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Endangered Status for *Brickellia mosieri* and *Linum carteri* var. *carteri*

Comment On: FWS-R4-ES-2013-0033-0001

Endangered and Threatened Wildlife and Plants: Proposed Endangered Status for *Brickellia mosieri* (Florida Brickell-bush) and *Linum carteri* var. *carteri* (Carter's Small-flowered Flax)

Document: FWS-R4-ES-2013-0033-0003

Submitted Electronically via eRulemaking Portal

Submitter Information

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General Comment

Data used for this Proposed Rule is up-to-date, very thorough, and well referenced. Knowledge about these two species' biology came from the major researchers known for the taxa.

Carter's Small-flowered Flax has been researched more than Florida Brickell-bush, so more is known about it biologically and so, more material is there to use to help in its conservation. The lack of research in certain areas of these species' biology is noted also in this Proposed Rule and compensated for in the best educated way.

One concern this biologist has that I did not see addressed in the Proposed Rule is the threat of herbivory from invertebrates, native and non-native (e.g., white flies, leaf borers, etc., etc.). I suspect that it is not a major concern for these species, however we have a *Brickellia* species here in north Florida, *Brickellia cordifolia*, that has considerable damage on an annual basis from a leaf boring type arthropod. The pest has not been identified yet.

Another concern I have that USFWS may or may not find useful is the threat of feral hogs on the plants. There must not be alot of these on the Pine Rocklands described, so it may not be an issue. Another potential threat to these two species is unnaturally high herbivory from deer or other vertebrates, such as rabbits, etc. that become very abundant in small preserves with no top predators. These threats are definitely problems in most of Florida, hopefully it is not a problem for the populations these two rare plant species.

In summary, the analysis for both species' data in the Proposed Rule was exceptional, using the

latest research and spatial data. This is a well-researched and insightful Proposed Rule for these two species and their potential protection under the USFWS Endangered Species Act. A conservationist could take the information here and use it to perpetuate both of these endangered species into the future.

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Endangered Status for *Brickellia mosieri* and *Linum carteri* var. *carteri*

Comment On: FWS-R4-ES-2013-0033-0001

Endangered and Threatened Wildlife and Plants: Proposed Endangered Status for *Brickellia mosieri* (Florida Brickell-bush) and *Linum carteri* var. *carteri* (Carter's Small-flowered Flax)

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Submitter Information

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General Comment

I am a field biologist at Fairchild Tropical Botanic Garden in Miami with over 12 years of experience with the taxa proposed for listing. I have a few brief comments about this rule.

Pg61276, top of middle column - I think the accepted name for wild tamarind is *Lysiloma latisiliquum*, not *L. bahamensis* as listed. (see <http://www.theplantlist.org/tpl/record/ild-29587>)

Pg61279, first paragraph, last sentence - I agree with the statements that flowering of *Brickellia mosieri* takes place primarily in the fall. The end of that sentence states that flowers may be present during most of the year. I'd like to provide a little more detail. Usually, off-season flowering is because of a fire. *B. mosieri* will flower in the 1-2 months following a fire, no matter the time of year.

Pg61283, last column, end of 3rd paragraph - There is an example citing a pers. comm from me (Possley) and a discussion of fire suppression at Pine Shore Pineland Preserve. Since we had that discussion, the pineland actually burned in a wildfire on 8 April 2013. Because of that, the habitat at Pine Shore is improved and this may no longer be the most endangered population of *B. mosieri*. In fact, I don't think it is.

Pg61286, last column, middle paragraph - There is a discussion citing a pers. comm. from Possley a fence installed at R. Hardy Matheson Preserve. I think the issue there is a little more complicated than what was written. Instead of saying that the mountain biking has been "remedied," I might say "mitigated" and qualify this by a statement that succession has increased since the mountain bikers have been fenced out, which has also not been good for the *Linum* habitat.

Pg61289, last column, 3rd paragraph - I'm pretty sure the IRC preserve is mis-named and it is the "George Avery Pineland" (i.e., it doesn't contain the word "and"), but please doublecheck with them.

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Endangered Status for Brickellia mosieri and Linum carteri var. carteri

Comment On: FWS-R4-ES-2013-0033-0001

Endangered and Threatened Wildlife and Plants: Proposed Endangered Status for Brickellia mosieri (Florida Brickell-bush) and Linum carteri var. carteri (Carter's Small-flowered Flax)

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Submitter Information

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General Comment

I have read over your proposal to list the plants Florida Brickell-bush and Carter's Small-flowered flax and found it to be a very thorough and well prepared document. I would like to note that although I do not have great familiarity with these two plant species, I am aware of their plight and I have some experience with rare plants in south Florida, having worked extensively with the semaphore cactus, which was just listed as endangered in October 2013. I know pine rocklands are limited in their distribution to Miami-Dade and development has severely reduced their extent. In addition, it is very difficult to manage this habitat with the fire treatments it needs because of the issue of permitting the necessary burns. Finally, invasive species are impacting many of the remaining pine rockland sites. I note that the total population of both species is quite small and has been reduced by 13% for one species and 30% for another and I applaud the Fish and Wildlife Service for taking steps to protect them. I hope that in the future, money may be made available to help with out-plantings and monitoring which are sorely needed to help secure populations of South Florida's charismatic but threatened flora and fauna.

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Endangered Status for *Brickellia mosieri* and *Linum carteri* var. *carteri*

Comment On: FWS-R4-ES-2013-0033-0001

Endangered and Threatened Wildlife and Plants: Proposed Endangered Status for *Brickellia mosieri* (Florida Brickell-bush) and *Linum carteri* var. *carteri* (Carter's Small-flowered Flax)

Document: FWS-R4-ES-2013-0033-0006

Submitted Electronically via eRulemaking Portal

Submitter Information

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General Comment

11/27/2013

Comments submitted here are being provided by Jimi Sadle in response to a request for peer review of this proposed rule by the USFWS South Florida Ecological Services Field Office, Vero Beach. All materials received for this review from the USFWS were reviewed in the preparation of these comments. In my opinion, the USFWS used the best available science in preparing the proposed listing of both *Brickellia mosieri* and *Linum carteri* var. *carteri*. I also believe that the assumptions used in preparing the package are sound.

Please consider the following specific comment in preparation of the final rule.

Page 61277, Historical Range

Two specimens of *B. mosieri* (filed as *B. eupatorioides* and annotated by K.A. Bradley as *B. eupatorioides* var. *floridana*) in the collection at Fairchild Tropical Botanic Garden Herbarium (FTG) indicate that the historic range of this species probably extended north of South Miami.

W.M. Buswell s.n. Jan 14, 1947 (FTG catalog number 95758) lists the collecting locality as "Pineland below Coral Gables, Florida"

J.K. Small s.n. Nov 30, 1912 (FTG catalog number 95757) lists the collecting locality as "pinelands near Coconut Grove"

In my opinion, this is a relatively minor point, but I believe that the historic range is better

characterized as extending from approximately Coconut Grove to Florida City. However, these specimens may also have been included with those described in this section as not giving accurate or precise location information. Images of these specimens are available online at www.virtualherbarium.org.

Thank you for the opportunity to review this proposed rule.
Sincerely,

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Endangered Status for *Brickellia mosieri* and *Linum carteri* var. *carteri*

Comment On: FWS-R4-ES-2013-0033-0001

Endangered and Threatened Wildlife and Plants: Proposed Endangered Status for *Brickellia mosieri* (Florida Brickell-bush) and *Linum carteri* var. *carteri* (Carter's Small-flowered Flax)

Document: FWS-R4-ES-2013-0033-0007

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Submitter Information

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General Comment

I have read all of the documents carefully, and with great interest. The FWS has done a very thorough job, reviewing all available data, the relevant literature, and contacting scientists with experience in the study of habitats and plants where these two candidate species are located (currently, and historically). Both *Brickellia mosieri* and *Linum carteri* var. *carteri* qualify as endangered using the Florida state ranking system employed by the Endangered Plant Advisory Council, and since their numbers are declining dramatically, and their habitat dwindling due to development pressures, it is time they receive federal designation and protection.

Especially critical to helping these species recover more robust numbers is an understanding of their reproductive biology, especially their floral biology, pollination, and breeding systems. Most individuals observed in nature produce some seeds, but the effects of habitat conditions on the reproductive allocation of both species has not yet been quantified. It may be that individuals in smaller, more isolated, and/or degraded pine rockland habitat fragments have lower reproductive rates than counterparts in larger, more well-maintained pine rockland sites; in that case, the genetic diversity represented in those low quality sites is likely to be lost over time, trumped only by their total elimination when sites are developed.

We must do what we can to maintain the genetic diversity of both of these species, as well as preserve their role in the species diversity of the pine rocklands of the Miami Rock Ridge. The reports say that not much more than 1% of the original extent of these rocklands remain undeveloped, and pressures are only growing as human numbers in south Florida continue to increase, as climate change and sea level rise push the humans further inland to the highest available ground. Giving both *Brickellia mosieri* and *Linum carteri* var. *carteri* federally endangered status will be an important

first step to protecting these species, as well as the imperiled habitat in which they occur.

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Endangered Status for *Brickellia mosieri* and *Linum carteri* var. *carteri*

Comment On: FWS-R4-ES-2013-0033-0001

Endangered and Threatened Wildlife and Plants: Proposed Endangered Status for *Brickellia mosieri* (Florida Brickell-bush) and *Linum carteri* var. *carteri* (Carter's Small-flowered Flax)

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Submitter Information

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General Comment

My comments regarding the written documents, and possible errata:

Page 9, Table 2: "Rockdale Pineland Addition" what is that? Attempted to call the folks at Miami-Dade County Parks and Recreation Natural Areas Management, no return call. I presume that it is actually Rockdale Pineland Preserve, or part of it.

Page 13, under "Federal Lands": Neither the US Coast Guard nor the NOAA properties are listed as containing *Brickellia mosieri* in Table 1 on Page 6, however are mentioned in the text on page 13.

Page 14, left column, 1st paragraph: *Lygodium microphyllum* is not likely a threat to these species as it primarily occupies wetland habitats. To my knowledge, *Lygodium microphyllum* is not known to invade pine rockland habitat. Other exotics are a threat however.

Critical Habitat for *Brickellia mosieri* & *Linum carteri* var. *carteri*:

Unit 4 critical habitat should also contain many of the mowed fields within the U.S. Coast Guard and Miami Zoo properties. Despite not having a pine canopy, or a shrub layer, most of these areas are mostly dominated by pine rockland species and are highly diverse containing many state listed species and at least one federally listed species (*Chamaesyce deltoidea*). Similar mowed areas likely occur in other portions of the Richmond Pine Rockland Complex.

Comments concerning a posted comment: Deer no longer occur in the areas for which these two species exist. Rabbits occur only sparingly, and not in all areas.

General Comments regarding the listing of these species and designation of critical habitat for them.

I have almost 20 years of experience with these two species and the habitat for which they occupy. I find that this listing is long overdue, and have personally observed populations of both species destroyed by development. There is much more to learn about how these species interact with their environment, and more study is needed, especially with regards to seed dispersal and pollinator mechanisms, as well as augmentation and reintroduction studies. In addition, GSA property within the Richmond Pine Rockland Complex should be more thoroughly surveyed for these two species, especially *Brickellia mosieri*. I am happy with the report, and all the very careful effort involved in creating a justification for listing *Brickellia mosieri* and *Linum carteri* var. *carteri*.

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Comment On: FWS-R4-ES-2013-0033-0001

Endangered and Threatened Wildlife and Plants: Proposed Endangered Status for *Brickellia mosieri* (Florida Brickell-bush) and *Linum carteri* var. *carteri* (Carter's Small-flowered Flax)

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Submitter Information

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General Comment

Need for listing

With their distributions confined to pine rocklands and their immediate vicinities in southernmost Miami-Dade County, *Brickellia mosieri* and *Linum carteri* var. *carteri* are (1) calciphiles that require direct contact with limestone or limestone-derived surfaces, and (2) intolerant of low light levels, but tolerant of fire and other disturbances that remove organic soils and expose the underlying bedrock. Total population numbers of dropped to a few thousand individuals, and their ranges have shrunk by 10-25% from known historical extent. Both are restricted to the southern half of Miami-Dade County. Of the two species, *L. carteri* historically had the more northern distribution, occurring on both shallow sand and limestone substrates, with some sites on or close to the coastal ridge. *L. carteri* is especially associated with scarified limestone surfaces, including roadsides, where it forms associations with weedy native species as well as pine rockland endemics. *B. mosieri* is more abundant, but is dependent on maintenance of the foundational *Pinus elliottii* var. *densa*, whose litter production and accumulation allows fires to burn, thereby removing hardwood shrubs and allowing the rich herbaceous flora to persist.

Rather than use some form of Population Viability Analysis (PVA), USFWS' rationale for listing *B. mosieri* and *L. carteri* rest on the environmental threats that they face, in conjunction with their low numbers in a few, widely dispersed populations. PVA are useful when they adequately represent demographic probabilities that can be extrapolated to future events and conditions, but data representing population responses to stochastic events such as hurricanes and fires (Coulson et al. 2001), or press disturbances such as fragmentation and sea level rise, are difficult to bring together for rare species like *B. mosieri* and *L. carteri*. For instance, the fate of both of these species are intimately connected to the condition of *P. elliottii*, which exhibited region-wide delayed mortality

following Hurricane Andrew and may be expected to do so again following the next major hurricane. PVA analysis based on data collected within the narrow range of conditions that prevailed at occupied sites during the last decade would not be able to account for the effects of such a sudden change.

In light of the small sizes of the current populations, the USFWS take the proper path in reaching its listing decisions on a more qualitative assessment based on the undisputable trajectory of increasing levels of threat, in light of the small sizes of the current populations. For small understory species with limited dispersal abilities, the likely population numbers (a total of ~3000 and 1300 individuals for *B. mosieri* and *L. carteri*, respectively) are truly alarming. Rules of thumb developed on the basis of medium-to-large size animals (e.g., Shaffer 1983) do not work well for herbaceous plants in which one thousand individuals might easily be concentrated in a single site, making the species vulnerable to a single event of human or natural origin. The threats to these tenuous populations include: (1) Reductions in total available habitat, with isolation of the potential habitat patches that do remain; (2) increasing urbanization in the inter-patch matrix, with concomitant decreases in the effectiveness of pollinators and seed dispersers; (3) increased difficulty in maintaining an appropriate fire regime, due to the fragmentation and urbanization discussed above; (4) increased difficulty in controlling exotic plant encroachment, another byproduct of matrix urbanization; and (5) salinization effects associated with sea level rise at low-elevation pine forests (Ross et al. 1994).

Based on the above, I concur with USFWS' determination that *B. mosieri* and *L. carteri* require listing as Endangered under the tenets of the Endangered Species Act.

Literature Cited

Coulson, T., G. M. Mace, E. Hudson, and H. Possingham. 2001. The use and abuse of Population viability Analysis. *Trends in Ecology & Evolution* 16 (5): 219-221.

Shaffer, M. L. 1983. Determining minimum viable population sizes for the grizzly bear. *International Conference on Bear Research and Management*

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Comment On: FWS-R4-ES-2013-0033-0001

Endangered and Threatened Wildlife and Plants: Proposed Endangered Status for *Brickellia mosieri* (Florida Brickell-bush) and *Linum carteri* var. *carteri* (Carter's Small-flowered Flax)

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Submitter Information

Name: George Gann

General Comment

I think the proposal looks very thorough. Some small suggested edits.

Page 61276. In column 2, *Lysiloma bahamensis* should be *L. latisiliquum* per ITIS et al. The intended taxon for *Sideroxylon reclinatum* is ssp. *austrofloridense*. *S. reclinatum* ssp. *reclinatum* is not a pine rockland species. Because of the taxonomic confusion with *Dodonaea*, I suggest deleting *Dodonaea angustifolia*; there are many typical species to choose from. *Aster adnatus* is now *Symphytotrichum adnatum* per ITIS et al. There is a typo in the 3rd column - (Bradley and Gann 199, p. 12) should be (Bradley and Gann 1999, p. 12).

Page 61277, in column 1 at bottom, per FNAI 2010 the sandhill community does not occur in Miami-Dade County. Mesic flatwoods would be more appropriate as an intergrade community but would require an additional citation.

Page 61279. In column 1 at bottom *Piriqueta caroliniana* is now *P. cistoides* ssp. *caroliniana* per ITIS et al.

Page 61285. In column 2, NFC definition of tropical hardwood hammocks includes rockland hammocks as mentioned elsewhere in the text.

Page 61286. In column 1 near top, a typo - *Neyraudia neyraudiana* should be *Neyraudia reynaudiana*. *Rhynchelytrum repens* is now *Melinis repens* per ITIS et al.

Page 61289. In column 3, toward the middle delete "George and Avery Pineland" and replace that sentence with "To date, *B. mosieri* has been outplanted at at least one private site, although the status of these plants is currently unknown." or similar.

George Gann
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Endangered Status for *Brickellia mosieri* and *Linum carteri* var. *carteri*

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Endangered and Threatened Wildlife and Plants: Proposed Endangered Status for *Brickellia mosieri* (Florida Brickell-bush) and *Linum carteri* var. *carteri* (Carter's Small-flowered Flax)

Document: FWS-R4-ES-2013-0033-DRAFT-0011

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Submitter Information

Name: Craig van der Heiden

General Comment

Comments on the proposed ruling to list *Brickellia mosieri* and *Linum carteri* var. *carteri* are provided by Craig van der Heiden from The Institute for Regional Conservation. The FWS has done thorough and exemplary work on providing information and documentation for the listing of these two species.

Please consider the following:

In the Supplemental Information—Methods for Determining Critical Habitat (document 2PRP_proposedCriticalHabitat_SupportingInformation_Methods) page 1 and 2, I recommend a change to the ranking for Objective 1. The suggested criteria for habitat patches are; 50-100% canopy openness should be scored highest (i.e. a 4), 25-50% canopy openness "3" and less than 25% canopy openness the lowest possible score ("1").

Open canopy is not less preferable especially for *Linum carteri* var. *carteri*. Closed canopy in pine rocklands indicates a lack of fire and disturbance and a change to rockland hammock. In the end this may not change anything when considering all the other variables in the consequence matrix.