## DISCLAIMER

HNF-69974
Revision 0

# Hanford Site Raptor Nest Monitoring Report for Calendar Year 2022

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

Contractor for the U.S. Department of Energy
under Contract 89303320DEM000031

**P.O. Box 943**
**Richland, Washington 99352**

**Approved for Public Release**

**Further Dissemination Unlimited**

This page intentionally left blank.

# Hanford Site Raptor Nest Monitoring Report for Calendar Year 2022

J. Nugent, HMIS
C. Lindsey, HMIS

Hanford Mission Integration Solutions
Richland, WA

Date Published
January 2024

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

**P.O. Box 943**
**Richland, Washington 99352**

APPROVED
By Julia Raymer at 10:16 am, Jan 30, 2024

Release Approval Date

# CONTENTS

1.0 INTRODUCTION ..... 2
1.1 Background ..... 3
1.2 Objectives ..... 5
1.3 Scope ..... 5

2.0 METHODS ..... 8

3.0 RESULTS ..... 10

4.0 DISCUSSION ..... 13

5.0 REFERENCES ..... 15

# FIGURES

Figure 1. Area Surveyed for Raptor and Raven Nests on DOE-RL-managed Lands of the Hanford Site in 2022 ..... 9

Figure 2. Raptor Nests Located on DOE-RL-Managed Lands of the Hanford Site in 2022 ..... 11

Figure 3. Common Raven Nests Located on DOE-RL-Managed Lands of the Hanford Site in 2022 ..... 12

Figure 4. Number of Raptor and Raven Nest Sites Located on DOE-RL-Managed Lands of the Hanford Site in 2012 through 2016 and 2022 ..... 13

# TABLES

Table 1. Species of Nesting Raptors of the Hanford Site ..... 4

Table 2 Nest Site Selection of Raptors on the Hanford Site and Likelihood of Detecting Nests during Surveys ..... 6

Table 3 First-egg Dates for Raptor Species Known to Nest on the Hanford Site ..... 7

Table 4. Nest Substrates Used by Raptors and Ravens on DOE-RL-managed Lands of the Hanford Site in 2022 ..... 10

# 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-RL activities. Ecological monitoring data provide baseline information about the plants, animals, and habitats under DOE-RL stewardship at the Hanford Site required for decision making under the *National Environmental Policy Act of 1969* (NEPA) and *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*. DOE/EIS-0222, *Final Hanford Comprehensive Land Use Plan Environmental Impact Statement*, (CLUP) evaluates the potential environmental impacts associated with implementing a comprehensive land-use plan for the Hanford Site for at least the next 50 years and ensures that DOE-RL, its contractors, and other entities conduct activities on the Hanford Site in compliance with NEPA.

The vision for the DOE-RL-managed portion of the Hanford Site focuses not only on the cleanup of nuclear facilities and waste sites but on the protection of groundwater and the Columbia River, as well as the restoration of the Hanford Site lands for access and use (DOE/RL-2009-10). DOE-RL works closely with partners (e.g., the U.S. Fish and Wildlife Service and National Park Service) to enable use of the Hanford Site land consistent with the CLUP. As the Hanford Site moves toward accomplishing this vision, monitoring the ecological resources present to determine whether there is a need for conservation and/or protection of any resources will be critical for making informed decisions for responsible site stewardship.

The CLUP identifies DOE/RL-96-32, *Hanford Site Biological Resources Management Plan*, (BRMP) as the primary implementation document for managing and protecting natural resources on the Hanford Site:

> *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 plant and animal species or habitats that fit into one or more of the categories below:

- Regulatory protections or requirements

- Rare and/or declining species (i.e., federally or state-listed endangered, threatened, or sensitive)

- Significant interest to federal, state, or tribal governments or the public.

The BRMP ranks wildlife species and habitats (Levels 0–5) based on the level of concern for each resource. The nest sites of the Ferruginous Hawk (*Buteo regalis*), a Washington State endangered species, are ranked as a Level 4 resource in the BRMP. Although the Bald Eagle (*Haliaeetus leucocephalus*) is no longer on the federal or Washington State threatened and endangered species lists, it is protected under the *Bald and Golden Eagle Protection Act of 1940* and their nest and roost sites are a Level 4 resource. Level 4 resources are essential to the biological diversity of the Hanford Site and the Columbia Basin Ecoregion. The management goal of Level 4 resources is preservation, with a high level of status monitoring. The nest sites of the Burrowing Owl, a Washington State candidate species, are classified as a Level 3 resource in the BRMP. Level 3 resources are important resources to the biological diversity of the Hanford Site and the Columbia Basin Ecoregion. The management goal for Level 3 is conservation with a moderate level of status monitoring.

Nesting raptor surveys fulfill the obligations described in the Memorandum of Understanding between the U.S. Department of Energy and U.S. Fish and Wildlife Service Regarding the Implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds" (DOE and FWS 2013) 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.

## 1.1 BACKGROUND

Raptors are apex predators that can significantly change the dynamics of an ecosystem by controlling prey species' populations. As top-level predators, raptors are also much more susceptible to environmental stressors such as toxins, habitat loss or degradation, and human disturbance. The number and diversity of nesting raptors in an area can be an indicator of environment health.

The Hanford Site supports a large and diverse community of raptorial birds (Fitzner et al. 1981), with 26 species of raptors observed on the Hanford Site. Thirteen raptor species have been recorded nesting on the Hanford Site, including eight species of diurnal raptors and five species of owls (Table 1). Two of these species are listed on the Washington State threatened and endangered species list. The Ferruginous Hawk (*Buteo regalis*) is an endangered species and the Burrowing Owl (*Athene cunicularia*) is a candidate species. The Bald Eagle has been determined sufficiently recovered and has been removed from the federal and Washington State threatened and endangered species lists but is still afforded protection under the *Bald and Golden Eagle Protection Act of 1940*. Raptor species on the Hanford Site are also given protection under the *Migratory Bird Treaty Act of 1918* (MBTA). The legal safeguards provided raptors has promoted DOE-RL to document and protect nest locations to avoid disturbance during the nesting season

and track populations over time to determine potential impacts of Hanford operations on these species.

**Table 1. Species of Nesting Raptors of the Hanford Site**

| Common Name | Scientific Name | Status[a] |
|---|---|---|
| Ferruginous Hawk | *Buteo regalis* | Washington State Endangered |
| Swainson's Hawk | *Buteo swainsoni* | None |
| Red-tailed Hawk | *Buteo jamaicenais* | None |
| Prairie Falcon | *Falco mexicanus* | None |
| American Kestrel | *Falco sparverius* | None |
| Northern Harrier | *Circus cyaneus* | None |
| Bald Eagle | *Haliaeetus leucocephalus* | None |
| Osprey | *Pandion haliaetus* | None |
| Great Horned Owl | *Bubo virginianus* | None |
| Long-eared Owl | *Asio otus* | None |
| Short-eared Owl | *Asio flammeus* | None |
| Burrowing Owl | *Athene cunicularia* | Washington State Candidate |
| Barn Owl | *Tyto alba* | None |

[a] Species status retrieved from WDFW 2023
NOTE: All species are protected under the *Migratory Bird Treaty Act of 1918*

The creation of the Hanford Site likely has benefited many raptor species from restrictions on public access, livestock grazing, and agriculture for the past 79 years. Prior to European settlement, trees occurred only sporadically on the Hanford Site along riparian zones. Species such as the American Kestrel (*Falco sparverius*), Great Horned Owl (*Bubo virginianus*), Long-eared Owl (*Asio otus*), Red-tailed Hawk (*Buteo jamaicenais*), Swainson's Hawk, Ferruginous Hawk, and Bald Eagle have benefited from the trees people planted near now-abandoned homesteads, townsites, and previous army encampment sites. Human-made structures on the Hanford Site have also provided nesting habitat for a variety of raptors: Barn Owls (*Tyto alba*) in abandoned structures; Red-tailed Hawks and Great Horned Owls on the outside of decommissioned reactor buildings; and Red-tailed, Swainson's, and Ferruginous Hawks and Bald Eagles on transmission towers and wooden utility poles. Ospreys are a more recent addition to the list of nesting raptors on the Hanford Site (first year 2000); ospreys have benefited from nest platforms built for their use (Poston et al. 2001).

Some species of raptors nest on the Hanford Site in low numbers due to the natural lack of suitable nesting habitats, food sources, or nesting substrates. For instance, Prairie Falcons nest primarily on cliffs, which on the Hanford Site are limited to Rattlesnake and Gable mountains, Gable Butte, and Yakima and Umtanum ridges. Northern Harriers (*Circus cyaneus*) nest primarily on the ground in wetland areas, which are also limited on the Hanford Site. Ospreys subsist on live fish and consequently are restricted to areas along the Columbia River.

Short-eared Owls (*Asio flammeus*) are common winter visitors to the Hanford Site but rarely nest onsite. This species nests on the ground in marshes, grasslands, and tundra areas supporting dense cyclic populations of small mammals (Wiggins et al. 2020). Short-eared Owls have also

been found nesting around Benson Ranch on the Fitzner/Eberhardt Arid Lands Ecology Reserve in the 1970s (1975 through 1978) (Fitzner et al. 1981) but no recent nesting Short-eared Owls have been observed onsite.

Bald Eagles appear on the Hanford Site primarily during the winter months when they congregate to feed on post-spawned fall Chinook salmon (Oncorhynchus tshawytscha) carcasses that wash up along the shores of the Columbia River and waterfowl that winter in the area. Prior to 2013, some pairs of Bald Eagles attempted to nest on the Hanford Site but most left the area in the spring without successfully raising young when their food sources diminished (DOE/RL-94-150). In 2013, the first successful Bald Eagle nest was documented on the Hanford Site (HNF-55187). The number of nesting Bald Eagles has gradually increased on the Hanford Site since 2013 (HNF-68963).

Since 1973, DOE-RL and the Washington State Department of Fish and Wildlife (WDWF) have conducted nesting raptor surveys on the Hanford Site (Olendorff 1973; Fitzner et al. 1977; Fitzner 1978, 1980a, 1980b; Fitzner et al. 1981; Poole et al. 1988; Fitzner and Newell 1989; Nugent 1995; Leary 1996; Dirkes and Hanf 1998; Leary et al. 1998; Dirkes et al. 1999; Poston et al. 2000, 2001; Clayton 2005). These surveys, however, were not conducted systematically and were not consistent in the area chosen for monitoring; depending on the year, surveys included either the entire area or a small section (i.e., only the DOE-RL-managed portion) of the Hanford Site or only known nest locations. The previous surveys were not conducted every year, and the species documented during those surveys included different subsets of raptors. A consistent approach for long-term monitoring of nesting raptors was initiated in 2012 for the portions of the Hanford Site managed by DOE-RL and was reproduced annually from 2013 to 2016 (HNF-53073; HNF-56769; HNF-58717; HNF-59755; HNF-60469).

## 1.2 OBJECTIVES

The focus of this report is to document the distribution and abundance of nesting raptors on the DOE-RL-managed portions of the Hanford Site. Raptor nest surveys provide land managers with specific locations of nest sites so that the nests can be avoided and disturbances minimized during the nesting season. Long-term trends in nesting raptor populations also allow for the assessment of potential impacts from Hanford Site operations.

## 1.3 SCOPE

The scope of this work is to document the distribution and abundance of as many nesting raptors species as possible on the DOE-RL-managed portions of the Hanford Site using the survey methods described in Section 2.0. These methods are likely to detect most species of nesting raptors on the Hanford Site but with varying degrees of success (Table 2) and with some highlights summarized in the text below.

**Table 2 Nest Site Selection of Raptors on the Hanford Site and Likelihood of Detecting Nests during Surveys**

| Species | Nest Site Selection | Likely to Detect Nests if Present? | Likely to Detect Most Nests? |
|---|---|---|---|
| Ferruginous Hawk | Trees, Cliffs/Rock Outcrops, Utility Structures | Yes | Yes |
| Swainson's Hawk | Primarily Trees, but also Utility Structures | Yes | Yes |
| Red-tailed Hawk | Trees, Cliffs/Rock Outcrops, Utility Structures, Buildings | Yes | Yes |
| Prairie Falcon | Primarily Cliffs | Yes | Yes |
| American Kestrel | Primarily Secondary Cavities in Tree | Yes | No |
| Northern Harrier | Primarily on Ground in Wetland Vegetation but also Dry Grasslands | No | No |
| Bald Eagle | Large Trees, Nest Platforms, Cliffs, Utility Structures | Yes | Yes |
| Osprey | Large Trees, Nest Platforms, Cliffs | Yes | Yes |
| Great Horned Owl | Primarily in Trees in Nests Built by Other Species | Yes | Yes |
| Long-eared Owl | Primarily in Trees in Nests Built by Other Species | Yes | Yes |
| Short-eared Owl | Primarily on Ground in Dry Sites | No | No |
| Burrowing Owl | Primarily in Burrows Dug by Other Animals but also Human-made Structures (e.g., Culverts, Artificial Burrows) | Yes | No |
| Barn Owl | Existing Cavities in Trees, Cliffs/Rock Outcrops, Caves, Buildings | Yes | Yes |

The survey methods are likely to detect most individual nest sites for Red-tailed, Swainson's, and Ferruginous Hawks; Prairie Falcons; Bald Eagles; Ospreys; and Great Horned and Long-eared Owls.

The species noted below nest in less conspicuous areas, and a high proportion of individual nest sites for these species are not likely to be detected using the described methods. Specific methods will be developed for these species should their regional status decline.

- Burrowing Owls nest in burrows in the ground; the survey methods described are not optimal for documentation of this species' nest sites. Nesting Burrowing Owls are assessed in a separate monitoring effort (DOE/RL-2023-20).
- Northern Harriers and Short-eared Owls are ground-nesting birds with difficult to detect nests and are, thus, not likely to be assessed accurately using the defined survey methodology. Short-eared Owls may not nest within the current survey area.
- American Kestrels are secondary cavity nesters; most nest sites are not detected using these survey methods.

The most conspicuous raptors nesting on the Hanford Site are the three species of Buteo Hawks: Red-tailed, Swainson's, and Ferruginous. These species build large stick nests on trees, cliffs,

rock outcrops, utility poles, transmission towers, and sometimes buildings. The largest number of raptor nest sites detected with these methods belong to Buteo Hawks.

Common Ravens (*Corvus corax*) also build large stick nests that are difficult to distinguish from Buteo Hawk nests without the presence of the birds. Although Common Ravens are not considered raptors, they perform a similar ecological role and are protected under the MBTA. Most Common Raven nests are detected with the prescribed survey methods and are included in this report.

Raptor nesting season on the Hanford Site extends over 6 months, generally from March through August. Fitzner et al. (1981) found that Great Horned Owls were the earliest in season nesters on the Hanford Site with an average egg laying date of March 15. In 2015, Great Horned Owls were discovered tending a nest with one egg on the 105-KE Reactor on January 14; however, this nest was observed depredated on January 22. Fitzner et al. (1981) also found that American Kestrels were the latest in season nesters with an average laying date of May 25. First-egg dates for raptor species known to nest on the Hanford Site are provided in Table 3. Although these data are limited and dated, survey timing can be inferred. Surveys were conducted in late May and early June to detect the greatest number of raptor nests, during which time all species occupy their respective nesting territories and are most readily detectible.

**Table 3 First-egg Dates for Raptor Species Known to Nest on the Hanford Site**

| Species | Hanford Site[a] | | | Statewide[b] | | |
|---|---|---|---|---|---|---|
| | Number of Records | Earliest First-egg Date | Latest First-egg Date | Number of Records | Earliest First-egg Date | Latest First-egg Date |
| Ferruginous Hawk | - | - | - | 23 | Mar 28 | Apr 30 |
| Swainson's Hawk | 39 | Apr 28 | May 20 | 28 | Apr 28 | May 31 |
| Red-tailed Hawk | 19 | Mar 30 | Apr 20 | 46 | Feb 23 | May 09 |
| Prairie Falcon | 3 | Apr 15 | May 24 | 126 | Mar 09 | May 18 |
| American Kestrel | 4 | May 08 | Jun 18 | 30 | Mar 26 | Jun 20 |
| Northern Harrier | 2 | Apr 07 | Apr 25 | 14 | Mar 26 | May 24 |
| Bald Eagle | - | - | - | 26 | Mar 01 | May 10 |
| Osprey | - | - | - | 26 | Apr 16 | Jun 21 |
| Great Horned Owl | 5 | Mar 05 (Jan 14)[c] | Apr 27 | 28 | Feb 11 | Apr 28 |
| Long-eared Owl | 7 | Mar 20 | May 21 | 41 | Mar 06 | Jun 03 |
| Short-eared Owl | - | - | - | 7 | Mar 18 | May 30 |
| Burrowing Owl | 6 | Apr 08 | - | 12 | Mar 23 | Jun 08 |
| Barn Owl | - | - | - | 6 | Mar 04 | May 14 |

[a] Fitzner et al. 1981
[b] Burke Museum (2023)
[c] In 2015, Great Horned Owls were observed tending a nest with one egg on January 14; however, the egg was found depredated on January 22.
- = No data available for this species on the Hanford Site.

# 2.0 METHODS

Nests were located using foot and vehicular surveys. Surveys were conducted on the DOE-RL-managed lands of the Hanford Site excluding an area south of 200-East Area (BC Controlled Area and Central Landfill) (Figure 1). DOE-RL-managed lands include the Central Hanford, McGee Ranch, Riverland, dunes areas, and the southern shoreline of the Columbia River. All elevated substrates in the surveyed areas were searched for nests. Suitable nesting structures included trees, cliffs, and rock outcrops; utility poles and transmission towers; abandoned buildings; and nest platforms.

Nest searches occurred in late May and early June, during which time all species occupy their respective nesting territories. Some nest sites were also recorded during other unrelated ecological surveys. A nest was considered occupied if adult birds were tending a recently built nest, or eggs or young were present. Nest site coordinates were taken using a handheld global positioning system or Google Earth on a smart phone. Areas in which nest sites were not easily accessible in the field, such as high cliffs, were later adjusted on maps in a Geographic Information System. Field personnel spent as little time as possible at each nest site to avoid disturbing the birds. Nest searches were not conducted during inclement weather. During cold or wet weather, field personnel avoided flushing incubating adult birds. Flushing adult birds at these times may cause nest failures.

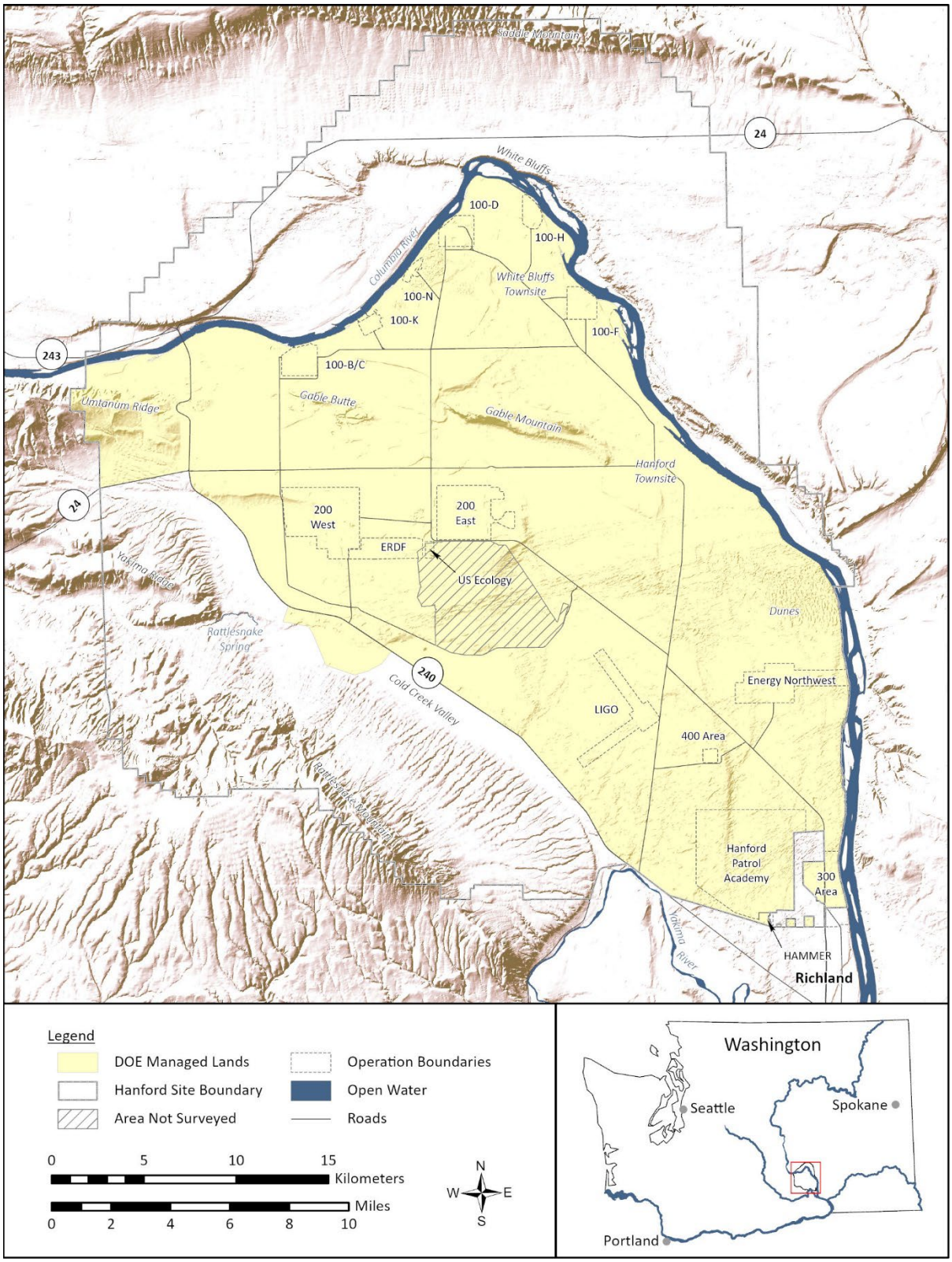


**Figure 1. Area Surveyed for Raptor and Raven Nests on DOE-RL-managed Lands of the Hanford Site in 2022**

# 3.0 RESULTS

Nest surveys were conducted on 10 days from May 16 through June 2, 2022 (specifically, May 16-18, May 23–26, and May 31-June 2). A total of 87 nest sites were recorded in 2022 during these surveys including nests of Ferruginous, Swainson's, and Red-tailed Hawks, Prairie Falcons, American Kestrels, Bald Eagles, Osprey, Great Horned Owls, and Common Ravens. Nest substrates used by raptors and ravens on DOE-RL-managed lands in 2022 are shown in Table 4. Approximately 7% of the raptor and raven nests located in 2022 were on naturally-occurring substrates such as cliffs and naturally-established trees along the Columbia River. The majority of raptor and raven nests were found on artificial structures. All raptor nest sites located in 2022 are displayed in Figure 2, and Common Raven nest sites found in 2022 are shown in Figure 3. In an additional study, 16 active Burrowing Owl nests were recorded on DOE-RL-managed lands in 2022. Fifteen of these nests were in artificial burrow systems built for their use and one nest was found in a natural burrow. Two of the artificial burrow systems nests were later abandoned but the other nests produced young. Details pertaining to Burrowing Owl nests and status on the Hanford Site are described in separate reporting (DOE/RL-2023-20).

**Table 4. Nest Substrates Used by Raptors and Ravens on DOE-RL-managed Lands of the Hanford Site in 2022**

| Species | Tree | Cliff | Transmission Tower | Utility Pole | Communications Tower | Nest Platform | Railroad Crossing Sign | Building | Total |
|---|---|---|---|---|---|---|---|---|---|
| Ferruginous Hawk | 1 | | 2 | | | | | | 3 |
| Swainson's Hawk | 8 | | 1 | | | | | | 9 |
| Red-tailed Hawk | | 1 | 1 | 1 | | | | | 3 |
| Prairie Falcon | | 2 | | | | | | | 2 |
| American Kestrel [a] | 1 | | | | | | | | 1 |
| Bald Eagle | 4 | | 1 | | | | | | 5 |
| Osprey | | | | | | 4 | | | 4 |
| Great Horned Owl | 3 | | | | | | | | 3 |
| Common Raven [b] | 4 | | 41 | 7 | 2 | | 1 | 2 | 57 |
| **Total** | **21** | **3** | **46** | **8** | **2** | **4** | **1** | **2** | **87** |

[a] Nests of American Kestrels are difficult to find; therefore, nest numbers likely represent minimums.
[b] Common Ravens are technically not raptors but occupy a similar ecological niche and are protected under the *Migratory Bird Treaty Act of 1918*.

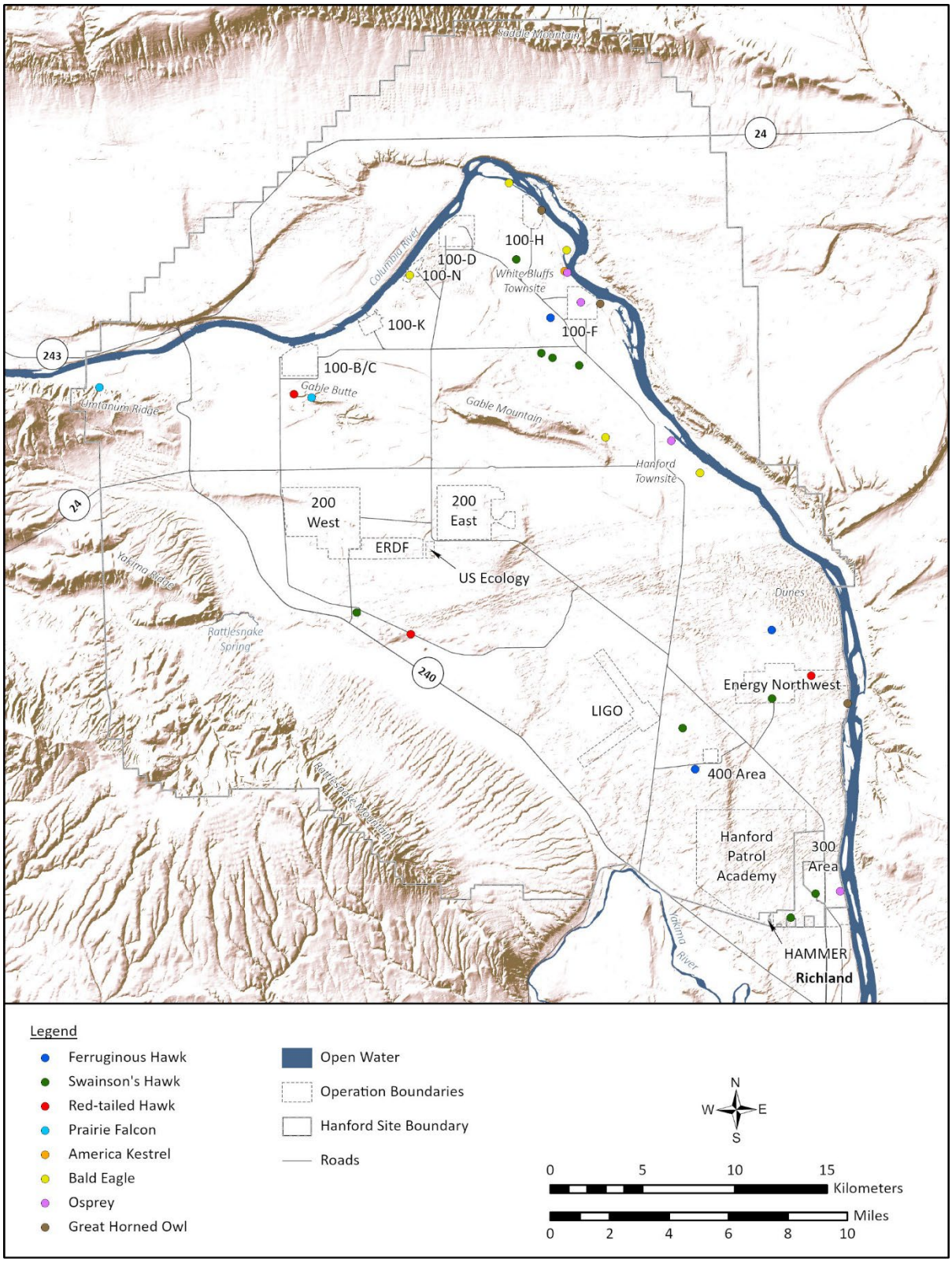


**Figure 2. Raptor Nests Located on DOE-RL-Managed Lands of the Hanford Site in 2022**

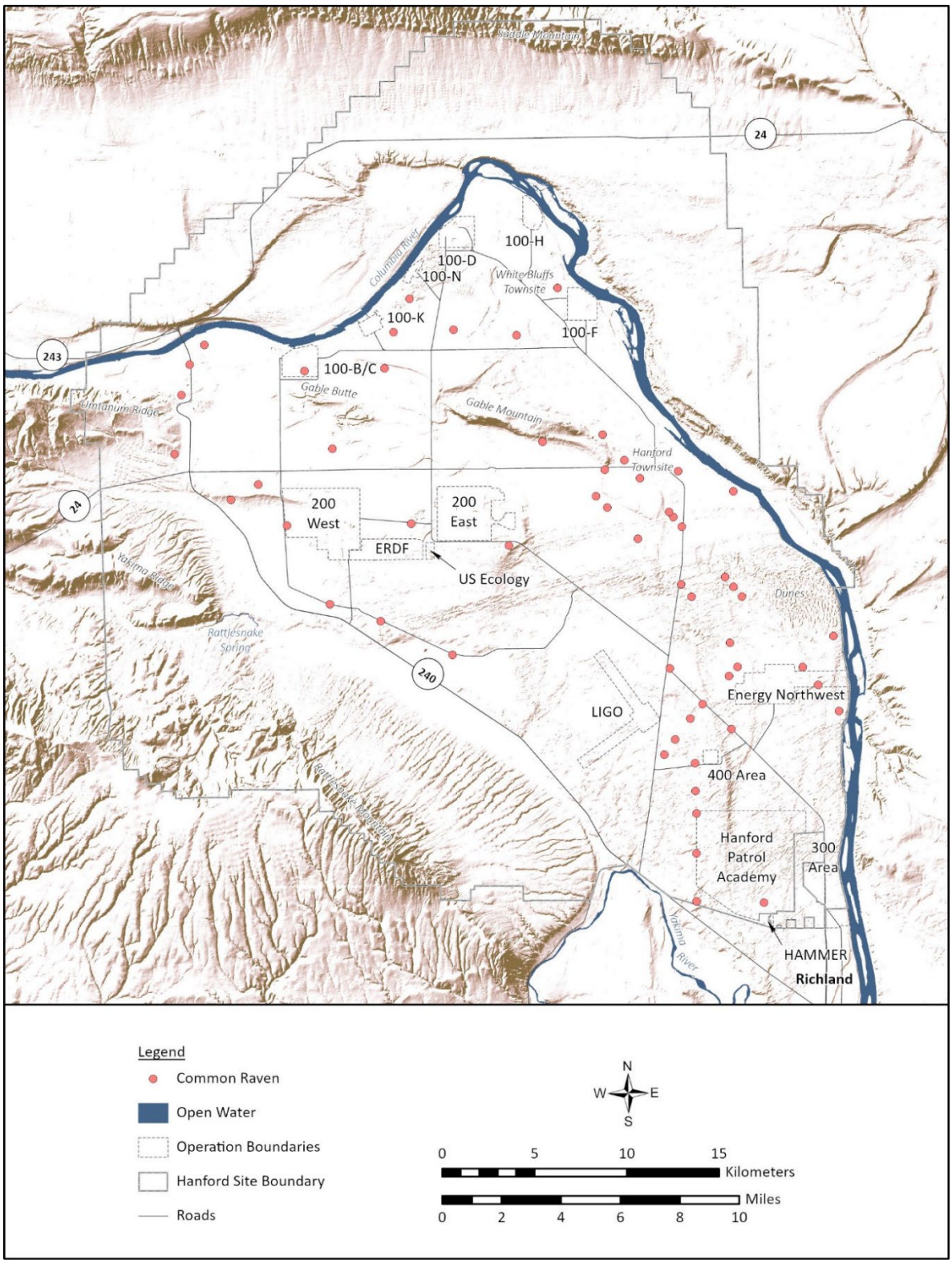


**Figure 3. Common Raven Nests Located on DOE-RL-Managed Lands of the Hanford Site in 2022**

# 4.0 DISCUSSION

Nests of eight raptor species (Ferruginous, Swainson's, and Red-tailed Hawks; Prairie Falcons; American Kestrel; Bald Eagles; Ospreys; and Great Horned) as well as Common Ravens were located in 2022. No nests of Long-eared Owls or Barn Owls were found in 2022. A comparison of the number of raptor and raven nest sites located in 2022 to the numbers found in 2012 through 2016 is presented in Figure 4.

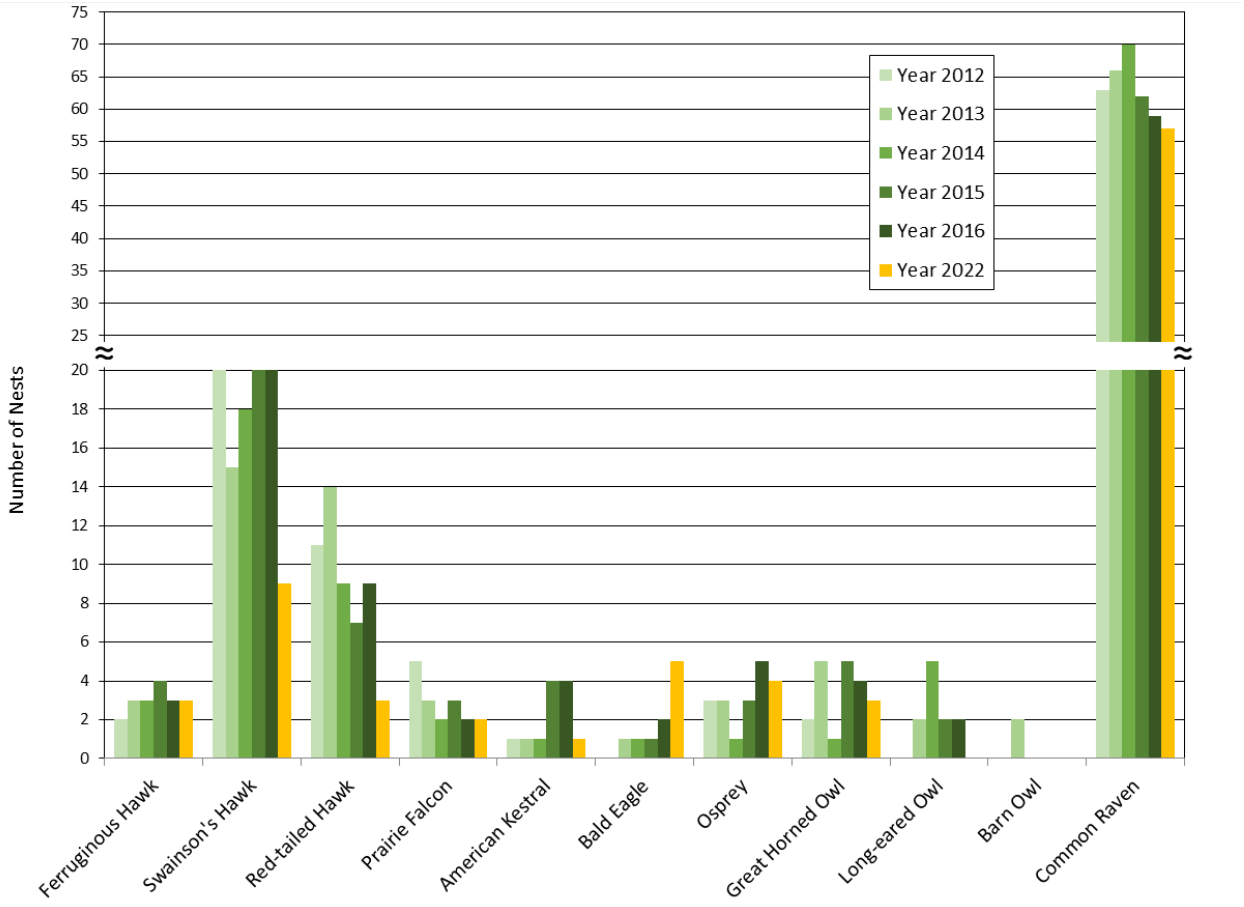


**Figure 4. Number of Raptor and Raven Nest Sites Located on DOE-RL-Managed Lands of the Hanford Site in 2012 through 2016 and 2022**

Ferruginous Hawks occupied three nest sites on the Hanford Site in 2022 including a nest found in a small tree in a new nesting territory not contained in the WDFW database. The new territory is located west of Route 2 North just south of the White Bluffs Townsite. The number of Ferruginous Hawk nests located in 2022 was comparable to the numbers seen in the years between 2012 and 2016 (2 to 4 nests per year). Productivity surveys were performed on the three nests on June 23, 2022, and found that two of the nests were successful. The nest near the White

Bluffs Townsite and the nest near the 400 Area (Fast Flux Test Facility North Territory) each produced one young for a total of two young for the Central Hanford Site in 2022.

Nine Swainson's Hawk nests were observed in 2022, which was well below the range of nests found in the years between 2012 and 2016 (15 to 20 nests per year), and on the low end of the range of nests found in the past 49 years (9 to 23 nests per year). The reason for the decline in the number of nesting Swainson's Hawks on the Hanford Site is not known but a possible cause may be the slow disappearance of their preferred nesting substrate, the planted trees which are succumbing to old age, lack of water, and fire. Further evidence of this cause is the observation of Swainson's Hawk use of transmission towers as nesting structures in recent years.

Three Red-tailed Hawk nests were found in 2022, which is the lowest recorded in the past 49 years (7 to 19 nests per year). It is unclear why nesting Red-tailed Hawk numbers were so small; however, combined with the low number of nesting Swainson's Hawks and the poor productivity of Ferruginous Hawks, it may indicate that prey populations were depressed on the Hanford Site in 2022.

Two Prairie Falcon nests were found in 2022. Nests were found on the basalt cliffs on Gable Butte and Umtanum Ridge. The number and location of Prairie Falcon nests documented on the Hanford Site has remained relatively unchanged in the past 49 years (2 to 5 nests per year).

One American Kestrel nest was located in 2022. The actual number of nesting American Kestrels on the Hanford Site was undoubtedly higher but the methods of this survey likely would not detect them.

Five Bald Eagle nests were documented in 2022, the highest number since the first successful nest was recorded in 2013. These nests were located in the Hanford Townsite, on the eastern flank of Gable Mountain, in the White Bluffs Slough, north of 100-H, and near 100-N. Productivity surveys were conducted on the five active nests on June 23, 2022. The Hanford Townsite nest and the Gable Mountain nest contained one young each. The White Bluffs Slough nest, the 100-H nest, and the 100-N nest had two young each. A total of eight young were produced on the Central Hanford Site in 2022. Additional information on Bald Eagle use of the Hanford Site in FY 2022 including night roosts and nest sites, can be found in *Hanford Site Bald Eagle Monitoring Report for Fiscal Year 2022* (HNF-68963).

Four Osprey nests were recorded on the Hanford Site in 2022; all were on nest platforms. One to five Osprey nests have been observed on the Hanford Site between the years 2012 and 2016.

Three Great Horned Owl nests were found on the Hanford Site in 2022, which was similar to the numbers observed in the years between 2012 and 2016 (1 to 5 nests per year). No Long-eared

Owl or Barn Owl nests were recorded on the Hanford Site in 2022, which was also comparable to the years between 2012 and 2016 (0 to 5 Long-eared Owls nests per year and 0 to 2 Barn Owl nests per year).

Fifty-seven Common Raven nests were recorded on the Hanford Site in 2022, which was below the range of nests found in the years between 2012 and 2016 (59 to 70 nests per year). The peak number of 70 nests occurred in 2014 and has decreased in the past three survey years (62 nests in 2015, 59 nests in 2016, and 57 nests in 2022).

A Regression Model was utilized to evaluate whether the number of nests for each species of raptor on the Hanford Site is changing over time, including the 2012, 2016, and 2022 monitoring years. The data do not violate the assumptions of the Regression Model. The model fits the data well (S = 2, R2 = 98.43). The number of nests is significantly correlated to the year for Common Ravens ($p<0.001$), Red-tailed Hawks ($p<0.001$), and Swainson's Hawks ($p<0.001$). The number of nests of these three species appear to be trending negatively over time, while the number of nests for the other species are not changing significantly over time ($p>0.05$). The reason for the observed decline is unknown but could be due to reduced habitat quality associated with widespread wildfires, increased non-native species cover, reduction of shrub cover, or loss of trees. It is possible that seasonal variation resulting from weather, precipitation, or other factors could cause the observed differences, and additional data would help to explain if the observed trends continue.

## 5.0 REFERENCES

*Bald and Golden Eagle Protection Act of 1940*, 16 U.S.C. 668-668d, 54 Stat. 250. U.S. Fish and Wildlife Service.

Burke Museum. 2023. *Washington Birds Breeding Phenology Project*. University of Washington. Accessed September 13. https://www.burkemuseum.org/sites/default/files/2019-07/BreedingPhenologyProject_sm.pdf.

Clayton, K. M,, 2005. *Breeding Population Status and Nest Site Characterization of Hawks* (Buteo spp.) *and Common Ravens* (Corvus corax) *on the Hanford Site, Southcentral Washington*. PNNL-SA-46396. Pacific Northwest National Laboratory, Richland, Washington. https://claytonkelly.files.wordpress.com/2007/06/hawkreport_clayton.pdf.

*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 U.S.C. 9601-9675.

Dirkes R. L. and R. W. Hanf. 1998. *Hanford Site Environmental Report for Calendar Year 1997.* PNNL-11795. Pacific Northwest National Laboratory, Richland, Washington. https://hmis.hanford.gov/files.cfm/PNNL-11795_1997.pdf.

Dirkes R. L., R. W. Hanf, J. R., and T. M. Poston. 1999. *Hanford Site Environmental Report for Calendar Year 1998*. PNNL-12088. Pacific Northwest National Laboratory, Richland, Washington. https://hmis.hanford.gov/files.cfm/PNNL-12088_1998.pdf.

DOE/EIS-0222. 1999. *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement*. U.S. Department of Energy, Washington, D. C. http://energy.gov/nepa/downloads/eis-0222-final-environmental-impact-statement-0.

DOE/RL-2023-20. 2023. Hanford Site Annual Environmental Report for Calendar Year 2022. U.S. Department of Energy, Richland Operations Office, Richland, Washington. Online at: https://hmis.hanford.gov/files.cfm/DOE-RL-2023-20_FULLREPORT.pdf.

DOE/RL-2009-10. 2013. *Hanford Site Cleanup Completion Framework*. Rev. 1. U.S. Department of Energy, Richland Operations Office, Richland, Washington. https://www.hanford.gov/files.cfm/Comp_Framework_Jan_%201-23-13-lfm.pdf.

DOE/RL-94-150. 2017. *Bald Eagle Management Plan for the Hanford Site, South-Central Washington.*, Rev. 3. U.S. Department of Energy, Richland, Washington. https://www.hanford.gov/files.cfm/DOE-RL-94-150_Rev3.pdf.

DOE/RL-96-32. 2017. *Hanford Site Biological Resources Management Plan*. Rev. 2. U.S. Department of Energy, Richland Operations Office, Richland, Washington. http://www.hanford.gov/files.cfm/DOE-RL-96-32-01.pdf.

DOE and FWS. 2013. Memorandum of Understanding between The United States Department of Energy and The United States Fish and Wildlife Service Regarding Implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds". https://www.energy.gov/sites/prod/files/2013/10/f3/Final%20DOE-FWS%20Migratory%20Bird%20MOU.pdf.

Executive Order 13186. *Responsibilities of Federal Agencies to Protect Migratory Birds*. http://energy.gov/nepa/downloads/executive-order-13186-responsibilities-federal-agencies-protect-migratory-birds.

Fitzner, R. E., D. Berry, L. L. Boyd, and C. A. Rieck. 1977. "Nesting of Ferruginous Hawks (Buteo regalis) in Washington 1974-75." *The Condor* 79:245-249. https://sora.unm.edu/sites/default/files/journals/condor/v079n02/p0245-p0249.pdf.

Fitzner, R. E. 1978. *The Ecology and Behavior of Swainson's Hawk in Southcentral Washington*. PhD thesis. Washington State University. Pullman, Washington.

Fitzner, R. E. 1980a. *Behavioral Ecology of the Swainson's Hawk in Southeastern Washington*. PNL-2754. Pacific Northwest Laboratory, Richland, Washington. http://www.osti.gov/scitech/servlets/purl/6600005-A1Pjcp/.

Fitzner, R. E. 1980b. Impacts of a Nuclear Energy Facility on Raptorial Birds. In A Workshop on Raptors and Energy Development, ed. R. P Howard and J. F. Gore. Bonneville Power Administration, U. S. Fish and Wildlife Service, Idaho Power Company, and the Idaho Chapter of the Wildlife Society. Boise, Idaho. January 25-26, 1980. https://tethys.pnnl.gov/sites/default/files/publications/Howard-and-Gore-1980.pdf.

Fitzner, R. E., W. H. Rickard, L. L. Cadwell, and L. E. Rogers. 1981. *Raptors of the Hanford Site and Nearby Areas of Southcentral Washington*. PNL-3212. Pacific Northwest National Laboratory, Richland, Washington. https://inis.iaea.org/collection/NCLCollectionStore/_Public/12/632/12632157.pdf.

Fitzner, R. E., and R. L. Newell. 1989. Ferruginous hawk nesting on the U.S. DOE Hanford Site: case history of a recent invasion caused by transmission lines. In *Proceedings IV: Issues and technology in the management of impacted wildlife*. Pp. 125-132. Thorne Ecological Institute, Boulder, Colorado.

HNF-53073. 2013. *Raptor Nest Monitoring Report for Calendar Year 2012*. Rev. 0. Mission Support Alliance, Richland, Washington. https://www.hanford.gov/files.cfm/HNF-53073_-_Rev_00_No_Coversheets.pdf.

HNF-55187. 2013. *Hanford Site Bald Eagle Monitoring Report for Fiscal Year 2013*. Rev. 0. Mission Support Alliance, Richland, Washington. https://www.hanford.gov/files.cfm/HNF-55187_-_Rev_00.pdf.

HNF-56769. 2014. *Hanford Site Raptor Nest Monitoring Report for Calendar Year 2013*. Rev. 0. Mission Support Alliance, Richland, Washington. https://www.hanford.gov/files.cfm/HNF-56769_-_Rev_00.pdf.

HNF-58717. 2015. *Hanford Site Raptor Nest Monitoring Report for Calendar Year 2014*. Rev. 0. Mission Support Alliance, Richland, Washington. https://www.hanford.gov/files.cfm/HNF-58717_-_Rev_00.pdf.

HNF-59755. 2016. *Hanford Site Raptor Nest Monitoring Report for Calendar Year 2015*. Rev. 0. Mission Support Alliance, Richland, Washington. https://www.hanford.gov/files.cfm/HNF-59755_-_Rev_00.pdf.

HNF-60469. 2016. *Hanford Site Raptor Nest Monitoring Report for Calendar Year 2016*. Rev. 0. Mission Support Alliance, Richland, Washington. https://www.hanford.gov/files.cfm/HNF_60469-00_Cleared_without_forms.pdf.

HNF-68963. 2023. *Hanford Site Bald Eagle Monitoring Report for Fiscal Year 2022*. Rev. 0. Hanford Mission Integration Solutions, Richland, Washington. https://www.hanford.gov/files.cfm/HNF-68963_-_Rev_00.pdf.

Leary, A. W. 1996. *Home Ranges, Core Use Areas, and Dietary Habits of Ferruginous Hawks in Southcentral Washington*. MS Thesis. Boise State University, Boise, Idaho.

Leary, A. W., R. Mazaika, and M. J. Bechard. 1998. "Factors Affecting the Size of Ferruginous Hawk Home Ranges." *Wilson Bulletin* 110(2):198-205. https://sora.unm.edu/sites/default/files/journals/wilson/v110n02/p0198-p0205.pdf.

*Migratory Bird Treaty Act of 1918.* 16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755 U.S. Fish and Wildlife Service. http://www.fws.gov/laws/lawsdigest/migtrea.html.

*National Environmental Policy Act of 1969*, 42 U.S.C. 4321, et seq.

Nugent, J. J. 1995. *Nest-Site and Habitat Selection of Buteo Species in Southeastern Washington and the Use of Geographic Information Systems to Model Nest Habitat Quality*. MS Thesis. University of Montana, Missoula, Montana. http://scholarworks.umt.edu/cgi/viewcontent.cgi?article=7568&context=etd.

Olendorff, R. R. 1973. *Raptorial Birds of the U.S.A.E.C. Hanford Reservation, South-Central Washington*. BNWL-1790. Battelle Pacific Northwest Laboratories, Richland Washington. https://ntrl.ntis.gov/NTRL/dashboard/searchResults/titleDetail/BNWL1790.xhtml.

Poole, L. D., N. V. Marr, and S. M. McCorquodale. 1988. *Productivity, Mortality, and Response to Disturbance of Nesting Swainson's Hawks on the Hanford Site*. PNL-6496. Pacific Northwest National Laboratory, Richland, Washington. http://www.osti.gov/scitech/servlets/purl/5212015-QfXHA6/.

Poston T. M., R. W. Hanf, and R. L. Dirkes. 2000. *Hanford Site Environmental Report for Calendar Year 1999*. PNNL-13230. Pacific Northwest National Laboratory, Richland, Washington. https://hmis.hanford.gov/files.cfm/PNNL-13230_1999.pdf.

Poston T. M., R. W. Hanf, R. L. Dirkes, and L. F. Morasch. 2001. *Hanford Site Environmental Report for Calendar Year 2000*. PNNL-13487. Pacific Northwest National Laboratory, Richland, Washington. https://hmis.hanford.gov/files.cfm/PNNL-13487_2000.pdf.

Wiggins, D. A., D. W. Holt, and S. M. Leasure. 2020. Short-eared Owl (*Asio flammeus*), version 1.0. In Birds of the World (S. M. Billerman, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.sheowl.01.

WDFW (Washington State Department of Fish and Wildlife). 2023. *State Listed Species*. Accessed September 13. https://wdfw.wa.gov/sites/default/files/2022-03/StateListed%26amp%3BCandidateSpeciesFeb2022.pdf.