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Hanford Site Roadside Bird Surveys Report for Calendar Year 2015



Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-09RL14728



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The cover photo is of a Horned Lark (*Eremophila alpestris*)

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1.0 Introduction

The U.S. Department of Energy, Richland Operations Office (DOE-RL) conducts ecological monitoring on the Hanford Site to collect and track data needed to ensure compliance with an array of environmental laws, regulations, and policies governing DOE activities. Ecological monitoring data provide baseline information about the plants, animals, and habitat under DOE-RL stewardship at Hanford that is required for decision-making under the *National Environmental Policy Act* (NEPA) and *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA). The *Hanford Site Comprehensive Land Use Plan* (CLUP, [DOE/EIS-0222-F](#)), which is the Environmental Impact Statement for Hanford Site activities, helps ensure that DOE-RL, its contractors, and other entities conducting activities on the Hanford Site are in compliance with NEPA.

The *Hanford Site Biological Resources Management Plan* (BRMP, [DOE/RL 96-32 Rev 1](#)) is identified by the CLUP as the primary implementation control for managing and protecting natural resources on the Hanford Site. According to the CLUP,

“the BRMP provides a mechanism for ensuring compliance with laws protecting biological resources; provides a framework for ensuring that appropriate biological resource goals, objectives, and tools are in place to make DOE an effective steward of the Hanford biological resources; and implements an ecosystem management approach for biological resources on the Site. The BRMP provides a comprehensive direction that specifies DOE biological resource policies, goals, and objectives.”

DOE-RL places priority on monitoring those plant and animal species or habitats with specific regulatory protections or requirements, that are rare and/or declining (federal or state listed endangered, threatened, or sensitive species), or are of significant interest to federal, state, tribal governments, or the public. The BRMP ranks wildlife species and habitats from Level 5 (highest priority) to Level 0 (lowest priority), providing a graded approach to monitoring biological resources based on the level of concern for each resource. Current monitoring of bird species and habitats on the Hanford Site span a range of BRMP resource levels from maintaining protective buffers around Ferruginous Hawk (*Buteo regalis*) nest sites (Level 4), Bald Eagle (*Haliaeetus leucocephalus*) nest and night roost sites (Level 4), and burrowing owl nest sites (Level 3), to safeguarding migratory bird nest locations in Level 0 habitat. The roadside bird surveys support the obligations described in the Memorandum of Understanding between the U.S. Department of Energy's (DOE) and the United States Fish and Wildlife Service (USFWS) *Regarding the Implementation of Executive Order 13186, “Responsibilities of Federal Agencies to Protect Migratory Birds”* by conducting research and other activities for the preservation and enhancement of habitat for migratory birds, maintenance of bird populations, and minimization of human impacts on native species.

The Hanford Site lies within the semi-arid Pasco Basin of the Columbia Plateau in southeastern Washington State. The site occupies an area of approximately 1,502 square kilometers (580 square miles) north of the city of Richland ([DOE/EIS-0222-F](#)). The DOE Hanford Site is unique in that public access is restricted, there is little ongoing industrial development, and agricultural activities do not occur within its

boundaries. The Hanford Site contains a variety of bird habitats that include: basalt outcrops, riparian zones along streams and springs, shrub-steppe on slopes and plains, sand dunes and blowouts, and abandoned fields or disturbed areas ([PNL-8942](#)). The Hanford Site provides large expanses of habitat for shrub-steppe birds and other landbirds that depend on either mature stands of sagebrush or areas with at least some component of native grasses in the understory ([The Nature Conservancy 1999](#)). In some portions of the Hanford Site, human activities such as farming, urbanization, and industrial development have greatly decreased the amount of natural habitat that native landbirds require for survival. In turn, the riparian areas of the Hanford Site may have been improved by planting larger trees near homesteads and towns. These trees provide nesting locations, feeding areas, and roosting spots for many species.

The amount and quality of shrub-steppe habitat in the Columbia Plateau has been greatly reduced from historical levels due to urban development, agricultural conversion, wildfires, and fragmentation. These changes place additional stressors on shrub-steppe obligate species and some, such as the Greater Sage Grouse (*Centrocercus urophasianus*), have been locally extirpated. Federal laws, including the Migratory Bird Treaty Act of 1918, provide protection for these species. Monitoring is essential to not only maintain current biological information on the abundance and distribution of these species on the Hanford Site, but also to ensure compliance with protection regulations and to inform future protection and management efforts.

Several sagebrush-steppe dependent species, such as the Sagebrush Sparrow (*Artemisiospiza nevadensis*), Sage Thrasher (*Oreoscoptes montanus*), and Loggerhead Shrike (*Lanius ludovicianus*), are currently listed by the Washington State Department of Fish and Wildlife (WDFW) as “candidate species” and have the potential to be listed as threatened or endangered in the future ([WDFW 2013](#)). In addition, the Hanford Site and surrounding area provides refuge to potentially 17 state-listed species as well as numerous state-monitored species ([WDFW 2013](#)) that benefit from the large expanses of habitat. This list includes birds such as the Ferruginous Hawk, a state “threatened” species, the American White Pelican, a state “endangered” species, and the Bald Eagle, a state “sensitive” species ([WDFW 2013](#)).

As resource managers of the Hanford Site, DOE-RL is responsible for conservation of wildlife and wildlife habitats ([DOE/RL 96-32](#)). Avifauna have been documented and monitored on the Hanford site for over 60 years ([WHC-EP-0402](#)), including over 20 years of roadside survey monitoring ([PNL 2011](#)). The monitoring performed in 2014 provides continued data for documenting species occurrence and distribution on the Hanford Site, and can be compared with the long-term data collected on the Hanford Site over multiple decades. The monitoring of birds that occur on the Hanford site is a valuable tool for developing baseline information on the presence and distribution of biological resources across the Hanford Site, identifying trends in species or populations, and compiling biological information necessary to implement adaptive management ([DOE/RL 96-32](#)).

Excluding raptorial species, the 2015 season bird surveys consisted of point counts and roadside survey counts. As part of a survey developed by the Washington Audubon (Audubon) and the WDFW, point counts were performed during the 2015 Sagebrush Songbird Survey in Washington State. . The program envisions a multi-year, 5-10 year minimum, program that surveys the Columbia Plateau to determine sagebrush songbird distribution across the region. This report will focus on the data collected at the Hanford Site using these protocols, and not on the region wide effort of the program. Migratory bird and breeding bird roadside surveys were performed on four historical survey routes in 2015 which were established by Pacific Northwest National Laboratory (PNNL) in 1988 (Figure 1). These routes were monitored in the spring months from 1988 through 1991, and winter counts were added in 1992 and 1993. Each transect was monitored monthly between 1994 and 2001 (Rickard).

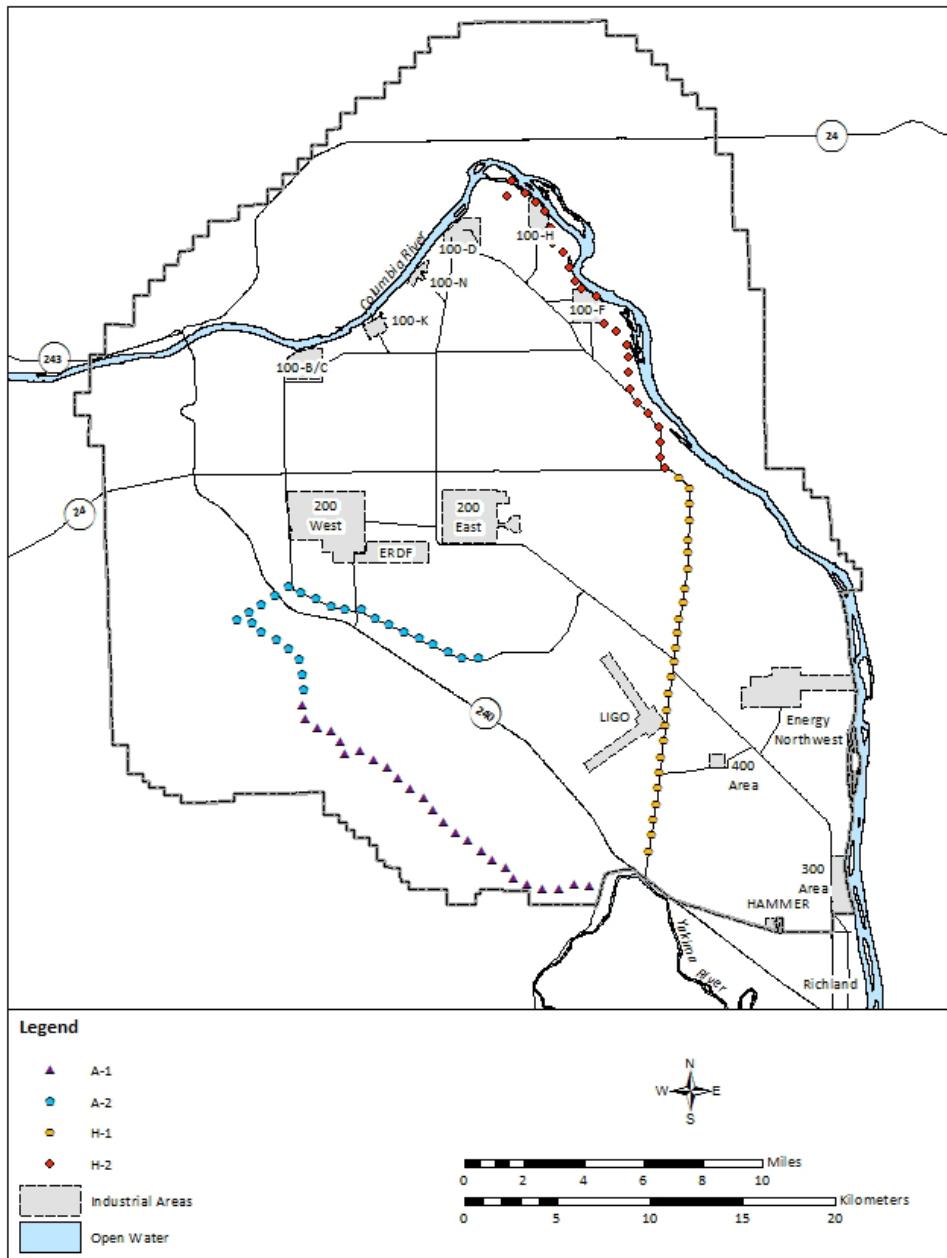


Figure 1. Roadside bird survey routes performed on the Hanford Site from 1988-2001

Bird Survey routes were modified in 2002 due to both the transfer of management responsibility of the Fitzner-Eberhardt Arid Lands Ecology Reserve (ALE) from the DOE to the U.S. Fish and Wildlife Service (USFWS), and a large fire in 2000, which modified the habitat along the routes. In 2002, surveys along ALE were discontinued as part of the routine program, and a new route was established to monitor mature sagebrush communities on the north side of Gable Mountain and Gable Butte, previously burned areas,

and successional grassland communities ([Wilde et al. 2013](#)). The four modified roadside bird survey routes that have been used from 2002 to present are shown in Figure 2.

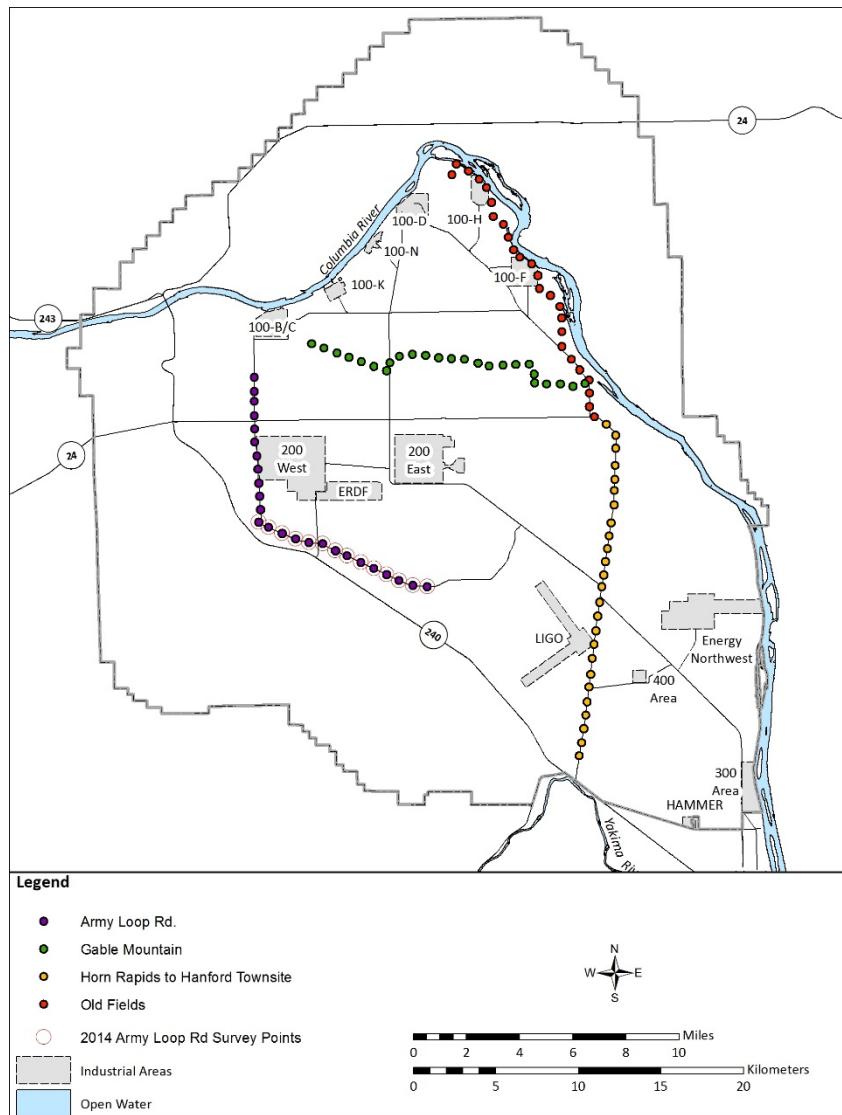


Figure 2. Roadside bird survey routes and point locations used on the Hanford Site since 2002

In 2005, Hanford became part of the North American Breeding Bird Surveys (BBS). The BBS is a unique collaborative counting effort designed to increase the understanding of North American bird populations and is now used as the primary data source for estimation of population change and modeling of the possible consequences of change in land use, climate, and many other possible stressors on bird populations ([Sauer 2010](#)). Jointly developed and coordinated by the United States Geological Survey (USGS), USFWS, and the Canadian Wildlife Service, the BBS incorporates counting efforts across the United States and Canada. Comprehensive summaries of population change have been calculated for >400 species of birds across North America (Sauer et al 2003). In 2005, two of the current routes, "Horn Rapids to Hanford Townsite" and "Old Fields", were surveyed in combination as the annual "Horn Rapids" BBS

route. The “Richland” BBS route was created in 2006 from the previously discontinued ALE routes, including half of the current Army Loop Rd Route, and surveys were performed by Hanford Site staff. Figure 3 shows the two USGS BBS survey routes performed at Hanford.

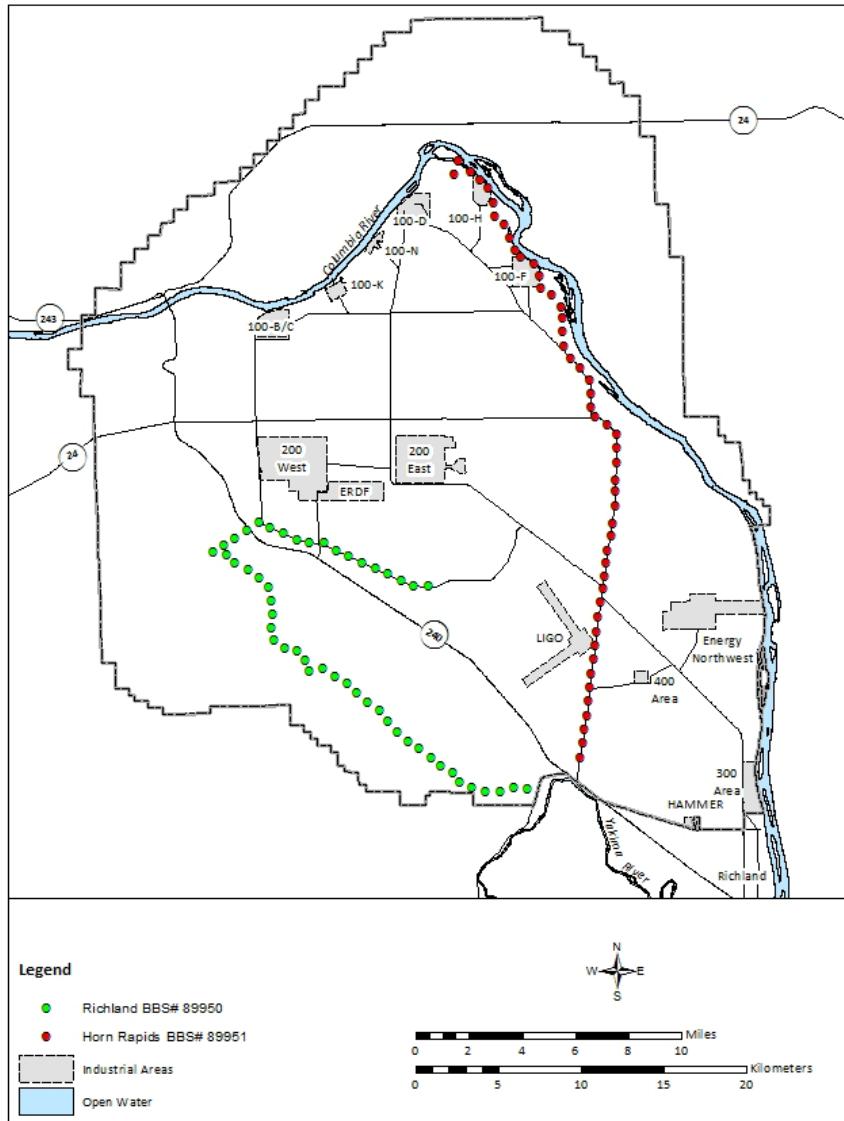


Figure 3. The U.S. Geological Survey Breeding Bird Survey routes performed annually on the Hanford Site

Survey of the two Hanford BBS routes covers two of the established Hanford routine roadside bird survey routes and surveys a half of a third route. To maintain consistency and allow the official BBS data to fit within the annual program results, MSA follows the methods of the BBS described in Section 2.0 when performing counts along survey routes.

This report does not provide an inventory of all birds that inhabited any portion of the Hanford Site in 2014, but rather documents the status of birds identified through a transect survey method. In 2015 this

report will solely list those species counted, which may be used for trending and evaluation in coming years. Road surveys are a practical way to monitor changes in species richness, the number of species represented in the community, and relative abundance, how common or rare a species is relative to other species in the community, of shrub-steppe birds over time and in response to various types of land-use changes.

2.0 Methods

In 2015 the survey protocols for bird species, excluding raptorial species, included roadside survey counts and the point counts that were performed under the Sagebrush Songbird Survey. These two protocols are widely used protocols in the industry. By performing both of these protocols you obtain large geographic coverage (roadside surveys) and habitat focused surveys away from roadside influence (Sagebrush Songbird Survey).

2.1 Roadside Survey Counts

Roadside survey counts follow the protocols used for the BBS coordinated by the USGS annually throughout North America (Bystrack 1981; Sauer 2010). Four survey routes (Figure 2) or portions of routes were surveyed a single time during the 2014 breeding season in coordination with BBS (June).

Hanford routine roadside routes are 20 kilometers (km) (12.43 miles) compared to the 40-km (24.85 miles) routes used in the BBS (Figure 2, Figure 3). The 40-km (24.85 miles) "Horn Rapids 89951" BBS route surveys both the Horn Rapids to Townsite [20km (12.43 miles)] and Old Fields [20km (12.43 miles)] Hanford survey routes. All roadside routes contain point counts at 0.8-km (0.5 miles) intervals marked with steel fence posts, rebar posts, pin flags, or by GPS coordinates only. There are 25 survey points per Hanford route and 50 survey points per BBS route. Birds within 400 meters (m) (0.25 miles) of each survey point were identified by sight or sound during a three-minute observation at each marker post. Surveyors drove to each survey location and observed the area for three minutes, recording their observations, then continued to the next location. The number of vehicles passing by during the survey time was recorded on the field sheet for each point. Observers remained at a survey point for more than the three minutes only if additional time was needed to confirm identification or to count birds that were noted during the three-minute observation period. Observations of any nesting activities within 400-m of the survey point were also noted. It is acknowledged that a roadside monitoring program is not without bias; however, the benefits are considered to outweigh most disadvantages ([USDA 1993](#)).

Attempts were made to start all Hanford surveys in the early morning hours, within 30 minutes before or after sunrise. The BBS survey routes were started as near as possible to 0438 hours, as requested in the USGS informational packet. Surveys were halted if adverse weather conditions such as high winds, heavy rain, or snowfall developed during the route survey. Each route was surveyed once during pre-breeding, breeding and fall survey period.

2.2 Sagebrush Songbird Survey

The methodology for performing the Sagebrush Songbird Survey counts were developed by WDFW and Audubon. Suggested survey points are received from Audubon for verification. The sites are visited to determine that the point would provide value to the survey and confirmed, moved or dropped from the list. Each of these points is surveyed 3 times, once in each month of April, May and June. The surveys are to be performed between the dawn to 0900 hours on days with no heavy rain and no substantial wind. Each point has 3 surveys performed for every visit; a travelling count from vehicle to point, a 10 minute point count following a 2-3 minute settle period, and a travelling count from the point to the vehicle. Data is recorded and scanned for submission to Audubon at the end of the season.

2.2.1 Data Collected During Travelling Counts

- Record the distance to be walked from the parking spot to the survey point
- Record time when starting walk to (or from) survey point (Time start)
- Note birds while walking from parking area to survey point and on return trip
- Note ONLY individuals that can be positively identified to species
- If a singing male, enter yes for Singing? ; Tally similar observations in column Tally
- Record time when arrived at destination (Time end)

2.2.2 Data Collected During Point Counts

- When arriving at the survey point take 2-3 minutes to let things settle and count sagebrush (2.2.3)
- Record the time started looking and listening for birds (start of 10-minute survey)
- Remain at the point and note ONLY individuals that can positively identified to species
- Do not use recorded vocalizations to illicit response or attract birds
- STOP recording birds at the 10-minute mark

2.2.3 Data Collected During Sagebrush Counts

- Count the number of sagebrush plants within about 100 yards of the survey point.
- **Do not include rabbitbrush or other shrubs**
- Include only bushes that are at least 0.5 meters in height (about knee-height)
- Circle this value in on the bottom of page 1 of the form (for example: "1-10")

3.0 Results

Roadside surveys were performed during 3 different periods of the year. Each route was surveyed during a pre-breeding survey, breeding survey and a fall migration period survey. Similar survey periods were used in 2013 and 2014 (Wilde 2015). All surveys were completed successfully and resulted in data collection for 12 Hanford route surveys (Table 1). The "Horn Rapids" BBS route includes both the Horn Rapids to Townsite and Old Fields routes in a single run. The second half of the Army Loop Rd route (points 12-25) were surveyed in 2015 as part of the "Richland" BBS route completion and then points 1-11 completed following the "Richland" BBS. Throughout the three surveys a total of 66 species were

documented from roadside surveys and 3360 individuals were counted (Table 2). The pre-breeding survey documented 1359 individuals with 43 unique species (Table 3). The breeding season surveys are the most consistently surveyed period and most often used for trending. For the 2015 breeding season surveys, a total of 1227 individual birds were documented (Table 4), similar to the 1332 individuals counted during breeding period surveys in 2014 and 1264 individuals from same period in 2013. 51 bird species were documented in the 2015 breeding season survey (Table 4), which was the same number seen in breeding period surveys during 2014 and slightly higher than the 47 species recorded in June 2013. For the 2015 fall migration surveys there was 37 species seen and 774 individual birds counted (Table 5).

Table 1. 2015 Survey dates and location.

Route Name	Pre-Breeding Survey	Breeding Survey	Fall Migration Survey
Army Loop Rd	3/10/2015	5/28/2015 ^a	9/02/2015
Gable Mountain	3/26/2015	6/19/2015	9/23/2015
Horn Rapids to Townsite	3/13/2015	6/05/2015 ^b	9/25/2015
Old Fields	3/19/2015	6/05/2015 ^b	9/24/2015

^a Surveyed during Richland BBS

^b Surveyed during Horn Rapids BBS

The Western Meadowlark (*Sturnella neglecta*) was the most abundant species documented. Surveys documented 885 Western Meadowlark individuals, 26.34% of all individuals counted. The second most abundant species was the Horned Lark (*Eremophila alpestris*) with 809 individuals, 24.08% of surveyed individuals (Table 2). The Western Meadowlark was counted on 246 survey points (82.00 %), while the Horned Lark was documented on 219 survey points (73.00%). These two species were clearly the most documented species in 2015; they were counted at nearly seven times as many survey points as any other species documented with the exception of the Common Raven (*Corvus corax*).

During the breeding season the “Old Fields” route had the highest species diversity and the highest abundance of individuals (Table 6). The “Old Fields” route has historically been the route with the highest species richness and abundance. The route runs along the northeastern edge of the central Hanford Site, often directly adjacent to the Columbia River, providing the largest variety of habitat of any route.

Table 2. Species, Sorted by Abundance, Over All Roadside Surveys Performed on the Central Hanford Site in 2015.

Common Name	Scientific Name	Routes ^a	Individuals	% Counts	Stops ^b	% Stops
Western Meadowlark	<i>Sturnella neglecta</i>	12	885	26.34	246	82.00
Horned Lark	<i>Eremophila alpestris</i>	12	809	24.08	219	73.00
European Starling	<i>Sturnus vulgaris</i>	8	278	8.27	34	11.33
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	2	165	4.91	12	4.00
Common Raven	<i>Corvus corax</i>	12	132	3.93	77	25.67
White-Crowned Sparrow	<i>Zonotrichia leucophrys</i>	6	128	3.81	31	10.33

Common Name	Scientific Name	Routes ^a	Individuals	% Counts	Stops ^b	% Stops
Canada Goose	<i>Branta canadensis</i>	4	117	3.48	14	4.67
Mourning Dove	<i>Zenaida macroura</i>	4	55	1.64	9	3.00
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	3	54	1.61	9	3.00
Red-Winged Blackbird	<i>Agelaius phoeniceus</i>	2	45	1.34	12	4.00
Yellow-Rumped Warbler	<i>Setophaga coronata</i>	3	43	1.28	12	4.00
Lark Sparrow	<i>Chondestes grammacus</i>	4	38	1.13	23	7.67
American Robin	<i>Turdus migratorius</i>	4	36	1.07	11	3.67
Sagebrush Sparrow	<i>Artemisiospiza nevadensis</i>	6	36	1.07	21	7.00
Great Egret	<i>Ardea alba</i>	2	35	1.04	5	1.67
California Quail	<i>Callipepla californica</i>	7	33	0.98	14	4.67
Loggerhead Shrike	<i>Lanius ludovicianus</i>	10	32	0.95	24	8.00
Tree Swallow	<i>Tachycineta bicolor</i>	1	30	0.89	3	1.00
Black-Billed Magpie	<i>Pica hudsonia</i>	7	28	0.83	19	6.33
Great Blue Heron	<i>Ardea herodias</i>	3	25	0.74	4	1.33
Rock Wren	<i>Salpinctes obsoletus</i>	3	24	0.71	18	6.00
Ring-Billed Gull	<i>Larus delawarensis</i>	3	24	0.71	9	3.00
Rock Pigeon	<i>Columba livia</i>	2	23	0.68	3	1.00
Mallard	<i>Anas platyrhynchos</i>	3	23	0.68	6	2.00
Bank Swallow	<i>Riparia riparia</i>	1	19	0.57	4	1.33
Long-Billed Curlew	<i>Numenius americanus</i>	4	18	0.54	10	3.33
Bullock's Oriole	<i>Icterus bullockii</i>	1	14	0.42	5	1.67
Common Nighthawk	<i>Chordeiles minor</i>	2	13	0.39	9	3.00
Western Kingbird	<i>Tyrannus verticalis</i>	3	12	0.36	9	3.00
Barn Swallow	<i>Hirundo rustica</i>	4	12	0.36	7	2.33
Double-Crested Cormorant	<i>Phalacrocorax auritus</i>	3	11	0.33	3	1.00
Eastern Kingbird	<i>Tyrannus tyrannus</i>	1	10	0.30	6	2.00
Killdeer	<i>Charadrius vociferus</i>	3	10	0.30	8	2.67
Common Merganser	<i>Mergus merganser</i>	2	9	0.27	2	0.67
Song Sparrow	<i>Melospiza melodia</i>	3	8	0.24	6	2.00
House Finch	<i>Haemorhous mexicanus</i>	4	8	0.24	5	1.67
Red-Tailed Hawk	<i>Buteo jamaicensis</i>	6	8	0.24	8	2.67
Savannah Sparrow	<i>Passerculus sandwichensis</i>	3	7	0.21	4	1.33
Bufflehead	<i>Bucephala albeola</i>	1	7	0.21	1	0.33
Bald Eagle	<i>Haliaeetus leucocephalus</i>	4	6	0.18	5	1.67
Yellow-Headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	1	6	0.18	3	1.00
Long-Billed Dowitcher	<i>Limnodromus scolopaceus</i>	1	6	0.18	1	0.33
American Wigeon	<i>Anas americana</i>	1	6	0.18	1	0.33
American Kestrel	<i>Falco sparverius</i>	3	5	0.15	6	2.00
Common Goldeneye	<i>Bucephala clangula</i>	1	5	0.15	2	0.67
American White Pelican	<i>Pelecanus erythrorhynchos</i>	2	5	0.15	3	1.00
Forster's Tern	<i>Sterna forsteri</i>	1	5	0.15	1	0.33

Common Name	Scientific Name	Routes ^a	Individuals	% Counts	Stops ^b	% Stops
Ring-Necked Pheasant	<i>Phasianus colchicus</i>	4	5	0.15	5	1.67
Rock Pigeon	<i>Columba livia</i>	1	4	0.12	1	0.33
Northern Flicker	<i>Colaptes auratus</i>	2	4	0.12	3	1.00
Caspian Tern	<i>Hydroprogne caspia</i>	1	4	0.12	2	0.67
Green-Winged Teal	<i>Anas crecca</i>	1	4	0.12	1	0.33
Ferruginous Hawk	<i>Buteo regalis</i>	2	3	0.09	2	0.67
Northern Harrier	<i>Circus cyaneus</i>	3	3	0.09	3	1.00
Brown-Headed Cowbird	<i>Molothrus ater</i>	1	3	0.09	2	0.67
American Crow	<i>Corvus brachyrhynchos</i>	1	3	0.09	1	0.33
Osprey	<i>Pandion haliaetus</i>	1	2	0.06	1	0.33
Ruby-Crowned Kinglet	<i>Regulus calendula</i>	1	2	0.06	1	0.33
Belted Kingfisher	<i>Megacyrle alcyon</i>	2	2	0.06	2	0.67
Merlin	<i>Falco columbarius</i>	2	2	0.06	2	0.67
Say's Phoebe	<i>Sayornis saya</i>	2	2	0.06	2	0.67
Mountain Bluebird	<i>Sialia currucoides</i>	1	2	0.06	1	0.33
Great Horned Owl	<i>Bubo virginianus</i>	1	1	0.03	1	0.33
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	1	1	0.03	1	0.33
Western Wood-Pewee	<i>Contopus sordidulus</i>	1	1	0.03	1	0.33
Gadwall	<i>Anas strepera</i>	1	1	0.03	1	0.33
Chukar	<i>Alectoris chukar</i>	1	1	0.03	1	0.33
Swainson's Hawk	<i>Buteo swainsoni</i>	1	1	0.03	1	0.33
Downy Woodpecker	<i>Picoides pubescens</i>	1	1	0.03	1	0.33

^aCount of how many of the 12 unique Hanford Roadside routes was species identified (12 Max)

^bNumber of survey points the species was identified

Table 3. Species, Sorted by Abundance, Over 4 Pre-breeding Roadside Surveys Performed on the Central Hanford Site in 2015.

Common Name	Scientific Name	Routes ^a	Individuals	% Counts	Stops ^b	% Stops
Western Meadowlark	<i>Sturnella neglecta</i>	4	451	33.19	97	97.00
Horned Lark	<i>Eremophila alpestris</i>	4	369	27.15	87	87.00
European Starling	<i>Sturnus vulgaris</i>	4	152	11.18	21	21.00
Canada Goose	<i>Petrochelidon pyrrhonota</i>	1	48	3.53	5	5.00
White-Crowned Sparrow	<i>Corvus corax</i>	2	47	3.46	6	6.00
Common Raven	<i>Zonotrichia leucophrys</i>	4	42	3.09	28	28.00
Tree Swallow	<i>Branta canadensis</i>	1	30	2.21	2	2.00
American Robin	<i>Zenaida macroura</i>	2	28	2.06	9	9.00
Sagebrush Sparrow	<i>Euphagus cyanocephalus</i>	3	24	1.77	18	18.00
Brewer's Blackbird	<i>Agelaius phoeniceus</i>	1	17	1.25	1	1.00
Long-Billed Curlew	<i>Setophaga coronata</i>	2	15	1.10	9	9.00
Mallard	<i>Chondestes grammacus</i>	1	14	1.03	4	4.00
Red-Winged Blackbird	<i>Turdus migratorius</i>	1	10	0.74	2	2.00
California Quail	<i>Artemisiospiza nevadensis</i>	2	10	0.74	7	7.00
Rock Wren	<i>Ardea alba</i>	1	10	0.74	9	9.00
Black-Billed Magpie	<i>Callipepla californica</i>	2	10	0.74	7	7.00
Great Blue Heron	<i>Lanius ludovicianus</i>	1	10	0.74	1	1.00
Loggerhead Shrike	<i>Tachycineta bicolor</i>	3	8	0.59	11	11.00
Bufflehead	<i>Pica hudsonia</i>	1	7	0.52	1	1.00
American Wigeon	<i>Ardea herodias</i>	1	6	0.44	1	1.00
Common Goldeneye	<i>Salpinctes obsoletus</i>	1	5	0.37	2	2.00
Common Merganser	<i>Larus delawarensis</i>	1	4	0.29	1	1.00
Savannah Sparrow	<i>Columba livia</i>	1	4	0.29	3	3.00
Double-Crested Cormorant	<i>Anas platyrhynchos</i>	1	4	0.29	1	1.00
Bald Eagle	<i>Riparia riparia</i>	2	4	0.29	5	5.00
Green-Winged Teal	<i>Numenius americanus</i>	1	4	0.29	1	1.00
Ring-Necked Pheasant	<i>Icterus bullockii</i>	2	3	0.22	5	5.00
Killdeer	<i>Chordeiles minor</i>	1	3	0.22	1	1.00
House Finch	<i>Tyrannus verticalis</i>	1	2	0.15	3	3.00
Northern Flicker	<i>Hirundo rustica</i>	1	2	0.15	1	1.00
Mountain Bluebird	<i>Phalacrocorax auritus</i>	1	2	0.15	3	3.00
Ferruginous Hawk	<i>Tyrannus tyrannus</i>	1	2	0.15	3	3.00
Red-Tailed Hawk	<i>Charadrius vociferus</i>	2	2	0.15	4	4.00
Merlin	<i>Mergus merganser</i>	1	1	0.07	2	2.00
Northern Harrier	<i>Melospiza melodia</i>	1	1	0.07	3	3.00
Chukar	<i>Haemorhous mexicanus</i>	1	1	0.07	3	3.00
Mourning Dove	<i>Buteo jamaicensis</i>	1	1	0.07	3	3.00
Song Sparrow	<i>Passerculus sandwichensis</i>	1	1	0.07	1	1.00
Ring-Billed Gull	<i>Bucephala albeola</i>	1	1	0.07	1	1.00

Common Name	Scientific Name	Routes ^a	Individuals	% Counts	Stops ^b	% Stops
Rock Pigeon	<i>Haliaeetus leucocephalus</i>	1	1	0.07	1	1.00
	<i>Xanthocephalus xanthocephalus</i>					
Belted Kingfisher	<i>xanthocephalus</i>	1	1	0.07	1	1.00
Say's Phoebe	<i>Limnodromus scolopaceus</i>	1	1	0.07	2	2.00
Great Horned Owl	<i>Anas americana</i>	1	1	0.07	1	1.00

^aCount of how many of the 4 unique Hanford Roadside routes was species identified (4 Max)

^bNumber of survey points the species was identified

Table 4. Species, Sorted by Abundance, Over 4 Breeding Season Roadside Surveys Performed on the Central Hanford Site in 2015.

Common Name	Scientific Name	Routes ^a	Individuals	% Counts	Stops ^b	% Stops
Horned Lark	<i>Eremophila alpestris</i>	4	300	24.45	77	77.00
Western Meadowlark	<i>Sturnella neglecta</i>	4	275	22.41	90	90.00
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	1	142	11.57	10	10.00
European Starling	<i>Sturnus vulgaris</i>	2	102	8.31	13	13.00
Lark Sparrow	<i>Chondestes grammacus</i>	4	38	3.10	28	28.00
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	1	36	2.93	4	4.00
Common Raven	<i>Corvus corax</i>	4	36	2.93	28	28.00
Red-Winged Blackbird	<i>Agelaius phoeniceus</i>	1	35	2.85	9	9.00
Great Egret	<i>Ardea alba</i>	1	34	2.77	4	4.00
Ring-Billed Gull	<i>Larus delawarensis</i>	1	20	1.63	6	6.00
Bank Swallow	<i>Riparia riparia</i>	1	19	1.55	4	4.00
Loggerhead Shrike	<i>Lanius ludovicianus</i>	4	18	1.47	15	15.00
Bullock's Oriole	<i>Icterus bullockii</i>	1	14	1.14	5	5.00
Common Nighthawk	<i>Chordeiles minor</i>	2	13	1.06	10	10.00
Sagebrush Sparrow	<i>Artemisiospiza nevadensis</i>	3	12	0.98	12	12.00
Western Kingbird	<i>Tyrannus verticalis</i>	3	12	0.98	11	11.00
Great Blue Heron	<i>Ardea herodias</i>	1	11	0.90	1	1.00
Eastern Kingbird	<i>Tyrannus tyrannus</i>	1	10	0.81	5	5.00
Rock Wren	<i>Salpinctes obsoletus</i>	1	8	0.65	8	8.00
California Quail	<i>Callipepla californica</i>	3	8	0.65	8	8.00
Black-Billed Magpie	<i>Pica hudsonia</i>	1	6	0.49	3	3.00
Double-Crested Cormorant	<i>Phalacrocorax auritus</i>	1	6	0.49	1	1.00
	<i>Xanthocephalus</i>					
Yellow-Headed Blackbird	<i>xanthocephalus</i>	1	6	0.49	3	3.00
Red-Tailed Hawk	<i>Buteo jamaicensis</i>	3	5	0.41	8	8.00
Common Merganser	<i>Mergus merganser</i>	1	5	0.41	1	1.00
Forster's Tern	<i>Sterna forsteri</i>	1	5	0.41	1	1.00
Mourning Dove	<i>Zenaida macroura</i>	2	5	0.41	5	5.00
Caspian Tern	<i>Hydroprogne caspia</i>	1	4	0.33	2	2.00

Common Name	Scientific Name	Routes ^a	Individuals	% Counts	Stops ^b	% Stops
House Finch	Haemorhous mexicanus	2	3	0.24	3	3.00
Long-Billed Curlew	Numenius americanus	2	3	0.24	3	3.00
Canada Goose	Branta canadensis	1	3	0.24	1	1.00
American White Pelican	Pelecanus erythrorhynchos	1	3	0.24	2	2.00
Brown-Headed Cowbird	Molothrus ater	1	3	0.24	1	1.00
American Crow	Corvus brachyrhynchos	1	3	0.24	1	1.00
Killdeer	Charadrius vociferus	1	3	0.24	3	3.00
Mallard	Anas platyrhynchos	1	2	0.16	1	1.00
Song Sparrow	Melospiza melodia	1	2	0.16	2	2.00
Osprey	Pandion haliaetus	1	2	0.16	1	1.00
American Robin	Turdus migratorius	1	2	0.16	1	1.00
Northern Harrier	Circus cyaneus	1	1	0.08	1	1.00
Ring-Necked Pheasant	Phasianus colchicus	1	1	0.08	3	3.00
Gadwall	Anas strepera	1	1	0.08	1	1.00
Bald Eagle	Haliaeetus leucocephalus	1	1	0.08	1	1.00
Savannah Sparrow	Passerculus sandwichensis	1	1	0.08	1	1.00
American Kestrel	Falco sparverius	1	1	0.08	1	1.00
Swainson's Hawk	Buteo swainsoni	1	1	0.08	1	1.00
Western Wood-Pewee	Contopus sordidulus	1	1	0.08	1	1.00
Merlin	Falco columbarius	1	1	0.08	1	1.00
Grasshopper Sparrow	Ammodramus savannarum	1	1	0.08	1	1.00
Say's Phoebe	Sayornis saya	1	1	0.08	2	2.00
Ferruginous Hawk	Buteo regalis	1	1	0.08	3	3.00
Barn Swallow	Hirundo rustica	1	1	0.08	1	1.00

^aCount of how many of the 4 unique Hanford Roadside routes was species identified (4 Max)^bNumber of survey points the species was identified

Table 5. Species, Sorted by Abundance, Over 4 Fall Migration Season Roadside Surveys Performed on the Central Hanford Site in 2015.

Common Name	Scientific Name	Routes ^a	Individuals	% Counts	Stops ^b	% Stops
Western Meadowlark	Eremophila alpestris	4	159	20.54	65	65.00
Horned Lark	Sturnella neglecta	4	140	18.09	62	62.00
White-Crowned Sparrow	Petrochelidon pyrrhonota	4	81	10.47	31	31.00
Canada Goose	Sturnus vulgaris	2	66	8.53	9	9.00
Common Raven	Chondestes grammacus	4	54	6.98	34	34.00
Mourning Dove	Euphagus cyanocephalus	1	49	6.33	4	4.00
Yellow-Rumped Warbler	Corvus corax	3	43	5.56	15	15.00
European Starling	Agelaius phoeniceus	2	24	3.10	8	8.00
Cliff Swallow	Ardea alba	1	23	2.97	3	3.00
Rock Pigeon	Larus delawarensis	1	22	2.84	2	2.00

Common Name	Scientific Name	Routes ^a	Individuals	% Counts	Stops ^b	% Stops
California Quail	<i>Riparia riparia</i>	2	15	1.94	7	7.00
Black-Billed Magpie	<i>Lanius ludovicianus</i>	4	12	1.55	15	15.00
Barn Swallow	<i>Icterus bullockii</i>	3	11	1.42	10	10.00
Mallard	<i>Chordeiles minor</i>	1	7	0.90	2	2.00
American Robin	<i>Artemisiospiza nevadensis</i>	1	6	0.78	3	3.00
Rock Wren	<i>Tyrannus verticalis</i>	1	6	0.78	7	7.00
Long-Billed Dowitcher	<i>Ardea herodias</i>	1	6	0.78	2	2.00
Loggerhead Shrike	<i>Tyrannus tyrannus</i>	3	6	0.78	11	11.00
Song Sparrow	<i>Salpinctes obsoletus</i>	1	5	0.65	4	4.00
Great Blue Heron	<i>Callipepla californica</i>	1	4	0.52	3	3.00
Rock Pigeon	<i>Pica hudsonia</i>	1	4	0.52	3	3.00
American Kestrel	<i>Phalacrocorax auritus</i>	2	4	0.52	6	6.00
Killdeer	<i>Xanthocephalus xanthocephalus</i>	1	4	0.52	3	3.00
Ring-Billed Gull	<i>Buteo jamaicensis</i>	1	3	0.39	2	2.00
House Finch	<i>Mergus merganser</i>	1	3	0.39	4	4.00
American White Pelican	<i>Sterna forsteri</i>	1	2	0.26	2	2.00
Ruby-Crowned Kinglet	<i>Zenaida macroura</i>	1	2	0.26	2	2.00
Northern Flicker	<i>Hydroprogne caspia</i>	1	2	0.26	3	3.00
Savannah Sparrow	<i>Haemorhous mexicanus</i>	1	2	0.26	2	2.00
Red-Tailed Hawk	<i>Numenius americanus</i>	1	1	0.13	3	3.00
Northern Harrier	<i>Branta canadensis</i>	1	1	0.13	3	3.00
Downy Woodpecker	<i>Pelecanus erythrorhynchos</i>	1	1	0.13	2	2.00
Ring-Necked Pheasant	<i>Molothrus ater</i>	1	1	0.13	1	1.00
Double-Crested Cormorant	<i>Corvus brachyrhynchos</i>	1	1	0.13	2	2.00
Great Egret	<i>Charadrius vociferus</i>	1	1	0.13	2	2.00
Belted Kingfisher	<i>Anas platyrhynchos</i>	1	1	0.13	2	2.00
Brewer'S Blackbird	<i>Melospiza melodia</i>	1	1	0.13	3	3.00
Bald Eagle	<i>Pandion haliaetus</i>	1	1	0.13	2	2.00

^aCount of how many of the 4 unique Hanford Roadside routes was species identified (4 Max)^bNumber of survey points the species was identified

Table 6. Species Richness and Abundance Counted During the 2015 breeding season Roadside Bird Survey Routes on the Hanford Site Sorted by Route.

Route Name	Species	Abundance
Army Loop Rd	10	221
Gable Mountain	9	126
Horn Rapids to Townsite	14	264
Old fields	47	616
Total	52^a	1227

^aUnique species identified

4.0 Discussion

For 26 years, the roadside bird survey monitoring program has provided the Hanford Site with valuable avian community data needed for population and habitat evaluation. As designed, the surveys are intended to be an indicator of abundance, species distribution, and potential habitat quality. Performing surveys using BBS methods is an efficient way of collecting species data over large portions of the Hanford Site and provide data that are comparable with the historical data set. All Hanford BBS route data are also displayed on the USGS BBS database for download and viewing. The Sagebrush Songbird data captured within this report and the larger region of data is housed in eBird and is being used to validate the Western Governors Association Crucial Habitat Assessment Tool distribution models and update the WDFW Habitat Species database.

This report has been produced to maintain the availability of the data for later trending and viewing. No additional analysis or investigation from the 2015 data was performed for the purposes of this report.

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