2001 BREEDING BIRD SURVEYS AT THE IDAHO NATIONAL ENGINEERING AND ENVIRONMENTAL LABORATORY

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Executive Summary

From 8 - 21 June 2001, 13 permanent survey routes located at the Idaho National Engineering and Environmental Laboratory (INEEL) were censused for birds. A 14th route established in 1997, IRR Circle, was surveyed on June 2001. A total of 4,318 individuals representing 51 species of birds was recorded along the 13 permanent routes. This is slightly below the average of 4,590.4 birds/year recorded from 1985-2000, and the lowest total recorded since 1991. In part, low numbers of birds counted at the INEEL in 2001 may be related to below average precipitation and above average temperatures. Dry and warm springs are correlated with lower bird counts on the INEEL, and in 2001 several species of birds dependent on surface water were absent or infrequently counted. In addition, bird counts for sagebrush obligate species such as Sage Sparrows (*Amphispiza belli*), Brewer's Sparrows (*Spizella breweri*), and Sage Thrashers (*Oreoscoptes montanus)* were lower than in recent years, perhaps as a result of fires on the INEEL in the past two years which have reduced the amount of shrub cover along three routes (Big Lost River, Tractor Flat, and TRA). No species were recorded at significantly greater numbers than in previous years (i.e., greater than 2.5 standard deviations above their 1985-2000 averages). However, large flocks of Franklin's Gulls (*Larus pipixcan*) were observed at the site for the first time since 1989. Species of special concern recorded in 2001 included Long-billed Curlews (*Numenius americanus*, N = 2), Ferruginous Hawks (*Buteo regalis*, N = 12), Swainson's Hawks (*Buteo swainsoni*, N = 3), and Loggerhead Shrikes (*Lanius ludovicianus*, N = 15). As in recent years (1996-2000), none of the species observed in 2001 were 2.5 or more standard deviations below long-term (1985 – 2000) average abundance, although several species recorded in previous years were not observed in 2001.

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Introduction

The Breeding Bird Survey (BBS) is a roadside route survey of avifauna designed to monitor abundance and distribution of birds in the United States and southern Canada. It began in the eastern U.S. in 1966 but is now nationwide in scope, with approximately 3700 annual survey routes (see United States Geological Survey (USGS) BBS data; web site: www.mbr-pwrc.gov/bbs/bbs.html). Data from these censuses are one of the main sources of information on avian population trends across the continent. Because methods are standardized, comparisons across years and regions of the country are possible, and a variety of local or regional assessments have been conducted (e.g., Geissler and Noon 1981, Holmes and Sherry 1988, Sauer and Droege 1990, Sauer et al. 2000).

BBS surveys have helped document population changes in the avifauna of the eastern U.S. (e.g., Sauer and Droege 1990, Askins et al. 1990, Finch and Stangel 1992, Hagan and Johnston 1992), but patterns of population change in western states have remained understudied in comparison. Insufficient route coverage over much of the western U.S. has limited attempts to compare trends in BBS data for populations of many western species (Sauer and Droege 1992). For example, Idaho has 62 BBS routes, while New York has 120, Minnesota 88, and Florida 136 routes (USGS BBS data). Moreover, BBS routes in shrubsteppe and grassland habitats are uncommon, despite apparent widespread declines in avifauna (Paige 1990, Sauer et al. 2000). In Idaho, approximately 20 BBS routes are surveyed in shrubsteppe and grassland habitat in southern Idaho, including 12 in southeastern Idaho.

The Idaho National Engineering and Environmental Laboratory (INEEL), located in southeastern Idaho, is comprised of large expanses of relatively undisturbed shrubsteppe 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 modified "mini-routes" have been surveyed at the INEEL. These surveys have yielded useful information about population dynamics, effects of weather and fire on avian abundance, 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, and Belthoff et al. 1998).

This report summarizes results of 2001 surveys at the INEEL and briefly compares findings to those from previous years.

Study Area

The 2,315 km^2 INEEL 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 semiarid, cold desert with an average elevation of approximately 1500 m above sea level. Anderson et al. (1996) detailed the climate, geology, and vegetation of the INEEL. Briefly, vegetation in the study area is typical of shrubsteppe 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 principle shrubs include Green Rabbitbrush (*Chrysothamnus viscidiflorus*), Shadscale (*Atriplex confertifolia*), and Winterfat (*Krascheninnikovia lanata*).

Large tracts of grasslands are dominated by Squirreltail (*Elymus elymoides*), Thickspike Wheatgrass (*Elymus lanceolatus*), Needle and Thread Grass (*Hesperostipa comata*), Ricegrass (*Achnatherum hymenoides*), and Bluebunch Wheatgrass (*Agropyron spicatum*). Basalt lava flows dominate the geology of the region, and the topography is flat to gently rolling, with the exception of East and Middle Butte, which protrude from the southern portion of the area. Two of the largest mountain ranges in Idaho (Lost River and Lemhi Mountains) rise above the INEEL site and Snake River Plain to the north and west. The study area experiences hot, dry summers and cold winters (Short 1986). Annual precipitation averages approximately 20 cm, and most of this occurs during the spring and winter. 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 flows into an ephemeral wetland known as the Lost River Sinks, which provides nesting and migratory stop-over habitat for waterfowl and shorebirds. Several human-made waste-water treatment ponds occur near research facilities and attract birds that prefer aquatic habitats as well.

Methods

From 8 - 21 June 2001, 13 permanent routes and one recently established route were surveyed for birds. These included five 40-km remote routes that traverse the major habitat types throughout remote areas of the site. These were standard BBS routes, from which data are reported to the U.S.G.S., Biological Resources Division annually. Standard BBS protocol (Robbins et al. 1986) was followed in completing each of these surveys. Briefly, I drove routes in a four-wheel drive vehicle and recorded the number of individuals of each

bird species detected during 3-min observation sessions at each stop. Surveys began approximately 30 minutes before sunrise. Stops were located every 0.8 km (0.5 miles), and I counted birds within a 0.4 km radius. Eight shorter facility complex routes, located in and around major INEEL facility complexes, ranged from 5.8 - 19.2 km in length. Surveys along the shorter facility complex routes were similar to remote routes, except that stops were closer together (0.32 km) and I counted birds within a 0.15-km radius. An additional survey route (IRR Circle; containing six stops 0.32 km apart) was established in 1997 around the irrigation circle, located near the Central Facilities Area (CFA). This area is part of an experiment designed to monitor how waste-water management affects flora and fauna. I recorded temperature, wind speed, and cloud cover at the start and end of each survey. Surveys were performed only when weather conditions were satisfactory as prescribed by the BBS protocol. In 2001, inclement weather postponed surveys for one day (12 June) because of high winds and rain. Routes took from approximately 50 min to 6 h to complete.

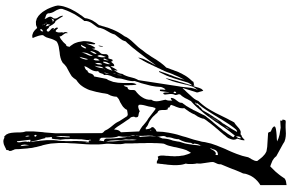
The five remote routes were surveyed on the following dates in 2001: Twin Buttes - 8 June, Big Lost River – 11 June, Tractor Flats - 13 June, Kyle Canyon - 15 June, Circular Butte - 19 June.

Facility Complex routes were surveyed on the following dates in 2001: RWMC - 9 June, EBRII - 10 June, ICPP - 14 June, CFA - 16 June, TAN - 17 June, NRF - 18 June, TRA - 20 June, PBF-SPERT - 21 June. The newly established route, IRR Circle, was surveyed using facility route protocol on 16 June after completion of the CFA route; therefore, the survey did not begin one-half hour before sunrise as other routes had. Results for IRR Circle are in Appendix A but are not summarized in this report because of differences in survey protocol and lack of data from previous years for comparison. Means and standard deviations are

presented throughout this report.

Results and Discussion

Bird abundance and species richness



Abundance — A total of 4,318 individual birds was recorded along the 13 survey routes (Table 1). This is slightly below the 1985-2000 average of 4,590.4 birds/year (no surveys were conducted in 1992 or 1993). The total number of birds counted during surveys is now 68,582 and the average per year is 4,572.1 (1985-2001).

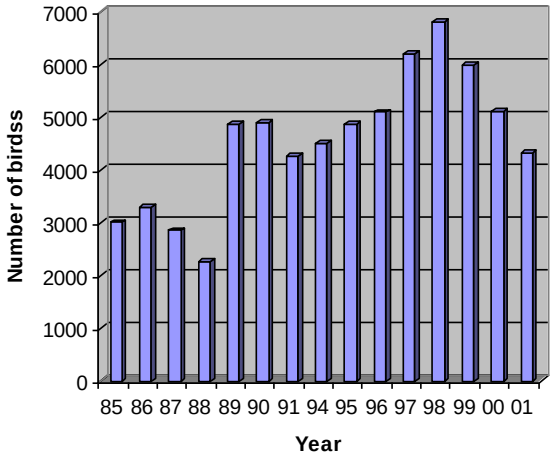


Figure 1. Total number of birds recorded by year (1985-2001) along 13 permanent routes at the Idaho National Engineering and Environmental Laboratory.

The total number of birds counted at the INEEL in 2001 was below average, and fewer birds were counted than in any year since 1991. One explanation for lower bird counts was that June of 2001 was dry (-0.85 inches below normal) and warm (+1.3° above normal) and there is a tendency for fewer birds to be recorded in dry and warm springs than in wet and cool springs (see Belthoff et al. 1998, Belthoff and Ellsworth 2000). In particular, birds

associated with aquatic habitats on the INEEL are greatly influenced by spring moisture and the flow of the Big Lost River. The Big Lost River is the primary source of surface water on the INEEL, and the river and Lost River Sinks provides nesting and migratory habitat for many species of waterfowl, shorebirds and other birds in wet years. However, in dry springs such as 2000 and 2001 the Big Lost River carries little or no water through the INEEL, and the Lost River Sinks seldom contain a significant amount of water in June. In 2001 and in other dry years, several species that are commonly observed in wet years are absent or uncommon including American Coot (*Fulica americana*), Blue-winged Teal (*Anas discors*), Cinnamon Teal (*Anas cyanoptera*), Redhead Duck (*Aythya americana*), Ruddy Duck (*Oxyura jamaicensis*), Willet (*Catoptrophorus semipalmatus*), American Avocet (*Recurvirostra americana*), and Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*). Some birds that depend on aquatic habitats are, however, observed near wastewater treatment ponds associated with facilities.

The lower than average number of birds counted at the INEEL in 2001 also may have been a result of large fires on the INEEL in 1999 and 2000 that burned extensive tracts of sagebrush along portions of three survey routes (Big Lost River, Tractor Flat, and TRA). The three primary sagebrush obligate species, Sage Sparrow (*Amphispiza belli*), Brewer's Sparrow (*Spizella breweri*), and Sage Thrasher (*Oreoscoptes montanus*) were observed in lower numbers in 2001 than in recent years, particularly in recently burned areas. For example, an area of extensive sagebrush cover was almost completely removed by fire along the first 30 stops of the Big Lost River route and several stops along the TRA route, and sagebrush obligate species were almost completely absent from these areas that previously contained many of these birds (Table 2). Not surprisingly, the total number of sagebrush

obligate species counted at stops in burned areas was significantly lower than in pre-fire years (Table 2), and is likely indicative of similar changes in sagebrush obligate bird populations across the INEEL landscape after fires. The removal of sagebrush and other shrub cover by fires probably has a negative impact on the abundance and nesting opportunities for several other bird species as well, including the Loggerhead Shrike (*Lanius ludovicianus*), Short-eared owl (*Asio Flammeus*), Common Nighthawk (*Chordeilus minor*) and Mourning Dove (*Zenaida macroura*). At the same time, the conversion of sagebrush shrub to grasslands should provide additional habitat for the principle grassland species in the region such as Horned Lark (*Eremophila alpestris*), Vesper Sparrow (*Pooecetes gramineus*), and Grasshopper Sparrow (*Ammodramus savannarum*), and I expect to see increases in the population of these species on the INEEL site in future years.

Overall, there were 332.2 ± 134.5 (N = 13) birds per route. The average number of birds per route was greater for remote routes (449.8 ± 99.2, N = 5) than for facility complex routes (332.0 ± 94.8, N = 5), and the average number of birds per stop was greater for remote routes (9.0 ± 1.7) than for facility routes (8.4 ± 1.8; Table 3). However, the area surveyed at each stop on remote routes is greater than the area surveyed on stops along facility routes, so comparisons between facility and remote routes are problematic. Indeed, although more birds are counted per stop on remote routes, previous analyses of BBS data on the INEEL, which considered the area surveyed per stop, suggest that facility routes contain more birds per area than remote routes (Belthoff and Ellsworth 2000 and Belthoff et al. 1998). These analyses do not, however, consider that as distance increases from the surveyor the probability of detecting a bird decreases. Because the area in which the surveyor is expected to search on facility routes is significantly greater than for facility routes, there are likely

many more birds on remote routes that are left uncounted than on facility routes. Therefore, simple comparisons between facility and remote routes in regards to densities of birds are not biologically sound and should be experimentally tested in the future to reduce bias. Appendix A contains a list of species observed and their relative abundance along each of the 13 survey routes and the IRR Circle.

Species Richness — In 2001, the total of 51 species detected during surveys was slightly below the average of 55.8 ± 7.6 recorded from 1985-2000 (Figure 2). No new species were observed on BBS survey routes in 2001, and the total number of species detected along the routes (1985-2001) remains at 112. In 2001, there were 19.6 ± 2.0 species per route. On average, the same number of species were recorded along remote routes (19.6 ± 2.9) as facility routes (19.6 ± 1.3). The fewest number of species (N = 17) were observed along the Circular Butte and Lost River routes, while the Kyle Canyon route had the greatest number of species (N = 24).

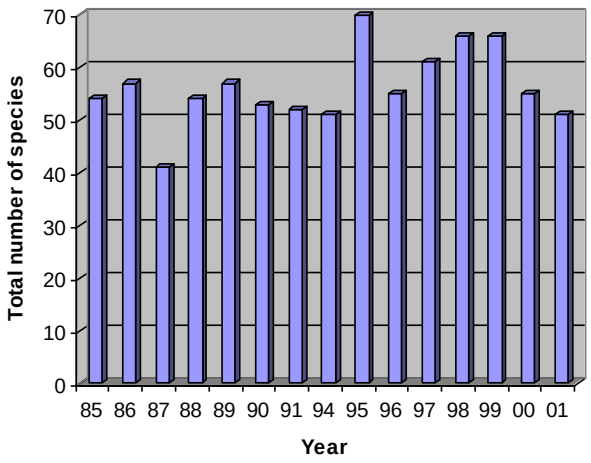


Figure 2. Total number of species recorded by year (1985-2001 along 13 permanent survey routes at the Idaho National Engineering and Environmental Laboratory.

Overall, the five most numerous species in order of abundance were Horned Larks, *Eremophila alpestris*; Western Meadowlarks, *Sturnella neglecta;* Brewer's Sparrows, *Spizella breweri*; Sage Thrashers, *Oreoscoptes montanus*, and Sage Sparrows, *Amphispiza belli*. These five species together comprised 70.9 % of the birds detected. Similarly, these species accounted for 71.4 % of all birds observed from 1985-2000. Although there have been minor shifts in the order over the years, it is clear that these five species are dominant components of the ecosystems at INEEL.

Comparisons with long-term averages

In 2001, no species had an abundance greater than 2.5 standard deviations above 1985 - 2000 averages. Indeed, with few exceptions most bird species were counted near or below 1985-2000 averages. However, Franklin's Gulls (*Larus pipixcan*) were observed on BBS routes for the first time since 1994, and I recorded the second highest annual total (Figure 3). In addition to observations of Franklin's Gulls while conducting BBS surveys, I also regularly observed Franklin's Gulls in flocks exceeding 200 birds in and around the INEEL during June. According to BBS records at the INEEL, 1989 was the last time that Franklin's Gulls appeared on the site in such large numbers. A likely explanation for the influx of gulls in 1989 and again in 2001 is that the birds were attracted to the site by a hatch of semi-periodical cicadas that hatch as adults at intervals of 3-17 years (probably in the genus *Okanagana*; however, at the time of this writing the taxonomic status of these insects are unknown; John Cooley University of Connecticut, personal communication). Densities of cicadas were extremely high at the INEEL in June of 2001, and provided Franklin's Gulls with a super abundance of food. Franklin's Gulls are primarily insect eaters and are known

to range widely away from their wetland nest areas in search of cicadas, grasshoppers, crickets, dragonflies, and other large-bodied insects. At the INEEL, it appeared that the highest densities of cicadas (and Franklin's Gulls) were located in sagebrush and juniper habitat along the southern boundary of the site in regions near Atomic City, CFA and the Twin Buttes.

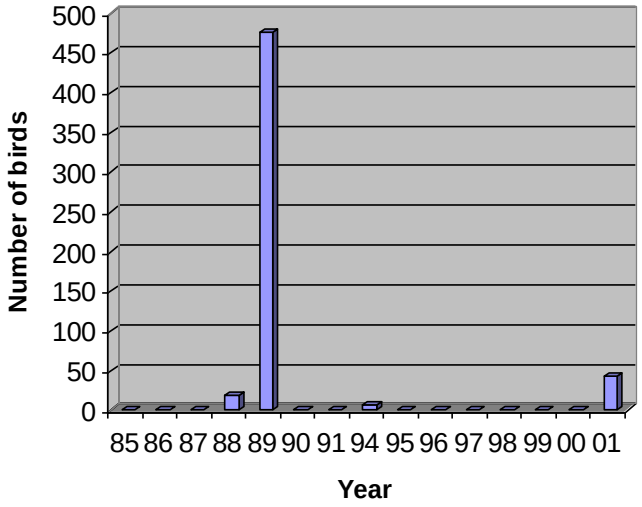


Figure 3. Total number of Franklin's Gulls recorded by year (1985-2001) along 13 permanent routes at the INEEL.

In years between cicada hatches, Franklin's Gulls apparently do not forage on the INEEL site, possibly because cicadas life-cycles are so synchronized developmentally that they are nearly absent as adults in the years between emergences (Gogala 1991) and other insects are not abundant enough to attract the gulls. Although the evidence is circumstantial, it seems possible that the species of semi-periodical cicada on the INEEL hatches at 12-year intervals evidenced by the periodic abundance of Franklin's Gulls. However, very little is known about semi-periodical cicadas in the western U.S. (John Cooley, personal communication),

and their hatches are not as predictable as the hatches of periodical cicadas in the eastern United States (genus *Magicadad*). Therefore, continued monitoring of both Franklin's Gulls and cicada abundance on the INEEL site could provide important information on hatch interval and regularity of this fascinating event.

As in the past three years, no species were more than two standard deviations below their long-term average abundance. However, several species observed in six or more previous years were absent in 2001, including American Coot (*Fulica americana*), Blue-winged Teal (*Anas discors*), Cinnamon Teal (*Anas cyanoptera*), Redhead Duck (*Aythya americana*), Ruddy Duck (*Oxyura jamaicensis*), Willet (*Catoptrophorus semipalmatus*), Sage Grouse (*Centrocercus urophasianus*), American Avocet (*Recurvirostra americana*), Burrowing Owl (*Athene cunicularia*), Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*), Cliff Swallow (*Hirundo pyrrhonota*), Northern Rough-Winged Swallow (*Stelgidopteryx serripennis*), Mountain Bluebird (*Sialia currucoides*), Lark Bunting (*Calamospiza melanocorys*), and Lazuli Bunting (*Passerina ciris*).

Species of special concern

Species of special concern observed during the 2001 census included Long-billed Curlew (*Numenius americanus*, N = 2, Ferruginous Hawk (*Buteo regalis*, N = 12), Swainson's Hawk (*Buteo swainsoni*, N = 3), and Loggerhead Shrike (*Lanius ludovicianus*, N = 15; Table 1). The INEEL continues to support species of birds that are low or declining in number throughout the Intermountain West.

Summary

Results from the 2001 Breeding Bird Surveys at the INEEL illustrated several abiotic and biotic factors that influence bird abundance and distribution in sagebrush and grassland habitats. Fires in recent years and a dry spring contributed to a slightly below average number of birds counted on the site in 2001. Declines in sagebrush obligate species, although not dramatic, likely reflect reduced sagebrush cover across the site. Moreover, few species of birds that depend on surface water were observed at stops near the Big Lost River drainage, which is typical of years with below normal June and early spring precipitation. Species richness was slightly below average, and no previously unrecorded species were observed. However, Franklin's Gulls were observed in large flocks for the first time since 1989, as they foraged on semi-periodical cicadas that seem to hatch only once every 12 years. Finally, four species of concern were recorded (Long-billed Curlew, Loggerhead Shrike, Ferruginous Hawk, and Swainson's Hawk).

Acknowledgments

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Table 1. Birds observed along 13 Breeding Bird Survey routes at the Idaho National Engineering and Environmental Laboratory during the 2001 census. Number (and percentage of total) of each species, type of route along which birds were encountered, and number of stops (and percentage of total) at which each species occurred are indicated.

Common Name	Scientific Name	N	%	Routes[a]	Stops[b]	%
Horned Lark	*Eremophila alpestris*	892	20.7	5,8	325	65.7
Western Meadowlark	*Sturnella neglecta*	773	17.9	5,8	367	74.1
Brewer's Sparrow	*Spizella breweri*	579	13.4	5,8	281	56.8
Sage Thrasher	*Oreoscoptes montanus*	414	9.6	5,8	274	55.3
Sage Sparrow	*Amphispiza belli*	404	9.4	5,8	256	51.7
Brown-headed Cowbird	*Molothrus ater*	205	4.7	5,8	117	23.6
Vesper Sparrow	*Pooecetes gramineus*	196	4.5	5,5	112	22.6
Brewer's Blackbird	*Euphagus cyanocephalus*	147	3.4	1,7	53	10.7
Mourning Dove	*Zenaida macroura*	130	3.0	5,7	75	15.2
Common Nighthawk	*Chordeiles minor*	70	1.6	4,7	36	7.3
House Finch	*Carpodacus mexicanus*	57	1.3	0,8	25	5.1
Barn Swallow	*Hirundo rustica*	45	1.0	0,8	26	5.3
Franklin’s Gull	*Larus pipixcan*	43	1.0	1,1	4	0.8
European Starling	*Sturnus vulgaris*	35	0.8	1,8	16	3.2
Killdeer	*Charadrius vociferus*	33	0.8	0,6	16	3.2
Common Raven	*Corvus corax*	27	0.6	5,6	21	4.2
American Robin	*Turdus migratorius*	27	0.6	3,4	19	3.8
Rock Wren	*Salpinctes obsoletus*	26	0.6	4,5	19	3.8

Chipping Sparrow	*Spizella passerina*	26	0.6	2,0	13	2.6
Gray Flycatcher	*Empidonax wrightii*	21	0.5	2,0	8	1.6
Loggerhead Shrike	*Lanius ludovicianus*	15	0.3	4,2	12	2.4
Say's Phoebe	*Sayornis saya*	15	0.3	0,6	12	2.4
Ferruginous Hawk	*Buteo regalis*	12	0.3	3,0	11	2.2
Mallard	*Anas platyrhynchos*	11	0.3	0,4	4	0.8
Bank Swallow	*Riparia riparia*	11	0.3	0,1	2	0.4
American Kestrel	*Falco sparverius*	9	0.2	1,4	7	1.4
Grasshopper Sparrow	*Ammodramus savannarum*	9	0.2	2,2	6	1.2
Wilson's Phalarope	*Phalaropus tricolor*	8	0.2	0,3	3	0.6
Western Kingbird	*Tyrannus verticalis*	8	0.2	2,2	6	1.2
Lark Sparrow	*Chondestes grammacus*	8	0.2	2,0	6	1.2
Red-winged Blackbird	*Agelaius phoeniceus*	7	0.2	0,2	4	0.8
Red-tailed Hawk	*Buteo jamaicensis*	6	0.1	4,0	5	1.0
Rock Dove	*Columba livia*	6	0.1	1,1	3	0.6
Northern Harrier	*Circus cyaneus*	6	0.1	3,1	6	1.2
Black-billed Magpie	*Pica pica*	4	0.1	1,1	3	0.6
Blue-gray Gnatcatcher	*Polioptila caerulea*	4	0.1	2,0	3	0.6
Spotted Sandpiper	*Actitis macularia*	4	0.1	0,2	2	0.4
Common Poorwill	*Phalaenoptilus nuttallii*	4	0.1	1,0	3	0.6
Swainson's Hawk	*Buteo swainsoni*	3	0.1	1,1	2	0.4
Gadwall	*Anas Strepera*	2	<0.1	0,1	1	0.2

Cinnamon Teal	*Anas cyanoptera*	2	<0.1	0,1	1	0.2
Long-billed Curlew	*Numenius americanus*	2	<0.1	1,0	2	0.4
California Gull	*Larus californicus*	2	<0.1	1,0	1	0.2
Prairie Falcon	*Falco mexicanus*	2	<0.1	2,0	2	0.4
Bullock's Oriole	*Icterus bullockii*	2	<0.1	0,1	1	0.2
Northern Pintail	*Anas acuta*	1	<0.1	0,1	1	0.2
Short-eared Owl	*Asio flammeus*	1	<0.1	1,0	1	0.2
House Sparrow	*Passer domesticus*	1	<0.1	1,0	1	0.2
Eastern Kingbird	*Tyrannus tyrannus*	1	<0.1	0,1	1	0.2
Green-tailed Towhee	*Pipio chlorurus*	1	<0.1	1,0	1	0.2
American Crow	*Corvus brachyrhynchos*	1	<0.1	1,0	1	0.2
TOTAL	**4,318 individuals** **51 species**					

[a]number of remote routes along which species occurred, number of facility complex routes along which species occurred.

[b]number of stops at which species was detected.

Table 2. Total number of 3 obligate species counted in 2001 compared to the mean number of sagebrush obligate bird species counted on 30 Big Lost River stops and 20 TRA stops prior to fires in the summer of 2000 at the INEEL (BBS surveys 1985-2000).

	TRA (20 stops)		Big Lost River (30 stops)	
Species	Pre-Fire Average (1985-2000)	2001	Pre-Fire Average (1985-2000)	2001
Sage Thrasher	21.1 ± 4.3	7	41.0 ± 4.7	10
Brewer's Sparrow	40.4 ± 9.6	2	64.1 ± 10.2	7
Sage Sparrow	34.9 ± 12.1	6	60.4 ± 8.3	17

Table 3. Number of species, number of individual birds, and average number of individuals per stop along Remote Routes (N = 5) and Facility Complex Routes (N = 8) at the INEEL in 2001.

Route	Stops	Species	N	Birds/Stop
Remote Routes				
Circular Butte (Monument)	50	17	417	8.3
Kyle Canyon	50	24	467	9.3
Lost River	50	17	304	6.1
Tractor Flats	50	19	542	10.8
Twin Buttes	50	21	519	10.4
Subtotal	**250**	**37**	**2249**	**9.0**
Facility Complex Routes				
CFA	42	20	339	8.1
EBRII	18	22	193	10.7
ICPP/INTEC	25	18	231	9.2
NRF	20	20	165	8.3
PBF-SPERT	28	18	321	11.5
RWMC	20	19	134	6.7
TAN	60	19	429	7.2
TRA	32	21	257	8.0
Subtotal	**245**	**37**	**2069**	**8.4**
TOTAL	**495**	**51**	**4,318**	**8.7**

Appendix A
Summary of Species by Route
(2001)

Survey Route: TWIN BUTTES
Survey Date: 8 June 2001

Species	Abundance	Percentage
Western Meadowlark	117	22.5
Horned Lark	95	18.3
Sage Thrasher	83	16.0
Brewer's Sparrow	73	14.0
Sage Sparrow	46	8.9
Common Nighthawk	27	5.2
Brown-headed Cowbird	23	4.4
Mourning Dove	14	2.7
Vesper Sparrow	7	1.3
Gray Flycatcher	5	1.0
Chipping Sparrow	5	1.0
Common Poorwill	4	0.8
Blue-gray Gnatcatcher	3	0.6
Rock Wren	3	0.6
Common Raven	3	0.6
American Robin	3	0.6
Lark Sparrow	3	0.6
Loggerhead Shrike	2	0.4
Red-tailed Hawk	1	0.2
Western Kingbird	1	0.2
Grasshopper Sparrow	1	0.2

Total Individuals = 519
Total Species = 23

Survey Route: BIG LOST RIVER
Survey Date: 11 June 2001

Species	Abundance	Percentage
Horned Lark	126	41.4
Western Meadowlark	64	21.0
Sage Sparrow	31	10.2
Brewer's Sparrow	20	6.6
Sage Thrasher	16	5.3
Brown-headed Cowbird	16	5.3
American Robin	6	2.0
Vesper Sparrow	6	2.0
Rock Wren	5	1.6
Common Nighthawk	4	1.2
Red-tailed Hawk	2	0.7
Ferruginous Hawk	2	0.7
Mourning Dove	2	0.7
Prairie Falcon	1	0.3
Common Raven	1	0.3
Western Kingbird	1	0.3
Grasshopper Sparrow	1	0.3

Total Individuals = 304
Total Species = 17

Survey Route: KYLE CANYON
Survey Date: 15 June 2001

Species	Abundance	Percentage
Horned Lark	74	15.8
Vesper Sparrow	71	15.2
Western Meadowlark	69	14.8
Brewer's Sparrow	69	14.8
Sage Sparrow	38	8.1
Sage Thrasher	31	6.6
Chipping Sparrow	21	4.5
Mourning Dove	18	3.9
Gray Flycatcher	16	3.4
Brown-headed Cowbird	10	2.1
Brewer's Blackbird	8	1.7
Ferruginous Hawk	8	1.7
Loggerhead Shrike	8	1.7
Common Raven	6	1.3
Lark Sparrow	5	1.1
Rock Wren	4	0.9
Black-billed Magpie	2	0.4
American Kestrel	2	0.4
American Robin	2	0.4
Blue-gray Gnatcatcher	1	0.2
Red-tailed Hawk	1	0.2
Northern Harrier	1	0.2
Prairie Falcon	1	0.2
Green-tailed Towhee	1	0.2

Total Individuals = 467
Total Species = 24

Survey Route: CIRCULAR BUTTE
Survey Date: 19 June 2001

Species	Abundance	Percentage
Horned Lark	115	27.6
Western Meadowlark	93	22.3
Brewer's Sparrow	72	17.3
Sage Sparrow	47	11.3
Sage Thrasher	33	7.9
Brown-headed Cowbird	24	5.8
Mourning Dove	10	2.4
Franklin's Gull	5	1.2
Rock Wren	3	0.7
Vesper Sparrow	3	0.7
Common Nighthawk	2	0.5
Northern Harrier	2	0.5
Red-tailed Hawk	2	0.5
Ferruginous Hawk	2	0.5
Loggerhead Shrike	2	0.5
Swainson's Hawk	1	0.2
Common Raven	1	0.2

Total Individuals = 417
Total Species = 17

Survey Route: TRACTOR FLATS
Survey Date: 13 June 2001

Species	Abundance	Percentage
Horned Lark	158	29.2
Western Meadowlark	124	22.9
Brewer's Sparrow	73	13.5
Sage Thrasher	50	9.2
Sage Sparrow	42	7.7
Mourning Dove	28	5.2
Vesper Sparrow	27	5.0
Brown-headed Cowbird	19	3.5
Common Raven	4	0.7
Common Nighthawk	4	0.7
Long-billed Curlew	2	0.4
Northern Harrier	2	0.4
California Gull	2	0.4
Rock Dove	2	0.4
Short-eared Owl	1	0.1
House Sparrow	1	0.1
Loggerhead Shrike	1	0.1
American Crow	1	0.1
European Starling	1	0.1

Total Individuals = 542
Total Species = 19

Survey Route: ICPP
Survey Date: 14 June 2001

Species	Abundance	Percentage
Western Meadowlark	58	25.1
Brewer's Sparrow	53	22.9
Horned Lark	31	13.4
Sage Sparrow	25	10.8
Sage Thrasher	24	10.4
Brown-headed Cowbird	10	4.3
House Finch	10	4.3
Brewer's Blackbird	3	1.2
Say's Phoebe	3	1.2
Swainson's Hawk	2	0.8
Common Nighthawk	2	0.8
Vesper Sparrow	2	0.8
European Starling	2	0.8
Black-billed Magpie	2	0.8
Mallard	1	0.4
American Kestrel	1	0.4
Killdeer	1	0.4
Barn Swallow	1	0.4

Total Individuals = 231
Total Species = 18

Survey Route: CFA
Survey Date: 16 June 2001

Species	Abundance	Percentage
Western Meadowlark	56	16.5
Franklin's Gull	38	11.2
Brewer's Sparrow	34	10.0
Sage Thrasher	33	9.7
Sage Sparrow	32	9.4
Horned Lark	22	6.5
Brown-headed Cowbird	20	5.9
Brewer's Blackbird	19	5.6
House Finch	13	3.8
American Robin	12	3.5
Killdeer	11	3.2
Barn Swallow	11	3.2
Common Nighthawk	11	3.2
European Starling	6	1.8
Say's Phoebe	5	1.5
Common Raven	4	1.2
Mourning Dove	4	1.2
American Kestrel	4	1.2
Western Kingbird	2	0.6
Grasshopper Sparrow	2	0.6

Total Individuals = 339
Total Species = 20

Survey Route: TRA
Survey Date: 23 June 2000

Species	Abundance	Percentage
Horned Lark	45	17.5
Brewer's Blackbird	45	17.5
Western Meadowlark	37	14.4
Sage Thrasher	26	10.1
Brown-headed Cowbird	17	6.6
Sage Sparrow	15	5.8
Mourning Dove	13	5.1
European Starling	12	4.7
Brewer's Sparrow	11	4.3
Vesper Sparrow	7	2.7
Mallard	5	1.9
House Finch	4	1.6
Red-winged Blackbird	4	1.6
Barn Swallow	3	1.2
Killdeer	3	1.2
American Robin	3	1.2
Common Nighthawk	2	0.8
Rock Wren	2	0.8
Common Raven	1	0.3
Loggerhead Shrike	1	0.3
American Kestrel	1	0.3

Total Individuals = 257
Total Species = 21

Survey Route: EBRII
Survey Date: 10 June 2001

Species	Abundance	Percentage
Western Meadowlark	31	16.1
Brewer's Sparrow	20	10.4
Sage Sparrow	19	9.8
Horned Lark	19	9.8
Sage Thrasher	16	8.3
Brewer's Blackbird	15	7.8
Killdeer	11	5.7
Mourning Dove	9	4.7
Barn Swallow	9	4.7
Brown-headed Cowbird	8	4.1
House Finch	7	3.6
Common Nighthawk	6	3.1
European Starling	4	2.1
Western Kingbird	4	2.1
Mallard	3	1.6
Spotted Sandpiper	2	1.0
Wilson’s Phalarope	2	1.0
Rock Wren	2	1.0
Common Raven	2	1.0
Say’s Phoebe	2	1.0
Northern Pintail	1	0.5
American Robin	1	0.5

Total Individuals = 193
Total Species = 22

Survey Route: NRF
Survey Date: 18 June 2001

Species	Abundance	Percentage
Horned Lark	35	21.2
Western Meadowlark	30	18.2
Sage Sparrow	18	10.9
Brown-headed Cowbird	15	9.0
Brewer's Sparrow	12	7.3
Sage Thrasher	12	7.3
Barn Swallow	7	4.2
Vesper Sparrow	7	4.2
Brewer's Blackbird	5	3.0
Wilson’s Phalarope	4	2.4
Killdeer	3	1.8
Common Nighthawk	3	1.8
House Finch	3	1.8
European Starling	3	1.8
Cinnamon Teal	2	1.2
Spotted Sandpiper	2	1.2
Mourning Dove	1	0.6
American Robin	1	0.6
Eastern Kingbird	1	0.6
Say’s Phoebe	1	0.6

Total Individuals = 165
Total Species = 20

Survey Route: PBF-SPERT
Survey Date: 21 June 2001

Species	Abundance	Percentage
Brewer's Sparrow	70	21.8
Western Meadowlark	47	14.6
Sage Sparrow	41	12.8
Horned Lark	40	12.5
Sage Thrasher	34	10.6
Brewer's Blackbird	29	9.0
Brown-headed Cowbird	25	7.8
Vesper Sparrow	9	2.8
Barn Swallow	5	1.6
Common Nighthawk	4	1.2
Mourning Dove	4	1.2
House Finch	4	1.2
European Starling	2	0.6
Bullock's Oriole	2	0.6
Say's Phoebe	2	0.6
Common Raven	1	0.3
Rock Wren	1	0.3
Loggerhead Shrike	1	0.3

Total Individuals = 321
Total Species = 18

Survey Route: RWMC
Survey Date: 9 June 2001

Species	Abundance	Percentage
Western Meadowlark	18	13.4
Brewer's Sparrow	18	13.4
Sage Thrasher	17	12.7
House Finch	15	11.2
Horned Lark	13	9.7
Sage Sparrow	12	9.0
Mourning Dove	8	6.0
Common Nighthawk	5	3.7
Barn Swallow	5	3.7
Rock Wren	4	3.0
Killdeer	3	2.2
Red-winged Blackbird	3	2.2
Say's Phoebe	2	1.5
Gadwall	2	1.5
Mallard	2	1.5
Wilson's Phalarope	2	1.5
European Starling	2	1.5
Brown-headed Cowbird	2	1.5
Common Raven	1	0.7

Total Individuals = 134
Total Species = 19

Survey Route: TAN
Survey Date: 17 June 2001

Species	Abundance	Percentage
Horned Lark	120	28.0
Vesper Sparrow	57	13.3
Brewer's Sparrow	52	12.1
Sage Thrasher	39	9.1
Sage Sparrow	37	8.6
Western Meadowlark	30	7.0
Brewer's Blackbird	23	5.4
Mourning Dove	20	4.6
Brown-headed Cowbird	16	3.7
Bank Swallow	11	2.6
Grasshopper Sparrow	5	1.2
Rock Dove	4	0.9
Common Raven	3	0.7
Barn Swallow	3	0.7
European Starling	3	0.7
Rock Wren	2	0.5
House Finch	2	0.5
Northern Harrier	1	0.2
American Kestrel	1	0.2

Total Individuals = 429
Total Species = 19

Survey Route: IRR CIRCLE**
Survey Date: 16 June 2001

Species	Abundance	Percentage
Western Meadowlark	22	36.6
Brown-headed Cowbird	10	16.6
Brewer's Sparrow	8	13.3
Brewer's Blackbird	7	11.6
Sage Sparrow	5	8.3
Horned Lark	4	6.6
Sage Thrasher	3	5.0
Red-winged Blackbird	1	1.6

Total Individuals = 60
Total Species = 8

**Established in 1997.