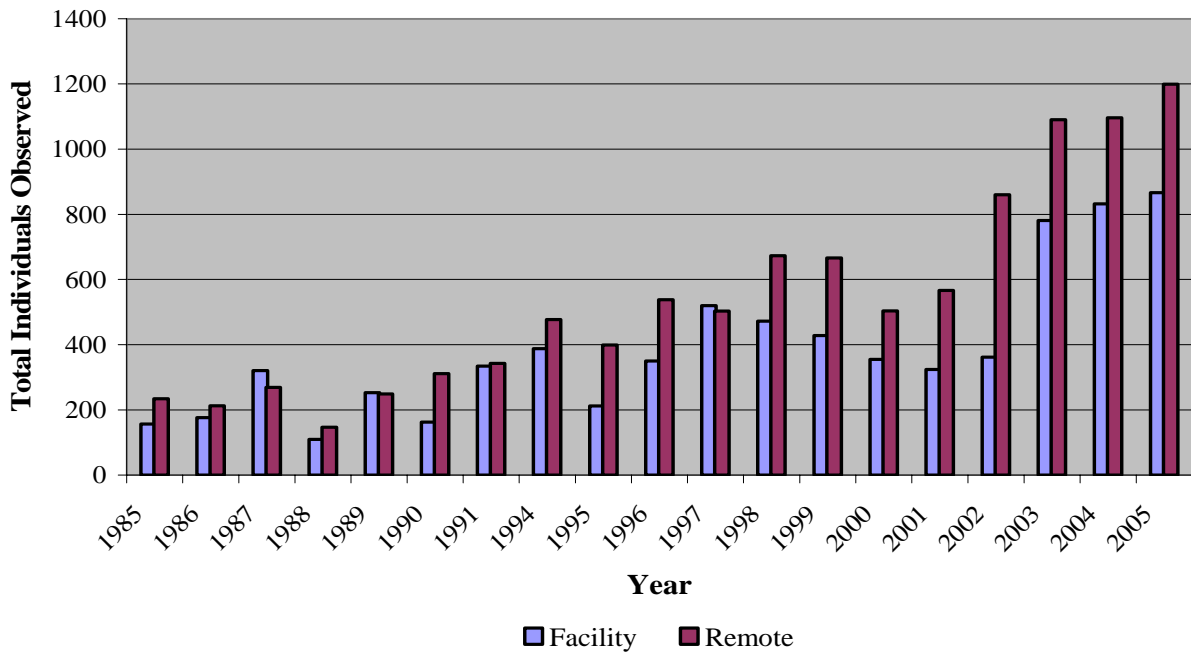


Figure 7. Horned Lark abundance from 1985-2005 on facility and remote routes.

Species of special concern - The sagebrush steppe habitat on the INL continues to support species of birds that are low or declining in number throughout the Intermountain West. Species of special concern are more often observed on remote routes than facility routes. Nine species with a state rank of rare or uncommon, imperiled, or critically imperiled recorded in 2005 including American white pelican (N=6), ferruginous hawk (N=15), long-billed curlew (*Numenius americanus*) (N=9), Franklin's gull (N=123), ring-billed gull (N=2), western burrowing owl (*Athene cunicularia*) (N=4), loggerhead shrike (*Lanius ludovicianus*) (N=40), northern mockingbird (*Mimus polyglottos*) (N=1), and lark bunting (*Calamospiza melanocorys*) (N=4). This is the first year that the American white pelican was observed during the annual BBS. Although Franklin's gull was the most abundant species of special concern during the 2005 survey, they are closely tied to cicada hatches on the INL and agricultural fields where they spend time foraging. The most common and routinely observed sensitive species are loggerhead shrike, ferruginous hawk and long-billed curlew whose populations have remained stable or slightly decreased since the BBS began in 1985 (Figure 8).



American White Pelican

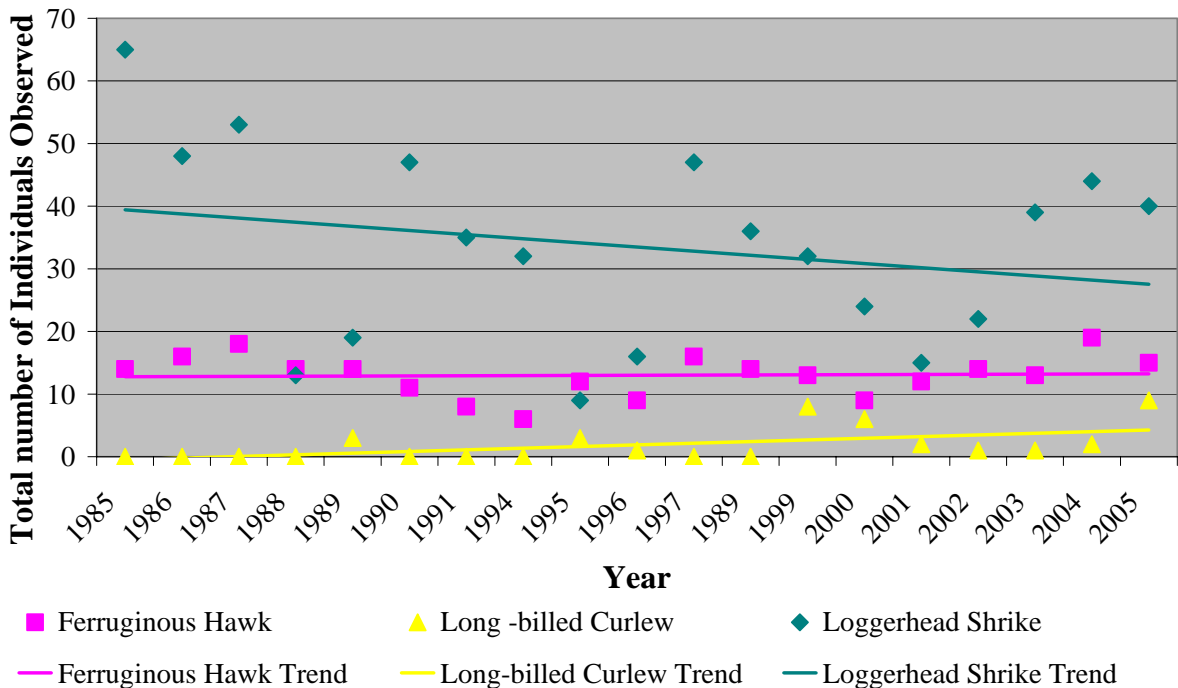


Figure 8. Annual trends in abundance of selected species of special concern observed from 1985-2005 during the breeding bird survey on the INL.

SUMMARY

A relatively high number of birds were counted along the BBS routes at the INL in 2005. Species closely associated with shrub-steppe/grassland habitats were detected in the greatest numbers. Horned larks continue to be observed in record numbers, boosting the overall total of birds considerably. Tractor flats and MFC had the highest density of birds with 33.3 per km² and 101 per km² respectively. Numbers at MFC were inflated due to the abundance of Franklin's gulls frequenting the area. The total number of species recorded during 2005 is the highest number since the counts began in 1985. Although, three species were recorded for the first time during the breeding bird survey (American white pelican, rough-legged hawk, and canvasback), it is doubtful that they were breeding individuals.



Rough-legged Hawk

These annual surveys provide valuable long-term data for land managers to allow them to determine impacts of activities conducted at the INL and surrounding areas on breeding bird populations. Factors that may affect a population range from natural events, such as drought and wildfires, to non-natural events such as the removal of resources through development or chemical application. These data also contributes to a nationwide database of bird population trends that is used by state and federal agencies.

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Appendix A

**SUMMARY OF SPECIES BY ROUTE
2005**

Survey Route: CIRCULAR BUTTE

Survey Date: June 10, 2005

| Species | Abundance | Percentage |
|------------------------|------------------|-------------------|
| Horned Lark | 249 | 36.2 |
| Western Meadowlark | 145 | 21.1 |
| Brewer's Sparrow | 86 | 12.5 |
| Sage Thrasher | 77 | 11.2 |
| Sage Sparrow | 33 | 4.8 |
| Brown-headed Cowbird | 27 | 3.9 |
| Chipping Sparrow | 19 | 2.8 |
| Mourning Dove | 13 | 1.9 |
| Common Raven | 12 | 1.7 |
| American White Pelican | 6 | 0.9 |
| Grasshopper Sparrow | 6 | 0.9 |
| Vesper Sparrow | 5 | 0.7 |
| Rock Wren | 4 | 0.6 |
| Brewer's Blackbird | 2 | 0.3 |
| Red-tailed Hawk | 1 | 0.1 |
| Loggerhead Shrike | 1 | 0.1 |

Total Individuals = 686
Total Species = 16

Survey Route: KYLE CANYON

Survey Date: June 14, 2005

| Species | Abundance | Percentage |
|----------------------|------------------|-------------------|
| Horned Lark | 131 | 23.6 |
| Western Meadowlark | 78 | 14.1 |
| Brewer's Sparrow | 64 | 11.5 |
| Sage Sparrow | 60 | 10.8 |
| Sage Thrasher | 60 | 10.8 |
| Vesper Sparrow | 37 | 6.7 |
| Gray Flycatcher | 20 | 3.6 |
| Mourning Dove | 18 | 3.2 |
| Grasshopper Sparrow | 18 | 3.2 |
| Loggerhead Shrike | 17 | 3.1 |
| Black-billed Magpie | 11 | 2.0 |
| Ferruginous Hawk | 9 | 1.6 |
| Chipping Sparrow | 8 | 1.4 |
| Brown-headed Cowbird | 4 | 0.7 |
| Common Raven | 3 | 0.5 |
| Rock Wren | 3 | 0.5 |
| Red-tailed Hawk | 3 | 0.5 |
| Prairie Falcon | 2 | 0.4 |
| American Kestrel | 2 | 0.4 |
| Western Tanager | 2 | 0.4 |
| Long-billed Curlew | 1 | 0.2 |
| Common Nighthawk | 1 | 0.2 |
| Mountain Bluebird | 1 | 0.2 |
| Northern Mockingbird | 1 | 0.2 |
| Lark Sparrow | 1 | 0.2 |

Total Individuals = 555

Total Species = 25

Survey Route: BIG LOST RIVER

Survey Date: June 8, 2005

| Species | Abundance | Percentage |
|-------------------------------|------------------|-------------------|
| Horned Lark | 341 | 50.0 |
| Western Meadowlark | 112 | 16.4 |
| Grasshopper Sparrow | 38 | 5.6 |
| Sage Thrasher | 37 | 5.4 |
| Brewer's Sparrow | 33 | 4.8 |
| Sage Sparrow | 27 | 4.0 |
| Vesper Sparrow | 24 | 3.5 |
| Chipping Sparrow | 15 | 2.2 |
| Brown-headed Cowbird | 12 | 1.8 |
| Common Raven | 10 | 1.5 |
| Mourning Dove | 7 | 1.0 |
| Red-tailed Hawk | 6 | 0.9 |
| Loggerhead Shrike | 5 | 0.7 |
| Rock Wren | 3 | 0.4 |
| Brewer's Blackbird | 3 | 0.4 |
| Savannah Sparrow | 2 | 0.3 |
| Ferruginous Hawk | 1 | 0.1 |
| Rough-legged Hawk | 1 | 0.1 |
| Short-eared Owl | 1 | 0.1 |
| Gray Flycatcher | 1 | 0.1 |
| Violet-green Swallow | 1 | 0.1 |
| Northern Rough-winged Swallow | 1 | 0.1 |
| House Finch | 1 | 0.1 |

Total Individuals = 682
Total Species = 23

Survey Route: TRACTOR FLATS

Survey Date: June 9, 2005

| Species | Abundance | Percentage |
|----------------------|------------------|-------------------|
| Horned Lark | 258 | 77.5 |
| Western Meadowlark | 193 | 23.2 |
| Brewer's Sparrow | 61 | 7.3 |
| Sage Thrasher | 59 | 7.1 |
| Sage Sparrow | 41 | 4.9 |
| Mourning Dove | 40 | 4.8 |
| Franklin's Gull | 35 | 4.2 |
| Brown-headed Cowbird | 25 | 3.0 |
| Vesper Sparrow | 22 | 2.6 |
| Black-billed Magpie | 15 | 1.8 |
| Common Raven | 13 | 1.6 |
| Grasshopper Sparrow | 12 | 1.4 |
| Chipping Sparrow | 10 | 1.2 |
| Brewer's Blackbird | 10 | 1.2 |
| Long-billed Curlew | 8 | 1.0 |
| American Crow | 6 | 0.7 |
| Northern Harrier | 3 | 0.4 |
| Short-eared Owl | 3 | 0.4 |
| Western Kingbird | 3 | 0.4 |
| Lark Bunting | 3 | 0.4 |
| Western Tanager | 2 | 0.2 |
| Lazuli Bunting | 2 | 0.2 |
| Swainson's Hawk | 1 | 0.1 |
| Loggerhead Shrike | 1 | 0.1 |
| Red-tailed Hawk | 1 | 0.1 |
| Killdeer | 1 | 0.1 |
| Burrowing Owl | 1 | 0.1 |
| House Finch | 1 | 0.1 |
| Violet-green Swallow | 1 | 0.1 |
| Barn Swallow | 1 | 0.1 |
| Rock Wren | 1 | 0.1 |

Total Individuals = 833

Total Species = 31

Survey Route: TWIN BUTTES

Survey Date: June 7, 2005

| Species | Abundance | Percentage |
|----------------------|------------------|-------------------|
| Horned Lark | 220 | 30.0 |
| Western Meadowlark | 174 | 23.7 |
| Brewer's Sparrow | 102 | 13.9 |
| Sage Thrasher | 60 | 8.2 |
| Sage Sparrow | 51 | 7.0 |
| Brown-headed Cowbird | 32 | 4.4 |
| Mourning Dove | 14 | 1.9 |
| Common Raven | 11 | 1.5 |
| Gray Flycatcher | 10 | 1.4 |
| Vesper Sparrow | 8 | 1.1 |
| Loggerhead Shrike | 7 | 1.0 |
| Short-eared Owl | 6 | 0.8 |
| Barn Swallow | 6 | 0.8 |
| Killdeer | 4 | 0.5 |
| Pine Siskin | 4 | 0.5 |
| Rock Wren | 4 | 0.5 |
| Red-tail Hawk | 2 | 0.3 |
| Rough-legged Hawk | 2 | 0.3 |
| Burrowing Owl | 2 | 0.3 |
| Ring-billed Gull | 2 | 0.3 |
| Cliff Swallow | 2 | 0.3 |
| Green-tailed Towhee | 2 | 0.3 |
| Prairie Falcon | 1 | 0.1 |
| Chipping Sparrow | 1 | 0.1 |
| Lark Bunting | 1 | 0.1 |
| Northern Flicker | 1 | 0.1 |
| Northern Harrier | 1 | 0.1 |
| Black-billed Magpie | 1 | 0.1 |
| European Starling | 1 | 0.1 |

Total Individuals = 732

Total Species = 29

Survey Route: CFA

Survey Date: June 27, 2005

| Species | Abundance | Percentage |
|----------------------|------------------|-------------------|
| Horned Lark | 93 | 19.3 |
| Brewer's Blackbird | 89 | 18.5 |
| Western Meadowlark | 51 | 10.6 |
| Sage Thrasher | 48 | 10.0 |
| Brewer's Sparrow | 30 | 6.2 |
| Sage Sparrow | 29 | 6.0 |
| Brown-headed Cowbird | 22 | 4.6 |
| Grasshopper Sparrow | 18 | 3.7 |
| European Starling | 14 | 2.9 |
| Vesper Sparrow | 13 | 2.7 |
| Barn Swallow | 10 | 2.1 |
| Killdeer | 9 | 1.9 |
| American Robin | 9 | 1.9 |
| House Finch | 9 | 1.9 |
| Common Raven | 8 | 1.7 |
| Loggerhead Shrike | 8 | 1.7 |
| Mourning Dove | 5 | 1.0 |
| Red-tail Hawk | 4 | 0.8 |
| Say's Phoebe | 4 | 0.8 |
| Chipping Sparrow | 3 | 0.6 |
| Sage Grouse | 2 | 0.4 |
| American Kestrel | 1 | 0.2 |
| Common Nighthawk | 1 | 0.2 |
| Rock Wren | 1 | 0.2 |

Total Individuals = 481
Total Species = 24

Survey Route: MFC (ANLW)

Survey Date: June 20, 2005

| Species | Abundance | Percentage |
|----------------------|------------------|-------------------|
| Franklin's Gull | 88 | 21.8 |
| Western Meadowlark | 85 | 21.0 |
| Horned Lark | 73 | 18.1 |
| Brewer's Blackbird | 31 | 7.7 |
| Brown-headed Cowbird | 28 | 6.9 |
| Brewer's Sparrow | 18 | 4.5 |
| Sage Thrasher | 17 | 4.2 |
| Killdeer | 12 | 2.8 |
| Barn Swallow | 10 | 2.5 |
| European Starling | 7 | 1.7 |
| Common Raven | 6 | 1.5 |
| Grasshopper Sparrow | 6 | 1.5 |
| Sage Sparrow | 4 | 1.0 |
| Gadwall | 3 | 0.7 |
| Say's Phoebe | 3 | 0.7 |
| American Robin | 3 | 0.7 |
| Vesper Sparrow | 2 | 0.5 |
| Chipping Sparrow | 2 | 0.5 |
| Green-winged Teal | 1 | 0.2 |
| Northern Harrier | 1 | 0.2 |
| Spotted Sandpiper | 1 | 0.2 |
| Rock Wren | 1 | 0.2 |
| Mourning Dove | 1 | 0.2 |
| Western Kingbird | 1 | 0.2 |

Total Individuals = 404
Total Species = 24

Survey Route: INTEC

Survey Date: June 24, 2005

| Species | Abundance | Percentage |
|----------------------|------------------|-------------------|
| Horned Lark | 65 | 24.4 |
| Brewer's Sparrow | 47 | 17.7 |
| Western Meadowlark | 24 | 9.0 |
| Sage Thrasher | 24 | 9.0 |
| Sage Sparrow | 20 | 7.5 |
| Barn Swallow | 14 | 5.2 |
| Brewer's Blackbird | 11 | 4.1 |
| Black-billed Magpie | 7 | 2.6 |
| Killdeer | 6 | 2.3 |
| Grasshopper Sparrow | 6 | 2.3 |
| Common Nighthawk | 5 | 1.9 |
| Vesper Sparrow | 5 | 1.9 |
| Mourning Dove | 5 | 1.9 |
| Chipping Sparrow | 5 | 1.9 |
| Rough-wing Swallow | 4 | 1.5 |
| House Finch | 4 | 1.5 |
| Cliff Swallow | 3 | 1.1 |
| Brown-headed Cowbird | 3 | 1.1 |
| Common Raven | 3 | 1.1 |
| Say's Phoebe | 2 | 0.7 |
| American Robin | 2 | 0.7 |
| Short-eared Owl | 1 | 0.4 |

Total Individuals = 266

Total Species = 22

Survey Route: CFA Wastewater Treatment Facility

Survey Date: June 23, 2005

| Species | Abundance | Percentage |
|-----------------------|------------------|-------------------|
| Brewer's Blackbird | 18 | 15.0 |
| Horned Lark | 12 | 10.0 |
| Western Meadowlark | 11 | 9.1 |
| Sage Thrasher | 9 | 7.5 |
| Lesser Scaup | 8 | 6.7 |
| Mallard | 7 | 5.8 |
| Wilson's Phalarope | 7 | 5.8 |
| Brewer's Sparrow | 5 | 4.2 |
| Grasshopper Sparrow | 5 | 4.2 |
| Yellow-head Blackbird | 5 | 4.2 |
| Eared Grebe | 4 | 3.3 |
| Gadwall | 4 | 3.3 |
| Killdeer | 4 | 3.3 |
| Cinnamon Teal | 3 | 2.5 |
| Common Nighthawk | 3 | 2.5 |
| Mourning Dove | 2 | 1.7 |
| Blue-wing Teal | 2 | 1.7 |
| Redhead | 2 | 1.7 |
| American Coot | 2 | 1.7 |
| Canvasback | 2 | 1.7 |
| House Sparrow | 2 | 1.7 |
| Say's Phoebe | 1 | 0.8 |
| Chipping Sparrow | 1 | 0.8 |
| Brown-headed Cowbird | 1 | 0.8 |

Total Individuals = 120
Total Species = 24

Survey Route: NRF

Survey Date: June 30, 2005

| Species | Abundance | Percentage |
|-------------------------|------------------|-------------------|
| Horned Lark | 81 | 25.2 |
| Western Meadowlark | 41 | 12.8 |
| Sage Thrasher | 30 | 9.3 |
| Vesper Sparrow | 29 | 5.9 |
| Sage Sparrow | 19 | 5.9 |
| Brown-headed Cowbird | 19 | 5.9 |
| Grasshopper Sparrow | 19 | 5.9 |
| Brewer's Sparrow | 17 | 5.3 |
| Yellow-headed Blackbird | 14 | 4.4 |
| Barn Swallow | 11 | 3.4 |
| Wilson's Phalarope | 6 | 1.9 |
| Mourning Dove | 5 | 1.6 |
| Killdeer | 5 | 1.6 |
| Nighthawk | 5 | 1.6 |
| Gadwall | 4 | 1.2 |
| Lazuli Bunting | 4 | 1.2 |
| Chipping Sparrow | 3 | 0.9 |
| Ruddy Duck | 2 | 0.6 |
| House Finch | 2 | 0.6 |
| Common Raven | 2 | 0.6 |
| Western Kingbird | 1 | 0.3 |
| Say's Phoebe | 1 | 0.3 |
| European Starling | 1 | 0.3 |

Total Individuals = 321
Total Species = 23

Survey Route: PBF

Survey Date: June 22, 2005

| Species | Abundance | Percentage |
|----------------------|------------------|-------------------|
| Western Meadowlark | 66 | 19.5 |
| Brewer's Sparrow | 64 | 19.0 |
| Horned Lark | 55 | 16.3 |
| Sage Thrasher | 50 | 14.8 |
| Grasshopper Sparrow | 26 | 7.7 |
| Sage Sparrow | 25 | 7.4 |
| Brown-headed Cowbird | 19 | 5.6 |
| Brewer's Blackbird | 9 | 2.7 |
| Mourning Dove | 6 | 1.8 |
| Chipping Sparrow | 4 | 1.2 |
| Common Nighthawk | 4 | 1.2 |
| Common Raven | 3 | 0.9 |
| House Finch | 2 | 0.6 |
| Say's Phoebe | 1 | 0.3 |
| Loggerhead Shrike | 1 | 0.3 |
| Red-tail Hawk | 1 | 0.3 |
| Common Poorwill | 1 | 0.3 |
| Vesper Sparrow | 1 | 0.3 |

Total Individuals = 338

Total Species = 18

Survey Route: RWMC

Survey Date: June 4, 2005

| Species | Abundance | Percentage |
|----------------------|------------------|-------------------|
| Western Meadowlark | 40 | 17.0 |
| Brewer's Sparrow | 28 | 11.9 |
| Sage Thrasher | 20 | 8.5 |
| Mourning Dove | 19 | 8.1 |
| Horned Lark | 17 | 7.2 |
| Barn Swallow | 14 | 6.0 |
| House Finch | 12 | 5.1 |
| Brown-headed Cowbird | 11 | 4.7 |
| Rock Wren | 10 | 4.3 |
| Killdeer | 8 | 3.4 |
| Gadwall | 6 | 2.6 |
| European Starling | 6 | 2.6 |
| Mallard | 5 | 2.1 |
| Brewer's Blackbird | 5 | 2.1 |
| Common Raven | 5 | 2.1 |
| Sage Sparrow | 4 | 1.7 |
| Rough-wing Swallow | 4 | 1.7 |
| Cliff Swallow | 4 | 1.7 |
| Say's Phoebe | 4 | 1.7 |
| Wilson's Phalarope | 3 | 1.3 |
| Rock Pigeon | 3 | 1.3 |
| Lesser Scaup | 2 | 0.8 |
| Red-wing Blackbird | 2 | 0.8 |
| American Coot | 1 | 0.4 |
| Short-eared Owl | 1 | 0.4 |
| Prairie Falcon | 1 | 0.4 |

Total Individuals = 235

Total Species = 26

Survey Route: TAN

Survey Date: June 21, 2005

| Species | Abundance | Percentage |
|----------------------|------------------|-------------------|
| Horned Lark | 309 | 48.4 |
| Sage Thrasher | 86 | 13.5 |
| Vesper Sparrow | 64 | 10.0 |
| Sage Sparrow | 60 | 9.4 |
| Brewer's Sparrow | 53 | 8.3 |
| Chipping Sparrow | 18 | 2.8 |
| Grasshopper Sparrow | 17 | 2.7 |
| Common Raven | 10 | 1.6 |
| Western Meadowlark | 6 | 0.9 |
| Rock Pigeon | 3 | 0.5 |
| Common Nighthawk | 3 | 0.5 |
| Ferruginous Hawk | 2 | 0.3 |
| Mourning Dove | 2 | 0.3 |
| Brown-headed Cowbird | 2 | 0.3 |
| Barn Swallow | 1 | 0.2 |
| Northern Harrier | 1 | 0.2 |
| Rock Wren | 1 | 0.2 |
| American Robin | 1 | 0.2 |

Total Individuals = 639

Total Species = 18

Survey Route: TRA

Survey Date: June 3, 2005

| Species | Abundance | Percentage |
|-------------------------|------------------|-------------------|
| Horned Lark | 173 | 39.9 |
| Western Meadowlark | 61 | 14.1 |
| Brewer's Sparrow | 53 | 2.2 |
| Brown-headed Cowbird | 29 | 6.7 |
| Sage Thrasher | 21 | 4.8 |
| Sage Sparrow | 16 | 3.7 |
| Violet-green Swallow | 10 | 2.3 |
| Vesper Sparrow | 8 | 1.8 |
| Grasshopper Sparrow | 6 | 1.4 |
| Red-winged Blackbird | 6 | 1.4 |
| Brewer's Blackbird | 5 | 1.1 |
| Gadwall | 4 | 0.9 |
| Mourning Dove | 3 | 0.7 |
| Barn Swallow | 3 | 0.7 |
| Rock Wren | 3 | 0.7 |
| Chipping Sparrow | 3 | 0.7 |
| Common Raven | 3 | 0.7 |
| Ferruginous Hawk | 3 | 0.7 |
| Yellow-headed Blackbird | 3 | 0.7 |
| Say's Phoebe | 2 | 0.5 |
| Killdeer | 2 | 0.5 |
| American Kestrel | 2 | 0.5 |
| Western Tanager | 2 | 0.5 |
| House Finch | 1 | 0.2 |
| Mallard | 1 | 0.2 |
| Swainson's Hawk | 1 | 0.2 |
| Red-tail Hawk | 1 | 0.2 |
| Short-eared Owl | 1 | 0.2 |
| Cliff Swallow | 1 | 0.2 |
| Burrowing Owl | 1 | 0.2 |
| Common Poorwill | 1 | 0.2 |
| Prairie Falcon | 1 | 0.2 |
| Black-billed Magpie | 1 | 0.2 |
| House Wren | 1 | 0.2 |
| Lark Sparrow | 1 | 0.2 |
| American Robin | 1 | 0.2 |

Total Individuals = 434

Total Species = 36
