Conservation of the Arogos Skipper, *Atrytone arogos arogos* (Lepidoptera: Hesperiidae) in Florida

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ABSTRACT

The Arogos skipper is a rare and declining butterfly found in native grassland habitats in the eastern and midwestern United States. Five distinct populations of the butterfly occur in specific parts of the range. *Atrytone arogos arogos* once occurred from southern South Carolina through eastern Georgia and peninsular Florida as far south as Miami. This butterfly is currently thought to be extirpated from South Carolina and Georgia. The six known sites in Florida for *A. arogos arogos* are public lands with dry prairie or longleaf pine savanna having an abundance of the larval host grass, *Sorghastrum secundum*. Colonies of the butterfly are threatened by catastrophic events such as wild fires, land management activities or no management, and the loss of genetic integrity. The dry prairie preserves of central Florida will be especially important to the recovery of the butterfly, since these are some of the largest and last remaining grasslands in the state. It may be possible to create new colonies of the Arogos skipper by releasing wild-caught females or captive-bred individuals into currently unoccupied areas of high quality habitat.

INTRODUCTION

The Arogos skipper (*Atrytone arogos*) is a very locally distributed butterfly that occurs only in the eastern and midwestern U. S. Most of the eastern colonies lie within a few hundred km of the Atlantic Ocean or Gulf of Mexico. This butterfly was first mentioned in a book about the butterflies and moths of Georgia (Abbot and Smith 1797), but the authors misidentified it as *Papilio vitellius*, a tropical species that had been illustrated by Fabricius in 1793. The first valid name for the Arogos skipper is *Hesperia arogos* (Boisduval and Le Conte 1834). The original description was based on paintings made by John Abbot who lived in Burke County, Georgia from 1776 to about 1800. According to Harris (1972) Abbot wrote "This species has been found only in the pine woods on the north side of Briar Creek, near Mill Town plantation." Harris also noted that Mill Town Plantation is now known as Millhaven Plantation. The type locality was given as North America, but John Abbot's notes limited the area to Screven County, Georgia (Miller and Brown 1981). Scudder (1869) described *Hesperia iowa* from specimens collected in prairie habitat near Denison, Iowa. In 1872 he revised the classification of some North American skippers and renamed *Hesperia iowa* as *Atrytone iowa* (Scudder 1872a). It wasn't until 1921 that Lindsey placed the typical Arogos skipper in the genus *Atrytone*, and 1951 that Klots recognized *Atrytone iowa* as a race of *Atrytone arogos*.

From 1994 to 1998 the U.S. Fish and Wildlife Service (USFWS) funded surveys to find populations of the Arogos skipper in the eastern U.S. (Hall 1999). Widely scattered colonies were found in New Jersey, North Carolina, South Carolina, Florida, and Mississippi. The three regions where the butterfly was most abundant included the New Jersey pine barrens, peninsular Florida, and southeastern Mississippi. From 2001 through 2003, USFWS funded us to search for the Arogos skipper in the southeastern U.S. and to investigate the biology of the butterfly. This paper presents the results of our observations on *Atrytone arogos arogos*.

METHODS

We looked for the Arogos skipper in eastern Louisiana, southern Mississippi, southern Alabama, Florida, southern and eastern Georgia, and southern South Carolina. For surveys on public land or Nature Conservancy holdings, land managers were contacted for permission to look for the Arogos skipper and for advice in locating habitat. At other times we searched highways for powerline crossings or bordering areas with potential habitat. Other lepidopterists were also contacted for information on the Arogos skipper. The atlases published by the DeLorme Company (1998a, b, c, d, 2000a, b) were especially useful for planning surveys, since these maps have latitude/longitude grids and show many features of topographic maps, including roads, major power lines, and natural areas. Our surveys were mostly conducted during the adult flight season from April through October. We searched for adults, especially at flowers, as well as for immature stages on the larval host grasses.

Land of Fire and Water: The Florida Dry Prairie Ecosystem. Proceedings of the Florida Dry Prairie Conference. Reed F. Noss, editor. 2006.

RESULTS

We have identified five distinct populations of the Arogos skipper that differ in adult phenotype, host plant, and habitat. Only two of these populations have been described and named. *Atrytone arogos arogos* (Boisduval and Le Conte 1834) once occurred from southern South Carolina to southern Florida. Currently, *A. arogos arogos* is known to survive only in peninsular Florida. Colonies have been identified in Clay, Duval, Highlands, Okeechobee, Osceola, Pasco, Polk, and possibly Citrus counties, Florida. In the past this butterfly has also been reported from Alachua, Brevard, Hillsborough, Indian River, Levy, Marion, Martin, Miami-Dade, Orange, Pinellas, Sarasota, Seminole, St. Johns, and Volusia counties, Florida (Minno 1994a); Screven County, Georgia (Harris 1972); and Aiken and Richland counties, South Carolina (Hall 1999), but has not been found at any of these locations in recent times.

Unlike other races of the Arogos Skipper, the females of *A. arogos arogos* are nearly black on the uppersides of the forewings. On the males (Fig. 1), the veins in the yellow patch on the uppersides of the forewings are partly outlined in black.

Atrytone arogos arogos occurs in savannas, dry prairies, and occasionally longleaf pine sandhills where the larval host plant is abundant. Adults are only active during the day when the sun is visible. When the sun becomes obscured by clouds, the adults leave flowers and perch on low vegetation. Males both perch and patrol in areas with high densities of the larval host grass in order to find females. The flight is very fast and low to the ground. Males and females readily visit flowers for nectar and become almost docile, to the point where they can be touched, while feeding. Flowers visited by the adults include purple thistle (*Cirsium horridulum*) in the Asteraceae (H. D. Baggett, personal communication) and redroot (*Lachnanthes caroliniana*) in the Haemodoraceae.

Figure 1. A male *Atrytone arogos arogos* from Duval County, Florida near Orange Park.

Atrytone arogos arogos has three generations per year with adults flying mostly in April-May, June-July, and August-September, but the timing of the generations is not well synchronized and there is considerable year-to-year variability. Adults have been reported between these dates: March 10, April 16-29, May 7-30, June 14-29, July 5-31, August 1-30, September 1-30, and October 6-18 in Florida; for May 17-19, June 2, and August 2-12 in Georgia; and for May 21, June 12-19, and August 19-26 in South Carolina (Hall 1999 and our observations). We have found adults to be most abundant and reliably present from mid-August to mid-September.

The population size of the most robust colonies appears to be, at most, a few hundred individuals per year. Usually only a few adults are seen per day at any particular colony. *Atrytone arogos arogos* was locally common at Ocala National Forest near Lake Delancy in Marion County and near Chassahowitzka National Wildlife Refuge in Citrus County, Florida during the mid-1990s, where ten or more adults could be seen per day. Unfortunately, these colonies are no longer extant.

Scudder (1872b) published the brief hand-written notes that Abbot had made on his butterfly paintings. Under the name "*Vitellius*" he cites "Caterpillar of a pale brown-greenish colour; feeds on buffalo-grass; spun July 25, chrysalis July 27, from which the imago Aug. 4; not common." According to Harris (1972) Abbot and Smith (1797) wrote of the Arogos skipper: "Feeds on the panic-grass figured, and on the buffalo-grass, at length folding the leaves together for protection. It spun itself up July 25, changed 27th, came forth in its winged state August 4." Minno (1994a) determined that the caterpillars of *A. arogos arogos* feed on lopsided indiangrass (*Sorghastrum secundum*) in peninsular Florida. The immature stages of *A. arogos arogos* were described by Minno (1994b). We believe that Abbot and Smith's (1797) reference to "panic-grass" (*Panicum* species) was in error and that "buffalo-grass" is *Sorghastrum secundum* because we have only found *A. arogos arogos* in association with lopsided indiangrass.

The only known extant colonies of *A. arogos arogos* are at Branan Field Gopher Tortoise Mitigation Park in Duval County; Jennings State Forest in Clay County; Jay B. Starkey Wilderness Park in Pasco County; Avon Park Air Force Range in Highlands and Polk counties; Kissimmee Prairie Preserve State Park in Okeechobee County[1]; and the Disney Wilderness Preserve, Bull Creek Wildlife Management Area, and Three Lakes Wildlife Management Area in Osceola County, Florida. Only single individuals have been observed at Kissimmee Prairie Preserve State Park and the Disney Wilderness Preserve after several years of butterfly surveys in areas with hundreds of acres of potential habitat (Buck and Linda Cooper, personal communication). A sighting was also made recently in

Editor's note: A list of the butterflies of Kissimmee Prairie Preserve State Park (Cooper and Cooper 2004) is included as an appendix to this paper.

Citrus County along U.S. Highway 19 near Chassahowitzka National Wildlife Refuge (Andy Anderson, personal communication). A colony of the Arogos skipper had been present along U.S. Highway 19 just north of the intersection with U. S. Highway 98 during in the mid 1990s, but none have been seen at this site since the late 1990s.

DISCUSSION

The Arogos skipper is an extremely rare and declining butterfly in the eastern United States. We found very little remaining habitat and no colonies of the Arogos skipper in Georgia. Much of the landscape in Georgia has been converted to agriculture, silviculture, or urban uses. The southwestern part of the state most likely had colonies of the *Ctenium aromaticum*-feeding Gulf Coast population, while the eastern half of Georgia was home to the *Sorghastrum secundum*-feeding *Atrytone arogos arogos*. Although we searched in Screven County, where John Abbot originally found the butterfly, we did not find any suitable habitat. The Arogos skipper may eventually be found at Fort Stewart near Hinesville with further surveys. There are many hundreds of acres of high quality habitat at Fort Stewart, but we could not find any signs of the skipper. Tiny remnants of potential habitat also occur at Okeefenokee National Wildlife Refuge, the Nature Conservancy's Broxton Rocks Preserve, and a few private parcels near Kingsland and St. George.

Southern South Carolina was similar to Georgia in that most of the natural landscape has been altered. There are a few areas with lopsided indiangrass at the Savannah River Site in Aiken County, but they were poor quality, and we did not find the butterfly. Nick Haddad of North Carolina State University has spent several years surveying for butterflies in powerline corridors at Savannah River Site, but has not found the Arogos skipper (personal communication). The Arogos Skipper was last observed in South Carolina at Aiken State Park, but the park is currently overgrown with trees and shrubs, and we did not find any suitable habitat or the butterfly. We only briefly searched a few private areas in South Carolina with nice-looking longleaf pine habitat, the Groton Plantation in Allendale County and the Okeetee Hunt Club property near Hardeeville. We found neither *Sorghastrum secundum* nor the Arogos skipper at these sites.

Powerline corridors that are managed by periodic mowing are important sites for the Arogos skipper. About half of the existing colonies in the southeastern U.S. are in powerline corridors. Whereas many powerline corridors in Florida and the Gulf States are still in a natural state, most of those we found in Georgia and South Carolina had been plowed and planted with bahiagrass (*Paspalum notatum*) or had regrown with weeds.

Although the Arogos skipper is found in habitats regularly burned by wild fires, the butterfly has no way to survive fire, except in unburned refugia. Natural fires usually result in a mosaic of burned and unburned habitat. Burning too much of the habitat at a colony could extirpate the butterfly from the site. Fire suppression may also lead to loss since the butterfly requires open habitat with an abundance of the larval host grass. Without fire, grasses tend to diminish and woody plants increase in dominance. Other threats to *A. arogos arogos* include catastrophic events such as tornados and hurricanes that may impact some colonies, and the loss of genetic integrity due to the isolated distribution and very low abundance of the existing populations.

We predict that *A. arogos arogos* will become extinct in the near future, unless a management plan focused on increasing its abundance is written and implemented. The butterfly needs to be monitored on a regular basis at the few remaining colonies in order to better understand its population dynamics and biology. Why is it so rare even in natural areas such as Kissimmee Prairie Preserve State Park, where there are hundreds of acres of high quality habitat with an abundance of larval host plants? Dry prairie habitat will play a major role in saving the butterfly, since natural areas such as Myakka State Park, Avon Park Air Force Range, Kissimmee State Park, and other existing and restored prairies in central Florida are some of the largest remaining grasslands in the state. By transferring wild-caught females or releasing captive bred individuals into suitable habitat it may be possible to create new colonies or bolster existing colonies.

In summary, *Atrytone arogos arogos* is an imperiled butterfly. We recommend that the following actions be undertaken as soon as possible: 1) develop and implement a management plan for existing colonies, 2) perform annual status surveys, 3) conduct captive rearing studies, and 4) conduct experiments aimed at creating new colonies on public lands with high-quality habitat. These measures will help insure that the butterfly will continue to survive.

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BUTTLERFLIES OF

KISSIMMEE PRAIRIE PRESERVE STATE PARK

OKEECHOBEE COUNTY, FLORIDA

DATE: _____ TIME: _____

WEATHER: _____

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SWALLOWTAILS AND PARNASSIANS

Family Papilionidae

SWALLOWTAILS subfamily Papilioniae
. . . . . Pipevine Swallowtail *Battus philenor* 8 **R**
. . . . . Polydamas Swallowtail *Battus polydamas* 1-12 **R**
. . . . . Zebra Swallowtail *Eurytides marcellus* 2-10
. . . . . Black Swallowtail *Papilo polyzenes* 1-12
. . . . . Giant Swallowtail *Heraclides cesphontes* 1-12
. . . . . Eastern Tiger Swallowtail *Pterourus glaucus* 1-12
. . . . . Palamedes Swallowtail *Pterourus palamedes* 1-12
. . . . . Spicebush Swallowtail *Pterourus troilus* 2-12

WHITES AND SULPHURES

Family Pieridae

WHITES Subfamily Pierinae
. . . . . Checkered White *Ponita protodice* 2-10 **R**
. . . . . Great Southern White *Ascia monuste* 3-12

SULPHURS Subfamily Coliadinae
. . . . . Orange Sulphur *Colias eurytheme* 5-10 **R**
. . . . . Cloudless Sulphur *Phoebis sennae* 1-12
. . . . . Orange-barred Sulphur *Phoebis philea* 1-12 **R**
. . . . . Large Orange Sulphur *Phoebis agarithe* 10 **R**
. . . . . Barred Yellow *Eurema daira* 1-12
. . . . . Little Yellow *Eurema lisa* 1-12
. . . . . Sleepy Orange *Eurema nicippe* 1-12
. . . . . Dainty Sulphur *Nathalis iole* 1-12

GOSSAMER-WING BUTTERFLIES

Family Lycaenida

HAIRSTREAKS Subfamily Theclinae
. . . . . Oak Hairstreak *Fixsenia favonius* 4-6 **R**
. . . . . White M Hairstreak *Parrhasius m-album* 3-11 **R**
. . . . . Gray Hairstreak *Strymon melinus* 3-10
. . . . . Red-banded Hairstreak *Calycopis cecrops* 1-12

BLUES Subfamily Polyommatinae
. . . . . Cassius Blue *Leptotes cassius* 3-12 **R**
. . . . . Ceraunus Blue *Hemiargus ceraunus* 1-12 **R**

METALMARKS Family Riodinidae
. . . . . Little Metalmark *Calephelis virginiensis* 1-12

BRUSHFOOTED BUTTERFLIES

Family Nymphalidae

HELICONIANS AND FRIILLARIES Subfamily Heliconiinae
. . . . . American Snout *Libytheana carinenta*
. . . . . Gulf Fritillary *Agraulis vanillae* 1-12
. . . . . Julia Heliconian *Dryas iulia* 7 **R**
. . . . . Zebra Heliconian *Heliconius charithonia* 1-12
. . . . . Variegated Fritillary *Euptoieta claudia* 3-10

TRUE BRUSHFOOTS Subfamily Nymphalinae
. . . . . Phaon Crescent *Phyciodes phaon* 1-12
. . . . . Pearl Crescent *Phyciodes tharos* 1-12
. . . . . Question Mark *Polygonia interrogationis* 2-12
. . . . . American Lady *Vanessa virginiensis* 28 **R**
. . . . . Painted Lady *Vanessa cardui* 4-11 **R**
. . . . . Red Admiral *Vanessa atalanta* 1-12
. . . . . Common Buckeye *Junonia coenia* 1-12
. . . . . White Peacock *Anartia jatrophae* 1-12

ADMIRALS Subfamily Limenitidinae
. . . . . Viceroy *Limenitis archippus* 1-12

EMPERORS Subfamily Apaturinae
. . . . . Hackberry Emperor *Asterocampa celtis* 3-12
. . . . . Tawny Emperor *Asterocampa clyton* 3-11

SATYRS Subfamily Satyrinae
. . . . . Carolina Satyr *Hemeuptychia sosybius* 1-12
. . . . . Georgia Satyr *Neonympha areolata* 3-10

MILKWEED BUTTERFLIES Subfamily Danainae
. . . . . Monarch *Danaus plexippus* 1-12
. . . . . Queen *Danaus gilippus* 1-12
. . . . . Soldier *Danaus eresimus* 3-12 **R**

SKIPPER

Family Hesperiidae

SPREAD-WING SKIPPERS Subfamily Pyrginae
. . . . . Silver-spotted Skipper *Epargyreus clarus* 2-12 **R**
. . . . . Long-tailed Skipper *Urbanus proteus* 1-12
. . . . . Dorantes Longtail *Urbanus dorantes* 1-12
. . . . . Northern Cloudywing *Thorybes pylades* 3-9
. . . . . Confused Cloudywing *Thorybes confusis* 2-10 **R**
. . . . . Juvenal's Duskywing *Erynnis juvenalis* 2-4 **R**
. . . . . Horace's Duskywing *Erynnis horatius* 1-12
. . . . . Zarucco Duskywing *Erynnis zarucco* 2-10
. . . . . Common/White Checkered-Skipper *Pyrgus communis/albescens* 2-11 **R**
. . . . . Tropical Checkered-Skipper *Pyrgus oileus* 1-12

GRASS-SKIPPERS Subfamily Hesperiinae
. . . . . Swarthy Skipper *Nastra lherminier* 2-11
. . . . . Neamathla Skipper *Nastra neamathla* 2-11
. . . . . Three-spotted Skipper *Cymaenes tripunctus* 10 **R**
. . . . . Clouded Skipper *Lerema accius* 1-12
. . . . . Least Skipper *Ancyloxpha numitor* 3-10
. . . . . Southern Skipperling *Copaeodes minimus* 3-12
. . . . . Fiery Skipper *Hylephila phyleus* 1-12
. . . . . Meske's Skipper *Hesperia meskei* 5-7 **R**
. . . . . Tawny-edged Skipper *Polites themistocles* 2-10
. . . . . Whirlabout *Polites vibex* 1-12
. . . . . Southern Broken-Dash *Wallengrenia otho* 3-11
. . . . . Sachem *Atalopedes campestral* 2-12
. . . . . Arogos Skipper *Atrytone arogos* 3-11 **R**
. . . . . Delaware Skipper *Atrytone logan* 3-11
. . . . . Byssus Skipper *Problema byssus* 6, 8-10 **R**
. . . . . Aaron's Skipper *Poanes aaroni* 3-10
. . . . . Palmetto Skipper *Euphyes arpa* 2-10
. . . . . Palatka Skipper *Euphyes pilatka* 3-10
. . . . . Berry's Skipper *Euphyes berryi* 4-10

. . . . . Dun Skipper *Euphyes vestris* 3-10 R
. . . . . Monk Skipper *Asbolis capucinus* 4-11
. . . . . Dusted Skipper *Atrytonopsis hianna* 3 & 4, 7-10 **R**
. . . . . Eufaula Skipper *Lerodea eufaula* 1-12
. . . . . Twin-spot Skipper *Oligoria maculata* 1-12
. . . . . Brazilian Skipper *Calpodes ethlius* 5-12
. . . . . Ocola Skipper *Panoquina ocola* 1-12

TOTAL INDIVUALS:_____

OBSERVERS: _____

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FIELD NOTES: _____

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Numbers 1-12 indicate butterfly flight months.
R indicates butterfly is RARE in the park.

Scientific nomenclature and English names follow the North American Butterfly Association 2001 **Checklist and English Names of North American Butterflies, Second Edition.**

NOTES continued . . . . .

This checklist will be updated periodically. If you have photo identification of species not listed, please notify us at the address below.

Checklist prepared by

Linda F. and Byrum W. Cooper
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Revised
March 2004

TOTAL SPECIES: _____