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HNF-59949

Revision 0

Hanford Site American Badger Monitoring Report for 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

P.O. Box 650
Richland, Washington 99352

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The cover photo was taken with a motion-activated trail camera.

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J. Grzyb
Mission Support Alliance

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1.0 Introduction

The U.S. Department of Energy (DOE) Richland Operations Office (-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 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,USDOE 1999), 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, USDOE 2013) is identified by the CLUP as the primary implementation control 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 those plant and animal species or habitats with specific regulatory protections or requirements; or that are rare and/or declining (federally or state listed endangered, threatened, or sensitive species); or of significant interest to federal, state, or tribal governments or the public. The BRMP ranks wildlife species and habitats (Levels 0–5), providing a graded approach to monitoring biological resources based on the level of concern for each resource. The American badger (*Taxidea taxus*) is ranked at Level 2, which is a potential species of concern according to the BRMP, and is to be monitored every three years.

The Washington Department of Fish and Wildlife (WDFW) lists the American badger as a state monitored species, meaning that it requires management, survey, or data emphasis. No previous monitoring efforts have been completed for badgers on the Hanford Site; therefore, no concrete evidence exist regarding their relative abundance or habitat distribution. The result of this long-term project will be a distribution map for badgers on the Hanford Site. The map will be useful for determining the badger's selected habitat characteristics and the level of connectivity between active badger-occupied areas. If unconnected populations are determined to be present, these will be considered opportunities to restore connectivity for badgers and other sagebrush obligate species.

1.1 American Badger Biology

When not raising young, badgers spend the majority of their lives as a solitary animal, preying on a variety of fossorial species. Their diet consists mainly of rodents such as ground squirrels, pocket gophers, prairie dogs, voles, deer mice, and woodrats, but when the opportunity arises, they will eat nesting birds, fish, carrion, lizards and insects (USFWS 2016).

The size of a badger's home range varies from ~1–10 km^2, correlating to prey density, female availability, and habitat features (USFWS 2016). Badgers require habitats consisting of deep soils, optimally silty or sandy loams, within which they can dig their burrows and preferably to include areas with some vegetative cover. Badgers will dig numerous burrows within their home range that vary in size and purpose: smaller dens may be built for capturing prey or serving as a toilet, while dens used for raising young tend to be larger and more elaborate.

Badgers mate in later summer or early autumn, but embryos are arrested in early development until environmental conditions are appropriate for implantation, usually between late December and early February. The female's pregnancy will last for approximately 7 months, but development occurs only in the 6 weeks following implantation. In early spring, liters of 1 to 5 young are born and cared for by their mother for 2–3 months. Juveniles will leave their natal den when they are 5–6 months old (USFWS 2016).

2.0 Methods and Results

2.1 Camera Trap Method

The entire central Hanford Site was divided into hexagonal transects 6 km^2 in size. Transect size was based on the approximate size of a female badger home range in Eastern Washington. Thus, a badger observed in one transect is not assumed to be present, and therefore not detectible, in any adjacent hexagon. Trail cameras were used to document the presence of badgers definitively within each hexagonal area. A total of 134 hexagons were designated for this project, and their transect layout over the Hanford Site is illustrated in Figure 1.

Two cameras were used at the start of this program in March 2015 but increased to five cameras in September 2015. The cameras were placed on a tripod at approximately 50 centimeters high with a slight downward tilt. Purchased from a trapping store, badger lure was originally drizzled into a makeshift stand but was later used only on vegetation in the immediate camera location. Cameras were placed within a 100 m radial distance from the hexagons center point. If suitable habitat was not found within this circumference, they were placed within a 1,000-m radial distance from the center point at the biologist's discretion. GPS points were taken at the actual location of the camera setup, and data were recorded on a pre-made field sheet that included hexagon number, distance from centroid, distance from trail, camera

direction (favoring north to keep the sun at the camera's back), start time, and vegetation type surrounding the camera. Cameras were deployed within the hexagon for a minimum of 1 week, at which point they were recovered and redeployed at another location.

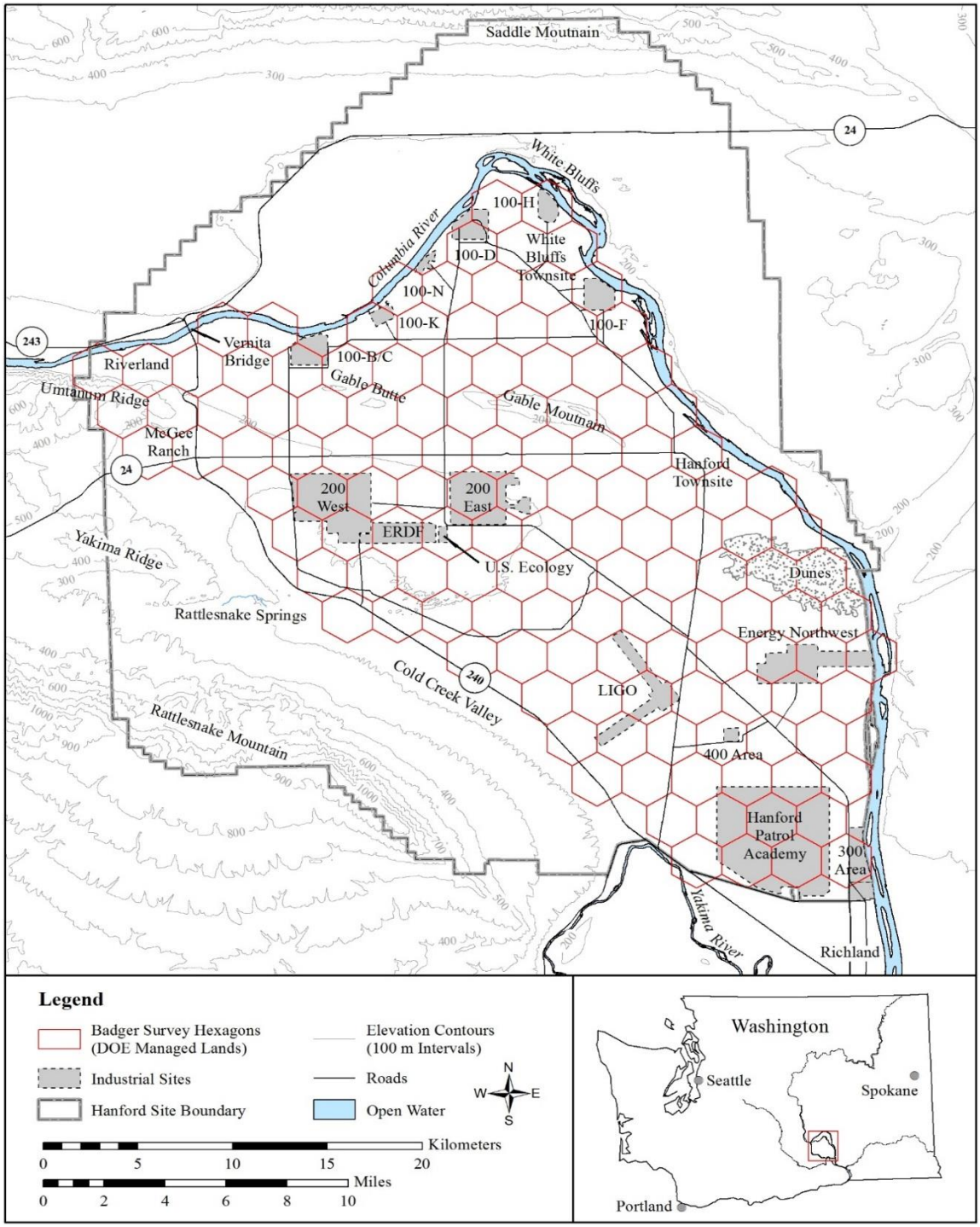

Figure 1. Hexagonal Transect Layout on the Hanford Site

2.2 Camera Trap Results

A total of 44 hexagons were monitored with trail cameras between April 2 and November 11, 2015. Cameras operated around the clock, and their night vision capabilities readily captured activity in pitch dark, as illustrated in Figure 2. Figure 3 illustrates the locations of the camera deployments. As of November 11, 2015, cameras have been deployed for 587 nights, with a total number of three confirmed American badger sightings. On February 19, 2015, a badger entering what appeared to be an active burrow triggered the camera. The surrounding habitat consisted of patchy sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), and cheatgrass (*Bromus tectorum*). A second badger triggered a camera on April 7, 2015. The habitat surrounding this location consisted of thick big sagebrush. A third trigger on September 9, 2015 captured a badger exiting a burrow, which was also located in an area of thick sagebrush. The two hexagons where the second and third badgers were captured on the trail cameras are adjacent to each other, potentially indicating that it was the same badger.

Figure 2. A Badger Captured in Pitch Darkness with a Trail Camera

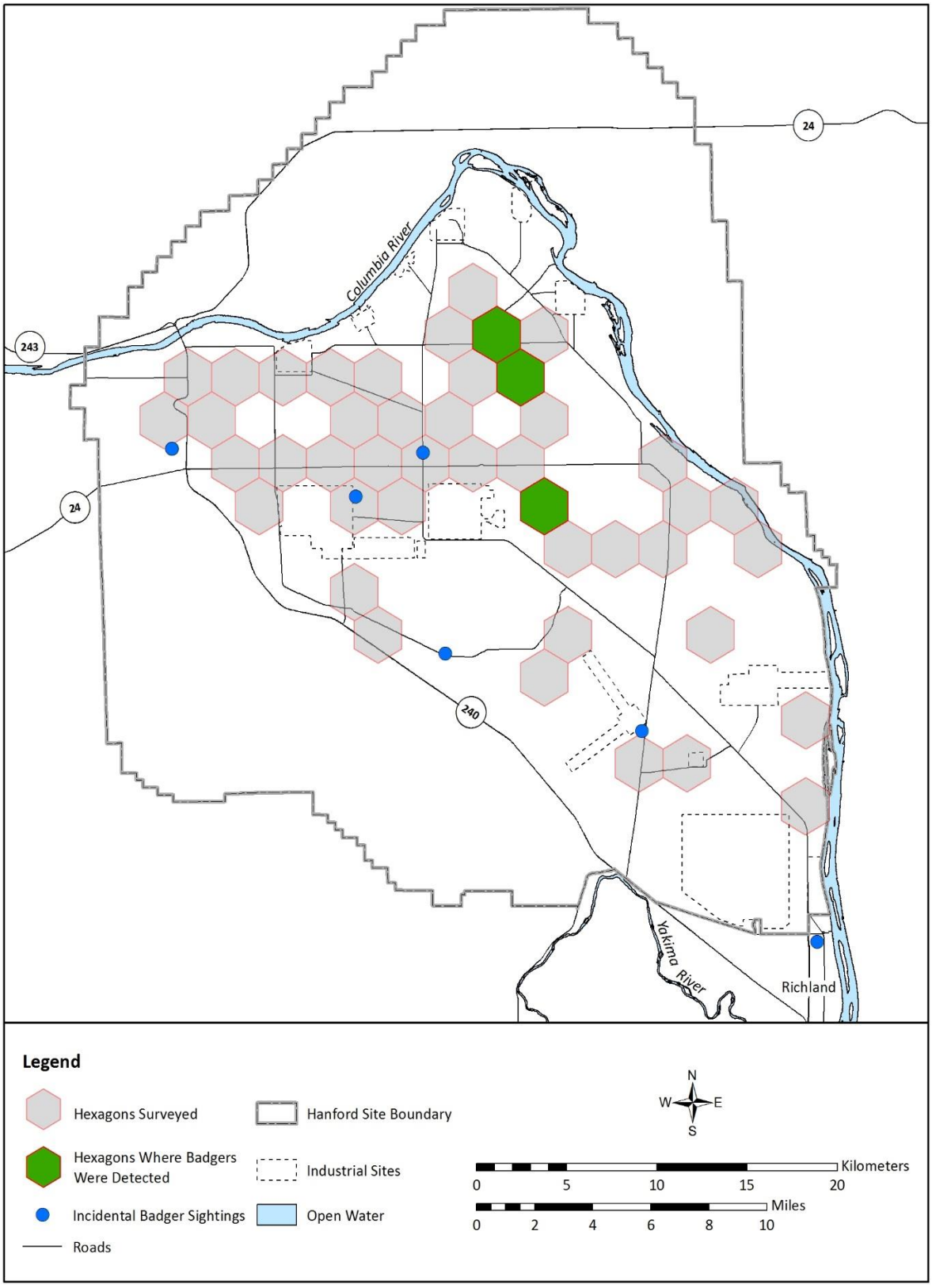

Figure 3. Map of Completed Hexagons and Incidental Sighting Locations

2.3 Incidental Observations

Starting on April 21, 2013, all incidental observations and their respective locations were recorded (Figure 3). On this date, the first incidental of a single adult carrying a mouse was caught on a trail camera that was deployed during black-tailed jackrabbit (*Lepus californicus*) monitoring. The following day, the same camera captured an adult and juvenile walking by. A lone adult incidental occurred along Army Loop Road while staff members were maintaining artificial burrowing owl (*Athene cunicularia*) burrows on February 19, 2015. Again, a jackrabbit camera captured an adult badger on April 3, 2015. On April 24, a staff member at the meteorological station on site notified PSRP staff of an adult badger walking by the tower and loading dock area. The fifth and most exciting incidental thus far occurred on May 21, 2015. While conducting sagebrush songbird surveys, PSRP staff members encountered two adult and five juvenile badgers near the intersection of Routes 4 North and 11 A. This sighting provided the opportunity to take dozens of close-up photos. The most recent incidental observation occurred on August 24, 2015, when a Pacific Northwest National Laboratory employee photographed a badger in the facilities parking lot. Currently, 13 of the 14 incidental observations have occurred in late winter and early spring. While they do not hibernate, badgers are much less active during the winter months, spending most of the time underground conserving energy. It is possible that these observations indicate the time of year when reliant food sources become available for badgers on the Hanford Site after the cold winter months.

Figure 4. Juvenile American Badgers Observed While Conducting Sagebrush Song Bird Surveys

2.4 Documentation of Badger Digs

To maximize data acquisition, staff members often record observations of badger activity while conducting field surveys. During 2015, surveyors performing reptile monitoring recorded badger activity. Sixteen 8 km linear transects were surveyed in 2015, for a total of 128 km. The number of badger diggings (both burrows and holes) were totaled for each 500 m segment of each transect. Figure 5 illustrates a typical badger burrow on the Hanford Site. The results of the badger activity documented during these surveys are shown in the map below (Figure 6). The greatest number of diggings (16–24 per 500 m segment) were documented in three separate transects. The second highest number of observed diggings (11–15 per 500 m segment) were also recorded in these transects. This data provides suggestive evidence of the locations and habitat types that provide the highest levels of badger activity on the Hanford Site.

Figure 5. A Typical American Badger Burrow on the Hanford Site

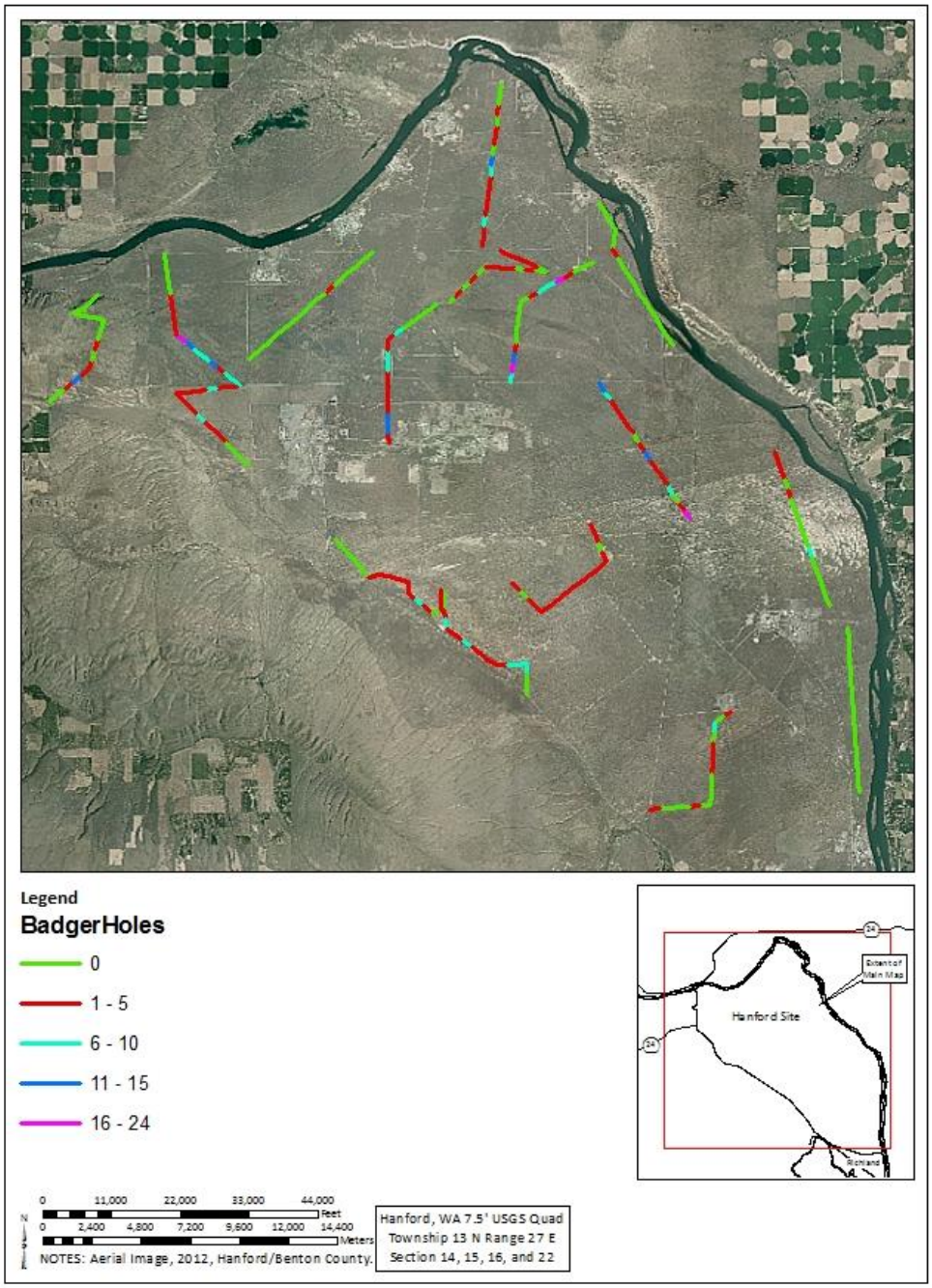

Figure 6. Distribution Map of Badger Holes Collected during 5-Mile Long Reptile Surveys

3.0 Discussion

The status of the American badger population on the Hanford Site was largely unknown at the onset of this project. Until these surveys commenced, badger data consisted of occasional isolated sightings. The data presented in this report have begun to show the distribution of badger activity across the DOE-RL managed portion of the Hanford Site. A map of all recorded badger data to date is shown in figure 7.

Not enough data exists to make definitive conclusions about badger distribution and abundance on site, but enough information to state several observations. First, a breeding population of American badger is present on the Hanford Site, as documented by both incidental sightings and trail camera evidence. It is not uncommon for badgers to dig a daily burrow in the summer, which over time amounts to thousands of holes in just a few years in a small population. The local arid environment often causes ground disturbance to endure, allowing badger diggings to last for decades. By contrast, the areas in which zero or little digging sign was observed strongly suggest a void in preferred habitat on the Hanford Site. Figure 7 indicates an increase of badger sign and observations in the upper 2/3 of the DOE managed area of the site. There is also a trend of decreasing sign closer to the river. Between these findings, it can be speculated where food sources exist, with ground squirrels being a major and preferred source of food for badgers. These hotspots on the distribution map may provide key areas for researchers to locate colonies of Townsend's ground squirrel (*Urocitellus townsendii*), considered a State Candidate Species by the WDFW (WDFW 2012) and ranked a Level 3 resource in the BRMP. The management goal for Level 3 resources is conservation and requires a moderate level of status monitoring.

Although the camera method of this project provided limited material, the data at hand is still beneficial, providing solid evidence of resident badgers on the Hanford Site.. The recordkeeping of incidental observations and noting signs of activity while working on separate field projects should provide sufficient data to complete a distribution map for badgers. Cameras are still encouraged to be deployed when obvious active badger burrows are discovered.

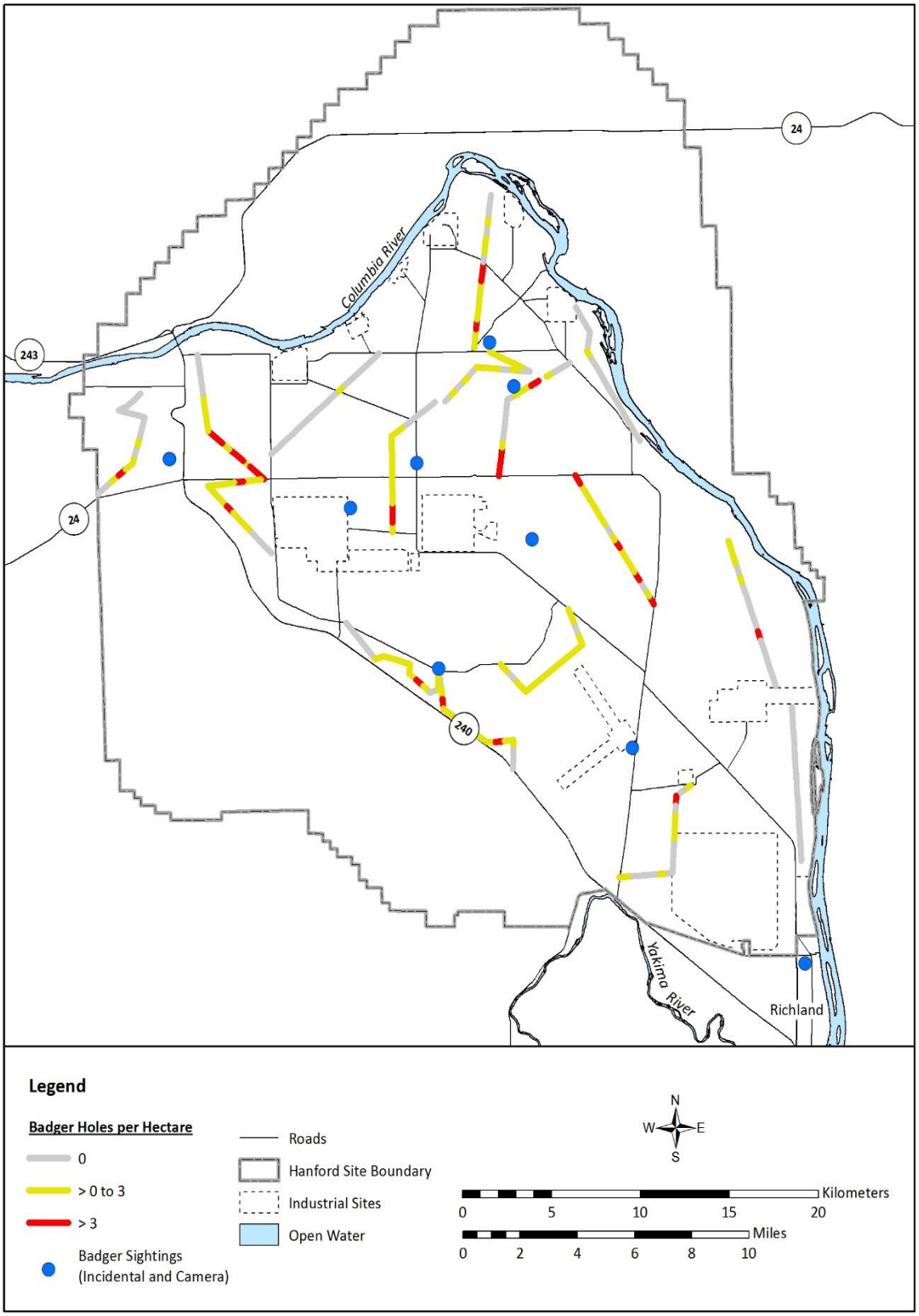

Figure 7. Distribution Map Containing All Badger Data

Other than occasionally tipping over due to high winds or curious animals, trail cameras functioned well using the deployment techniques described, despite the limited badger triggers. If the species of interest was in view of the camera's sensors, there is a high confidence level that an image would have been captured. Camera settings were adjusted seasonally to minimize false triggering. In the summer, high winds combined with tall cheatgrass and uneven heating often triggered the camera several thousand times during a single deployment. Other than sorting through the large number of pictures, this process did not affect the usability of the data unless the camera cards were completely filled. Sensitivity settings on cameras were reduced slightly during these times to minimize the number of false triggers. The use of badger lure did not appear to provide any benefit: the second badger captured on camera during this project did not show any acknowledgment to the scent, while the third never returned to the burrow after clearly investigating the scent.

The FY2015 monitoring effort documented the presence of the American badger on the Hanford Site and is helping to establish a population distribution map for this Washington State monitored species, while also documenting the primary habitats used by badgers on the Hanford Site. At this point, the majority of suitable habitat has been surveyed using the trail camera method. There are a few small outlier patches that may possibly contain badger populations as well as a handful of suitable habitat survey locations that may have provided false negatives. The non-surveyed outliers and false-negative locations may be surveyed or re-surveyed in the future if active sign, such as fresh burrows, are observed. Such monitoring will eventually provide the appropriate data for a complete distribution map for American badger on the DOE-RL managed portion of the Hanford Site.

Collectively, the information contained in this monitoring report will be useful during site development planning to minimize potential project-related impacts to badgers as well as other sagebrush obligate species. The data will also be very useful in identifying high-value areas for shrub-steppe connectivity restoration. Habitat surveys in areas occupied and unoccupied by badgers greatly contribute to the understanding of badger habitat requirements.

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