

Diana Fritillary

Speyeria diana

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DESCRIPTION

Taxonomy and Basic Description

The Diana fritillary (Cramer 1775) is a member of a large genus in the subfamily Heliconiinae of the family Nymphalidae. The genus was named in honor of the famous German lepidopterist Adolph Speyer and the species epithet honors Diana, the Roman goddess of light and life (Opler and Krizek 1984). The species was originally described from specimens taken near Jamestown in Virginia. This eastern Virginia population of *S. diana* has been presumed extirpated since sometime in the 1950's. The genus has been reviewed with updated taxonomy by Howe (1975), Scott (1986), and Opler and Krizek (1984) (for eastern species).

Most species of the genus *Speyeria* occur in western and northern North America (Scott 1986). The species is distributed throughout the middle and southern Appalachians in forested areas and west to the Ozark Mountains in Missouri, Arkansas and extreme eastern Oklahoma (Opler and Krizek 1984; Opler and Malikul 1998; Carlton and Nobles 1996). In South Carolina, the known distribution of the Diana fritillary is limited to counties in the southern Appalachian and upper piedmont ecoregions.

The Diana fritillary is a uniquely dimorphic species of *Speyeria*. Males show the typical fritillary color, but have the orange largely accentuated along the outer margins of the wings, washing out most of the typical outer wing markings. The inner part of the wings is dark, mostly brownish black. The underside is a beautiful burnt orange, with no silver spots as in many *Speyeria*, and much of the typical pattern is obliterated. The only species likely to be confused with Diana males (and mainly just in flight) is *Speyeria cybele*, the great spangled fritillary. It is similar in both size and color, but shows the typical fritillary pattern, with silver spots on the underside of the hindwings. Females, in contrast to the males, are dark blue-black. The typical fritillary pattern is still visible, but indistinct because of the dark ground color. There are lighter blue spots and patches near the edge of the wing (Opler and Malikul 1998). The female color pattern is thought to mimic *Battus philenor*, the pipevine swallowtail, a toxic butterfly that occurs throughout the range of the Diana fritillary. In addition to female Dianas, the red spotted purple (*Limenitis arthemis astyanax*), spicebush swallowtail (*Papilio troilus*), female black swallowtail (*Papilio polyxenes*), and the dark morph of the female eastern tiger swallowtail



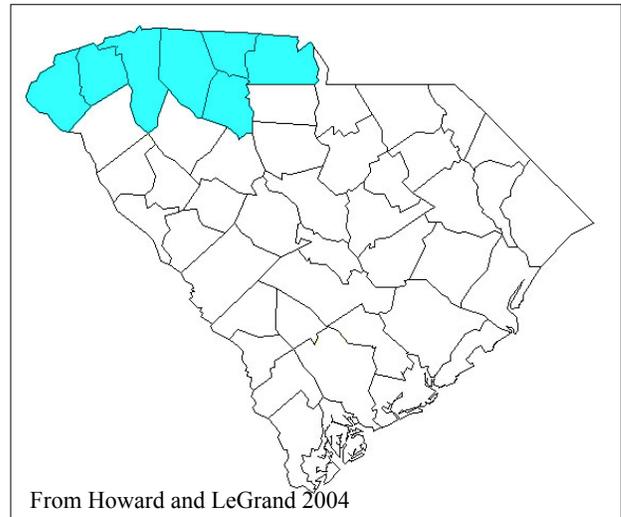
(*Papilio glaucus*), all are apparently mimics of the pipevine swallowtail, and all co-occur with the Diana fritillary. Both sexes of the Diana fritillary are rather large butterflies, with wingspans of 88 to 112mm (3 to 4 inches) (Opler and Malikul 1998).

Status

The Diana fritillary is known from seven counties in South Carolina, but is primarily restricted to the mountains and the upper piedmont of these areas. In the mountain regions, the species is likely to be stable, but its status in the upper piedmont is unknown.

POPULATION DISTRIBUTION AND SIZE

Historically, the Diana fritillary occurred throughout the Southern Appalachian Ecoregion and probably into the piedmont. In North Carolina, the species was recorded from the piedmont and, in Virginia, populations once occurred in the coastal areas (Opler and Malikul 1998). Relatively stable populations probably still occur in several of the counties in the Southern Appalachian Ecoregion of South Carolina. The species was confirmed in the Pickens Ranger District of the Sumter National Forest in 2004 (Scholtens 2004). No estimates of population size have been made.



HABITAT AND NATURAL COMMUNITY REQUIREMENTS

This species is a specialist of forested areas, in contrast to most other eastern members of the genus, which are usually found in more open areas. The Diana fritillary and its congeners feed on violets (*Viola* spp.) as larvae, with *S. diana* feeding on several woodland species. Larvae emerge from eggs laid on the ground in the fall. They overwinter as first instars, very young juveniles; insects typically mature at or near instar five. They begin feeding in the spring and complete development by late spring. They then pupate in the leaf litter, undergo metamorphosis and emerge as adults, generally starting in June. Males are typically the first to emerge, with females following one-and-a-half to two weeks later. During the first part of the summer, males are almost exclusively seen at flowers and actively flying through the habitat. Females become much more apparent later in the summer, starting in late July as they spend more time searching for oviposition sites. Both use a variety of nectar plants as adults, and have been recorded feeding on such sources as milkweed (*Asclepias* spp.) (Opler and Krizek 1984), buttonbush (*Cephalanthus occidentalis*), coneflower (*Echinacea* spp.), and compassplant (*Silphium laciniatum*) (Moran and Baldrige 2002). In the Sumter National Forest in South Carolina during July, the most important nectar source is apparently a common mint (*Pycnanthemum incanum*) (Scholtens 2004). Adults often are seen in openings and along roadsides as they feed on flower nectar, but seldom far from their woodland habitat.

CHALLENGES

Diana fritillary populations have apparently been declining over much of their historical range, but the causes are not well known. Populations of woodland violets are healthy and in most localities, plenty of adult nectar sources are present. One possible cause of declines is the use of BT-based sprays to control gypsy moths. “BT” refers to *Bacillus thuringiensis*, a naturally occurring bacteria widely used in various types of applications as a very effective natural insecticide. One study has shown that Diana fritillary larvae are highly susceptible to these sprays (Peacock et al. 1998). If this hypothesis is true, populations south of the gypsy moth front should not be affected, while those north of the front would be. Recent surveys in Arkansas have shown that Diana fritillaries are more widespread than originally thought and populations are likely stable in that area (Moran and Baldrige 2002).

CONSERVATION ACCOMPLISHMENTS

Conservation study of the Diana fritillary is in its infancy. Populations have been surveyed in several states to determine distribution and status (Lewis 2001). No specific management efforts are known to exist. In South Carolina, a survey was recently performed in the Pickens District of Sumter National Forest, confirming the presence of the species in the forest (Scholtens 2004).

CONSERVATION RECOMMENDATIONS

- Conduct surveys to determine the distribution of the Diana fritillary in South Carolina.
- Monitor any identified populations of the Diana fritillary, particularly before gypsy moth invasions in the vicinity of those populations.
- Determine the effect of gypsy moth control efforts on the Diana fritillary.
- Explore the need to list Diana fritillary in South Carolina, based on survey results.

MEASURES OF SUCCESS

As research and management needs are identified, projects will be initiated to address those needs.

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