

## **Appendix 1. Definitions**

The following glossary defines scientific terms as they pertain to Miami blue assessment, conservation, and research described in this management plan.

<b>Area of Occupancy</b>	The geographic area inhabited by all individuals in a population. Typically, the amount of habitat in which individuals are known to occur.
<b>Augmentation</b>	Moving animals to supplement existing populations.
<b>Extent of Occurrence</b>	The geographic area encompassing all locations of individuals of a species, including intervening areas of unoccupied habitat. Synonymous with range.
<b>Generation</b>	The average age of breeders in a population. The estimated generation time for Miami blue is between one month and one year (FWC 2003).
<b>Known Site</b>	A location where Miami blues have been verified within the last generation (i.e., one month to one year).
<b>Long-term</b>	An extended period of time relative to the life span of individuals in a population. Length is based on commonly used viability procedures and practicality, but is typically at least 100 years.
<b>Metapopulation</b>	A collection of local populations connected by occasional dispersal in which there are local extinctions and colonizations.
<b>Population</b>	Individuals of the same species that occur in a defined area at the same time and regularly interact or interbreed. For the purpose of this management plan, a population is defined as an aggregate of known colonies separated by barriers such as water, highways, or urban areas with little to no host plants or nectar sources.
<b>Range-wide</b>	All individuals of the species throughout the entire extent of its area of occurrence. For the Miami blue, the range-wide population includes individuals historically found from Hillsborough and Brevard counties south to Key West in Monroe County.
<b>Reintroduction</b>	Moving Miami blues to re-establish populations in formerly occupied habitat.

*Management Plan – Miami Blue*

- Translocation**                      The intentional human-assisted movement of Miami blues from one location to another.
- Viable Population**                A stable, self-sustaining population with a high probability (e.g., more than 95%) of surviving for a long-term period (e.g., 100 years).

## Appendix 2. Derivation of the conservation objectives for the Miami blue

The conservation objectives for the Miami blue are: 1) to secure and maintain populations of Miami blues across at least a 40 square mile extent of occurrence and at least a four square mile area of occupancy; and 2) and to maintain a population of > 250 individuals over the next ten years (2002-2012). FWC staff arrived at this objective after carefully considering two main factors: 1) the distribution and status of the Miami blue population in 2002, and 2) the FWC listing criteria for an Endangered species. These factors and the process used to develop the conservation objective are discussed in detail below.

1. **Distribution and Status.** The species was thought to be extirpated prior to 1999. One remaining colony was found in 1999 with approximately 50 individuals (Calhoun et al. 2002). Multiple surveys have failed to find additional colonies. Emmel and Daniels (2002a, b) estimated the population to range between 51- 66 individuals in 2002. In 2002, the suspected range of the Miami blue was less than 158 square miles if one includes the entire Florida Keys. In reality the current range equals the actual area of occupancy, which is less than one square mile (FWC 2003).
2. **FWC Listing Criteria.** To be listed as an Endangered species, a species only needs to meet one of the five designated criteria. Additionally, to continue to be listed as an Endangered species, a species needs to meet one of the five designated criteria. However, to be reclassified from Endangered to Threatened, a species must exceed the requirements for all five criteria. The purpose of this exercise was to determine the minimum population requirements for reclassifying the status of the Miami blue to Threatened.
  - a. **Criterion A: A range-wide population reduction of less than 80% and greater than 50% over the next ten years.** To qualify for reclassification as Threatened under this criterion, the Miami blue population would have to maintain at least 21% of the 2002 population through the year 2012 and beyond. This equates to 10 - 14 individuals or a maximum rate of decline of five adults per year.
  - b. **Criterion B: A range-wide extent of occurrence between 40 square miles and 2,000 square miles or a range-wide area of occupancy between four square miles and 200 square miles.** To qualify for reclassification as Threatened under this criterion, the range of the population would need to expand from one square mile to at least 40 square miles. A site found or established in the Upper Keys would satisfy this requirement. The range-wide area of occupancy would need to increase four-fold to four square miles. A second or third large colony established or found outside of Bahia Honda State Park could increase the area of occupancy past four square miles.

Instead of being reclassified as Threatened based on extent of occurrence, the Miami blue could be reclassified by meeting two of the three following required conditions under this criterion: 1) the species' range must not be severely fragmented; 2) the species must not be experiencing declines and/or fluctuations in extent of occurrence, area occupied, habitat quality, number of locations, or number of mature individuals; or 3) the species must not be experiencing extreme fluctuations in extent of occurrence, area occupied, number of locations, or number of mature individuals. If two of the three conditions are met, Criterion B will no longer apply to the Miami blue. However, if two of these conditions are not met, reclassifying the status of the Miami blue to Threatened may not be warranted. It is unlikely the Miami blue will ever meet the first condition due to the fact that most of the potential habitat or reintroduction sites are fragmented by development, ocean, or unsuitable habitat. But it is likely that the second and third conditions can be met, especially with a captive propagation plan in place. However, under current conditions, any further declines or extreme fluctuations could easily lead to extinction of the Miami blue.

- c. **Criterion C: At least 250 mature individuals in the range-wide population and less than a 25% decline over the next three years.** In 2002, there were an estimated 51-66 adults in the range-wide population. In order to qualify for reclassification as Threatened under this criterion the population would need to increase by more than 279% (184 mature adults) and retain at least 76% of that population over the next three years.
- d. **Criterion D: Between 50 and 250 mature individuals in the range-wide population.** The estimated population of 51-66 individuals in 2002 already meets this criterion for reclassifying the Miami blue to Threatened (FWC 2003).
- e. **Criterion E: Between 20% and 50% probability of extinction in the wild within 20 years or ten years, respectively.** As indicated in the Final Biological Status Report, available data are not sufficient to permit estimation or modeling of the probability of extinction of Miami blues in the wild. Acquisition of new data may enable such modeling in the future.

From a numerical standpoint, if the population remained stable for the next ten years, the minimum reclassification requirements for an Endangered species would be met under Criteria A and C. However, if the Miami blue population remained at the 2002 level or increased from that level over the next ten years without any increase in the extent of occurrence, the minimum requirements for reclassification from Endangered to Threatened under Criterion B and C would not be met.

Upon consideration of these factors, FWC staff concluded that in order to meet the minimum reclassification as Threatened criteria, 1) the extent of occurrence would have to be increased to at least 40 square miles and 2) the number of mature individuals

*Management Plan – Miami Blue*

will have to be increased to at least 250 individuals over the next ten years. Because the population is currently small and restricted to one colony, a captive propagation and translocation (augmentation and reintroduction) plan will be required to avoid extinction and to achieve the conservation objective within that timeframe.