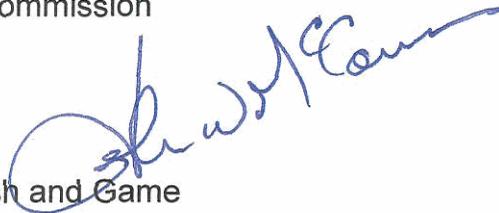


## Memorandum

Date: June 22, 2010

To: John Carlson, Jr.  
Executive Director  
Fish and Game Commission

From: John McCamman  
Director  
Department of Fish and Game



Subject: Department review of petition to list all populations of the mountain yellow-legged frog as an endangered species

The Department of Fish and Game's (Department) has reviewed the petition to list all populations of the mountain yellow-legged frog as endangered under the California Endangered Species Act.

We reviewed the petition, interviewed knowledgeable individuals, and conducted an independent evaluation. The attached Petition Evaluation Report summarizes the categories of information required, evaluates the adequacy and thoroughness of the information provided, and incorporates additional relevant information that the Department obtained during the review period. We have determined that there is sufficient information to indicate that the petitioned action may be warranted. The Department recommends that the petition be accepted and considered.

If you have any questions or need additional information, please contact Sonke Mastrup, Deputy Director, Wildlife and Fisheries Division at 916 653-4673 or Eric Loft, Chief, Wildlife Branch at 916 445-3555.

Attachment

State of California  
Natural Resources Agency  
Department of Fish and Game

**REPORT TO THE FISH AND GAME COMMISSION**

**EVALUATION OF PETITION  
FROM THE CENTER FOR BIOLOGICAL DIVERSITY TO LIST ALL  
POPULATIONS OF THE MOUNTAIN YELLOW-LEGGED FROG  
(*Rana muscosa* and *Rana sierrae*)  
AS ENDANGERED**

June 2010



**John McCamman, Director  
Department of Fish and Game**



**EVALUATION OF PETITION  
FROM CENTER FOR BIOLOGICAL DIVERSITY TO LIST  
ALL POPULATIONS OF THE MOUNTAIN YELLOW-LEGGED FROG  
(*Rana muscosa* and *Rana sierrae*) AS ENDANGERED**

**INTRODUCTION**

The Department of Fish and Game (Department) has prepared this Evaluation Report pursuant to Fish and Game Code section 2073.5. (See also Cal. Code Regs., tit. 14, § 670.1, subd. (d).) On January 27, 2010, the Office of the California Fish and Game Commission (Commission) received the “Petition to List All Populations of the Mountain Yellow-Legged Frog (*Rana muscosa* and *Rana sierrae*) as Endangered under the California Endangered Species Act” (January 25, 2010) (hereafter, the Petition), as submitted to the Commission by the Center for Biological Diversity (Petitioner). Commission staff transmitted the Petition to the Department pursuant to Fish and Game Code section 2073 on February 4, 2010, and the Commission published formal notice of receipt of the Petition on February 26, 2010. (Cal. Reg. Notice Register 2010, No. 9-Z, p. 333.)

This Evaluation Report as required by statute sets forth the Department’s evaluation of the Petition on its face and in relation to other relevant information possessed or received by the Department, and a related recommendation to the Commission as to whether the Petition contains sufficient information to indicate that the petitioned action may be warranted. The Commission, a constitutionally established entity separate from the Department, is vested by California law with exclusive statutory authority to designate species as endangered or threatened under CESA (Fish & G. Code, § 2050 et seq.). (Cal. Const., art. IV, § 20, subd. (b); Fish & G. Code, § 2070.)

The Department of Fish and Game (Department) has prepared this Evaluation Report pursuant to Fish and Game Code section 2073.5. (See also Cal. Code Regs., tit. 14, § 670.1, subd. (d).) This section of the Fish and Game Code and related regulatory authority direct the Department to prepare and submit to the Fish and Game Commission (Commission) an initial evaluation of any petition deemed complete by the Commission, as an initial matter, to add or remove any species to the list of species designated by the Commission as threatened or endangered under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.).<sup>1</sup> The Commission, as established by the California Constitution, is vested with exclusive statutory authority under California law to designate endangered, threatened, and candidate species under CESA. (Cal.

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<sup>1</sup> See, e.g., Cal. Code Regs., tit. 14, 670.1, subd. (b) (governing initial review by the Commission as to whether a petition is complete).

Const., art. IV, § 20, subd. (b); Fish & G. Code, § 2070; see also Fish & G. Code, §§ 2062, 2067, 2068 (endangered, threatened, and candidate species defined.) The Commission, pursuant to this authority, may add, remove, uplist or downlist any plant or animal species to the list of endangered or threatened species, or designate any such species as a candidate for related action under CESA. (See generally Cal. Code Regs., tit. 14, §§ 670.1, subd. (i)(1)(A)-(C), 670.2, 670.5.)

The subject of this Evaluation Report is the “Petition to List All Populations of the Mountain Yellow-Legged Frog (*Rana muscosa* and *Rana sierrae*) as Endangered under the California Endangered Species Act” (January 25, 2010) (hereafter, the Petition), as submitted to the Commission by the Center for Biological Diversity (Petitioner). The Office of the Commission received the Petition on January 27, 2010; Commission staff deemed the Petition complete and notified the Petitioner to that effect on February 4, 2010; and the Commission transmitted the Petition to the Department pursuant to Fish and Game Code section 2073 on February 4, 2010. (See also Cal. Code Regs., tit. 14, § 670.1, subds. (a), (b); Fish & G. Code, §§ 2072, 2072.3.) The Commission also published public notice of receipt of the Petition as required by the Fish and Game Code on February 26, 2010. (Cal. Reg. Notice Register 2010, No. 9-Z, p. 333; Fish & G. Code, 2073, 2078; Cal. Code Regs., tit. 14, § 670.1, subd. (c).)

Fish and Game Code section 2073.5 directs the Department to complete its initial evaluation of a CESA listing petition within 90 days of receipt of the petition. Subdivision (b) of the same section also authorizes the Commission to grant the Department an extension not to exceed 30 days to allow the Department additional time to further analyze and evaluate the petition, and complete the evaluation report. The Department’s Director made such a request to the Commission in the present case on April 22, 2010. The Commission was unable to act on the Department’s request for lack of a quorum at its meeting in Stockton, California, on May 5, 2010, granting the Department’s request for an extension to complete this Evaluation Report at a meeting in Sacramento, California, on May 20, 2010.

## **REGULATORY OVERVIEW**

### **CESA’s Candidacy Evaluation Test And the Commission’s Related Determination**

In general, Commission “Listing of Endangered Species” under CESA is governed by Division 3, Chapter 1.5, Article 2, of the Fish and Game Code, commencing with section 2070. A related regulation is found in Title 14, section 670.1, of the California Code of Regulations. The CESA listing process is also described in published appellate California case law, including *Center for Biological Diversity v. California Fish and Game Commission* (2008) 166 Cal.App.4th 597, 600 (hereafter *CBD*); *California Forestry Association v. California Fish and Game Commission* (2007) 156 Cal.App. 4th 1535, 1541-

1542; and *Natural Resources Defense Council v. California Fish and Game Commission* (1994) 28 Cal.App.4th 1104, 1111-1116 (hereafter *NRDC*).

The published appellate decision providing the most detailed overview of the CESA listing process describes Commission listing of species as a two-step process:

“In the first step the Commission determines whether a species is a candidate for listing by determining whether the petition – when considered with the Department’s written report and the comments received – provides sufficient information to indicate that the endangered or listing ‘may be warranted.’ If this hurdle is cleared, the petition is ‘accepted for consideration’ and the second step begins: the Department conducts a (roughly) year-long scientific-based review of the subject species, reports to the Commission, and then the Commission determines whether listing of the candidate as an endangered or threatened species ‘is [or] is not warranted.’”

(*NRDC*, 28 Cal.App.4<sup>th</sup> at pp. 1114-1115.)

The Commission, in the present case, is at the first step of the CESA listing process for the mountain yellow-legged frog (MYLF) listing Petition. This Evaluation Report is focused on the same first step, intended by law to inform the Commission’s related determination as to whether the Petition, when considered with this Evaluation Report and other related information before the Commission, provides sufficient information to indicate the petitioned action may be warranted. (See generally Fish & G. Code, §§ 2073.5, 2074.2; Cal. Code Regs., tit. 14, § 670.1, subds. (d), (e).) This first step is sometimes referred to as the “for consideration” stage in the Commission listing process and the standard governing the Commission’s related determination at this first stage is sometimes referred to as the candidacy evaluation test. (See, e.g., *CBD*, *supra*, 166 Cal.App.4<sup>th</sup> at p. 610.) Should the Commission determine at a noticed public meeting that the Petition provides such sufficient information, the Commission will “accept” the Petition for further review, designating MYLF as a candidate species protected under CESA following publication of related notice to that effect. (Fish & G. Code, §§ 2074.2, subds. (a)(2), (b), 2074.4, 2080, 2085; Cal. Code Regs., tit. 14, § 670.1, subd. (e)(2).)

The candidacy evaluation test governing the Commission’s determination at this first step in the CESA listing process is the subject of two appellate decisions from California’s Third District Court of Appeal. The first decision, *NRDC*, *supra*, 28 Cal.App.4<sup>th</sup> 1104, addresses in detail the statutory language in the Fish and Game Code governing the candidacy evaluation test. (See, e.g., *Id.* at pp. 1108-1109.) The second decision, *CBD*, *supra*, 166 Cal.App.4<sup>th</sup> 597, elaborates on *NRDC*, addressing the candidacy evaluation test specifically in the context of a

Commission decision to reject a petition for further consideration after determining there was not sufficient information to indicate that the petitioned action may be warranted. (*CBD, supra*, 166 Cal.App.4<sup>th</sup> at pp. 599-600.)

In *NRDC*, the Court of Appeal interpreted the statutory language regarding Commission determinations as to whether a petition contains “sufficient information to indicate that the petitioned action may be warranted.” (Fish & G. Code, § 2074.2, subd. (a); see also Cal. Code Regs., tit. 14, § 670.1, subd. (e).) In so doing, the court interpreted the standard to mean “that amount of information – when considered in light of the [Department’s] written report and comments received – that would lead a reasonable person to conclude there is a ‘substantial possibility’ the requested listing ‘could’ occur[.]” (*NRDC, supra*, 28 Cal.App.4<sup>th</sup> at pp. 1108-1109 (internal citations omitted).) In other words, the court concluded that, if a reasonable person reviewing the petition would conclude that listing could occur, the Commission must accept the petition and designate the species as a candidate for listing under CESA. Based on other “guideposts” offered by the court, while the Commission must find more than a reasonable possibility of listing to designate a species as a candidate, it need not find a reasonable probability of such a future listing at this first step in the CESA listing process. (See *Id.* at pp. 1119-1125.)

Importantly, the *NRDC* decision emphasizes that Commission determinations at this first step in the CESA listing process must be based on scientific information, including the species’ population trend, range, distribution, abundance, life history, habitat requirements, nature of threats to its existence, impact of future management actions, management recommendations, sources of information regarding the species, and a distribution map. (See, e.g., Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subds. (d), (e).) Stated another way, the *NRDC* decision emphasizes the Commission must determine at this first step whether the petitioned action may be warranted based on biological information in the petition or as otherwise available, and not on non-biological factors such as potential economic consequences of the petition’s acceptance. Indeed, as the Third District Court of Appeal concluded, Commission candidacy determinations under CESA must “be based on science not economics.” (*NRDC, supra*, 28 Cal.App.4<sup>th</sup> at p. 1117, fn. 11.)

The *CBD* decision adds important detail regarding the candidacy evaluation test governing the Commission’s first step in the CESA listing process. The Court of Appeal affirmed its earlier, related decision in *NRDC*, emphasizing the term “sufficient information” in Fish and Game Code section 2074.2 means that amount of information that would lead a reasonable person to conclude the petitioned action may be warranted; that the phrase “may be warranted” is appropriately characterized as a “substantial possibility that listing could occur”; and that “substantial possibility” means something more than a reasonable possibility, but that it does not require that listing is more likely than not. (*CBD, supra*, 166 Cal.App.4<sup>th</sup> at pp. 609-610.) In so doing, the court also acknowledged

that the “Commission is the finder of fact in the first instance in evaluating the information in the record.” (*Id.* at p. 611, citing *NRDC, supra*, 28 Cal.App.4<sup>th</sup> at p. 1125.) The court also clarified:

“[T]he standard, at this threshold in the listing process, requires only that a substantial possibility of listing could be found by an objective, reasonable person. The Commission is not free to choose between conflicting inferences on subordinate issues and thereafter rely upon those choices in assessing how a reasonable person would view the listing decision. Its decision turns not on rationally based doubt about listing, but on the absence of any substantial possibility that the species could be listed after the requisite review of the status of the species by the Department under [Fish and Game Code] section 2074.6.”

(*Ibid.*)

Finally, the definitions in CESA of endangered and threatened species are tantamount in any determination as to whether the MYLF Petition contains sufficient information to indicate that the petitioned action may be warranted. The Fish and Game Code defines “endangered species,” in pertinent part, to mean:

“[A] native species or subspecies of a bird, mammal, fish amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, over exploitation, predation, competition, or disease.”

(Fish & G. Code, § 2062; see also *California Forestry Association, supra*, 156 Cal. App. 4<sup>th</sup> at p. 1540, 1549-1551 (“range” for purposes of CESA means the range of the species in California).)

Likewise in pertinent part, the Fish and Game Code defines “threatened species” to mean:

“[A] native species or subspecies of a bird, mammal, fish amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by [CESA].”

(Fish & G. Code, § 2067.)

## **The Department's Petition Evaluation Report and Related Recommendation to the Commission**

As indicated earlier, the Department has prepared this Evaluation Report consistent with controlling statute and regulation. (Fish & G. Code, § 2073.5; Cal. Code Regs., tit. 14, § 670.1, subd. (d).) Fish and Game Code section 2073.5 directs the Department to “evaluate the petition on its face in relation to other relevant information,” and to submit to the Commission a “written evaluation report” with a recommendation as to whether or not the petition contains sufficient information to indicate the petitioned action may be warranted. The related regulation repeats the same charge, focusing the Department’s obligation more specifically on an evaluation of whether the petition contains “sufficient *scientific* information” to indicate that the petitioned action may be warranted based on certain petition content requirements prescribed by Fish and Game Code section 2072.3. (Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1) (*italics added*)). Consistent with that authority, controlling regulation directs the Department to prepare its initial evaluation of a petition and make its related recommendation to the Commission based on all of the following:

- population trend;
- range;
- distribution;
- abundance;
- life history;
- kind of habitat necessary for survival;
- factors affecting the ability to survive and reproduce;
- degree and immediacy of the threat;
- impact of existing management efforts;
- suggestions for future management;
- availability and sources of information; and
- a detailed distribution map.

(*Id.*, § 670.1, subd. (d)(1)(A)-(L).)

As set forth the below, the Department’s initial evaluation of the MYLF Petition on its face, and in relation to other relevant information the Department possesses or has received to date from interested persons, focuses on each of these components.

With respect to the Department’s related recommendation to the Commission as to whether the MYLF Petition contains sufficient information to indicate the petitioned action may be warranted, the Department notes its statutory charge is cast in terms similar to that of the Commission. (Compare Fish & G. Code, §§ 2073.5 and 2074.2.) The Department notes at the same time, however, that the Commission, a constitutionally established distinct entity, is vested under California law with exclusive statutory authority to make listing determinations

under CESA. (Cal. Const., art. IV, § 20, subd. (b); Fish & G. Code, § 2070.) The Department, in this sense, serves in an advisory capacity in the CESA listing process, providing evaluation and analyses to the Commission, and related recommendations regarding final determinations ultimately vested with the Commission alone. (See, e.g., *Id.*, §§ 2071.5, 2072.7, 2073.5, 2074.6; Cal. Code Regs., tit. 14, § 670.1, subds. (d)(1), (f).) That the Department serves in an advisory capacity to the Commission in the CESA listing process is highlighted in related appellate case law, all of which involve judicial review of final Commission action and a related acknowledgement by the court that the Commission alone is vested with exclusive authority to make listing decisions under CESA. (See *NRDC*, *supra*, 28 Cal.App.4<sup>th</sup> at p. 1108; *CBD*, *supra*, 166 Cal.App.4<sup>th</sup> at p. 599; *California Forestry Association*, *supra*, 156 Cal.App.4<sup>th</sup> at pp. 1540-1541.)

The Department's charge and focus in its advisory capacity to the Commission is scientific. As noted above, the provisions in the Fish and Game Code governing the Department and Commission's obligations at the first step in the CESA listing process are both cast in terms of whether the petition at issue contains sufficient information to indicate that the petitioned action may be warranted. (Fish & G. Code, §§ 2073.5, 2074.2.) The title of the subparagraph in the regulation governing the Department's obligations at the same first step directs the Department to evaluate the petition and make its related recommendation to the Commission based on whether there is "Sufficient Scientific Information." (Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1).) The same is true at the second step in the CESA listing process where the Department is charged by statute and regulation to provide a written status review of the biological status of the species, and a related recommendation to the Commission as to whether the petitioned action is warranted based on the "best available science." (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f).) Emphasizing the same point to ensure that end, the Department is also charged by regulation to subject a preliminary draft of a candidate species status review to independent and competent peer review whenever possible. (*Id.*, subd. (f)(2).)

The Department's scientific mandate and focus in its advisory capacity to the Commission during the CESA listing process bears emphasis in light of the Third District Court of Appeal's decisions in *NRDC* and *CBD*. As noted above, both decisions involve judicial review of Commission candidacy determinations at the first step in the CESA listing process. Indeed, the decisions comprise the entirety of published appellate case law at this point in time governing the candidacy evaluation test under CESA. Both decisions, in turn, cast the Commission's "may be warranted" obligations under Fish and Game Code section 2074.2 in terms of whether a reasonable person would conclude that there is a substantial possibility list could occur. (*NRDC*, *supra*, 28 Cal.App.4<sup>th</sup> at p. 1125; *CBD*, *supra*, 166 Cal.App.4<sup>th</sup> at pp. 609-610.) Indeed, the court in *CBD* emphasized as noted above that the "reasonable person standard is an objective standard" and it "does not permit the trier of fact [i.e., the Commission as a constitutionally

established entity comprised of individual commissioners] to substitute his or her own subjective view for the objective, reasonable person.” (*Id.* at p. 610, fn. 13.)

In short, under controlling law, the Commission’s obligation at this first step in the CESA listing process is to discern what an objective, reasonable person would conclude in light of the information contained in the MYLF Petition. In its advisory capacity to the Commission at the same first step, the Department is charged by law to provide a scientific evaluation and a related recommendation to the Commission reflecting the Department’s independent judgment as to whether the MYLF Petition contains sufficient scientific information to indicate that the petitioned action may be warranted. (Fish & G. Code, § 2073.5; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1).) To that end, the Department’s evaluation as set forth below, along with its related recommendation as set forth in this Evaluation Report, are based on and reflect the Department’s independent scientific analysis and recommendation as to whether the Commission should accept the MYLF Petition for further consideration, designating the species as a candidate for listing under CESA.

## **DEPARTMENT EVALUATION OF THE PETITION TO LIST MOUNTAIN YELLOW-LEGGED FROG**

### **Summary of Life History, Distribution, Population Trend and Management Status of the Mountain Yellow-legged Frog**

#### **Life History and Distribution**

The mountain yellow-legged frog (MYLF), a member of the true frog family Ranidae, consists of two species. The southern mountain yellow-legged frog (*Rana muscosa*) is endemic to the southern Sierra Nevada and the Transverse Ranges, while the Sierra Nevada mountain yellow-legged frog (*R. sierrae*) is native to the northern and central Sierra Nevada. MYLF distribution is generally restricted to mid- to high-elevation aquatic habitat, with most extant populations occurring on national park and national forest lands. Breeding habitat consists of ponds, lakes and streams that do not dry out in summer, are deep enough to prevent freezing to the bottom in winter, and do not contain fish. MYLF tadpoles take two to four years to metamorphose into juvenile frogs, depending on water temperature.

#### **Population Trend**

Although once the most abundant vertebrate in the high-elevation habitats of the Sierra Nevada and Transverse Ranges, the Petition and other related information indicates at this juncture for purposes of this initial Evaluation Report that MYLF populations have declined such that re-surveys of museum (i.e., historic)

locations show that 95.2% of *R. mucosa* and 93.3% of *R. sierrae* populations have been extirpated (i.e., are locally extinct). The Petition and other related information also indicate for purposes of this initial Evaluation Report that predation from introduced trout species, extensive mortality from a fungal disease, and air pollution are the primary factors affecting survival and reproduction. The Petition also highlights other factors that may affect survival and reproduction such as pesticides, UV radiation, land use planning, climate change, and susceptibility to local extinctions caused by the existence of remaining MYLF in isolated, small populations.

### **Management Status**

In 2002, the U.S. Fish and Wildlife Service (USFWS) listed the southern California Distinct Population Segment (DPS) (inhabiting the San Gabriel, San Bernardino and San Jacinto mountain ranges) of *R. muscosa* as endangered under the federal Endangered Species Act (FESA) (16 U.S.C. § 1531 et seq.). (See 67 Fed.Reg. 44382 (July 2, 2002).) In October 2000, the USFWS determined that listing MYLF in the Sierra Nevada under FESA may be warranted, designating MYLF in the Sierra Nevada as a federal candidate species. (65 Fed.Reg. 60603 (October 12, 2000).) In 2003 and again in 2007, the USFWS determined that listing the MYLF Sierra Nevada DPS is warranted, but precluded by other higher priority listing actions under FESA. (68 Fed.Reg. 2283 (January 16, 2003); 72 Fed.Reg. 34657 (June 25, 2007).) The MYLF Sierra Nevada DPS remains a designated candidate species under FESA (the Sierra Nevada DPS contains *R. sierrae* in roughly the northern two thirds of the Sierra and *R. muscosa* in the southern third).

The Department designated MYLF as Species of Special Concern (SSC) in 1994. The Department's California Wildlife Action Plan (2007) also identifies MYLF as a Species of Greatest Conservation Need. Finally, the Department identified MYLF as a "decision species" in the recent Hatchery and Stocking Program Environmental Impact Report/Environmental Impact Statement (SCH No. 2008082025) prepared and certified by the Department in coordination with the USFWS in January 2010.

## EVALUATION OF THE INFORMATION PROVIDED IN THE PETITION AND ADDITIONAL INFORMATION GATHERED BY THE DEPARTMENT OF FISH AND GAME

### **Population Trend** (“Population Status and Trends” on beginning on page 4 of Petition)

The Petition describes the decline in population trend of MYLF. The Petition indicates that MYLF have gone from being one of the most numerous vertebrates in the Sierra Nevada to being classified as “endangered” by the International Union for the Conservation of Nature (IUCN). The Petition discusses calculated extinction rates within the ranges of both species of MYLF that compare historical (1899-1994) and current (1995-2005) site occupancy. The Petition discusses published estimates of extinction rates for the southern MYLF (*Rana muscosa*) at 96.2% and 92.5% for the Sierra Nevada MYLF (*Rana sierrae*). One study in Yosemite National Park cited in the Petition found 37% of the *R. sierrae* populations in the park to be extirpated over the course of 2000-2007. For *R. muscosa* in the Transverse Ranges, the Petition cites a published calculated extinction rate of 98.1%, and surveys conducted in the same area by the U.S. Geological Service (USGS), U.S. Forest Service (USFS), and the Department indicate that only eight MYLF populations remain in the area. For Sierra Nevada *R. muscosa* populations, the Petition indicates the rate of population decline is higher now than the rate prior to 1970 due to mortality from the chytrid fungus (more discussion about the fungus, below). The body of literature provided by the Petition in terms of MYLF population trend appears to be reasonably complete.

### **Range** (“Range and Distribution” in the Petition, beginning on page 8)

The Petition describes the range of MYLF, identifying both the historical and current range in California and Nevada. The Department believes the Petition reasonably characterizes the range of the MYLF. Historically, for example, MYLF occurred throughout mid- to high-elevation aquatic habitats of the Sierra Nevada, a few bordering Nevada locations, and throughout the Transverse Ranges of southern California. MYLF currently range discontinuously throughout the Sierra Nevada and the Transverse Ranges of California, and is extirpated from Nevada.

### **Distribution** (“Range and Distribution” in the Petition, beginning on page 8)

For purposes of this initial Evaluation Report, the Department believes the Petition includes a reasonably accurate discussion of the distribution of MYLF, both from a current and historic perspective throughout the species’ range. In Nevada, *R. sierrae* was distributed historically in the Lake Tahoe area and further

north on Mount Rose in mid- to high-elevation streams and lakes. In California, *R. sierrae* was distributed historically from the Diamond Mountains in Plumas County (northeast of the Sierra Nevada) south to Inyo County on both sides of the crest of the Sierra. *R. sierrae* is extinct in Nevada, and a north to south biogeographic break occurs between the two species of MYLF in the Sierra Nevada. On the west side of the Sierra Crest, populations of *R. sierra* are distributed from north of the Feather River, bordered by the ridges that divide the Middle and South Fork of the Kings River. On the east side of the Sierra Crest, *R. sierrae* populations are distributed from the Glass Mountains south of Mono Lake (Mono County) south to the type locality at Matlock Lake (Inyo County).

In southern California, *R. muscosa* was distributed historically in five isolated clusters on Breckenridge Mountain (Kern County); Palomar Mountain (San Diego County); and in the San Jacinto, San Bernardino, and San Gabriel mountains of Riverside, San Bernardino, and Los Angeles counties, respectively. In the Sierra Nevada, *R. muscosa* was distributed historically west of the Sierra Crest in Tulare, Inyo, and Fresno counties. Currently, *R. muscosa* is extirpated from Palomar and Breckenridge mountains, and extant populations in the Sierra Nevada are bordered to the north by ridges that divide the Middle and South Forks of the Kings River. The Petition also notes that current population distributions of both species are restricted primarily to national forest and national park lands. The Petition does not mention the recent (June 2009) rediscovery of a *R. sierrae* population not seen in 50 years in the San Jacinto Wilderness Area located within San Bernardino National Forest. (See <http://www.sciencedaily.com/releases/2009/07/090726093404.htm>.)

**Abundance** (“Abundance- Population Estimates and Changes” in the Petition, beginning on page 12)

The Petition describes the abundance of MYLF as historically “ubiquitous at higher elevations throughout the Transverse Ranges in southern California and the Sierra Nevada of California and Nevada”. The Petition states that “biological surveys conducted over a century ago concluded that *R. sierrae* and *R. muscosa* were the most abundant vertebrates in the high elevation habitats of the Sierra Nevada and the Transverse Ranges.” The Petition also notes that the most prominent declines of MYLF in the Sierra Nevada have occurred north of Lake Tahoe in the northernmost portion of the range and south of Sequoia-Kings Canyon National Park in the southernmost portion of the range. For purposes of its initial Evaluation Report, the Department considers the Petition’s discussion of MYLF abundance as accurate.

**Life History** (“Natural History- Species Description, Biology, and Ecology” in the Petition, beginning on page 13)

For purposes of this Evaluation Report, the Department believes the Petition provides a reasonably thorough overview of available scientific literature describing the life history of MYLF; describing both MYLF species as having a body that is moderately sized and variably colored with a mix of brown and yellow, and dark dorsal patterns varying in size, shape and number. The Petition accurately indicates that MYLF females average slightly larger in size than males; and that females lack the dark, enlarged thumbs and forearms diagnostic of breeding males.

The Petition accurately describes in the Department’s opinion that MYLF is a member of the family *Ranidae* (true frogs), which consists of frogs closely associated with aquatic habitat for breeding and foraging. The Petition also accurately indicates that MYLF has undergone taxonomic reclassification multiple times. Current taxonomy based on both morphological and molecular analysis as accurately described in the Petition, consists of two separate species named (1) southern MYLF (*R. muscosa*) inhabiting the Transverse Ranges and southern Sierra Nevada, and (2) Sierra Nevada MYLF (*R. sierrae*) inhabiting the northern and central Sierra Nevada. The two species differ in mitochondrial DNA, mating calls, and leg length.

In the “Movement” section of the “Natural History” discussion in the Petition, MYLF is accurately described as a diurnal species that basks in sunlight to help regulate body temperature. The Petition also indicates accurately that MYLF are usually found within a distance of 3 ft (1 m) from water, its habitat for overwintering, feeding and breeding.

In the “Feeding” section of the “Natural History” discussion in the Petition, MYLF is described as a top aquatic predator, with juveniles and adults feeding mostly on adult forms of aquatic insects and small terrestrial insects such as ants and bees. The Petition also indicates that MYLF larvae feed on algae and diatoms in silt at the bottom of rocky streams that require an open riparian canopy to photosynthesize.

The Petition describes MYLF reproduction and growth as breeding activity starting between April and July, depending on the timing of ice melt, usually lasting one month. The Petition indicates that a definitive breeding migration is not present in MYLF since it spends the majority of its time near suitable breeding habitat. Approximately 15 to 800 globular eggs per mass are laid in clumps. Oviposition (egg laying) is variable and may occur in shallow or deep water, with egg masses attached to stream banks, vegetation, or rocks. Metamorphosis from larvae (tadpoles) to frogs takes two to four years, depending on elevation and water temperature. Successful breeding occurs in

aquatic habitat that does not dry out in summer, is deep enough not to freeze to the bottom in winter, and does not overlap with fish presence.

Following submittal of the Petition to the Commission a study was published by Matthews and Preisler (2010) that used a mark-recapture study to examine *R. sierrae* movements over a 10 year period. This study confirms in more detail that MYLF has strong site fidelity i.e., 49% of frog recaptures occurred at one water body, and 51% were in two to six different water bodies. The longest distances moved from one observation to the next were over 0.3 mi (500 m; 11 of 1,250 tagged frogs) and 0.45 mi (729 m; one frog).

Mortality risks to the MYLF include predation on eggs (Matthews and Preisler 2010) and larvae by various introduced trout species, and disease caused by the chytrid fungus, the latter of which is discussed in the “Factors Affecting the Ability to Survive and Reproduce” section of the Petition. Although longevity has been described to be an average of four years from metamorphosis (as mentioned in the Petition), it is notable to the Department for purposes of this Evaluation Report that over 11% of the frogs recaptured by Matthews and Preisler (2010) were at least 10 years old.

**Kind of Habitat Necessary for Survival** (“Habitat Requirements” in the Petition, beginning on page 21)

For purposes of this Evaluation Report, the Department believes the Petition accurately describes the kind of habitat necessary for MYLF survival and reproduction, stating that MYLF is associated with “ponds, lakes, and streams at moderate to high elevations.” At higher elevation lakes, the Petition indicates MYLF tends to inhabit grassy or muddy shores, while at lower elevation lakes the frogs tend to inhabit sandy or rocky shores. The Petition also indicates that streams used by MYLF tend to be low gradient and slow to moderately moving to maximize reproduction and avoid flood effects.

The Petition indicates MYLF adults often inhabit rocks near the shore (for basking) in areas denuded of vegetation, while tadpoles inhabit shallow areas near shore. Adults also frequent shallow areas for their warm water temperatures and refuge from fish predation. In addition, the Petition points out that a regression model evaluating presence and absence of MYLF in the southern Sierra Nevada indicated that water bodies occupied by larvae were deeper, had more silt in the littoral zone, had more inlet streams, and had more high quality lakes nearby. If that habitat was available, the Petition indicates the absence of fish had the most dramatic effect on patch occupancy. Differences in habitat occupancy also exist between MYLF in the Sierra Nevada and in southern California. In the Sierra Nevada, MYLF tend to occupy lakes, ponds, and occasionally streams, while in southern California MYLF tend to occupy streams exclusively.

**Factors Affecting the Ability to Survive and Reproduce** (“Factors Affecting the Ability to Survive and Reproduce- species, subspecies, and/or population” in the Petition beginning on page 24)

For purposes of this initial Evaluation Report, the Department believes the discussion in the Petition regarding factors affecting MYLF ability to survive and reproduce is consistent with available scientific literature and is reasonably presented. The Petition divides the factors into two categories: “present or threatened modification or destruction of habitat” and “other factors that may lead to extinction of the [MYLF,]” with the latter mainly focusing on the detrimental effects of small population size and isolation.

Within the modification or destruction of habitat category, spread of the fungal disease chytridiomycosis (caused by *Batrachochytrium dendrobatidis*; Bd) is the first factor mentioned in the Petition. Frog mortality occurs when the fungus causes a skin infection that interferes with oxygen exchange and osmoregulation (fluid balance) of post-metamorphic frogs. Bd has been described as the worst infectious disease ever recorded among vertebrates in terms of the number of species impacted, and its propensity to drive vertebrate species to extinction is directly linked to the recent extinction or serious decline of hundreds of amphibian species worldwide. The disease is widely distributed throughout the Sierra Nevada, resulting in significant mortality in populations of both *R. muscosa* and *R. sierrae*. Scientific literature published after Petition submittal to the Commission indicates that Bd may be present as both an epidemic (widespread, rapid outbreak) and endemic (constant presence with a small number of the population actually becoming infected) infection (Briggs et al. 2010). Another new publication suggests that interventions designed to prevent Bd infection intensity (e.g., temporary removal of frogs from approaching infection, treatment with antifungal drugs) could reduce the probability of population extinction (Vredenburg et al. 2010).

The Petition accurately indicates for purposes of this Evaluation Report that predation by introduced trout species is a significant factor affecting MYLF survival and reproduction. MYLF evolved in historically fishless waters, so larvae have no defense mechanisms against trout predation. Evidence indicates that the introduction of trout into MYLF habitat results in increased predation on the species, and that it restricts and fragments the species’ distribution. In addition to eliminating or reducing MYLF populations by predation, trout presence precludes what would be normal frog recolonization areas after stochastic (random) extirpations. This results in the fragmentation of MYLF habitat and the isolation of remaining populations. These effects are reversible to some degree; trout removal studies have shown that in the absence of disease, significant increases in overall MYLF density can occur after fish removal.

The Petition also identifies the presence of pesticides and other contaminants as factors affecting MYLF survival and reproduction. The Petition discusses the

effects of pesticide drift and the sub-lethal effects of pesticides combined with factors such as disease and introduced trout. While the Petition mentions UV radiation as a factor that affects survival and reproduction, it also states that UV radiation has not been shown to reduce survival or affect distribution of the MYLF.

Land use planning results are also identified by the Petition as factors that affect MYLF survival and reproduction. Negative impacts of these planning decisions include: fire and fire management activities, livestock grazing, overexploitation by scientific collectors and researchers, and recreation involving off road vehicle use. Further factors identified by the Petition as affecting MYLF survival and reproduction are water pollution, including siltation, nitration, and pesticide pollution.

The Petition also discusses potential climate change effects, including changes in water availability, frog recruitment (i.e., survival of tadpoles to metamorphosis), and breeding season length. The Petition indicates climate change is likely having a negative effect on MYLF. Subsequent to Petition submittal, Matthews and Preisler (2010) discussed MYLF high breeding site fidelity with respect to lakes drying up. Since the drying of a lake can result in up to four year-classes (generations) of tadpoles being lost, the authors of the study suggest future investigation regarding the extent to which MYLF in the Sierra Nevada breed in lakes prone to drying.

In evaluating the afore-mentioned factors affecting the MYLF's ability to survive and reproduce, the Department considers the information presented in the petition to be reasonably accurate and complete.

**Degree and Immediacy of Threat** (“Nature, Degree, and Immediacy of Threat” in Petition beginning on page 45)

For purposes of this Evaluation Report, the Department believes the Petition provides a reasonably complete treatment regarding the degree and immediacy of the threat associated with the MYLF. The Petition states that, despite the fact that the majority of remaining MYLF populations exist on protected public lands, “the species has declined dramatically in the last several decades.” The Petition also highlights that small populations are particularly vulnerable to stochastic (random) events that could lead to extinction, and that the extinction risk is sufficient enough for the USFWS to determine that federal listing of the southern MYLF DPS as endangered is warranted under FESA. The Petition did not mention that the IUCN global amphibian assessment classified both species of mountain yellow-legged frogs as endangered: *R. muscosa* because of “a drastic long-term and likely ongoing decline that has resulted in a very small current area of occupancy, severe population fragmentation, and small estimated population size”; and *R. sierrae* because of “severe recent declines that likely are continuing (rate of decline over past 10 years unknown) and that has left only a small

number of extant populations occupying a small fragmented area” (<http://www.iucnredlist.org/apps/redlist/search>).

**Impact of Existing Management Efforts** (Impact of Existing Management Efforts in Petition beginning on page 46)

The Petition provides an incomplete review of existing management efforts for MYLF. The Petition states that federal, state, and local management is currently providing insufficient protection to the MYLF. Federal management is discussed as being inadequate, including several management plans originating from both USFS and the National Park Service (NPS) within the range of the MYLF, but that these federal planning documents lack implementation of a general action plan to conserve the species.

Not mentioned in the Petition is the fact that a working group of agency biologists from the USFS, NPS, USFWS and the Department, and MYLF experts recently completed a conservation assessment for *R. muscosa* and *R. sierrae* in the Sierra Nevada. The (as yet unpublished) assessment forms the foundation of scientific information necessary for a MYLF conservation strategy, development of which has been recently resurrected for MYLF in the Sierra Nevada.

National Parks, including Sequoia-Kings Canyon and Yosemite, are also mentioned in the Petition for their development of an Aquatic Management Plan and a High Elevation Aquatic Resources Plan, respectively, both of which would benefit MYLF through fish removal efforts. State and local management, specifically the Department, is identified in the Petition as providing insufficient protection for MYLF during fish stocking activities throughout high elevation aquatic habitat in California.

The Petition mentions a number of current research activities, monitoring studies and habitat improvement projects being conducted on behalf of MYLF. The Petition includes limited information, however, regarding Department activities to benefit MYLF. For example, an important change in Department trout stocking practices occurred in 2001 when stocking was halted in waters where MYLF were known to occur, precluding any new or additional impacts to MYLF. Beginning in 1998, the Department has removed trout from 34 Sierra Nevada lakes to benefit MYLF, and removal in another 16 lakes is underway. Approximately seven miles of stream habitat in the Sierra Nevada have been made fishless to benefit MYLF, and ongoing trout removals from roughly 5 miles of habitat in three Southern California streams are nearing completion. There are approximately 400 waters identified in Department Aquatic Biodiversity Management Plans for MYLF restoration. These waters are being converted from stocked waters to their historically fishless condition to benefit MYLF.

The Petition did not mention an interagency agreement and effort to captively-propagate MYLF eggs salvaged from a southern California site where recent

catastrophic fire and subsequent flooding threatened one of the eight remaining MYLF populations in the Transverse Ranges. The San Diego Zoo, along with USGS, USFS, USFWS, University of California and the Department are currently cooperating to attempt reintroduction of MYLF eggs or other life stages into waters in the San Bernardino National Forest. Other reintroduction efforts will be determined based on the success of the current one.

**Suggestions for Future Management** (“Recommended Management and Recovery Actions” in Petition beginning on page 56)

The Petition makes the following general recommendations for managing the MYLF in California:

- Protect mountain yellow-legged frog habitat from habitat degradation related to livestock grazing, off-road vehicles, urban sprawl and other factors.
- Conduct research on the impacts of pesticides on mountain yellow-legged frogs and ban use of pesticides in the Central Valley with known negative impacts on frog populations.
- Take steps to stop the spread of chytrid fungus by limiting travel to areas where frogs have tested positive for the disease, requiring researchers to follow strict hygienic protocols, and educating the public about not handling or transporting frogs.
- Cease all stocking of trout in lakes with mountain yellow-legged frogs and in lakes in the same sub-watershed with mountain yellow-legged frogs.
- Non-native trout should be removed from many lakes to allow further recovery of mountain yellow-legged frogs. Fish removal should also be planned for whole watersheds in order to allow development of mountain yellow-legged frog meta-populations, increasing the species resilience to individual population extinctions related to disease and other factors.

**Availability and Sources of Information** (“Information Sources” and “Literature Cited” in the Petition beginning on page 56)

The Petition includes an extensive section listing the literature cited in the text. Some pertinent scientific literature was published after submittal of the Petition to the Commission. Related scientific literature published subsequent to Petition submittal is listed below. This more recent information does not diminish the overall accuracy and completeness of the petition.

**Detailed Distribution Map**

The Petition contains a single map, on page 8, delineating the range (versus distribution) of the MYLF in California. Attached to this Evaluation Report is an

additional map illustrating in detail the distribution of both species of MYLF in California.

#### **Literature Relevant to MYLF Status Published After Submittal of Petition**

Briggs, C. J., R. A. Knapp and V. T. Vredenburg. 2010 . Enzootic and epizootic dynamics of the chytrid fungal pathogen of amphibians. PNAS 107(21): 9695–9700.

Matthews, K. R. and H. K. Priesler. 2010. Site fidelity of the declining amphibian *Rana sierrae* (Sierra Nevada yellow-legged frog). Can. J. Fish. Aquat Sci 67:243-255.

Vredenburg , V. T., R. A. Knapp, T. S. Tunstall and C. J. Briggs. 2010. Dynamics of an emerging disease drive large-scale amphibian population extinctions. PNAS 107( 21):9689–9694.

124°0'0"W

120°0'0"W

116°0'0"W

41°0'0"N

37°0'0"N

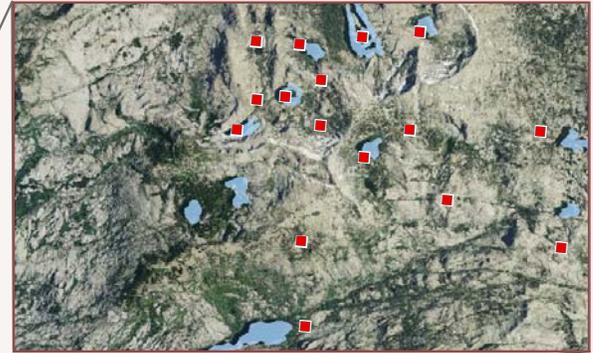
33°0'0"N

41°0'0"N

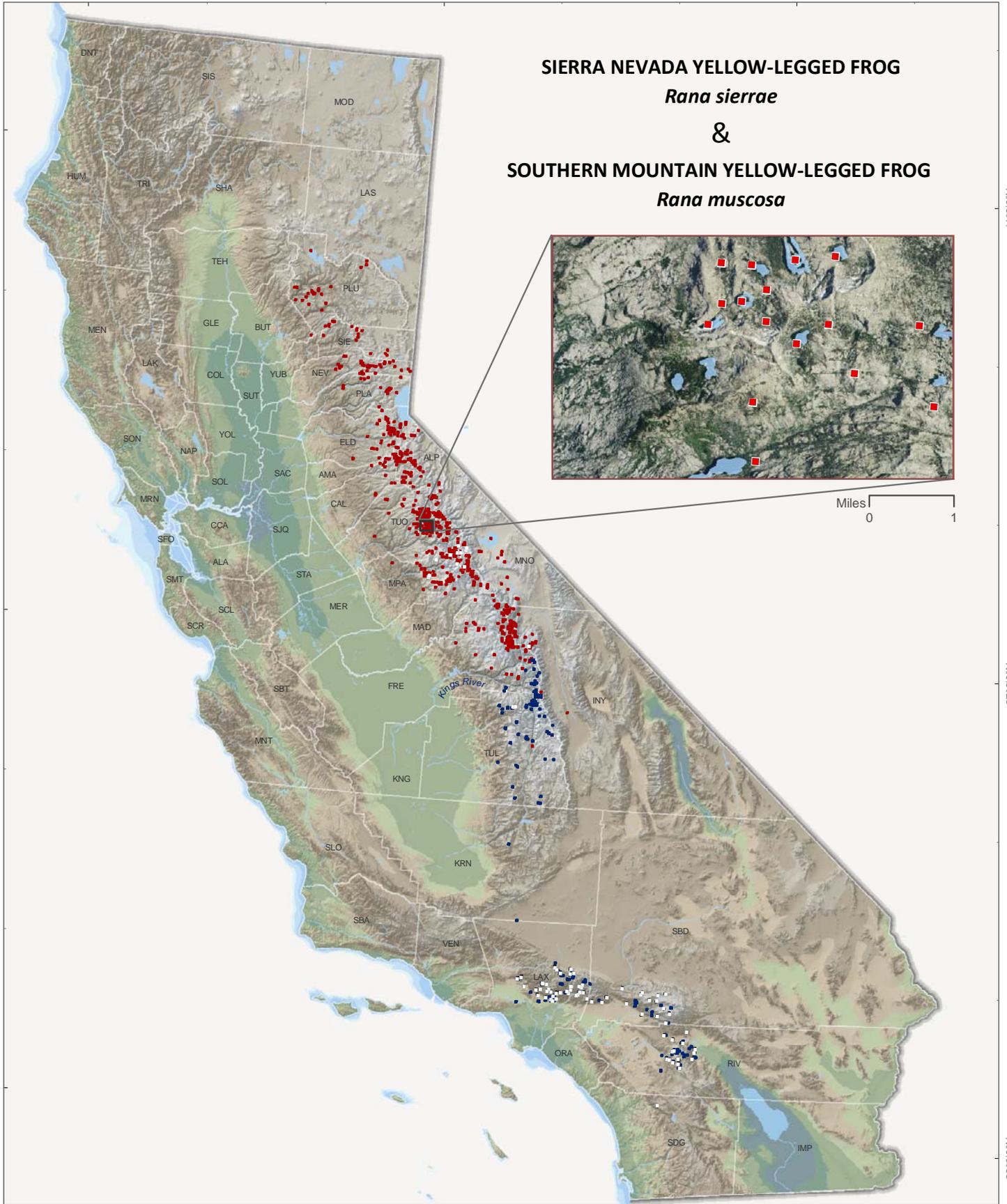
37°0'0"N

33°0'0"N

**SIERRA NEVADA YELLOW-LEGGED FROG**  
*Rana sierrae*  
 &  
**SOUTHERN MOUNTAIN YELLOW-LEGGED FROG**  
*Rana muscosa*



Miles  
 0 1



- *Rana sierrae*
- *Rana muscosa*

□ CNDDB Extirpated

Source data; CNDDB May 2010, Vredenberg et al. 2007, BIOS S99, DS193, DS279, and museum data from CAS, and MVZ.