

Tehema and Butte Counties contain Northern Basalt Flow vernal pools that are limited to ancient terraces and hilltops that comprise some of the oldest geologic formations in California. Northern Volcanic Mudflow vernal pools are delineated in Butte and Yuba Counties. Throughout the Central Valley, the habitat ranges from high terrace landforms to claypan and hardpan pool types. Northern Basalt Flow vernal pools are found in Fresno County in the low elevation foothills. In the Suisun Marsh area, vernal pool fairy shrimp are found in the saline-alkaline transition zone. The parent material of vernal pools greatly influences species composition and hydrologic functioning of the vernal pool (Hanes and Stromberg 1998; Holland and Jain 1981, 1988). Soils beneath vernal pools are extremely variable and are not the same as soils mapped by soil surveys, but are usually undescribed hydric inclusions which vary upon location (Holland and Dain 1990). The primary constituent elements of critical habitat for vernal pool fairy shrimp are the habitat components that provide:

(i) Vernal pools, swales, and other ephemeral wetlands and depressions of appropriate sizes and depths that typically become inundated during winter rains and hold water for sufficient lengths of time necessary for vernal pool fairy shrimp incubation, reproduction, dispersal, feeding, and sheltering, including but not limited to Northern Hardpan, Northern Claypan, Northern Volcanic Mud Flow, and Northern Basalt Flow vernal pools formed on a variety of geologic formations and soil types, but which are dry during the summer and do not necessarily fill with water every year; and

(ii) The geographic, topographic, and edaphic features that support aggregations or systems of hydrologically interconnected pools, swales, and other ephemeral wetlands and depressions within a matrix of surrounding uplands that together form hydrologically and ecologically functional units called vernal pool complexes. These features contribute to the filling and drying of the vernal pool, and maintain suitable periods of pool inundation, water quality, and soil moisture for vernal pool crustacean hatching, growth and reproduction, and dispersal, but not necessarily every year.

Oregon

Vernal pool fairy shrimp is the only species addressed in this final rule that occurs in Oregon. Four units in Oregon are designated as essential to the conservation of vernal pool fairy

shrimp, and there are 29 units in California. The Oregon units occur approximately 200 km (125 mi) north of the nearest unit designated for this species in California. We identified critical habitat areas essential to the conservation of vernal pool fairy shrimp to reflect the species geographic distribution and varying habitat types and species associations across its range. Maintaining vernal pool fairy shrimp across their full geographic distribution would make the species less susceptible to environmental variation or negative impacts associated with human disturbances or natural catastrophic events across the species entire range at any one time (Grosberg 2002, Helm 1998; Hunter 1996, New 1995, Primack 1993; Redford and Richter 1999; Rossum *et al.* 2001). Variation in environmental conditions such as precipitation amount, precipitation timing, and temperature, influence vernal pool species including hatching and reproduction of vernal pool fairy shrimp from year to year (Eriksen and Belk 1999, Grosberg 2002, Helm 1998, Helm and Vollmar 2002, Service 1994c, Simovich 1998).

Unit 1A, B, C, D, E, F, and G, North Agate Desert Unit, Jackson County (2,130 ac (862 ha))

This unit consists of seven subunits, all located to the north of Little Butte Creek. This unit represents the northern limit of the species' distribution (criterion 1). It is of sufficient size to sustain the natural ecosystem processes (e.g., fires) that have historically influenced vernal pool habitat, and is separated from the nearest other unit designated for Oregon, Unit 4, by over 2 mi (3.2 km). Three of the subunits are west of the Rogue River, and the remaining four are to the east. All but one of these subunits are located to the south of U.S. Route 234 (Sam's Valley Highway). The one remaining unit is located to the east of the Rogue River, about 1.5 mi (2.4 km) north of the confluence with Reese Creek.

Unit 2A, B, C, D, and E, White City East Unit, Jackson County (2,251 ac (911 ha))

This unit consists of five subunits, located east of U.S. Route 62 (Crater Lake Highway) and south and southeast of Dutton Road. This unit provides the easternmost extent of the species' range in Oregon (criterion 1). It represents a significant component of the species' original range in the State and is of a sufficient size to sustain the natural ecosystem processes (e.g., fires) that have historically influenced vernal pool habitat (Borgias 2003). The largest and easternmost of the subunits occurs just

to the east and north of Agate Lake. It is separated by more than 1 mi (1.6 km) from Unit 3, White City West, and by approximately 3.5 mi (5.6 km) from the North Agate Desert Unit.

Unit 3A, B, and C, White City West Unit, Jackson County (2,301 ac (931 ha))

This unit consists of three subunits, located west of Agate Road, south of the Rogue River, and east of Bear Creek. This unit contains the least fragmented intact examples of the original Agate Desert mounded vernal pool grassland habitat (criterion 3). It is of sufficient size to sustain the natural ecosystem processes (e.g., fires) that have historically influenced vernal pool habitat; it is separated from the White City East Unit by more than 1 mi (1.6 km) and from the Table Rocks Unit by over 1.5 mi (2.4 km).

We believe that, taken together, the designated Agate Desert units (Units 1–3) comprise a functional vernal pool complex consisting of vernal pools, mounded grassland and associated uplands, where natural processes, including connectivity, function within or near the natural range of variability. Each of the three designated Agate Desert units is essential to the conservation of vernal pool fairy shrimp in the Agate Desert.

Unit 4A and B, Table Rocks Unit, Jackson County (892 ac (361 ha))

This unit consists of two subunits, located on two flat-topped mesas known as Upper and Lower Table Rocks, situated north and west of the Rogue River. These rimrock features are remnants of ancient lava flows that filled portions of the Rogue River nearly 10 million years ago (BLM 1998). Subsequent erosion of softer geologic layers has left these harder andesite (volcanic rock) formations rising some 800 ft (245 m) above the present Rogue Valley. Vernal pools on the Table Rocks differ from those of the Agate Desert, in that they are formed over an impervious layer of bedrock. This unit represents a unique habitat for vernal pool fairy shrimp in Oregon (criterion 2). The Table Rocks Unit is disjunct from the North Agate Desert Unit by over 2 mi (3.2 km), and from the White City West Unit by approximately 1.5 mi (2.4 km).

California

Unit 5, Redding Unit, Shasta County (3,666 ac (1,485 ha))

This unit contains the largest intact vernal pool habitat in the Sacramento Valley and represents the northern portion of vernal pool fairy shrimp's range in California (criteria 1 and 4).