

2016 Breeding Bird Surveys on the Idaho National Laboratory Site

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EXECUTIVE SUMMARY

Breeding bird surveys (BBSs) have been conducted almost every year since 1985 to monitor bird populations on the Idaho National Laboratory (INL) Site. In 2016, we conducted surveys in June along five routes that are part of a nationwide survey administered by the U.S. Geological Survey (USGS) and eight routes near INL Site facilities. We documented 6,183 birds from 53 species during those surveys.

We observed similar bird abundance patterns for those species that are typically the most numerous including horned lark (*Eremophila alpestris*, $n=903$), western meadowlark (*Sturnella neglecta*, $n=644$), sage thrasher (*Oreoscoptes montanus*, $n=503$), sagebrush sparrow (*Artemisiospiza nevadensis*, $n=216$), and Brewer's sparrow (*Spizella breweri*, $n=193$). In addition, we observed large numbers of Franklin's gulls (*Larus pipixcan*, $n=3,082$) as they flew over the eastern side of the INL Site. With the exception of the Franklin's gull, the five species listed above have been the five most abundant 23 times during the past 30 years of surveys, and in the remaining seven years they were among the six most abundant species.

Investigators observed two species that were previously not recorded during the INL surveys: one great egret (*Ardea alba*) and three Eurasian collared dove (*Streptopelia decaocto*). One species was observed during the surveys that had been recorded in 7 of the past 26 years. This species was the Canada goose (*Branta canadensis*, $n=7$).

Species observed during the 2016 BBS that are considered by the Idaho Department of Fish and Game as species of greatest conservation concern included the Franklin's gull (*Larus pipixcan*, $n=3,082$), grasshopper sparrow (*Ammodramus savannarum*, $n=5$), ferruginous hawk (*Buteo regalis*, $n=13$), long-billed curlew (*Numenius americanus*, $n=7$), and burrowing owl (*Athene cunicularia*, $n=2$).

Brewer's and Sagebrush sparrows continue to be observed at near-historical lows, likely as a result of big fires in 2010 and 2011. In addition, raven observations continue at high levels.

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ACRONYMS

ATRC	Advanced Test Reactor Complex
BBS	Breeding Bird Survey
CFA	Central Facilities Area
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
MFC	Materials and Fuels Complex
NRF	Naval Reactor Facility
PBF	Power Burst Facility
RWMC	Radioactive Waste Management Complex
TAN	Test Area North
USGS	United States Geological Survey

1.0 INTRODUCTION

The North American Breeding Bird Survey (BBS) was developed by the U.S. Fish and Wildlife Service and the Canadian Wildlife Service to document trends in bird populations. Pilot surveys began in 1965 and immediately expanded to cover the U.S. east of the Mississippi and Canada, and by 1968 included all of North America (Sauer and Link 2011). The BBS program in North America is managed by the U.S. Geological Survey (USGS) and currently consists of over 5,100 routes, with approximately 2,500 of these being sampled each year (Sauer and Link 2011).

Breeding bird survey data provide long-term species abundance and distribution trends for > 420 species of birds across a broad-geographic scale (Sauer and Link 2011). These data have been used to estimate population changes for hundreds of bird species, and they are the primary source for regional conservation programs and modeling efforts for birds (Sauer and Link 2011). The BBS provides a wealth of information about population trends of birds in North America, and is the foundation for broad conservation assessments extending beyond local jurisdictional boundaries (Sauer and Link 2011).

Five BBS routes (i.e. remote routes) are on the Idaho National Laboratory (INL) Site and have been surveyed nearly each year since 1985 (except 1992 and 1993). The U.S. Department of Energy, Idaho Operations Office (DOE) also established and annually surveys eight additional routes around INL Site facilities to monitor birds near the highest human activity centers (i.e. facility routes)(Fig. 1). The DOE supports BBS efforts in part because the agency aims to contribute to the international effort to track bird population trends. In addition, BBS data can benefit INL Site managers directly by providing information on local breeding bird populations, which may be useful as they consider new activities and comply with the National Environmental Protection Act. Currently, DOE is interested in tracking abundance trends of songbirds that are sagebrush specialists because this bird assemblage uses the same habitat as greater sage-grouse, a bird that DOE is invested in conserving (DOE and USFWS 2014). Similarly, common raven abundance trends may indicate nest depredation risk for sage-grouse. This report summarizes results from the 2016 BBS and examines long-term trends.

1.1 STUDY AREA

The INL Site encompasses almost 900 mi² (2,330 km²) on the Upper Snake River Plain in southeast Idaho (Fig. 1) and is administered by the U. S. Department of Energy. The INL Site was designated a National Environmental Research Park in 1975 to facilitate research assessing environmental impacts from the development of nuclear energy technologies. This area is located within portions of Bingham, Bonneville, Butte, Clark, and Jefferson counties. The INL Site has been designated as an Important Bird Area by the Idaho Comprehensive Wildlife Conservation Strategy (Idaho Department of Fish and Game 2005). This designation recognizes wildlife species that are listed by either state or federal agencies and provides a comprehensive listing of the Idaho species of greatest conservation need (Idaho Department of Fish and Game 2013). The INL Site has also been recognized as a Global Important Bird Area by the National Audubon Society.

Topography across the INL Site is mostly flat with an average elevation of 4,985 ft (1,519 m). Other than minor topographic variation created by basalt outcrops, the only significant

geographical relief occurs around East and Middle buttes and the southern portion of the Lemhi Mountains located near the northwest corner of the INL Site.

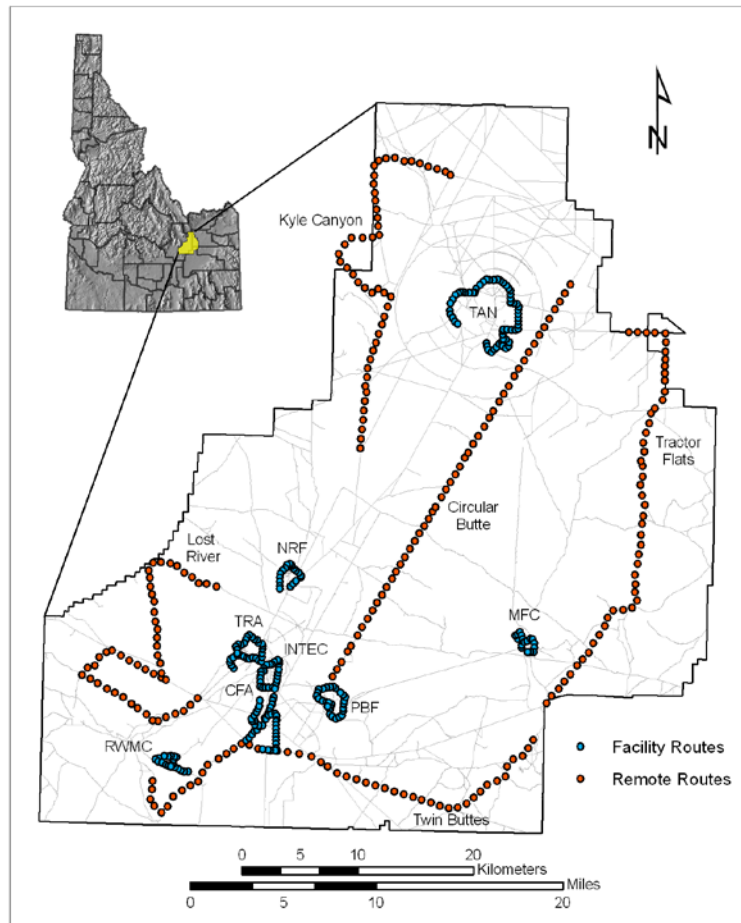


Figure 1. Breeding Bird Survey routes on the Idaho National Laboratory Site. Blue dots represent survey points along facility routes and red dots represent the same for remote routes.

The INL Site is located in a semi-arid desert characterized by hot, dry summers and cold winters. Annual precipitation on the INL Site averages 8 inches (20 cm), with peak precipitation commonly occurring in spring. The geology is dominated by Quaternary basalt lava flows, including many outcrops and lava tubes. Aeolian soils consisting primarily of silt loam and sandy loam are the most common soil type on the INL Site, while alluvial soils more commonly occur along the flood plain of the Big Lost River. The INL Site is a shrub-steppe ecosystem dominated by a woody shrub over-story and perennial bunchgrass and forb understory. Big sagebrush (*Artemisia tridentata* ssp.) is the most dominant shrub community on the INL Site, while other common species include green rabbitbrush (*Chrysothamnus viscidiflorus*), spiny hopsage (*Grayia spinosa*), shadscale (*Atriplex confertifolia*), winterfat (*Krascheninnikovia lanata*), and other sagebrush species (*A. spp.*). The most common native grasses are streambank wheatgrass (*Elymus lanceolatus*), bottlebrush squirreltail (*E. elymoides*), Indian ricegrass (*Achnatherum hymenoides*), and needle-and-thread grass (*Hesperostipa comata*). More information regarding the climate, geology, and vegetation communities on the INL Site is described in Shive et al. (2011).

Little surface water exists during spring and summer on the INL Site. The Big Lost River and Birch Creek are both diverted upstream for agricultural purposes and consequently little, if any, water from these streams reaches the INL Site. During years of high flow, however, water from the Big Lost River can reach the INL Site where it drains into what used to be an ephemeral wetland known as the Big Lost River Sinks. The sinks provide the only substantial water source for waterfowl and shorebirds on the INL Site, although a number of man-made waste treatment ponds near facilities also provide aquatic habitat for migrating birds.

1.2 METHODS

Data Collection

The BBS is a roadside count of all birds seen or heard along predefined routes. Thirteen BBS routes were surveyed from June 1 to June 28, 2016, consisting of five official USGS BBS routes and eight facility routes developed specifically for the INL Site (Fig. 1). Each remote survey route is 24.5 miles (39.2 km), consisting of 50 sampling points systematically spaced every 0.5 mile (0.8 km). Facility routes vary in length between 3.6 miles (5.8 km) and 11.9 miles (19.2 km), depending on the size of the facility. Sampling points along facility routes are separated by approximately 0.2 mile (0.32 km).

During surveys, observers followed the North American BBS protocols provided by the USGS Patuxent Wildlife Research Center (Sauer and Link 2011). At each sampling location (i.e., stop), a trained observer recorded every bird species observed or heard within a quarter-mile radius during a 3-minute interval. Any bird that was suspected of being counted on the previous stop was not recorded again (Sauer and Link 2011). Additional data such as temperature, wind speed, and sky condition were recorded after every five stops along remote routes, and at the beginning and end of each facility route. Each route was only surveyed when weather conditions were appropriate (e.g., no heavy rain or strong wind). These surveys began one-half hour before sunrise and continued for up to 6 hours until the route was completed. The number of vehicles that passed observers during the 3-minute sampling period was recorded on all remote routes, and observers noted whether background noise interfered with audible detection of birds.

Shannon's H and E_H were calculated for all BBS routes to show the species diversity, species abundance, measure of evenness, and compared with standard species richness information documented in past reports. We assumed that data obtained from each survey route was an accurate representation of the local bird community.

1.3 RESULTS AND DISCUSSION

Summary Statistics

We observed 6,183 birds and 53 species during the 2016 surveys (Appendix A). Total observations were 31% higher than the 29-year mean of 4,704 birds (1985-2015, 1992 and 1993 excluded; Fig. 2), though we recorded fewer species (mean=56 species). The total 2016 count was the highest recorded since 2005 and the fourth highest since surveys began (Table 1). This increase was driven by 3,054 Franklin's gulls (*Larus pipixcan*) counted on the MFC and Tractor Flats routes (see below).

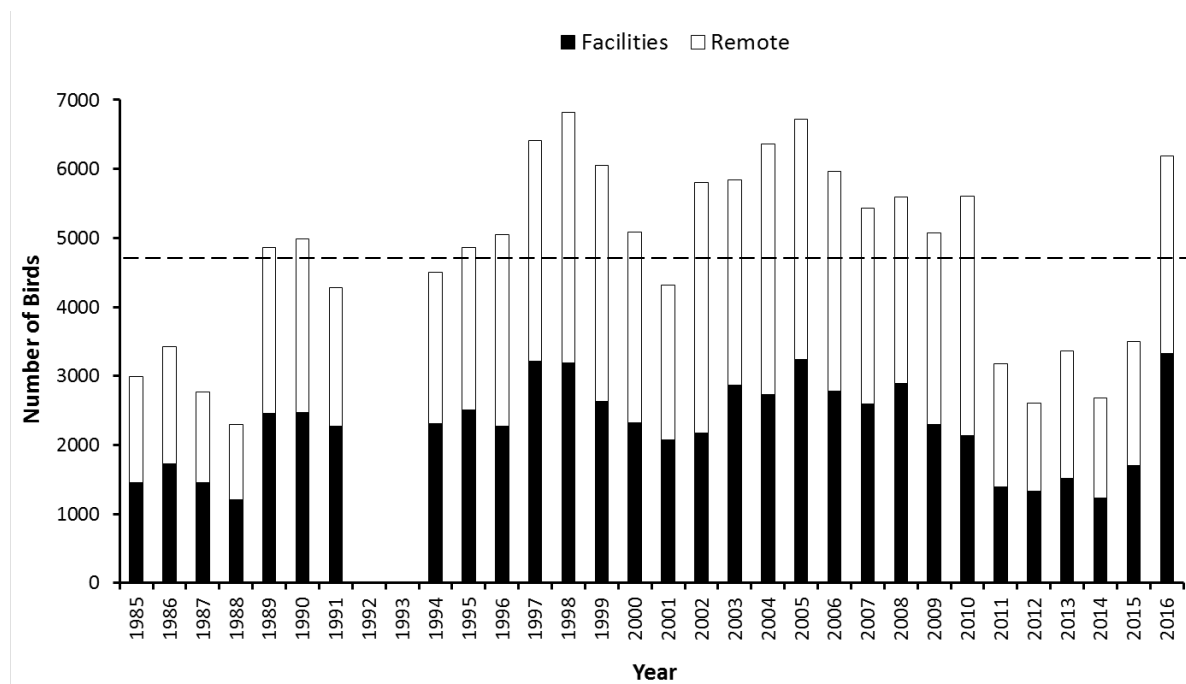


Figure 2. Total annual counts from Breeding Bird Surveys on the Idaho National Laboratory Site since surveys were initiated. The dashed black line indicates the annual mean from 1985 to 2015. No Breeding Bird Surveys were conducted on the INL Site in 1992 or 1993.

The six most abundant birds were Franklin's gull ($n=3,082$), horned lark (*Eremophila alpestris*, $n=903$), western meadowlark (*Sturnella neglecta*, $n=644$), sage thrasher (*Oreoscoptes montanus*, $n=503$), sagebrush sparrow (*Artemisospiza nevadensis*, $n=216$), and Brewer's sparrow (*Spizella breweri*, $n=193$). These six species comprised > 89% of all observations, and with the exception of Franklin's gull, each was observed on every remote route (Table 2, Appendix A). Horned lark, western meadowlark, sage thrasher, sagebrush sparrow, and Brewer's sparrow have been the five most abundant species in 23 of the 30 years of INL Site BBS (in the other years they were among the seven most abundant species).

Horned larks were the most evenly distributed species, observed at 68.3% (338) of the total stops made during the survey (Table 2). The horned lark is traditionally the most abundant species recorded during BBSs on the INL Site and, with the exception of 2013 and 2016, has been the most abundant species annually since 1998.

The Tractor Flats Route had the highest species richness and the highest bird abundance of any remote route (Table 1), and consistently has had the highest abundance among remote routes since 1999, excluding 2010. Mean bird abundance on this route since 1985 was 714 individuals, which is higher than other remote routes. Across all routes in 2016, MFC had the highest abundance. The RWMC Route had highest species richness of the facility routes. The TAN Route has had the highest mean abundance at a facility since 1985 with 471 birds and NRF, MFC, and CFA have had the highest mean richness since 1985 with 21 species.

Table 1. Summary numbers for each breeding bird route that was surveyed in 2016 on the Idaho National Laboratory Site.

Route	Stops	# Species	Abundance
Remote Routes			
Lost River	50	13	376
Circular Butte	50	15	325
Kyle Canyon	50	20	316
Tractor Flats	50	27	1,617
Twin Buttes	50	17	223
Subtotal	250	35*	2,857
Facility Routes			
CFA	42	20	202
INTEC	25	14	169
MFC	18	25	2,049
NRF	20	15	155
PBF	28	11	222
ATRC	32	12	154
RWMC	20	26	157
TAN	60	13	218
Subtotal	245	43*	3,326
Total	495	53	6,183

*Total number of unique species.

Rare Observations and Species of Special Concern

Five species were observed during the 2016 BBS that are considered Species of Greatest Conservation Need by the Idaho Department of Fish and Game (2013). These included the Franklin's gull (*Larus pipixcan*, $n=3,082$), ferruginous hawk (*Buteo regalis*, $n=13$), long-billed curlew (*Numenius americanus*, $n=7$), grasshopper sparrow (*Ammodramus savannarum*, $n=5$), and burrowing owl (*Athene cunicularia*, $n=2$).

Species Assemblage Summary

The most abundant species assemblage in 2016 was the shorebirds, representing nearly 50.1% of all BBS observations (Fig. 3). This was due to an estimated 3,082 Franklin's gull observations, primarily on two routes. The second most abundant species assemblage was the shrub-steppe/grassland category representing 30.4% of all observations (Fig. 3). This assemblage normally has the highest abundance because the majority of the INL Site consists of shrub-steppe and grassland habitats. The third most abundant species assemblage was the sagebrush obligates

Table 2. Summary of species from 13 routes, sorted by abundance, that were observed during the 2016 Breeding Bird Survey on the Idaho National Laboratory Site.

Common Name	Scientific Name	n	%	Routes ¹	Stops ²	% ³
Franklin's Gull	<i>Larus pipixcan</i>	3,082	49.85	3,2	30	6.06
Horned Lark	<i>Eremophila alpestris</i>	903	14.60	5,8	338	68.28
Western Meadowlark	<i>Sturnella neglecta</i>	644	10.42	5,8	291	58.79
Sage Thrasher	<i>Oreoscoptes montanus</i>	503	8.14	5,8	285	57.58
Sage Sparrow	<i>Amphispiza belli</i>	216	3.49	5,7	139	28.08
Brewer's Sparrow	<i>Spizella breweri</i>	193	3.12	5,8	131	26.46
Mourning Dove	<i>Zenaida macroura</i>	162	2.62	5,8	113	22.83
Common Raven	<i>Corvus corax</i>	90	1.46	5,8	50	10.10
Barn Swallow	<i>Hirundo rustica</i>	75	1.21	1,7	22	4.44
Common Nighthawk	<i>Chordeiles minor</i>	46	0.74	5,4	32	6.46
Vesper Sparrow	<i>Pooecetes gramineus</i>	43	0.70	5,6	29	5.86
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	26	0.42	1,5	14	2.83
Ferruginous Hawk	<i>Buteo regalis</i>	13	0.21	2,0	7	1.41
Swainson's Hawk	<i>Buteo swainsoni</i>	13	0.21	4,4	10	2.02
Loggerhead Shrike	<i>Lanius ludovicianus</i>	12	0.19	3,2	11	2.22
Rock Wren	<i>Salpinctes obsoletus</i>	11	0.18	5,3	11	2.22
Brown-headed Cowbird	<i>Molothrus ater</i>	10	0.16	1,3	4	0.81
Northern Harrier	<i>Circus cyaneus</i>	10	0.16	2,3	9	1.82
Red-tailed Hawk	<i>Buteo jamaicensis</i>	10	0.16	3,3	9	1.82
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	10	0.16	0,2	4	0.81
Say's Phoebe	<i>Sayornis saya</i>	10	0.16	0,5	9	1.82
European Starling	<i>Sturnus vulgaris</i>	9	0.15	1,2	4	0.81
Killdeer	<i>Charadrius vociferus</i>	9	0.15	0,4	6	1.21
Canada Goose	<i>Branta canadensis</i>	7	0.11	0,2	2	0.40
Long-billed Curlew	<i>Numenius americanus</i>	7	0.11	2,1	4	0.81
American Kestrel	<i>Falco sparverius</i>	6	0.10	1,1	4	0.81
Black-billed Magpie	<i>Pica pica</i>	5	0.08	2,0	4	0.81
Cliff Swallow	<i>Hirundo pyrrhonota</i>	5	0.08	1,3	3	0.61
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	5	0.08	2,0	4	0.81
Western Kingbird	<i>Tyrannus verticalis</i>	5	0.08	0,4	4	0.81
Chipping Sparrow	<i>Spizella passerina</i>	4	0.06	2,0	3	0.61
House Sparrow	<i>Passer domesticus</i>	4	0.06	0,2	2	0.40
American Robin	<i>Turdus migratorius</i>	3	0.05	1,1	2	0.40

Common Name	Scientific Name	n	%	Routes ¹	Stops ²	% ³
American Wigeon	<i>Anas americana</i>	3	0.05	0,1	1	0.20
Eurasian Collared-Dove	<i>Streptopelia decaocto</i>	3	0.05	1,0	2	0.40
Burrowing Owl	<i>Athene cunicularia</i>	2	0.03	1,0	2	0.40
Golden Eagle	<i>Aquila chrysaetos</i>	2	0.03	1,1	2	0.40
Lark Sparrow	<i>Chondestes grammacus</i>	2	0.03	1,0	1	0.20
Mallard	<i>Anas platyrhynchos</i>	2	0.03	0,1	1	0.20
Northern Flicker	<i>Colaptes auratus</i>	2	0.03	1,1	2	0.40
Northern Shoveler	<i>Anas clypeata</i>	2	0.03	0,1	1	0.20
Prairie Falcon	<i>Falco mexicanus</i>	2	0.03	1,1	2	0.40
Redhead	<i>Aythya americana</i>	2	0.03	0,1	1	0.20
American Avocet	<i>Recurvirostra americana</i>	1	0.02	0,1	1	0.20
American Crow	<i>Corvus brachyrhynchos</i>	1	0.02	1,0	1	0.20
Bank Swallow	<i>Riparia riparia</i>	1	0.02	0,1	1	0.20
Blue-gray Gnatcatcher	<i>Poliopitila caerulea</i>	1	0.02	1,0	1	0.20
Great Egret	<i>Ardea alba</i>	1	0.02	0,1	1	0.20
House Finch	<i>Carpodacus mexicanus</i>	1	0.02	0,1	1	0.20
House Wren	<i>Troglodytes aedon</i>	1	0.02	0,1	1	0.20
Lark Bunting	<i>Calamospiza melanocorys</i>	1	0.02	0,1	1	0.20
Mountain Bluebird	<i>Sialia currucoides</i>	1	0.02	0,1	1	0.20
Short-eared Owl	<i>Asio flammeus</i>	1	0.02	1,0	1	0.20

¹The first value represents the number of remote routes at which a species was recorded, and the second value represents the number of facility routes at which a species was recorded.

²Number of stops at which a species was documented.

³Percent of stops (from a total of 495) at which a species was recorded.

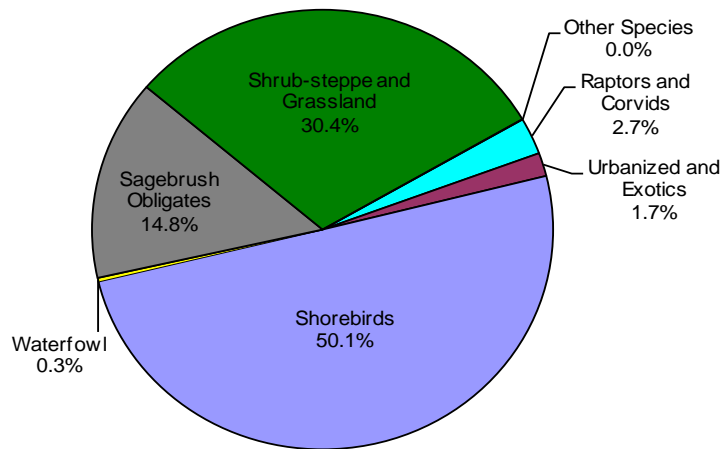


Figure 3. Summary of species assemblage for Breeding Bird Surveys of remote and facility routes on the Idaho National Laboratory Site in 2016.

representing 14.8% of all observations. As indicated earlier in this report, recent fires on the INL Site have reduced the amount of sagebrush habitat. Such reduction in sagebrush most likely has affected the abundance of sagebrush-obligate species. Further analyses needs to be conducted to verify this relationship.

Shorebirds

We observed 3,100 individuals representing five species from the shorebird assemblage, which accounted for 50.1% of the total BBS observations (Fig. 3). Because standing water is rare on the INL Site, typically most observations of shorebirds occur in proximity to waste ponds near facility routes. In 2016, Franklin's gulls were observed by the hundreds flying in large and small groups from the northeast towards the southwest, primarily along the MFC and Tractor Flats routes. We do not know why they were moving in such large numbers at this time of the year, but it was probably in response to an abundant food resource somewhere off the INL Site. The large number of observations ($n=3,082$) comprised 99.4% of all shorebird observations. Other shorebirds seen included, killdeer (*Charadrius vociferous*, $n=9$), long-billed curlew (*Numenius americanus*, $n=7$), American Avocet (*Recurvirostra americana*, $n=1$), and great egret (*Ardea alba* $n=1$).

Shrub-steppe/Grassland

Species representing the shrub-steppe/grassland assemblage have always been observed in greatest numbers in past BBSs, and they again dominated observations in 2016 ($n=1,881$, Fig. 3). Common shrub-steppe/grassland species include horned lark, western meadowlark, brown-headed cowbird (*Molothrus ater*), and vesper sparrow (*Pooecetes gramineus*). Western meadowlark ($n=644$) and horned lark ($n=903$) were the most abundant species in this assemblage and were two of the top three most abundant species for the entire survey (Table 2).

Sagebrush Obligates

The sagebrush obligate assemblage had the second highest species abundance with 912 individuals (14.8% of total). This assemblage includes Brewer's sparrow, sagebrush sparrow, sage thrasher, and greater sage-grouse. Sage thrasher was the most abundant sagebrush obligate ($n=503$), followed by sagebrush sparrow ($n=216$) and Brewer's sparrow ($n=193$). Since 1985, sage thrasher counts have fluctuated, but appear to be stable. Sagebrush and Brewer's sparrows, however, are at historically low levels (Fig. 4). For the past six years (since 2011), sagebrush sparrow observations ranged from 161–237, all of which were lower than the previous low count of 241 individuals recorded in 1987. Brewer's sparrow observations in 2016 were 25% higher than in 2015, but still under 200 birds. Only in two years (1985 and 1988) prior to 2012 had observations been below 200 Brewer's sparrows.

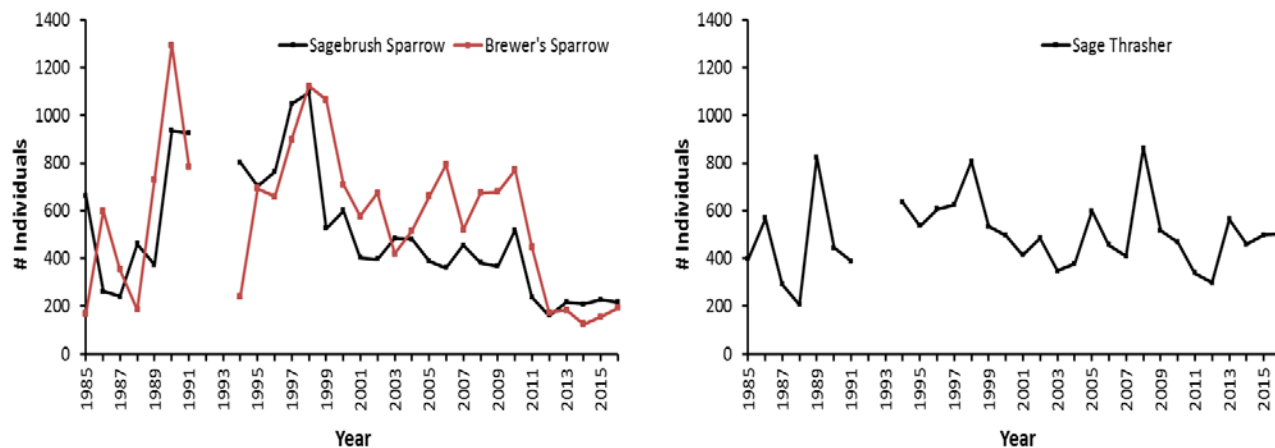


Figure 4. Trends of three sagebrush obligates recorded during Breeding Bird Surveys since 1985. Surveys were not conducted in 1992 and 1993.

In many western states, sagebrush obligates are facing significant habitat loss; consequently, many populations are in decline (Knick 1999; Knick et al. 2003). On the INL Site, three large fires in 2010 and 2011 burned 29,944 ha (73,993 acres) of sagebrush-dominated communities, representing over 20% of big sagebrush communities (DOE-ID and USFWS 2014). Sharp declines in the number of observations of Brewer's and sagebrush sparrows correspond with these fires. It is not clear, however, why sage thrasher abundance has apparently not been affected. Across its range in Idaho, sage thrasher populations have declined by 1.6 percent per year (95 percent C.I. is 3.25-0.51 percent) between 1966 and 2013 (Sauer et al. 2014).

The sharp reduction in sagebrush-dominated lands on the INL Site most likely has affected the total abundance of birds, including sagebrush obligates in this area. Breeding bird surveys in the western U.S. indicate that populations of horned larks, western meadowlarks, Brewer's sparrows, and sagebrush sparrows have all declined across their range (Knick et al. 2003; Sauer and Link 2011). As sagebrush obligates are experiencing population declines from habitat loss and disturbance (Knick et al. 2003), it is encouraging to see the relatively high abundance of these species each year on the INL Site. Recent fires on the INL Site, however, have reduced the amount of sagebrush habitat. Such reduction in habitat most likely has affected the total abundance of birds, including sagebrush obligates in this area.

Raptors, Corvids, and Shrikes

The raptor and corvid assemblage consisted of 167 observations representing 2.7% of the total count. Among these were 13 species of raptors (i.e. eagles, hawks, falcons, and owls). Ferruginous hawk (*Buteo regalis*) and Swainson's hawk (*Buteo swainsoni*) were the most abundant raptors observed ($n=13$). We observed only 12 loggerhead shrikes (*Lanius ludovicianus*) in 2016, which was substantially lower than the mean of 30 loggerhead shrikes per year (1985–2015).

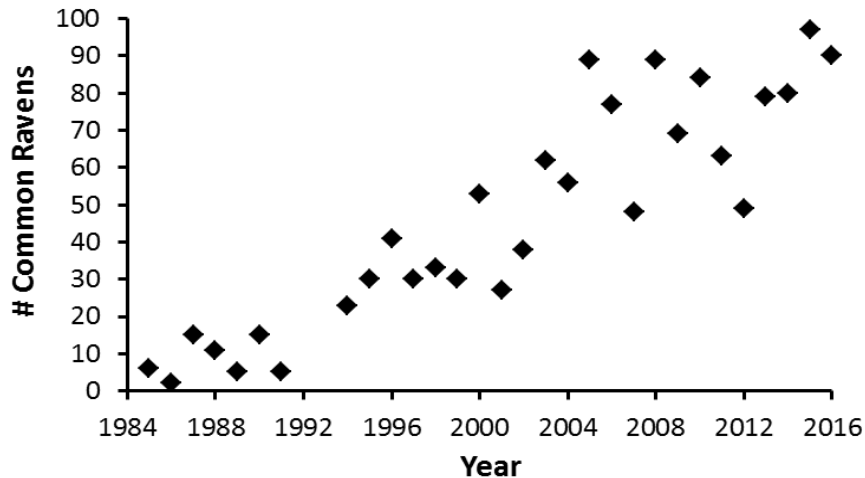


Figure 5. Common raven observations during breeding bird surveys on the INL Site 1985-2016. No surveys were conducted in 1992 and 1993, and the data point in 2010 was removed because it represented an outlier ($n=280$) caused by a single large flock flying overhead during one survey.

The corvid family includes ravens (*Corvus* spp.), crows (*C. spp.*), and magpies (*Pica* spp.). The common raven (*C. corax*) was the most abundant species within this assemblage in 2016 ($n=90$). The number of common ravens observed in 2016 was higher than any other year except 2010 and 2015 (Fig. 5) (for clarity of presentation, data from 2010 were excluded as an outlier in the figure because 280 ravens were observed, mostly in a single, large flock). Though native to Idaho, the common raven is an effective nest predator of sage-grouse, and DOE is concerned about the potential impact common ravens may have on nesting sage-grouse (DOE and USFWS 2014). There is some evidence that territory-holding mated pairs may be primarily responsible for sage-grouse nest predation, rather than non-territorial juvenile flocks (Bui et al 2010). It is unclear how many common ravens observed during the breeding bird survey are mated pairs and how many are unmated, but the trend reported here may not be a good indicator of the level of nest predation risk to sage-grouse.

Urbanized and Exotics

The urbanized and exotics assemblage represents birds associated with urban or human-altered environments, which are most commonly found around INL Site facilities. Examples of these species include European starling (*Sturnus vulgaris*), barn swallow (*Hirundo rustica*), and American robin (*Turdus migratorius*). This assemblage constituted 1.7% ($n=105$) of the total observations in 2016. The barn swallow was the most abundant species observed in this assemblage ($n=75$ individuals), followed by European starling ($n=9$ individuals).

Waterfowl

Waterfowl are commonly observed during the BBS even though little standing water exists on the INL Site. With the exception of the ephemeral Big Lost River and the Big Lost River Sinks wetland, the only standing water bodies on the INL Site are wastewater treatment ponds near facilities. These man-made ponds serve as stopover locations for migrating birds and a number of different species have been observed using these areas since 1985.

We documented 16 individuals from five waterfowl species, Canada goose (*Branta canadensis*, $n=7$), American wigeon (*Anas americana*, $n=3$), Mallard (*Anas platyrhynchos*, $n=2$), northern

shoveler (*Anas clypeata*, $n=2$), and redhead (*Aythya americana*, $n=2$) representing 0.3% of total observations.

Other Birds

Two species that were not assigned to any species assemblage were observed in 2016. They were the bank swallow (*Riparia riparia*, $n=1$) and house wren ($n=1$).

Community Diversity Index

The RWMC Route had the most diverse bird community of all 13 routes ($H=2.49$, $E_H=0.76$; Table 3), followed by the NRF Route ($H=2.30$, $E_H=0.85$). Tractor Flats had the highest species richness ($n=27$). Among remote routes, Kyle Canyon ($H=2.09$; $E_H=0.71$) had the most diverse bird community, while Lost River was the least diverse based on richness ($n=13$) and Tractor Flats was the least diverse based on H ($H=1.74$). The MFC Route was the least diverse of all routes ($H=0.42$; $E_H=0.13$).

The CFA route has been among the top three in regard to diversity seven of the past eight years. RWMC has been among the three most diverse routes during seven of the past 10 years. During the same time, Tractor Flats has had the highest or second highest species richness. This information indicates that the area surrounding CFA and RWMC (building, trees, and waste-water ponds) may provide unique habitat for several species of birds. Additionally, the northern stops on the Tractor Flats Route occur in the agricultural areas near State Highway 33, which likely influences the total number of unique birds that are detected in that area.

Table 3. Values for species richness, Shannon Diversity (H), and Equitability (E_H) indices for the 2016 Idaho National Laboratory Site Breeding Bird Surveys.

Route	Species Richness	Shannon's H	Shannon's E_H
Remote Routes			
Twin Buttes	15	2.06	0.76
Kyle Canyon	20	2.09	0.71
Lost River	13	1.83	0.68
Circular Butte	14	1.66	0.67
Tractor Flats	27	1.21	0.37
Facility Routes			
NRF	15	2.30	0.85
INTEC	14	2.07	0.78
RWMC	26	2.49	0.76
PBF	11	1.75	0.73
TAN	13	1.79	0.70
ATRC	12	1.72	0.69
CFA	20	2.05	0.68
MFC	25	0.42	0.13

2.0 CONCLUSION

Two sagebrush-obligate species are at historically low levels on the INL Site, which is probably a consequence of losing large amounts of sagebrush-dominated communities during recent wildfires. Conversely, common raven observations continue to increase (which also may be driven by wildfires). The combination of loss of sagebrush-dominated communities and increased predators that raid nests of sagebrush obligates may affect the growth potential of some species, especially sage-grouse, which is a conservation concern for DOE.

3.0 ACKNOWLEDGEMENTS

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Appendix A

SUMMARY OF SPECIES BY ROUTE 2016

Survey Route: RWMC		
Survey Date: June 1, 2016		
Species	Abundance	Percentage
Barn Swallow	36	22.93
Sage Thrasher	32	20.38
Western Meadowlark	25	15.92
Mourning Dove	8	5.10
Sagebrush Sparrow	7	4.46
Brewer's Sparrow	6	3.82
Red-winged Blackbird	6	3.82
Horned Lark	5	3.18
Brewer's Blackbird	4	2.55
American Wigeon	3	1.91
Killdeer	3	1.91
Rock Wren	3	1.91
Canada Goose	2	1.27
Common Raven	2	1.27
Northern Shoveler	2	1.27
Redhead	2	1.27
Say's Phoebe	2	1.27
American Avocet	1	0.64
European Starling	1	0.64
Great Egret	1	0.64
House Finch	1	0.64
House Wren	1	0.64
Loggerhead Shrike	1	0.64
Mountain Bluebird	1	0.64
Swainson's Hawk	1	0.64
Western Kingbird	1	0.64
<i>Total Individuals</i>	157	
<i>Total Species</i>	26	

Survey Route: Lost River		
Survey Date: June 3, 2016		
Species	Abundance	Percentage
Horned Lark	151	40.16
Western Meadowlark	81	21.54
Sage Thrasher	38	10.11
Brewer's Sparrow	29	7.71
Mourning Dove	23	6.12
Sagebrush Sparrow	18	4.79
Common Raven	13	3.46
Vesper Sparrow	11	2.93
Common Nighthawk	3	0.80
Chipping Sparrow	2	0.53
Loggerhead Sparrow	2	0.53
Swainson's Hawk	2	0.53
Franklin's Gull	1	0.27
Long-billed Curlew	1	0.27
Rock Wren	1	0.27
<i>Total Individuals</i>		
	376	
<i>Total Species</i>		
	15	

Survey Route: INTEC		
Survey Date: June 6, 2016		
Species	Abundance	Percentage
Sage Thrasher	41	24.26
Western Meadowlark	33	19.53
Horned Lark	29	17.16
Barn Swallow	21	12.43
Brewer's Sparrow	12	7.10
Sagebrush Sparrow	12	7.10
Mourning Dove	10	5.92
Common Nighthawk	3	1.78
Brewer's Blackbird	2	1.18
Brown-headed Cowbird	2	1.18
Common Raven	1	0.59
Rock Wren	1	0.59
Say's Phoebe	1	0.59
Vesper Sparrow	1	0.59
<i>Total Individuals</i>		
	169	
<i>Total Species</i>		
	14	

Survey Route: Tractor Flats		
Survey Date: June 7, 2016		
Species	Abundance	Percentage
Franklin's Gull	1144	70.75
Western Meadowlark	148	9.15
Horned Lark	127	7.85
Sage Thrasher	41	2.54
Brewer's Sparrow	37	2.29
Sagebrush Sparrow	31	1.92
Mourning Dove	22	1.36
Common Raven	21	1.30
Common Nighthawk	10	0.62
Grasshopper Sparrow	4	0.25
Long-billed Curlew	4	0.25
Northern Harrier	4	0.25
Eurasian Collared-Dove	3	0.19
American Kestrel	2	0.12
Barn Swallow	2	0.12
Black-billed Magpie	2	0.12
Burrowing Owl	2	0.12
Lark Sparrow	2	0.12
Red-tailed Hawk	2	0.12
Swainson's Hawk	2	0.12
American Crow	1	0.06
Brown-headed Cowbird	1	0.06
Brewer's Blackbird	1	0.06
European Starling	1	0.06
Rock Wren	1	0.06
Short-eared Owl	1	0.06
Vesper Sparrow	1	0.06
<i>Total Individuals</i>		
	1617	
<i>Total Species</i>		
	27	

Survey Route: MFC		
Survey Date: June 9, 2015		
Species	Abundance	Percentage
Franklin's Gull	1910	93.22
Horned Lark	30	1.46
Western Meadowlark	28	1.37
Brewer's Blackbird	13	0.63
Sage Thrasher	13	0.63
Common Raven	9	0.44
Brown-headed Cowbird	6	0.29
Canada Goose	5	0.24
Brewer's Sparrow	4	0.20
Killdeer	4	0.20
Red-winged Blackbird	4	0.20
Common Nighthawk	3	0.15
Mourning Dove	3	0.15
Barn Swallow	2	0.10
Long-billed Curlew	2	0.10
Mallard	2	0.10
Rock Wren	2	0.10
Say's Phoebe	2	0.10
Bank Swallow	1	0.05
Northern Harrier	1	0.05
Prairie Falcon	1	0.05
Red-tailed Hawk	1	0.05
Swainson's Hawk	1	0.05
Vesper Sparrow	1	0.05
Western Kingbird	1	0.05
<i>Total Individuals</i> 2049		
<i>Total Species</i> 25		

Survey Route: Circular Butte		
Survey Date: June 13, 2016		
Species	Abundance	Percentage
Horned Lark	150	46.15
Western Meadowlark	73	22.46
Sage Thrasher	32	9.85
Sagebrush Sparrow	21	6.46
Brewer's Sparrow	15	4.62
Mourning Dove	13	4.00
Common Raven	7	2.15
Common Nighthawk	6	1.85
Franklin's Gull	2	0.62
Northern Harrier	2	0.62
Grasshopper Sparrow	1	0.31
Golden Eagle	1	0.31
Rock Wren	1	0.31
Vesper Sparrow	1	0.31
<i>Total Individuals</i>	325	
<i>Total Species</i>	14	

Survey Route: CFA		
Survey Date: June 14, 2016		
Species	Abundance	Percentage
Western Meadowlark	56	27.72
Sage Thrasher	54	26.73
Horned Lark	34	16.83
Sagebrush Sparrow	13	6.44
Brewer's Sparrow	7	3.47
European Starling	7	3.47
American Robin	2	0.99
American Kestrel	4	1.98
Common Nighthawk	4	1.98
Say's Phoebe	4	1.98
Barn Swallow	3	1.49
Brewer's Blackbird	3	1.49
Common Raven	3	1.49
Western Kingbird	2	0.99
House Sparrow	1	0.50
Killdeer	1	0.50
Mourning Dove	1	0.50
Northern Flicker	1	0.50
Red-tailed Hawk	1	0.50
Swainson's Hawk	1	0.50
<i>Total Individuals</i>		
	<i>202</i>	
<i>Total Species</i>		
	<i>20</i>	

Survey Route: Kyle Canyon		
Survey Date: June 15, 2016		
Species	Abundance	Percentage
Western Meadowlark	91	28.80
Sage Thrasher	60	18.99
Horned Lark	46	14.56
Sagebrush Sparrow	44	13.92
Brewer's Sparrow	25	7.91
Ferruginous Hawk	11	3.48
Mourning Dove	8	2.53
Common Raven	7	2.22
Vesper Sparrow	5	1.58
Loggerhead Shrike	4	1.27
Black-billed Magpie	3	0.95
Red-tailed Hawk	3	0.95
Chipping Sparrow	2	0.63
Swainson's Hawk	2	0.63
American Robin	1	0.32
Blue-gray Gnatcatcher	1	0.32
Common Nighthawk	1	0.32
Prairie Falcon	1	0.32
Rock Wren	1	0.32
Total Individuals		
	316	
Total Species		
	19	

Survey Route: RTC		
Survey Date: June 20, 2016		
Species	Abundance	Percentage
Horned Lark	70	45.45
Western Meadowlark	30	19.48
Sage Thrasher	15	9.74
Mourning Dove	12	7.79
Brewer's Sparrow	9	5.84
Sagebrush Sparrow	6	3.90
Barn Swallow	4	2.60
Brewer's Blackbird	3	1.95
Common Raven	2	1.30
Northern Harrier	1	0.65
Say's Phoebe	1	0.65
Vesper Sparrow	1	0.65
Total Individuals		
	154	
Total Species		
	12	

Survey Route: PBF		
Survey Date: June 22, 2016		
Species	Abundance	Percentage
Mourning Dove	27	12.16
Horned Lark	89	40.09
Sage Thrasher	41	18.47
Western Meadowlark	29	13.06
Sagebrush Sparrow	8	3.60
Brewer's Sparrow	14	6.31
Vesper Sparrow	4	1.80
Common Raven	7	3.15
Killdeer	1	0.45
Lark Bunting	1	0.45
Western Kingbird	1	0.45
<i>Total Individuals</i>		
	222	
<i>Total Species</i>		
	11	

Survey Route: TAN		
Survey Date: June 24, 2016		
Species	Abundance	Percentage
Horned Lark	67	30.73
Sage Thrasher	66	30.28
Sagebrush Sparrow	29	13.30
Brewer's Sparrow	20	9.17
Mourning Dove	14	6.42
Western Meadowlark	8	3.67
Vesper Sparrow	6	2.75
Barn Swallow	2	0.92
Northern Harrier	2	0.92
Common Raven	1	0.46
Golden Eagle	1	0.46
Loggerhead Shrike	1	0.46
Red-tailed Hawk	1	0.46
<i>Total Individuals</i> 218		
<i>Total Species</i> 13		

Survey Route: Twin Buttes		
Survey Date: June 27, 2016		
Species	Abundance	Percentage
Horned Lark	74	33.18
Sage Thrasher	42	18.83
Western Meadowlark	29	13.00
Sagebrush Sparrow	21	9.42
Common Raven	14	6.28
Vesper Sparrow	10	4.48
Brewer's Sparrow	8	3.59
Mourning Dove	8	3.59
Common Nighthawk	4	1.79
Loggerhead Shrike	4	1.79
Swainson's Hawk	3	1.35
Ferruginous Hawk	2	0.90
Red-tailed Hawk	2	0.90
Northern Flicker	1	0.45
Rock Wren	1	0.45
<i>Total Individuals</i>		
	223	
<i>Total Species</i>		
	15	

Survey Route: NRF		
Survey Date: June 28, 2016		
Species	Abundance	Percentage
Horned Lark	31	20.00
Sage Thrasher	28	18.06
Franklin's Gull	25	16.13
Mourning Dove	13	8.39
Western Meadowlark	13	8.39
Common Nighthawk	12	7.74
Brewer's Sparrow	7	4.52
Sagebrush Sparrow	6	3.87
Barn Swallow	5	3.23
Cliff Swallow	5	3.23
Common Raven	3	1.94
House Sparrow	3	1.94
Vesper Sparrow	2	1.29
Brown-headed Cowbird	1	0.65
Swainson's Hawk	1	0.65
Total Individuals		
	155	
Total Species		
	15	