

Potential Sites for the Reintroduction of the Oregon Spotted Frog (*Rana pretiosa*) in the State of Oregon Using Habitat Modeling



The Oregon Spotted Frog

A threatened native amphibian

The Oregon Spotted Frog (*Rana pretiosa*) was given On August 28, 2014, a listing by the USFWS of threatened species under the Endangered Species Act and a final ruling designating critical habitat was given in September 2014. The Oregon spotted frog has been lost from at least 78 percent of its former range. Precise historic data is lacking, but this species has been documented in British Columbia, Washington, Oregon, and California. It is believed to have been extirpated locally extinct but exists elsewhere from California. It is currently known to occur from extreme southwestern British Columbia, south through the eastern side of the Puget Willamette Valley Trough and the Columbia River Gorge to south-central Washington, to the central Cascades Range and Klamath Valley in Oregon. In Oregon, Oregon spotted frogs historically were found in Multnomah, Clackamas, Marion, Linn, Benton, Jackson, Lane, Wasco, Deschutes and Klamath counties. Currently, this species is only known to occur in Wasco, Deschutes, Klamath, Jackson and Lane counties.

Habitat

This species is the most aquatic native frog in the Pacific Northwest. It is almost always found in or near a perennial body of water that includes zones of shallow water and abundant emergent or floating aquatic plants, which the frogs use for basking and cover cover (Leonard et al. 1993, Coleman and Thoms 1996, McAllister and Leonard 1997, Paul 1997, Paul 1999). Oregon spotted frogs seem to prefer fairly large, warm marshes (approximate minimum size of 4 hectares (9 acres)) that can support a large enough population to persist despite high predation rates (Hayes 1994) and sporadic reproductive failures. Large concentrations of Oregon spotted frogs have been found in areas with the following characteristics: (1) the presence of good breeding and overwintering sites connected by year-round water; (2) reliable water levels that maintain depth throughout the period between oviposition and metamorphosis; and (3) the absence of introduced predators, especially warm-water game fish and bullfrogs.

Description

The Oregon spotted frog is named for the black spots that cover the head, back, sides, and legs. The dark spots have ragged edges and light centers, which are usually associated with tubercles or raised areas of skin; these spots become larger and darker and the edges become more ragged with age. Body color also varies with age. Juveniles are usually brown or, occasionally, olive green on the back and white or cream with reddish pigments on the underbelly and abdomen. Adults range from brown to reddish brown, but tend to become more red with age; large, presumably older individuals may be brick red over most of the back. Red increases on the abdomen with age, and the underbelly becomes a vivid orange-red. This red coloration can be used to distinguish the spotted frogs from other native frogs. The Oregon spotted frog is a medium-sized frog, ranging from 44 to 100 millimeters (1.7 to 4 inches) in body length (McAllister and Leonard 1997). Females are typically larger than males and can reach up to 100 millimeters (4 inches) (Leonard et al. 1993).

Reasons for Decline

Many factors are believed to have caused Oregon spotted frogs to decline and continue to threaten this species, including loss of habitat, non-native plant invasions, and the introduction of exotic predators such as bullfrogs. Over 95 percent of historic marsh habitat, and consequently Oregon spotted frog habitat, has been lost in the Willamette and Klamath basins. Changes in hydrology (due to construction of ditches and dams) and water quality, development, and livestock overgrazing continue to result in habitat loss, alteration, and/or fragmentation. Non-native plant invasions by such aggressive species as reed canary grass (*Phalaris arundinacea*), and succession of plant communities from marsh to meadow also threaten this species' existence. Introductions of



Method

Habitat models allow for the assessment of the quality of habitat for a species within the study area or a modeled corridor, and serve as the required tool layer for land-use planning and corridor analysis. In GIS, habitat suitability models relate suitability to raster-based layers. In our model we chose land use/land cover, elevation, distance from major highways, wetlands greater than 9 acres, mean temperature and precipitation, connectivity between wetlands and existing populations. Using the ArcInfo tool extension Corridor design, we created a model from these inputs and ran the model to locate the best location to reintroduce the Oregon Spotted Frog. The parameters we used were mostly based on Screening Model for Determining Likelihood of Site Occupancy by Oregon Spotted Frogs (*Rana pretiosa*) in Washington State created by the Washington Department of Fish and Wildlife; a two tiered model with some modifications to suit our needs. Our methodology for screening for appropriate habitat is as follows:

Screening Model Parameters Tier 1

Elevation
Range-wide potentially habitable elevations range from sea level (above the influence of seawater) to 1902 m (6,241 ft) above sea level. In Washington, Oregon spotted frogs have been found at habitable elevations ranging between 43 – 840 m (141 – 2,790 ft).

NW1 classification
Palustrine emergent habitat is the only occupied site for which NW1 data were available. A wetland containing palustrine emergent habitat, alone or in any combination with 2 additional palustrine, lacustrine, or riverine habitat type is listed the animal appendix should be considered potential OSP habitat.

Wetland size
Minimum known wetland size at an occupied and reproductively active site in Washington State, determined by aerial extent of NW1 vegetation, was 4.3 ha (11.6 ac). Buffering this value by 25%, any wetland 2.3 ha (5.8 ac) were considered potentially habitable.

NLCD Landscape composition
Between 0 – 75% of all area within 1.6 km (1 mi) of occupied wetland sites contained developed classes of NLCD. Buffering by 25% produced an upper estimate of 2.8 ha of the area within 1.6 km of a candidate wetland parameter that may be developed for residential, commercial, industrial, and/or transportation purposes. (Germann and Cosentino 2004)

Distance to major highways
The Oregon Spotted frog may migrate between breeding sites and wintering habitat between 1-2 kilometers and as much as up to 9 kilometers. The maximum normal migration distance of 2 kilometers was used as a barrier to migration distance.

Environmental Factors
Mean temperature and precipitation were used in the model for habitat criteria. These parameters were determined through the use of the Corridor Design Tool. Habitat modeling, based on existing populations of *Rana pretiosa*.

Existing Populations
Any sites that were found to have existing populations of *Rana pretiosa* were eliminated from the selection process as the goal of the project was to determine sites for reintroduction of this species but the proximity of existing populations was taken into consideration as reintroduction is important to maintain genetic diversity. This was determined by analyzing for connectivity between sites using the Corridor Design tool. These sites should be considered in the larger scheme of species management.

The second tier of the model involves an onsite investigation by a state biologist to confirm the suitability of the habitat. As a means of confirming the output of the tool a Weighted Analysis was performed of the data and from the results of the two methods we choose two sites for potential reintroduction of Oregon Spotted Frog.

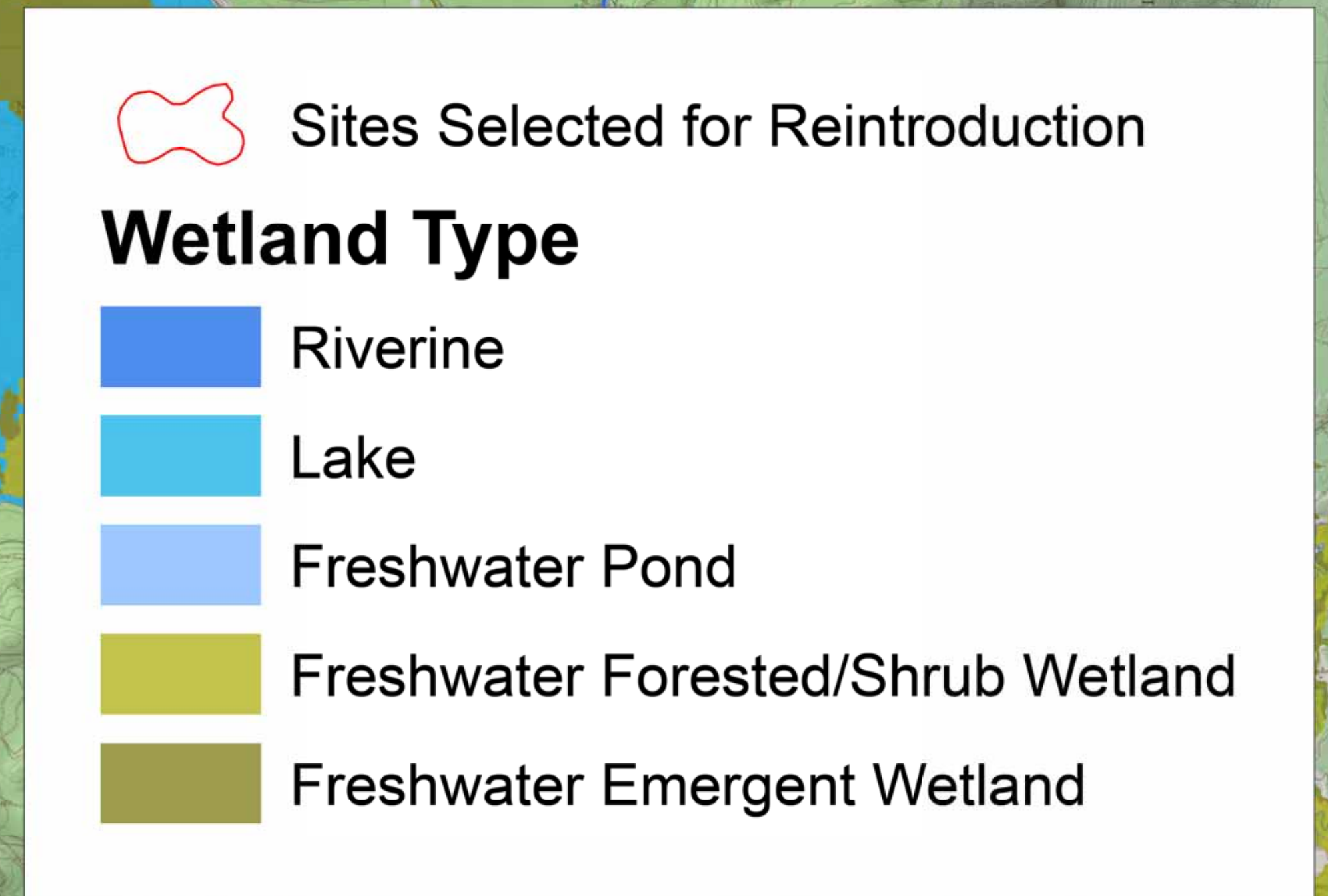
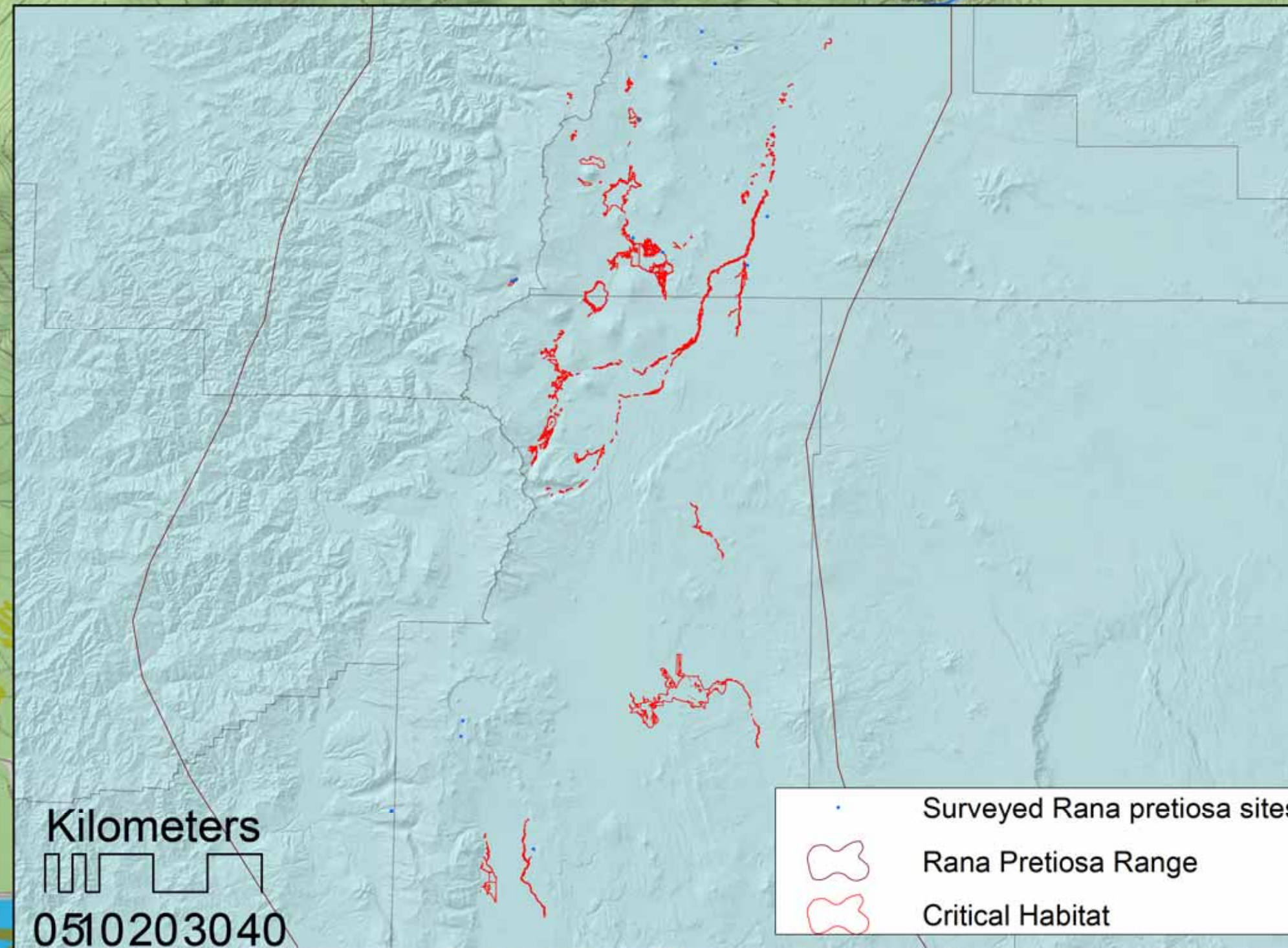
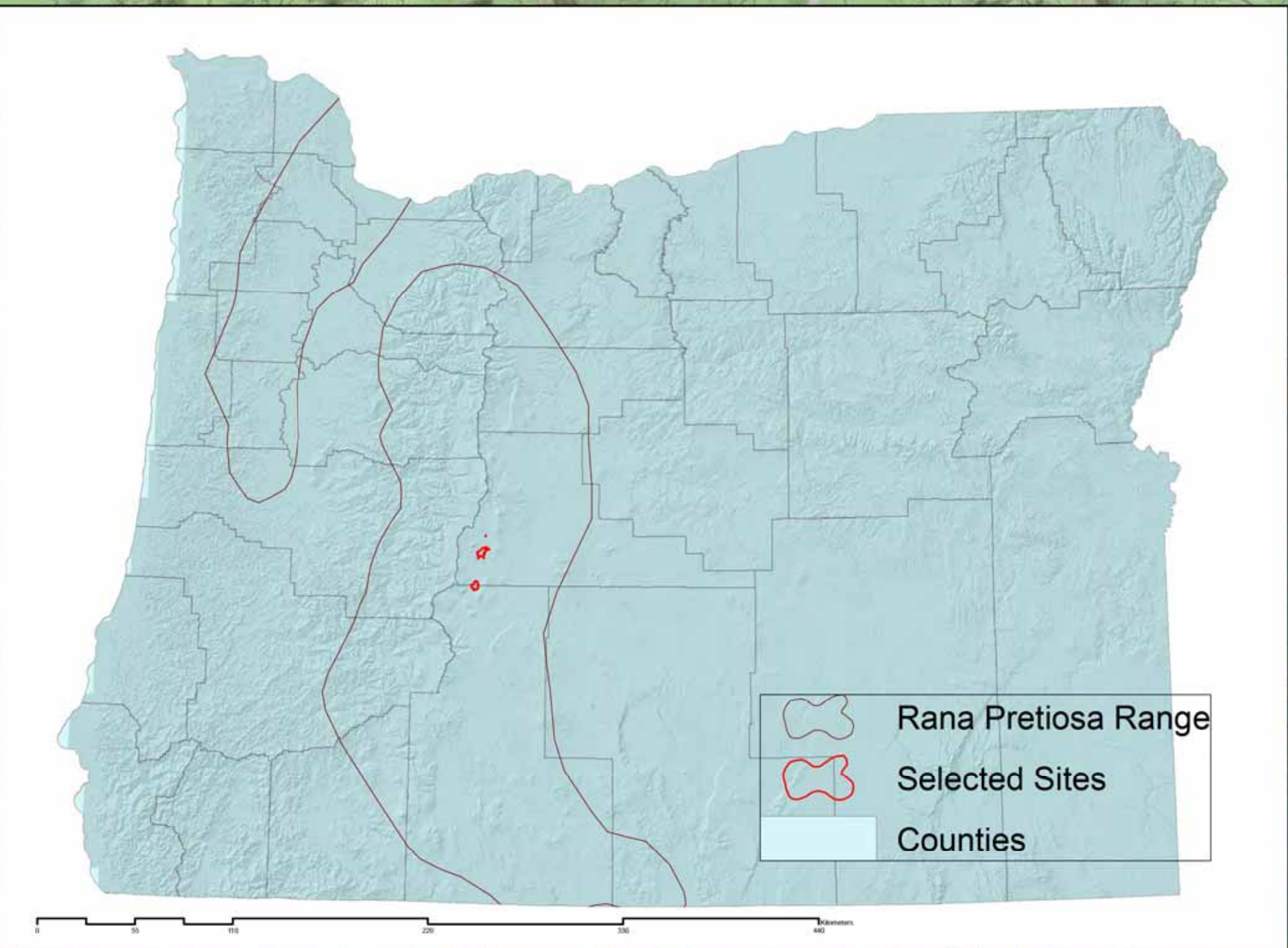


Potential site for Reintroduction: Davis Lake



Potential Site for Reintroduction: Crane Prairie Reservoir

Source	URL	Source	URL
U.S. Fish and Wildlife Service	http://www.fws.gov	U.S. Fish and Wildlife Service	http://www.fws.gov
U.S. Department of the Interior	http://www.doi.gov	U.S. Department of the Interior	http://www.doi.gov
U.S. Department of Agriculture	http://www.usda.gov	U.S. Department of Agriculture	http://www.usda.gov
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Sources:



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