Wireweed
(*Polygonella basiramia*)

5-Year Review:
Summary and Evaluation

Photo: Dave Bender, Service

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

5-YEAR REVIEW
Wireweed (*Polygonella basiramia*)

I. GENERAL INFORMATION

A. Methodology used to complete the review: In conducting this 5-year review, we relied on the best available information pertaining to historical and contemporary distributions, life histories, genetics, habitats, and threats of this species. This review includes information from the previous 5-year review (U.S. Fish and Wildlife Service [Service] 2010) that is still applicable to the species, with updated or new information incorporated, as appropriate. We announced initiation of this review and requested information in a published *Federal Register* notice with a 60-day comment period in 2019 (84 FR 28850). We used a variety of information resources, including monitoring reports, surveys, and other scientific and management information, augmented by conversations and comments from biologists familiar with the species. Specific sources included the final rule listing this plant under the Endangered Species Act of 1973, as amended (ESA) (52 FR 2227), the recovery plan (Service 1999) and its amendment (Service 2019), the last 5-year review (Service 2010), peer reviewed scientific publications, and unpublished field observations by Federal, State, and other experienced biologists. The Florida Ecological Services Field Office (FESFO) Vero Beach contracted with Archbold Biological Station's (ABS) plant ecologist to update this review, which the lead recovery biologist for wireweed in the FESFO, Vero Beach finalized. Literature and documents used for this review are on file at the FESFO. All recommendations resulting from this review are a result of thoroughly reviewing the best available scientific information on wireweed. The Service did not seek additional peer review for this updated 5-year review.

B. Reviewers

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C. Background

1. FR Notice citation announcing initiation of this review: June 20, 2019. 84 FR 28850

2. Listing history
Original Listing
FR notice: 52 FR 2227
Date listed: January 21, 1987
Entity listed: Species
Classification: Endangered

3. Associated rulemakings: There are no associated rulemakings for this species.

4. Review History: Each year the Service reviews and updates listed species information to benefit the required Recovery Report to Congress. Through 2013, we performed a yearly recovery data call. The last 5-year status review conducted in 2010 showed this species as uncertain with no change recommended to the species' status due to the probability of continued populations losses at unprotected sites and the lack of adequate fire management (Service 2010).

Recovery Plan: 1999
Recovery Plan Amendment: 2019 (84 FR 38291). Amendments to revise the recovery criteria for wireweed.
Previous 5-year review: 1991 and 2010

5. Species' Recovery Priority Number at start of review: 2. A recovery priority number of "2" indicates that this is a species with a high degree of threat and high recovery potential.

6. Recovery Plan or Outline
Name of plan: South Florida Multi-Species Recovery Plan (MSRP)
Date issued: May 18, 1999
Date of amendment to the original 1999 MSRP wireweed recovery criteria: September 24, 2019 (Service 2019)
Dates of previous revisions: Recovery Plan for nineteen central Florida scrub and high pineland plants June 20, 1996 (revised plan). Recovery plan for eleven Florida scrub plant species January 29, 1990 (original plan).

II. REVIEW ANALYSIS

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

1. Is the species under review listed as a DPS? No. The ESA defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This definition limits listing DPS to only vertebrate species of fish and wildlife. Because the species under review is a plant, the DPS policy is not applicable. The application of the DPS policy to the species listing is not addressed further in this review.

B. Recovery Criteria

1. Does the species have a final, approved recovery plan containing objective, measurable criteria? Yes.

2. Adequacy of recovery criteria.

a. Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat? Yes

b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)? Yes

3. List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information.

The recovery criteria as presented in the 2019 amendment to the recovery plan is broken down into three parts ([1-3] in bold below) for clarity purposes (Service 2019). These criteria address factors A) the present or threatened destruction, modification, or curtailment of its habitat or range; D) inadequacy of existing regulatory mechanisms; and E) other natural or manmade factors affecting its survival. Factors B (overutilization for commercial, recreational, scientific, or educational purposes) and C (disease or predation) are not relevant to this species.

Wireweed will be considered for delisting when:

1. At least 40 populations exhibit a stable or increasing trend, evidenced by natural recruitment and multiple age classes;

2. Populations (as defined in criterion 1) in rosemary scrub or scrubby flatwoods habitats are distributed across the known range of the species; and

3. Populations are protected and managed via a conservation mechanism to a degree that enough suitable habitat is present for the species to remain viable for the foreseeable future.

These criteria have been largely met. There are 69 Element Occurrence Records (EORs) (Florida Natural Areas Inventory [FNAI] 2021); however, there are insufficient data to evaluate the trends of these populations in the first criterion as little current research or monitoring on this species is occurring. Detailed demographic data on individual populations (Level 3 monitoring, *sensu* Menges and Gordon 1996) was collected nearly two decades ago (Maliakal-Witt 2004) but has not been applied to questions of individual population persistence. Given the species' life history (many populations, plants killed by fire, no persistent seed bank, and need for dispersal into burned areas), metapopulation analyses would be more appropriate than individual population viability analyses. The second and third criteria have been largely met with EORs distributed across the range of the species and many (44 EORs or 64 percent) protected with suitable land management and other conservation mechanisms.

C. Updated Information and Current Species Status

1. Biology and Habitat

The Service (2010) summarized information on the biology and habitat of wireweed in the MSRP (Service 1999) and in the prior 5-year status review (Service 2010). Relevant biology and habitat information since 2010 are summarized and updated in this review.

a. Abundance, population trends (e.g., increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate), or demographic trends:

Abundance

The Service summarized the most recent FNAI database (FNAI 2021) for this document. FNAI reports 69 EORs, all on the Lake Wales, Bombing Range, and Winter Haven ridges in Highlands and Polk counties. Wireweed is predominately a Lake Wales Ridge (LWR) species, with 84 percent of occurrences located there (Turner et al. 2006). However, unlike many other listed plant species restricted to the LWR, wireweed is also found on the nearby Bombing Range Ridge.

Wireweed occurs at nearly all (18 of 19) of the units of the Lake Wales Ridge Wildlife and Environmental Areas (LWRWEAs) (Menges et al. 2019): four areas at Avon Park Air Force Range (APAFR), three units of Lake Wales Ridge State Forest (LWRSF), three state parks (Highlands Hammock, Lake June in Winter, and Allen David Broussard Catfish Creek Preserve), two areas owned by The Nature Conservancy (Saddle Blanket Lakes, Tiger Creek Preserve), two tracts at Lake Wales Ridge National Wildlife Refuge, land owned by the Southwest Florida Water Management District, and at ABS. According to FNAI (2021), most occurrences (44 of 69 or 64 percent) are on protected areas, with 17 on LWRWEAs and many others on the LWRSF and various state parks (Table 1).

Wireweed is a short-lived perennial plant, with widely varying population sizes (Bridges 2018). Population sizes vary annually and seasonally (Maliakal-Witt 2004). Because this species lacks a persistent seed bank, wireweed population recovery often experiences a delay for a few years after fire (which kills individual plants) until seeds disperse into the site (Book 2019). Most EORs (FNAI 2021; Table 1) do not specify the size of the occurrence, but those that do, range widely including populations in the thousands (Table 1). Christman (2006) reported about 1,082,433 plants throughout all occurrences evaluated, with the largest occurrence at 32,959 plants and the smallest consisting of one plant. More recent survey data (2014 to 2017) from APAFR (four EORs over nearly 1,500 acres) documented over 218,000 plants in four EORs (Bridges 2018). These surveys also documented an increase in the population sizes of wireweed over the last few years of surveys attributed to increased prescribed fire and hurricane damage opening overgrown areas (Bridges 2018). Bridges (2018) compared data collected from APAFR to Christman (2006) and estimated that APAFR accounted

for about a third of known plants for wireweed and considered APAFR a "major stronghold" for the species.

Population trends

The recently reported 69 EORs (FNAI 2021) were a decline from the 119 extant EORs reported in the previous 5-year review (Service 2010), largely due to changes in FNAI definitions. Since 2010, FNAI has increased the area used to define an EOR. Due to insufficient research and monitoring of wireweed, there are insufficient data to evaluate the trends in populations. Detailed demographic data on individual populations (Level 3 monitoring, *sensu* Menges and Gordon 1996) was collected nearly two decades ago (Maliakal-Witt 2004) but has not been applied to questions of individual population persistence. Given the species' life history (many populations, plants killed by fire, no persistent seed bank, and need for dispersal into burned areas), metapopulation analyses would be more appropriate than individual population viability analyses.

FNAI ranks the viability (EORANK) of the EORs based on the size of the EOR general condition of the EOR, and the condition of the landscape surrounding the EOR. Based on FNAI data (2021) there were 65 EORs of wireweed considered extant and 4 EORs that were possibly extirpated (X?) (Table 1). A total of 35 EORs were considered viable (EORANK of A, AB, B, BC, or C), 5 EORs classified with uncertain viability (EORANK of BD or E), and 29 EORs were considered non-viable (EORANK of D, D?, H, X?) (Table 1, Figure 1). Of the 35 viable EORs, 30 (86 percent) occurred on protected lands (sites with habitat management or conservation mechanism) (Table 1, Figure 1). In contrast, the 29 non-viable EORs had few occurrences (9 EORs or 31 percent) on protected lands (Table 1, Figure 1). All 5 of the EORs with uncertain viability occurred on protected lands (Table 1, Figure 1). There is a need for surveys to determine the viability of these EORs.

Fire Ecology

Fire is a key ecological factor in Florida scrub (Menges 1999, 2007) and has significant effects on populations of wireweed. Fire kills individual plants (Menges and Kohfeldt 1995) and wireweed lacks the substantial persistent seed bank that many scrub endemic herbaceous plants use to recover after fire (Maliakal-Witt 2004). Dispersal from outside burns or from unburned patches in patchy burns is necessary for recolonization of burned areas. Wireweed is sensitive to shrub cover (Quintana-Ascencio and Menges 2000) and largely occurs in gaps among dominant shrubs. Nonetheless, wireweed abundance does not change significantly with time-since-fire (Menges and Kohfeldt 1995, Hawkes and Menges 1995) and modeling suggests that frequent fires do not benefit wireweed (Maliakal-Witt 2004). In a study of gap dynamics over time, whether gaps burned did not appear to affect wireweed loss or colonization (Menges et al.

2017). Menges et al. (2019) recommended a relatively wide range of fire return intervals (5 to 40 years).

Because fire kills the plants, patchy fires are advantageous for wireweed, in allowing plants and seeds to survive in unburned patches. These patches can be sources of propagules to allow wireweed populations to re-establish in burned areas. A detailed study of wireweed abundance and fire refugia spatial patterns (Book 2019) demonstrated that wireweed abundance in burned patches decreased with distance from refugia and that abundance increased with time-since-fire, especially close to refugia. This shows that unburned patches are key to wireweed recovery after fire. Regional persistence of wireweed will be dependent upon on metapopulation dynamics. Patchy fires may provide an ideal combination, both creating suitable habitats and providing a fine-grained spatial landscape structure so wireweed can colonize those habitats.

Demographic Features

Wireweed is a short-lived, herbaceous perennial. Mean lifespan is only 0.3 years (Maliakal-Witt 2004). Few plants live beyond a year or two (Maliakal-Witt 2004). Plants are functionally dioecious (either female or hermaphroditic), with both genders producing seeds (Hawkes and Menges 1995). Seeds often germinate immediately after production at high percentages (Quintana-Ascencio and Menges 2000, Petru and Menges 2004) leaving few seeds in the soil seed bank after a few months (Navarra et al. 2011). Numerous factors affect germination, such as seed depth, precipitation, lichens (see Service 2010, also Stephens et al. 2012). Although seeds are small, dispersal distances are likely short.

The detailed study by Maliakal-Witt (2004) of wireweed (in comparison to its more widespread congener *P. robusta* [largeflower jointweed]) showed that wireweed had more variable recruitment and survival, but less variable growth. Much of the variation in vital rates was due to rainfall. Overall, the finite rate of increase (lambda) was higher in years with higher winter rainfall (Maliakal-Witt 2004)). Drought scenarios increased extinction risk in wireweed (Maliakal-Witt 2004). In contrast to many listed species that co-occur with it, wireweed extinction risk was higher with more frequent fires (e.g. 11 to 20 years) and lower with no fire (Maliakal-Witt 2004). Based on these results, Maliakal-Witt (2004) cautioned against frequent fire.

Hawkes and Menges (1995) found that wireweed plant densities and time-since-fire were unrelated, suggesting that plant populations could persist for extended periods without fire. However, both plant density and seedling production were greatest in gaps. Wireweed exhibits classic metapopulation dynamics at the gap scale (Boyle 2004). Wireweed is more likely to occupy larger and less isolated gaps. Gap area and isolation were significant predictors of wireweed abundance, which increased rapidly with gap area (Boyle 2004). Extinctions were most likely in smaller and more isolated gaps.

b. Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding):

Wireweed has moderate levels of genetic diversity (Lewis and Crawford 1995, Boyle 2004). Population differentiation is relatively low (Boyle 2004) in contrast to other LWR endemic species such as Highlands scrub hypericum (*Hypericum cumulicola*) (Menges et al. 2001). This combination implies that gene flow among patches is occurring in wireweed. This may maintain genetic connectivity among patches even as local extinctions, colonization, and metapopulations occur (Boyle 2004).

c. Taxonomic classification or changes in nomenclature:

Experts consider the species taxonomically valid; however, there is some disagreement on the placement of the genus *Polygonella* and its relationship with *Polygonum*. The Integrated Taxonomic Information System (2021) reports the name *Polygonella basiramia* (Small) G.L. Nesom & V.M. Bates as valid for wireweed. Based on genetic data, Schuster et al. (2011) proposed merging the *Polygonella* genus into the *Polygonum* genus. With this change the newly proposed name for wireweed was *Polygonum basiramium* (Small) T.M. Schust. & Reveal (Schuster et al. 2011).

d. Spatial distribution, trends in spatial distribution (e.g., increasingly fragmented, increased numbers of corridors), or historic range (e.g., corrections to the historical range, change in distribution of the species' within its historic range):

Wireweed is endemic to the Lake Wales, Winter Haven, and Bombing Range ridges in Central Florida. Current FNAI data (2021) show 69 EORs, the majority (64 percent) of which are on protected lands. Many of these populations are large and/or occur in large habitat patches (Table 1). Although habitat loss and isolation have affected wireweed (Christman 2006), it is still one of the most widely distributed and abundant of federally listed plants in Florida scrub.

e. Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

Wireweed occurs only in Florida scrub; a xeric shrubland ecosystem found primarily on sand ridges in Florida. Within Florida scrub, it is restricted to moderately-drained white sands (Menges et al. 2007) that generally support rosemary scrub or scrubby flatwoods. Nearly all EORs occur in scrub, rosemary scrub, sand pine scrub, or scrubby flatwoods (FNAI 2021). Wireweed often occurs in disturbed sites with the proper soil type. Wireweed is a specialist for gaps (Maliakal-Witt 2004) and bare sand microhabitats (Hawkes and Menges 1995). Wireweed is one of the more common species in rosemary scrub gaps,

occurring in about 16 percent of randomly selected gaps (Menges et al. 2008). Many of the sites with known wireweed populations are managed to try and control invasive species and maintain healthy scrub habitats using prescribed fire; however, lack of fire management continues to be a problem, especially for unprotected sites.

2. Five-Factor Analysis

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

The MSRP (Service 1999) details the habitat loss on the LWR. Current threats to the habitat of wireweed include habitat loss from development and habitat modification due to altered fire regimes. Twenty-five of 69 occurrences are located on private property where they have no protection from development and prescribed fire is unlikely (FNAI 2021). Although protected on public lands from development, inadequate fire management (fire too infrequent or non-existent) threatens wireweed at some sites.

Continued conversion of Florida scrub and sandhill to agriculture, housing, and other developments is undoubtedly affecting the number, distribution, and size of wireweed populations. An analysis of land conversion on the LWR suggests that about 85 percent of upland habitats were lost by about 1990 (Weekley et al. 2008). By the early part of this century, about 87 percent of upland habitat was gone (Turner et al. 2006). Habitat losses were greatest on yellow sands and in the northern part of the LWR (Weekley et al. 2008). About 11 percent of the LWR is currently protected in conservation lands (Weekley et al. 2008). The loss of so much habitat suggests that many wireweed populations may have become extirpated.

Habitat destruction from development continues to occur and development pressure remains high. Increasing pressure from population growth is likely to result in further loss of these habitats going forward. If trends continue, estimated development will destroy 34 percent of land by 2070, up from 19 percent in 2010 (Carr and Zwick 2016). At the same time, conservation lands will increase less than 1 percent (from 9,269,000 ac in 2010 to 9,525,000 ac by 2070). Overall, loss of habitat to development, primarily on private lands, will likely continue in Central Florida, eliminating populations and reducing the area of suitable habitat for wireweed. Therefore, habitats on protected lands are critical for the recovery of these scrub plants.

Although wireweed is not particularly sensitive to fire frequencies, fire is necessary to maintain habitats that support wireweed. Fire suppression started on a regional scale on the LWR about 80 years ago. Due to the extent of residential and agricultural development on the LWR, fire has all but disappeared from the region as a widespread, natural phenomenon.

In protected areas, prescribed fire is needed to manage scrub habitats and restore suitable conditions for wireweed. According to the Nature Conservancy (2010), prescribed fire is lacking at numerous sites since they were acquired for conservation. Because there is little chance for the use of prescribed fire to maintain habitats on private land, imperiled species on unprotected sites will almost certainly disappear over time (Turner et al. 2006).

Land managers also use mechanical treatments such as mowing, roller-chopping, and logging to manage scrub habitats and prevent the loss of habitat by invasive species such as natal grass (*Melinins repens*), which is a potential threat to wireweed (David et al. 2020). The long-term effects on scrub vegetation dynamics, and the response of species to these novel disturbances are not well-understood (Menges and Gordon 2010). Mechanical treatments cause soil compaction, soil disturbance, and may increase invasion by non-native plant species. Menges and Gordon (2010) recommend that mechanical treatments be used only when prescribed fire is precluded because of a site's proximity to the urban interface or, perhaps, in the initial phases of restoring severely overgrown sites to a natural fire condition (i.e. as a complimentary treatment to accelerate the restoration process rather than a surrogate for fire).

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

Overutilization for commercial, recreational, scientific, or educational purposes is not a known threat to wireweed.

c. Disease or predation:

Vertebrate herbivory (attributed to rodents and birds) has been observed on wireweed (Quintana-Ascencio et al. 2009). The overall threat level from predation appears low. No diseases have been observed to affect wireweed.

d. Inadequacy of existing regulatory mechanisms:

The ESA protect plants only when they occur on federally-owned lands or when a federal nexus is involved. Florida's "Preservation of Native Flora of Florida" law (Rule Chapter 5B-40 of the Florida Administrative Code under authority from the Florida Statutes, Chapters 581.185, 581.186, and 581.187) protect plants only when they occur on state-owned lands. This law allows for collection of plants on state-owned lands by permit only and only for scientific and educational purposes.

Wireweed is listed as endangered by the State of Florida on the Regulated Plant Index (Florida Department of Agriculture and Consumer Services Rule [FDACS] 5B-40). This law regulates the taking, transport, and sale of listed plants. However, this law does not prohibit property owners from destroying populations

of listed plants nor require they manage habitats to maintain populations.

Existing Federal (ESA) and state regulations (FDACS Rule 5B-40) prohibit the removal or destruction of listed plant species on public lands. However, they afford no protection to listed plants on private lands. In addition, state regulations are less stringent than federal regulations on land management practices that may adversely affect populations of listed plants. In conclusion, no existing regulatory measures reduce or remove the threat of loss of populations or removal/destruction of plants on private property, and existing mechanisms are inadequate to protect this species.

e. Other natural or manmade factors affecting its continued existence:

Climate Change

There is currently no evidence of negative impacts to wireweed from climate change factors, but this could change in the future as Florida is vulnerable to changes in rainfall and temperatures expected due to climate change. While the strong influence of ocean currents make projecting regional climate in Florida difficult (Kirtman et al. 2017), estimates project that Florida's average annual temperatures will increase approximately 1.5 to 5.5°F (0.8 to 3.1°C) by 2050 and from 2.3 to 11.5°F (1.1 to 6.4°C) by 2100. The degree of change depends on the greenhouse gas emission rates and the region in Florida (Runkle et al. 2017). In addition, it is predicted that for Central Florida summer rainfall (wet season) will decrease up to 5 percent by 2050 (Runkle et al. 2017). Wireweed vital rates are sensitive to winter and spring rainfall (Maliakal-Witt 2004). Higher temperatures and changes in precipitation patterns could alter relative humidity levels and evapotranspiration rates, leading to the potential for more frequent and intense droughts and wildfire events. Scrub and sandhill species, in general, can tolerate drought conditions, but it is unclear how this anticipated future threat will fully affect species like wireweed or the ability to implement prescribed fire (Kupfer et al. 2020).

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

Sea-level rise is another anticipated consequence of climate change in Florida. Sea level rise will not cause direct impacts to the Central Florida ridges as is anticipated for coastal and low elevation areas. However, as sea level rises in coastal regions, development is likely to move inland, further increasing the threat of development in the higher elevation areas, such as the LWR (Volk et al. 2017).

Ex situ measures

Wireweed is lacking *ex situ* conservation measures for which imperiled and rare plants need. Bok Tower Gardens does not have wireweed in its' Center for Plant Conservation's National Collection of Endangered Species. However, wireweed may not be an ideal candidate for *ex situ* measures. Its short life span will create problems holding plants in a botanical garden setting. Seeds are stored at the National Center for Genetic Resources Preservation in Fort Collins, Colorado. Seeds tend to germinate immediately and may not store well over long periods (although this has not been investigated).

Non-native plant species

Bahia grass (*Paspalum notatum*), cogon grass (*Imperata cylindrica*), and natal grass (*Rhynchelytrum repens*) invade scrub habitats and have negative effects through direct competition and by altering fire behavior. These species occur at numerous sites supporting wireweed. Because of wireweed's small stature and its preference for open conditions, exotic grasses are likely to have a serious negative effect on wireweed where they co-occur. At some protected sites, lang managers implement varying degrees of effort to control these species.

Off-road vehicles (ORVs)

ORV impacts have occurred to natural areas on the LWR and throughout Central Florida (Schultz et al. 1999). ORVs crush, uproot, and tear plants as they drive over them. Although most managed sites restrict ORV use where wireweed occurs, ORVs are a potential threat on unprotected sites.

D. Synthesis

Wireweed is abundant, in terms of both the number of populations within its range and the number of plants in many of its populations. Generally, wireweed occurs in sites with appropriate habitat and soils that are not extremely fire suppressed. Within sites, wireweed is a gap specialist. Populations fluctuate widely, with fast increases in appropriate post-disturbance situations.

One of wireweed's potential vulnerabilities is widespread intense fire. Because fire kills plants and the species lacks a substantial persistent seed bank, population recovery depends on dispersal from unburned areas. Wireweed will slowly recolonize areas affected by complete large fires that have few unburned patches. Patchy fires will provide local refugia and allow metapopulation dynamics that can allow wireweed to persist at a site. Besides needing patchy fires, wireweed does not require specific fire return intervals or fire intensities. It will likely disappear from long-unburned areas, due to competition from woody plants and the closure of gaps.

Wireweed recruitment and survival is also sensitive to drought, with modeling suggesting that extinction risk will be higher if climate change increases drought frequency (Maliakal-Witt

2004). The anticipated increase in average annual temperature and decrease in summer rainfall due to climate change will likely become a threat to wireweed in the future.

In conclusion, much progress has been made in meeting the recovery criteria for wireweed. There are 69 EORs distributed across the range of these species. Sixty-four percent are protected with suitable land management and other conservation mechanisms. However, FNAI considers 29 of the EORs (42 percent) as non-viable, and more research and analysis are needed to evaluate population or metapopulation viability. Information is lacking on population trends and management practices necessary to maintain protected populations. For these reasons, wireweed continues to meet the definition of endangered under the ESA. Between now and the next 5-year review (2026), we recommend surveys to better determine the trends in wireweed populations and whether the species still meets the definition of endangered under the ESA.

III. RESULTS

A. Recommended Classification:

_X_ No change is needed

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

- Acquire or implement conservation actions on private sites with existing wireweed occurrences.
- Work with State, Federal, and non-profit partners to ensure adequate fire management at sites that support wireweed.
- Initiate large-scale Level 1 monitoring throughout wireweed's geographic range, including sites across a spectrum of time-since-fire and management regimes.
- Conduct metapopulation analyses to determine the number of populations needed for the species survival.
- Determine longevity of stored seed and feasibility of maintaining this species in long-term seed storage and *ex situ* living collections.
- Maintain open lines of communication between State land managers and Service recovery leads and provide updates as appropriate to ensure proper management of occurrences.
- Continue to improve the capacity for use of wireweed in restoration efforts.
- Utilize outreach and assistance programs to encourage private landowners to protect and manage scrub habitat on private lands.

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Table 1. Summary of Florida Natural Areas Inventory data for wireweed populations. Table includes element occurrence number, last date observed, habitats (extracted by Menges from longer FNAI descriptions), largest population size or latest population condition, EOR rank, source, and managed area name. EOR rank: A = excellent estimated viability; AB = excellent or good estimated viability; B = good estimated viability; BC = good or fair estimated viability; BD = good, fair, or poor estimated viability; C = fair estimated viability; D = poor estimated viability; D? = possibly poor estimated viability; E = verified extant (viability not assessed); H = historical; X? = possibly extirpated. Managed area abbreviations: ABS = Archbold Biological Station; ADBCCPSP = Allan David Broussard Catfish Creek Preserve State Park; CE = Conservation Easement; LJW = Lake June-in-Winter Scrub Preserve State Park LWRWEA = Lake Wales Ridge Wildlife and Environmental Area.

EOR#	LASTOBS	Habitats	Population size/condition	EOR rank	Source	Managed Area
39	10/10/1986	white sand, oak scrub	N/A	H	Christman	None
40	10/10/1986	Rosemary scrub	N/A	H	Christman	Crooked Lake West
144	2/23/2017	Scrub	1100	AB	Schultz	LWRWEA
112	4/21/1987	White sand scrub	Most gone	X?	Christman	None
117	9/20/2012	Scrub	Not relocated	D?	Schultz	Hickory Lake Scrub County Park
37	1988	Scrub/sandhill	Present in 1988	H	Gatewood	ADBCCPSP
93	9/30/1987	rosemary scrub	Extant	H	Christman	Scott Lake CE
105	9/5/1989	sand pine scrub	Extant	X?	Christman	LWR State Forest
68	1992	Sandhill/scrub	Extant	E	Christman	Avon Park Air Force Range
130	9/24/2020	Scrub	1000+	A	Jenkins	ABS, LWRWEA
87	10/23/2012	Scrub, scrubby flatwoods	79	BC	Schultz	LWRWEA, Royce
49	9/11/1998	Open oak scrub.	Scattered	D	Schultz	None
42	11/23/1987	scrub	Small patches	H	Christman	None
1	9/13/1983	slash pine/oak scrub	Common	BD	Schultz	Highlands Hammock State Park
35	11/15/2018	Scrub; rosemary scrub	Hundreds	AB	DeLaney	LWR State Forest

EOR#	LASTOBS	Habitats	Population size/condition	EOR rank	Source	Managed Area
52	4/29/1987	Sand pine and oak scrub	Extant	H	Christman	Crooked Lake West
2	4/15/1998	sand pine	Common, extant	BC	Schultz	LWRWEA
70	1991 -92	Oak and sand pine scrub	Extant	E	Christman	APAFR
88	9/22/2020	Sand pine/rosemary scrub	370	A	Weekley	LWRWEA
41	10/9/1986	Oak scrub	N/A	H	Christman	None
59	9/15/2015	scrub	300+	AB	FNAI	Sun Ray Scrub, LWRWEA
43	11/23/1987	scrub	N/A	H	Christman	None
36	10/8/2012	Scrub	200+	A	McPherson	ADBCCPSP
38	10/9/1986	scrub	N/A	H	Christman	None
17	7/1/1986	Scrubby flatwoods	N/A	X?	Schultz	None
9	10/15/2014	Scrub	2000+	A	Schultz	Jack Creek, LWRWEA, LJW
51	7/12/1987	Sand pine scrub	N/A	H	Christman	Crooked Lake West, CE
32	10/30/2015	Scrub	Hundreds	AB	Knothe	LWRSF
94	4/23/1986	White sand scrub	N/A	H	Christman	None
5	9/15/1983	scrub	Extant	H	Schultz	None
135	9/17/2020	Various scrub types	5000+	AB	FNAI	LWRWEA
24	10/8/1978	White sand scrub	N/A	H	USFWS	None
20	8/21/1986	White sand scrub	N/A	H	Huck	None
19	10/24/2012	rosemary scrub	Very large	A		Holmes Avenue, LWRWEA
53	1987-04	Oak and sand pine scrub	Extant	H	Christman	None
141	10/15/2012	Sand pine scrub	100+	B	Schultz	LWRWEA
110	5/4/1987	Scrub	N/A	H	Christman	None
109	9/25/1986	Various types of scrub	N/A	H	Christman	None
140	8/20/1998	disturbed sand pine	200+	BC	Schultz	None

EOR#	LASTOBS	Habitats	Population size/condition	EOR rank	Source	Managed Area
108	11/17/2014	Sand pine scrub	Extant	BC	Christman	Saddle Blanket Scrub Preserve
47	3/20/1987	Scrub	Extant	H	Christman	None
13	2/20/2017	Scrub	100	A	FNAI	LWRWEA
80	10/16/1986	Yellow/white sand scrub	Extant	H	Christman	None
143	10/20/1998	Oak scrub	Extant	BC	Schultz	None
124	1992	Oak scrub and sand pine.	Extant	E	DeLaney	Avon Park Air Force Range
63	10/25/2012	Scrub	>510	A	Christman	ADBCCPSP
96	4/22/1987	Oak scrub	Extant	H	Christman	LWR National Wildlife Refuge
106	10/15/2012	scrub	200+	A	Schultz	Highlands Hammock State Park
82	1/19/1987	scrub	Converted to agriculture	X?	Christman	None
48	3/27/1987	White sand scrub	Most developed	H	Christman	None
65	12/9/1987	Oak scrub	Extant	H	Christman	None
92	10/22/2012	Scrub	500+	A	Schultz	LWRWEA
46	5/4/1987	Scrub	Extant	H	Christman	Sandy Gully Ag and CE
137	9/17/2012	Sand pine scrub	Abundant	AB	Schultz	LWR National Wildlife Refuge
57	10/13/2014	Sand pine and oak scrub	1200+	A	Gandy	Highlands Hammock State Park
58	10/20/1998	Oak and sand pine scrub.	Extant	C	Schultz	None
138	9/18/2012	sand pine scrub.	50	C	Schultz	LWRWEA
145	10/22/2012	Scrub	200+	A	FNAI	LWRWEA
148	10/23/2012	oak scrub	11-50	C	FNAI	LWRWEA
151	10/26/2012	Scrubby flatwoods	>2100	A	Biehl	Lakeland Highlands Scrub
155	1999 -2000	Scrub	10-99	BC	Weekley	LWR National Wildlife Refuge
158	10/13/2014	Yellow sand scrub	564	A	FNAI.	Highlands Hammock State Park
159	11/6/1994	Various scrub types	Large	AB	Orzell	Avon Park Air Force Range

EOR#	LASTOBS	Habitats	Population size/condition	EOR rank	Source	Managed Area
160	10/14/2014	Firelane edge	13+	BC	Schultz	None
161	10/15/2014	scrubby flatwoods	50+	B	Schultz	None
162	10/15/2014	Open scrub	1000+	B	Schultz	Rafter T Ranch CE
163	10/25/2018	Sand pine scrub	50+	BC	FNAI	Crooked Lake WEA
167	10/23/2012	Scrub	100+	AB	FNAI	LWRWEA
169	4/5/1987	Various scrub types	Extant	E	Christman	Istokpoga Preserve

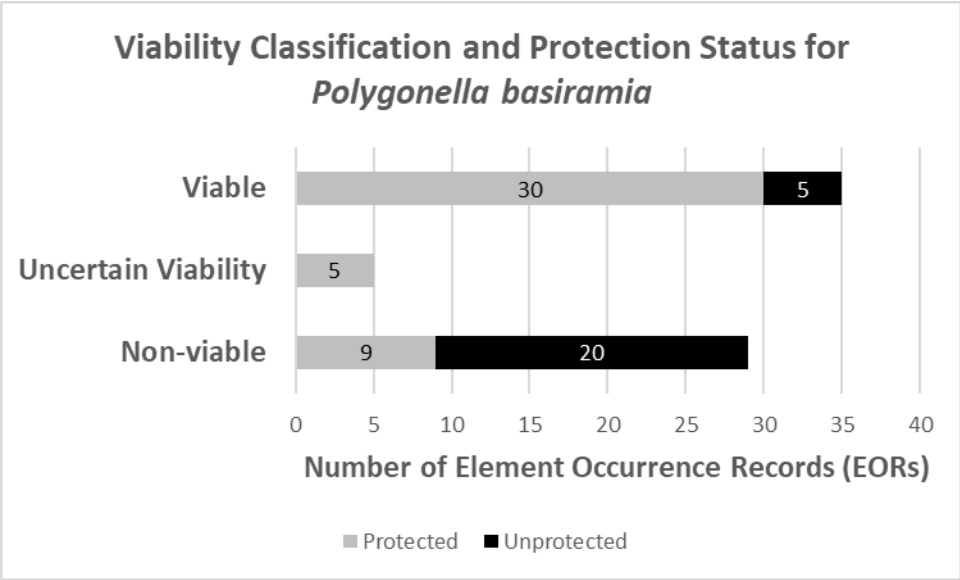

Figure 1. Viability classification and protection status for wireweed element occurrence records (FNAI 2021).

U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of Wireweed (*Polygonella basiramia*)

Current Classification: Endangered.

Recommendation resulting from the 5-Year Review:

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

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

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve ROXANNA HINZMAN Digitally signed by ROXANNA HINZMAN Date: 2021.07.01 11:21:06 -04'00' Date _____

* Since 2014, Southeast Region Field Supervisors have been delegated authority to approve 5-year reviews that do not recommend a status change.