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Revision 0

Hanford Site Snake Hibernacula Monitoring Report for Calendar Year 2013

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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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 provides baseline information about the plants, animals, and habitat under DOE stewardship at Hanford required for decision-making under the *National Environmental Policy Act* (NEPA) and *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA). In addition, ecological monitoring helps ensure that DOE, its contractors and other entities conducting activities on the Hanford Site are in compliance with the *Hanford Site Comprehensive Land Use Plan* (DOE/EIS-0222-F). 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 (federal or state listed endangered, threatened, or sensitive species); or of significant interest to federal, state, or tribal governments or the public.

For the general public, snakes are one of the least understood and most feared groups of animals, often resulting in the intentional killing of individuals and destruction of habitat. However, snakes fill an important role in the ecosystems they occupy, eating a variety of prey, and providing a source of food for many other predators. The identification of snake hibernacula locations and other related data are used to generate the maps and information in the *Hanford Site Biological Resources Management Plan* (DOE/RL-96-32, Rev. 1), which is the guide for the conservation of natural resources on the Hanford Site. The DOE-RL can then use this information to consider and protect these valuable resources while developing projects supporting the Hanford Site mission. These data also provide an inventory by which their populations and distribution can be tracked to monitor for changes over time.

Snakes in temperate climates must seek shelter from freezing temperatures to survive the winter, and will congregate at specific sites known as hibernacula. A single hibernaculum may contain hundreds of snakes, often of several different species. Snakes show strong site fidelity to these specific locations year after year. Finding and protecting snake hibernacula is critical to maintaining Hanford Site populations of both common and sensitive species. The striped whipsnake (*Masticophis taeniatus*), the night snake (*Hypsiglena torquata*), and racers (*Coluber constrictor*) are three species of snakes documented on the Hanford Site that are considered rare by the Washington Department of Fish and Wildlife (WDFW). The WDFW considers the striped whipsnake a State Candidate species and could potentially be listed as Threatened or Endangered if habitat degradation continues. The striped whipsnake is known to den with other species including western rattlesnakes (*Crotalus viridis*), racers, and gopher snakes (*Pituophis melanoleucus*) (Larsen 1997). The Department of Natural Resources considers hibernacula destruction a key threat to this species (Hallock 2005). The night snake and racers are on the WDFW State Monitor list. These three rare species could be sharing hibernacula with other snakes that are known to be present on the Hanford Site, including gopher snakes, common garter snakes (*Thamnophis sirtalis*), western terrestrial garter snakes (*Thamnophis elegans*), and western rattlesnakes.

On the Hanford Site, snakes typically seek out hibernacula in mid-October, and remain there until April. During early to mid-April, western rattlesnakes will typically spend 2-3 weeks moving into and out of the hibernacula locations prior to dispersing to feeding ranges. Some species may remain nearby the hibernaculum longer for breeding and egg laying (Larsen 1997). Hibernacula locations used by western rattlesnakes are readily identifiable during the emergence period, due to the presence of snakes at the openings (Figure 1). A thorough investigation into the locations of snake hibernacula across the Hanford Site was initiated by Mission Support Alliance in 2012 and continued in 2013. Prior to 2012, only three hibernacula were known on the Hanford Site. As a result of the 2012 survey, six additional hibernacula were located, bringing the total number of known snake hibernacula on the Hanford Site to nine (Table 1). The locations of all of the hibernacula identified in 2012 are shown in Figure 2. Additional information detailing the 2012 survey is available in the "*Snake Hibernacula Monitoring Report for Calendar Year 2012*" (HNF-53026). Four artificial hibernacula at three different sites were constructed on the Hanford Site during the River Corridor site remediation. To date, no snake use of these artificial hibernacula has been documented (WCH-554) (Figure 2).

Figure 1. Western Rattlesnake at Den Entrance During Initiation of Snake Emergence

Table 1. Known Hibernacula on the Hanford Site Prior to the 2013 Surveys

Type	Name	General Location	Snakes Observed
Known Active	North of Asphalt Tanks	West of Hanford Townsite	N/A
Known Active	Rolling Rock	100-B/C	N/A
Known Active	Utility Pole Base	Vernita Cliffs	N/A
2012 Survey	Den 1	Vernita Cliffs	2
2012 Survey	Den 2	Gable Butte	5
2012 Survey	Den 3	Pit 28	2
2012 Survey	Den 4	Gable Mountain	2
2012 Survey	Den 5	Gable Mountain	4
2012 Survey	MB43A Power Pole	Vernita Cliffs	5

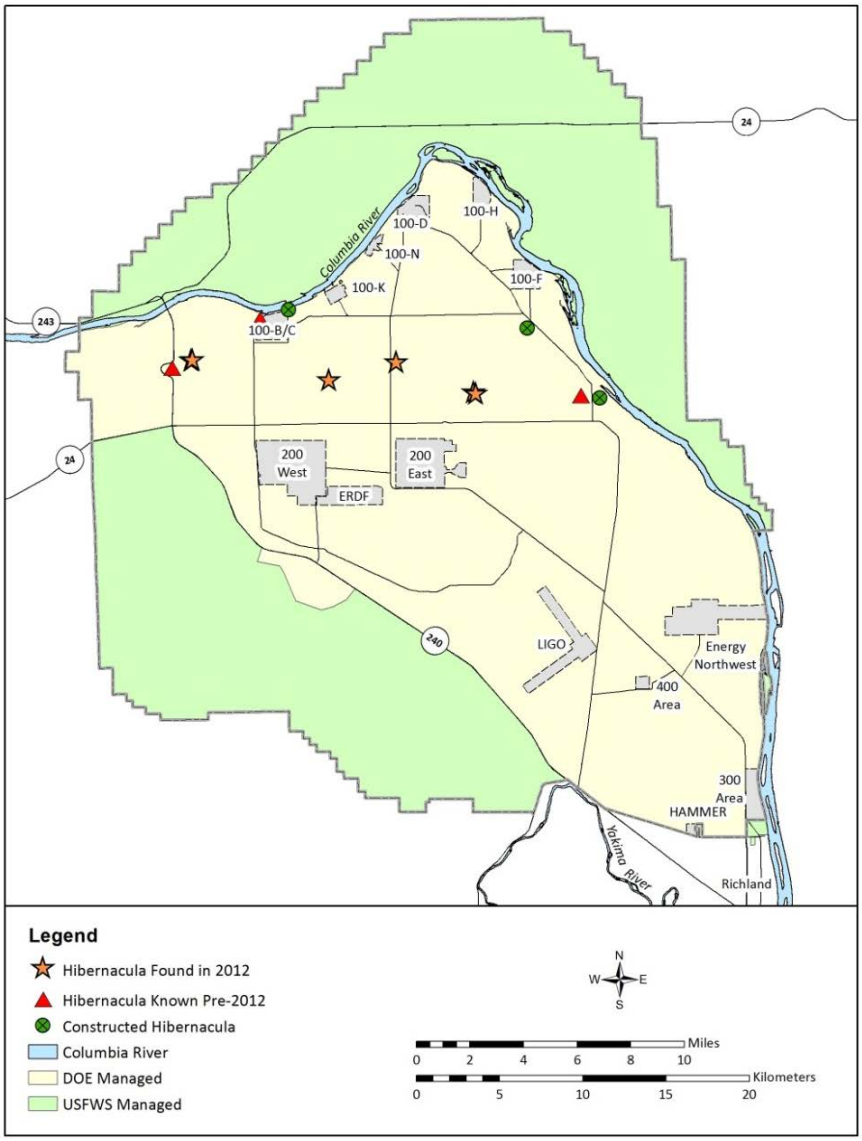

Figure 2. Known Hibernacula on the central Hanford Site Prior to the 2013 Surveys

2.0 Methods

"Potential hibernacula" areas can be located at any time of year and then surveyed during snake emergence to determine if the site is functioning as a hibernaculum. The major characteristic of a potentially suitable hibernaculum include available void spaces that are of sufficient depth underground to avoid freezing. Other conditions within the void spaces such as humidity and airflow may also play a role in site selection. Hibernacula can include burrows, rock piles, rock crevices, or manmade structures.

Project staff determined the initiation of emergence by regularly visiting the known snake hibernacula on the Hanford Site. Once snakes were detectible at the entrances to these locations, it was determined that conditions were suitable to locate snakes in other areas. Personnel walked through areas identified as "potential hibernacula" and listened for the rattle of a western rattlesnake. Once located, photographs and GPS positions were taken to document each location (Figure 3). Personnel continued to monitor the known hibernacula to determine the timing of snake dispersal, which ends the surveys for new hibernacula.

3.0 Results

Project staff identified 15 locations as *potential hibernacula* prior to the 2013 survey, including some large expanses of talus slopes, as well as man-made features such as piles of rip-rap basalt (Figure 4). During the 2013 survey season, teams of two personnel conducted five surveys documenting the status of known and potential hibernacula locations identified in the 2012 survey. These locations were documented as active/inactive based on the presence of the hibernacula characteristics described above. At each location, personnel took photos and GPS positions regardless of the presence of snakes for future surveying and data collection.

Due to the limited timeframe when snakes are present at hibernacula openings before dispersal to their home range, there is only a short period of time to document if the potential hibernaculum is an active den or not. On March 18, 2013, personnel surveyed the Rolling Rock hibernaculum near 100-B/C Area; however, no snake activity was observed, likely due to low ambient temperatures. On March 28, 2013, surveyors documented the presence of snakes at the North of Asphalt Tanks hibernaculum near the Hanford townsite, but the snakes had not left the den and were only heard rattling inside. Based on this observation, conditions were suitable for surveying potential hibernacula for snake emergence. Surveyors returned to the North of Asphalt Tanks hibernaculum on April 1, 2013, and documented the initiation of snake emergence. During the next three survey days, personnel continued monitoring potential snake hibernacula and documented the presence or absence of snake activity. Table 2 details the new dens found during the 2013 survey. Finally, on April 23, 2013, personnel incidentally discovered a snake den while retrieving a trail camera used for jackrabbit monitoring.

On April 30, 2013, project personnel returned to the MB1-17-3 den and the East Gable Roadside dens and detected no snake activity, indicating that dispersal had occurred, ending the hibernacula surveys for 2013. During the 2013 survey, project personnel discovered 14 new dens (Figure 5) bringing the total number of known, active dens to 23 on the Hanford Site.

Figure 3. Entrance to "Gable 1" Hibernacula Identified During 2013

Table 2. New Snake Hibernacula Located During the 2013 Survey on the Hanford Site

Date	Name	General Location	Description	Snakes Observed
April 1, 2013	East Gable Quarry	Gable Mountain	Rock mound	1 Rattlesnake
April 1, 2013	MB1-17-3A	East of Gable Quarry	Rocks at base of utility pole	1 Rattlesnake
April 1, 2013	East Gable Roadside	Gable Mountain	Rock pile on east side of road	1 Rattlesnake
April 1, 2013	White Bluffs Sinkhole	White Bluffs	Small hole opening to an underground void	> 1 Rattlesnake
April 1, 2013	Vernita Ferry Crossing	Vernita Bridge	Underground void	1 Rattlesnake
April 2, 2013	West of Rolling Rock 1	100-B/C	Boulder pile covered in soil	2 Rattlesnakes, 1 Green Racer
April 2, 2013	West of Rolling Rock 2	100-B/C	Boulder pile covered in soil	2 Rattlesnakes
April 2, 2013	West of Rolling Rock 3	100-B/C	Boulder pile covered in soil	≥ 2 Rattlesnakes
April 2, 2013	Vernita Cliff 1	Vernita Cliffs	Talus slope	1 Rattlesnake
April 2, 2013	Vernita Cliff 2	Vernita Cliffs	Talus slope	2 Rattlesnakes
April 2, 2013	Vernita Cliff 3	East of Quarry (Vernita Cliffs)	600m east of quarry	1 Rattlesnake
April 3, 2013	Gable 1	Gable Mountain	Covered void created by quarry activities	≥ 2 Rattlesnakes
April 3, 2013	Gable Talus 1	Gable Mountain	Talus Mound on steep slope	1 Rattlesnake
April 23, 2013*	McGee Ranch Den	McGee Ranch	Large hole with exposed pre-Hanford irrigation pipe showing in bottom	≥ 2 Rattlesnakes
*Incidental discovery during other field work.				

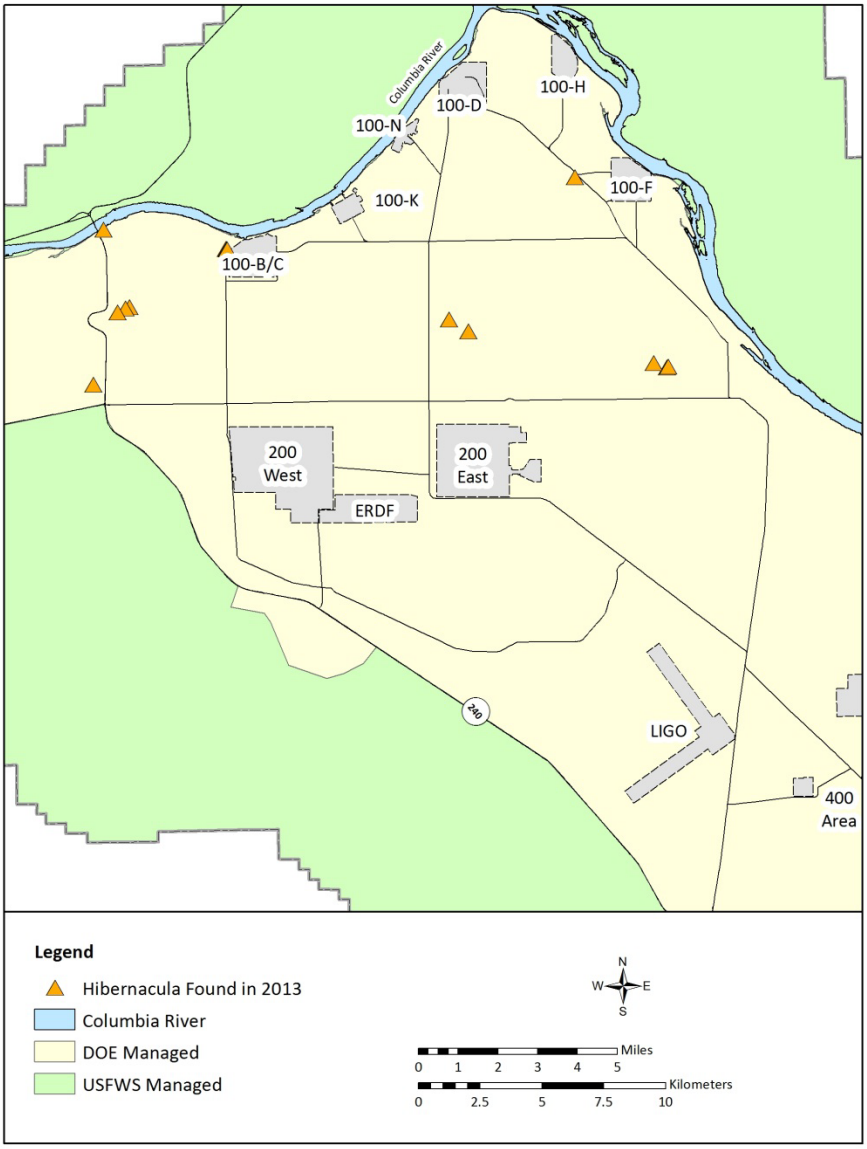

Figure 4. New Hibernacula Identified in 2013

4.0 Discussion

The snakes detected at hibernacula entrances during these surveys likely represent only a portion of the total number of western rattlesnakes using each den. In addition, snakes of other species, potentially including rare species, are likely using these locations but are unlikely to be detected using this survey method because they do not exhibit the same emergence behavior as the western rattlesnakes.

The combined 2012 and 2013 surveys took the total number of known snake hibernacula on the Hanford Site from only three to 23 (Figure 6). This greatly increases the understanding of snake hibernacula use across the Hanford Site, allows these locations to be considered and protected during DOE project planning and Ecological Compliance Reviews, and provides additional opportunities for research into suitable hibernacula characteristics. These data also provide opportunities for

determining the presence of rare species that could be concentrated at these hibernacula locations. Future research efforts could include trapping at known hibernacula, prior to snake dispersal, to capture dispersing snakes and to determine if rare species are present.

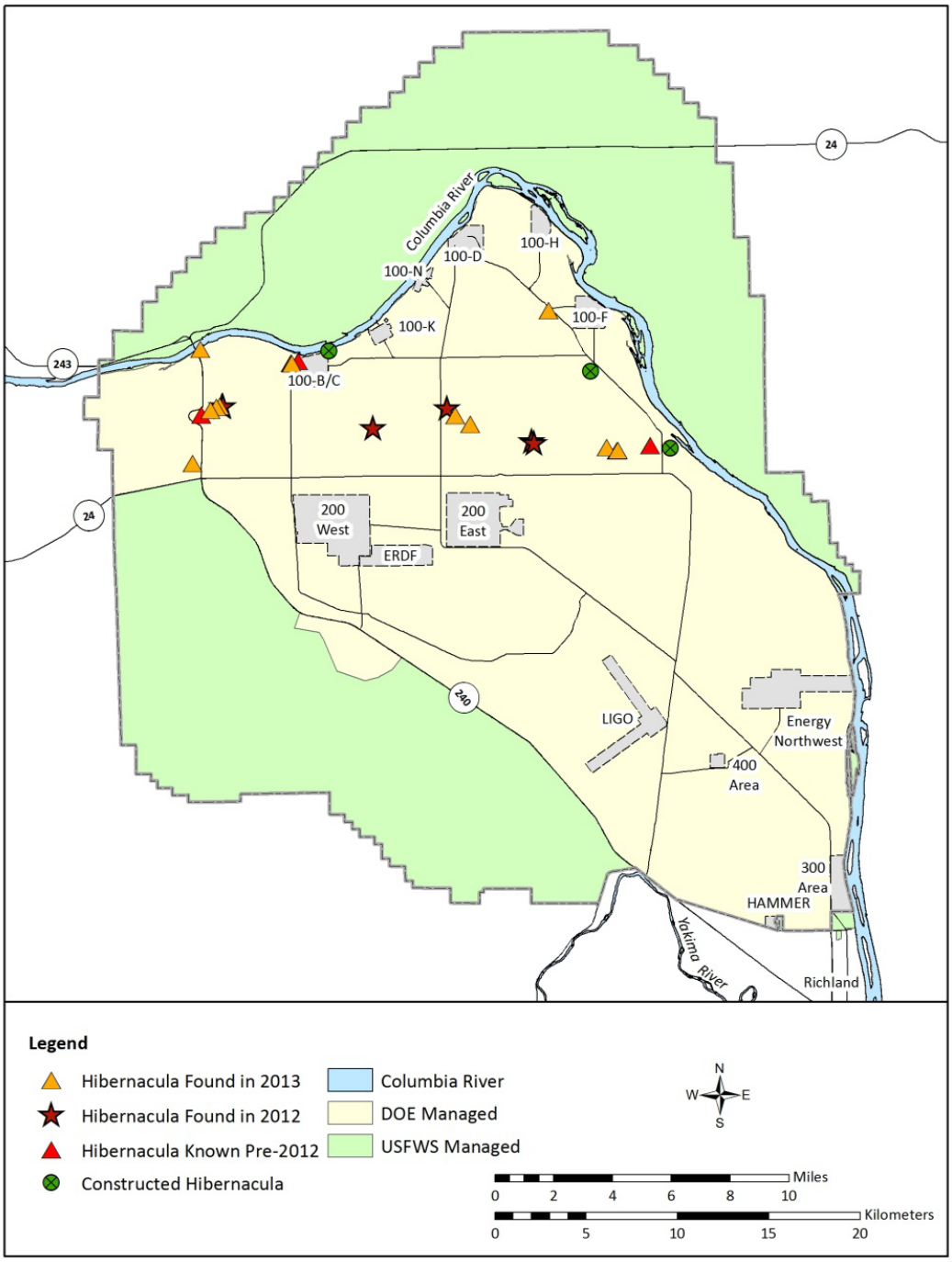

Figure 5. All Known Active Snake Hibernacula on the central Hanford Site 2013

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