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Raptor Nest Monitoring Report for Calendar Year 2012

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

P.O. Box 650
Richland, Washington 99352

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Mission Support Alliance

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1.0 Introduction

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). Several of these species are on state and federal threatened and endangered species lists (WDFW 2012). The Ferruginous Hawk (*Buteo regalis*) is a Washington State threatened species and a federal species of concern. The Bald Eagle (*Haliaeetus leucocephalus*) is a Washington State sensitive species and a federal species of concern. The Burrowing Owl (*Athene cunicularia*) is a Washington State candidate species and a federal species of concern. Swainson's Hawks (*Buteo swainsoni*), Prairie Falcons (*Falco mexicanus*), and Ospreys (*Pandion haliaetus*) are Washington State Monitored species. Because of the status of these species, it is important that the U.S. Department of Energy (DOE) documents nest locations to avoid disturbance during the nesting season and to track populations over time to determine impacts of Hanford operations on these species.

Table 1. Status of nesting raptors of the Hanford Site

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

The creation of the Hanford Site has likely benefited many raptor species, due to restrictions on public access, livestock grazing, and agriculture for the past 69 years. In addition, species such as American Kestrels (*Falco sparverius*), Great Horned Owls (*Bubo virginianus*), Long-eared Owls (*Asio otus*), Red-tailed Hawks (*Buteo jamaicenais*), Swainson's Hawks, Ferruginous Hawks, and Bald Eagles have benefited from the trees that people planted near abandoned homesteads, townsites, and previous army encampment sites. Prior to European settlement, trees occurred only sporadically on the Hanford Site along riparian zones. Human construction has also provided nesting habitat for a variety of raptors. Barn Owls (*Tyto alba*) have been found nesting in abandoned buildings on the Hanford Site. Red-tailed Hawks, Swainson's hawks and ferruginous hawks have also benefited from transmission towers and wooden utility poles. Ospreys, which are recent additions to the list of nesting raptors on the Hanford Site, have benefited from nest platforms built for their use.

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 Mountain, Gable Mountain, Gable Butte, Yakima Ridge, and Umtanum Ridge. Northern Harriers (*Circus cyaneus*) nest primarily on the ground in wetland areas which are also limited on the Hanford Site. Ospreys are most likely limited by the lack of suitable nest sites and food sources. 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. Short-eared owls nest on the ground in marshes, grasslands, and tundra areas supporting dense cyclic populations of small mammals (Wiggins et al. 2006). Short-eared Owls have been found nesting in the past around Benson Ranch on Fitzner/Eberhardt Arid Lands Ecology Reserve (Fitzner et al. 1981) but nowhere else on site.

Bald Eagles occur on the Hanford Site primarily during the winter months when they congregate to feed on spawned-out fall Chinook salmon (*Oncorhynchus tshawytscha*) carcasses that wash up along the shores of the Columbia River, and waterfowl that winter in the area. While pairs of Bald Eagles do attempt to nest on the Hanford Site, most individuals leave the area in the spring, without successfully raising young, when their food sources diminish (USDOE 2009).

Historically, surveys of nesting raptors have been conducted on the Hanford Site since 1973 by the DOE and Washington Department of Fish and Wildlife (WDFW) (Olendorff 1973; Fitzner et al. 1977; Fitzner 1978, 1980, 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. 1998, 1999; Poston et al. 2000, 2001; Clayton 2005). However, these surveys were not conducted systematically. The past surveys were not consistent in the area chosen for monitoring: some years included only central Hanford, some years included either the entire Hanford Site or a portion of the Hanford Site, and some years only included known nest locations. The previous surveys were not conducted every year, and the species documented in previous surveys included different subsets of raptors.

The focus of this report is to document the distribution and abundance of nesting raptors on the DOE managed portions of the Hanford Site. Annual surveys provide land managers with specific locations of nest sites so nests can be avoided and disturbances minimized during the nesting season. Long term trends in nesting raptor populations will be summarized to allow assessment of the possible impacts of Hanford Site operations. This report initiates a consistent and reproducible approach for long term monitoring of nesting raptors on the portions of the Hanford Site managed by DOE.

The survey methods described in Section 2 of this report are likely to detect the majority of species of nesting raptors on the Hanford Site but with varying degrees of success (Table 2). One exception is the Short-eared Owl which may not nest within the present survey area. The survey methods are likely to detect a majority of individual nest sites for Red-tailed Hawks, Swainson's Hawks, Ferruginous Hawks, Prairie Falcons, Bald Eagles, Ospreys, Great Horned Owls, and Long-eared Owls. Some species nest in sites that are less conspicuous and a high proportion of individual nest sites for these species are not likely to be detected using these methods. For example, burrowing owls nest in burrows on the ground and the methods described here are not optimal for documentation of these nest sites (a separate monitoring effort was instituted for Burrowing Owls). Northern Harriers and Short-eared Owls are ground nesting birds and their nests are difficult to detect, and are thus not likely to be accurately assessed using this methodology. American Kestrels are secondary cavity nesters and most nest sites are not detected using these survey methods.

Table 2. Nest site selection of raptors on the Hanford Site and likelihood of detecting nests during annual 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	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	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 most conspicuous raptors nesting on the Hanford Site are the three species of Buteo hawks: the Red-tailed Hawk, Swainson's Hawk, and Ferruginous Hawk. These species build large stick nests on trees, cliffs, rock outcrops, utility poles and transmission towers. The largest number of nest sites detected with these methods will 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 birds. Common Ravens are not considered raptors but perform a similar ecological role. The majority of Common Raven nests are detected with these survey methods.

Raptor nesting season on the Hanford Site extends over six months, generally from March through August (Fitzner et al. 1981). Fitzner et al. (1981) found that Great Horned Owls were the earliest nesters on the Site with an average laying date of March 15. American Kestrels were the last 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. In order to detect the greatest number of raptor nests, surveys were conducted in late May and early June when all species were occupying nesting territories.

Table 3. First-egg dates for raptor species known to nest on the Hanford Site

Species	Hanford Site[1]			Statewide[2]		
	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	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

[1]Fitzner et al. 1981

[2]The Burk Museum, University of Washington 2012

2.0 Methods

Nests were located using vehicular and foot surveys. Surveys were conducted on the DOE managed lands of the Hanford Site excluding portions of the 200 Areas (Figure 1). DOE managed lands include central Hanford, McGee Ranch and Riverland areas, the dunes area, and the southern shoreline of the Columbia River. The 200 Areas were not surveyed extensively due to time constrains; there are numerous buildings and elevated structures and many restricted zones in the 200 Areas. 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. The distribution of nesting substrates on DOE managed portions of the Hanford Site is provided in Figure 2. Nest searches occurred in late May and early June when all species occupy nesting territories. Nest surveys were conducted on ten days from May 22, 2012 through June 7, 2012 (May 22-24, May 29-31, and June 4-7). 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. A Trimble Global Positioning System (GPS) with sub-meter accuracy was used to record nest site coordinates. Coordinates for nest sites not easily accessible in the field, such as high cliffs, were later adjusted on maps in a Geographic Information System (GIS). Field personnel spent as little time as possible at each nest site to avoid disturbing the birds. During cold or wet weather, field personnel avoided flushing incubating adult birds. Flushing adult birds at this time may cause nest failures. Nest searches were not conducted during inclement weather.

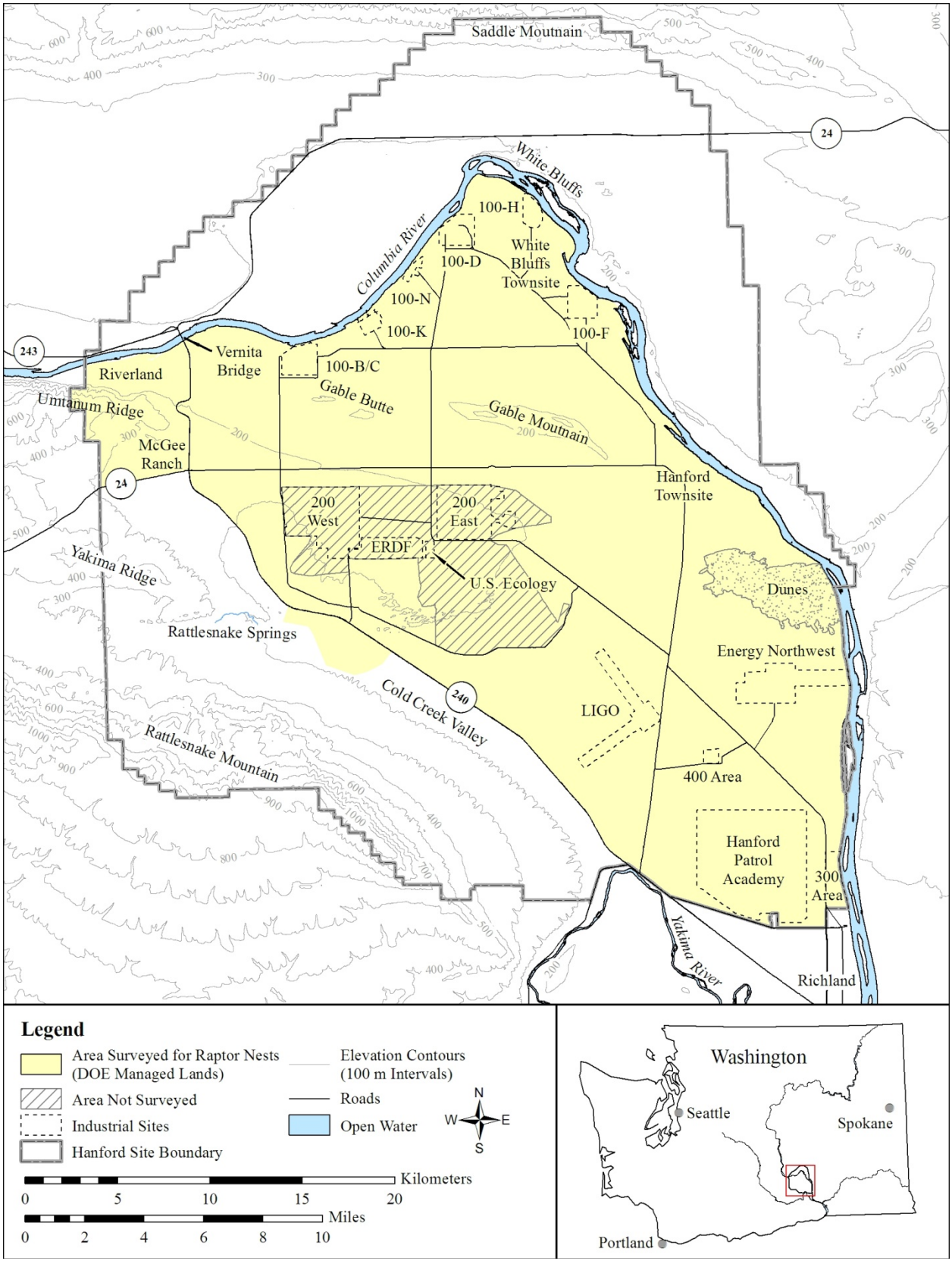

Figure 1. Area surveyed for raptor nests on DOE managed lands of the Hanford Site in 2012

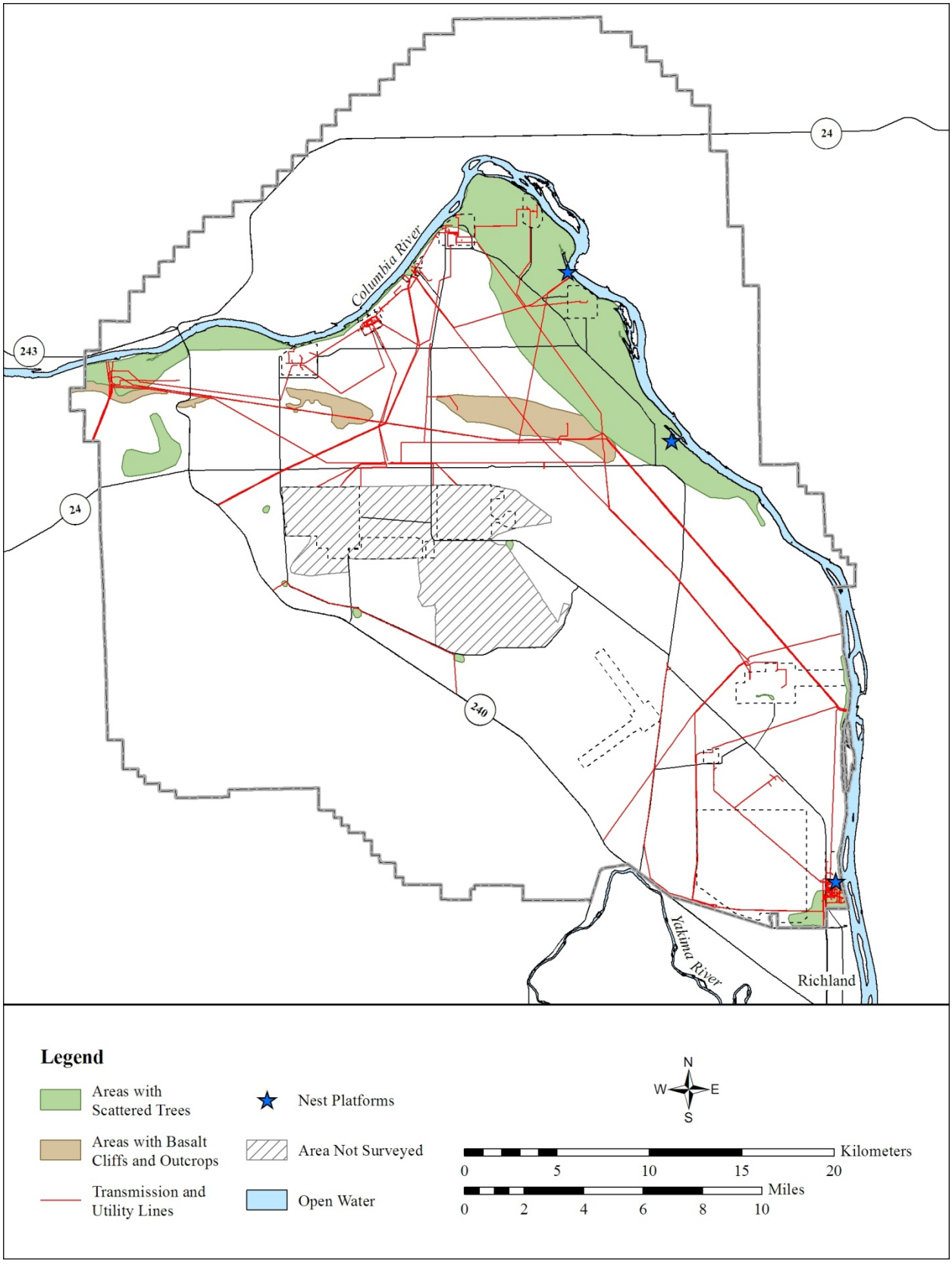

Figure 2. Distribution of nesting substrates on DOE managed lands of the Hanford Site

3.0 Results

A total of 107 nest sites were recorded in 2012 including the nest sites of two Ferruginous Hawks, 20 Swainson's Hawks, 11 Red-tailed Hawks, five Prairie Falcons, one American Kestrel, three Ospreys, two Great Horned Owls, and 63 Common Ravens. Nest substrates used by raptors and ravens on DOE managed lands are shown in Table 4. Approximately 12% of the raptor and raven nests located in 2012 were on naturally occurring substrates such as cliffs and non-planted trees along the Columbia River (although some of these trees were non-native species). Raptor nest sites located in 2012 are illustrated in Figure 3. Common Raven nest sites found in 2012 are shown in Figure 4.

Table 4. Nest substrates used by raptors and ravens* on DOE managed lands of the Hanford Site in 2012

Species	Tree	Cliff	Transmission Tower	Utility Pole	Nest Platform	Instrument Tower	Electrical Substation	Building	Total
Ferruginous Hawk			2						2
Swainson's Hawk	19			1					20
Red-tailed Hawk	3	2	6						11
Prairie Falcon		5							5
American Kestral		1							1
Osprey					3				3
Great Horned Owl	2								2
Common Raven*	10	3	40	6		1	1	2	63
Total	34	11	48	7	3	1	1	2	107
*Common Ravens are not technically raptors but occupy a similar ecological niche.									

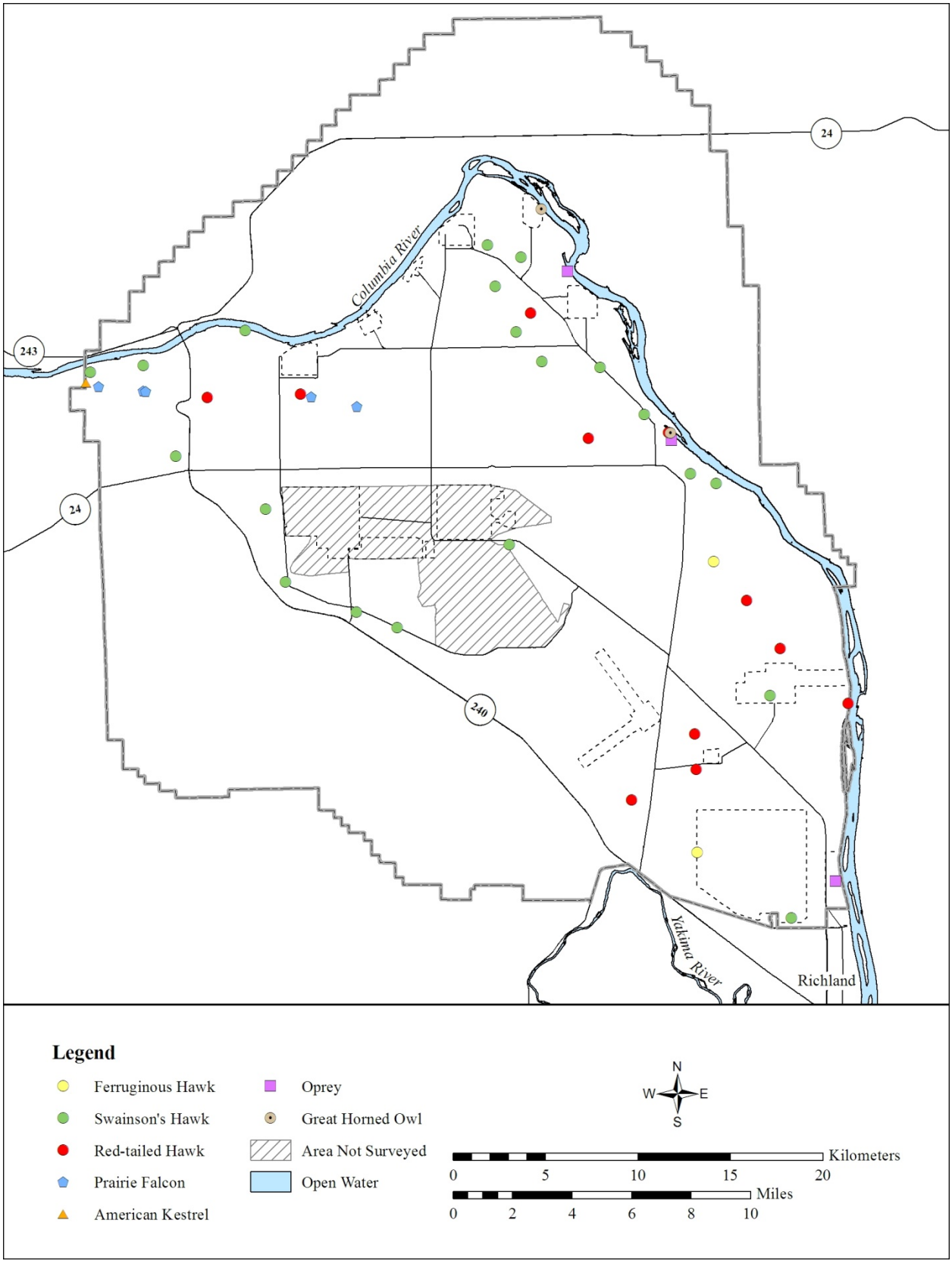

Figure 3. Raptor nest sites located on DOE managed lands of the Hanford Site in 2012

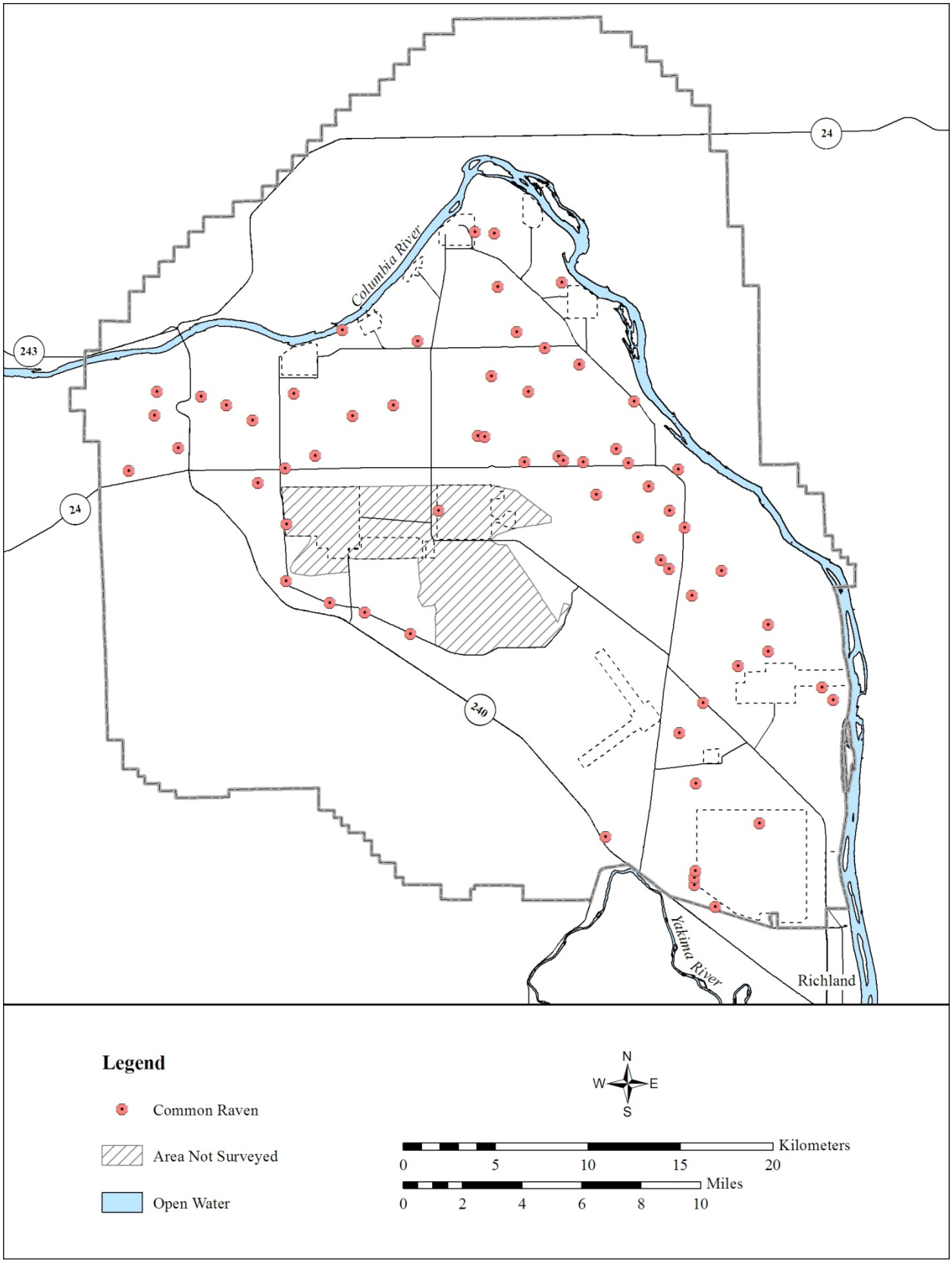

Figure 4. Common Raven nest sites located on DOE managed lands of the Hanford Site in 2012

4.0 Discussion

Nests of seven raptor species (Ferruginous Hawks, Swainson's Hawks, Red-tailed Hawks, Prairie Falcons, American Kestrel, Ospreys, and Great Horned Owls) were detected in 2012 using the methods described in Section 2. Common Raven nests were also detected using these methods. It is likely that all or most of the nests on the DOE managed portions of the Hanford Site of these species (except American Kestrels) were detected during this survey.

Two Ferruginous Hawk nests were located in 2012; both were found on 230 kV transmission towers. Nesting ferruginous hawks were uncommon on the Hanford Site prior to 1987 with only one or two pairs nesting each year. At that time, their presence was limited to basalt outcroppings on the side hills of Rattlesnake Mountain (Fitzner and Newell 1989). Olendroff (1973) found no ferruginous hawks nesting on the Hanford Site although he suggested that many excellent sites were available. He speculated that the absence of nesting Ferruginous Hawks on the Hanford Site may be the result of low numbers of large mammals such as Townsend's ground squirrel (*Urocitellus townsendii*), black-tailed jackrabbits (*Lepus californicus*), and cottontail rabbits (*Sylvilagus nuttallii*). Fitzner et al. (1981) reported one active nest on the Hanford Site (1975 through 1978) but the presence of several old nests on Gable Butte and Rattlesnake Mountain indicated that more birds were present ten to 20 years prior.

In the late 1980s, Fitzner and Newell (1989) documented what they termed an "invasion" of nesting Ferruginous Hawks on the Hanford Site. In 1987, four pairs of Ferruginous Hawks were observed nesting on the relatively new 230 kV transmission towers associated with the Washington Public Power Supply System reactors (now known as Energy Northwest). Construction of the transmission towers began in 1976 and lines were energized between December 1976 and July 1981. In 1988, seven Ferruginous Hawk nests were observed on 230 kV transmission towers and one in a tree which was believed to have been built after the nest's occupants abandoned a nest in a nearby 230 kV transmission tower (high winds blew nesting material from the tower). Fitzner and Newell (1989) theorized that the influx of nesting Ferruginous Hawks was most likely adult birds that had previously nested in nearby areas such as Esquatzel Coulee and the Juniper Dunes in Franklin County and Badger Slope/Horse Heaven Hills in Benton County.

In 1991, 1992, and 1993, eleven active Ferruginous Hawk nests were reported on the entire Hanford Site (eight to ten active nests in the area of our survey) each year (Fitzner et al. 1994; Nugent 1995). The majority of these nests were located on transmission towers. Leary et al. (1998) used radio-telemetry to track male Ferruginous Hawks nesting on the Hanford Site in 1994 and 1995. They found that the male birds occupied large home ranges and spent much of their time long distances from their nests hunting in irrigated agricultural fields adjacent to the Hanford Site. Their findings may suggest that prey were less available in habitats near the nests and more available in the irrigated fields. They also observed female Ferruginous Hawks hunting when their young were only two weeks old, also suggesting lack of food sources. Leary et al. (1996) also documented gulls (*Larus spp.*) in the diet of Ferruginous Hawks at three nests on the Hanford Site in 1994 and 1995, a third indication that food may have been scarce.

A steady decrease in the number of nesting Ferruginous Hawks on the Hanford Site has occurred since the 1990s. Clayton (2005) reported four nesting pairs on transmission towers in 2005 and Washington Department of Fish and Wildlife (Per. Comm. M. Livingston, WDFW, April 11, 2012) documented only two nesting pairs on transmission towers in 2010.

Ferruginous Hawks are especially sensitive to human disturbance and incursion into their nesting areas. On the Hanford Site, nesting ferruginous Hawks are protected using WDFW guidelines (WDFW 2004). Buffer zones of 1000 meters are established around active nests. Road closure signs were placed in the roads where they intersect with the 1000 meter buffers for the first time during 2012. Nest areas are protected from all human disturbance within 250 m between March 1 and May 31 and 1000 m for prolonged (>0.5 hours) activities during the entire nesting and fledging season (March 1 to August 15). The data collected during this survey allows for the identification and protection of nesting Ferruginous Hawks.

Twenty Swainson's Hawk nests were detected in 2012 which was more than in most previous surveys. The majority of nests were found in small trees associated abandoned homesteads, townsites, and previous army encampment sites. Olendorff (1973) found ten Swainson's Hawk nests on the Hanford Site in 1973, all of which were located in "man-created situations." He suggested that Swainson's Hawks must have been excluded from the Hanford Site prior to the settlement of Europeans in the area in the late 1800s. Fitzner et al. (1981) agreed with this assessment. They found 15 to 18 nesting pairs of Swainson's Hawks on the entire Hanford Site each year between 1975 and 1978 (14 to 16 nesting pair in the area of our study). During intensive surveys in 1987, Poole et al. (1988) located 36 occupied Swainson's Hawk nest territories on the entire Hanford Site (23 occupied nest territories in the area of our survey). Nugent (1995) found 22 and 25 Swainson's Hawk nests on the entire Hanford Site in 1991 and 1992 respectively (14 Swainson's Hawk nests each year in the area of our study). Clayton (2005) located nine Swainson's Hawk nests in the area of our study in 2005.

Eleven Red-tailed Hawks nests were found in 2012 which is a typical number based on previous surveys. In 1973, Olendorff (1973) located twelve red-tailed hawk nests on the Hanford Site (nine in the area of our study). From 1975 to 1977, Fitzner et al. (1981) reported a dramatic increase in nesting Red-tailed Hawks on the Hanford Site from nine to 25 nests (seven to 19 in the area of our study). Nugent (1995) observed 20 red-tailed hawk nests in 1991 and 25 in 1992 on the entire Hanford Site (13 nests in our study area each year). Clayton (2005) found 14 Red-tailed Hawks nests in the area of our study in 2005.

Five Prairie Falcon nests were found along the basalt cliffs of Gable Butte and Umtanum Ridge in 2012. The number and location of Prairie Falcon nests on the Hanford Site has remained relatively constant over the years. Olendroff (1973) observed seven Prairie Falcon nests along this stretch of cliffs from Gable Butte to the Yakima-Benton County Line in 1973 while Fitzner (1981) found no more than four pairs nesting in any one year (1975 through 1978) on the entire Hanford Site. In 1973, Olendroff (1973) observed an eyrie in a cavity on the basalt cliffs of Umtanum Ridge which was also occupied in the early 1960s. He speculated that this cavity was used "for decades, if not centuries." In 2012, Prairie Falcons were observed using a nest site on Gable Butte that Olendroff also described being used in 1973. Olendroff described the nest site as "there is an old road (actually a trail) into the little valley, but it has not been used for years; hopefully it will remain unused, since the eyrie is secluded, picturesque and 'one of a kind' in the Gable Butte-Gable Mountain region." The site remains today as he described it.

Only one American Kestrel nest was found in 2012. The nest was located on a basalt cliff on Umtanum Ridge and was noticed by chance when the pair of kestrels occupying the nest was observed defending it from a raven. Kestrels are secondary cavity nesters and many nests were probably undetected during our surveys.

Ospreys were observed nesting on the Hanford Site for the first time in 2000 (Poston et al. 2001). Three Osprey nests were found in 2012: one in the 300 Area, one in the Hanford Townsite, and one near the

White Bluffs boat launch. In the 300 Area, a pair of ospreys began building a nest on a wooden utility pole. Before the ospreys laid eggs, workers installed a new nest platform near the nest and moved nesting material from the utility pole to the nest platform. The nesting Osprey pair accepted the new platform and continued nesting. The other two Osprey nests located in 2012 were found on nest platforms built for their use.

No Bald Eagle nests were observed in 2012. Two adult birds were seen at the historical nest location on White Bluffs Peninsula on May 29, 2012 but did not appear to be tending a nest.

Two Great Horned Owl nest locations were found in 2012. Both sites were in trees adjacent to the Columbia River, one near the 100-H Area and the other in the Hanford Townsite. Fitzner (1981) described Great Horned Owls as "not abundant on the Hanford Site, due to the scarcity of heavily wooded habitats and cliffs." He found five nesting pairs of Great Horned Owls on the entire Hanford Site in 1976 and that number declined to three nesting pairs in 1978.

No Short-eared Owl or Long-earedOwl nests were located in 2012. Unidentified owls were seen at two locations during the nest surveys. A young owl was observed in a grove of trees about 2.5 km upstream of Vernita Bridge and 0.25 km south of Yeager Slough on the Columbia River. Another owl was seen in a grove of trees north of the 100-D Area and adjacent to the Columbia River. In both instances, no nest was found.

No Burrowing Owl nests were detected in 2012 using the above survey methods. However, nest burrows were found on the Hanford Site in 2012 under a different monitoring effort (Wilde et al. 2012). Known nest burrows from previous years were revisited to determine if they were active. A total of 39 active Burrowing Owl nest burrows were observed on DOE managed lands of the Hanford Site in 2012 including 23 natural burrows and 16 artificial burrows. Included in the 23 active natural nest burrows were seven new nest burrows located during other unrelated ecological surveys.

Nesting ravens appear to have increased significantly on the Hanford Site in recent years. Sixty-three raven nests were found in 2012 compared to 45 nests located by Clayton (2005) in 2005. Only three of the 63 nests found in 2012 were on naturally occurring substrates (cliffs associated Gable Butte and Umtanum Ridge). The majority of raven nests (40 of 63 nests) were found on transmission towers or utility poles.

Nesting raptors and ravens have clearly benefited from the introduction of anthropogenic nest structures (e.g., transmission towers, utility poles, planted trees) on the Hanford Site. Although some nesting pairs may have used other available nesting substrates, in the absence of current anthropogenic sources, it is certain that the total number of raptors would be significantly less without these artificial nesting locations. It is unclear what impacts artificially high nesting populations of raptors and ravens have on prey species such as ground squirrels, jackrabbits, and sage grouse (*Centrocercus urophasianus*), but the prevalence of raptors on the Hanford Site and the low levels or complete lack of these prey species is compelling. Determining the impact to these prey species may be an area of future research. The above described protocol is currently planned to continue on an annual basis to document the distribution and abundance of nesting raptors on the DOE managed portions of the Hanford Site.

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