TEMPORALLY IRREGULAR BREEDING OF WESTERN SPADEFOOT TOADS (SPEA HAMMONDII) IN MANAGED WETLANDS

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The intensive cultivation of landscapes and associated practices, such as pesticide use, have been shown to negatively affect amphibian species (Marco and others 1999; Davidson and others 2002; Gray 2002; Kiesecker 2002; Fellers and others 2004; Ghioca-Robrecht and others 2010), and have been linked with marked declines of amphibians in California’s Central Valley (Sparling and others 2001; Fisher and Shaffer 2002). In light of such issues, the United States Department of Agriculture (USDA) has undertaken the Conservation Effects Assessment Project (CEAP), which is a multi-agency effort to measure the environmental effects of federally-funded conservation practices and programs and develop the science base for environmentally responsible agricultural management. These assessments are performed at national, regional, and watershed scales focusing on croplands, grazing lands, wetlands, and wildlife. In California’s Central Valley, CEAP assessments have focused on lands enrolled in the Wetlands Reserve Program (WRP). The WRP is a voluntary program administered by the USDA’s Natural Resource Conservation Service that provides technical and financial support for landowners who elect to participate in conservation initiatives, such as wetland restoration.

Conservation practices and programs like the WRP are intended to protect, restore, and enhance habitat. While conservation methods are designed to support wildlife and provide ecosystem services, the effects on wildlife are not entirely clear; conservation efforts can potentially have both positive and negative effects on species. One commonly used method is the manipulation of flooding regimes at managed wetlands. It is known that changes in hydroperiod can influence the breeding phenology of aquatic species such as amphibians (Lannoo 1998; Sartorius and Rosen 2000; Horner 2001), but little is known about the effects on breeding of manipulated flooding regimes not managed in accordance with natural hydroperiods. The aim of our study was to assess whether Western Spadefoot Toads (Spea hammondii) opportunistically breed outside of known breeding periods in wetlands whose hydroperiods are managed according to WRP guidelines, rather than natural hydroperiods.

Western Spadefoot Toads range from northern California to northwestern Baja California, Mexico. In California, this species occurs throughout the Central Valley and associated foothills, as well as the Coast Ranges and coastal lowlands between San Francisco and northwestern Mexico (Fig. 1; Stebbins 2003; USFWS 2005). The Western Spadefoot Toad is a Species of Special Concern in California, where populations have been reduced by agricultural practices, urban development, and the introduction of nonnative predators (Jennings 1996; Davidson and others 2002). More than 80% of historically occupied Western Spadefoot Toad habitat in southern California, and more than 30% of such habitat in northern and central California, has been developed or converted to uses that are unsuitable for sustained populations (Jennings and Hayes 1994).

The Western Spadefoot Toad is a desert-adapted and opportunistic breeding species that synchronizes its reproduction with infrequent and unpredictable rainfall (Denver 1998). The

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