

**BEFORE THE SECRETARY OF THE INTERIOR**



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**EMERGENCY PETITION TO LIST  
THE MIAMI TIGER BEETLE (*Cicindela floridana*)  
UNDER THE ENDANGERED SPECIES ACT**

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Petitioners:

The **Center for Biological Diversity** is a nonprofit, public interest environmental organization dedicated to the protection of imperiled species and the habitat and climate they need to survive through science, policy, law and creative media. The Center is supported by more than 800,000 members and activists throughout the country. The Center works to secure a future for all species, great or small, hovering on the brink of extinction.

The **Miami Blue Chapter of the North American Butterfly Association** is located in southeast Florida and named after one of our rarest butterflies. Our chapter is working hard to meet the challenges of the 21st century as they apply to butterfly interests.

**South Florida Wildlands Association** was founded in March of 2010, and is rapidly gaining recognition as a forceful and effective group working to protect south Florida's public lands and remaining wildlife habitat.

**Tropical Audubon Society** is a chapter of Audubon Florida and the National Audubon Society. It is a nonprofit, 501 (c)(3) tax-exempt organization whose mission is to work toward protection of the natural world and to promote wise stewardship of natural resources, especially native plants and animals and their habitat.

**Sandy Koi** is the Biological Scientist for Catharine Mannion's Ornamental Entomology Lab. She earned an MSc in Entomology in 2013 from the University of Florida under the guidance of Dr. Jaret. She has a BSc in Environmental Science from Nova Southeastern University; her published scientific research revolves around the object of her thesis, the Atala butterfly (*Eumaeus atala*), an imperiled South Florida species that she has been studying since 2001.

Sandy currently spearheads an assisted relocation project for the Atala butterfly *from* eruption sites *into* suitable new sites in Southeast Florida. She coordinated butterfly surveys for Florida Natural Areas Inventory (FNAI) and is an active member of the North American Butterfly Association (NABA). She is a contributing member of the Imperiled Butterfly Working Group (IBWG), under the authority of the Florida Fish and Wildlife Conservation Commission (<http://share2.myfwc.com/IBWG/default.aspx>).

Many of her photographs and plant information about South Florida butterfly host and nectar plants grace the national NABA website ([www.naba.org](http://www.naba.org)) and she is a frequent speaker at local organizations in Florida, including Butterfly Days at Fairchild Tropical Botanic Garden and the Southern Lepidopterists' Society. She maintains a blog that highlights her research, eco-tours and children's nature programs (<http://e-atala.blogspot.com>).

**Al Sunshine** is a Miami Based Investigative Reporter and Community Activist with more than 40 years of experience covering South Florida, the Caribbean and the Southeast. His work has earned him multiple awards including several Emmys, an Edward R Murrow

Emergency Petition to List the Miami Tiger Beetle, Submitted December 11, 2014

Award for website blogging, as well as multiple Consumer Protection awards on both the national and state levels. His work covering the “Challenger Disaster” for CNN is cataloged in the Library of Congress.

Al’s News Reports during Miami’s Drug Wars in the 1970’s-80’s are chronicled in the documentary “Cocaine Cowboys”. Al’s investigations prompted more than a dozen state and local consumer protection laws. He also produced one of the first local television news series in Miami on the growing environmental challenges facing South Florida, “The Vanishing Everglades” featuring Marjorie Stoneman Douglas, Bob Graham and Bobby Jones.

Al is a long-time resident of South Miami-Dade is one of the founding members of the Miami Rocklands Preservation Coalition.

**Chris Wirth** has a bachelor of science degree and produced an honor’s thesis entitled Description of the third instar larvae of *Cicindela abdominalis* F., *C. floridana* Cartwright, *C. highlandensis* Choate, and *C. scabrosa* Schaupp (Coleoptera: Carabidae: Cicindelinae). He was a field research assistant for Dr. Knisley, an expert on the Miami tiger beetle and has photographed the Miami tiger beetle and its habitat.

Submitted this 11th day of December, 2014:

Pursuant to Section 4(b) of the Endangered Species Act (“ESA”), 16 U.S.C. § 1533(b), Section 553(3) of the Administrative Procedures Act, 5 U.S.C. § 553(e), and 50 C.F.R. § 424.14 and 424.20, the Center for Biological Diversity, Miami Blue Chapter of the North American Butterfly Association, South Florida Wildlands Association, Tropical Audubon Society, Sandy Koi, Al Sunshine, and Chris Wirth formally petition on an emergency basis the Secretary of Interior to list the Miami tiger beetle as a threatened or endangered species and to designate critical habitat concurrent with listing pursuant to 16 U.S.C. 1533(a)(3)(A) and 50 C.F.R. § 424.12. In the alternative, the aforementioned groups and individuals petition for listing the Miami tiger beetle under the U.S. Fish and Wildlife Service’s (“Service”) standard listing procedures.

The Service has jurisdiction over this petition. This petition sets in motion a specific process placing definite response requirements and time restraints on the Service. Specifically, the Service must issue an initial finding as to whether the petition “presents substantial scientific or commercial information indicating that the petitioned action may be warranted.”<sup>1</sup> The Service must make this initial finding “[t]o the maximum extent practicable, within 90 days after receiving the petition.”<sup>2</sup>

The Miami tiger beetle was presumed extinct until recent surveys discovered individuals at three sites in the Richmond pine rocklands. It is now regarded as a species of concern by the Service, and is imminently threatened by destruction from the construction and operation of a mixed-use shopping mall and the potential development of a theme park. Both developments would directly destroy occupied habitat and impact adjacent occupied habitat by limiting burns and other flora management efforts. The beetle is also threatened by vegetation encroachment which may be less imminent but is ongoing. The imperiled status of the Miami tiger beetle coupled with the impending urban development warrant emergency action by the Service pursuant to 16 U.S.C. § 1533(b)(7) and 50 C.F.R. § 424.20.

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<sup>1</sup> 16 U.S.C. § 1533(b)(3)(A).

<sup>2</sup> *Id.*

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## I. EXECUTIVE SUMMARY

The Miami tiger beetle, a diminutive iridescent native of Florida, was first discovered and described in the 1930s. It was not seen again until 2007 in the Richmond Heights area of Miami, Florida. Today that same habitat is under threat of imminent destruction from a planned mixed-use shopping mall and proposed theme park.

Congress enacted the Endangered Species Act (“ESA”) in 1973 to provide “a program for the conservation of ... endangered species and threatened species” and “a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved.”<sup>3</sup> As the first step in the protection of these species, Section 4 of the ESA requires the Secretary to list species as “endangered” or “threatened” when they meet the statutory listing criteria.<sup>4</sup> An “endangered” species is one “in danger of extinction throughout all or a significant portion of its range,” and a “threatened” species is “likely to become endangered in the near future throughout all or a significant portion of its range.”<sup>5</sup>

Once a species is listed, the ESA provides a variety of procedural and substantive protections to ensure not only the species’ continued survival, but also its ultimate recovery. “Congress has spoken in the plainest words, making it clear that endangered species are to be accorded the highest priorities.”<sup>6</sup>

The best available scientific information indicates that the Miami tiger beetle is threatened with extinction. While it may have always been rare (which is uncertain since nearly all of the pine rockland has been destroyed, except some preserved patches in Miami-Dade) to begin with, the last remaining populations, all occurring on a contiguous tract of pine rocklands, known as the Richmond pine rocklands, are now imminently threatened with complete extinction. The U.S. Fish and Wildlife Service (“Service”) must review this petition and take emergency listing action to immediately list the Miami tiger beetle and afford it the fullest protection under the ESA.

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<sup>3</sup> 16 U.S.C. § 1531(b).

<sup>4</sup> *Id.* § 1533.

<sup>5</sup> *Id.* § 1532(6) & (20).

<sup>6</sup> *TVA v. Hill*, 437 U.S. 153, 155 (1978).

## II. INTRODUCTION

Florida has unique and abundant biological resources and is considered a biodiversity hot spot in the United States, hosting an estimated 700 vertebrate species and over 30,000 invertebrate species.<sup>7</sup> There are a number of wildlife and plant species persisting in Florida, found nowhere else in the world, with 147 endemic vertebrates, 410 endemic invertebrates, and 295 endemic plants.<sup>8</sup> The Miami tiger beetle is one of those species.

The Miami tiger beetle, a diminutive iridescent native of Florida, was first discovered and described in the 1930s. It was not seen again until 2007 in the Richmond Heights area of Miami, Florida. Today that same habitat is under threat of imminent destruction from a planned stripmall and proposed theme park.

To provide greater protection to this rare Florida ecosystem and to stave off looming extinction, the Center for Biological Diversity, Miami Blue Chapter of the North American Butterfly Association, South Florida Wildlands Association, Tropical Audubon Society, Sandy Koi, Al Sunshine, and Chris Wirth hereby petition the U.S. Fish and Wildlife Service (“Service”) to list the Miami tiger beetle as threatened or endangered under the Endangered Species Act (“ESA”).

## III. NATURAL HISTORY

### A. Taxonomy

Oscar L. Cartwright first described the Miami tiger beetle (*Cicindela floridana*) in 1939 as a Florida variety of the eastern pinebarrens tiger beetle (*Cicindela abdominalis*) from a specimen collected by Frank N. Young in 1934.<sup>9</sup> It had not been recollected again until it was rediscovered in 2007.<sup>10</sup> Based on differences from the closely related scabrous tiger beetle (*Cicindela scabrosa*), including morphology, distribution, habitat and seasonality, it is now considered a full species.<sup>11</sup> Genetic analysis, mtDNA, was also used to confirm the taxonomy of the Miami tiger beetle.<sup>12</sup> The beetle is recognized as a valid species in the most recent catalog of beetle taxonomy.<sup>13</sup> The Integrated Taxonomic Information System (ITIS) serial number for this species is 931870.<sup>14</sup>

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<sup>7</sup> Myers, N., R. Mittermeier, C. Mittermeier, G. Fonseca, and J. Kent. Biodiversity hotspots for conservation priorities. *Nature* Vol. 403 Feb. 24, 2000 at 853.

<sup>8</sup> Florida Fish and Wildlife Commission, *Florida's Wildlife Legacy Initiative*, myfwc.com, <http://myfwc.com/conservation/specialinitiatives/fwli/> (last visited Oct. 18, 2014).

<sup>9</sup> Brzoska, D., C. Knisley, and J. Slotten. 2011. Rediscovery of *Cicindela scabrosa floridana* Cartwright (Coleoptera: Cicindelidae) and its elevation to species status. *Insecta Mundi* 0162: 1-7 at 1.

<sup>10</sup> Brzoska at 1.

<sup>11</sup> Brzoska at 1.

<sup>12</sup> Knisley, C.B. 2011. Taxonomy, Biology, and Conservation of the Florida Tiger Beetle, *Cicindela Floridana*, report to South Florida Ecological Services Office, *hereinafter* “Knisley 2011”.

<sup>13</sup> Bousquet, Y. 2012. Catalogue of Geadephaga (Coleoptera, Adephaga) of America, north of Mexico. *ZooKeys* 245. 1722 pp.

<sup>14</sup> Integrated Taxonomic Information System, 2014. Species Profile available at: [http://www.itis.gov/servlet/SingleRpt/SingleRpt?search\\_topic=TSN&search\\_value=931870](http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=931870) (last visited December 8, 2014).

## B. Species Description

The Miami tiger beetle is small, less than 10 mm long.<sup>15</sup> Its shell is a shiny metallic green, with some individuals appearing copper-colored.<sup>16</sup> Brzoska provides the following more detailed physical description:<sup>17</sup>

**General habitus.** Body small (6.5- 8.2 mm males, 7.4- 9.0 mm females), elytral maculation reduced to apical lunule confined to edge. Dorsal coloration shiny metallic green, with some individuals showing a cuprous wash. Ventral surface metallic blue; abdomen rufous.

**Head.** Labrum long, white, edentate, slightly flattened anteriorly, with usually 6, rarely 4 submarginal setae. Clypeus and gena glabrous with purple reflection. Frons glabrous (except for two pairs of supraorbital setae), faintly striated, purple reflection laterally. Mandibles with four teeth, anterior third dark brown/black, posterior two-thirds testaceous, white laterally. Antennal segments 1-4 metallic green, 5-11 testaceous. Segment 1, widened anteriorly with 1 subapical sensory seta; segment 2 small, glabrous; segments 3 and 4 thin with apical and lateral setae; segments 5-11 covered with dense tomentose setae.

**Thorax.** Pronotum slightly tapering to posterior, v-shaped impression anteriorly, 40-50 wide flattened setae laterally, disk smooth, ventral surface smooth with dense setae around coxal margins. Mesosternum glabrous, mesepimeron covered with dense decumbent setae. Metasternum with scattered setae on anterior margin; metepisternum with dense decumbent setae.

**Abdomen.** Rufous, sternites 1-3 with dense lateral decumbent setae.

**Legs.** Testaceous to yellow, with metallic green reflection.

**Elytra.** Deeply punctured throughout with subsutural foveae. Apex with microserrations and short medial spine. Maculation includes only a thin apical lunule confined to distal and lateral apex.

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<sup>15</sup> Brzoska at 3.

<sup>16</sup> *Id.*

<sup>17</sup> *Id.*



© Chris Wirth



Female Miami tiger beetle  
© Chris Wirth



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### C. Biology: Reproduction, Diet, Behavior

Little is known about the reproduction, diet, and behavior of the Miami tiger beetle. It has been observed darting after and feeding upon ants.<sup>18</sup> In general, adult tiger beetles are swift ambush predators that use visual cues to hunt a variety of prey.<sup>19</sup> Adults are active May through October.<sup>20</sup> Tiger beetles generally have a life span of several weeks to two months, with a maximum flight period for a population three months.<sup>21</sup> In terms of abundance, below is a table reflecting “[s]easonal abundance of *C. floridana* adults at the Metrozoo site. Based on counts of adults seen in 1-2 hour surveys of the same two areas.”<sup>22</sup>

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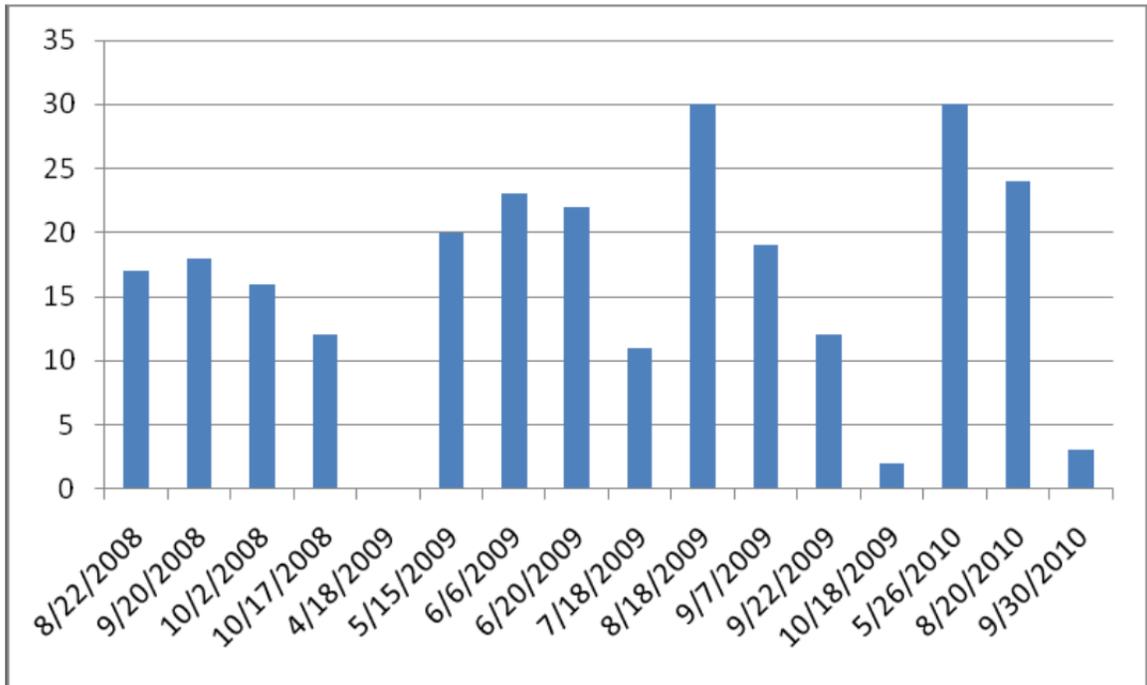
<sup>18</sup> <https://cicindela.wordpress.com/2011/02/18/floridian-tiger-beetle-rediscovered/>.

<sup>19</sup> Schmidt, J.P. Undated. Cicindelidae of Colorado. Webpage. Available at: <http://www.colostate.edu/Depts/cicindela/> (last visited December 8, 2014).

<sup>20</sup> Knisley 2011 at 4.

<sup>21</sup> Knisley 2011 at 35.

<sup>22</sup> Knisley 2011 at 35.



#### D. Habitat Requirements

The Miami tiger beetle is found only in small sandy pockets of pine rockland habitat in Miami-Dade County, Florida.<sup>23</sup> Pine rocklands are characterized by limestone outcrops, Florida slash pine as the sole canopy species, and diverse understory of scrubs and herbs. The Miami tiger beetle can be found in this habitat from early May through mid-October suggesting either continual or two emergence periods.<sup>24</sup>

Adults and larvae have been observed in patches of bare ground in this habitat in 2-6 square meters.<sup>25</sup> Soil samples from where specimens were observed are sandy to loamy sand soil.<sup>26</sup>

<sup>23</sup> Knisley 2011 at 6; Knisley et al. Knisley, C., M. Kippenhan, and D. Brzoska. 2014. Conservation status of United States tiger beetles. *Terrestrial Arthropod Reviews* 7(2014) 1-53 (uncorrected proofs) at 44.

<sup>24</sup> Knisley 2011 at 6.

<sup>25</sup> Knisley 2011 at 32.

<sup>26</sup> Knisley 2011 at 32.



*An example of an open patch of sand in pine rockland habitat.*

© Chris Wirth

### **E. Current and Historic Distribution**

The scabrous tiger beetle (*Cicindela scabrosa*) is widely found throughout Florida, as far south as Collier County on the west coast and St. Lucie County on the east coast. However, the Miami tiger beetle has always only been known from Miami, with its exact historic localities unclear. It appears the 1934 specimen was collected in the vicinity of Gratigny Road in sandy hammocks or near Barry College where no apparent habitat currently exists.<sup>27</sup> Field visits did not yield any specimens.<sup>28</sup> In 2007, a Miami tiger beetle population was discovered at a pine rockland site in the Richmond Heights area of Miami, Florida.<sup>29</sup> The current known range of the Miami tiger beetle consists of three sites within the Richmond Heights area of Miami – Metrozoo pineland, University of

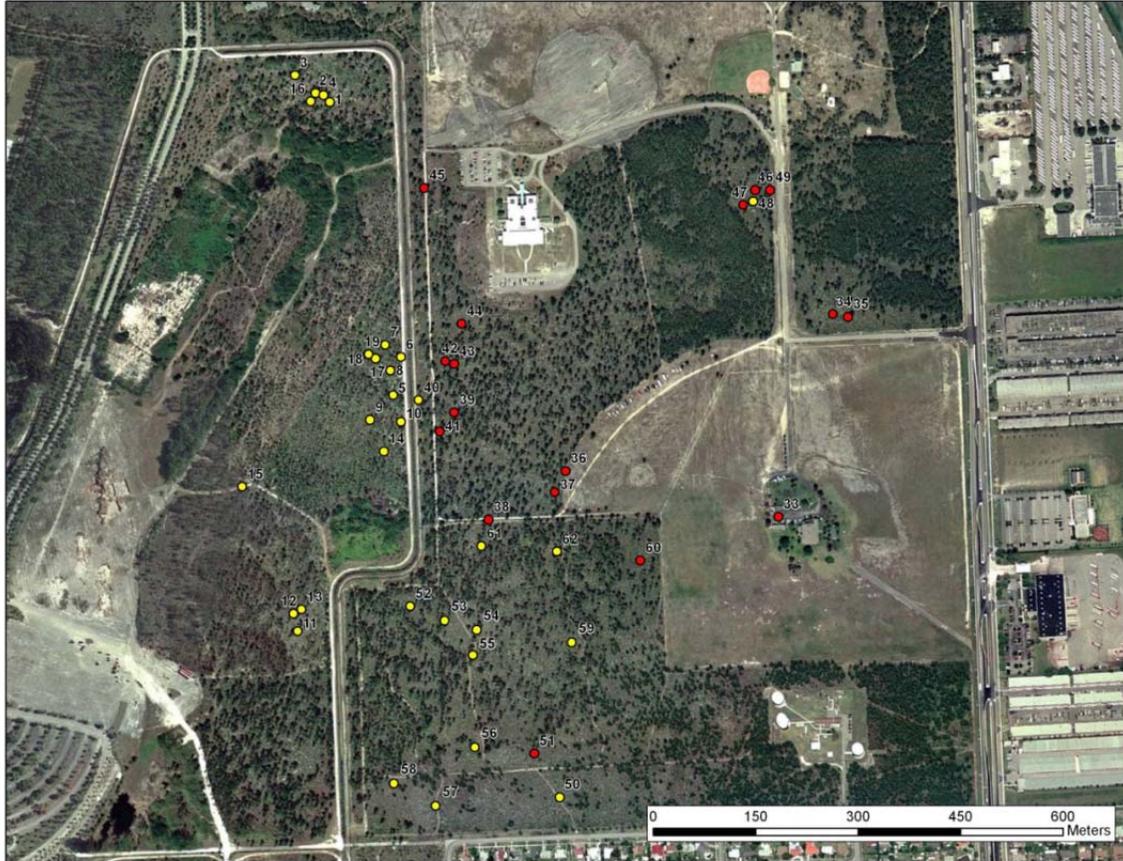
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<sup>27</sup> Brozka 2.

<sup>28</sup> Brozka 2.

<sup>29</sup> Knisley 2011 at 26.

Miami CSTARS campus, and U.S. Coast Guard land.<sup>30</sup> The highest counts at each of the sites ranged from 2 to 45 adults.<sup>31</sup> These three sites should be considered a single population given tiger beetle movement and their close proximity being within dispersal range.<sup>32</sup>



“Aerial photograph showing all three sites where *C. floridana* was found (Metrozoo is site on left; University of Miami CSTARS campus is lower right and U. S. Coast Guard site is upper right. Specific patches with *C. floridana* adults are indicated with yellow dots.” Knisley 2011 at 27.

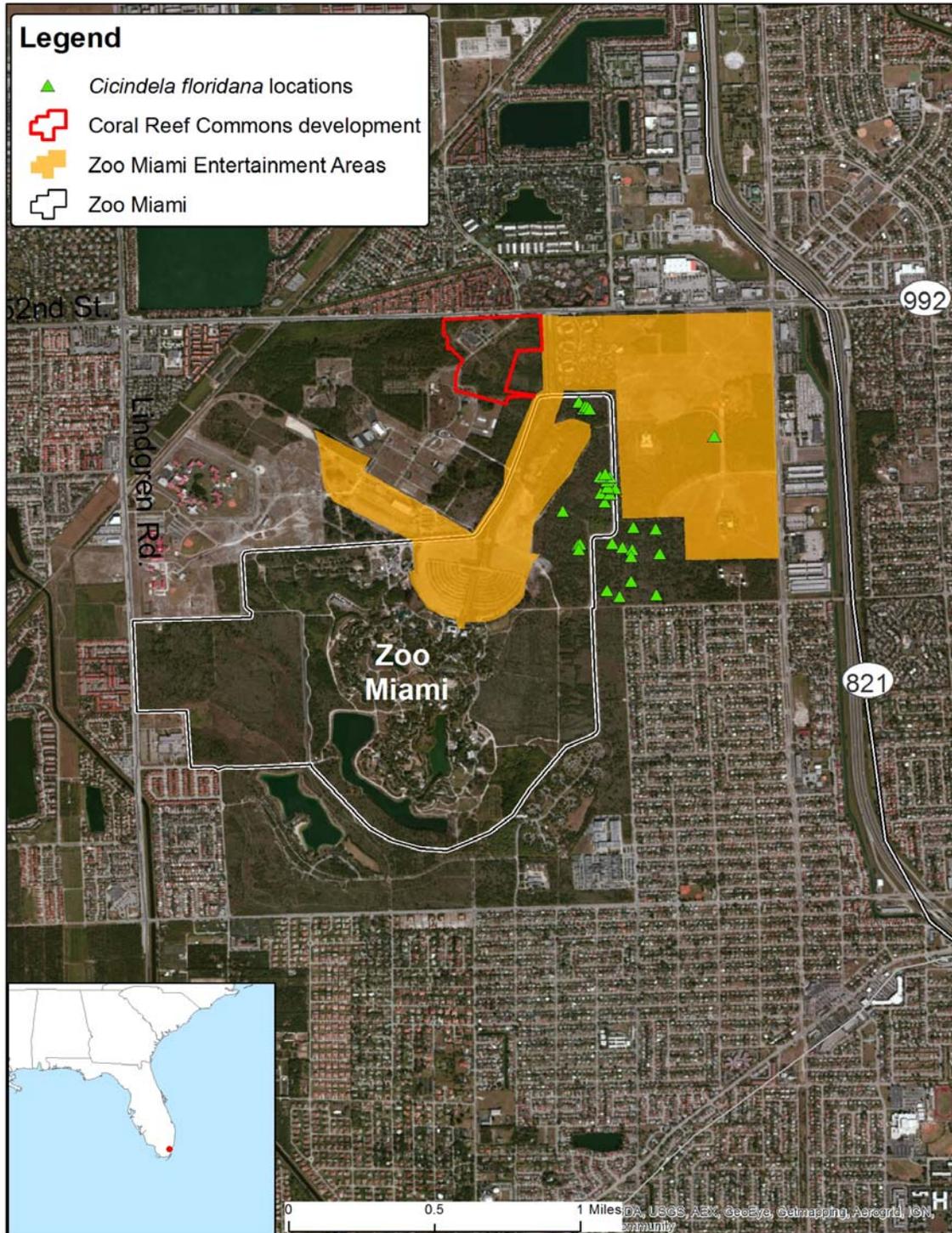
<sup>30</sup> Knisley at 44; Knisley 2011 at 26.

<sup>31</sup> Knisley at 4.

<sup>32</sup> Knisley personal communication Dec. 9, 2014.



“Aerial photograph of Metrozoo pineland showing primary patches with *C. floridana* as yellow dots. In the upper northeast section, adults (and larvae) were found in additional patches beyond the mapped waypoints.” Knisley 2011 at 28.



#### IV. POPULATION STATUS

The Service regards the Miami tiger beetle as a species of concern,<sup>33</sup> and the Florida Fish and Wildlife Conservation Commission regards it as a species of greatest conservation need.<sup>34</sup> It has been recommended for state and federal listing by at least one expert.<sup>35</sup> The Miami tiger beetle is currently only known from three locations, with each site supporting 2-45 adults. Knisley et al. (2014) consider the Miami tiger beetle one of the two most threatened tiger beetles in the United States.

In 2010, surveys of larvae at the Metrozoo site produced 63 larval burrows.<sup>36</sup> A 2011 repeat survey produced only 5 larvae.<sup>37</sup> Recent surveys indicate populations may be declining due to vegetation encroachment.<sup>38</sup>

#### V. THREATS

Invertebrates are experiencing widespread decline worldwide. Sixty-seven percent of monitored populations show a 45 percent decline.<sup>39</sup> The primary threat to tiger beetles are habitat loss and fragmentation due to human activities.<sup>40</sup> The Miami tiger beetle is no exception. Habitat where it was discovered in the 1930s has since been converted to development.

Native habitats in Florida are rapidly disappearing.<sup>41</sup> This has resulted in the extirpation or extinction of 13 vertebrates over the last 150 years.<sup>42</sup> Perennially rare communities, such as pine rocklands, are among the native habitats in Florida that have been drastically reduced in area.<sup>43</sup> Pine rockland is a globally endangered plant community with over 98 percent decline in its pre-settlement area due to significant ecological degradation, conversion to other land uses, and outright destruction.<sup>44</sup> This important community provides critical habitat for many endangered species.<sup>45</sup>

Due to its very small population size and high magnitude imminent threats to its incredibly limited habitat, the Miami tiger beetle warrants emergency protection under the Endangered Species Act, as it is threatened by at least three of the five listing factors

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<sup>33</sup> <http://www.fws.gov/VeroBeach/MSRPPDFs/appendixC.PDF> at C-19.

<sup>34</sup> [http://myfwc.com/media/1487124/03\\_SGCN\(2\).pdf](http://myfwc.com/media/1487124/03_SGCN(2).pdf) at 29.

<sup>35</sup> Knisley at 46.

<sup>36</sup> Knisley 2011 at 32.

<sup>37</sup> Knisley 2011 at 32.

<sup>38</sup> C. Wirth, personal communication Dec. 4, 2014.

<sup>39</sup> Dirzo, R., H. Young, G. Ceballos, N. Isaac, and B. Collen. 2014. Defaunation in the Anthropocene. *Science* 345, 401.

<sup>40</sup> Knisley at 46.

<sup>41</sup> Kautz, R.S. and J.A. Cox, *Habitats for Biodiversity Conservation in Florida*, Conservation Biology, Feb. 2001, at 55, 56.

<sup>42</sup> *Id.*

<sup>43</sup> *Id.*

<sup>44</sup> Bergh, C. and J. Wisby, *Fire History of Lower Keys Pine Rocklands*, The Nature Conservancy, Florida Keys Initiative, May 1996 at 1.

<sup>45</sup> *Id.*

under the Act as discussed in detail below. Without Endangered Species Act protection, the Miami tiger beetle is at very high risk of extinction.

### **A. Present or threatened destruction, modification, or curtailment of habitat or range**

The globally significant pine rockland is threatened by a variety of factors. Habitat loss and degradation is the primary cause of extinction globally and is the primary threat to the Miami tiger beetle. Pine rockland with sandy patches suitable to support the Miami tiger beetle have largely been lost to urban development.<sup>46</sup> Most remaining habitat is considered unsuitable due to dense vegetation and lack of land management via controlled burns.<sup>47</sup>

#### **1. Richmond pine rockland**

The pine rockland community is one of the most endangered habitats in North America.<sup>48</sup> Pine rocklands provide critical foraging and nesting habitat for a diverse array of wildlife, including federally listed species.<sup>49</sup> They also provide cover and roosting sites to a variety of wildlife species.<sup>50</sup> Pine rockland ecosystems contain a rich herbaceous flora with many narrowly endemic animal species.<sup>51</sup> These once-extensive communities have been plagued by development in the region, and are now greatly reduced in area and divided into many smaller fragments.<sup>52</sup> Pine rocklands are found in three areas of southern Florida: the Miami Rock Ridge of southeastern peninsular Florida, the Lower Florida Keys, and the southern Big Cypress pinelands.<sup>53</sup> The Miami Rock Ridge is characterized by a very diverse shrub layer dominated by hardwoods, and an equally diverse herb layer containing 35 taxa endemic to southern Florida, including several species listed by the federal government.<sup>54</sup> This area has been fragmented and degraded by past land use practices and hurricanes.<sup>55</sup>

The north-south distribution of pine rocklands along the Miami Rock Ridge has already

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<sup>46</sup> Knisley at 44.

<sup>47</sup> Knisley at 44.

<sup>48</sup> Williams, D.A., Y. Wang, M. Borchetta, and M.S. Gaines, *Genetic diversity and spatial structure of a keystone species in fragmented pine rockland habitat*, *Biological Conservation*, April 2007, at 256, 257.

<sup>49</sup> FWS, *Multi-Species Recovery Plan – Pine Rocklands*, 3-161, July 23, 2014.

<sup>50</sup> *Id.* at 3-167.

<sup>51</sup> Snyder, J.R., M.S. Ross, S. Koptur, and J.P. Sah, *Developing Ecological Criteria for Prescribed Fire in South Florida Pine Rockland Ecosystems*, Se. Envtl. Research Ctr., July 2005, at 1.

<sup>52</sup> *Id.*; URS Corporation Southern. 2007. EEL Program, Management Plan, Part II – Pine Rockland (DRAFT) Chapter 1: The Pine Rockland Habitat,

[http://regionalconservation.org/ircs/pdf/publications/2007\\_09.pdf](http://regionalconservation.org/ircs/pdf/publications/2007_09.pdf); FNAI – Guide to the Natural Communities of Florida: 2010 Edition, [http://www.fnai.org/PDF/NC/Pine\\_Rockland\\_Final\\_2010.pdf](http://www.fnai.org/PDF/NC/Pine_Rockland_Final_2010.pdf).

<sup>53</sup> *Id.*

<sup>54</sup> *Id.*

<sup>55</sup> Abandoned & Little Known Airfields: Florida – Southern Miami Area. June 11, 2013; 1945 Richmond/South Dade Hurricane Presented by Robert Molleda at 2007 Florida Governor’s Hurricane Conference; Macfie, D. Richmond Naval Air Station, 1942-1961, Tequesta.

been reduced by over 12 miles.<sup>56</sup> According to the Pine Rocklands Multispecies Recovery Plan (“Recovery Plan”) for South Florida, the ultimate goal of the Service is to restore the pine rocklands by maintaining the function, structure, and ecological processes of pine rocklands, and preventing any further loss, degradation, or fragmentation, of this imperiled South Florida community.<sup>57</sup>

In Miami-Dade County, the remaining pine rockland habitat is highly fragmented, with the majority of fragments being less than 50 ha in size and embedded in an urban landscape.<sup>58</sup> The Richmond tract of pine rocklands in Miami-Dade County, where the Miami tiger beetle is found, contains 260 taxa of native plants.<sup>59</sup> Fifteen vertebrate species are endemic to this pine rocklands habitat.<sup>60</sup> ESA-listed species that may utilize or depend upon pine rocklands in this area include: Florida bonneted bat, Florida leafwing butterfly, Bartram’s scrub-hairstreak butterfly, Florida brickell-bush, Carter’s small-flowered flax, deltoid spurge, and tiny polygala.<sup>61</sup>

The Miami tiger beetle uses the Richmond tract.<sup>62</sup> Extensive surveys of most of the pine rockland sites in Miami-Dade County failed to find any additional sites for the Miami tiger beetle.<sup>63</sup> The Miami tiger beetle’s total global habitat is thus limited to parts of the Richmond pine rockland habitat.

## 2. Coral Reef Commons<sup>64</sup>

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<sup>56</sup> FWS, *Multi-Species Recovery Plan – Pine Rocklands*, 3-173, July 23, 2014.

<sup>57</sup> *Id.* at 3-191.

<sup>58</sup> Williams at 256, 257.

<sup>59</sup> FWS, at 3-162.

<sup>60</sup> *Id.* at 3-168.

<sup>61</sup> *Id.* at 3-169.

<sup>62</sup> FWS LOC July 15, 2014.

<sup>63</sup> Knisley, personal communication Dec. 4, 2014.

<sup>64</sup> For more information on the Coral Reef Commons, please see Staletovich, J. Nov. 6, 2014, Miami-Dade County warns developer to protect forest, Miami Herald, <http://www.miamiherald.com/news/local/community/miami-dade/article3608747.html>; Harper, J. Oct. 2014, Going, going, gone, Biscayne Times, [http://www.biscaynetimes.com/index.php?option=com\\_content&view=article&id=1915:going-going-gone&catid=70:going-green&Itemid=200](http://www.biscaynetimes.com/index.php?option=com_content&view=article&id=1915:going-going-gone&catid=70:going-green&Itemid=200); Staletovich, J., Oct. 16, 2014, Feds: Shopping center in Rare Miami-Dade forest likely to kill endangered species, Miami Herald, <http://www.miamiherald.com/news/local/environment/article2922164.html>; Staletovich, J., Sept. 12, 2014, Developer defends Wal-Mart in rare forest, Miami Herald, <http://www.miamiherald.com/news/local/environment/article2092364.html>; Stern, G., Sept. 12, 2014, Outraged Miami Residents Confront Walmart Developer in Kendall, [http://www.huffingtonpost.com/grant-stern/outraged-miami-residents-b-5808574.html?utm\\_hp\\_ref=miami&ir=Miami](http://www.huffingtonpost.com/grant-stern/outraged-miami-residents-b-5808574.html?utm_hp_ref=miami&ir=Miami); Bach, Trevor, Sept. 4, 2014, Two Flowers Species at Controversial Walmart Site Are Now Endangered, <http://blogs.miaminewtimes.com/riptide/2014/09/joining-butterfly-two-flower-species-found-at-controversial-walmart-development-site-also-listed-as.php>; Kruse, M., Sept. 4, 2014, Carter’s small-flowered flax and Florida brickellbush now officially are endangered species, Tampa Bay Times, <http://www.tampabay.com/blogs/state/carters-small-flowered-flax-and-florida-brickellbush-now-officially-are/2196134>; Staletovich, J., Sept. 3, 2014, Two flowers growing in Miami-Dade County deemed endangered, Miami Herald <http://www.miamiherald.com/news/local/community/miami-dade/article1987767.html>; Butler, A. Aug. 26, 2014, Cutler Bay passes resolution to protest development of south Miami-Dade land, Miami Herald, [Emergency Petition to List the Miami Tiger Beetle, Submitted December 11, 2014](http://www.miamiherald.com/news/local/community/miami-</a></p></div><div data-bbox=)

RAM is a group of companies and partnerships that acquire, develop, finance, and manage retail and multifamily properties in the Southeast.<sup>65</sup> RAM intends to construct Coral Reef Commons, a development consisting of a variety of residential and commercial buildings, within the Richmond pine rocklands in Miami-Dade County, Florida.<sup>66</sup> On July 15, 2014 the Service notified RAM that such development could result in the “take” of ESA-listed species, and thus, RAM could be liable for violating Federal law.<sup>67</sup>

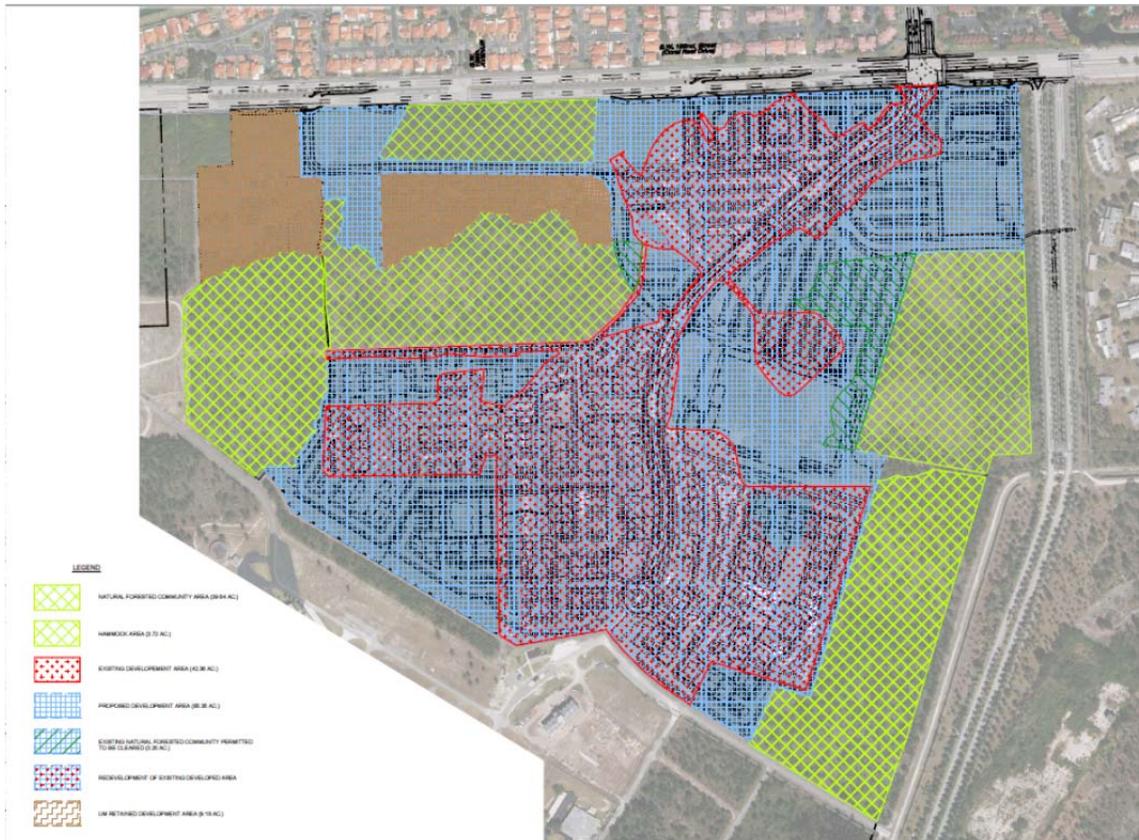
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[dade/cutler-bay/article1982226.html](http://www.sun-sentinel.com/local/palm-beach/fl-endangered-butterflies-20140811-story.html); Flesher, D. Aug. 11, 2014, South Florida butterflies win federal protection, Sun-Sentinel, <http://www.sun-sentinel.com/local/palm-beach/fl-endangered-butterflies-20140811-story.html>; Liston, B., Aug. 11, 2014, Endangered Florida butterflies to get federal protection, Reuters, <http://www.reuters.com/article/2014/08/11/us-usa-florida-butterflies-idUSKBN0GB1UX20140811>; Bach, T. July 29, 2014, Thousands Sign Petitions Against Walmart Development on Endangered Pine Rockland, [http://blogs.miaminewtimes.com/riptide/2014/07/petition\\_against\\_rockland\\_forest\\_wal\\_mart\\_development\\_has\\_8000\\_signatures.php](http://blogs.miaminewtimes.com/riptide/2014/07/petition_against_rockland_forest_wal_mart_development_has_8000_signatures.php); Author unknown, July 19, 2014, Destruction Thanks to University of Miami's Sale of Pine Rocklands -- It doesn't end there, <http://eyeonmiami.blogspot.com/2014/07/destruction-thanks-to-university-of.html>; CBS Local News, July 18, 2014, Feds to Developer: Stop Planning Walmart In Rare Miami-Dade Forest, <http://miami.cbslocal.com/2014/07/18/feds-stop-work-on-walmart-in-miami-dade-land-with-rare-species/>; Staletovich, J., July 17, 2014, Feds ask developer to stop work on Walmart in rare Miami-Dade forest, Miami Herald, <http://www.miamiherald.com/news/local/community/miami-dade/article1975937.html>; Bravo, K. July 12, 2014, The Awful Reason Florida is Bulldozing One of the World's Rarest Forests, <http://www.takepart.com/article/2014/07/12/awful-reason-why-florida-bulldozing-one-worlds-rarest-forests?cmpid=tpdaily-eml-2014-07-14>; Staletovich, J., July 12, 2014, Walmart planned for endangered forest lands in South Florida, Miami Herald, <http://www.miamiherald.com/news/local/community/miami-dade/article1975284.html>; Bandell, B. July 8, 2014, University of Miami sells 80 acres to developer for mixed-use project, South Florida Business Journal, [http://www.bizjournals.com/southflorida/news/2014/07/08/university-of-miami-sells-80-acres-to-developer.html?utm\\_source=feedburner&utm\\_medium=feed&utm\\_campaign=Feed%3A+industry\\_22+%28Industry+Education%29&utm\\_content=Google+Feedfetcher](http://www.bizjournals.com/southflorida/news/2014/07/08/university-of-miami-sells-80-acres-to-developer.html?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+industry_22+%28Industry+Education%29&utm_content=Google+Feedfetcher); Yager, R., Zoning Approvals Sought for Coral Reef Commons Complex, <http://www.communitynewspapers.com/kendall-gazette/zoning-approvals-sought-for-coral-reef-commons-complex/>; Bolado, C. Newly Endangered Plants Stand in Wal-Mart Project's Way, Law 360, <http://www.law360.com/articles/573723/newly-listed-endangered-plants-put-hold-on-wal-mart-project>.

<sup>65</sup> RAM Realty Services, *About RAM*, ramrealestate.com, <http://www.ramrealestate.com/about-ram/> (last visited Oct. 21, 2014).

<sup>66</sup> FWS LOC July 15, 2014.

<sup>67</sup> FWS LOC July 15, 2014.



RAM, July 23, 2014 Exhibit of Development Area.

In November 2014, RAM announced it has or will imminently submit a Section 10 take permit and habitat conservation plan (“HCP”) application to the Vero Beach office of the Service to authorize the take of ESA-listed species, potentially including the Florida bonneted bat (*Eumops floridanus*), Florida leafwing butterfly (*Anaea troglodyta*), Bartram’s scrub-hairstreak butterfly (*Strymon acis bartrami*), Florida brickell-bush (*Brickellia mosieri*), Carter’s small-flowered flax (*Linum carteri* var. *carteri*), deltoid spurge (*Chamaesyce deltoidea* ssp. *deltoidea*), and tiny polygala (*Polygala smallii*) associated with the destruction of irreplaceable and endangered pine rockland habitat.<sup>68</sup>

<sup>68</sup> Bach, T. Nov. 28, 2014, Developer to Submit Habitat Conservation Plan for Controversial Walmart Project, [http://blogs.miaminewtimes.com/riptide/2014/11/developer\\_to\\_submit\\_habitat\\_conservation\\_plan\\_in\\_order\\_to\\_proceed\\_with\\_cont.php](http://blogs.miaminewtimes.com/riptide/2014/11/developer_to_submit_habitat_conservation_plan_in_order_to_proceed_with_cont.php).



Phase II of the RAM Project, <http://www.ramrealestate.com/wp-content/uploads/2014/08/Coral-Reef-Site-Flyer.pdf>

In addition, the native southeast Florida pine endemic to the rockland ecosystem, Dade County pine (*Pinus elliottii* var. *densa*), is redlisted by the International Union for the Conservation of Nature and Natural Resources.<sup>69</sup>

The Service identifies acquiring lands that are threatened with development, such as the pine rocklands of the proposed Coral Reef Commons, as the main tool in preventing further destruction or degradation of existing pine rocklands.<sup>70</sup> The Coral Reef Commons development threatens to undo the important work the Recovery Plan has prioritized for South Florida, threatens already listed species, and could push the Miami tiger beetle to extinction.<sup>71</sup>

### 3. Miami Wilds<sup>72</sup>

<sup>69</sup> <http://www.iucnredlist.org/details/18153818/0>.

<sup>70</sup> *Id.*

<sup>71</sup> RAM, through University of Miami has already obtained an After-the-Fact Natural Forest Community permit and Covenant to clear vegetation. See DRER letter to Altshul, July 23, 2013.

<sup>72</sup> For more information on Miami Wilds, please see Author unknown, Nov. 6, 2014, MIAMI WILDS: Stupid Theme Park..., <http://eyeonmiami.blogspot.com/2014/11/miami-wilds-stupid-theme-park-guest.html?spref=fb>; Vazquez, C. Nov. 6, 2014, Developer receives grant for 20<sup>th</sup> Century Fox theme park at Zoo Miami, Local 10 News, <http://www.local10.com/news/developer-receives-grant-for-20th-century->

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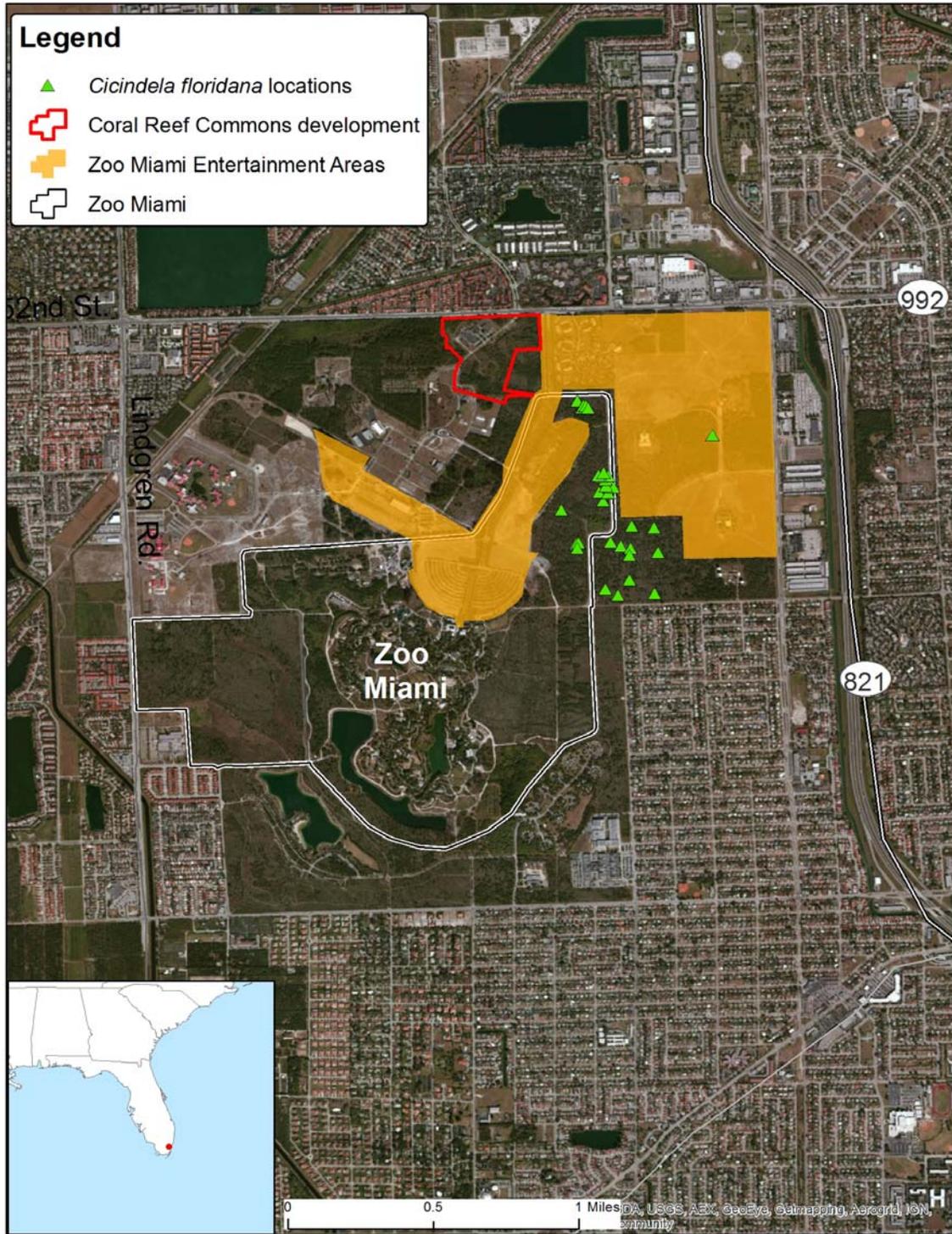
Another principle threat to the Miami tiger beetle is the proposed development of Miami Wilds, a theme park on Miami-Dade County property, adjacent to the Coral Reef Commons and Zoo Miami. The county recently approved \$13.5 million to 20<sup>th</sup> Century Fox, however, it is unclear how soon work would begin.<sup>73</sup>

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[fox-theme-park-at-zoo-miami/29587044](http://www.miamiherald.com/news/local/community/miami-dade/article3588472.html); Hanks, D. Nov. 5, 2014, Miami Wilds gets \$14 million, Miami Herald, <http://www.miamiherald.com/news/local/community/miami-dade/article3588472.html>; Dro, Oct. 24, 2014, Miami Wilds, A Theme Park Proposed For Near Zoo Miami, Wants \$13.5 Million in County Funds, <http://the305.com/2014/10/24/photo-miami-wilds-a-theme-park-proposed-for-near-zoo-miami-wants-13-5-million-in-county-funds/>; Bevan, S. Oct. 23, 2014, Miami Wilds LLC requests \$13M in public funding for amusement park, South Florida Business Journal, <http://www.bizjournals.com/southflorida/blog/morning-edition/2014/10/20th-century-fox-requests-13m-in-public-funding.html>; Dinkova, L. Oct. 22, 2014, Miami Wilds LLC wants \$13 million in public funding, Miami Today News, <http://www.miamitodaynews.com/2014/10/22/20th-century-fox-wants-13-million-public-funding-miami-wilds/>; Butler, A. Aug. 26, 2014, Cutler Bay passes resolution to protest development of south Miami-Dade land, Miami Herald, <http://www.miamiherald.com/news/local/community/miami-dade/cutler-bay/article1982226.html>; Kroch, K. Aug. 1, 2014, Plans for Massive Amusement Park Overlap with Endangered Florida Forest, <http://thinkprogress.org/climate/2014/08/01/3466392/amusement-park-endangered-florida-forest/>; Bravo, K. July 12, 2014, The Awful Reason Florida is Bulldozing One of the World's Rarest Forests, <http://www.takepart.com/article/2014/07/12/awful-reason-why-florida-bulldozing-one-worlds-rarest-forests?cmpid=tpdaily-eml-2014-07-14>.

<sup>73</sup> Munzenrieder, K. Oct. 23, 2014. Fox Theme Park, Miami Wilds, Wants \$13.5 Million in County Money, [http://blogs.miaminewtimes.com/riptide/2014/10/fox\\_theme\\_park\\_miami\\_wilds\\_wants\\_135\\_million\\_in\\_county\\_money.php](http://blogs.miaminewtimes.com/riptide/2014/10/fox_theme_park_miami_wilds_wants_135_million_in_county_money.php); <http://www.skyscrapercity.com/showthread.php?t=1474675&page=2>.

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#### **4. Residential and Industrial Development and Human Population Growth**

Human population nearly doubled in the southeast from 1970-2000.<sup>74</sup> Florida's population is expected to continue to grow,<sup>75</sup> and Miami is experiencing a population growth rate of eight percent.<sup>76</sup> Population growth threatens biodiversity due to increased demand for land, water, and other resources. Metropolitan areas in the southeast United States are adding urbanized land at an even faster rate than population is increasing, with developed land increasing by 47 percent from 1982-1997.<sup>77</sup> Habitat loss and degradation due to development is generally permanent and poses an increasing threat to imperiled species. Due to impending destruction of its habitat from the factors discussed above, the Miami tiger beetle warrants immediate protection under the Endangered Species Act.

##### **B. Overutilization for commercial, recreational, scientific, or educational purposes**

Overutilization pushes imperiled species towards extinction, especially in conjunction with other threats. It is not known whether overutilization threatens the Miami tiger beetle, but given its limited population size it should be considered as a serious potential threat.

##### **C. Disease and Predation**

It is not known whether disease or predation threaten the Miami tiger beetle, but given its very limited range, the species is at heightened vulnerability to both of these factors. Although the specific ecology of the Miami tiger beetle is unknown, numerous organisms are known to prey on larval and adult tiger beetles in general<sup>78</sup> Although neither of these factors are known threats to the beetle at this time, either could quickly rise to a species-level threat.

##### **D. Inadequacy of existing regulatory mechanisms**

###### **1. State Fish and Wildlife Departments**

There are no existing regulatory mechanisms that adequately protect the Miami tiger beetle. The Service regards the Miami tiger beetle as a species of concern,<sup>79</sup> and the

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<sup>74</sup> Folkerts, G.W. 1997. State and fate of the world's aquatic fauna. p. 1-16 In: Benz, G.W. and D.E. Collins (editors). 1997. Aquatic Fauna in Peril: The Southeastern Perspective. Southeast Aquatic Research Institute Special Publication 1, Lenz Design and Communications, Decatur, GA. 553 pp.

<sup>75</sup> U.S. Census Bureau 2009.

<sup>76</sup> U.S. Census Bureau 2009.

<sup>77</sup> Buckner, M.M., W. Smith, J.A. Takats. 2002. Tennessee, Cumberland, and Mobile River Basins at Risk. A Biological Assessment and Vision for the World Wildlife Fund's Southeast Rivers and Streams Project. Nashville, TN. 52 pp,

[www.worldwildlife.org/what/wherewework/sers/WWFBinaryitem2738.pdf](http://www.worldwildlife.org/what/wherewework/sers/WWFBinaryitem2738.pdf).

<sup>78</sup> Schmidt, J.P. Undated. Cicindelidae of Colorado. Webpage. Available at: <http://www.colostate.edu/Depts/cicindela/> (last visited December 8, 2014).

<sup>79</sup> <http://www.fws.gov/VeroBeach/MSRPPDFs/appendixC.PDF> at C-19.

Florida Fish and Wildlife Conservation Commission regards it as a species of greatest conservation need.<sup>80</sup> These designations do not provide a framework for conservation, or contain mandatory or enforceable provisions to protect species or their habitat. Further, the implementation of conservation strategies is dependent on the cooperation of resource managers and stakeholders, making their implementation and effectiveness uncertain. Partner involvement in recommended conservation actions is voluntary, and is limited by the statutory requirements and permitted degree of discretion of partner agencies.

State conservation priorities and initiatives are also sharply limited by funding, with charismatic and game species generally receiving the majority of resources.

[M]any state-based programs for non-game fishes are left to languish on “soft” money, are underemphasized, and lack the force of institutional will or statutory authority, short of federal mandate, to effect change.<sup>81</sup>

The focus of conservation strategies is also generally on vertebrates, making them inadequate to protect imperiled invertebrate species:

Conservation of freshwater invertebrates has been hampered by the severity of human impacts to fresh waters and their inhabitants, the very limited resources (money, scientific effort) that have been applied to conservation problems, frequent adherence to a conservation approach that was developed largely for terrestrial birds and mammals, and an overly reactive approach, in which conservation activities often have been reactions to acute threats rather than actions designed to enhance long-term population viability. Consequently, conservation activities have been and will continue to be inadequate to protect freshwater invertebrate populations and species.<sup>82</sup>

### **E. Other Natural or Human Caused Factors**

The Miami tiger beetle may be threatened by multiple other natural and human-caused factors, in particular, global climate change and sea-level rise. It is unknown whether mosquito-control spraying will impact populations of the Miami tiger beetle, although it is known that the chemicals that have been tested that are used in mosquito control negatively impact most insects.<sup>83</sup>

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<sup>80</sup> [http://myfwc.com/media/1487124/03\\_SGCN\(2\).pdf](http://myfwc.com/media/1487124/03_SGCN(2).pdf) at 29.

<sup>81</sup> Warren, Jr., M.L., P.L. Angermeier, B.M. Burr, and W.R. Haag. 1997. Patterns of fish imperilment in the Southeast. p. 105-164 In: Benz, G.W. and D.E. Collins (editors). 1997. Aquatic Fauna in Peril: The Southeastern Perspective. Southeast Aquatic Research Institute Special Publication 1, Lenz Design and Communications, Decatur, GA. 553 pp. at 123.

<sup>82</sup> Strayer, D.L. 2006. Challenges for freshwater invertebrate conservation. *Journal of the North American Benthological Society* 25(2):271–287 at 272.

<sup>83</sup> Bargar, T. 2012. Risk assessment for adult butterflies exposed to the mosquito control pesticide naled. *Environmental Toxicology and Chemistry*. Setac Press 31 (<http://onlinelibrary.wiley.com/>); Hoang, T.C., R.L. Pryor, G.M. Rand, and R.A. Frankes. 2011 Use of butterflies as nontarget insect test species and the acute toxicity and hazard of mosquito control insecticides. *Environmental Toxicology and Chemistry*, Vol. 30, No. 4, 997-1005; Salvato, M. 2001. Influence of mosquito control chemicals on butterflies

## 1. Global Climate Change

Climate models project both continued warming in all seasons across the southeast United States, and an increase in the rate of warming.<sup>84</sup> The warming in air and water temperatures projected for the southeast will create heat-related stress for fish and wildlife. Climate change will alter the distribution of native plants and animals and will lead to the local loss of imperiled species and the displacement of native species by invasives.<sup>85</sup> Concerning the effects climate change is expected to have on southeastern environments, Karl et al. (2009) state, “[e]cological thresholds are expected to be crossed throughout the region, causing major disruptions to ecosystems and to the benefits they provide to people.”

Climate change will increase the incidence and severity of both drought and major storm events in the southeast.<sup>86</sup> The percentage of the southeast region experiencing moderate to severe drought has already increased over the past three decades. Since the mid- 1970s, the area of moderate to severe spring and summer drought has increased by 12 percent and 14 percent, respectively. Fall precipitation tended to increase in most of the southeast, but the extent of region-wide drought still increased by nine percent.<sup>87</sup> Both drought and severe storms could threaten the Miami tiger beetle with direct mortality and with habitat alteration, altered vegetation, and altered prey base. .<sup>88</sup>

The warming climate will likely cause ecological zones to shift upward in latitude and altitude and species’ persistence will depend upon, among other factors, their ability to disperse to suitable habitat.<sup>89</sup> Because of the tiger beetle’s incredibly limited range and the high degree of development in the surrounding area, there is likely no suitable habitat where the beetle could disperse making climate change a dire threat to its survival.

## 2. Sea-level rise

The Richmond pine rocklands are less than five miles from the Atlantic Ocean. Sea-level rise will likely imminently impact this habitat.

### **a. Global sea level rise is accelerating in pace and is likely to increase by three to four feet or more within this century**

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(Nymphalidae, Lycaenidae, Hesperidae) of the Lower Keys, *Journal of the Lepidopterist’s Society*, 55, 8-14; S. Koi (personal communication Dec. 8, 2014).

<sup>84</sup> Karl, T.R., J.M. Melillo, and T.C. Peterson (eds.). 2009. *Global Climate Change Impacts in the United States*. U.S. Global Change Research Program. Cambridge University Press, <http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/regional-climatechange-impacts/southeast>.

<sup>85</sup> Karl et al. 2009.

<sup>86</sup> Karl et al. 2009.

<sup>87</sup> Karl et al. 2009.

<sup>88</sup> Seager, R., A. Tzanova, and J. Nakamura. 2009. Drought in the Southeastern United States: causes, variability over the last millennium, and the potential for future hydroclimate change. *Journal of Climate* 22: 5021-5045.

<sup>89</sup> Peters, R.L. and J.D.S. Darling. 1985. The greenhouse effect and nature reserves. *Bioscience* 35(11):707-717.

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Global average sea level rose by roughly eight inches over the past century, and sea level rise is accelerating in pace.<sup>90</sup> As summarized by the Third National Climate Assessment, “Since the late 1800s, tide gauges throughout the world have shown that global sea level has risen by about 8 inches. A new data set shows that this recent rise is much greater than at any time in at least the past 2000 years. Since 1992, the rate of global sea level rise measured by satellites has been roughly twice the rate observed over the last century, providing evidence of additional acceleration.”<sup>91</sup> Many areas of the Southeast Atlantic and Gulf of Mexico coasts have experienced significantly higher rates of relative sea-level rise than the global average during the past 50 years.<sup>92</sup> Large regions of Florida have elevations at or below 3 to 6 feet, making these areas particularly vulnerable to sea-level rise and flooding.<sup>93</sup>

According to the Third National Climate Assessment, global sea level is projected to rise another 1 to 4 feet by 2100, with sea-level rise of 6.6 feet possible.<sup>94</sup> Sea level rise could increase by another 6 inches in just the next decade.<sup>95</sup> In its 2012 sea-level rise assessment, the National Research Council similarly estimated global sea-level rise at 8 to 23 cm by 2030, 18 to 48 cm by 2050, and 0.5 m to 1.4 m by 2100.<sup>96</sup> The effects of sea-level rise will be long-lived. Scientists estimate that we lock in 8 feet of sea-level rise over the long term for every degree Celsius (1.8 degrees Fahrenheit) of warming.<sup>97</sup>

Regional projections for Florida also indicate that sea level rise of three to four feet or more is highly likely within this century. The Southeast Florida Regional Climate Change Compact Counties—Monroe, Miami-Dade, Broward, and Palm Beach counties—released the Southeast Florida Regional Climate Change Action Plan in October 2012 which included a detailed “Unified Sea Level Rise Projection” for south Florida. The sea level rise projections for south Florida are similar what has been estimated globally by the National Research Council: 8 to 18 cm (3 to 7 inches) by 2030, 23 to 61 cm (9 to 24 inches) by 2060, and 48 cm to 1.45 m (19 to 57 inches) by 2100.<sup>98</sup>

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<sup>90</sup> Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, Eds., 2014: Climate Change Impacts in the United States: The Third National Climate Assessment. U.S. Global Change Research Program, 841 pp. doi:10.7930/J0Z31WJ2. Available at

<http://nca2014.globalchange.gov/>.

<sup>91</sup> Melillo et al. 2014 at 44.

<sup>92</sup> Karl et al. 2009 at 37.

<sup>93</sup> Weiss, J.L. et al. 2011. Implications of recent sea level rise science for low-elevation areas in coastal cities of the coterminous U.S.A. *Climatic Change* 105:635-645; Strauss, B.H., R. Ziemiński, J.L. Weiss, and J.T. Overpeck. 2012. Tidally adjusted estimates of topographic vulnerability to sea level rise and flooding for the contiguous United States. *Environmental Research Letters* 7: 014033.

<sup>94</sup> Melillo et al. 2014.

<sup>95</sup> Melillo et al. 2014 at 45.

<sup>96</sup> NRC. 2012. Sea level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future, National Research Council of the National Academies.

<sup>97</sup> Levermann, A. et al. 2013. The multimillennial sea-level commitment of global warming. *PNAS* 110:13745-13750.

<sup>98</sup> Southeast Florida Regional Climate Change Compact Technical Ad hoc Work Group. 2011. Unified Sea Level Rise Projection for Southeast Florida. A document prepared for the Southeast Florida Regional

## **b. Storms and storm surge are increasing in intensity**

Increasingly intense storms and storm surge pose additional climate threats to coastal wildlife species in Florida. Studies have found that the frequency of high-severity hurricanes is increasing in the Atlantic,<sup>99</sup> along with an increased frequency of hurricane-generated large surge events and wave heights.<sup>100</sup> The risk of extreme storm surges has already doubled as the planet warms, and these events could become 10 times more frequent in the coming decades.<sup>101</sup> High winds, waves, and surge from storms can cause significant damage to coastal habitat. When storm surges coincide with high tides, the chances for damage are greatly heightened.<sup>102</sup> As sea levels rise, storm surge will be riding on a higher sea surface which will push water further inland and create more flooding of coastal habitats.<sup>103</sup> For example, one study estimated that hurricane flood elevations along the Texas coast will rise by an average of 0.3 meters by the 2030s and 0.8 meters by the 2080s, with severe flood events reaching 0.5 meters and 1.8 meters by the 2030s and 2080s, respectively.<sup>104</sup>

## **c. Coastal squeeze threatens to increase habitat loss for these species**

Coastal species face significant risks from coastal squeeze that occurs when habitat is pressed between rising sea levels and coastal development that prevents landward movement.<sup>105</sup> Human responses to sea level rise including coastal armoring and landward

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Climate Change Compact Steering Committee. 27 p. Available online at <http://southeastfloridaclimatecompact.org/>.

<sup>99</sup> Elsner, J. B., J. P. Kossin, and T. H. Jagger. 2008. The increasing intensity of the strongest tropical cyclones. *Nature* 455:92-95; Bender, M. A., T. R. Knutson, R. E. Tuleya, J. J. Sirutis, G. A. Vecchi, S. T. Garner, and I. M. Held. 2010. Modeled impact of anthropogenic warming on the frequency of intense Atlantic hurricanes. *Science* 327:454-458; Kishtawal, C. M., N. Jaiswal, R. Singh, and D. Niyogi. 2012. Tropical cyclone intensification trends during satellite era (1986–2010). *Geophysical Research Letters* 39:L10810, 6pp.

<sup>100</sup> Grinsted, A., J. C. Moore, and S. Jevrejeva. 2012. Homogeneous record of Atlantic hurricane surge threat since 1923. *Proceedings of the National Academy of Sciences of the United States of America* 109:19601-19605; Komar, P. D., and J. C. Allan. 2008. Increasing hurricane-generated wave heights along the U.S. east coast and their climate controls. *Journal of Coastal Research* 24:479-488.

<sup>101</sup> Grinsted, A. et al. 2013. Projected hurricane surge threat from rising temperatures. *PNAS* doi:10.1073/pnas.1209980110.

<sup>102</sup> Cayan, D. R., P. D. Bromirski, K. Hayhoe, M. Tyree, M. D. Dettinger, and R. E. Flick. 2008. Climate change projections of sea level extremes along the California coast. *Climatic Change* 87:857-873.

<sup>103</sup> Tebaldi, C., B. H. Strauss, and C. E. Zervas. 2012. Modelling sea level rise impacts on storm surges along US coasts. *Environmental Research Letters* 7:014032. doi: 10.1088/1748-9326/7/1/014032.

<sup>104</sup> Mousavi, M. E., J. L. Irish, A. E. Frey, F. Olivera, and B. L. Edge. 2011. Global warming and hurricanes: the potential impact of hurricane intensification and sea level rise on coastal flooding. *Climatic Change* 104:575-597.

<sup>105</sup> Scavia, D., J. C. Field, D. F. Boesch, R. W. Buddemeier, V. Burkett, D. R. Cayan, M. Fogarty, M. A. Harwell, R. W. Howarth, C. Mason, D. J. Reed, T. C. Royer, A. H. Sallenger, and J. G. Titus. 2002. Climate change impacts on US coastal and marine ecosystems. *Estuaries* 25:149-164; Fitzgerald, D. M., M. S. Fenster, B. A. Argow, and I. V. Buynevich. 2008. Coastal impacts due to sea level rise. *Annual Review of Earth and Planetary Science* 36:601-647; Defeo, O., A. McLachlan, D. S. Schoeman, T. A. Schlacher, J. Dugan, A. Jones, M. Lastra, and F. Scapini. 2009. Threats to sandy beach ecosystems: a review. *Estuarine, Coastal and Shelf Science* 81:1-12; LeDee, O. E., K. C. Nelson, and F. J. Cuthbert. 2010. The challenge of

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migration pose significant risks to the ability of species threatened by sea-level rise to move landward, if other suitable habitats were even available<sup>106</sup> Projected human population growth and development in Florida may thus threaten the Miami tiger beetle with coastal squeeze.<sup>107</sup>

### **3. Inherent Vulnerability of Small Isolated Populations**

Small, isolated populations are vulnerable to extirpation due to limited gene flow, reduced genetic diversity, and inbreeding depression.<sup>108</sup> Population isolation also increases the risk of extinction from stochastic genetic and environmental events including drought, flooding, and toxic spills.<sup>109</sup> Habitat modification and cumulative habitat degradation are also major threats for species, which exist in isolated populations. Due to blocked avenues of dispersal or limited dispersal ability, isolated populations “gradually and quietly perish” as habitat conditions deteriorate.<sup>110</sup> The very limited range and low population size of the Miami tiger beetle thus exacerbate its risk of extinction.

### **4. Synergies and Multiple Causes**

The risk of extinction for the Miami tiger beetle is heightened by synergies between threats as most species face multiple threats and these threats interact and magnify each other. For example, as habitat availability shrinks, species become more vulnerable to threats from invasive species, pollution, climate change, disease, predation, and other factors. For example, the threat of vegetation encroachment to the tiger beetle is heightened because its habitat has already been severely limited by development, and its very limited range makes it exceedingly vulnerable to other factors such as predation, climate change, and stochastic events.

Because of the multifaceted ecological relationships among species, the extirpation of a species can have effects that cascade throughout the community. The loss of a single species can imperil associated species, highlighting the need to protect entire communities of species simultaneously.

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threatened and endangered species management in coastal areas. *Coastal Management* 38:337-353; Menon, S., J. Soberón, X. Li, and a. T. Peterson. 2010. Preliminary global assessment of terrestrial biodiversity consequences of sea level rise mediated by climate change. *Biodiversity and Conservation* 19:1599-1609; Noss, R. F. 2011. Between the devil and the deep blue sea: Florida’s unenviable position with respect to sea level rise. *Climatic Change* 107:1-16.

<sup>106</sup> Defeo et al. 2009.

<sup>107</sup> Zwick, P. D., and M. H. Carr. 2006. Florida 2060: A Population Distribution Scenario for the State of Florida; available at [www.1000fof.org/PUBS/2060/Florida-2060-Report-Final.pdf](http://www.1000fof.org/PUBS/2060/Florida-2060-Report-Final.pdf).

<sup>108</sup> Lynch, M. 1996. A quantitative-genetic perspective on conservation issues. In: Avise, J.C. and J.L. Hambrick (eds.). *Conservation genetics: case histories from nature*. Chapman and Hall, New York. pp. 493-494.

<sup>109</sup> FWS 2009.

<sup>110</sup> U.S. Fish and Wildlife Service (FWS). 2000. Mobile River Basin Aquatic Ecosystem Recovery Plan. Atlanta, GA. 128 pp. Available online: [www.ecos.fws.gov/docs/recovery\\_plans/2000/001117.pdf](http://www.ecos.fws.gov/docs/recovery_plans/2000/001117.pdf).

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## VI. REQUEST FOR CRITICAL HABITAT

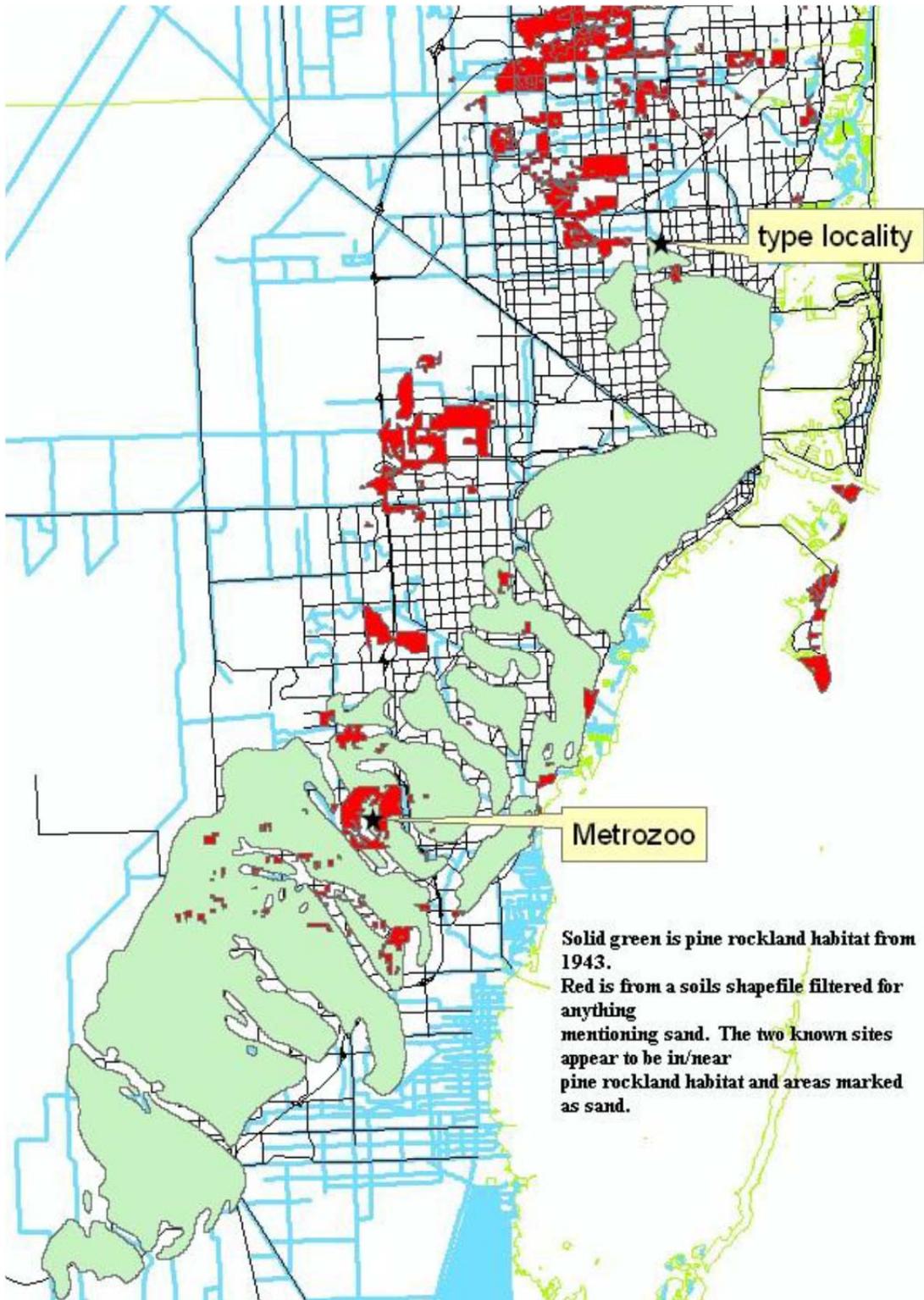
Critical habitat designation would provide significant conservation benefits to the Miami tiger beetle, and we urge the Service to propose critical habitat designation as soon as possible.<sup>111</sup> The critical habitat designation should not only protect existing, known habitat areas, but should also protect currently unoccupied areas that could be important for facilitating habitat movement for the Miami tiger beetle in response to development and climate change. Deliberate repopulation or reintroduction into areas of species can help restore species' status.<sup>112</sup>

Below is a map showing the “distribution of sandy soils and pine rockland in the Miami area. Note concentration of sandy soils in the area of the three known *C. floridana* sites. Actual type locality is uncertain (see taxonomic manuscript) but probably just west of where indicated in red sand patch.”<sup>113</sup>

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<sup>112</sup> Seddon, P., C. Griffiths, P. Soorae, and D. Armstrong. 2014. Reversing defaunation: Restoring species in a changing world. *Science* Vol. 345 Issue 6195 July 25, 2014.

<sup>113</sup> Knisley 2011 at 34.



### **A. A finding of “Not Determinable” will not be defensible**

The Service must publish a final listing decision within one year of publishing the proposed listing decision.<sup>114</sup> When the final listing decision is issued, the Service must designate critical habitat for the species *concurrently* “to the maximum extent prudent and determinable.”<sup>115</sup> A “not determinable” finding allows the Service to extend the time for designating critical habitat under the ESA.<sup>116</sup> This means that when critical habitat is “not determinable,” the Service has one year from the date of the final listing decision (i.e., two years from the proposed listing decision) to designate critical habitat. At or before the end of the one- year extension, “the Secretary *must* publish a final regulation, based on *such data as may be available at that time.*”<sup>117</sup> That final deadline applies even if a longer deliberative process might produce a “better” critical habitat designation.<sup>118</sup> However, the “not determinable” findings should rarely be made. It is expected that the Service will make “the *strongest attempt possible* to determine critical habitat within the time period designated for listing.”<sup>119</sup> The Service is to use the best available science in determining critical habitat. That “optimal conditions” are unknown is not a barrier to designating. Similarly, it is not the Service’s task to understand what features of occupied habitat are currently lacking. Instead the Service should synthesize information about what is known about the species and its habitat needs.

### **B. Unoccupied areas should be identified and designated as critical**

The ESA requires the designation of critical habitat for listed species, encompassing all areas “essential to the conservation [survival and recovery] of the species.” Importantly in a climate change context, the ESA explicitly allows the Services to designate critical habitat “outside the geographical area occupied by a species at the time it was listed, upon a determination that such areas are essential for the conservation of the species.”<sup>120</sup> As species and habitats shift in response to climate change, protecting habitat areas outside of the current range, including stepping stone patches and corridors to facilitate species movements to new areas and shifting habitat, will become critical to allowing species to persist in a changing climate. In the case of the Miami tiger beetle, the Service should identify and designate habitat that will protect the species from further development impacts and climate change.

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<sup>114</sup> 16 U.S.C. § 1533(b)(5)(A), (b)(6)(A).

<sup>115</sup> *Id.* § 1533(a)(3).

<sup>116</sup> *Id.* § 1533(b)(6)(C)(ii). *See also* 50 C.F.R. § 424.17(b)(2) (If critical habitat is not determinable, the Service “may extend the 1-year period specified in paragraph (a) of this section by not more than one additional year.”).

<sup>117</sup> 16 U.S.C. § 1533(b)(6)(C)(ii) (emphasis added).

<sup>118</sup> *See Enos v. Marsh*, 616 F. Supp. 32, 61 (D. Haw. 1984), *aff’d*, 769 F.2d 1363 (9th Cir. 1985); *N. Spotted Owl*, 758 F. Supp. at 625-26 (“In no event may the secretary delay the designation of critical habitat for more than twelve months . . . ”); *Colo. Wildlife Fed’n v. Turner*, Civ. No. 92-F-884, 1992 U.S. Dist. LEXIS 22046, at \*13-14 (D. Colo. Oct. 27, 1992). *See also Ctr. for Biological Diversity v. Evans*, No. C 04-04496 WHA, 2005 WL 1514102 (N.D. Cal. June 14, 2005) (“Congress did not contemplate paralysis while critical habitat issues were studied to death.”).

<sup>119</sup> H.R. Rep. No. 97-597 (1982), *reprinted in* 1982 U.S.C.C.A.N. 2807, 2819-2820 (emphasis added). *See also N. Spotted Owl*, 758 F. Supp. at 625.

<sup>120</sup> 16 U.S.C. § 1532(5).

## **VII. EMERGENCY PETITION JUSTIFICATION**

In past emergency listings, the Service has determined that the risk to a proposed species from an imminent federally permitted project warrants use of its emergency listing powers. The Service notes that, “[w]ith emergency listing, we can also influence Federal actions that may potentially impact the subspecies . . .” (76 Fed. Reg. at 49563). Heightened federal protection through use of an emergency listing is particularly warranted for extremely sensitive and isolated species such as the Miami tiger beetle, especially in the face of imminent development which is likely to jeopardize the continued existence of the species.

The ESA empowers and requires the Secretary to act immediately to list a species whenever “any emergency pos[es] a significant risk to the well-being of any species of fish or wildlife or plants.” 16 U.S.C. § 1533(b)(7). An emergency posing a significant risk to the well-being of the Miami tiger beetle exists, thereby triggering the duty to immediately list the Miami tiger beetle. The Coral Reef Commons development and Miami Wilds in the only known habitat of the Miami tiger beetle will lead to the present or threatened destruction, modification, or curtailment of the Miami tiger beetle’s habitat or range; and other natural or manmade factors affecting the species’ continued existence. 16 U.S.C. § 1533(a)(1) (2006).

The Miami tiger beetle should be protected now while there is still time to consider the impacts of the Coral Reef Commons development and Miami Wilds before they are authorized through a Section 10 or Section 7 permit. The possibility is real that, by the time of formal listing of the Miami tiger beetle, these developments will already be under construction, thereby resulting in irreversible harm to the species and its only known global habitat.

Therefore, petitioners request that the Service (1) immediately protect the Miami tiger beetle as endangered under its emergency listing authority; and (2) immediately designate critical habitat for the Miami tiger beetle under its emergency listing authority.

## **VIII. CONCLUSION**

The Miami tiger beetle is a rare Florida gem. Once thought extinct, it now faces imminent extinction from development. It merits immediate ESA protection to ensure its survival and recovery. The Service should act quickly to afford the Miami tiger beetle the fullest protection under the ESA.

## LITERATURE CITED

- Author unknown, Nov. 6, 2014, MIAMI WILDS: Stupid Theme Park..., <http://eyeonmiami.blogspot.com/2014/11/miami-wilds-stupid-theme-park-guest.html>.
- Bach, T. Nov. 28, 2014, Developer to Submit Habitat Conservation Plan for Controversial Walmart Project, [http://blogs.miaminewtimes.com/riptide/2014/11/developer\\_to\\_submit\\_habitat\\_conservation\\_plan\\_in\\_order\\_to\\_proceed\\_with\\_cont.php](http://blogs.miaminewtimes.com/riptide/2014/11/developer_to_submit_habitat_conservation_plan_in_order_to_proceed_with_cont.php).
- Bach, Trevor, Sept. 4, 2014, Two Flowers Species at Controversial Walmart Site Are Now Endangered, [http://blogs.miaminewtimes.com/riptide/2014/09/joining\\_butterfly\\_two\\_flower\\_species\\_found\\_at\\_controversial\\_walmart\\_development\\_site\\_also\\_listed\\_as.php](http://blogs.miaminewtimes.com/riptide/2014/09/joining_butterfly_two_flower_species_found_at_controversial_walmart_development_site_also_listed_as.php)
- Bender, M. A., T. R. Knutson, R. E. Tuleya, J. J. Sirutis, G. A. Vecchi, S. T. Garner, and I. M. Held. 2010. Modeled impact of anthropogenic warming on the frequency of intense Atlantic hurricanes. *Science* 327:454-458.
- Bach, T. July 29, 2014, Thousands Sign Petitions Against Walmart Development on Endangered Pine Rockland, [http://blogs.miaminewtimes.com/riptide/2014/07/petition\\_against\\_rockland\\_forest\\_walmart\\_development\\_has\\_8000\\_signatures.php](http://blogs.miaminewtimes.com/riptide/2014/07/petition_against_rockland_forest_walmart_development_has_8000_signatures.php)
- Bandell, B. July 8, 2014, University of Miami sells 80 acres to developer for mixed-use project, *South Florida Business Journal*, [http://www.bizjournals.com/southflorida/news/2014/07/08/university-of-miami-sells-80-acres-to-developer.html?utm\\_source=feedburner&utm\\_medium=feed&utm\\_campaign=Feed%3A+industry\\_22+%28Industry+Education%29&utm\\_content=Google+Feedfetcher](http://www.bizjournals.com/southflorida/news/2014/07/08/university-of-miami-sells-80-acres-to-developer.html?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+industry_22+%28Industry+Education%29&utm_content=Google+Feedfetcher)
- Bargar, T. 2012. Risk assessment for adult butterflies exposed to the mosquito control pesticide naled. *Environmental Toxicology and Chemistry*. Setac Press. 31. (<http://onlinelibrary.wiley.com/>).
- Bergh, C. and J. Wisby, *Fire History of Lower Keys Pine Rocklands*, The Nature Conservancy, Florida Keys Initiative, <http://www.fws.gov/southeastfire/documents/Bergh-Wisby-1996.pdf>.
- Bevan, S. Oct. 23, 2014, Miami Wilds LLC requests \$13M in public funding for amusement park, *South Florida Business Journal*, <http://www.bizjournals.com/southflorida/blog/morning-edition/2014/10/20th-century-fox-requests-13m-in-public-funding.html>
- Bolado, C. Newly Endangered Plants Stand in Wal-Mart Project's Way, *Law 360*, <http://www.law360.com/articles/573723/newly-listed-endangered-plants-put-hold-on-wal-mart-project>.
- Emergency Petition to List the Miami Tiger Beetle, Submitted December 11, 2014

Bousquet, Y. 2012. Catalogue of Geadephaga (Coleoptera, Adephaga) of America, north of Mexico. ZooKeys 245. 1722 pp.,  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3577090/pdf/ZooKeys-245-001.pdf>.

Bravo, K. July 12, 2014, The Awful Reason Florida is Bulldozing One of the World's Rarest Forests, <http://www.takepart.com/article/2014/07/12/awful-reason-why-florida-bulldozing-one-worlds-rarest-forests?cmpid=tpdaily-eml-2014-07-14>.

Brzoska, D., C. Knisley, and J. Slotten. 2011. Rediscovery of *Cicindela scabrosa floridana* Cartwright (Coleoptera: Cicindelidae) and its elevation to species status. Insecta Mundi 0162: 1-7.

Buckner, M.M., W. Smith, J.A. Takats. 2002. Tennessee, Cumberland, and Mobile River Basins at Risk. A Biological Assessment and Vision for the World Wildlife Fund's Southeast Rivers and Streams Project. Nashville, TN. 52 pp, :  
[www.worldwildlife.org/what/wherewework/sers/WWFBinaryitem2738.pdf](http://www.worldwildlife.org/what/wherewework/sers/WWFBinaryitem2738.pdf).

Buhlmann, K.A. and J.W. Gibbons. 1997. Imperiled aquatic reptiles of the Southeast. p. 201-231 In: Benz, G.W. and D.E. Collins (editors). 1997. Aquatic Fauna in Peril: The Southeastern Perspective. Southeast Aquatic Research Institute Special Publication 1, Lenz Design and Communications, Decatur, GA. 553 pp.

Butler, A. Aug. 26, 2014, Cutler Bay passes resolution to protest development of south Miami-Dade land, Miami Herald,  
<http://www.miamiherald.com/news/local/community/miami-dade/cutler-bay/article1982226.html>.

Cayan, D. R., P. D. Bromirski, K. Hayhoe, M. Tyree, M. D. Dettinger, and R. E. Flick. 2008. Climate change projections of sea level extremes along the California coast. Climatic Change 87:857-873.

CBS Local News, July 18, 2014, Feds to Developer: Stop Planning Walmart In Rare Miami-Dade Forest, <http://miami.cbslocal.com/2014/07/18/feds-stop-work-on-walmart-in-miami-dade-land-with-rare-species/>.

Defeo, O., A. McLachlan, D. S. Schoeman, T. A. Schlacher, J. Dugan, A. Jones, M. Lastra, and F. Scapini. 2009. Threats to sandy beach ecosystems: a review. Estuarine, Coastal and Shelf Science 81:1-12.

Department of Regulatory and Economic Resources letter to Altshul, July 23, 2013.  
Dinkova, L. Oct. 22, 2014, Miami Wilds LLC wants \$13 million in public funding, Miami Today News, <http://www.miamitodaynews.com/2014/10/22/20th-century-fox-wants-13-million-public-funding-miami-wilds/>.

Dirzo, R., H. Young, G. Ceballos, N. Isaac, and B. Collen. 2014. Defaunation in the Anthropocene. Science 345, 401.

Emergency Petition to List the Miami Tiger Beetle, Submitted December 11, 2014

Dro, Oct. 24, 2014, Miami Wilds, A Theme Park Proposed For Near Zoo Miami, Wants \$13.5 Million in County Funds, <http://the305.com/2014/10/24/photo-miami-wilds-a-theme-park-proposed-for-near-zoo-miami-wants-13-5-million-in-county-funds/>.

Elsner, J. B., J. P. Kossin, and T. H. Jagger. 2008. The increasing intensity of the strongest tropical cyclones. *Nature* 455:92-95.

Fitzgerald, D. M., M. S. Fenster, B. A. Argow, and I. V. Buynevich. 2008. Coastal impacts due to sea level rise. *Annual Review of Earth and Planetary Science* 36:601-647.

Flesher, D. Aug. 11, 2014, South Florida butterflies win federal protection, Sun-Sentinel, <http://www.sun-sentinel.com/local/palm-beach/fl-endangered-butterflies-20140811-story.html>

Florida Fish and Wildlife Commission, *Florida's Wildlife Legacy Initiative*, myfwc.com, <http://myfwc.com/conservation/specialinitiatives/fwli/> (last visited Oct. 18, 2014).

FNAI – Guide to the Natural Communities of Florida: 2010 Edition, [http://www.fnai.org/PDF/NC/Pine\\_Rockland\\_Final\\_2010.pdf](http://www.fnai.org/PDF/NC/Pine_Rockland_Final_2010.pdf)

Freeman, Paul Abandoned & Little Known Airfields: Florida – Southern Miami Area. June 11, 2013

FWC Species of Greatest Conservation Need. [http://myfwc.com/media/1487124/03\\_SGCN\(2\).pdf](http://myfwc.com/media/1487124/03_SGCN(2).pdf).

Folkerts, G.W. 1997. State and fate of the world's aquatic fauna. p. 1-16 In: Benz, G.W. and D.E. Collins (editors). 1997. *Aquatic Fauna in Peril: The Southeastern Perspective*. Southeast Aquatic Research Institute Special Publication 1, Lenz Design and Communications, Decatur, GA. 553 pp.

Green, D.E. and C.K. Dodd, Jr. 2007. Presence of amphibian chytrid fungus *Batrachochytrium dendrobatidis* and other amphibian pathogens at warmwater fish hatcheries in southeastern north America. *Herpetological Conservation and Biology* 2(1): 43-47.

Grinsted, A., J. C. Moore, and S. Jevrejeva. 2012. Homogeneous record of Atlantic hurricane surge threat since 1923. *Proceedings of the National Academy of Sciences of the United States of America* 109:19601-19605,, <http://www.pnas.org/content/109/48/19601.full.pdf+html> .

Grinsted, A. et al. 2013. Projected hurricane surge threat from rising temperatures. *PNAS* doi:10.1073/pnas.1209980110, <http://www.pnas.org/content/110/14/5369.full.pdf+html>.

Hanks, D. Nov. 5, 2014, Miami Wilds gets \$14 million, Miami Herald, <http://www.miamiherald.com/news/local/community/miami-dade/article3588472.html>.

Emergency Petition to List the Miami Tiger Beetle, Submitted December 11, 2014

Harper, J. Oct. 2014, Going, going, gone, Biscayne Times, [http://www.biscaynetimes.com/index.php?option=com\\_content&view=article&id=1915:going-going-gone&catid=70:going-green&Itemid=200](http://www.biscaynetimes.com/index.php?option=com_content&view=article&id=1915:going-going-gone&catid=70:going-green&Itemid=200).

Hinga, Ann July 19, 2014, Destruction Thanks to University of Miami's Sale of Pine Rocklands -- It doesn't end there, <http://eyeonmiami.blogspot.com/2014/07/destruction-thanks-to-university-of.html>.

Hoang, T.C., R.L. Pryor, G.M. Rand, and R.A. Frankes. 2011 Use of butterflies as nontarget insect test species and the acute toxicity and hazard of mosquito control insecticides. *Environmental Toxicology and Chemistry*, Vol. 30, No. 4, 997-1005.

Integrated Taxonomic Information System, 2014. Species Profile available at: [http://www.itis.gov/servlet/SingleRpt/SingleRpt?search\\_topic=TSN&search\\_value=931870](http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=931870) Accessed December 8, 2014.

Karl, T.R., J.M. Melillo, and T.C. Peterson (eds.). 2009. *Global Climate Change Impacts in the United States*. U.S. Global Change Research Program. Cambridge University Press, <http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/regional-climatechange-impacts/southeast>.

Kautz, R.S. and J.A. Cox, *Habitats for Biodiversity Conservation in Florida*, Conservation Biology, Feb. 2001.

Kishtawal, C. M., N. Jaiswal, R. Singh, and D. Niyogi. 2012. Tropical cyclone intensification trends during satellite era (1986–2010). *Geophysical Research Letters* 39:L10810, 6pp., <http://iclimete.org/dev/publications-protected/J122.pdf>.

Knisley, C., M. Kippenhan, and D. Brzoska. 2014. Conservation status of United States tiger beetles. *Terrestrial Arthropod Reviews* 7(2014) 1-53 (uncorrected proofs).

Knisley, C.B. 2011. *Taxonomy, Biology, and Conservation of the Florida Tiger Beetle, Cicindela Floridiana*, report to South Florida Ecological Services Office.

Knisley, C. CV.

Koi, S. CV.

Komar, P. D., and J. C. Allan. 2008. Increasing hurricane-generated wave heights along the U.S. east coast and their climate controls. *Journal of Coastal Research* 24:479-488.

Kroch, K. Aug. 1, 2014, Plans for Massive Amusement Park Overlap with Endangered Florida Forest, <http://thinkprogress.org/climate/2014/08/01/3466392/amusement-park-endangered-florida-forest/>.

Kruse, M., Sept. 4, 2014, Carter's small-flowered flax and Florida brickellbush now officially are endangered species, Tampa Bay Times,

Emergency Petition to List the Miami Tiger Beetle, Submitted December 11, 2014

<http://www.tampabay.com/blogs/state/carters-small-flowered-flax-and-florida-brickellbush-now-officially-are/2196134>.

LeDee, O. E., K. C. Nelson, and F. J. Cuthbert. 2010. The challenge of threatened and endangered species management in coastal areas. *Coastal Management* 38:337-353.

Levermann, A. et al. 2013. The multimillennial sea-level commitment of global warming. *PNAS* 110:13745-13750, <http://www.pnas.org/content/110/34/13745.full.pdf+html>.

Liston, B., Aug. 11, 2014, Endangered Florida butterflies to get federal protection, Reuters, <http://www.reuters.com/article/2014/08/11/us-usa-florida-butterflies-idUSKBN0GB1UX20140811>.

Lynch, M. 1996. A quantitative-genetic perspective on conservation issues. In: Avise, J.C. and J.L. Hambrick (eds.). *Conservation genetics: case histories from nature*. Chapman and Hall, New York. pp. 493-494.

Macfie, D. Richmond Naval Air Station, 1942-1961, Tequesta.

Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, Eds., 2014: *Climate Change Impacts in the United States: The Third National Climate Assessment*. U.S. Global Change Research Program, 841 pp. doi:10.7930/J0Z31WJ2. Available at <http://nca2014.globalchange.gov/>.

Menon, S., J. Soberón, X. Li, and a. T. Peterson. 2010. Preliminary global assessment of terrestrial biodiversity consequences of sea level rise mediated by climate change. *Biodiversity and Conservation* 19:1599-1609.

Munzenrieder, K. Oct. 23, 2014. Fox Theme Park, Miami Wilds, Wants \$13.5 Million in County Money, [http://blogs.miaminewtimes.com/riptide/2014/10/fox\\_theme\\_park\\_miami\\_wilds\\_wants\\_135\\_million\\_in\\_county\\_money.php](http://blogs.miaminewtimes.com/riptide/2014/10/fox_theme_park_miami_wilds_wants_135_million_in_county_money.php); <http://www.skyscrapercity.com/showthread.php?t=1474675&page=2>.

Mousavi, M. E., J. L. Irish, A. E. Frey, F. Olivera, and B. L. Edge. 2011. Global warming and hurricanes: the potential impact of hurricane intensification and sea level rise on coastal flooding. *Climatic Change* 104:575-597.

Molleda, R. 2007. 1945 Richmond/South Dade Hurricane Presented by Robert Molleda at 2007 Florida Governor's Hurricane Conference

Myers, N., R. Mittermeier, C. Mittermeier, G. Fonseca, and J. Kent. Biodiversity hotspots for conservation priorities. *Nature* Vol. 403 Feb. 24, 2000.

Noss, R. F. 2011. Between the devil and the deep blue sea: Florida's unenviable position with respect to sea level rise. *Climatic Change* 107:1-16.

Emergency Petition to List the Miami Tiger Beetle, Submitted December 11, 2014

NRC. 2012. Sea level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future, National Research Council of the National Academies.

Peters, R.L. and J.D.S. Darling. 1985. The greenhouse effect and nature reserves. *Bioscience*. 35(11):707-717.

RAM, 2015 New Development. Coral Reef Commons, Miami, Florida.

RAM, July 23, 2014 Exhibit of Development Area.

RAM Realty Services, *About RAM*, ramrealestate.com, <http://www.ramrealestate.com/about-ram/>.

Salvato, M. 2001. Influence of mosquito control chemicals on butterflies (Nymphalidae, Lycaenidae, Hesperiiidae) of the Lower Keys, *Journal of the Lepidopterists' Society*, 55. 8-14.

Scavia, D., J. C. Field, D. F. Boesch, R. W. Buddemeier, V. Burkett, D. R. Cayan, M. Fogarty, M. A. Harwell, R. W. Howarth, C. Mason, D. J. Reed, T. C. Royer, A. H. Sallenger, and J. G. Titus. 2002. Climate change impacts on US coastal and marine ecosystems. *Estuaries* 25:149-164.

Schmidt, J.P. Undated. Cicindelidae of Colorado. Webpage. Available at: <http://www.colostate.edu/Depts/cicindela/> Accessed December 8, 2014.

Seager, R., A. Tzanova, and J. Nakamura. 2009. Drought in the Southeastern United States: causes, variability over the last millennium, and the potential for future hydroclimate change. *Journal of Climate* 22: 5021-5045, [http://www.ldeo.columbia.edu/res/div/ocp/pub/seager/Seager\\_etal\\_SE\\_2009.pdf](http://www.ldeo.columbia.edu/res/div/ocp/pub/seager/Seager_etal_SE_2009.pdf).

Seddon, P., C. Griffiths, P. Soorae, and D. Armstrong. 2014. Reversing defaunation: Restoring species in a changing world. *Science* Vol. 345 Issue 6195 July 25, 2014.

Snyder, J.R., M.S. Ross, S. Koptur, and J.P. Sah, *Developing Ecological Criteria for Prescribed Fire in South Florida Pine Rockland Ecosystems*, Se. Env'tl. Research Ctr., July 2005

Southeast Florida Regional Climate Change Compact Technical Ad hoc Work Group. 2011. Unified Sea Level Rise Projection for Southeast Florida. A document prepared for the Southeast Florida Regional Climate Change Compact Steering Committee. 27 p. Available online at <http://southeastfloridaclimatecompact.org/>.

Staletovich, J. Nov. 6, 2014, Miami-Dade County warns developer to protect forest, *Miami Herald*, <http://www.miamiherald.com/news/local/community/miami-dade/article3608747.html>.

Emergency Petition to List the Miami Tiger Beetle, Submitted December 11, 2014

Staletovich, J., Oct. 16, 2014, Feds: Shopping center in Rare Miami-Dade forest likely to kill endangered species, Miami Herald, <http://www.miamiherald.com/news/local/environment/article2922164.html>.

Staletovich, J., Sept. 12, 2014, Developer defends Wal-Mart in rare forest, Miami Herald, <http://www.miamiherald.com/news/local/environment/article2092364.html>.

Staletovich, J., Sept. 3, 2014, Two flowers growing in Miami-Dade County deemed endangered, Miami Herald <http://www.miamiherald.com/news/local/community/miami-dade/article1987767.html>.

Staletovich, J., July 17, 2014, Feds ask developer to stop work on Walmart in rare Miami-Dade forest, Miami Herald, <http://www.miamiherald.com/news/local/community/miami-dade/article1975937.html>.

Staletovich, J., July 12, 2014, Walmart planned for endangered forest lands in South Florida, Miami Herald, <http://www.miamiherald.com/news/local/community/miami-dade/article1975284.html>.

Stern, G., Sept. 12, 2014, Outraged Miami Residents Confront Walmart Developer in Kendall, [http://www.huffingtonpost.com/grant-stern/outraged-miami-residents-b\\_5808574.html?utm\\_hp\\_ref=miami&ir=Miami](http://www.huffingtonpost.com/grant-stern/outraged-miami-residents-b_5808574.html?utm_hp_ref=miami&ir=Miami).

Strayer, D.L. 2006. Challenges for freshwater invertebrate conservation. *Journal of the North American Benthological Society* 25(2):271–287.

Strauss, B.H., R. Ziemiński, J.L. Weiss, and J.T. Overpeck. 2012. Tidally adjusted estimates of topographic vulnerability to sea level rise and flooding for the contiguous United States. *Environmental Research Letters* 7: 014033.

Tebaldi, C., B. H. Strauss, and C. E. Zervas. 2012. Modelling sea level rise impacts on storm surges along US coasts. *Environmental Research Letters* 7:014032. doi: 10.1088/1748-9326/7/1/014032.

URS Corporation Southern. 2007. EEL Program, Management Plan, Part II – Pine Rockland (DRAFT) Chapter 1: The Pine Rockland Habitat, [http://regionalconservation.org/ircs/pdf/publications/2007\\_09.pdf](http://regionalconservation.org/ircs/pdf/publications/2007_09.pdf).

U.S. Fish and Wildlife Service (USFWS). 2011d. Emergency Listing of the Miami Blue Butterfly as Endangered, and Emergency Listing of the Cassius Blue, Ceraunus Blue, and Nickerbean Blue Butterflies as Threatened Due to Similarity of Appearance to the Miami Blue Butterfly. 76 Fed. Reg. 49542 (Aug. 10, 2011).

U.S. Fish and Wildlife Service July 15, 2014 Letter of Concern to Jim Sopher, Project Manager, RAM Realty Services.

Emergency Petition to List the Miami Tiger Beetle, Submitted December 11, 2014

U.S. Fish and Wildlife Service (FWS). 2000. Mobile River Basin Aquatic Ecosystem Recovery Plan. Atlanta, GA. 128 pp. Available online: [www.ecos.fws.gov/docs/recovery\\_plans/2000/001117.pdf](http://www.ecos.fws.gov/docs/recovery_plans/2000/001117.pdf).

USFWS, Species of Concern.  
<http://www.fws.gov/VeroBeach/MSRPPDFs/appendixC.PDF>.

U.S. Fish and Wildlife Service (FWS). 2009. Proposed Endangered Status for the Georgia Pigtoe Mussel, Interrupted Rocksnail, and Rough Hornsnail with Critical Habitat; Proposed Rule. June 29, 2009. 74 FR 31114.

USFWS, *Multi-Species Recovery Plan – Pine Rocklands*,  
[http://www.fws.gov/southeastfire/documents/MSRP\\_PineRocklands.pdf](http://www.fws.gov/southeastfire/documents/MSRP_PineRocklands.pdf).

Vazquez, C. Nov. 6, 2014, Developer receives grant for 20<sup>th</sup> Century Fox theme park at Zoo Miami, Local 10 News, <http://www.local10.com/news/developer-receives-grant-for-20th-century-fox-theme-park-at-zoo-miami/29587044>.

Warren, Jr., M.L., P.L. Angermeier, B.M. Burr, and W.R. Haag. 1997. Patterns of fish imperilment in the Southeast. p. 105-164 In: Benz, G.W. and D.E. Collins (editors). 1997. *Aquatic Fauna in Peril: The Southeastern Perspective*. Southeast Aquatic Research Institute Special Publication 1, Lenz Design and Communications, Decatur, GA. 553 pp.

Weiss, J.L. et al. 2011. Implications of recent sea level rise science for low-elevation areas in coastal cities of the coterminous U.S.A. *Climatic Change* 105:635-645.

Williams, D.A., Y. Wang, M. Borchetta, and M.S. Gaines, *Genetic diversity and spatial structure of a keystone species in fragmented pine rockland habitat*, *Biological Conservation*, April 2007.

Wirth, C. <https://cicindela.wordpress.com/tag/cicindela-scabrosa-floridana/>.

Wirth, C. <https://cicindela.wordpress.com/2011/02/18/floridian-tiger-beetle-rediscovered/>

Wirth, C. CV

Yager, R., Zoning Approvals Sought for Coral Reef Commons Complex,  
<http://www.communitynewspapers.com/kendall-gazette/zoning-approvals-sought-for-coral-reef-commons-complex/>.

Zwick, P. D., and M. H. Carr. 2006. Florida 2060: A Population Distribution Scenario for the State of Florida; available at [www.1000fof.org/PUBS/2060/Florida-2060-Report-Final.pdf](http://www.1000fof.org/PUBS/2060/Florida-2060-Report-Final.pdf).

Emergency Petition to List the Miami Tiger Beetle, Submitted December 11, 2014