Miami Tiger Beetle
(Cicindelidia floridana)

5-Year Review:
Summary and Evaluation

Photo by Chris Wirth

U.S. Fish and Wildlife Service
South Atlantic–Gulf Region
Florida Ecological Services Field Office
Vero Beach, Florida

July 2022

5-YEAR REVIEW

Miami tiger beetle (*Cicindelidia floridana*)

I. GENERAL INFORMATION

A. Methodology used to complete the review:

In conducting this 5-year review, we relied on the best available information pertaining to historical and contemporary distributions, life histories, genetics, habitats, and threats to this species. We announced initiation of this review and requested information in a published Federal Register notice with a 60-day comment period in 2021 (86 FR 37178; Service 2021a). We received two public comments during the open comment period. One comment expressed concern for the species and the general threats of climate change and pollution, but no specific information was supplied with the comment. The second comment provided specific information pertaining to the species, habitat conditions, and threats. Comments received were incorporated into the 5-year review, as appropriate. We also used a variety of information resources, including monitoring reports, surveys, and other scientific and management information, augmented by conversations and comments from biologists familiar with the species. Specific sources included the final rule listing this species under the Endangered Species Act of 1973, as amended (Act) (81 FR 68985; Service 2016a), peer reviewed scientific publications, and unpublished field observations by Federal, State, and other experienced biologists. The review was conducted by the lead recovery biologist for Miami tiger beetle in the Florida Ecological Services Field Office (FESFO), Vero Beach. Literature and documents used for this 5-year review are on file at the FESFO. All recommendations resulting from this review are a result of thoroughly reviewing the best available information on Miami tiger beetle.

B. Reviewers

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C. Background

1. **Federal Register Notice citation announcing initiation of this review:**
   July 14, 2021, 86 FR 37178 (Service 2021a)

2. **Listing history**
   Original Listing
   Federal Register Notice: 81 FR 68985 (Service 2016a)
   Federal Register Notice date: October 5, 2016
   Effective listing date: November 4, 2016
   Entity listed: *Cicindelidia floridana*
   Classification: Endangered

3. **Associated rulemakings**
   Proposed critical habitat designation, 86 FR 49945 (Service 2021b), September 7, 2021. The final critical habitat rule has not been finalized.

4. **Review History**
   This is the first status review for the Miami tiger beetle.

5. **Species' Recovery Priority Number at start of review**
   There was no recovery priority number assigned at the start of this review. As part of this review, we will assign a recovery priority number which can be found on the signature page of this document.

6. **Recovery Plan**
   There is currently no approved recovery plan for this species.

II. REVIEW ANALYSIS

A. Application of the 1996 Distinct Population Segment (DPS) policy

The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This definition limits listing of a DPS to only vertebrate species. Because the species under review is a not a vertebrate, the DPS policy is not applicable.

B. Recovery Criteria

1. **Does the species have a final, approved recovery plan containing objective, measurable criteria?**
   No, there is no final, approved recovery plan for the species.

C. Updated Information and Current Species Status

Information on the species' biology and status is thoroughly reviewed in the listing rule (81 FR 68985; Service 2016a). Summarized information below is based on the listing rule and available new information.

1. **Biology and Habitat**

   a. **Summary of new information of species biology and life history**
   Life history - Adult female Miami tiger beetles select the habitat and microhabitat of larva by selecting an egg-laying site in sandy habitat (Knisley and Schultz 1997). Generally, the same microhabitats are occupied by both larvae and adults. Development in tiger beetles includes three larval instars (molting periods) followed by a pupal and adult stage. The adult Miami tiger beetle are seen in flight from mid-May to mid-October. This 5-month long adult flight period is unusual in tiger beetles and is much longer than the seasonality of three closely-

related *Cicindelidia* species with ranges in Florida (Knisley and Brzoska 2018). It is unclear if there are one or two groups of Miami tiger beetle adults emerging during this extended period. If there are two groups, adults emerging in May and June would mate, lay eggs, and produce larvae that could develop and emerge as a second group of adults in late July and August. Larvae from these later active adults would develop through fall and winter, emerging as adults the following May. This rapid rate of development is possible given the small size of the species and the continually warm temperatures within their range. The development rate likely increases during the summer rainy season when prey are more abundant (Knisley and Brzoska 2018).

Feeding – Adult Miami tiger beetles are active diurnal predators that feed on small arthropod prey using their well-developed jaws. Small arthropods, especially ants, are the most common prey for tiger beetles in Florida (Choate 1996).

Dispersal – Based on available information, the Miami tiger beetle appears to have only limited dispersal abilities. Among tiger beetles there is a general trend of decreasing flight distance with decreasing body size (Knisley and Hill 1996). The Miami tiger beetle is one of the smallest tiger beetles (less than half an inch in length) and is likely to be a weak flier based on its size and the limited flight distance of the closely related and similarly sized Highlands tiger beetle (*Cicindelidia highlandensis*) (usually flying only 5 to 10 meters [16.4 to 32.8 feet]) (Knisley and Hill 2013). Additionally, tiger beetle species in woodland, scrub, or dune habitats seem to disperse less than water edge species, and this could further explain the apparent limited dispersal of the species (Knisley and Hill 1996).

As a group, tiger beetles occupy ephemeral habitats where local extinction due to habitat loss or degradation is common, so dispersal to establish new populations in distant habitat patches is a likely survival strategy for most species (Knisley 2015a). Limited dispersal capabilities and other constraints (e.g., few populations, limited numbers, and barriers created by intervening unsuitable habitat), however, can disrupt otherwise normal metapopulation dynamics and contribute to imperilment.

b. Abundance, population trends, demography

Information on Miami tiger beetle population sizes, trends, and demography are limited because survey data are inconsistent, and some sites are difficult to access due to permitting, security, and liability concerns. The Miami tiger beetle is currently known from only two populations (Richmond population and Nixon Smiley population) in the Norther Biscayne Pinelands of Miami-Dade County, Florida (Figure 1).

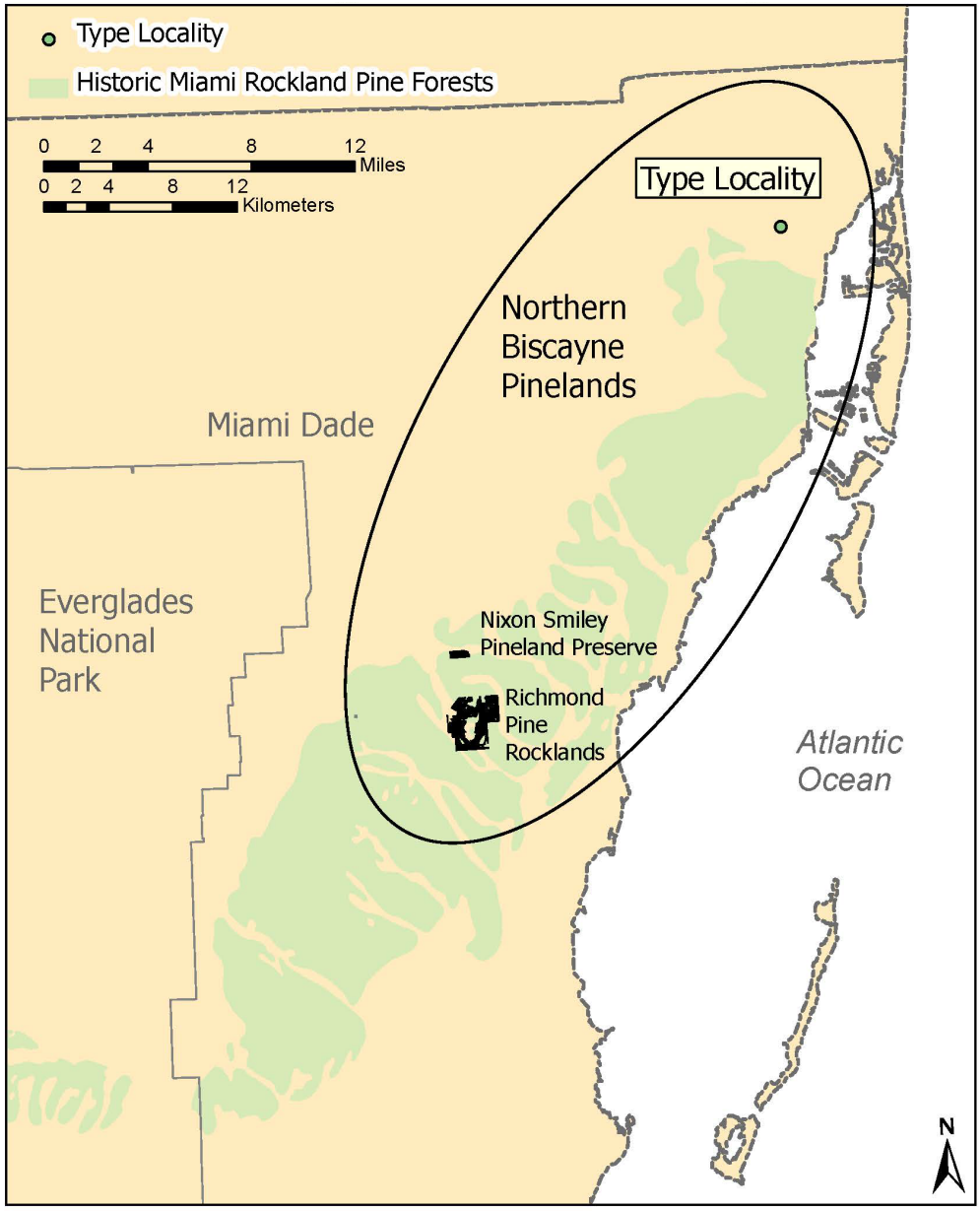

Figure 1. Estimated historical range of the Miami tiger beetle within the Northern Biscayne Pinelands of Miami-Dade County, Florida with designations for the locations of the Richmond Pine Rockland (Richmond population), Nixon Smiley Pineland Preserve (Nixon Smiley population), and type locality.

The location where the species was first discovered (type locality; Figure 1) in North Miami has been developed and is considered extirpated. The Richmond population has known occupancy throughout four individual, contiguous parcels: Zoo Miami Pine Rockland Preserve, Larry and Penny Thompson Park, University of Miami's Center for Southeastern Tropical Advanced Remote Sensing (CSTARS), and the U.S. Coast Guard (USCG) (see II.C.1.e. below for distribution). The most consistent survey data are from three parcels: Zoo Miami

Pine Rockland Preserve and Larry and Penny Thompson Park in the Richmond population and Nixon Smiley Pineland Preserve (Nixon Smiley population). Surveys from these parcels are generally conducted two times per year, dependent on staffing and funding availability. Surveys from the remaining two parcels in the Richmond population, the CSTARS and USCG, have been infrequent. No known surveys were conducted in occupied areas in 2020 due to limited field work during the COVID-19 pandemic.

Visual index counts (observations while slowly walking or standing still in appropriate habitat) are the standard survey method used to determine presence and abundance of Miami tiger beetles. However, studies have demonstrated that this survey method significantly underestimates actual numbers of tiger beetles present. It is estimated that tiger beetle abundance at a site is typically 2 to 3 times higher than produced by the index count (Knisley and Schultz 1997; Knisley 2009; Knisley and Hill 2013; Knisley and Brzoska 2018). In surveys conducted from 2008 to 2021, the number of adult individuals observed ranged from 0 to 54 during any one survey date and location (Knisley 2015b; Mays 2021a, pers. comm.).

While the number of tiger beetles observed in surveys can fluctuate depending on weather conditions, habitat conditions of areas surveyed, and variation in daily or seasonal activity, the numbers of Miami tiger beetles observed at Zoo Miami have showed a general decline from 2008 through 2021 (Knisley and Brzoska 2018; Mays 2021a, pers. comm.). This observed decline in peak Miami tiger beetle counts has been attributed in part to the increased vegetation encroachment into the bare open areas of the forested pine rockland management units (Knisley and Brzoska 2018; Mays 2021a, pers. comm.). This is supported by most observations coming from the periphery (e.g., fire breaks and rocky perimeter roads that are managed to prevent vegetation encroachment and still provide the open, sandy habitat the species requires) instead of the interior sections of the forested pine rockland management units (Mays 2021a, pers. comm.).

The numbers of Miami tiger beetles observed at Larry and Penny Thompson Park and Nixon Smiley Pineland Preserve have fluctuated between 1 to 54 and 8 to 50 individuals, respectively through the survey years, with lower counts in 2019 and 2021 attributed to cloudy, overcast weather conditions and lack of surveys in late-June to early-July, which is considered the peak active adult flight period for the species (Mays 2021a, pers. comm.).

c. Genetics

We have no new information on genetics of the species.

d. Taxonomic classification or changes in nomenclature

The Miami tiger beetle was first documented from collections made in 1934 in North Miami (Figure 1). With no observations after the initial collection, the species was thought extinct until rediscovery in 2007 at the Zoo Miami Pine

Rockland Preserve in Miami-Dade County. The rediscovery of a Miami tiger beetle population provided additional specimens to the 1934 collection and prompted a full study of its taxonomic status, which elevated it to a full species, *Cicindelidia floridana* (Brzoska et al. 2011). The species was listed as *Cincindelida floridana* and we have no new information to indicate any changes in taxonomy or nomenclature.

The Integrated Taxonomic Information System (2021) recognizes the Miami tiger beetle as a valid species, but they use the former genus, *Cicindela*. Florida Natural Areas Inventory (FNAI, 2021a) and NatureServe (2021) also accept the Miami tiger beetle's taxonomic status as a species; however, they both use the new generic designation, *Cicindelidia*. Although there are differences in the genus used by organizations, based upon the best available scientific information, the Miami tiger beetle remains a valid species.

e. Distribution and trends in spatial distribution

The historical range of the Miami tiger beetle is not completely known, and available information is limited based on a single historical observation prior to the species' rediscovery in 2007. It is likely that the Miami tiger beetle historically occurred throughout pine rockland habitat in the Northern Biscayne Pinelands of the Miami Rock Ridge (86 FR 49945; Service 2021b; Figure 1).

The Miami tiger beetle was considered extinct until 2007, when a population was discovered at the Richmond Heights area of south Miami, Florida, known as the Richmond Pine Rocklands (Brzoska et al. 2011; Knisley 2011). The Richmond Pine Rocklands is a mixture of publicly and privately owned lands that retain the largest area of contiguous pine rockland habitat within the urbanized areas of Miami-Dade County.

The Miami tiger beetle is extremely rare and currently only known to occur in two separate populations within pine rockland habitat in Miami-Dade County. The Richmond population occurs on four contiguous parcels within the Richmond Pine Rocklands: Zoo Miami, Larry and Penny Thompson Park, USCG, and CSTARS. A second population (Nixon Smiley population) was identified in 2015 at the Miami-Dade County owned and managed Nixon Smiley Pineland Preserve. The two populations are approximately 5 kilometers (3.1 miles) apart and separated by ample urban development, which likely represents a significant barrier to dispersal and limits the species ability to recolonize after local extirpation events.

In 2021, Miami tiger beetles were detected at a new area of Zoo Miami, west of all previously known locations at the zoo and approximately 1.4 kilometers (km) (0.87 miles [mi]) from the known locations on the eastern sections of the zoo property (Ridgley 2021, pers. comm.). This discovery highlights the importance of surveying for the species on the undeveloped lands adjacent to known locations.

In August 2021, FNAI (2021b) surveyed 11 pine rockland sites within the presumed historic range of the species throughout Miami-Dade County with no known documented Miami tiger beetle observations. This extensive survey effort produced no new Miami tiger beetle observations at new locations.

f. Habitat or ecosystem conditions

The open pine rockland habitat that Miami tiger beetles rely on is naturally maintained by regular lightning induced fire and susceptible to other natural disturbances such as hurricanes, frost events, and sea-level rise (Ross et al. 1994). Fires historically burned on an interval of approximately every 3 to 7 years and were typically started by lightning strikes during the frequent summer thunderstorms (FNAI 2010).

Miami-Dade County, the Institute for Regional Conservation (IRC), and Coral Reef Commons (through a habitat conservation plan [HCP]) have implemented habitat conservation measures including vegetation thinning and prescribed fire to help conserve pine rocklands and the various imperiled species that depend on them. Despite efforts to manage pine rocklands throughout Miami-Dade County, sites with the Miami tiger beetle are not burned as frequently as needed to maintain suitable beetle habitat. For example, the forested pine rocklands at the USCG parcel have not been burned in recent history, and vegetation is thick and overgrown throughout most of the site (Knisley 2015b; Possley 2020, pers. comm.; Mays 2021b, pers. comm.), except for three small areas where IRC conducted targeted vegetation thinning in early 2021 (Gann 2021, pers. comm.). Similarly, the pine rocklands at Zoo Miami are notably overgrown and in need of prescribed fire and vegetation and pine duff clearing, even in an area that has recently received prescribed fire (FNAI 2021b; Mays 2021a, pers. comm.).

Limited vegetation clearing was conducted in the occupied area at Larry and Penny Thompson Park in 2020 to 2021, and beetles are still present in this area; however, no clearing was conducted in the western fire break and illegal all-terrain vehicle trail on the northwest corner and these areas have become thick with grasses and less compatible with tiger beetle needs (Mays 2021b, pers. comm.). No Miami tiger beetles have been observed in these areas since 2019. The pine rocklands at the CSTARS site are used as on off-site mitigation area for the Coral Reef Commons HCP and are currently managed to maintain healthy pine rockland habitat using invasive, exotic plant management, mechanical treatment, and prescribed fire (see II.C.2d below for more details). While no surveys have been conducted for the Miami tiger beetle on this site since pine rockland management started there, the species has recently been observed along the fenceline adjacent to the property (Mays 2021b, pers. comm.).

Nixon Smiley Pineland Preserve has not been purposefully managed, but a recent arson or wildfire did occur in the summer of 2019 that helped to open up habitat in part of the area occupied by the species and new areas to the west of the

occupied area. Burma reed (*Neyraudia reynaudiana*) and other invasive plants continue to invade the pine rocklands at Nixon Smiley (Mays 2021b, pers. comm.). Due to the proximity of this site to the Miami Executive Airport, prescribed fire is likely not a management option, and the site will require vegetation clearing by hand or mechanical equipment.

2. Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms):

a. Present or threatened destruction, modification or curtailment of its habitat or range

As discussed in the listing rule (Service 2016a), the Miami tiger beetle continues to be threatened by habitat loss and modification caused by development, changes in land use, and inadequate land management, including the lack of prescribed burns and vegetation (native and nonnative) encroachment. Threats to the habitat of the Miami tiger beetle occurred in the past, continue currently, and are expected to impact the species in the future. Habitat loss, fragmentation, degradation, and associated pressures from increased human population are primary threats; these threats are expected to continue, placing the species at greater risk. The species' occurrence on pine rocklands that are partially protected from development tempers some impacts, yet the threat of further loss, habitat changes from lack of fire management, and fragmentation of habitat remains. For example, Miami-Dade County is planning to construct a water park, hotel, and parking area in areas around occupied Miami tiger beetle habitat at Zoo Miami within the Richmond Pine Rocklands. While the county is taking steps to ensure that no occupied Miami tiger beetle habitat is directly impacted by the proposed project, there is the possibility that such planned development could further reduce the ability to conduct prescribed fire within the Richmond Pine Rocklands.

The pine rockland habitat where the Miami tiger beetle occurs depends on management actions (i.e., prescribed fire) which are hindered by surrounding development in each of the known populations. Therefore, based on our analysis of the best available information, the present and future loss and modification of the species' habitat are still a primary threat to the Miami tiger beetle throughout its range.

b. Overutilization for commercial, recreational, scientific, or educational purposes

Collection interest in tiger beetles, especially rare species, is high and markets currently exist. Collection and trade of the Miami tiger beetle has been documented through entomological websites and social media (Wirth 2016, pers. comm.). The risk of collection of the Miami tiger beetle is high, as some sites are generally accessible and not monitored or patrolled (Wirth 2021, pers. comm.).

Due to the combination of few remaining populations, low abundance, restricted range, and likely limitations in dispersal between occupied habitats, we have

determined that collection is a significant threat to the species and could potentially occur at any time. Even limited collection from the remaining populations could have negative effects on reproductive and genetic viability of the species and could contribute to the extirpation of populations, especially if adults are taken prior to oviposition or from populations with limited number of adults or isolated populations.

c. Disease or predation

Disease and predation have not been studied but are not currently considered a threat to the Miami tiger beetle.

d. Inadequacy of existing regulatory mechanisms

Federal: Currently there is one Habitat Conservation Plan that provides some protections for Miami tiger beetle under the auspices of section 10 of the Act. As part of the Coral Reef Commons HCP, an approximately 21-hectare (ha) (51-acre [ac]) onsite preserve was established within the Richmond population under a conservation encumbrance that will be managed in perpetuity for pine rockland habitat and sensitive and listed species, including the Miami tiger beetle. In addition, approximately 21 ha (51 ac) of the CSTARS site (discussed above; Richmond population) is an offsite mitigation area for Coral Reef Commons. Miami tiger beetle occurs at the CSTARS site, which is managed to maintain healthy pine rockland habitat using invasive, exotic plant management, mechanical treatment, and prescribed fire, addressing both the habitat and conservation needs of the species.

State: The Miami tiger beetle is currently listed by the State of Florida as a federally endangered species under Chapter 68A-27, Rules Relating to Endangered or Threatened Species. Generally, all State-owned property and resources are protected from harm in Chapter 62D–2.013(2), and animals are specifically protected from unauthorized collection in Chapter 62D–2.013(5) of the Florida Statutes. However, this does not provide any direct protection to habitat.

Local: Under Miami-Dade County ordinance (Section 26-1), a permit is required to conduct scientific research (Rule 9) on county environmental lands. In addition, Rule 8 of this ordinance provides for the preservation of habitat within County parks or natural areas operated by the Parks, Recreation and Open Spaces Department.

In addition, ordinance 89-9, Chapter 24-60 of the Miami-Dade County Code provides legal protection for sites designated by the county as Natural Forest Communities (NFCs) by enacting regulations on habitat alterations to minimize damage to and protect environmentally sensitive forest lands, including pine rocklands. The Miami-Dade County Department of Regulatory and Economic Resources (RER) has regulatory authority over NFCs and are charged with enforcing regulations that provide partial protection on the Miami Rock Ridge.

Miami-Dade Code typically allows up to 20 percent of a pine rockland designated as NFC to be developed and requires that the remaining 80 percent be placed under a perpetual covenant. In certain circumstances, where the landowner can demonstrate that limiting development to 20 percent does not allow for "reasonable use" of the property, additional development may be approved. The NFC landowners are also required to obtain a NFC permit for any work within the boundaries of the NFC property.

The NFC program currently regulates approximately 600 pine rocklands or pine rockland/hammock properties, comprising approximately 1,200 ha (3,000 ac) of habitat (Joyner 2013, pers. comm.). Sections of the Richmond and Nixon Smiley populations are within the NFC program. When RER discovers unpermitted activities, it takes appropriate enforcement action and seeks restoration when possible. Because these regulations allow for development of pine rockland habitat and unpermitted development and destruction of pine rockland continues to occur, the regulations are not fully effective at protecting against loss of Miami tiger beetles or their potential habitat.

Miami-Dade County also has a voter approved Environmentally Endangered Lands (EEL) program to fund the acquisition, protection, and maintenance of environmentally sensitive lands. Under this program to date, Miami-Dade County has acquired a total of approximately 627 ha (1,550 ac) of pine rocklands. Some of the properties under the EEL program include sites occupied by the Miami tiger beetle, including Larry and Penny Thompson Park and sections of Zoo Miami. Unfortunately, many of the EEL pine rocklands are not managed appropriately to maintain the open, sparsely vegetated areas that are needed by the beetle and may limit their persistence on those properties.

In summary, we find that there are only limited protections if the species was not protected under the auspices of the Act. Existing regulatory measures, due to a variety of constraints, do not work as designed and, therefore, are inadequate to address threats to the species throughout all of its range.

e. Other natural or manmade factors affecting its continued existence

A wide array of natural and manmade factors affects the continued existence of the Miami tiger beetle. A detailed discussion of these factors is available in the listing rule (Service 2016a) and additional details are provided below. Collectively, these threats have occurred in the past, are impacting the species now, and will continue to impact the species in the future. The species is immediately vulnerable to extinction because of few remaining small populations, restricted range, and isolation. Aspects of the Miami tiger beetle's natural history (e.g., limited dispersal) and environmental stochasticity (including hurricanes and storm surges) may also contribute to imperilment through direct mortality, pushing individuals out of appropriate habitat, and modification of habitat. Other natural (e.g., changes to habitat, invasive and exotic vegetation) and anthropogenic (e.g., habitat alteration, impacts from humans, climate change, and

sea-level rise) factors are also identifiable threats. Climate change and sea level rise (SLR) are major concerns for the Miami tiger beetle.

Observed climate changes include, but are not limited to, warmer global surface temperatures, increased frequency and intensity of heavy precipitation, global SLR, and increased number and intensity of extreme weather events (e.g., droughts, heavy precipitation, tropical cyclones, heat waves) (Intergovernmental Panel on Climate Change [IPCC] 2021). Under simulations for two greenhouse-gas emissions pathways, representative concentration pathway (RCP) 4.5 (intermediate-high) and 8.5 (extreme), the mean temperature in Miami-Dade County is predicted to increase 2.0 to 4.0 degrees Fahrenheit (1.1 to 2.2 degrees Celsius), respectively, by 2074 (Alder and Hostetler 2013). Under these same simulations, precipitation is expected to decline up to approximately 1.0 (RCP 4.5) to 2.0 inches per month (RCP 8.5) (2.5 to 5.1 centimeters per month) throughout the majority of the wet season (May through September) by 2074. Higher temperatures and changes in precipitation patterns could alter relative humidity levels and evapotranspiration rates, leading to the potential for more frequent and intense droughts and wildfire events. The phenology (timing of seasonal activities) of organisms in the South Florida pine rockland community can be altered with these changes in temperature and precipitation, which could initiate changes to the life history patterns of the Miami tiger beetle (e.g., adult and larval seasonality) and their insect prey base (Stys et al. 2017). Elevated temperatures are also anticipated to reduce substantially the ability to conduct prescribed fire during the summer burn season (Kupfer et al. 2020). In addition, higher levels of carbon dioxide in the atmosphere connected to climate change (IPCC 2021) have been shown to stimulate growth and biomass in the vegetative community (Ainsworth and Long 2005; Stover et al. 2007; Seiler et al. 2009; Stys et al. 2017). All of these changes in climate could also translate into potential changes in the vegetative community and greater rates of vegetative encroachment into the open, sandy areas needed by the beetle.

In addition to changes in precipitation and temperatures patterns, there are also anticipated changes to the severity of tropical storms and hurricanes. Sweet et al. (2017) predicted a 20 percent increase in both rainfall rates and wind speeds near the center of storms due, in part, to higher sea surface temperatures.

Another anticipated consequence of climate change in Florida is SLR. Scenarios project a regional sea level within the range of the Miami tiger beetle of approximately 1.18 to 1.41 ft (0.36 to 0.43 m) by 2050 and 3.6 to 5.2 ft (1.1 to 1.6 m) by 2100 (Sweet et al. 2022). Under both scenarios occupied populations (Richmond and Nixon Smiley) and other pine rockland sites that potentially could support but are not currently known to have Miami tiger beetles are projected to be free from direct inundation from sea level rise.

D. Synthesis

The Miami tiger beetle is an endemic of the pine rockland ecosystem in Miami-Dade County, Florida. Habitat loss, degradation, and fragmentation of this ecosystem have significantly reduced the range of the species, leaving just two known discontinuous populations remaining. The species likely has limited dispersal and a limited ability to rescue extirpated populations. The remaining two, small populations appear to occupy relatively small habitat patches, which make the populations vulnerable to local extinction from normal fluctuations in population size, genetic problems from small population size, or environmental catastrophes. The threat of habitat loss is continuing from development, inadequate habitat management resulting in vegetation encroachment, and environmental effects resulting from climatic change. The fragmented nature of Miami-Dade County's remaining pine rockland habitat and the influx of development around them may preclude the ability to conduct prescribed burns or other beneficial management actions that are needed to maintain habitat required by the species. Due to the restricted range, small population size, few populations, and relative isolation, collection is a significant threat and could potentially occur at any time. Additionally, the existing regulatory mechanisms do not provide adequate protection for the species. Based on the status of the species and the severity of threats it faces, the Miami tiger beetle continues to meet the definition of endangered.

III. RESULTS

C. Recommended Classification:

____ **Downlist to Threatened**
____ **Uplist to Endangered**
____ **Delist** (*Indicate reasons for delisting per 50 CFR 424.11):*
  ____ *Extinction*
  ____ *Recovery*
____ ***Original data for classification in error***
__X_ **No change is needed**

IV. RECOMMENDATIONS FOR FUTURE ACTIVITIES

- Work with partners to secure funding and implement prescribed fire and vegetation management at occupied and potentially suitable Miami tiger beetle sites, with priority for critical habitat units.
- Conduct surveys for additional populations of Miami tiger beetles at all potentially suitable pine rockland sites throughout the Miami Rock Ridge and evaluate sites for suitability in translocation trials, with priority for critical habitat units.
- Conduct studies on:
  - the Miami tiger beetle's response to vegetation reduction and removal techniques in localized areas.

    - the Miami tiger beetle's life history, dispersal capabilities, habitat requirements, population dynamics, and threats to develop guidance for best management practices and conservation strategies.
    - captive rearing methods for development of a captive propagation plan.
- Routinely monitor, preferably monthly, population sizes and distribution to assess status and trends of the species.
- Complete a species status assessment and recovery plan for the Miami tiger beetle.

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U.S. FISH AND WILDLIFE SERVICE

5-YEAR REVIEW of Miami Tiger Beetle (*Cicindelidia floridana*)

Current Classification: Endangered

Recommendation resulting from the 5-Year Review:

_____ Downlist to Threatened
_____ Uplist to Endangered
_____ Delist
_X_ No change needed

Recovery Priority Number (see 48 FR 43098 and correction, 48 FR 51985)**:**
We are recommending establishing a Recovery Priority Number of 5c. This corresponds to a species with a high degree of threat, and low recovery potential with possible conflict with economic interests. Recovery potential is considered low for the Miami tiger beetle because the species was thought to be extinct until 2007 and now is known from only two populations. Some of the sites where it occurs are not on conservation lands, rather in public and private ownership. Restoration efforts in pine rocklands near Miami tiger beetle locations have begun but are limited and are not showing defined progress for this species to assume high recovery potential. The isolated nature of the few remaining pine rockland fragments, and a lack of adequate fire management and proposed development directly adjacent to pine rocklands occupied by the Miami tiger beetle may prevent dispersal and natural recolonization, limit success of possible future augmentations or reintroductions, and otherwise conflict with recovery goals and objectives.

Review Conducted By: Emily Bauer, Florida Ecological Services Field Office, Vero Beach.

FIELD OFFICE APPROVAL:

Division Manager, Florida Classification and Recovery, Florida Ecological Services Field Office, Fish and Wildlife Service

Approve LOURDES MENA Digitally signed by LOURDES MENA Date: 2022.08.03 12:34:08 -04'00' Adobe Acrobat version: 2022.001.20169

LEAD REGIONAL OFFICE APPROVAL:

Assistant Regional Director – Ecological Services, Fish and Wildlife Service

Approve CATHERINE PHILLIPS CZARNECKI Digitally signed by CATHERINE PHILLIPS CZARNECKI Date: 2022.08.04 12:50:12 -04'00'