



Fender's Blue Butterfly (*Icaricia icarioides fenderi*)

Conservation Status—Fender's blue butterfly was listed as endangered under the Endangered Species Act in 2000 (USFWS 2008) and is therefore listed under the ISSSP. Critical habitat units were designated in 2006 and are located in Yamhill, Polk, Benton, and Lane Counties, Oregon (USFWS 2008). A draft recovery plan for the species was published in September 2008 (USFWS 2008). Threats to the Fender's blue butterfly include loss of prairie habitat to agriculture and urban development, intrusion of woody vegetation into the species' habitat, and altered natural disturbance regimes (USFWS 2008). The total population of the species was estimated to be 3000-5000 individuals in 2003 (Schultz et al. 2003). Population viability modeling by Schultz and Hammond (2003) suggests a high probability of future extinction across much of the species range.

Distribution—Fender's blue butterfly is considered an endemic to the Willamette Valley of Oregon, although its precise historic distribution is not known (Schultz et al. 2003). The species was first collected in 1929, but there are no records of it being observed between 1937-1989 (USFWS 2008). The species is presently known to occur on fewer than 30 sites in Yamhill, Polk, Benton, and Lane Counties (Schultz et al. 2003, USFWS 2008).

Ecology—The life cycle of the Fender's blue butterfly is typically completed within one year. Adults live approximately 2 weeks, during which time a female may lay up to 350 eggs (Schultz et al. 2003). Egg mortality is high; only 1-2 eggs per female will ultimately survive to become adult butterflies (Schultz et al. 2003). Only three species of perennial lupines are known to be used for oviposition and food of larvae: Kincaid's lupine (*Lupinus sulphureus* ssp. *Kincaidii*), longspur lupine (*L. arbustus*), and sicklekeel lupine (*L. albicaulis*; USFWS 2008). All three lupines are closely associated with dry, upland prairies dominated by native bunchgrasses (*Festuca* spp.; Schultz et al. 2003, USFWS 2008). Larvae feed on their lupine hostplants until the plant senesces, at which time the larva enters diapause near the base of the plant. Larvae again become active in March-April of the following year. Once completing larval development, they enter a pupal stage for approximately 2 weeks, and then emerge as adult butterflies in May and June (Schultz et al. 2003). Nectar plants used by adults occur in upland and wet prairies. Plants most commonly used by adult butterflies include: narrowleaf onion (*Allium amplexans*), Tolmie star-tulip (*Calochortus tolmiei*), dwarf checkerbloom (*Sidalcea malviflora* ssp. *virgata*), common wooly sunflower (*Eriophyllum lanatum*), and Oregon geranium (*Geranium oregonum*; Schultz et al. 2003). The rarity of host and nectar plants used by Fender's blue butterfly larvae is one of the most important factors limiting the species population size (Schultz and Dlugosch 1999, Schultz 2001).

Habitat fragmentation and diminishing population connectivity pose a serious threat to the persistence of Fender's blue butterfly. The primary host plant of the species, Kincaid's lupine, is

known to occur at fewer than 60 sites, comprising a total area of approximately 160 ha (395 ac; Wilson et al. 2003, USFWS 2008). Historically, patches of Kincaid's lupine probably occurred <0.5 km (<0.31 mi) apart in the Willamette Valley, but today patches range between 3-30 km (1.9-18.6 mi; Schultz 1998). Given a model-based estimate of the maximum dispersal distance of adult butterflies as 2 km from their natal lupine hosts (Schultz et al. 2003), most populations today are highly isolated and are at risk of genetic and demographic problems associated with small populations (Schultz et al. 2003).

Habitat Management/Restoration— Land management for conserving Fender's blue butterfly has focused on restoring the three primary habitat components of the species: 1) host plants used for oviposition and larval food sources, 2) nectar plants used by adults, and 3) vegetation structure of short-stature, bunchgrass prairies (Schultz 2001). Numerous projects have investigated native plant reintroductions and weed control techniques to increase abundance of host (particularly Kincaid's lupine) and nectar plants (Schultz 2001, Clark and Wilson 2005, Severns 2008, Thorpe et al 2008). Solarization, a soil sterilization technique, has been used to effectively reduce competition from weeds prior to out-planting Kincaid's lupine (Schultz 2001). Herbicides and hand-pulling have also been used with success to control weeds on lands managed for Fender's blue butterfly habitat by The Nature Conservancy (Greg Fitzpatrick pers. comm.). Burning and/or mowing have been used to restore a vegetation structure resembling native prairies and to reduce weeds (Wilson et al. 2003, Thorpe et al. 2008). In all of the techniques noted above, the timing and intensity of treatments was crucial to the success of treatments in the above projects.

Non-Habitat Limiting Factors— Insecticides used to control gypsy moths (*Lymantria dispar*), mosquitoes that are vectors for West Nile Virus (*Aedes vexans*, *Culex* spp.), and agricultural pests pose a threat when applied near areas occupied by Fender's blue butterfly (USFWS 2008). Barry et al. (1993; reported in USFWS 2008) reported that *Btk* (*Bacillus thuringiensis* var. *kurstaki*), a biological agent used to control lepidopteron pests, can drift in toxic concentrations over 3 km from the point of application.

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