

MOODY FLATS QUARRY PROJECT

Shasta Salamander Habitat Assessment and Survey Report

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Section 1 Introduction

North State Resources, Inc. (NSR) conducted a Shasta salamander (*Hydromantes shastae*) habitat assessment on the 3-M Company Redding Property during December 2009 and January 2010. NSR also conducted protocol-level Shasta salamander surveys in portions of potential habitat identified during the assessment in March and April 2010, and March 2012. This report summarizes the results of the habitat assessment and surveys.

Section 2 Study Area

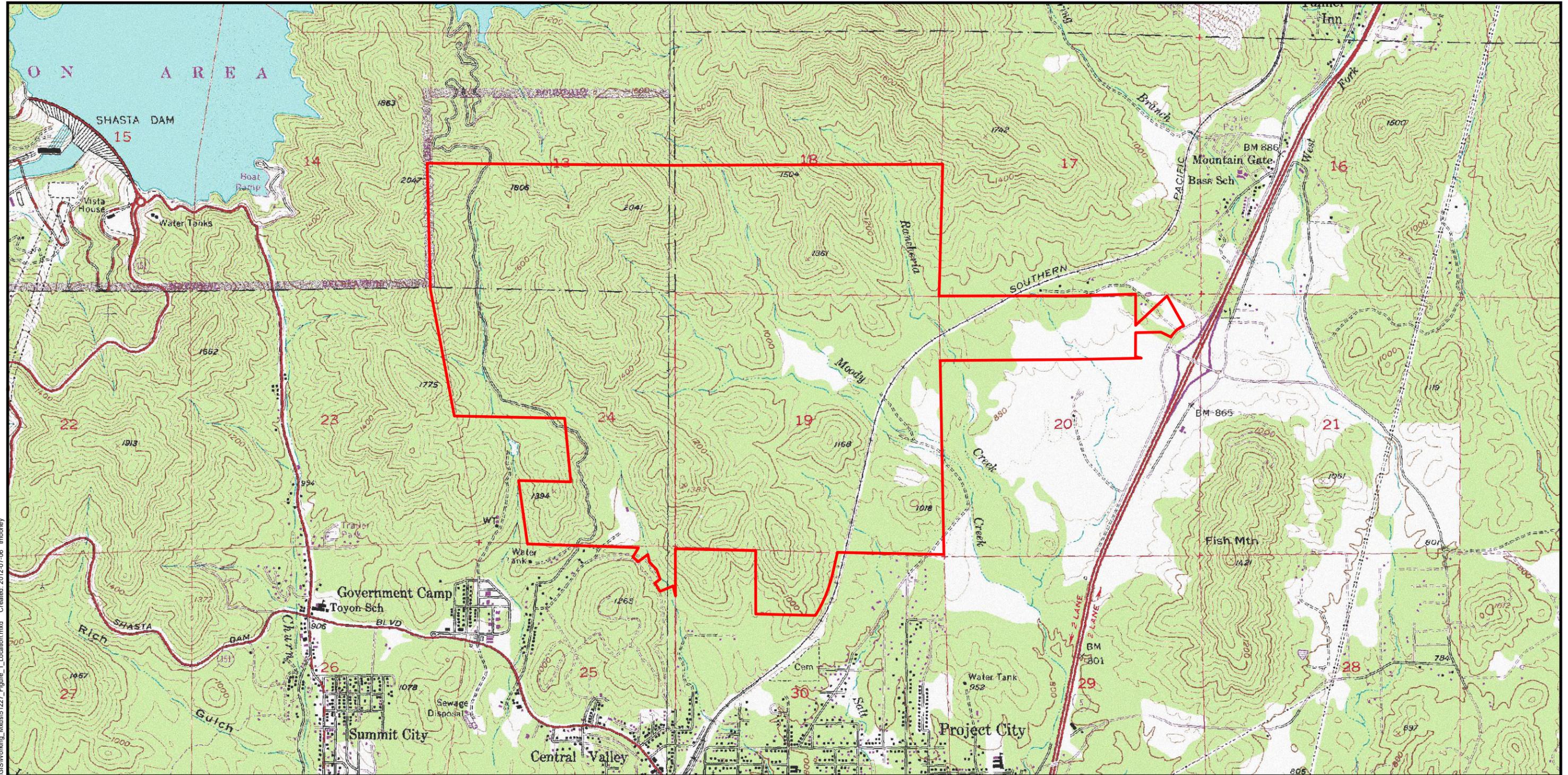
The 3-M Company Redding property is located near Mountain Gate approximately five miles north of Redding, Shasta County, California. The property is generally located west of Interstate 5, south of Lake Shasta, and north of the City of Shasta Lake. A general location map is included as Figure 1.

The 3-M Company Redding property encompasses approximately 1,940 acres. The proposed Moody Flats Quarry project area encompasses approximately 802 acres; which includes proposed quarry pits, aggregate plants, an overburden storage area, a processing plant, a stockpiling and load out area, and associated infrastructure. The Shasta salamander habitat assessment includes the entire 3-M Company Redding property and the proposed Moody Flats Quarry project area (study area).

Section 3 Habitat Assessment

3.1 Background

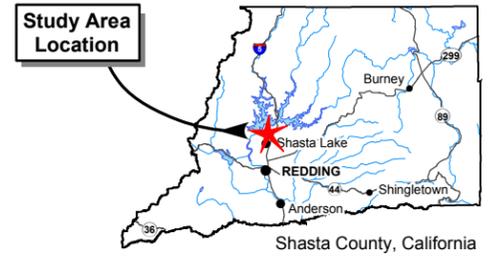
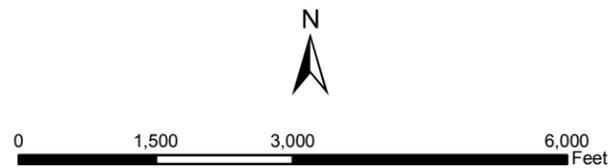
The Shasta salamander is a terrestrial salamander species endemic to a small portion of Shasta County, California. The species is currently designated as threatened under the California Endangered Species Act, as Sensitive and Survey and Manage by the U.S. Forest Service (USFS) Region 5, and as Sensitive by the U.S. Bureau of Land Management. Long considered to only occur within and adjacent to limestone formations, Shasta salamanders were discovered in 1999 in non-limestone habitat at an area known as Green Mountain, Shasta Lake, Shasta County, California (Lindstrand 2000). The Green Mountain discovery sites range between 1.5 to 4 miles from the nearest limestone outcrop formation and show that previous assumptions regarding habitat-use by this species are incomplete. Additional non-limestone discovery sites were found in 2002 during USFS survey efforts, and included several additional sites in the Green Mountain area (North State Resources 2002) and two new locations in northern Shasta County (Nauman and Olson 2004).



 Study Area (1940.33 acres)

Public Land Survey:
 Township: 33N
 Range: 04W
 Sections: 17, 18, 19, 20, 30
 Range: 05W
 Sections: 13, 14, 23, 24, 25

USGS 7.5 Quads:
 Project City - 1969
 Shasta Dam - 1969



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Figure 1
Project Location Map

Shasta salamanders have been found at numerous additional non-limestone habitat locations since 2002, and currently there are 54 known non-limestone sites at 31 general locations (L. Lindstrand III, North State Resources Inc., unpublished data, Lindstrand et. al, in press).

The known Shasta salamander geographic range extends from Mountain Gate west to the western portion of Shasta Lake, north to McCloud Reservoir, and east to the lower Pit River near the confluence with Shasta Lake. Recent survey efforts now show the species also occurs west of Shasta Lake to the vicinity of French Gulch and south to the vicinity of Whiskeytown Reservoir (Lindstrand et. al., in press). Ongoing work to define the species geographic range show the area from Mountain Gate trending westerly towards Shasta Dam represents a portion of the southern extent of the range (L. Lindstrand III, North State Resources, Inc., unpublished data); this portion of the species geographic range includes most of the study area.

Elevations at most known Shasta salamander sites range between 800 and 2,000 feet, and extend to 5,450 feet (Lindstrand et. al., in press). The nearest known Shasta salamander sites relative to the study area occur approximately three to four miles east in the vicinity of Mountain Gate and include sites in limestone and non-limestone habitat.

Habitats at all currently known Shasta salamander sites can be classified using three categories; limestone outcrop habitat, slope habitat (known previous to 2009 as up to 700 feet from limestone outcrop habitat), and non-limestone habitat. Habitats at the known non-limestone sites vary and include mixed conifer, hardwood-conifer, and hardwood forests, woodland habitats, and woodland/chaparral habitats. Cover objects used by Shasta salamanders at these locations vary, and include rock, logs, bark, rock, duff/litter, and coarse woody debris. Generally, some or all of these cover objects are relatively common at most locations; and overall, these micro-habitat characteristics provide suitable “general” terrestrial salamander habitat, which is now known to be used by Shasta salamanders.

Although not present at all sites, most non-limestone habitats occupied by Shasta salamanders have some type of rock substrate and cover. The presence of rock outcrops, talus, extensive scattered rock, and/or areas of layered rock appear to be the most consistent and best indicator of potential non-limestone Shasta salamander habitat.

3.2 Habitat Assessment Results

The Shasta salamander habitat assessment occurred during December 2009 and January 2010. The assessment consisted of reviewing the study area using topographic maps, detailed color aerial photography, and performing pedestrian surveys using existing roads, trails, and other vista points. The presence, absence, composition, and quality of known Shasta salamander physical habitat characteristics were evaluated throughout the study area. These physical habitat characteristics include presence of limestone or other rock outcrops, talus, other colluvial (i.e., layered) rock areas, vegetative habitat structure, substrate composition, the presence of ground cover objects, and juxtaposition to other known or potentially suitable Shasta salamander habitat.

The study area is dominated by foothill pine (*Pinus sabiniana*) and interior live oak (*Quercus wislizenii*) woodlands, with occasional canyon live oak (*Quercus chrysolepis*), California black oak (*Quercus kelloggii*), blue oak (*Quercus douglasii*), valley oak (*Quercus lobata*), and ponderosa pine

(*Pinus ponderosa*) woodlands. Occasional small- to large-size annual grassland and mixed chaparral habitats are interspersed within the woodlands. Small, thin stringers of riparian habitat also occur along several intermittent stream drainages that are found in the study area. The understory in all these habitats ranges from open to dense; however, most habitats are characterized by dense understory vegetation.

Elevations in the study area range from approximately 800 to 2,000 feet and the topography ranges from relatively flat to very steep. Metamorphic and/or metasedimentary rock outcrops occur and are found mainly in the north and northwestern portions of the study area. No limestone formations occur within the study area. Since limestone formations do not occur, potential Shasta salamander habitat in the study area is limited to non-limestone habitat.

Vegetation habitats in the study area range from areas with sparse ground cover to abundant and complex cover of scattered rock, leaf litter, and coarse woody debris. Several portions of the study area have the vegetative structure found at many known non-limestone Shasta salamander sites, including the nearest known sites located near Mountain Gate. Additionally, the topography in portions of the study area is complex and provides additional vegetative and surface substrate diversity. These geographic, physical, and vegetative characteristics combined with the presence of rock habitat provide the overall factors considered potential non-limestone habitat for the purposes of this assessment. Habitats in the study area lacking the presence of rock habitat do not appear to have the characteristics required for terrestrial salamanders, including the Shasta salamander.

The assessment results show several locations in the study area have characteristics typical of terrestrial salamander habitat; in particular, there are several small to large rock outcrop habitats and other areas with layered rock. Potential Shasta salamander habitat was identified during the assessment in several scattered locations, most of which occur in the western and northern portions of the study area. The potential habitat areas encompass approximately 100 acres and range in size from 0.2 to 57 acres. These areas are shown in Figure 2.

In summary, the study area occurs in an area considered within the species geographic range. No limestone formations occur within or near the project area, therefore the site is not considered (limestone) rock or slope Shasta salamander habitat. However, portions of the study area have general terrestrial salamander habitat characteristics, including rock habitats, and are similar to nearby known non-limestone Shasta salamander sites. Based on the geographic location, vegetative habitat type(s), vegetation structure and quality, geologic characteristics, and juxtaposition to nearby known non-limestone Shasta salamander sites, potential Shasta salamander habitat occurs in portions of the study area. The potential non-limestone habitat encompasses approximately 100 acres and locations range in size from 0.2 to 57 acres.

Section 4 Survey Methods

The Shasta salamander habitat assessment identified approximately 100 acres of non-limestone habitat in the study area. Approximately 85 acres of non-limestone habitat occur in the proposed Moody Flats Quarry project impact area (Figure 3). These 85 acres were identified during planning efforts as the locations to conduct protocol-level Shasta salamander surveys.

The Shasta salamander surveys generally followed the guidelines described in Survey Protocol for the Shasta Salamander (*Hydromantes shastae*), Version 3.0 (Olson and Lewendal 1999) (survey protocol). These surveys consist of time-constrained searches based on a given survey area and habitat type, and occur during specific weather conditions. As described in the survey protocol, eight person-hours of survey time (i.e., search time) is conducted for every 10 acres of “rock outcrop habitat” (i.e., limestone), and four person-hours of survey time is conducted for every 10 acres of habitat in “slope habitat” (i.e., areas adjacent to limestone habitat). In both situations, three survey visits are required, with at least one visit occurring during the spring. Additionally, a minimum of ten days must elapse between visits. NSR followed the survey protocol guidelines with one primary exception; since the survey protocol does not address non-limestone habitat, NSR followed the slope habitat requirements for the purposes of this survey effort.

NSR planned the surveys by selecting areas identified during the habitat assessment that occur in or adjacent to the proposed project impact area (Figure 3). The size of each habitat area served as the basis for determining the required amount of search time for surveys. Approximately 85 acres of potential habitat identified during the assessment occur in the proposed project area. Using the slope habitat search time requirements, approximately 35 hours of search time is required for each survey visit. The salamander protocol states that the Shasta salamander surveys must occur only when relative humidity is at a minimum of 65 percent for slope habitat surveys and 90 percent for rock outcrop surveys. Air temperatures must also be no lower than 39°f. NSR used the minimum percent relative humidity requirement for slope habitat (i.e., 65 percent) for this survey effort.

The Shasta salamander surveys consisted of intensive searches of the survey areas looking for salamanders in likely locations where the species seeks cover while surface active. Microhabitats such as rocks, woody debris, and leaf litter were examined for the presence/absence of Shasta salamanders while actively surveying. All survey results were recorded on standard field data forms including search effort, weather conditions, and species information.

The Shasta salamander surveys were conducted under California Department of Fish and Game Scientific Collecting Permit #SC-1611, which includes an additional Memorandum of Understanding providing authorization to conduct Shasta salamander surveys.

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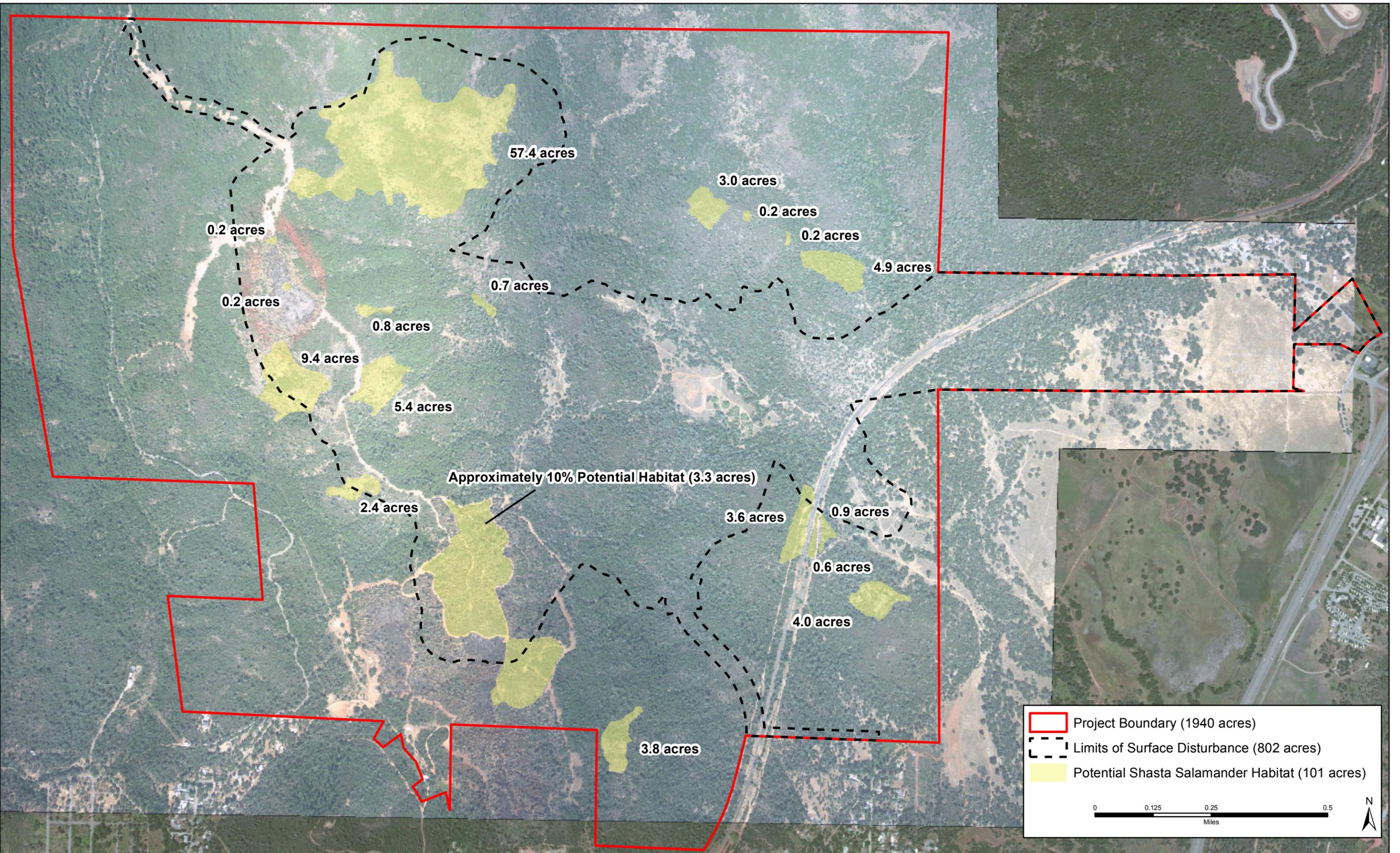


Figure 3
Potential Shasta Salamander Habitat and Disturbance Area

Section 5 Survey Results

NSR conducted one complete survey round on 31 March and 1 April 2010, and a partial survey round on 21 April 2010 and 14 March 2012. Forty-one survey hours were expended during the first survey round, while the second survey round consisted of 27 survey hours. All protocol weather and related survey conditions were met during the surveys.

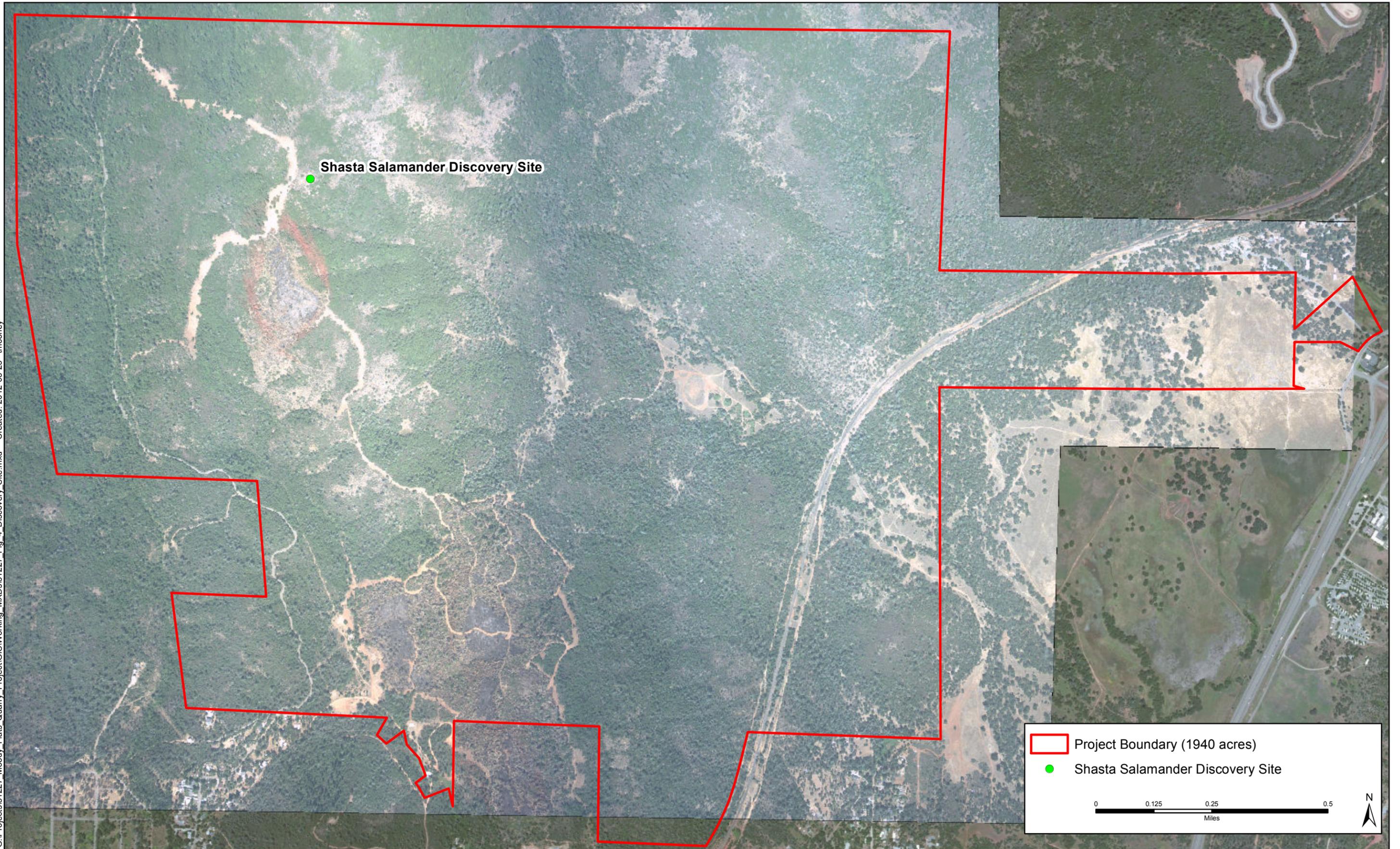
One Shasta salamander was found during the second round of surveys on 14 March 2012. This was an adult specimen found in rock talus on a large rock outcrop/cliff feature in the northern portion of the study area (Figure 4). Since the species was found, the remaining hours required to complete neither the second survey round nor the entire third survey round, were completed.

Other terrestrial salamander species found during the surveys include black salamander (*Aneides flavipunctatus*). Other herpetofauna found included pacific chorus frog (*Pseudacris regilla*), western fence lizard (*Sceloporus occidentalis*), western skink (*Eumeces skiltonianus*), northern alligator lizard (*Elgaria coerulea* ssp. *principis*), California kingsnake (*Lampropeltis getula* ssp. *californiae*), and gopher snake (*Pituophis catenifer*).

Terrestrial mollusks are commonly found incidentally during Shasta salamander surveys, as the habitats, survey techniques and weather conditions are similar. Four terrestrial mollusk species were found during the surveys including Church's sideband (*Monadenia churchi*), shoulderband (*Helminthoglypta hertleini*), California megomphix (*Megomphix californicus*), and Shasta chaparral (*Trilobopsis roperi*). Shasta chaparral is one of a suite of species currently petitioned to be listed as threatened or endangered under the Endangered Species Act. The U.S. Fish and Wildlife Service initiated a 12 month review in September 2011 following issuance of a 90-day finding that the petition was warranted. Shasta chaparral was found in several locations in the rock outcrop habitat in the western and northern portions of the study area during the Shasta salamander surveys.

Copies of field data forms and maps supporting the survey efforts are included in Appendix A. Photographs of the Shasta salamander and discovery site are included in Appendix B.

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- Project Boundary (1940 acres)
- Shasta Salamander Discovery Site

0 0.125 0.25 0.5
Miles



Figure 4
Shasta Salamander Discovery Site

Section 6 References

- Lindstrand III, L. 2000. Discovery of Shasta salamanders in atypical habitat. *California Fish and Game* 86(4):259–261.
- Lindstrand III, L. 2008. A new elevation record for Shasta salamander, *Hydromantes shastae*, in northern California. *California Fish and Game* 94(2):119–121.
- Lindstrand III, L., K. Bainbridge, and G. Youngblood. *in press*. Habitat characteristics, a range extension, and an elevational record for Shasta salamanders. *California Fish and Game* 98(3).
- Nauman, R., and D. H. Olson. 2004. Surveys for amphibians in Shasta County, California with notes on the distribution of Shasta salamanders (*Hydromantes shastae*). *Northwestern Naturalist* 85(1):35–38.
- North State Resources, Inc. 2002. Green Mountain Shasta Salamander Purposive Surveys [unpublished]. Technical report prepared for Shasta-Trinity National Forest, Shasta Lake Ranger District, 14225 Holiday Road, Redding, CA 96003.
- Olson, D.H. and P.C. Lewendal. 1999. Survey protocol for the Shasta salamander (*Hydromantes shastae*). Chapter III. *In*: D.H. Olson, editor. Survey protocols for amphibians under the survey and manage provision of the Northwest Forest Plan, Version 3.0, October 1999. USDA Forest Service R5/R6 and USDI Bureau of Land Management, Oregon, Washington, California, USA.

Appendix A

Shasta Salamander Survey Data Forms and Maps

SHASTA SALAMANDER SURVEY FORM

Observer(s): HK, CM, AC, MH, KB, GY, JVS, KH

Date: 31 March 2010

Survey Location: Moon Flats Quarry

Start Time: 1000 End Time: 1508 Total Survey Time: 16.75

USGS Quad Name(s): Project City; Shasta Dam

Legal Description: T. 33N R. 4W S. 24, 19, 13

Elevation: 1100-1800' Aspect: variable % Slope: Moderate-Very Steep

Habitat Type: ~~Rock Outcrop~~ ~~Slope~~ Site Visit (circle one for protocol, or N/A for general surveys): N/A 1 2 3
 (metamorphic / meta sedimentary rock)

Weather	Wind (Beaufort Number)	Sky Condition (Weather Bureau Code)	Air Temperature (f)	Relative Humidity (%)
Start Survey	1-2	1-2	52.0	69.6 %
Mid-Survey	↓	↓	54.7	80.0 %
End Survey	↓	↓	56.9	86.0 %

Soil Temps
 41° F
 46° F
 47° F

Herpetofauna Species Found			
Species	Life Stage	Size (SVL, mm)	Cover Type
Black salamander	A	24	Rock
western fence lizard (4)			
Ca. Kingsnake (1)			
Western skink (3)			
e			

Comments (attach quad. map of survey area and results):

good survey conditions overall, cool + showers this week, showers in area yesterday afternoon. Surveyed the potential habitat areas scattered across the middle + southern portions of site. Good (potential) habitat; mixture of "solid" rock, layered rock + woodlands. One black salamander was the only terrestrial salamander found. Terrestrial mollusks found include *Trilobopsis roperi*, *Monadenia churchi* + *Helminthoglypta hertlenii* (live + shells). *Trilobopsis* site shown on field map.

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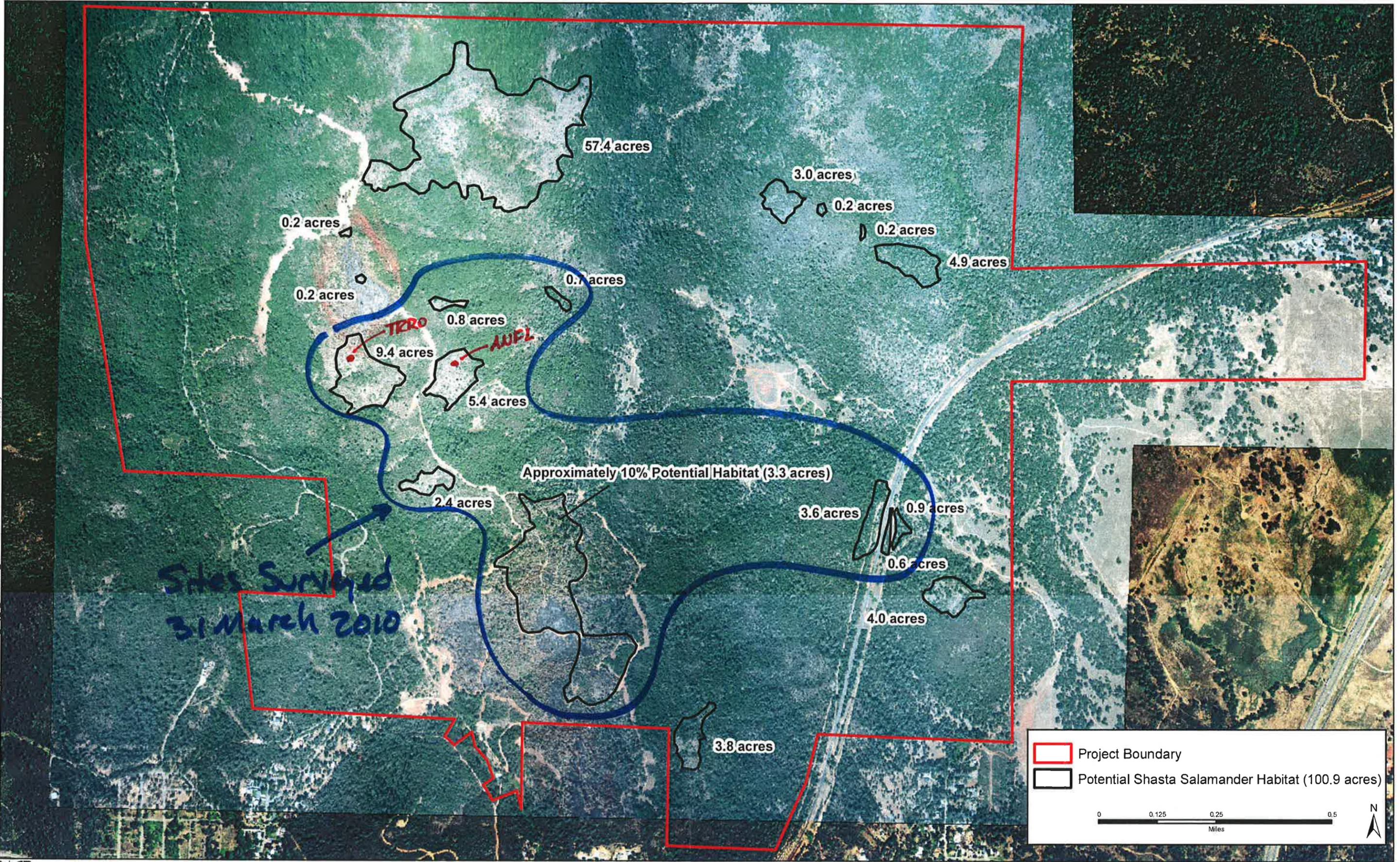
• TRRO = *Trilobopsis roperi*
• ANFL = Black Salamander

F. 51186, 31 March 2010 HYSH Surveys - Survey Map
HK, CM, AC, MH, KB, BY, JVS, KH

3M Shasta Project

Figure 2

Potential Shasta Salamander Habitat



SHASTA SALAMANDER SURVEY FORM

Observer(s): LL3, KB, GY, HK, SVS, KH, MH, AC, CM

Date: 1 April 2010

Survey Location: Moody Flats Quarry

Start Time: 0900

End Time: 1500

Total Survey Time: 24.75

USGS Quad Name(s): Project City; Shasta Dam

Legal Description:

T. 33N

R. 4W

S. 24, 19, 13

Elevation: 1600-2000'

Aspect: Variable

% Slope: moderate to very steep

Habitat Type:

Rock Outcrop

Slope

Site Visit (circle one for protocol, or N/A for general surveys):

N/A 1 2 3

(Meta volcanic / metamorphic rocks)

Weather	Wind (Beaufort Number)	Sky Condition (Weather Bureau Code)	Air Temperature (f)	Relative Humidity (%)
Start Survey	0-3	1	54'	75%
Mid-Survey	↓	↓	64'	57% (exposed slopes)
End Survey	↓	↓	66'	67% (north slopes)

Soil Temps =
41-48'f

} @ Mid.
+ End
Survey

Herpetofauna Species Found

Species	Life Stage	Size (SVL, mm)	Cover Type
Western fence lizard (13)			
N. alligator lizard (2)			
Western skink (8)			
Gopher snake (1)			
No other herps. found; no terrestrial salamanders found			

Comments (attach quad. map of survey area and results):

Good survey conditions; showers
+ cool all this week, showers @ site last night. RH dropped a bit in
afternoon as temps. increased + winds increased; still good survey conditions
and good overnight conditions. Searched large areas of potential habitat
at northern portion of site. Mixture of "solid" + layered rock w/ scattered woodlands.
Overall good habitat (potential). No terrestrial salamanders found. Terrestrial
mollusks found include Monadenia churchi, Helminthoglypta hertlenii + Tritobopsis
reperi (Tritobopsis reperi sites shown on field map). Mollusks found were
live + active and dead (i.e., shells).

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• TRRO: *Trilobopsis roperi*

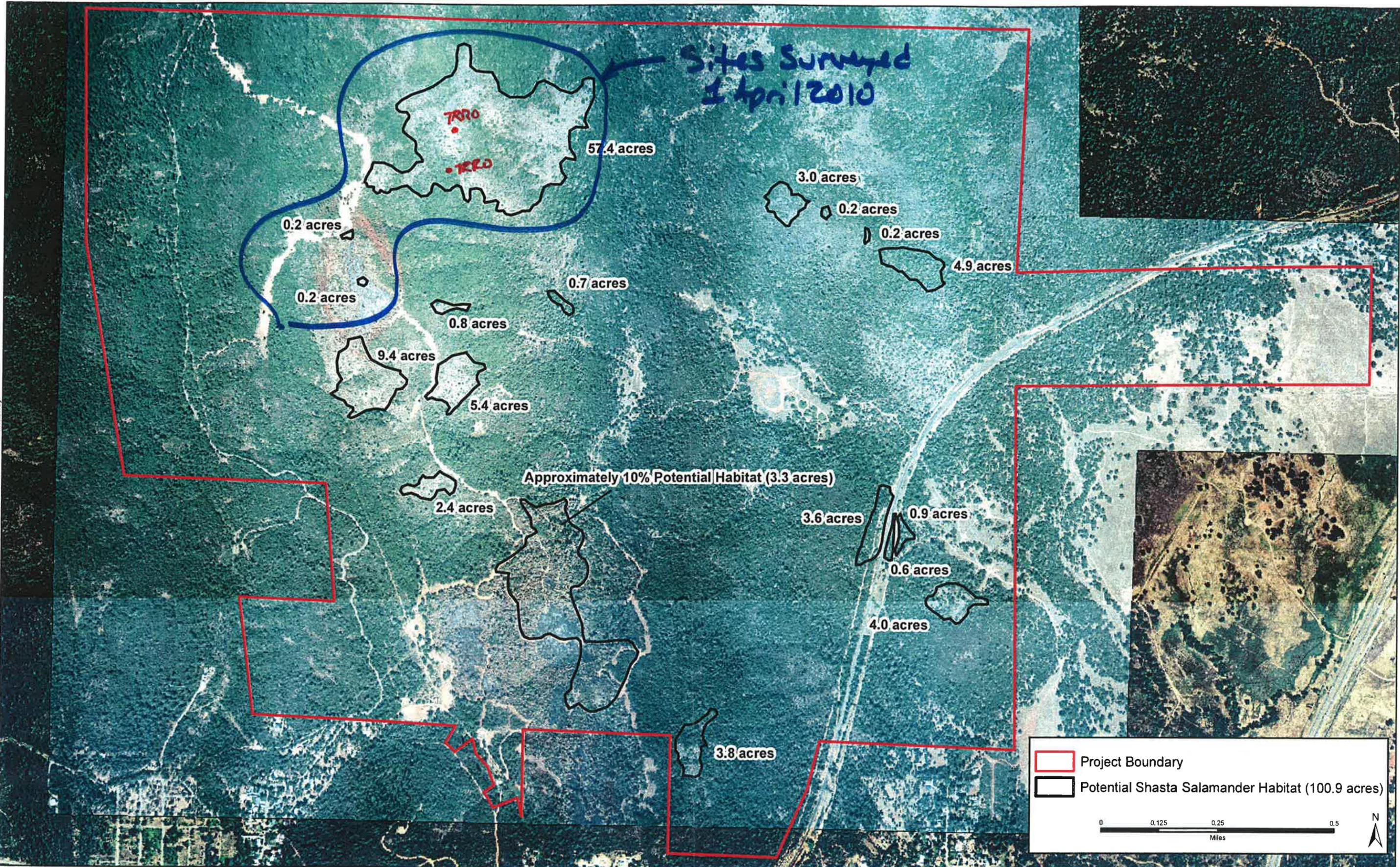


Fig 51186. 1 April 2010 HYSM Surveys - Survey Map
LLB, KB, GY, HK, JVS, KH, MM, AC, CM

3M Shasta Project

Figure 2
Potential Shasta Salamander Habitat



SHASTA SALAMANDER SURVEY FORM

Observer(s): GY, HK, KB, KH, AC, CM

Date: 4/21/10

Survey Location: Moody Flats

Start Time: 1000

End Time: 1530

Total Survey Time: 20 hrs

USGS Quad Name(s): Shasta Dam, Project City

Legal Description: T. 33N R. 4W S. 24,19,13

Elevation: 1200 - 2041

Aspect: Variable

% Slope: 5-60%

Habitat Type: Rock Outcrop Slope Site Visit (circle one for protocol, or N/A for general surveys): N/A 1 (2) 3

(partial)

Weather	Wind (Beaufort Number)	Sky Condition (Weather Bureau Code)	Air Temperature (f)	Relative Humidity (%)
Start Survey	0-1	2	47°F	84%
Mid-Survey	0-1	1	58°F	81%
End Survey	2-3	1	62°F	61%

Soil 39°
Soil 40°
Soil 48°

Herpetofauna Species Found			
Species	Life Stage	Size (SVL, mm)	Cover Type
None Found	—	—	—

Comments (attach quad. map of survey area and results): Conditions were good.
Rain the previous ~~two~~ days had saturated the ground. Moisture
remained present at the surface until mid day when the sun
came out. We found 6 western fence lizards, 3 western skinks, 1
Alligator lizard and a gopher snake as well as MOCH, HEHE, MECA
snail shells and 2 live HEHE and 1 live TRRO snail.

area surveyed

67, HK, KB, KH, AC, CM

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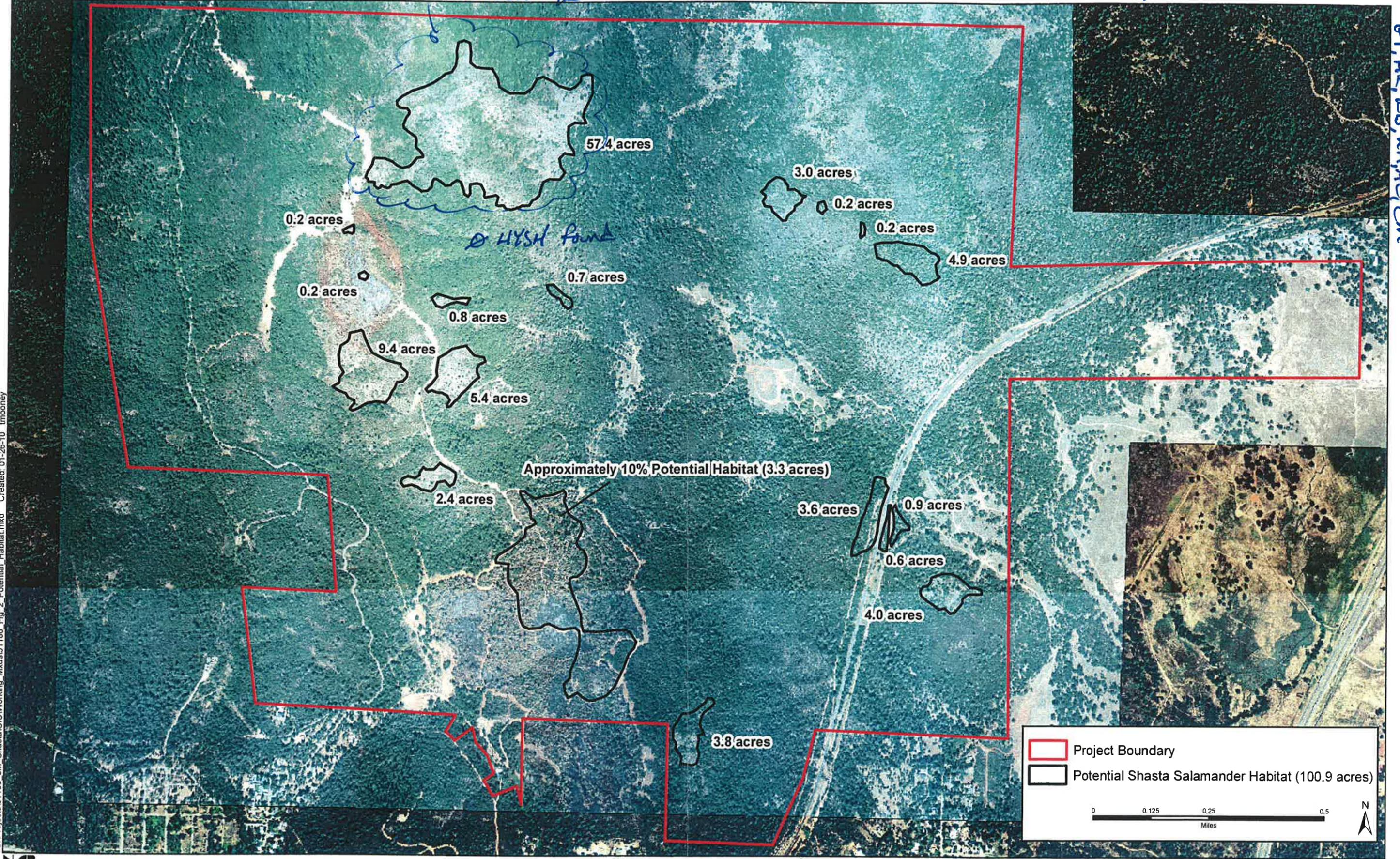


Figure 2 Potential Shasta Salamander Habitat

SHASTA SALAMANDER SURVEY FORM

Observer(s): L. Lindstrand III, K. Rainbridge, Youngblood Date: 14 March 2012

Survey Location: Moody Flats (northern-most, large habitat polygon)

Start Time: 0930 hrs. End Time: 1500 hrs. Total Survey Time: 7.5 hrs.

USGS Quad Name(s): Shasta Dam

Legal Description: T. 33N R. 5W S. 13 (SE1/4)

Elevation: 1400-2000' Aspect: variable % Slope: variable - rock - steep

Habitat Type: Rock Outcrop Slope Site Visit (circle one for protocol, or N/A for general surveys): N/A 1 (2)³ (partial)

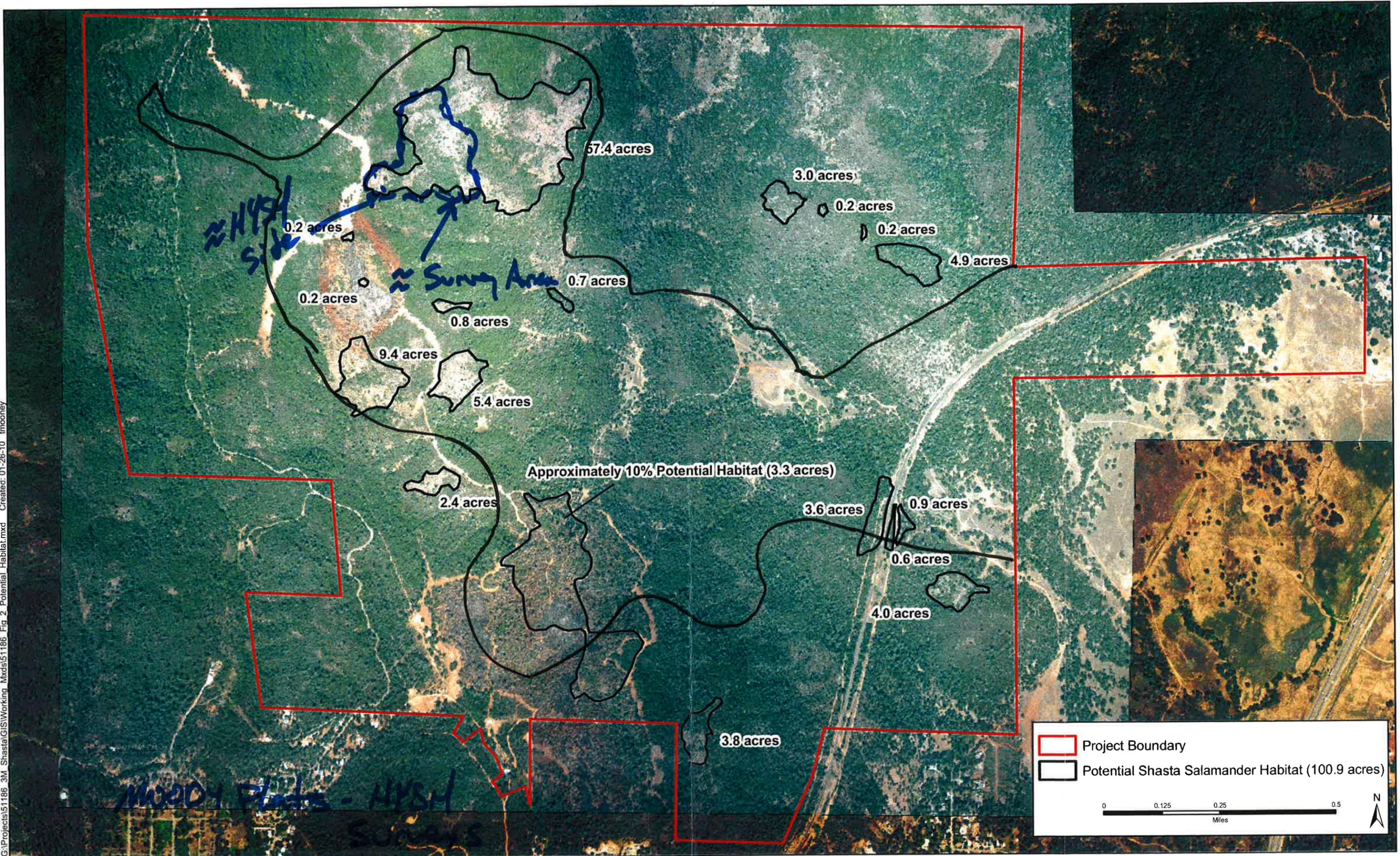
Weather	Wind (Beaufort Number)	Sky Condition (Weather Bureau Code)	Air Temperature (f)	Relative Humidity (%)
Start Survey	<u>0-1</u>	<u>8</u>	<u>50° F</u>	<u>88%</u>
Mid-Survey	<u>0-1</u>	<u>8</u>	<u>48° F</u>	<u>100%</u>
End Survey	<u>0-1</u>	<u>8</u>	<u>53° F</u>	<u>100%</u>

Herpetofauna Species Found

Species	Life Stage	Size (SVL, mm)	Cover Type
<u>Western skink</u>	<u>A</u>	<u>-</u>	<u>Rock</u>
<u>Western skink</u>	<u>A</u>	<u>-</u>	<u>Rock</u>
<u>Shasta salamander</u>	<u>A</u>	<u>32</u>	<u>Rock</u>
<u>Western fence lizard</u>	<u>A</u>	<u>-</u>	<u>Rock</u>
<u>Black salamander</u>	<u>J</u>	<u>19</u>	<u>Rock</u>
<u>Western fence lizard</u>	<u>A</u>	<u>-</u>	<u>Rock</u>
<u>Pacific chorus frog</u>	<u>A</u>	<u>-</u>	<u>Rock</u>
<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>
<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>

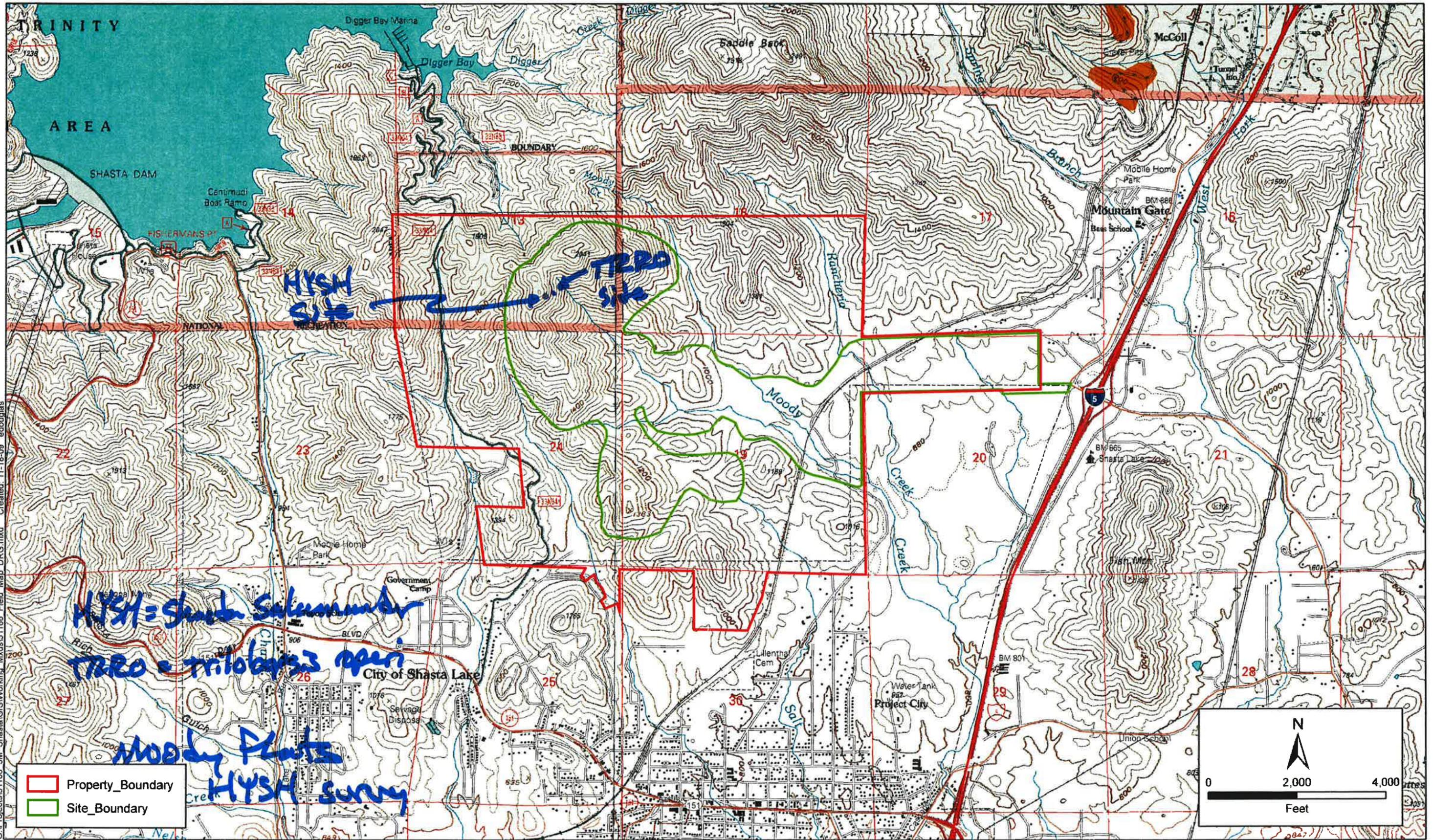
Comments (attach quad. map of survey area and results): Good survey conditions. Wet pattern recently + cool temps. Rain Saturday + Sunday 10+11 Mar 12 + since yesterday (13 Mar 12) + hasn't stopped. Cool, but not near freezing air temps. Ground + cover objects all saturated. 1 adult HYSH found on open rock outcrop in a gravel/cobble pocket among large bedrock areas. Dark individual, NO sex det. possible (no swollen vent or mental, or eggs). Individual was very active upon capture + measurements/photos - released unharmed. Terrestrial mollusks obs. include Helminthoglyphis hertlenii, Monodonta churchi, and Trilobopsis roperi. HYSH site coordinates: 0552207/4506950 UTM 10T, NAD 83; Garmin Legend HClx. HYSH was found @ 1130 hrs., or 2 hrs. into the survey effort (34.5 search-hours).

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14 MARCH 2012 LL3, KB, GY Field Map

Figure 2 Potential Shasta Salamander Habitat



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Appendix B

Shasta Salamander and Discovery Site Photographs



Shasta salamanders found at Moody Flats project area, 14 March 2012.



General habitat at Shasta salamander discovery site, 14 March 2012.