BASELINE AQUATIC WILDLIFE SURVEY REPORT

BOWMAN CANYON PROPERTY
MARIN COUNTY PARKS
MARIN COUNTY, CALIFORNIA

AUGUST 2019

Prepared for

MARIN COUNTY PARKS
PRESERVATION · RECREATION

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Section 1. INTRODUCTION

This report summarizes the results of baseline aquatic wildlife surveys conducted by Nomad Ecology, LLC (Nomad) in 2019 on the Bowman Canyon Property, located in northwest Novato, immediately adjacent to Mount Burdell Open Space Preserve in northeastern Marin County (Figure 1). The Bowman Canyon Property was recently acquired by Marin County Parks, and baseline data for biological resources for the property had not yet been gathered. The property is approximately 167 acres in size and is situated primarily along a steeply sloping ridgeline characterized by grassland, oak-bay woodland, and coastal scrub, with a gentler slope and lower-growing serpentine grasslands in the northern portion. The aquatic wildlife baseline surveys included a combination of pond and stream habitat assessments and surveys within the Bowman Canyon Property. Habitat assessments included an evaluation of pond and stream habitat within the Bowman Canyon Property for potential to support certain special-status wildlife species including California red-legged frog (*Rana draytonii*), California giant salamander (*Dicamptodon ensatus*), western pond turtle (*Actinemys marmorata*), and foothill yellow-legged frog (*Rana boylii*); and an evaluation of threats to these special-status species or the integrity of their habitat. Surveys included daytime and nighttime visual encounter surveys and an aquatic dipnet survey for California red-legged frog.

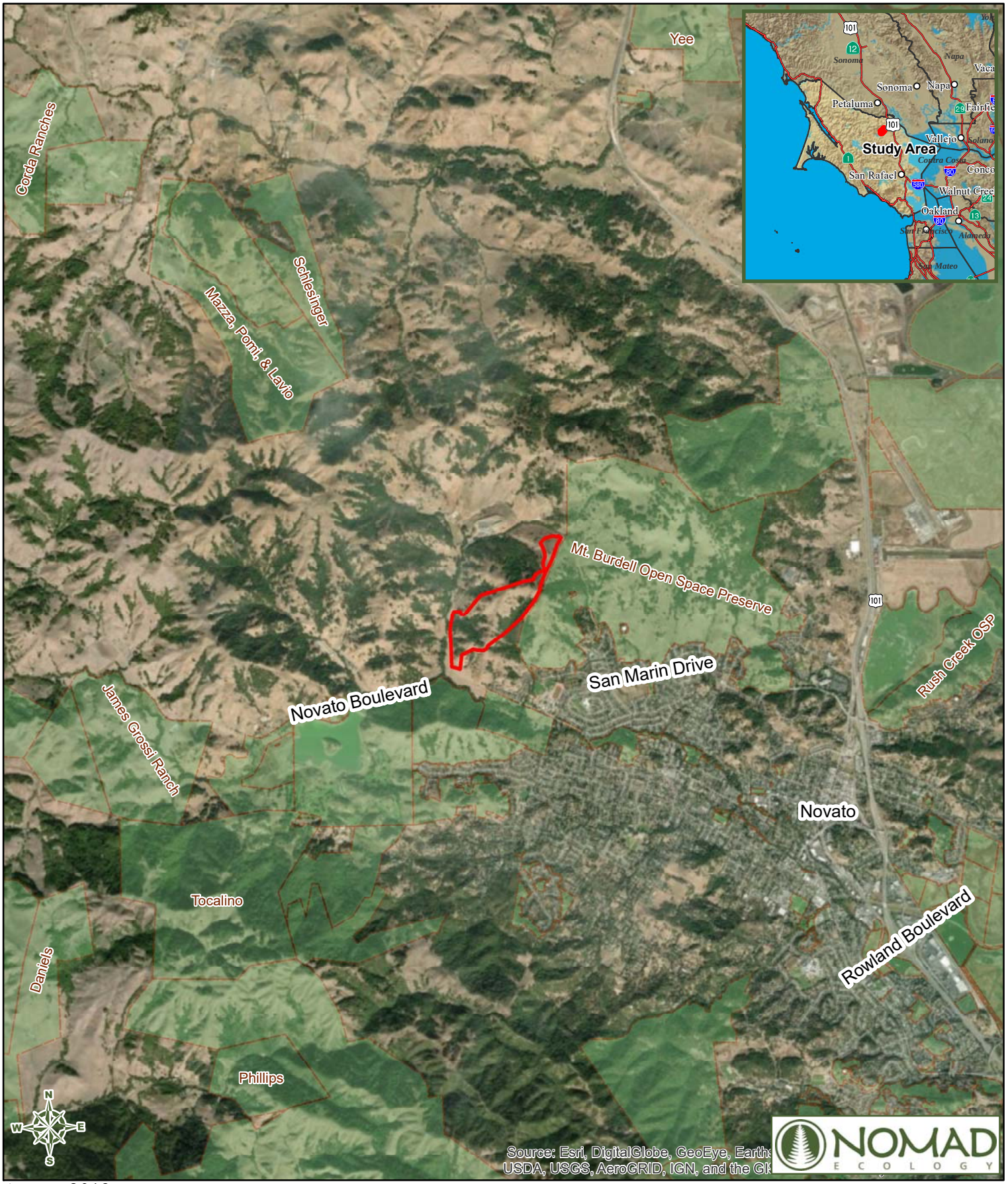
1.1. SURVEY PURPOSE

Nomad's main objective was to conduct habitat assessments and surveys for California red-legged frog in the pond and stream habitats of the Bowman Canyon Property. The habitat assessments also included an evaluation for potential to support California giant salamander, foothill yellow-legged frog, and western pond turtle, as well identifying possible threats to special-status wildlife species or habitat integrity. The focus of the visual encounter and dipnet surveys was also to detect California red-legged frog, however Nomad biologists also searched for western pond turtle, California giant salamander, foothill yellow-legged frog, and other special-status species during all site visits and surveys.

These initial survey results are intended to document baseline data so that Marin County Parks can identify meaningful future surveys and monitoring to be conducted to track special-status species' populations within the Bowman Canyon Property and also identify potential habitat restoration and enhancement opportunities.

1.2. LIFE HISTORIES OF TARGET SPECIES

Nomad's survey methods and timing were designed to maximize the probability of detecting California red-legged frog, though we also recorded data about observations of other herpetofauna, special-status species, and suitable habitat for other special-status species that were considered targets for these surveys. Understanding the life-history of the target species is critical to effectively managing their habitat; a summary of relevant life history information for California red-legged frog and other target species is provided below.



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Baseline Aquatic Wildlife Report

Legend
- Bowman Canyon Property
- Public Land

Figure 1
Vicinity Map
Bowman Canyon Property
Marin County Parks

1:63,360
0 0.5 1
Miles

Sources: National Agriculture Imagery Program, ESRI

Marin County, California

1.2.1 CALIFORNIA RED-LEGGED FROG

The California red-legged frog is a federally listed threatened species and a California Species of Special Concern. The California red-legged frog is one of two species of red-legged frog endemic to the Pacific Coast. Historically it occurred from Riverside County to Mendocino County along the Coast Range; from Calaveras County to Butte County in the Sierra Nevada; and in Baja California, Mexico. California red-legged frogs are still locally abundant within portions of the San Francisco Bay area and the central coast. Within the remaining distribution of the species, only isolated populations have been documented in the Sierra Nevada, northern Coast, and northern Transverse ranges. This species is believed to be extinct from the southern Transverse and Peninsular ranges, but is still present in Baja California, Mexico (USFWS 2017).

California red-legged frogs predominately inhabit permanent and seasonal water sources such as streams, lakes, marshes, natural and human-made ponds, and ephemeral drainages in valley bottoms and foothills up to 1,500 meters (4,921 feet) in elevation (Jennings and Hayes 1994, Bulger et al. 2003). Adults breed in a variety of aquatic habitats, while larvae and metamorphs use streams, deep pools, backwaters of streams and creeks, ponds, marshes, sag ponds, dune ponds, and lagoons. Stock ponds are frequently used for breeding when they provide a suitable hydroperiod, pond structure, and vegetative cover, and when they are managed to control non-native predators such as American bullfrogs (*Lithobates catesbeianus*) and exotic fish. Red-legged frog breeding occurs between November and April within still or slow-moving water with light to dense, riparian or emergent vegetation, such as cattails (*Typha* spp.), tules (*Schoenoplectus* spp.) or overhanging willows (*Salix* spp.) (Hayes and Jennings 1988). Egg masses are attached to vegetation below the surface and hatch after 6 to 14 days (Storer 1925, Jennings and Hayes 1994). Larvae undergo metamorphosis 3.5 to 7 months following hatching and reach sexual maturity at 2 to 3 years of age (Jennings and Hayes 1994).

Some California red-legged frogs remain at breeding sites during the non-breeding season, whereas others disperse into adjacent upland habitat or to other aquatic sites (Fellers 2005, Fellers and Kleeman 2007, Tatarian 2008). Tatarian (2008) reported that 57% of frogs fitted with radio transmitters in Round Valley of eastern Contra Costa County stayed at their breeding pools, whereas 43% moved into adjacent upland habitat or to other aquatic sites. The distance red-legged frogs will travel from breeding sites is site dependent. Fellers and Kleeman (2007) reported that in Marin County, only a few out of 123 frogs studied moved farther than the nearest suitable non-breeding habitat. In this study, the furthest distance traveled was 1.4 kilometers (0.9-mile) and most dispersing frogs moved through grazed pastures to reach the nearest riparian habitat (Fellers and Kleeman 2007). In general, terrestrial habitats used by California red-legged frogs have abundant cover (e.g., burrows, woody debris, and vegetation), and are relatively close to water (USFWS 2002, Fellers and Kleeman 2007, Tatarian 2008). California red-legged frog diet is dependent on prey availability at each site, but consists mostly of terrestrial invertebrates (Bishop et al. 2014).

California red-legged frog adult, Contra Costa County.

The U.S. Fish and Wildlife Service (USFWS) has identified the following "Primary Constituent Elements" (PCEs) essential to the conservation of the California red-legged frog (USFWS 2010):

1. *Aquatic Breeding Habitat (PCE-1)*. Standing bodies of fresh water (with salinities less than 7.0 ppt), including: natural and manmade (e.g., stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years.

2. *Non-Breeding Aquatic Habitat (PCE-2)*. Freshwater and wetted riparian habitats, as described above, that may not hold water long enough for the species to hatch and complete its aquatic life cycle, but that provide shelter, foraging, predator avoidance, and aquatic dispersal for juvenile and adult California red-legged frogs. Other wetland habitats considered to meet these elements include, but are not limited to: plunge pools within intermittent creeks; seeps; quiet water refugia during high water flows; and springs of sufficient flow to withstand the summer dry period.

3. *Upland Habitat (PCE-3)*. Upland areas adjacent to or surrounding breeding and non-breeding aquatic and riparian habitat, up to a distance of 1.6 kilometer (1 mile) in most cases, and comprised of various vegetation types such as grasslands, woodlands, wetland, or riparian plant species that provides the frog shelter, forage, and predator avoidance. Upland features are also essential in that they are needed to maintain the hydrologic, geographic, topographic, ecological, and edaphic features that support and surround the wetland or riparian habitat. These upland features contribute to the filling and drying of the wetland or riparian habitat and are responsible for maintaining suitable periods of pool inundation for larval frogs and their food sources. They also provide breeding, non-breeding, feeding, and sheltering habitat for juvenile and adult frogs (e.g., shelter, shade, moisture, cooler temperatures, a prey base, foraging opportunities, and areas for predator avoidance). Upland habitat should include structural features such as boulders, rocks and organic debris (e.g., downed trees, logs), as well as small mammal burrows and moist leaf litter.

4. *Dispersal Habitat (PCE-4)*. Accessible upland or riparian dispersal habitat within designated units and between occupied locations within a minimum of 1.6 kilometer (1 mile) of each other, and that allow for movement between such sites. Dispersal habitat includes various natural habitats and altered habitats such as agricultural fields, which do not contain barriers (e.g., heavily traveled road without bridges or culverts) to dispersal. Dispersal habitat does not include

> moderate- to high-density urban or industrial developments with large expanses of asphalt or concrete, nor does it include large reservoirs over 50 acres in size, or other areas that do not contain those features identified in primary constituent elements 1, 2, or 3 as essential to the conservation of the subspecies.

California red-legged frogs are currently threatened by loss of habitat from the growth of cities and suburbs, mining, overgrazing by cattle, invasion of non-native plants, impoundments, water diversions, stream maintenance for flood control, degraded water quality, and introduced predators, such as bullfrogs. The fragmentation of existing habitat and the continued colonization of existing habitat by non-native species may represent the most significant threat (USFWS 2017). Although a positive correlation exists between the absence of California red-legged frogs and the presence of bullfrogs, these two species are known to coexist in some environments (Doubledee et al. 2003, Cook and Currylow 2014).

1.2.2 CALIFORNIA GIANT SALAMANDER

The California giant salamander is a State Species of Special Concern. California giant salamanders occur in north-central California, from southern Santa Cruz County to extreme southern Mendocino and Lake Counties. They occur up to elevations of 900 meters (2,953 feet), primarily in mesic coastal oak woodlands and coniferous forests, or in coastal chaparral (Stebbins 2003, Thomson et al 2016). Aquatic adults and larvae are found in cool, rocky streams and occasionally in lakes and ponds (Nussbaum and Clothier 1973). Where permanently flowing streams are available adults may remain aquatic for their entire lives, retaining their gills while becoming reproductively mature, a condition called neoteny. In some areas, larvae will transform to the terrestrial adult form after 1 to 2 years (Nussbaum et al. 1983), and therefore either perennial or semi-perennial streams can be used by this species for breeding.

Terrestrial adults search for prey such as snails, slugs, other invertebrates, small mice, shrews, possibly reptiles, and other amphibians under surface objects and in tunnels underground (Nussbaum et al. 1983, Stebbins 2003). Aquatic adults and larvae eat aquatic invertebrates, fish, and other amphibians (Antonelli et al. 1972). Aquatic adults and larvae hide within spaces between rocks in streambeds. Terrestrial adults are found under surface litter and in tunnels underground. Eggs are laid during spring in concealed locations several feet below the surface in cold, slowly flowing water in springs, channels, under streambanks, and beneath rocks and coarse woody debris in stream bottoms (Nussbaum et al. 1983, Stebbins 2003).

1.2.3 FOOTHILL YELLOW-LEGGED FROG

The foothill yellow-legged frog is designated by the California Department of Fish and Wildlife (CDFW) as a California Species of Special Concern and as a Candidate for listing as Threatened under the California Endangered Species Act. The species' candidacy for listing is currently under review by CDFW, after which a status review will be submitted to inform the California Fish and Game Commission's decision on whether or not to list the species (California Fish and Game Commission 2017). Foothill yellow-legged frog ranges from the Cascade Mountains in Oregon south to the Transverse Ranges in Los Angeles County, and from the coast to the western Sierra Nevada foothills between 183 and 1524 meters (600 and 5,000 feet) elevation (Stebbins and McGinnis 2012, CDFG 2010, Moyle 1973). It inhabits small to moderately-sized perennial streams, and ephemeral streams with perennial pools, characterized by cobble-rocky substrate and shallow, flowing water in valley-foothill riparian, hardwood-conifer, mixed conifer, coastal scrub, mixed chaparral, and wet meadow communities (Hayes and Jennings 1988, Jennings 1988). Foothill yellow-legged frog populations may require both mainstream and tributary habitats for long-term persistence. Streams too small to provide breeding habitat may be critical as seasonal habitats, such as in winter and during the hottest part of the summer (VanWagner 1996). There is also evidence that habitat use by metamorphs, sub-adults, and adult frogs differs by age-class and

can change seasonally (Randall 1997). Larvae feed on algae, while adults feed primarily on terrestrial and aquatic insects (Fitch 1938). Adults generally breed between March and June. Larvae require 15 weeks to complete their metamorphosis, typically emerging between July and September (Storer 1925, Jennings 1988). Foothill yellow-legged frogs are infrequent in habitats where introduced fish and bullfrogs are present (Jennings and Hayes 1994).

Foothill yellow-legged frog metamorph, Santa Clara County.

1.2.4 WESTERN POND TURTLE

The western pond turtle is a California Species of Special Concern. Its geographical range extends along much of the west coast from Puget Sound in Washington south to the Baja Peninsula in Mexico (Jennings and Hayes 1994). Western pond turtles are habitat generalists. They have been observed in slow-moving rivers and streams, lakes, reservoirs, permanent and ephemeral wetlands, stock ponds, and sewage treatment ponds. They prefer aquatic habitats with refugia, such as undercut banks and submerged vegetation (Holland 1994), and they require emergent sunny basking sites such as mud banks, rocks, logs, root wads, and mats of submergent vegetation to thermoregulate their body temperature (Holland 1994, Jennings and Hayes 1994). Pond turtles are omnivorous and feed on a variety of aquatic and terrestrial invertebrates, fish, amphibians and aquatic plants.

Western pond turtles use terrestrial habitat for refuge, nesting, and resting. Rathbun et al. (2002) reported mean maximum distances of 49.7 meters (163 feet), 93.7 meters (307 feet), and 12.0 meters (39 feet) from the nearest water for these three types of terrestrial habitat use, respectively. However, travel distances appear to be a function of site-specific factors, and females have been reported ranging as far as 500 meters (1,640 feet) from a watercourse to find suitable nesting habitat. Nest sites are most often situated on south or west-facing slopes, are sparsely vegetated with short grasses or forbs, and are scraped in sands or hard-packed dry silt or clay soils (Rathbun et al. 1992, Holland 1994, Reese and Welsh 1997). Most oviposition occurs during May and June, although some individuals may deposit eggs as early as late April and as late as early August (Jennings and Hayes 1994).

Female pond turtles may lay two clutches in a single year, with the interval between clutches ranging from 27 to 43 days (Scott et al. 2008). The natural incubation period for pond turtle eggs is 80-126 days (Ernst and Lovich 2009). Hatchlings appear to overwinter in the nest because hatchling-sized turtles have almost never been observed in an aquatic site during the fall (Jennings and Hayes 1994). Bullfrog adults are known to eat hatchling and juvenile turtles, often making it difficult for any young turtles to survive to adulthood at bullfrog infested ponds (Holland 1994). The western pond turtle is believed to be declining throughout most of its range. Threats to the species include habitat loss, ongoing impacts to nesting habitat (e.g., by agricultural and grazing practices), the introduction of exotic predators (e.g., bullfrogs

and red foxes) or competitors (e.g., non-native turtles), and artificially high mesopredator (e.g., raccoon, fox, and skunk) populations (Jennings and Hayes 1994, Holland 1994).

Section 2. METHODS

2.1. DATA RESOURCES AND BACKGROUND RESEARCH

Background information for special-status aquatic wildlife species was compiled through a review of the following resources:

- California Department of Fish and Wildlife California Natural Diversity Database (CNDDB) Query for a five-mile buffer of the Bowman Canyon Property (CNDDB 2019)
- Species and habitat (ponds and streams) data and other Bowman Canyon Property information (boundaries, map notes, etc.) provided by Marin County Parks in the form of GIS shapefiles and PDF files

Nomad analyzed this data and determined the habitat assessment locations in coordination with Marin County Parks, and then developed a survey plan based on the habitat assessments to conduct baseline surveys targeting California red-legged frog. This survey plan was submitted to USFWS on May 16, 2019 and approved on May 23, 2019.

2.2. PERSONNEL AND FIELD INVESTIGATIONS

Nomad Ecology Senior Wildlife Biologist Meghan Bishop conducted the surveys for this project and has the required permits for the research. Ms. Bishop currently holds a Section 10(A)1(a) Federal Recovery Permit issued by the USFWS to conduct independent surveys for adult and larval California red-legged frog and California tiger salamander (Permit #75275B, exp. 4/24/21), and a Scientific Collecting Permit (Permit #011581, exp. 1/3/21) from CDFW. Nomad Senior Wildlife Biologist Dana Terry worked under the supervision of Ms. Bishop during the dipnet surveys conducted on May 31, 2019. Pond and stream habitat assessments and visual surveys were also conducted on March 29, May 1, and May 31, 2019. Ms. Bishop and Mr. Terry assessed all habitat within the Bowman Canyon Property for potential to support special-status wildlife species and potential for restoration and enhancement opportunities.

2.3. HABITAT ASSESSMENT AND SURVEY METHODS

2.3.1 SURVEY LOCATIONS, TIMING, AND TECHNIQUES

In March 2019, all aquatic features were visited to assess habitat and conduct daytime visual encounter surveys. One of the features, referred to as Dry Lake Pond, was identified as potentially suitable breeding habitat for California red-legged frog. The other three features that were assessed were a small pool within the trail on the north end of the property (Road Wet Pool) and the two main streams that run through the property (Stream A and Stream B). See Figure 2 for aquatic feature locations. The Road Wet Pool and both streams were shallow (less than 1 foot deep) and therefore did not appear to provide suitable breeding habitat for California red-legged frog. A daytime and nighttime visual encounter survey, and a daytime dipnet survey were conducted in May at the Dry Lake Pond. Data was recorded on habitat assessment and survey forms included in the USFWS "*Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog*" (USFWS 2005).

Daytime Pond Habitat Assessments

The data collected on the habitat assessment form included the size of aquatic features, maximum depth recorded, information on emergent, submerged, and overhanging vegetation, weather data, species observed, and any other notable information (such as threats observed). The maximum depth of ponds was measured either with a tape measure or the Deeper Fish Finder depth meter (Deeper UAB, Vilnius, Lithuania) when ponds were greater than two feet in depth, by throwing the device, while attached to a long rope, to several locations within the pond to find the deepest measurement. Weather data was collected using a Kestrel weather meter (Nielsen-Kellerman Co., Boothwyn, PA). Percent cover of emergent, submerged, and overhanging vegetation was estimated in the field using the California Native Plant Society Cover Diagrams.

Road Wet Pool where a daytime habitat assessment and visual encounter survey were conducted on March 29, 2019.

Daytime and Nighttime Pond Visual Encounter Surveys

Survey techniques adhered closely to the USFWS *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* (2005).

Daytime visual encounter surveys involved a thorough visual search with binoculars of the banks, floating and emergent vegetation, water, woody debris, and exposed rocks with the aim of locating California red-legged frog and western pond turtle individuals. Daytime visual encounter surveys were conducted concurrently with the pond habitat assessments. Suitable aquatic features were surveyed at night with the aim of locating adult and juvenile California red-legged frogs. Survey methods utilized detection techniques including frog call identification and eye shine recognition.

A survey data sheet was completed and included all amphibian species observed, number of individuals observed or heard, life stages, size class, and certainty of identification. All other wildlife observed during the survey was included on the data sheet. If more than 100 individuals of a non-listed species (i.e. Sierran treefrog, California newt) were observed, the numbers were conservatively estimated to the nearest 100 (i.e. if estimated to be more than 100 but less than 200, the number observed was 100+; if it was estimated to be greater than 500, the number observed was 500+).

Larval Dipnet Survey

The Dry Lake Pond was sampled for amphibian larvae on May 31 using D-shaped, long-handled dipnets with 1/8th inch (3.2mm) or finer mesh. Seine use was not practical for the Dry Lake Pond due to

emergent and submerged vegetation and also due to the small size of the pond that allowed for complete coverage utilizing dipnet survey techniques.

The same survey data sheet described above for the visual encounter survey was used. The numbers of amphibian larvae were estimated by counting the number of larvae observed in the first few dipnets and then averaging this to determine larvae observed per dipnet and multiplying by the number of dipnet sweeps performed. Surveyors followed agency-approved for disinfecting equipment and clothing prior to surveying aquatic features guidance (Declining Amphibian Population Task Force Code 2005).

Stream Assessment and Survey

In March and May, Ms. Bishop and Mr. Terry assessed the stream habitat within the Bowman Canyon Property for potential to support special-status aquatic wildlife species (i.e. foothill yellow-legged frog, California red-legged frog, western pond turtle, and California giant salamander). The stream reaches were steep and difficult to access, therefore select entrance and exit points were identified in accessible areas so the conditions of the streams could be determined and at least portions of the streams could be surveyed. A daytime visual encounter survey for special-status aquatic wildlife species was also performed during the assessment. Photos of all stream reaches were taken and data was recorded (i.e. canopy coverage, substrate, etc.) to help determine if habitat was suitable for special-status species.

2.4. LIMITATIONS

Although survey timing and intensity was optimized to detect California red-legged frog, it is not possible to rule out the presence of this species where they were not detected. The surveys could prove presence where species are detected, but negative findings are not sufficient to prove absence since the field surveys did not conform to species-specific agency-approved protocols. Protocol survey requirements differ for each species, but are much more time intensive and were not feasible to meet the goals of this project. There are additional notable species-specific limitations of the surveys. Western pond turtles are wary and often are only detectable if surveys are conducted during sunny and warm conditions and if there is basking habitat that is visible to the surveyors from a significant distance. California giant salamander and foothill yellow-legged frog adults can be difficult to detect during visual encounter surveys, since they often hide under rocks or crevices to protect themselves from predators. Additionally, the streams could not be thoroughly surveyed due to safety concerns and access difficulties, and were only surveyed in accessible areas to assess the habitat for potentially supporting special-status amphibians and reptiles.

Upland grassland habitat on the Bowman Canyon Property.

Section 3. HABITAT ASSESSMENT AND SURVEY RESULTS

3.1. KNOWN OCCURRENCES IN THE VICINITY OF BOWMAN CANYON PROPERTY

Occurrences of special-status wildlife species within the vicinity of the Bowman Canyon Property had been recorded from other surveys or incidental sightings reported to California Natural Diversity Database (CNDDB 2019). This information was used in combination with communication with Marin County Parks staff to determine where the nearest known breeding populations or species sightings have been recorded.

The CNDDB tracks user-submitted occurrences of all special-status species in California, and is used extensively as a reference for regulatory and planning purposes. It may substantially under-represent actual density, particularly for species that are difficult to detect, since the number of occurrences reported are limited by locations where biologists are conducting surveys. It also likely under-represents densities of species that are not prominent in the regulatory or planning processes.

Several occurrences of California giant salamander, California red-legged frog, western pond turtle, and foothill yellow legged frog occur in the vicinity of Bowman Canyon Property (CNDDB 2019). Table 1 summarizes the known occurrences within five miles of the Bowman Canyon Property. There are no California giant salamander occurrences within 5 miles of the property. The nearest occurrences are located 5.4 miles south and 5.4 miles south-southwest (EONDX #100580 and #98429[1], respectively), both of which represent observations of single adults in 2010. There are five occurrences of western pond turtle, two occurrences of foothill yellow-legged frog, and one occurrence of California red-legged frog within 5 miles of the Bowman Canyon Property (Table 1). All of these occurrences are more than four miles away from the Bowman Canyon Property, except for one of the western pond turtle occurrences (EONDX #54262) that is considered to be sensitive by the CNDDB, and is given a very large non-specific polygon indicating only that it is located somewhere within the Petaluma River USGS topographic quadrangle. This polygon overlaps with the Bowman Canyon Property, but because the specific locality of this occurrence is suppressed, the actual location may be very far from the property.

In addition to the CNDDB occurrences, there have been California red-legged frog observations throughout the adjacent Mount Burdell Preserve (Lisa Michl, pers. comm.). The Mount Burdell Preserve is located immediately east of the Bowman Canyon Property. Adults (both females and males) have been seen at two different spring boxes, one located near Joske Grove and the other at Cheap Thrills Spring near the newly built pond. A juvenile was also observed at cheap Thrills Spring. Observations were first reported in 2014, with the most recent sightings in February of 2018 and the summer of 2019. Western pond turtles are also known to occur at Stafford Lake, located approximately 1 mile southwest of the Bowman Canyon Property (Lisa Michl, pers. comm.).

[1] Each occurrence record in the CNDDB is given a unique reference number called an Element Occurrence Index, abbreviated EONDX

California newt (*Taricha torosa*) adult observed within the Bowman Canyon Property near the Road Wet Pool. California newts are not a listed species and therefore occurrences of this species are not tracked by the CNDDB.

Table 1. Target Covered Species Occurrences within Five Miles of the Bowman Canyon Property.

Species	Element Occurrence Index # (CNDDB EONDX #)	Year	Location Observed	General Species Information
Western pond turtle	54262	2004	Unknown location within a large polygon, general location within Petaluma River Quadrangle	No information
Western pond turtle	49246	2002	0.5 miles south of San Antonio Creek, 4.6 miles northwest of Bowman Canyon Property	Unknown number of individuals observed
Western pond turtle	105855	2016	Neely Ranch, 1.0 miles northeast of San Antonio Road at D Street Ext., 5.0 miles north northwest of Bowman Canyon Property.	30 adults and 15 juveniles observed in a series of four ponds
Western pond turtle	4936	1994, 2002	San Antonio Creek, 5.0 miles northwest of Bowman Canyon Property	4 adults observed in 1994 and 15 individuals observed in 2002
Western pond turtle	4661	Unknown	Nicasio, 5.0 miles southwest of Bowman Canyon Property	Multiple museum specimens from unknown dates
California red-legged frog	105854	2016	Neely Ranch, 1.0 miles northeast of San Antonio Road at D Street Ext., 5.0 miles north northwest of Bowman Canyon Property.	2 adults and 27 young of the year observed in three of seven ponds on the Neely Ranch property. All seven ponds also contain bullfrogs.
Foothill yellow-legged frog	76099	1922, 1972	Sausal Creek at Point Reyes-Petaluma Road, 4.9 miles west of Bowman Canyon Property	Found metamorphs in 1922, one individual collected in 1972
Foothill yellow-legged frog	112107	1999, 2004, 2005, 2011	Halleck Creek, 1.8 miles northeast of Nicasio, 4.1 miles southwest of Bowman Canyon Property	At least four genetic samples collected in this area before 2004
Foothill yellow-legged frog	43715	1999	Headwaters of Nicasio Creek at 3838 Lucas Valley Road, 5.0 miles south of Bowman Canyon Property	One adult found in Big Rock Creek, one adult found in Nicasio Creek, and two adults found in Dairy Creek

3.2. POND HABITAT ASSESSMENT DATA

Habitat assessments were conducted in March at each pond within the Bowman Canyon Property. Data collected included depth, size, amount and type of vegetation in and overhanging the pond, and threats observed. A summary of the data collected is in Table 2. Photos of the ponds are included in Appendix A and the locations of the ponds are depicted on Figure 2.

The Dry Lake Pond is a small pond, but appears to contain a sufficient depth and hydroperiod to support breeding California red-legged frog (Appendix A, Photos 1 and 15). The Road Wet Pool was very shallow at the time of the assessment, and appears to contain water only because it is located in a slight depression where a seep drainage crosses the existing dirt access road. It is not thought to be able to support breeding populations of special-status amphibians because of its shallow depth (Appendix A, Photo 5). It is important to note that 2019 was an above average rain year, and therefore it is possible that these two ponds contain even less water during a below average rain year, and likely have shorter hydroperiods.

Other threats, including all native and non-native predators observed at each pond, are summarized in Table 2. The Dry Lake Pond has a damaged berm that is in need of repair to prevent the eventual failure of the pond (Appendix A, Photo 3).

Table 2. Pond Habitat Assessment Results

POND ID	DATES SURVEYED	SIZE	MAXIMUM DEPTH	VEGETATION (EMERGENT, OVERHANGING, DOMINANT SPECIES)	THREATS OBSERVED
Dry Lake Pond	3/29/19 5/1/19 5/31/19	75 x 45 ft	2 ft	Emergent: *Rumex* sp. (10% cover), *Eleocharis macrostachya* (20% cover), and annual grasses (10%)	Some predatory invertebrates present that could prey on small tadpoles (i.e. diving beetle, large beetle larvae, damselfly larvae, leeches), Berm repair needed
Road Wet Pool	3/29/19	20 ft x 15 ft	6 inches	Emergent: grasses (15% cover)	Not large or deep enough to provide suitable California red-legged frog breeding habitat

Dry Lake Pond on the Bowman Canyon Property, May 1, 2019.

3.3. POND SURVEY DATA

This section summarizes the survey data of the ponds surveyed within the Bowman Canyon Property over the months of March and May, 2019.

No California red-legged frogs of any life stage were observed during the surveys. It is possible that California red-legged frogs are present in small numbers either within the Bowman Canyon Property or in the vicinity, but were not detectable during the surveys.

Sierran tree frogs and California newts were observed during the visual and dipnet surveys (Appendix A, Photos 2, 4, 6, 16-18). Detailed survey data, including abundance of each species observed during each survey, including non-listed amphibians, are summarized in Table 3. Photos of the ponds and wildlife observed during the surveys are included in Appendix A.

Table 3. Detailed Pond Survey Results

POND ID	DATES SURVEYED	METHODS	SIERRAN TREE FROG	CALIFORNIA NEWT	OTHER SPECIES OBSERVED
Dry Lake Pond	3/29/19	Daytime Visual	100+ E, T, A[1]	--	--
	5/1/19	Daytime Visual	100+ T, M, A	1 L	Cows grazing and drinking water at pond during daytime survey
	5/1/19	Nighttime Visual	100+ T, A	--	--
	5/31/19	Daytime Dipnet and Visual	1,000+ T, M	100+ L	Snails, clam shrimp, damselfly larvae, beetle larvae, diving beetle, leech
Road Wet Pool	3/29/19	Daytime Visual	50 T	2 A (observed nearby pool in terrestrial habitat)	--

[1]E=Egg mass, T=Tadpole (Frogs), L=Larvae (Salamanders), M=Metamorph, A=Adult

3.4. STREAM HABITAT ASSESSMENT AND SURVEY DATA

The primary purpose of the stream habitat assessment and surveys was to identify stream reaches that could potentially support breeding and/or non-breeding California red-legged frog, California giant salamander, foothill yellow-legged frog, and western pond turtle. Two stream reaches were assessed and no special-status species were observed. All stream reaches are depicted on Figure 2, and were divided into Stream Segment A and B representing the drainage system on the west and east side of the property, respectively. Additional information about observations at each stream segment is included in Table 4 below. Photos of the stream segments are included in Appendix A.

Neither of the streams appear to be perennial within the Bowman Canyon Property, because they are fed by upland seeps, additional site visits would be required in late summer and fall to verify whether this is true. The stream segments had shallow water during the March and May visits, with there being a slightly lower flow of water observed visually during the survey in May. Foothill yellow-legged frog, California giant salamander, and western pond turtle populations require perennial streams or rivers, or intermittent streams with perennial pools or pools that hold water into the fall. It appears the limiting factor for why these species were not observed in these stream segments is their shallow depth and lack of perennially flowing or perennially ponded water. Both of the streams within the Bowman Canyon Property are heavily shaded by dense overhanging tree canopy, leaving almost no sun-exposed surfaces for basking and thermoregulation. This, combined with the small channel size and shallow depths, makes the streams onsite essentially unsuitable for western pond turtles, and limits their suitability for California red-legged

frog and foothill yellow-legged frogs. California red-legged frogs could potentially utilize Stream Segment A as non-breeding habitat if there is a breeding population nearby.

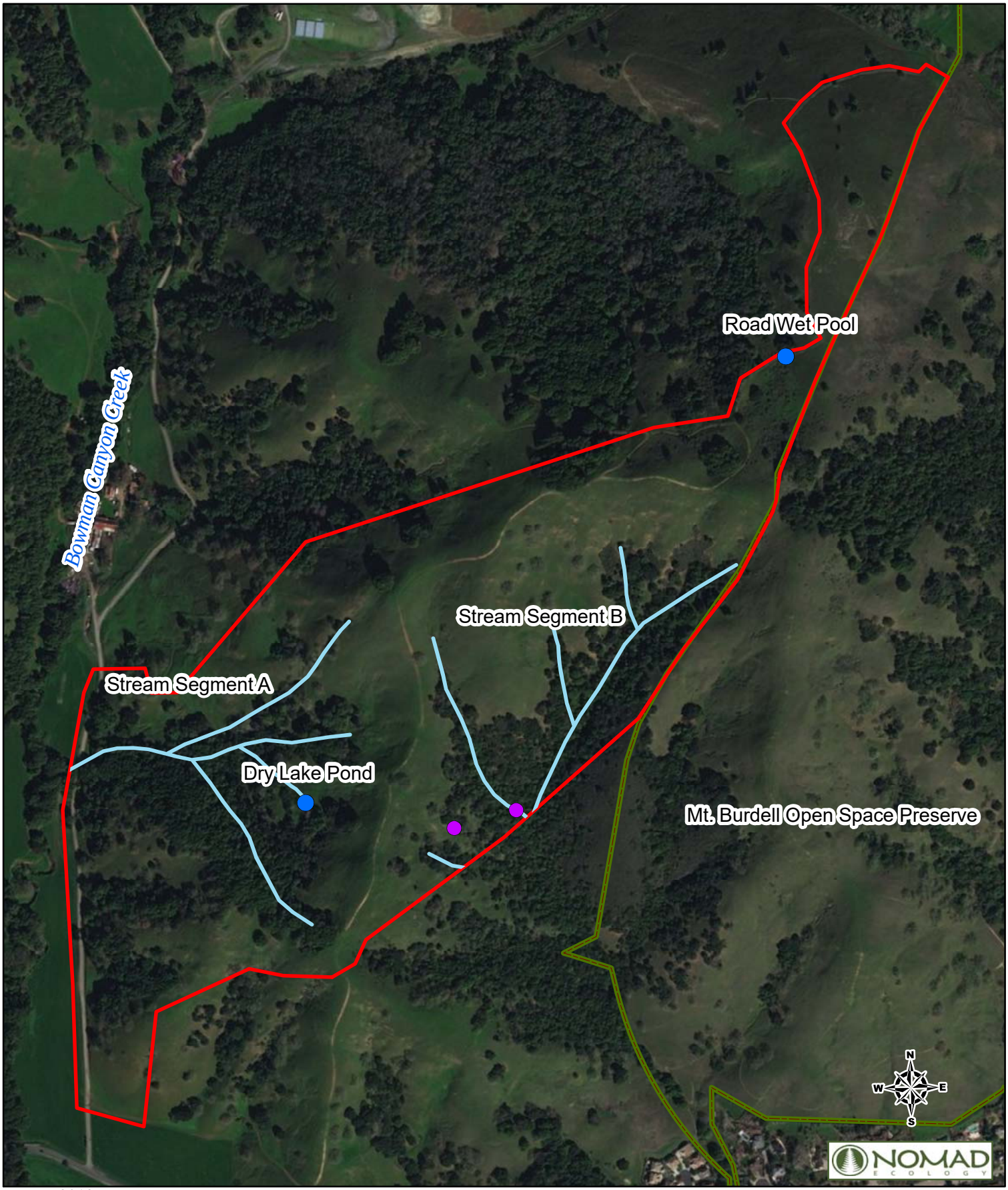
The substrate within Stream Segment A was mostly muddy with steep eroded banks in many areas, which is not preferred by California giant salamander or foothill yellow-legged frog (Appendix A, Photos 8-9). Sections of the stream were dry in May (Appendix A, Photo 10). Stream Segment A includes a series of small (likely seasonal) tributaries that are seep-fed and flow generally west, from the western side of the Bowman Canyon Property and then offsite into Bowman Canyon Creek. Bowman Canyon Creek flows into Novato Creek, which flows west to east and is located south of Novato Boulevard and south of the Bowman Canyon Property boundary.

The substrate within Stream Segment B was mostly rocky, with some pools observed that were over 1 foot deep (Appendix A, Photos 11-12). Stream Segment B appears to provide potentially suitable non-breeding habitat for foothill yellow-legged frog and California red-legged frog. It does not appear to be deep enough, hold water long enough into the summer, or provide sunny areas that are all necessary to provide breeding habitat for these species. Because no known breeding populations of these species occur within dispersal distance, this stream segment is not likely currently utilized by these species. Additionally the streams have high gradients (approximately 5 to 10%) and steep banks, which are not preferred by foothill yellow-legged frog. Stream Segment B is also a series of small (likely seasonal) tributaries that are seep fed and flow generally south from the eastern end of the Bowman Canyon Property until it reaches Novato Creek. There is little known about California giant salamander habitat use. California giant salamanders spend most of their time in refugia, commonly going several days or weeks without changing their location. Due to documented sedentary behavior of terrestrial adults and limited migration movements (average movement rate of 2.4 meters/day), it is not thought that California giant salamanders would utilize streams that are not suitable for breeding as non-breeding aquatic habitat (Johnston 1998).

Two dusky-footed woodrat (*Neotoma fuscipes*) nests were observed during the stream assessments, and their locations are included in Figure 2 (Appendix A, Photos 13-14). The dusky-footed woodrat has several subspecies and there are two subspecies with ranges that overlap near the Bowman Canyon property (*N. fuscipes monochroura* and *N. fuscipes fuscipes*). The San Francisco dusky-footed woodrat (*N. fuscipes annectens*) is listed as a Species of Special Concern by CDFW, its range includes the south and east bays, but does not include Marin County (Matocq 2002). Detailed information about the habitat and wildlife observed at each stream segment is included in Table 4.

Table 4. Stream Assessment and Survey Results

Stream ID	Date Assessed / Surveyed	Dry/Wet	Amphibians Present	Riparian Canopy	Substrate	Potential to Support Special-Status Aquatic Wildlife	Other Notable Observations
A	3/29/19 5/1/19 5/31/19	Wet – Flowing throughout in March, some dry locations during May visits	--	Mostly shaded, oak woodland	Mix of mud and sand	Very Low	May be potential for stream restoration where eroded steep banks occur
B	3/29/19 5/1/19	Wet – Flowing throughout	--	Mostly shaded, oak woodland	Mix of mud, sand, gravel, and cobble	Low	Two dusky-footed woodrat nests observed in riparian canopy near stream



August 2019

Baseline Aquatic Wildlife Report

Legend

- Ponds Surveyed
- Dusky-Footed Woodrat Nests
- Bowman Canyon Property
- Mt. Burdell Park Boundary
- Streams Assessed

Figure 2

Aquatic Habitat Surveyed

Bowman Canyon Property

Marin County Parks

1:8,000

0 600 1,200 Feet

Sources: USGS, California Spatial Information Library, Marin Parks, Bay Area Open Space Council. Projection: State Plane NAD 83 Feet.

Marin County, California

Section 4. SUMMARY AND RECOMMENDATIONS

4.1. SUMMARY

No special-status amphibians or reptiles were observed in 2019 during the baseline surveys at the Bowman Canyon Property. Two ponds and two stream segments were assessed for potential to support special-status species and visually surveyed for special-status species. Dry Lake Pond was determined to provide suitable habitat for California red-legged frog and additional daytime and nighttime visual surveys and dipnet surveys were conducted at this pond. No California red-legged frogs were observed during the surveys. Sierran treefrogs and California newts were found to be breeding in Dry Lake Pond. Stream Segment B could potentially provide non-breeding aquatic habitat for California red-legged frog and foothill yellow-legged frog, but because no known breeding populations of these species occur nearby it is not likely currently utilized. Recommendations for future management of California red-legged frog habitat within the Bowman Canyon Property are included below.

4.2. RECOMMENDATIONS

An overall summary of the recommendations for management activities, restoration, and/or enhancement at each pond is included in Table 5. There are three potential management activities recommended for the Bowman Canyon Property to improve habitat for special-status aquatic species:

1) Berm repair and spillway restoration,
2) Install basking habitat; and
3) Sediment excavation/desilt/enlarge pond

Discussion of each of these management activity recommendations is included in the subsections below. There are many opportunities to conduct habitat restoration, enhancement, and creation activities within the Bowman Canyon Property. In addition to these management recommendations, we also recommend continued monitoring to detect any populations of special-status species and gather data about trends within the Bowman Canyon Property. Specific recommendations for monitoring are included in the Monitoring and Adaptive Management section below.

4.2.1 BERM REPAIR AND SPILLWAY RESTORATION

There are many opportunities for habitat restoration within the Bowman Canyon Property. One of the most important actions that should be implemented as soon as possible is the berm repair at the Dry Lake Pond. This is the only pond to have potential to support breeding California red-legged frogs, and the berm is experiencing substantial erosion where water is spilling over the top (Photo 3, Appendix A), which may cause it to fail entirely if no repairs are made. The current state of berm erosion is also reducing the depth of Dry Lake Pond (approximate maximum depth of two feet at the time of the surveys) by lowering the height of the natural spillway. Despite the damage to the berm, the pond still likely has a proper hydroperiod to support California red-legged frog to metamorphosis, although the current shallow depth paired with regular cattle use could mean the continual sedimentation and subsequent disappearance (or change to a shallow seep) of this pond soon. Additionally, because longer-lasting ponds are known to produce significantly larger numbers of metamorphosing juveniles, repairing the berm could increase the potential population size of California red-legged frogs that the pond could support. Increased depth and longer hydroperiod would also improve habitat quality for western pond turtles. The berm repair should be a relatively quick and minor repair, with limited impact to the surrounding

environment. Continued cattle use to maintain the current vegetative cover is also important for potential future breeding success at this pond. Wildlife biologist experts in California red-legged frog should be consulted during the design process and construction implementation for the berm repair.

Berm requiring repair at Dry Lake Pond, viewing downhill from top of berm. Note significant downcutting and erosion below berm.

4.2.2 INSTALL BASKING HABITAT

The installation of basking structures in ponds that could support western pond turtle is another enhancement action that requires relatively minimal implementation effort. This could be as simple as placing large logs, tree limbs, or other natural debris on the edges of the ponds such that turtles are able to climb up out of the water to bask. Although there was no confirmed presence, installation of basking habitat could also be beneficial for other wildlife species or help encourage western pond turtles to start utilizing Dry Lake Pond as habitat. Dry Lake Pond provides potentially suitable western pond turtle habitat, currently has very little basking habitat. Installation of basking habitat at Dry Lake Pond will have greater priority if desilting/enlarging the pond is conducted first, since pond turtles prefer deeper waters (and longer hydroperiods) than what the Dry Lake Pond currently provides.

4.2.3 DESILT/ENLARGE/CREATE PONDS

Other restoration and enhancement ideas for California red-legged frog habitat within the Bowman Canyon Property are focused on pond expansion or deepening. Desilting and enlarging Dry Lake Pond within the Bowman Canyon Property could help improve habitat to be more suitable for California red-legged frog breeding. However, we understand this is a substantial project, with no guarantee that California red-legged frogs could colonize the pond. As discussed previously in this report, there are no known breeding populations of California red-legged frog within dispersal distance of Dry Lake Pond, but there has been a California red-legged frog observation in a seep in the adjacent Mount Burdell

Preserve (Lisa Michl pers. comm.). A stock pond creation project is currently ongoing at Mount Burdell Preserve, and this new pond is located approximately 1.0 miles northwest of Dry Lake Pond.

The Dry Lake Pond is currently a shallow pond that has an unknown hydroperiod (additional surveys would be required in summer and/or fall to determine how long it holds water). By deepening this pond, it could provide more complex habitat features for California red-legged frog to hide from predators and make this pond more likely to support a breeding population by providing a longer hydroperiod which is important for successful breeding. Longer-lasting ponds are important for breeding California red-legged frog mainly because they produce significantly larger numbers of metamorphosing juveniles. Ponds and pools that dry early produce fewer and usually smaller juveniles than those that hold water longer. Ideally, the pond would remain inundated into August but remain seasonal (Ford et al. 2013). Vegetative cover has been shown to be more important for California red-legged frogs in shallower features where larvae are more visible to predators (Ford et al. 2013). Wildlife biologist experts in California red-legged frog, western pond turtle, and their habitats, should be consulted during the design process and construction implementation for pond restoration activities to ensure that it will improve habitat for these species.

Additionally the Road Wet Pool could be expanded to the south of the existing trail to create potential California red-legged frog breeding habitat. A culvert could be put in place under the road, in order to keep the road accessible during the wet season. Although opportunities exist for pond creation within the Bowman Canyon Property, we advise that management activities first focus on the restoration/ enhancement of existing features.

4.2.4 MONITORING AND ADAPTIVE MANAGEMENT

Adaptive Management is a decision-making process promoting flexible management such that actions can be adjusted as uncertainties become better understood or as conditions change. Monitoring the outcomes of management is the foundation of an adaptive approach, and is necessary because of the degree of uncertainty and natural variability associated with ecosystems and their responses to management. The specific monitoring requirements within the Bowman Canyon Property will be driven by the management actions performed and the special-status species' populations identified. If management actions are not performed, monitoring of existing habitat should still be conducted to determine if new special-status species populations are discovered and if proposed management actions should be placed in a higher priority class or if new management needs have developed.

We recommend continued monitoring of the Dry Lake Pond to ensure that the pond continues to provide suitable California red-legged frog breeding habitat. If the berm is repaired, additional surveys should be performed to see how the repair affects the pond depth, inundation period, and amphibian species populations. Results of California red-legged frog surveys and post-construction monitoring at the newly created pond on Mount Burdell Preserve will likely influence the management and monitoring approach for Dry Lake Pond. Dry Lake Pond is within dispersal distance of the newly created pond within Mount Burdell Preserve and therefore California red-legged frog presence at the Mount Burdell Preserve pond will greatly increase the likelihood that individuals could colonize Dry Lake Pond.

By conducting baseline surveys of the ponds and streams within the Bowman Canyon Property, this project identified where special-status species aquatic breeding and aquatic non-breeding habitat is present within the Bowman Canyon Property. The habitat assessment and survey results also provided the guidance needed to identify recommendations for management and monitoring activities to implement in future years within the Bowman Canyon Property. These management and monitoring recommendations are intended to provide the greatest chance of future success of existing habitat to support special-status species populations within the Bowman Canyon Property.

Coast live oak woodland on Bowman Canyon Property. Stream Segment B runs through the drainage within this oak woodland canopy.

Section 5. REFERENCES

Antonelli, A. L., R. A. Nussbaum, and S. D. Smith. 1972. Comparative food habits of four species of stream-dwelling vertebrates (*Dicamptodon ensatus, D. copei, Cottus tenuis, Salmo gairdneri*). Northwest Science 46:277-289.

Bishop, M., R. Drewes, and V. Vredenburg. 2014. Food Web Linkages Demonstrate Importance of Terrestrial Prey for the Threatened California Red-legged Frog. Journal of Herpetology 48: 137-143.

Bulger, J. B., N. J. Scott Jr., and R. Seymour. 2003. Terrestrial Activity and Conservation of adult California red-legged frogs *Rana aurora draytonii* in coastal forests and grasslands. Biological Conservation 110:85-95.

California Department of Fish and Game (CDFG). 2010. Vegetation Classification and Mapping Program List of California Vegetation Alliances. The Vegetation Classification and Mapping Program. Wildlife and Habitat Data Analysis Branch. September.

California Natural Diversity Database (CNDDB). 2019. Version 5.2.14. Query for occurrences of California giant salamander, California red-legged frog, foothill yellow-legged frog, and western pond turtle. Wildlife and Habitat Data Analysis Branch. March.

California Fish and Game Commission. 2017. California Fish and Game Commission Notice of Findings: Foothill yellow-legged frog (*Rana boylii*). < http://www.fgc.ca.gov/CESA/Foothill_Yellow-Legged_Frog/fylffindingscandidacy.pdf>. (Accessed 2017 Sep).

Cook, D. G. and A. F. Currylow. 2014. Seasonal Spatial Patterns of Two Sympatric Frogs: California Red-legged Frog and American Bullfrog. Western Wildlife 1:1-7.

Declining Amphibian Population Task Force. 2005. Fieldwork Code of Practice. Accessed at: https://www.fws.gov/southwest/es/NewMexico/documents/SP/Declining_Amphibian_Task_Force_Fieldwork_Code_of_Practice.pdf

Doubledee, R. A., E. B. Muller, and R. N. Nisbet. 2003. Bullfrogs, Disturbance Regimes, and the Persistence of California Red-Legged Frogs. Journal of Wildlife Management 67(2):424-438.

Ernst, C. H. and J. E. Lovich. 2009. Turtles of the United States and Canada. Second edition. Johns Hopkins University Press. 827 pp.

Fellers, G. M. 2005. *Rana draytonii* Baird and Girard 1852, California Red-legged Frog. Pp. 552-554. In: Michael Lannoo (Ed.), Amphibian Declines: The Conservation Status of United States Species. Volume 2: Species Accounts. University of California Press, Berkeley, California. xxi+1094 Pp.

Fellers, G. M. and P. M. Kleeman. 2007. California Red-Legged Frog (*Rana draytonii*) Movement and Habitat Use: Implications for Conservation. Journal of Herpetology 41:276–286.

Fitch, H. S. 1938. *Rana boylii* in Oregon. Copeia 3: 148.

Ford, L. D., P. A. Van Hoorn, D. R. Rao, N. J. Scott, P. C. Trenham, and J. W. Bartolome. 2013. Managing Rangelands to Benefit California Red-legged Frogs and California Tiger Salamanders. Livermore, California: Alameda County Resource Conservation District.

Hayes, M. P. and M. R. Jennings. 1988. Habitat Correlates of Distribution of the California Red-legged Frog (*Rana aurora draytonii*) and the Foothill Yellow-Legged Frog (*Rana boylii*): Implications for Management. pp. 144-158 In: Szaro, Robert C., Kieth E. Severson and David R. Patton (technical coordinators). July 19-21, 1988. Proceedings of the symposium on the management of amphibians, reptiles and small mammals in North America. United States Department of Agriculture, Forest Service, General Technical Report (GTR)-166.

Holland, D. C. 1994. The western pond turtle: habitat and history. U.S. Department of Energy, Bonneville Power Administration, Portland, Oregon. 11 chapters + appendices.

Jennings, M. R. and M. P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report to the California Department of Fish and Game. 255 pp.

Jennings, M. R. 1988. Natural History and Decline of Native Ranids in California. Pp. 61–72 in: H. F. DeLisle, P. R. Brown, B. Kaufman, and B. M. McGurty (editors), Proceedings of the conference on California herpetology. Southwestern Herpetologists Society, Special Publication (4).

Johnston B. 1998. Terrestrial Pacific Giant Salamanders (*Dicamptodon tenebrosus* Good) – Natural history and their response to forest practices. MSc. Thesis. University of British Columbia, Vancouver, BC, Canada. 98 p

Matocq, M. D. 2002. Phylogeographical structure and regional history of the dusky-footed woodrat, Neotoma fuscipes. Molecular Ecology. 11:229-242.

Moyle, P.B. 1973. Effects of Introduced Bullfrogs, *Rana catesbeiana*, on the Native Frogs of the San Joaquin Valley, California. Copeia 1973(1): 18-22.

Nussbaum, R. A., E. D. Brodie, Jr., and R. M. Storm. 1983. Amphibians and reptiles of the Pacific northwest. University of Idaho Press, Moscow, ID.

Nussbaum, R. A., and G. W. Clothier. 1973. Population structure, growth, and size of larval *Dicamptodon ensatus* (Eschscholtz). Northwest Science. 47:218-227.

Randall, P. J. 1997. Distribution and ecology of fish and frogs in tributaries to the South Fork Yuba River. M.S. thesis, University of California, Davis.

Rathbun, G. B., N. Seipel, and D. Holland. 1992. Nesting Behavior and Movements of Western Pond Turtles. Clemmys marmorata. Southwestern Naturalist 37(3):319-324.

Rathbun, G. B., N. J. Scott Jr, and T. J. Murphey. 2002. Terrestrial Habitat Use by Pacific Pond Turtles in a Mediterranean Climate. Southwestern Naturalist 47(2):225-235.

Reese, D. A., and H. H. Welsh Jr. 1997. Use of Terrestrial Habitat by Western Pond Turtles, *Clemmys marmorata*: Implications for Management. Pp. 352-357. In J. Van Abbema (ed.), Conservation, Restoration, and Management of Tortoises and Turtles, An International Conference WCS Turtle Recovery Program and the New York Turtle and Tortoise Society, New York.

Scott, N. J., G. B. Rathbun, T. G. Murphey, and M. B. Harker. 2008. Reproduction of Pacific Pond Turtles (*Actinemys marmorata*) in Coastal Streams of Central California**.** Herpetological Conservation and Biology 3(2):143-148.

Stebbins, R. C. 2003. A field guide to western reptiles and amphibians. Third Edition. Houghton Mifflin Co., New York, NY.

Stebbins, R. C., and S. M. McGinnis. 2012. Field Guide to the Amphibians and Reptiles of California. University of California Press, Berkeley, California.

Storer, T. I. 1925. A synopsis of the amphibia of California. University of California Press, Berkeley, California.

Tatarian, P. J. 2008. Movement Patterns of California Red-Legged Frogs (*Rana draytonii*) in an Inland California Environment. Herpetological Conservation and Biology 3(2):155-169.

Thomson, R. C., A. N. Wright, and H. B. Shaffer. 2016. California Amphibian and Reptile Species of Special Concern. California Department of Fish and Wildlife. University of California Press, Oakland, California.

U.S. Fish and Wildlife Service. 2002. Recovery Plan for the California Red-Legged Frog *(Rana aurora draytonii)*. U.S. Fish and Wildlife Service, Portland, Oregon. viii + 173 pp.

_____. 2005. Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog. August. Available at: https://www.fws.gov/sacramento/es/Survey-Protocols-Guidelines/Documents/crf_survey_guidance_aug2005.pdf

_____. 2010. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the California Red-legged Frog; Final Rule. Federal Register 75(51):12816-12959.

_____. 2017. California Red-legged Frog, *Rana draytonii*. California Red-legged Frog scientific species account. March 2017. Accessed July 3, 2019. https://www.fws.gov/sacramento/es_species/Accounts/Amphibians-Reptiles/ca_red_legged_frog

Section 6. APPENDICES

APPENDIX A: PHOTOS

Photo 1. A representative photo of Dry Lake Pond. March 29, 2019.

Photo 2. Sierran treefrog tadpoles observed during visual encounter survey at Dry Lake Pond. March 29, 2019

Photo 3. Berm requiring repair at Dry Lake Pond. March 29, 2019.

Photo 4. Sierran treefrog egg mass observed in Dry Lake Pond. March 29, 2019

Photo 5. Senior Wildlife Biologist Meghan Bishop assessing aquatic habitat and conducting a visual survey at Road Wet Pool. March 29, 2019

Photo 6. California newt adult observed near the Road Wet Pool on the northern side of the Bowman Canyon Property. March 29, 2019

Photo 7. Senior wildlife biologist Dana Terry assessing upland habitat and noting bird observations. March 29, 2019

Photo 8. Representative photo of Stream Segment A on March 29, 2019.

Photo 9. Representative photo of Stream Segment A on March 29, 2019. Sections of the stream had highly eroded banks.

Photo 10. Dry section of Stream Segment A on western edge of property on May 1, 2019.

Photo 11. Representative photo of Stream Segment B with Senior Wildlife Biologist Dana Terry surveying on May 1, 2019.

Photo 12. Representative photo of Stream Segment B. May 1, 2019

Photo 13. Dusky-footed woodrat nest observed near Stream Segment B on March 29, 2019.

Photo 14. Dusky-footed woodrat nest observed immediately adjacent to Stream Segment B. May 1, 2019

Photo 15. Representative photo of Dry Lake Pond on May 31, 2019.

Photo 16. Sierran treefrog larvae, California newt larvae, clam shrimp, and snails observed while conducting dipnet survey at Dry Lake Pond. May 31, 2019.

Photo 17. California newt larvae observed while performing a dipnet survey at Dry Lake Pond. May 31, 2019

Photo 18. Two California newt larvae and one Sierran treefrog larva in hand for size reference, observed during the dipnet survey at Dry Lake Pond. May 31, 2019