Recovery Plan for the endangered Schaus' swallowtail butterfly (*Heraclides aristodemus ponceanus*)
https://www.fws.gov/verobeach/MSRPPDFs/Schaus.pdf
Original Approved: May 19, 1999
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AMENDMENT 1

We have identified the best available information that indicates the need to amend recovery criteria for the Schaus' swallowtail butterfly (*Heraclides aristodemus ponceanus*) since the recovery plan was completed. In this modification, we synthesize the adequacy of the existing recovery criteria, show amended recovery criteria, and provide the rationale supporting the recovery plan modification. The modification will be shown as an addendum that supplements the recovery plan by adding delisting criteria which were not developed at the time this recovery plan was completed. The recovery objective and the step-down outline are described on pages 4-757 to 4-765 of the Recovery Plan (RP) for the Schaus' swallowtail (USFWS 1999). Recovery plans are a non-regulatory document that provide guidance on how best to help recover species.

For
U.S. Fish and Wildlife Service
Atlanta, Georgia

Approved: Larry Williams
Acting **Regional Director, U.S. Fish and Wildlife Service**

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METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

The amendments to the recovery criteria are based on further evaluation of the Schaus' swallowtail historical range, ecology, annual abundance, and other recent studies with the species; information in the 2008 5-year review; and newer information gathered for the revised 5-year review initiated in 2018. This most recent and best available information was synthesized by U.S. Fish and Wildlife Service (Service) biologists and managers in the South Florida Ecological Services Field Office (SFESFO) in order to develop the delisting criteria for Schaus' swallowtail.

ADEQUACY OF RECOVERY CRITERIA

Section 4(f)(1)(B)(ii) of the Endangered Species Act (Act) requires that each recovery plan shall incorporate, to the maximum extent practicable, "objective, measurable criteria which, when met, would result in a determination…that the species be removed from the list." Legal

challenges to recovery plans (see Fund for Animals v. Babbitt, 903 F. Supp. 96 (D.D.C. 1995)) and a Government Accountability Audit (GAO 2006) also have affirmed the need to frame recovery criteria in terms of threats assessed under the five listing factors.

Recovery Criteria

The RP (USFWS 1999, p. 4-757; **https://www.fws.gov/verobeach/MSRPPDFs/Schaus.pdf**) provides recovery criteria for the Schaus' swallowtail, but it is unclear which are downlisting and which are delisting criteria.

Synthesis

The Schaus' swallowtail (Schaus') was listed as threatened in 1976 (41 FR 17736), primarily due to habitat loss and fragmentation, collecting pressures and influence of mosquito control pesticides, then reclassified to endangered in 1984 (49 FR 34504), based on continued range decline.

The Schaus' is currently extant on several islands within Biscayne National Park (BNP) and on north Key Largo (Crocodile Lake National Wildlife Refuge [NWR]; Dagny Johnson Key Largo Hammock State Park). However, at the time of listing the historical range of Schaus' was believed to have included the entire Florida Keys and southern tip of Florida (namely all hardwood hammocks from Everglades National Park south to Key West). Subsequent review of Schaus' distribution suggests the subspecies largely occurred within the northern Keys, westward onto coastal areas of Miami (modern day Coral Gables) (Henderson 1945; Kimball 1965). Although there are a few extremely old reports of Schaus' observations from the lower Keys and the Everglades, Kimball (1965) suggested these were rare and in some instances dubious. Schwartz (1987), who conducted the most extensive review of butterflies of the lower Keys, indicated that aside from a single old record of Schaus' from Key West, the subspecies is otherwise unknown from south of the Matecumbes. Lenczewski (1980) did not include Schaus' on her comprehensive historical summary of butterflies known to occur in the Everglades. Therefore, the lower Florida Keys and the Everglades are not included within the historical range discussed as part of the delisting criteria for this subspecies.

Although Schaus' populations have been monitored for several decades, it has only been since 2011 that the subspecies' range-wide abundance and distribution have been evaluated in a consistent manner from year-to-year. A total of 4 and 32 individuals were encountered range-wide in 2012 to 2013, respectively (Daniels 2015). However, as a result of captive releases and normal seasonal conditions (rainfall, abundant fresh host plant growth), observations of Schaus' densities increased in subsequent years (Daniels 2015; Tedford, pers. comm. 2017, 2018; Daniels, pers. comm. 2017; Cabrera, pers. comm. 2018). In 2018, naturally occurring Schaus' numbers increased to 438 individuals within the stronghold regions (Elliott Key within BNP and northern Key Largo) (Daniels, pers. comm. 2018a; Tedford, pers. comm. 2017, 2018. Therefore, captive-reared stock has or will be used to augment populations on other islands within BNP, as well as at locations on central Key Largo (i.e., John Pennekamp Coral Reef State Park) (Daniels, pers. comm. 2018b).

Schaus' is currently threatened by Factors A, B, D, and E (USFWS 2008). The predominant threats described at the time Schaus' was listed as endangered have each been reduced, but not eliminated. In addition, studies indicate that predation on south Florida butterflies, including all immature stages of Schaus', from nonnative ants is greater than initially known at the time of listing (Forys *et al*. 2001, 2002; Salvato *et al*. 2016; Clayborn and Koptur 2017). Therefore, Schaus' is likely also threatened by Factor C.

While habitat loss (Factor A) has been reduced, remaining hardwood hammocks for acquisition or substantial range expansion of extant Schaus' populations are limited. Therefore, restoration and management of what habitat remains will provide the greatest benefit to hardwood hammock species. Several habitat restoration projects have occurred or are ongoing within Schaus' habitat on Key Largo and within BNP designed to increase abundance and connectivity of hardwood hammock vegetation for use by Schaus'.

The Florida Park Service, Crocodile Lake NWR, North American Butterfly Association and State Park volunteers have conducted consistent, daily monitoring of extant Schaus' populations across northern Key Largo during the spring flight season (April to June), as well as during the fall flight (September). The frequent monitoring and survey efforts within the main flight window of Schaus' has likely reduced opportunities for poaching (Factor B) on north Key Largo. Similar on-the-ground monitoring also occurs within BNP by University of Florida and National Park Service (NPS).

Parasitism and predation (Factor C) are a natural part of the subspecies' life history, but their impacts may increase significantly when habitat composition and native and non-native predator abundance and composition patterns are altered. Because the Schaus' is restricted in range and abundance these factors could pose increased threats to its survival. A number of parasites, predators, and diseases have been documented for several endangered butterflies, at all immature stages, in southern Florida. The magnitude and imminence of the threat from nonnative predators, particularly ants, is high, while predation from native species is moderate. The threats of parasitism and disease on Schaus' require further study, but are likely moderate given their roles in the ecologies of other imperiled butterflies in southern Florida.

Currently, regulatory mechanisms (Factor D) provide significant protections to Schaus'. However, some of the suitable habitat on northern Key Largo, southward to the central keys, as well as within Miami-Dade County, remains vulnerable to development pressure. Regulatory mechanisms have not eliminated potential threats such as nonnative predation (Factor C, above) or influence from mosquito control (Factor E, below).

Although mosquito management efforts (Factor E) are believed to have historically contributed to Schaus' declines, ongoing coordination between the Service, its' partners and mosquito control districts have greatly reduced this threat. Mosquito control pesticides are restricted from the islands of BNP, as well as within Crocodile lake NWR on northern Key Largo. However, the Service and Florida Keys Mosquito Control District have coordinated to allow limited treatments during emergency situations (such as post-Irma) in order avoid or minimize any impacts to

occupied hardwood hammocks and butterfly habitat. Occupied and suitable Schaus' habitat on State lands on northern Key Largo and southward in the keys remain subject to pesticide applications.

Recent climate change modeling suggests that the tropical hardwood hammock in Key Largo is less vulnerable to sea level rise (Factor E) than other areas in the Florida Keys (FWC 2017; Benedict *et al*. 2018). However, at three to four feet of sea level rise, water levels fragment habitat and several habitat bottlenecks materialize; effects further exacerbated by the highway running through Schaus' habitat on northern Key Largo (CR905). Additionally, a portion of hammock areas affected by sea level rise will likely transition into mangrove forest, causing further reduction of Schaus' habitat (Saha *et al*. 2011).

Schaus' appears to be more vulnerable to extinction due to limited range and abundance of extant populations (Factor E). As addressed in Factor A, above, remaining hardwood hammocks for substantial range expansion of extant Schaus' populations are limited. Therefore, restoration and management of what habitat remains will provide the greatest benefit to hardwood hammock species. As discussed above, several ongoing and future habitat restoration projects within Schaus' habitat designed to increase abundance and connectivity of hardwood hammock vegetation are the best option for increasing the subspecies' distribution and reducing this threat.

Hurricanes and tropical storms (Factor E), depending on location, intensity and habitat conditions (time-since-disturbance), could result in Schaus' population extirpations or overall extinction. However, the thinning of dense hardwood hammocks from storms likely serves to promote new growth of larval host plants, resulting in subsequent population increases, including within adjacent habitats, in the years following the disturbance.

AMENDED RECOVERY CRITERIA

Recovery criteria serve as objective, measurable guidelines to assist in determining when an endangered species has recovered to the point that it may be downlisted to threatened, or that the protections afforded by the Act are no longer necessary and the Schaus' may be delisted. Delisting is the removal of a species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Downlisting is the reclassification of a species from endangered to threatened. The term "endangered species" means any species (species, subspecies, or DPS) which is in danger of extinction throughout all or a significant portion of its range. The term "threatened species" means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Revisions to the Lists, including delisting or downlisting a species, must reflect determinations made in accordance with sections 4(a)(1) and 4(b) of the Act. Section 4(a)(1) requires that the Secretary determine whether a species is an endangered species or threatened species (or not) because of threats to the species. Section 4(b) of the Act requires that the determination be made "solely on the basis of the best scientific and commercial data available." Thus, while recovery plans provide important guidance to the Service, States, and other partners on methods of

minimizing threats to listed species and measurable objectives against which to measure progress towards recovery, they are guidance and not regulatory documents.

Recovery criteria should help indicate when we would anticipate that an analysis of the species' status under section 4(a)(1) would result in a determination that the species is no longer an endangered species or threatened species. A decision to revise the status of or remove a species from the Federal Lists of Endangered and Threatened Wildlife and Plants, however, is ultimately based on an analysis of the best scientific and commercial data then available, regardless of whether that information differs from the recovery plan. When changing the status of a species, we first propose the action in the *Federal Register* to seek public comment and peer review, followed by a final decision announced in the *Federal Register*.

Herein, we provide delisting criteria for the Schaus' RP as it was unclear in the plan (USFWS 1999) which were downlisting and which were delisting criteria.

Amended Recovery Criteria (delisting):

We are providing recovery criteria for the Schaus' recovery plan (USFWS 1999), which will supersede (replace) the existing criteria. The below recovery criteria describes a recovered species, or a species that should be considered for removal from the List of Endangered and Threatened Wildlife (50 CFR 17).

1. The two (2) existing populations maintain a stable or increasing trend, evidenced by natural recruitment and multiple age classes (addresses Factors A and E).
2. A network of five (5) new populations are either discovered or reintroduced in Monroe County that exhibit a stable or increasing trend, evidenced by natural recruitment and multiple age classes.
3. One (1) new population is either discovered or reintroduced in Miami-Dade County that exhibits a stable or increasing trend, evidenced by natural recruitment and multiple age classes.
4. Eight (8) populations (criteria 1,2,3) are on protected lands and managed such that these populations exhibit a stable or increasing trend, evidenced by natural recruitment and multiple age classes. (addresses Factor A, B, C, D, and E)
5. Threats have been reduced or eliminated to the degree that the subspecies is viable into the foreseeable future. (addresses Factor A, B, C, D, and E)

Justification

Schaus' populations are extant on several islands within BNP, as well as on northern Key Largo (Crocodile Lake NWR; Dagny Johnson Key Largo Hammock State Botanical Site); these areas, outlined in delisting criterion #1, are entirely under conservation. BNP is managed by the NPS, while conservation lands on northern Key Largo are managed by the U.S. Fish and Wildlife Service (Service) and Florida Department of Environmental Protection (FDEP). Schaus' recovery actions, such as population augmentation and habitat restoration are ongoing at each of these locations.

Recovery efforts during the next 5 years will aim to increase Schaus' abundance and distribution on northern Key Largo which in turn may allow for greater dispersal southward to several state-managed conservation areas in Monroe County outlined in delisting criterion #2 and 3, such as John Pennekamp Coral Reef State Park (central Key Largo), Sandy Sprunt Dove Creek Hammock Environmental Management Area (southern Key Largo) and Fossil Reef Geological Site (Windley Key) within the known historical range in the Florida Keys. In 2018, reintroductions were conducted in John Pennekamp Coral Reef State Park to augment and increase Schaus' distribution.

On mainland Miami-Dade County, suitable, but unoccupied habitat remains at the Charles Deering Estate at Cutler (CDE), which lies on the mainland adjacent to BNP. CDE maintains hardwood hammock and other natural communities that are protected and managed by Miami-Dade Parks and Recreation. Similarly, Bill Baggs State Park on Key Biscayne, managed by FDEP, lies due north of BNP and is within the historical range of the subspecies. As with BNP and northern Key Largo, both areas are managed, at least in part, for conservation, however, substantial restoration would be required in order to be suitable to sustain Schaus' populations.

Establishing additional Schaus' populations on conservation lands within the historical range would increase the redundancy, representation, distribution and resiliency of the subspecies in the event of a natural event such as a hurricane. Additional populations would increase resiliency of the subspecies from threats, such as predation from nonnative predators.

BNP, Crocodile Lake NWR and Dagny Johnson Key Largo Hammock Botanical State Park have management plans designed to maintain and restore the hardwood hammock vegetation on which Schaus' depends. In addition, several habitat restoration projects have occurred or are ongoing within Schaus' habitat on Key Largo and within BNP designed to increase abundance and connectivity of hardwood hammock vegetation for use by the subspecies.

Conservation areas that retain suitable Schaus' habitat within the subspecies' historical range, such as those discussed in delisting criterion #2 and 3, will need to be evaluated to make sure each has management plans that address recreation, invasive species control, pesticide use, and public education to achieve delisting criterion #4.

The predominant threats described at the time Schaus' was listed were habitat destruction, mosquito control practices, and illegal collecting. Subsequently, studies indicate that parasitism, predation, and other ecological factors may serve as threats. As summarized under Synthesis (above), none of these threats has been eliminated. However, many threats have been reduced or are being addressed in order to achieve and maintain Schaus' populations as outlined in delisting criterion #5.

Rationale for Amended Recovery Criteria

The existing criteria for the Schaus' swallowtail on page 4-757 in the MSRP (Service 1999) (https://ecos.fws.gov/docs/recovery_plan/sfl_msrp/SFL_MSRP_Species.pdf) included only downlisting criteria. With these amendments, delisting has been clearly defined with measurable, objective criteria in keeping with the recovery strategy and goals outlined in the MSRP. These criteria address what is necessary to ensure resiliency, redundancy, and representation by addressing factors that threaten the species. In achieving these criteria, we expect the Schaus' swallowtail to have a low probability of extinction for the foreseeable future and have stable populations needed for long-term recovery. We will work together with our partners to strategically and efficiently implement the new criteria.

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