



Boloria bellona (Fabricius) (Nymphalidae: Heliconiinae) from the Blue Mountains of the Pacific Northwest

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BOLORIA BELLONA* (FABRICIUS) (NYMPHALIDAE: HELICONIINAE) FROM THE BLUE MOUNTAINS OF THE PACIFIC NORTHWEST*Additional key words:** historical records; Meadow Fritillary; peripheral range; threatened species

The Meadow Fritillary, *Boloria bellona* (Fabricius) (Nymphalidae: Heliconiinae), is widely distributed in North America, occurring across the northern USA from the Pacific Northwest to the East Coast, and from eastern British Columbia to Newfoundland in Canada (Holland 1898, Opler 2012). In the eastern USA, *B. bellona* has adapted to disturbed habitats and apparently is expanding its distribution into the southeastern states (Opler 2012). Throughout most of its range *B. bellona* is a common butterfly, ranked G5 by the Natural Heritage Program (demonstrably secure globally and not a conservation concern). In the Pacific Northwest, however, *B. bellona* is on the periphery of its range and is considered local and rare (Warren 2005). It is presently ranked as a species of concern in the states of Washington (S2?; imperiled, but with reservation) and Oregon (S1; critically imperiled). Because all species are locally uncommon or rare at some level of their geographic distribution (Bossart & Carlton 2002), the conservation merit of listing otherwise common species as threatened in regions on the edge of their distribution is open to debate (LaBonte et al. 2001). Studies on these "edge" species, however, can potentially offer important insight into the relative importance of ecological, environmental, and anthropogenic factors that impact population range expansions and declines. Peripheral populations of a species that have been geographically isolated for long periods also may have diverged enough genetically to be recognized as incipient species.

All recent records for *B. bellona* in the state of Washington are from north-central and northeastern regions (Pyle 2002; News of the Lepidopterists' Society Vol. 46, Suppl. S1, 2004 "2003 Season Summary"). Although these specimens are often listed as belonging to the subspecies *B. bellona toddi* (W. Holland) (e.g., LaBonte et al. 2001), Warren (2005) felt that because so few specimens from the Pacific Northwest are available for comparison with other currently recognized subspecies (see Pelham 2008), a trinomial should not be assigned to these individuals.

The southernmost documented distribution of *B. bellona* in the far western USA is in the Blue Mountains of southeastern Washington and northeastern Oregon (Pyle 2002, Warren 2005, Opler et al. 2012). Pyle (2002), however, stated that the species has not been recorded from the Blue Mountains [Washington] since 1952, and

mentioned that a single locality in Umatilla County, Oregon was of uncertain status. Warren (2005) provided additional information on the Oregon locality, pointing out that a population at Lehman Springs, Umatilla County (ca. 1325 m elev.) was found in 1982, 1983 and 1984, with small numbers of adults collected in each year (from late May to early July), but that this population has not been seen since. The lack of recent records for *B. bellona* from the Blue Mountains suggests that either it has been extirpated, or alternatively, that remaining colonies are localized and have been overlooked.

Recently, while sorting and cataloguing papered adult specimens I collected in the early 1970s from southeastern Washington, four individuals of *B. bellona* were discovered. The specimens were collected on 21 June 1970 near Big Springs Campground, Umatilla National Forest, Garfield County, Washington. This site is located in the northern Blue Mountains, roughly midway between the northern boundary of Umatilla National Forest and Big Springs Campground, at an elevation of ca. 1400 m (ca. 4600 ft.). Approximate



FIG. 1. *Boloria bellona* (male), Blue Mountains, near Big Springs Campground, Garfield Co. Washington, 21 June 1970. Top (dorsal view); bottom (ventral view). Wing span: 41 mm.

geographic coordinates, estimated from a Google™ Earth satellite photograph, are 46.258° N, 117.516° W. The Big Springs site is approximately 140 km NE of Lehman Springs, and about 10–20 km E of the Blue Mountain locality in southeastern Washington shown on the distribution map for *B. bellona* in Pyle (2002). A further search of my collection now housed in the Santa Barbara Museum of Natural History, Santa Barbara, California, revealed six additional specimens with the same collection data as above. Obtaining ten adults of *B. bellona* after about one hour of collecting suggests that the Big Springs population was relatively healthy at that time. An adult from this sample is shown in Fig. 1. As far as I am aware, specimens from the Blue Mountain populations of *B. bellona* have not been figured previously.

When the Big Springs specimens of *B. bellona* were collected, the significance of the find was not apparent. In the only reference available at that time for Washington State butterflies, Leighton (1946) listed the species for Pullman [Whitman County], located in the Palouse Hills of southeastern Washington, ca. 60 km NE of the Big Springs site. Thus, finding a nearby colony of *B. bellona* in the northern Blue Mountains did not seem unusual. It is now suspected that the previously known colonies of *B. bellona* in the Palouse Hills probably have been extirpated (Pyle 2002).

Additional fieldwork will be required to determine the current status of the populations of *B. bellona* in the Blue Mountains. There seems a reasonable likelihood, however, that the species has not been extirpated there. As mentioned above, the apparently healthy colony found near Big Springs in 1970 is near the site mentioned by Pyle (2002) where the species was last reported in 1952. The reappearance of *B. bellona* in the northern Blue Mountains after an apparent absence of 18 years suggests either that the area was visited infrequently by lepidopterists during those years, or possibly that a recolonization had occurred after a local extirpation. A recolonization, however, would imply the existence of additional source populations in the general area that may still be extant. Examination of satellite

images of the Big Springs site, and the northern portion of Umatilla National Forest, suggests that no apparent habitat degradation has occurred there as of September 2011.

Boloria bellona should be sought from late May to early July in riparian habitats (Warren 2005), focusing on elevations corresponding to the most recently documented sites at Lehman Springs and Big Springs (1200–1500 m). Larval host plants in the Blue Mountains populations have not been determined (Warren 2005) but are assumed to be violets, *Viola* spp. (LaBonte et al. 2001; Pyle 2002).

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