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Ground Squirrel 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



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Date Published
July 2012

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Release Approval

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1.0 INTRODUCTION

The Washington Department of Fish and Wildlife (WDFW) lists the Townsend's ground squirrel (*Urocitellus townsendii*) as a "State Candidate" (WDFW 2012). These animals are important to the shrub-steppe ecosystem for many reasons. They serve as a food source for many mammals such as badgers and coyotes and fall prey to predatory birds such as hawks, falcons, and owls. The ground squirrel diet consists of a variety of foods including seeds, which contributes to native plant seed dispersal. The process of digging burrows helps aerate the soil and provides burrows for other species including burrowing owls (Sato 2012). Their decline is due to the loss of suitable habitat and isolation of their communities through fragmentation. Townsend's ground squirrels can be difficult to monitor due to their concealed underground lifestyle and short seasons of activity.

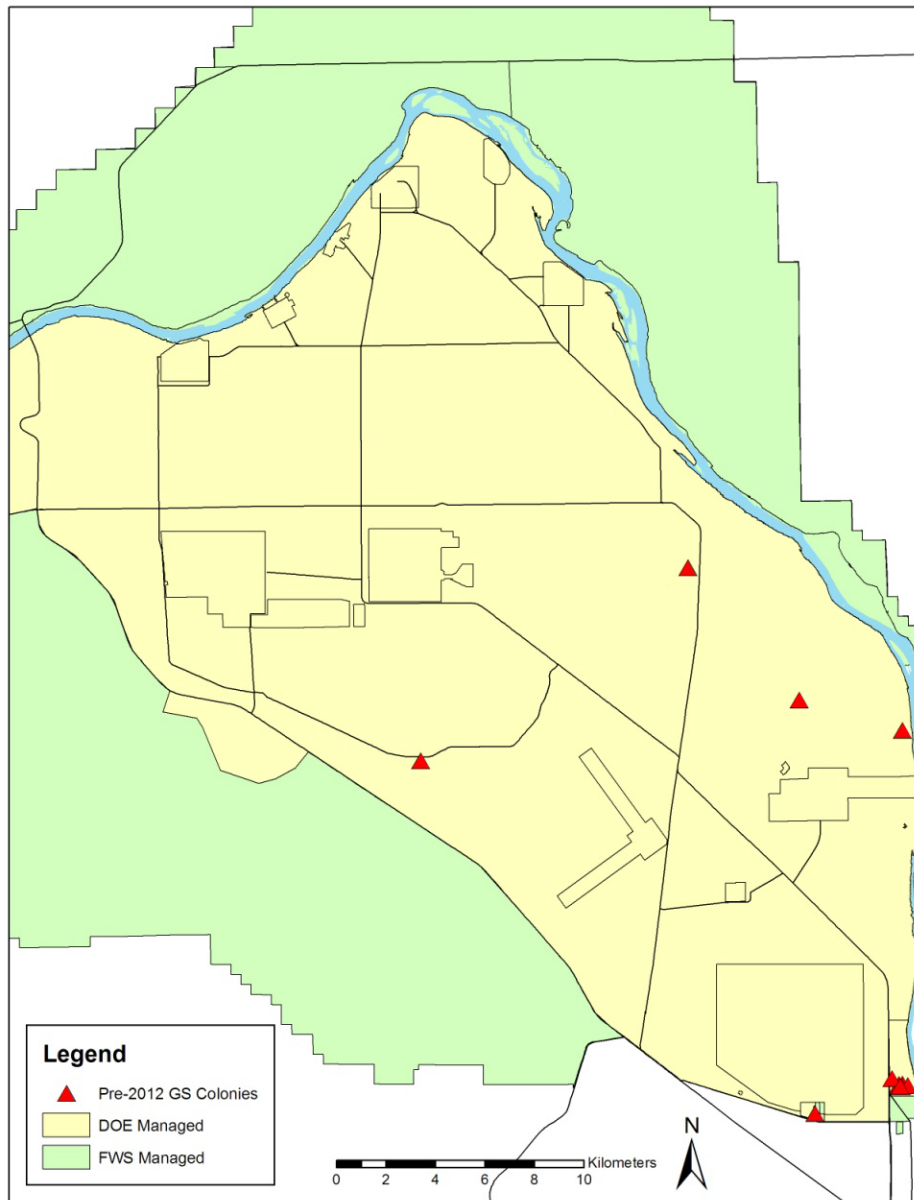
Ground squirrels are underground for much of the year for hibernation and estivation, which makes it crucial to monitor them in the correct time window. The ground squirrels' lifecycle is broken up into several seasonal components. During mid to late January squirrels emerge from their burrows after hibernation. They spend the next month breeding, followed by gestation and rearing of young. The young become active outside the burrow by mid April. They become dormant again starting in late-May to late-June, entering a type of torpor called estivation that is used to avoid the hot and dry portion of the year (WDFW 2012). After estivation, the ground squirrels may spend late September and October foraging in preparation for hibernation.

The crucial window of opportunity to observe and monitor these ground squirrels is between late January, after hibernation, and before late May when estivation begins. The ground squirrels are breeding and rearing young at this time of the year. It is the longest active period and thus the best time for squirrel monitoring. Age determination is easier at this time because juvenile ground squirrels are smaller and protective maternal alarm calls are used, maximizing the likelihood of detection.

Ground squirrels on the Hanford Site are known to consume mostly Sandberg's bluegrass (*Poa secunda*), followed by a variety of forbs including western tansymustard (*Descurainia pinnata*), lupine (*Lupinus spp.*), and long-leaf phlox (*Phlox longifolia*) (Rogers and Gano 1980). Two subspecies of Townsend's ground squirrels are known to occur in Washington, *U. townsendii townsendii* and *U. townsendii nancyae*. The subspecies *nancyae* is expected to occur on the Hanford Site (Sato 2012).

At the onset of the 2012 monitoring season, six Townsend's ground squirrel colonies were known on the Hanford Site (Figure 1); however, the recent status of these colonies was unknown. Monitoring is necessary to collect the baseline data needed to manage and preserve this sensitive species. The goal of this initial investigation was to document the status of previously known colony locations, and to survey for new colonies across the central portion of the Hanford Site. The central Hanford Site, the portion managed by the Department of Energy, encompasses approximately 315 mi² (815.8 km²) and presents a large geographical area to search for these elusive creatures.

Figure 1. Townsend's Ground Squirrel Colonies known on the Hanford Site (Prior to 2012)



2.0 METHODS

To document the status of historical colony locations, surveyors used a Trimble GeoXT Global Positioning System (GPS) to navigate to the centroid point of the colonies. Surveyors then performed circular surveys around the colony locations, at 30 and 60-meter (98 and 197 ft) radii, looking for active burrows. Each colony was determined absent, inactive, or active based on the criteria in Table 1.

Table 1. Classification criteria for ground squirrel colonies

Category	Description
A (Absent)	Area surveyed is absent of potential burrows and no animals are seen or calls heard
I (Inactive Burrows)	Burrows were present but caved in, damage or not currently in active state
P1 (Present Level 1)	Animals or Burrows present and active in the quantity range of 1-5 animals or burrows
P2 (Present Level 2)	Animals or Burrows present and active in the quantity range of 6-20 animals or burrows
P3 (Present Level 3)	Animals or Burrows present and active in the quantity greater than 20 animals or burrows

Active ground squirrel burrows were identified by approximately 7 cm (2.8 in) diameter openings, absence of vegetation, lack of spider webs at the opening, and presence of tracks, and/or signs of herbivory near the opening. If burrows were located away from the centroid, they were flagged and additional searches were performed out to 60 meters (197 ft) from the identified burrows. Using this method, the outermost burrows were identified, and the extent of the colony was captured as a polygon with the GPS. The number of burrows at each active location was estimated.

In addition to documenting the status of previously identified ground squirrel colonies, transect surveys were conducted to identify new colonies across the central portion of the Hanford Site. Transects were designed as squares with 1000 meter (3281 ft) sides and rounded corners (Figure 2). Each transect was placed at least 50 meters (164 ft) from paved roadways for the entire length of each transect. The purpose of this buffer was to maximize surveys in areas not likely to be observed while driving, with the idea that personnel using those roads could potentially document colonies within 50 meters (164 ft) of paved roadways incidentally. This resulted in most transects beginning 50 (164 ft) meters from any paved road. Transects were positioned so that the legs angled 45 degrees from the road. This resulted in diamond shaped transects that maximized the distance between the transect legs, maximized the areas surveyed far from roads, and minimized time surveyors spent walking while not surveying (aka dead-heading). Each “Diamond Transect” was designed to be completed by two surveyors, with each surveyor covering a 30 meter (98 ft) wide swath, for a total of 60 meters (197 ft) wide surveyed along the length of the transects. One surveyor carried the GPS and followed the transect path, while the second surveyor paralleled the first, staying 30 meters (98 ft) away. Transects were located across the Hanford Site and included varying vegetation and soil types, from mature sagebrush stands to open cheatgrass, and from dune sand to silt loam (Figure 3).

Lastly, surveyors conducted focused searches for ground squirrels in areas where other Hanford biologists had potentially observed ground squirrels and where ground squirrel colonies were incidentally encountered during ecological compliance reviews or other surveys. These focused surveys were conducted on foot in the area of interest, with surveyors searching for active burrows and listening for Townsend’s ground squirrel alarm calls.

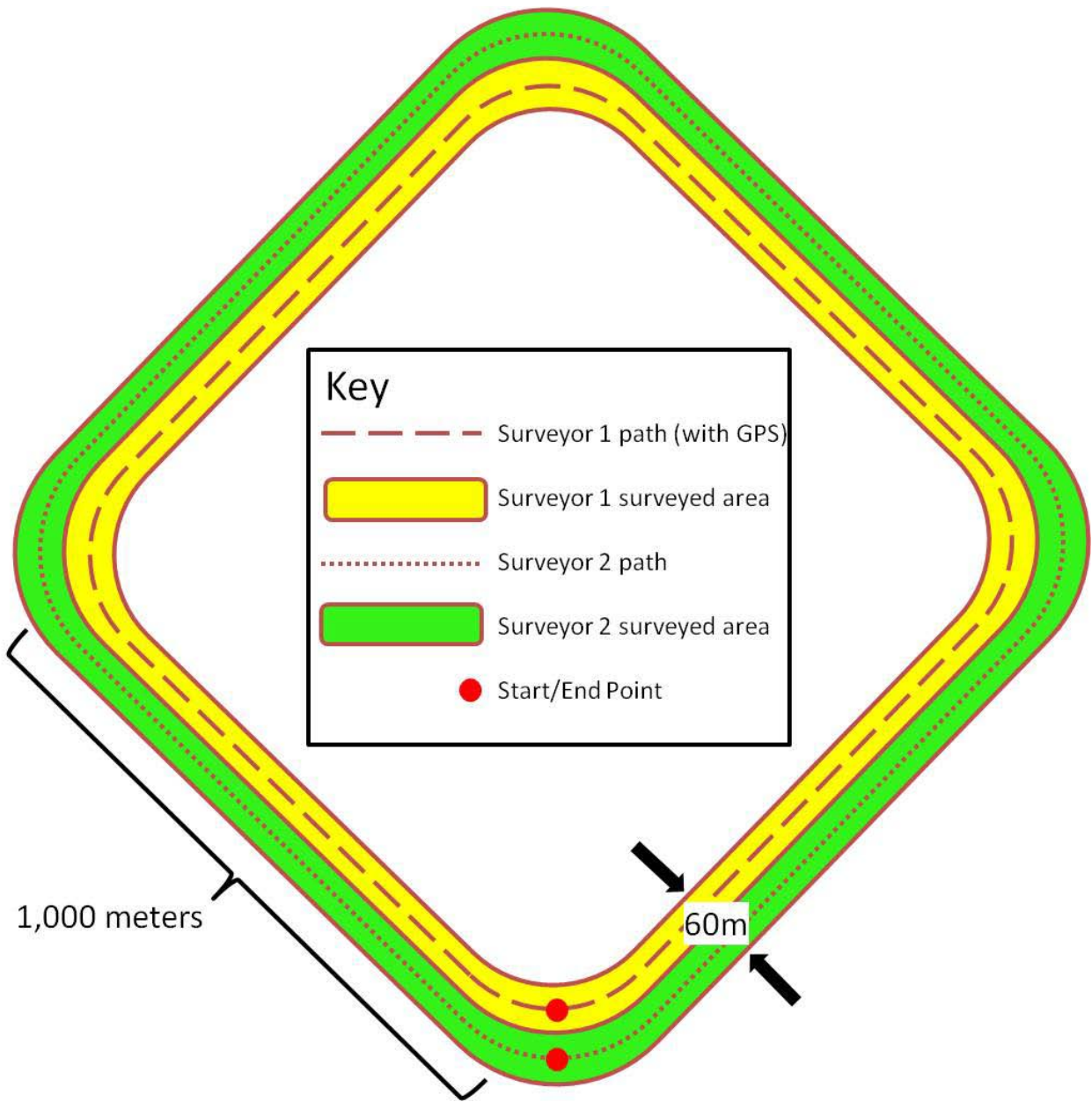
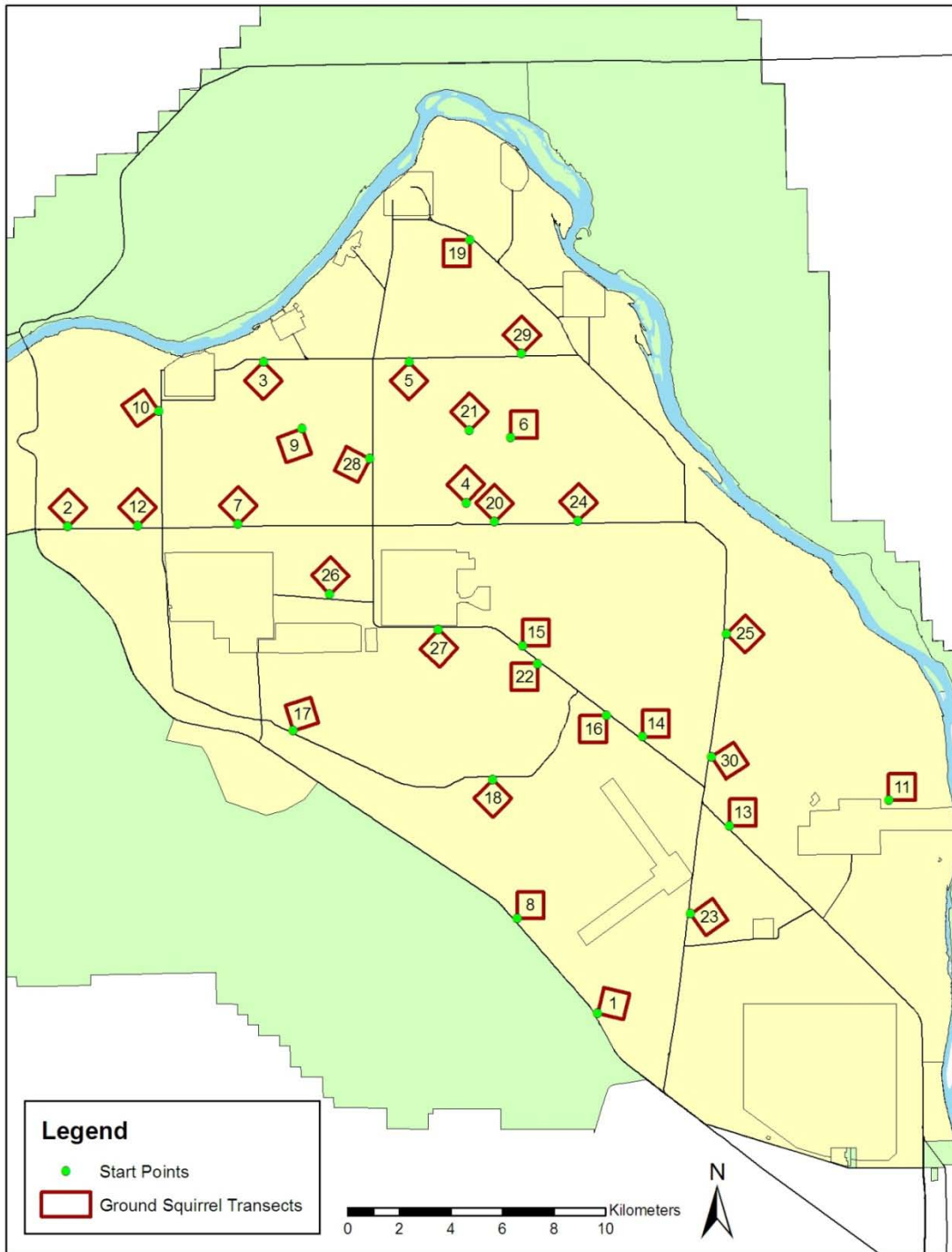


Figure 2. Diamond Transects used for Conducting Ground Squirrel Surveys

Figure 3. Transect Locations across the Central Portion of the Hanford Site



3.0 RESULTS

Surveys at historical colony locations were performed at the start, and then throughout the 2012 survey window. All historical colonies were investigated during 2012, and only the colonies in the 300 Area and near the Volpentest HAMMER Training Facility were found active. These locations were used to gauge levels of activity and to calibrate staff burrow recognition for the transect surveys. A summary of the results of the historical colony surveys are shown in Table 2.

Table 2. Monitoring Results at Historical Townsend’s Ground Squirrel Colonies (2012)

Name	Source	Status2012	# Burrows 2012
West Dunes	PSRP Database	absent	0
East Dunes	PSRP Database	inactive	0
South of HTS	PSRP Database	inactive	0
300 Area 1	PSRP Database	inactive	0
300 Area 2	PSRP Database	present 2	6-20
300 Area 3	PSRP Database	inactive	0
300 Area 4	PSRP Database	present 2	6-20
300 Area 5	PSRP Database	inactive	0
300 Area 6	PSRP Database	present 1	1-5
300 Area 7	PSRP Database	present 2	6-20
HAMMER	PSRP Database	present 1	1-5
Army Loop	PSRP Database	inactive	0
PSRP = Public Safety and Resource Protection			

Surveys were performed at 30 transects (Figure 3), completing the first transect on March 5, and the final transects on May 2. Each transect was completed in its entirety; with the exception of Transect GS27, which was terminated after one leg was completed because the transect intersected a restricted access area. No ground squirrel colonies were identified along any of these transects. Survey summaries are shown in Table 3.

Finally, field personnel conducted focused surveys at areas where other Hanford Site biologists reported seeing ground squirrels, and where squirrels were incidentally encountered during compliance reviews or other field surveys. Surveyors recorded six previously undocumented Townsend’s ground squirrel colonies through these methods during 2012 (Figure 3). The results of these surveys are summarized in Table 4.

Table 3. Ground Squirrel Data from Transects Surveying (2012)

2012 Transect	Transect completed	Date Surveyed	Colony Detected	Observations
GS1	yes	4/4/2012	no	
GS2	yes	3/5/2012	no	burrowing owl burrow documented
GS3	yes	4/17/2012	no	jackrabbit sign
GS4	yes	4/3/2012	no	some jackrabbit sign
GS5	yes	4/2/2012	no	one jackrabbit
GS6	yes	4/12/2012	no	high level of jackrabbit sign
GS7	yes	5/1/2012	no	
GS8	yes	4/4/2012	no	
GS9	yes	4/3/2012	no	
GS10	yes	4/3/2012	no	one jackrabbit
GS11	yes	5/2/2012	no	
GS12	yes	3/8/2012	no	one jackrabbit
GS13	yes	5/2/2012	no	
GS14	yes	4/18/2012	no	
GS15	yes	5/1/2012	no	
GS16	yes	4/25/2012	no	
GS17	yes	4/17/2012	no	
GS18	yes	4/17/2012	no	
GS19	yes	4/9/2012	no	burrowing owl burrow documented
GS20	yes	4/3/2012	no	one jackrabbit
GS21	yes	5/1/2012	no	moderate jackrabbit sign
GS22	yes	5/2/2012	no	
GS23	yes	4/25/2012	no	
GS24	yes	4/11/2012	no	
GS25	yes	3/22/2012	no	
GS26	yes	5/1/2012	no	one jackrabbit
GS27	1 leg	5/2/2012	no	large part of transect within CA
GS28	yes	4/17/2012	no	
GS29	yes	4/2/2012	no	
GS30	yes	3/29/2012	no	one jackrabbit

Figure 4. Colonies Identified and Confirmed during 2012 Surveys

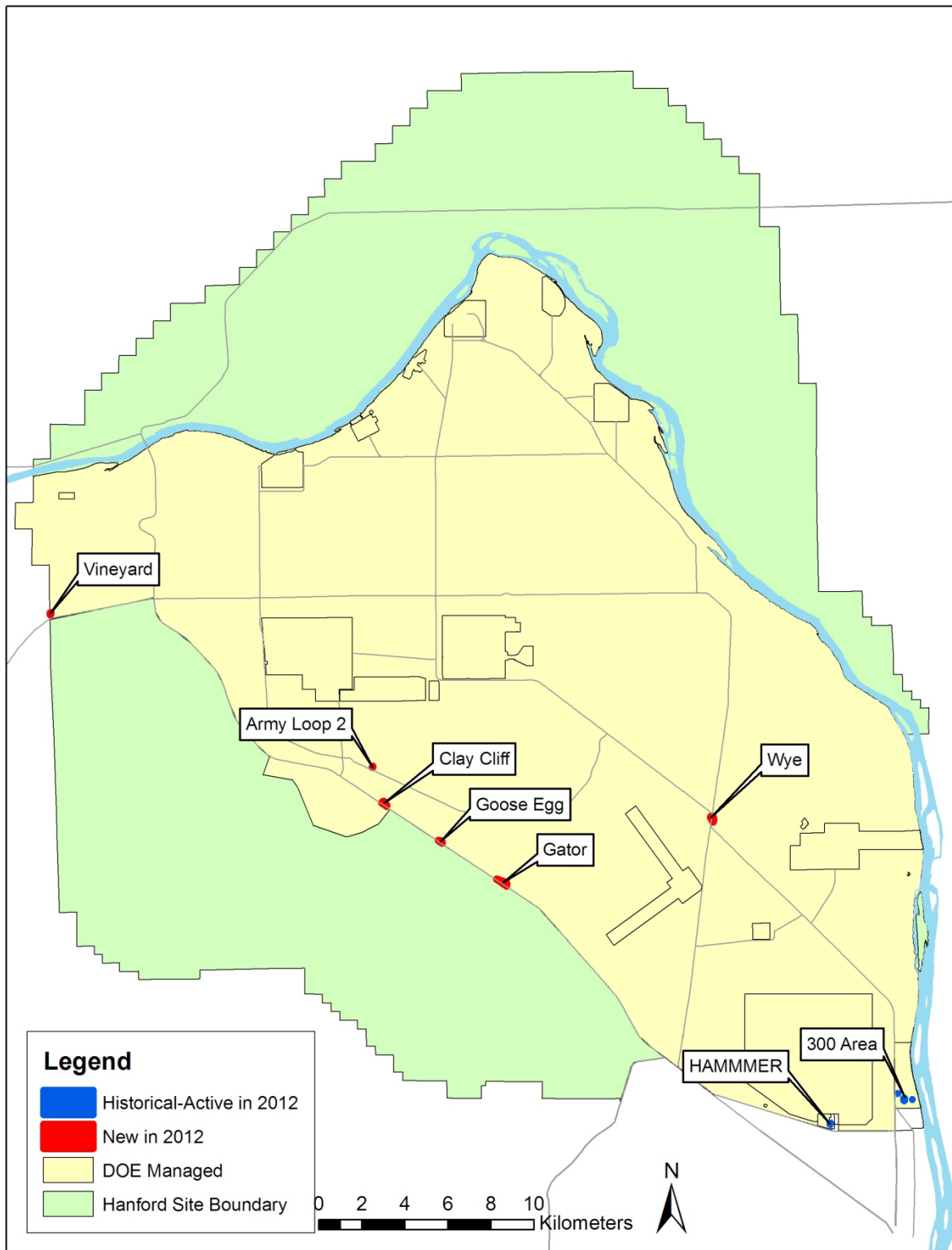


Table 4. Ground Squirrel Colonies Identified Incidentally (2012)

Name	Source	Status	Approx. # Burrows 2012
Wye1	J. Lucas (WCH)	Present 1	6
Wye2	Expanded survey of Wye1	Present 2	11
Wye3	Expanded survey of Wye2	Present 3	40
Wye4	Expanded survey of Wye3	Present 2	7
Gator	R. Roos (MSA)	Present 3	100
Goose Egg	Compliance Survey	Present 3	40
Clay Cliffs	Compliance Survey	Present 3	40
Vineyard	Compliance Survey	Present 3	20
Army Loop 2	Burrowing Owl Survey	Present 3	20

Figure 5. Burrow Complex at Newly Identified Goose Egg Colony near Highway 240



4.0 DISCUSSION

A total of 117 kilometers (73.7 miles) of transects were walked during the 2012 ground squirrel survey, covering 702 hectares (1,735 acres). This survey was a significant effort and time commitment; however, only about 1% of the central Hanford Site was surveyed. Although no ground squirrels were discovered along the diamond transects, two burrowing owl burrow locations were discovered and several black-tailed jackrabbits (*Lepus californicus*) were flushed and documented. This survey method was an efficient way to cover remote tracts of ground over a broad area and could prove useful for other surveying efforts.

The surveys performed during 2012 increased the number of known active ground squirrel colonies on the central Hanford Site from two to eight. If this project were limited to surveying historical colony locations, the results of the survey would have been very ominous, with colonies persisting at only two of the six previously documented locations. The newly identified colonies put the previously known colonies into better context, and provided a less dire picture of the status of Townsend's ground squirrels on the Hanford Site. The expanded number of documented colonies provides additional research opportunities. Future work could include comparing site-specific conditions such as soil and vegetation at each location to determine what conditions Townsend's ground squirrels are selecting for on the Hanford Site.

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