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RANA DRAYTONII (California Red-legged Frog). **DISPERSAL.**

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RANA DRAYTONII (California Red-legged Frog). **DISPERSAL.** Very little information is available regarding dispersal of post-metamorphic juvenile *R. draytonii* from perennial ponds, although mass emigration in response to receding water has been documented for other pond-breeding anurans (Paton et al. 2000. Northwest. Nat. 7[3]:255–269, Pilliod et al. 2002. Can. J. Zool. 80[11]:1849–1862). During the 2003–04 and 2004–05 rain seasons, we captured *R. draytonii* incidentally in pitfall traps while conducting studies for *Ambystoma californiense* at five perennial ponds on the ca. 8094 ha Santa Lucia Preserve near Carmel, Monterey County, California, USA. The study area consisted primarily of a mosaic of grassland, coastal scrub, oak woodland, and redwood forest habitats in four watersheds (Potrero, Robinson Canyon, Las Garzas, San Clemente) that drain into the Carmel River and Pacific Ocean. The property was historically used to graze cattle, and the manmade stock ponds, which ranged in size from 0.08–0.53 ha, were situated in relatively open areas in or near grassland or oak savanna. The purpose of this note is to document mass dispersal of *R. draytonii* metamorphs from perennial ponds, which has conservation and land management implications given that the species is listed as Threatened by the federal government.

We initiated drift fence studies on 15 Oct in 2003 and 2004, prior to the first significant rain each season, and completed them by 1 April. Every pond was partially enclosed with 20 m lengths of 0.914 m high silt fence (Enge 1997. Herpetol. Rev. 28:30–31) buried at least 15 cm and situated 2–10 m from the high water line. Two to 10 m gaps were left between lengths of drift fence to allow free movement of amphibians on nights when the pitfall traps were shut. Each of the five study ponds were ≥ 65% enclosed by drift fence spaced equidistant around the entire perimeter. Paired pitfall

traps (7.6 L) were installed 10 m apart at the ends and middle of each length of fence and covered with an elevated plywood shade. On evenings when rain was forecast (>50% likelihood), traps were opened and checked on the following morning; after each rain event traps were left open for one additional night. We recorded length measurements snout–urostyle length (SUL) from a subset of captured *R. draytonii* and released them in the nearest dense, moist vegetation on the opposite side of the drift fence (outward-bound) or at the edge of the pond (inward-bound).

Pitfall traps were open 57 nights in 2003-04 and 49 nights in the 2004–05 winter seasons. We recorded 308 captures of *R. draytonii* in both years combined, of which 220 were metamorphs (73%). Metamorphs were captured at all ponds although the number varied considerably by location (Table 1). Average size (SUL) of dispersing metamorphs was 30.7 mm (range 22–42 mm; N = 213). The actual number of metamorphs, sub-adults (ca. 45–75 mm) and adults (>75 mm) recaptured was unknown because individuals were not marked. Since there were gaps in the drift fence arrays, any metamorphs captured in outside traps at the end of a drift fence section were still considered to be dispersers; those captured in interior outside traps (N = 15) were excluded from analysis. Therefore, 93% of captured metamorphs were assumed to be dispersers. Given that no inward-bound individuals captured from Dec through March measured < 57 mm SUL (N = 32), there was no indication that any metamorphs returned to the ponds.

In 2003–2004, 95% of all metamorphs were captured by 25 Dec (Fig. 1). Only three metamorphs were captured after 1 Jan, in spite of heavy rains from Jan through March. In 2004–05, 95% of metamorphs were captured by 12 Nov. Similar to the previous year, despite frequent rain from Jan through March, no metamorphs were captured after 30 Dec. In both years, the highest capture frequency occurred during the first significant precipitation of the rain season, even though the magnitude of these events differed markedly (8 mm on 1 Nov 2003 vs. 24 mm on 17 Oct 2004). Precipitation during 2003-04 was 88% of normal while precipitation in 2004-05 was 143% of normal for Carmel Valley, California. These results suggest that the first rains of late summer/early fall, regardless of magnitude, incite dispersal and that most *R. draytonii* metamorphs have left by the end of the calendar year.

The number of captured metamorphs varied considerably between seemingly productive *R. draytonii* breeding ponds. Comparisons of relative abundance to estimate potential recruitment should be viewed with caution, since this study did not target *R. draytonii*. Furthermore, over-wintering *R. draytonii* tadpoles (Fellers et al. 2001. Herpetol. Rev. 32:156–157) were observed at two of the five ponds, and individuals may therefore transform and disperse

TABLE 1. Number of *Rana draytonii* captured in 2003–04 and 2004–05 on the Santa Lucia Preserve, Carmel, California, USA.

Pond #	Season	Metamorphs	Subadults	Adults	Total
2	2003-04	31	0	4	35
3	2004-05	16	2	38	56
13	2003-04	27	1	5	33
17	2004-05	42	12	11	65
27	2004-05	110	0	9	119

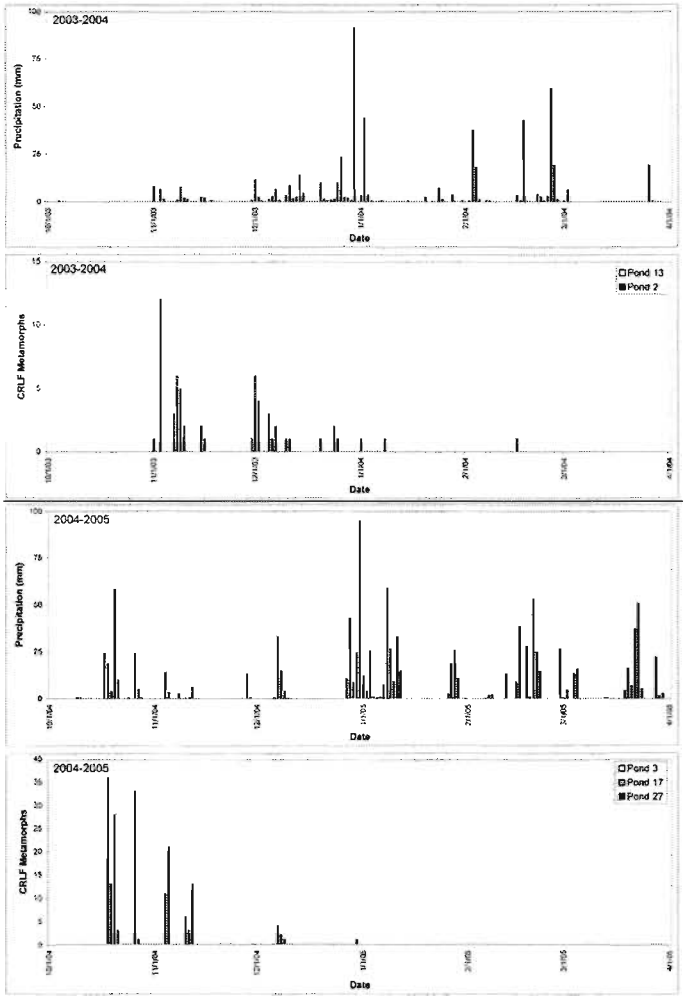

FIG. 1. Precipitation and number of *R. draytonii* metamorphs captured in 2003–04 and 2004–05, Santa Lucia Preserve, Carmel Valley, California, USA.

at nearly anytime of the year when environmental conditions are appropriate. Nevertheless, our data indicates that the first several precipitation events of the fall season incite mass dispersal of *R. draytonii* metamorphs, even at perennial ponds that may appear to provide the appropriate habitat requirements for all age classes. In addition to avoiding predators (including conspecifics), metamorphs presumably disperse to seek appropriate non-breeding habitat until they reach reproductive age and either return or colonize new locations. Our data supports the contention that core-habitat conservation models, which are often symmetrical, may be insufficient for *R. draytonii* and other pool-breeding amphibians that require appropriate movement corridors to ensure connectivity between breeding and non-breeding habitat across a varied landscape (Baldwin et al. 2006. J. Herpetol. 40:442–453; Fellers and Kleeman 2007. J. Herpetol. 41:276–286).

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