

Schaus' Swallowtail Butterfly

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The Schaus' swallowtail (*Papilio aristodemus ponceanus*) is an internationally famous butterfly endemic to southern Florida. This large, dark brown-and-yellow butterfly has orange and blue spots on the top hind wing and blue and chestnut brown patches on the hind wing below. It was named in 1911 by the physician William Schaus after he collected specimens in the Miami area. This beautiful butterfly once ranged from the Miami hammocks to Lower Matecumbe Key, and there are some records that it had been seen in Key West. Today, it is found only on northern Key Largo and several small keys in Biscayne National Park.

The Schaus' swallowtail has been listed as an endangered species by the State of Florida and the federal government since 1975. It is one of only seven swallowtail butterflies worldwide (out of 573 species in the swallowtail family *Papilionidae*) listed as endangered by the International Union for Conservation of Nature and Natural Resources (Collins and Morris, 1985).



Illustration courtesy of U.S. Fish and Wildlife Service

Distribution and Decline

The population and range of Schaus' swallowtail has declined dramatically during this century. None have been seen on the mainland of Florida since 1924, and from the early 1940s through the 1980s, they have been found only on the upper Florida Keys, which includes a portion

of Biscayne National Park. In 1984, numbers sank to an all-time low, when an estimated 70 or fewer adults were left in the several remaining populations.

An intensive study of the factors contributing to the decline of this butterfly (Emmel, 1986, 1988, 1994, 1995a, 1995b) showed that aerial and truck spraying of pesticides by the Monroe County Mosquito Control District (see article on *Mosquito Control in the Florida Keys*) was apparently the chief factor contributing to the rapid decline of the species since its last substantial population peak in 1972. In that year, Monroe County initiated the use of two very powerful organophosphate pesticides, Dibrom (sprayed from airplanes) and Baytex (sprayed in ultra-low-volume fogs from trucks), replacing other less-toxic insecticides previously in use. Laboratory tests have shown that these two chemicals are extremely toxic to butterflies and most other insects. Biologists at the University of Florida and elsewhere are currently seeking ways to promote equally effective or better mosquito control by using methods other than these extremely toxic pesticides that are endangering the continued survival of this beautiful butterfly.

Life History and Behavior

The Schaus' swallowtail lays its eggs on torchwood (*Amyris elemifera*) and on wild lime (*Zanthoxylum fagara*). The eggs hatch about 10 days after laying, and like other swallowtails, the caterpillar then passes through five successively larger stages, called instars. Eggs are usually laid during the month of May and early June at the peak of the flight season. Larvae emerge, then slowly feed to maturity on the tender young leaves of torchwood or wild lime during June and early July. The young first-instar larva is brown and cryptic in color. The second, third and fourth instar larvae look like bird droppings (dark brown and white), and have rows of obvious bright blue spots spaced across each segment. The mature fifth-instar larva has the same blue spots and is olive brown in ground color, with a series of separated white patches on each side. The larval stages take about five weeks to pass from the egg hatching to the end of the fifth instar.

At this point, the mature larva forms a hard-shelled pupa, which serves as the resting stage for the species until the next spring. This pupa is brown and gray, mottled to be cryptic in its natural resting place on tree trunks or limestone outcroppings. Late in the spring, the onset of the wet-season rains and other environmental changes (perhaps including the lengthening daily photoperiod) stimulates the emergence of the pupa. A new adult lives an average of only about 3.5 days, but some individuals live as long as three weeks. Swallowtails have many natural enemies, including ants, true bugs, spiders, mantids, immature katydids, anoles and warbler birds. Most of this loss to predation occurs during the five larval stages.

The adults maneuver remarkably well, avoiding obstacles such as spider webs and trees in the thick tropical hardwood hammocks where they like to fly. They are

active from as early as 7 a.m. to 7 p.m. or even later. Most activity is during the middle of the day, with males visiting many flowers to obtain nectar between searches for females, and with the females searching for foodplants on which to lay their eggs.

Habitat Preference and Survival

This swallowtail butterfly is a true denizen of the tropical hardwood hammocks of the Florida Keys. For that reason, probably the most important contributing factor to its decline from 1911 through 1972 was habitat destruction by man as he built housing and commercial areas in the Keys. From the 1940s to 1960s avid lepidopterists collected large numbers from the small populations left on some of the Keys, further reducing their numbers. On northern Key Largo, however, where considerable tracts of tropical hardwood hammock remain to this day, the species persisted in good numbers until the early 1970s, and suffered a drastic decline starting at the end of 1972.

Following a statewide Mosquito Control Pesticide Conference at the University of Florida in January 1991, and action by the U.S. Fish and Wildlife Service in the Keys, Monroe County Mosquito Control District stopped spraying most of the areas on northern Key Largo that had any tropical hardwood hammock habitat for the Schaus Swallowtail. In May-June 1991 and again in May-June 1992, the Schaus Swallowtail populations rebounded on northern Key Largo to the point where eight new populations were established. Unfortunately, on August 24, 1992, Hurricane Andrew's eye passed over the Keys in Biscayne Bay and extreme northern Key Largo, doing great damage by both high winds and a storm surge of lengthy salt water immersion. Elliott Key, for example, was covered by a storm surge of 4-10 feet in depth for at least an hour. Thus in the May-June 1993 flight season, only 17 living adults could be found on Elliott Key. Serendipitously, however, the U.S. Fish and Wildlife Service, the National Park

Service, and the State of Florida had authorized the removal of 100 eggs from wild females on Elliott Key on June 1, 1992, just two months before the hurricane, and these had been employed to start a captive propagation program at the University of Florida, with the intention of reintroducing the butterfly further south in the Keys and minimizing the risk of a single catastrophic storm destroying the last remaining populations around Biscayne Bay. By 1995, the colony had been built up to the point where 760 pupae could be reintroduced into six sites from southern to northern Key Largo and on the Florida mainland. Another 500 adults were reintroduced in 1996, and 800 were to be reintroduced in 1997. This captive propagation and experimental reintroduction program has brought back the Schaus Swallowtail to areas where it has not flown for as long as 70 years. The U.S. Fish and Wildlife Service is strongly supporting this project through its Atlanta Regional Office and South Florida Ecosystem Office at Vero Beach. This is the first major captive propagation and reestablishment program successfully carried out for an invertebrate species in the United States, and the presence of the butterfly over a much wider range will make it easier for the resident and visitor to the Florida Keys to see the Schaus Swallowtail if it can survive drift of pesticides from the extensive areas still being sprayed regularly for adult mosquitoes.

Today, the chief threat to the Schaus' swallowtail survival is continued indiscriminate use of mosquito-control pesticides in areas uninhabited by man but inhabited by this beautiful butterfly. Without a change in policy concerning spraying of these extraordinarily toxic organophosphate pesticides, this magnificent butterfly -- and many of its fellow species among the harmless insects that do so much to beautify the unique tropical hardwood hammocks and our natural environment in the Keys -- will be lost forever.

For references, see *Notes on Articles* in Appendix 1.

Tree Snails of Monroe County

Steve Howe

Monroe County is blessed with many kinds of tree snails.

These animals, seen on branches, leaves, limestone and some man-made surfaces, at one time were much more plentiful and varied than they are now. One species, the Florida tree snail *Liguus*, had more than 60 different color forms in the past, but many of these can no longer be found.

Another, the Stock Island tree snail *Orthalicus*, is close to extinction. Snail habitats have been altered and populations reduced by development, by intrusion of non-native plants and animals, and by actions of people. As a result, the snails we see now are just a sample of what we had in the past.

The Florida tree snail is also found in Cuba, its ancestral home. The little *Drymaeus* tree snail has a wide range throughout the Caribbean. The rare Stock Island tree snail is unique to Monroe County, but its ancestors and those of the other two *Orthalicus* tree snails in Florida hail from Latin America and parts of the Caribbean.

The necessary habitat for tree snails is the hardwood hammock. The high hammock, consisting of mahogany, lysiloma (wild tamarind), pigeon plum, sable palm, royal palm and live oak, supports some species and some color patterns not usually found in the low hammock. The wild tamarind is the most important substrate for the food source for high hammock tree snails. Low hammock, characterized by poisonwood, seagrape, thatch palm and buttonwood, is shrubbier and has its own snails. Jamaican dogwood is the most important substrate for the food source for low hammock tree snails, and also is preferred as a nesting area for young snails. As hammock habitat is

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