Macbridea alba
(White birds-in-a-nest)

5-Year Status Review:
Summary and Evaluation

Lathrop Management Area (Bay County) and Apalachicola National Forest (Liberty County).
Photos by Vivian Negrón-Ortiz

U.S. Fish and Wildlife Service
Southeast Region
Florida Ecological Services Field Office
Panama City, Florida
October 2024

5-YEAR STATUS REVIEW
Macbridea alba (White birds-in-a-nest)

GENERAL INFORMATION

Current Classification: *Threatened*

Lead Field Office: FL Ecological Services Field Office, Dr. Vivian Negrón-Ortiz

Review Author(s):

Reviewers:
Lead Regional Office: Southeast Region, Carrie Straight.

Date of original listing: June 8, 1992 (57 FR 19813; May 8, 1992).

Methodology used to complete the review: In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a status review is to assess each threatened species or endangered species to determine whether its status has changed and if it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants (50 CFR 424.11). The U.S. Fish and Wildlife Service (Service) evaluated the best available information about the *Macbridea alba* (White birds-in-a-nest) biology, habitat, and threats of to inform this status review.

We announced initiation of this review in the Federal Register on June 6, 2024 (89 FR 48437) with a 60-day comment period and received several peer-reviewed articles. Key stakeholders were contacted while the review was being written, and various answers to questions and communications were received. This review was accomplished using information obtained from the Recovery Plan (Service 1994); 5-yr reviews of 2009 and 2020 (Service 2009 and 2020), unpublished field survey results, reports of current research projects, peer reviewed scientific publications, unpublished field observations by Service, State and other experienced biologists, and personal communications.

FR Notice citation announcing the species is under active review:
June 6, 2024 (89 FR 48437)

Species' Recovery Priority Number at start of 5-year review (48 FR 43098): 8C
This ranking is based on a moderated threat due to habitat destruction, a high recovery potential, and its status as a species. The 'C' indicates that the species' recovery may be in conflict with construction or other development projects or other forms of economic activity.

Review History:
Previous 5-year reviews recommending no change in status was published in 2009 and 2020 (Service 2009, 2020).

REVIEW ANALYSIS

Listed Entity

Taxonomy and nomenclature
Macbridea alba is an accepted species (Catalogue of Life, https://www.catalogueoflife.org/data/taxon/3WXMS; Atlas of Florida Plants, https://florida.plantatlas.usf.edu/Results.aspx), and therefore, it is considered valid by the Service. For details, see reviews conducted by the Service in 2009 and 2020.

Recovery Criteria

Recovery Plan
Recovery plans are not regulatory documents and intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved. If the recovery criteria defined in the plan are still valid, meeting recovery criteria can indicate that the species no longer requires protections under the Act. However, when recommending whether a listed species should be delisted, the Service must apply the factors in section 4(a) of the Act (84 FR 45020).

The Recovery Plan for four plants of the lower Apalachicola Region, Florida: *Euphorbia telephioides* (telephus spurge), *Macbridea alba* (white birds-in-a-nest), *Pinguicula ionantha* (Godfrey's butterwort), and *Scutellaria floridana* (Florida skullcap) (Service 1994) includes a recovery objective for delisting the species as well as the criterion. The objectives are to guarantee that the populations in Apalachicola National Forest are secure, and to conserve the species outside the Apalachicola National Forest by protecting habitat through land acquisition, and changes in management practices on government land, rights-of way, and private land. For delisting the species, the goal is to adequately protect and manage 15 populations distributed throughout the species' historical range for 10 years. The plan states that these goals are by necessity only preliminary, and they will be refined. The recovery criterion addresses factor 1. Factor 2 was addressed in the recovery plan as a threat, but recovery criteria were not stipulated. Factor 3 is not relevant to *M. alba*. Factors 4 and 5, although relevant to this species, were not addressed by the Recovery Plan.

The Service believes these criteria are appropriate and relevant; however, no criteria have currently been met.

Biology and Habitat Summary

Macbridea alba is endemic to the Florida Panhandle, and occurs in Bay, Gulf, Franklin, and Liberty counties (Fig. 1). In those counties, plants are found in mesic pine flatwoods, wet savannas, seepage slopes, and ecotones between pine flatwoods and titi-swamps (Schulze et. al 2002). Consistently, it has been observed in longleaf pine savannas and in transitional habitats with associative species including wiregrass (*Astrida stricta*), saw palmetto (*Serenoa repens*), meadow beauties (*Rhexia* spp.), and toothache grass (*Ctenium aromaticum*) (Service 2020).

Macbridea alba is hermaphrodite, capable of both sexual and vegetative (via rhizomes) reproduction (Godt et al. 2004), as well as to being able to outcross and self, with selfed seeds exhibiting inbreeding depression (Godt et al. 2004). Vivipary (i.e., pre-germinated seed within the calyx) was confirmed in *M. alba* populations by Johnson et al. (2023), with fruit and seed set generally low across populations. Studies of germination and seed bank indicates that a persistent seed bank is not present and seed lacks dormancy (Schulze et al. 2002). Therefore, conserving this species in-situ is the best option, and an ex-situ collection of established seedlings and adults is recommended. In 2022, the Atlanta Botanical Garden deposited 159 seeds from 42 maternal lines into their Seed Bank. Germination trials of 230 seeds resulted in a 30% germination. Seed collections continued for this species in 2023 from populations located on non-federally owned protected lands (ABG 2024).

In 2008, about 10,000 plant stems were estimated throughout the entire range of *M. alba*. The highest density of sites with plants is found in Apalachicola National Forest, Liberty Co. (Fig. 1, Service 2008, 2020). Several locations have been extirpated (Fig. 1, Table 1, Bay Co.) due to habitat loss (development, cattle grazing) or habitat modification. In 2020, there were 42 historic element of occurrence (hereafter referred to as occurrences) records, comprised of about 349 source features (hereafter 'subpopulation;' Service 2020); a few occurrences were reported extirpated, and others were found without plants (Service 2020). As of 2024, there are 41 occurrences in the Florida Native Areas Inventory (FNAI) database with a few considered extirpated or possibly extirpated (H. Rosner-Katz, pers. comm. 2024).

Between 2021 and 2024 several *M. alba* surveys and stem counts were conducted by Florida Native Plant Inventory (FNAI 2024), Florida Department of Agriculture and Consumer Services (FDAC 2024) and Atlanta Botanical Garden (ABG 2024) (Table 1). A summary is presented here:

- *Bay County, Lathrop Bayou Tract (LB)*:
    - 2023: 1,155 stems
    - 2024: 2,172 stems in 2024 (Table 1). The increase seen from 2023 to 2024 likely because of a prescribed burn in 2024.
- *Gulf County:*
    - 2023: 124 vegetative and 78 reproductive individuals in St. Joseph Bay State Buffer Preserve.
    - 2023: new population was documented in T.H. Stone Memorial St. Joseph Peninsula State Park (Gulf Co., Fig. 1) with 19 vegetative plants.
- *Liberty & Franklin Counties, Apalachicola National Forest:*
    - 2023: 2,246 stems
    - 2024: 2,811stems (increase of 565 stems from 2023; FNAI 2024 and H. Rosner-Katz, pers. comm. 2024).
- *Franklin County.*
    - Tate's Hell State Forest 2024: Of the three occurrences, no plants were found in two (FDAC 2024). Counts since 2008 in these two occurrences have shown similar results. Two of the larger populations on the east side of CR 69 were destroyed by rights-of-way herbicide application and a culvert reinstallation / improvement.

- Box-R Wildlife Management Area populations between 2022 and 2023: around 440 reproductive individuals in 4 populations (ABG 2024).
- Box-R Wildlife Management Area 2024 partial counts show fewer reproductive individuals for two populations (ABG 2024).

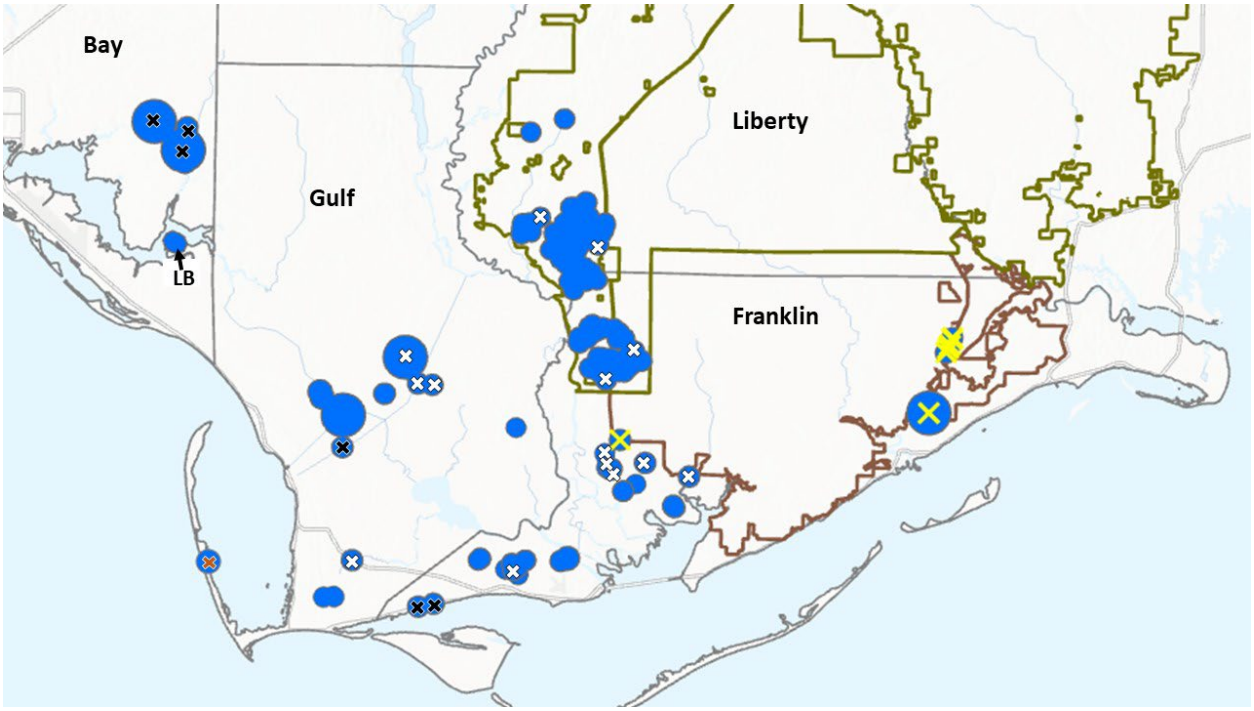

Figure 1. Map showing *Macbridea alba* historical geographical range, calculated range extent is about 2,281.357 km^2. Blue: buffer zone analysis of adjacent source features determined by 1km distance; represents where the species is present according to surveys, unless specified by symbols. White: Element Occurrences (EOs) without/absent of plants; yellow: EOs potentially extirpated / fragmented with some habitat present; black: EOs and habitat completely extirpated; and brown: new population, T.H. Stone Memorial St. Joseph Peninsula State Park (THMSP); LB: Lathrop Bayou. Brown border: Tate's Hell State Forest, Franklin Co; Green border: Apalachicola National Forest, Liberty County.

Table 1. Estimated *Macbridea alba* occurrences and stems per county and years. Apalachicola National Forest (ANF), Box-R Wildlife Management Area (Box-R), Lathrop Bayou (LB), St. Joseph Bay State Buffer Preserve (SJSBP), T.H. Stone Memorial St. Joseph Peninsula State Park (THMSP).

County	**1963-2008 #occurences (stems)**	**2010-2020 #occurences (stems)**	**2021-2024 (stems)**	**#occurences** A: Absence E: Extirpated
Bay	3 (26 – 41)	3 (LB: 168)	LB (2,174)	3E
Gulf	10 (956 - 1,176)	2 (66)	THMSP & SJSBP (221)	4A; 1E
Franklin	16 (1,335 to 1,784)	11 (2,062 to 2122)	Box-R & THSF (471)	8A;2E
Liberty	3 (5,429 to 5,970+)	4 (5390 to 7110+)	ANF (2,811)	2A
Total	32 (7746 to 8971)	20 (7,686 to 9,466)	(5,677)	6E;13A

- Protected Occurrences. There are currently 25 protected occurrences (H. Rosner-Katz, pers. comm. 2024), and about 13 occurrences with good viability (NatureServe 2024). Ten of the 25 protected occurrences are found in the Apalachicola National Forest (Fig. 1), and 15 occurrences have been protected outside the National Forest.
- *Macbridea alba* is almost continuously spread throughout large sections of the ANF, Liberty Co. (Fig. 1).
- Currently, there are six extirpated EOs in Bay, Gulf, & Franklin counties (Table 1, Fig. 1). Of the 35 EOs remaining, plants were not observed (during the most recent surveys) for 13 EOs (Table 1, Fig. 1).

We are not aware of any additional new biology or habitat information since the most recent species review that impacts the status of the species and all of information provided in the last 5-year review remains valid (Service 2020).

Threats (Five-Factor Analysis) Summary

The status of a species is determined from an assessment of factors specified in section 4 (a)(1) of the Act.

Factor A: the present or threatened destruction, modification, or curtailment of its habitat or range

Habitat destruction, fragmentation, and modification are the primary threats identified in the Recovery Plan for *M. alba* and remains the main threats to date for this plant. Timbering, urban development, fire suppression, livestock grazing, and sea level rise along the coasts and salt-water intrusion are factors that have been present and continue to transform the ecosystems in Florida.

Tree farming. Tree farming, i.e., privately owned forest managed (clearcutting, mechanical site preparation, and planting of pine plantations) for timber production was a primary threat since the mill in Panama City (Bay County) was in operation from 1931 to 2022; the paper mill in Port St. Joe (Gulf Co.) was sold and shut down in 1999. Although these two mills have been shut down, tree farming continues to pose a threat since there are about 1,200 certified Tree Farms in Florida and many thousands of acres of tree farms (https://www.treefarmsystem.org/about-fl).

Fire suppression. Suppression of fire continues to threaten the pineland and savanna's flora since fire is essential for the maintenance of flatwoods. With insufficient fire frequency in longleaf pine communities, a woody midstory quickly develops (Glitzenstein et al. 1995), negatively affecting the understory diversity. Lack of fire, and subsequent growth of shrubs (such as encroachment of *Cyrilla racemiflora* L.) and saplings in the understory, inhibits *M. alba* emergence. In recently burned areas, *M. alba* emergence is prolific within two years of the fire event. According to Anderson et al. (2020), frequent prescribed burnings, i.e., 4 to 5-year intervals, are needed to maintain optimal *M. alba*. Important to notice is that prescribed fire has been implemented in various sites where *M. alba* occurs: the Apalachicola National Forest utilizes a 3 to 5-year interval burn rotation; Lathrop Bayou uses a 2 to 7-year interval; and St. Joseph Bay State Buffer Preserve uses a 2 to 5-year interval. Although the Apalachicola National

Forest has a yearly goal of burning thousands of acres with prescribed fire, not all the *M. alba* occurrences are burned annually. Fire is a vital ecosystem process throughout the southeast region, including Florida, and the decline of fire frequency negatively affect *M. alba* abundance. Thus, fire suppression continues to be a threat.

Coastal real estate and road development. Urban development continues to threaten *M. alba*, and commercial and residential development is especially prevalent along roadways and near or within business districts in the region. By 2070, Panhandle Florida is expected to experience a 38% increase in population (https://1000fof.org/sealevel2040/#2070). Modeling of future urbanization and sea level rise indicates increasing losses in extent and area of priority conservation ecosystems toward 2070 (Romañach et el. 2020).

Many historical *M. alba*'s locations are found along US 98 and other state roads, areas which may see increased development because they are major transportation corridors. Construction activity may directly kill individual plants or convert habitat to unsuitable space; widening may convert native habitat to managed roadside; and culvert modification may change drainage patterns, which may change seasonal hydrology. Therefore, because they contribute to habitat loss, road widening and new roads continue to pose a threat to the species.

Conversion of timberlands to cattle grazing. The conversion of Florida Panhandle timberlands to open pasture for cattle grazing (Service 2020) is a recent threat. Private timberlands totaling over 300,000 acres in Bay, Calhoun, Franklin, Gadsden, Gulf, Jefferson, Leon, Liberty, and Wakulla counties have been sold and some parcels converted. For *M. alba,* several managed timberland locations in Bay County were cleared and converted to cattle pasture (2019) within five years of the land being sold in 2014 (Fig. 1). Livestock activities such as trampling, herbivory, congregation, soil disturbance and compaction have been a cause of major habitat destruction and species endangerment in western land. Therefore, conversion of timberlands to cattle grazing and associated activities pose a threat to unprotected occurrences of this species.

Sea level rise. Sea level rise as a result of climate change is a growing concern for much of Florida's coastline and the endemic species that occur there because about 10% of Florida is less than one meter above current sea level. According to Romañach et el. (2020), sea level rise will have a greater impact on Florida than urbanization by 2070, mostly over losses to Coastal Uplands. In the Florida Panhandle, about 279,000 acres of land will be lost to sea level rise by 2070, including 233,000 acres of protected natural land (https://1000fof.org/sealevel2040/#2070), affecting suitable habitat for *M. alba.*

Using the National Oceanic and Atmospheric Administration's Sea Level Rise and Coastal Flooding Impacts Viewer (https://coast.noaa.gov/slr/), the projections between 2040 and 2060 indicate that coastal habitat areas in Bay, Franklin, and Gulf counties would be largely inundated beginning at one foot of sea level rise. These projections will most likely extirpate populations located in Gulf (2 occurrences) and Franklin (6 occurrences) counties by intrusion of saltwater beginning at one foot sea level rise. Projections by 2070 suggest that the sea level rise may result in the relocation of about 18% of Franklin County's human population (https://1000fof.org/sealevel2040/#2070); this implies that *M. alba* occurrences in this county may be at greater risk of being extirpated.

Factor B: overutilization for commercial, recreational, scientific, or educational purposes

The Recovery Plan (Service 1994) suggested that the use of the savannas in Apalachicola National Forest for educational purposes and tourism could create risks of casual collecting during the flowering season. Currently, there is no evidence to suggest that this currently is a threat, but this could eventually become a concern.

Factor C: disease or predation

Foliar, stem, and fruits herbivore damage was observed by Johnson et al. (2023). Damage was caused by *Endothenia hebesana,* a polyphagous micro-lepidoptera species that feeds on the developing seeds of host plants; all three life stages were witnessed on the plant. Herbivory was abundant and present in over 15% of stems across all sampled populations. Based on this information, herbivore damage is an increasing threat to the species.

Factor D: the inadequacy of existing regulatory mechanisms

Federal. The Act prohibits the removal of federally listed threatened and endangered plants or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of state law or regulations or in the course of any violation of a state criminal trespass law. However, the Act does not provide protection for plants on non-federal lands unless it is in violation of state law. Since *M. alba* is a threatened species, the seeds are regulated under these specified conditions. However, the seeds are not regulated if they are provided freely (no exchange of money, goods, or services; 7 CFR 319.37.2).

Several populations of *M. alba* occur on private timberland and ROWs. While the Act requires federal agencies to carry out programs for the conservation of endangered and threatened species, no such programs are stipulated for private landowners. Neither section of the Act provides protection for plants on private lands if the activity is permissible under state/local laws.

Florida. *Macbridea alba* is protected under Florida State Law, chapter 581.185: Preservation of native flora of Florida (https://www.flsenate.gov/Laws/Statutes/2013/581.185), which includes preventions of take, transport, and the sale of the plants listed under the State Law. The rule Chap. 5B-40, Florida Administrative Code, contains the "Regulated Plant Index" (5B-40.0055) and lists endangered, threatened, and commercially exploited plant species for Florida; defines the categories; lists instances where permits may be issued; and describes penalties for violations (Coile and Garland 2003). The State requires permission of private landowners for collecting of state-listed plants from their property. This law does not protect habitat or plants from impacts by private landowners on their own property.

Bay County Comprehensive plan, under Chapter 6, provides restrictions, constraints and requirements to protect and preserve designated habitat conservation areas for rare, threatened, or endangered species, and wetlands (http://baycountyfl.gov/276/Planning-Zoning). Gulf, Franklin, and Liberty counties do not have such regulations.

Highway rights-of-way maintenance activities are not always reviewed for threatened and endangered species impact. However, if there is an activity (e.g., construction, mowing, or maintenance projects) affecting protected species, then projects funded by federal funding require consultation with the Service under the Act. The Florida Department of Transportation routinely consults with the Service on all major road construction activities. However, these protections are inadequate to protect occurrences in the path of or adjacent to transportation projects.

Factor E: other natural or manmade factors affecting its continued existence.

Herbicide. While the Recovery Plan (Service 1994) mentioned that the use of herbicide or the wrong type of herbicide is a threat when it is used to control vegetation on power line rights-of-ways, we no longer consider this a threat to *M. alba* because mowing is now the common practice to maintain transmission rights-of-ways in Florida. As discussed above, herbicide treatments along transportation rights-of-ways are still a threat to the species. Franklin County allows only "spot treatment" due to impacts concerning the Apalachicola National Forest and waters within Apalachicola Bay and River basin.

Climate Change - Catastrophic events. As discussed above under Factor A, sea level rise may pose a significant threat to some occurrences. Hurricanes have impacted the Florida Panhandle and are expected to increase in intensity and reach major category strength as warming of the land and ocean continued. Therefore, this threat is expected to continue. According to pre/post-Hurricane Michael analyses by C. Anderson et al. (2020), natural communities such as sandhills were more affected, whereas scrub, scrubby flatwoods, wet flatwoods, and coastal grasslands were found more resistant to damage. *Macbridea alba* occurs in mesic pine flatwoods, wet savannas, seepage slopes, and ecotones between pine flatwoods, so possibly it has some resistant to this disturbance.

According to the Florida Climate Center (https://climatecenter.fsu.edu/topics/climate-change), winter precipitation in the Panhandle has increased, and is expected to experience around 30-40 more extreme heat days per year. By 2050, an increase of more than 50 days with temperatures ≥ 95°F is projected to most of Florida. So even if precipitation remains constant or increase, higher temperatures will result in an increase of soil moisture loss and more intense droughts, likely affecting the persistence *M. alba* plants, the quality of current habitat, and habitat suitability for reintroduction.

Synthesis

Macbridea alba is an herbaceous flowering plant in the mint family commonly known as white birds-in-a-nest. It is presently located in four Florida panhandle counties. One new occurrence was documented in 2023, six occurrences have been extirpated, and 32% occurrences were found without plants. *Macbridea alba* occurs in fire-prone habitats. Where fire management is implemented, it stimulates the emergence of individuals and maintains healthy, stable populations. *Macbridea alba* is mainly threatened by habitat destruction/modification. Timbering, urban development, conversion of land to cattle grazing, and inadequate fire management, i.e., fire suppression, are the main pressures reducing or eliminating individual

populations. In addition, saltwater intrusion due to sea level rise is becoming a major threat for occurrences located in Gulf and Franklin counties. An emergent threat was detected with predation by a micro-lepidoptera. The populations at Apalachicola National Forest are protected and adequately managed; these represent 40% of the total protected populations. Habitat on private lands has deteriorated in quality and extent due to conversion of much of the forest land to pulpwood plantations (e.g., clearcutting, conversion to improved pasture, drainage, and fire exclusion), and some to cattle grazing. Based on the species distribution, numbers, and threats, we believe *Macbridea alba* should remain as a threatened species.

RECOMMENDED FUTURE ACTIVITIES

Recovery Activities

1. **Censuses** are critical for Element Occurrences found without plants (Fig. 1). For those EOs, a comprehensive census (e.g., the total number of individuals, number of flowering vs. non-flowering plants, and whether seedling recruitment is occurring) needs to be completed across the current distribution to determine abundance, threats, and habitat suitability. A consistent and repeatable method should be employed.
2. **Reintroduction**. A reintroduction approach should be designed and executed with the assistance of the Service botanist for those sites where the habitat is present and still suitable. An annual monitoring is required to examine plant survival and reintroduction success. For consideration:
    a. Tate's Hell State Forest, Franklin Co.
        i. Florida Native Areas Inventory Element Occurrences # 57 & 58. No plants have been observed since 2008.
        ii. Florida Native Areas Inventory Element Occurrence #11 along east side of CR 67, Tate's Hell State Forest, Franklin Co. was fragmented due to rights-of-way herbicide spraying and culvert reinstallation.
3. Conduct **surveys/inventories** on potentially new sites (targeting recently burned sites).
4. Establish (or continue) **frequent growing-season fire regimes** to maintain optimal conditions of populations. Re-visit sites shortly after a burn event and count individuals.

Monitoring and Research Activities

1. **Monitoring**.
    a. Implement monitoring for selected populations outside of Apalachicola National Forest in Bay, Gulf, and Franklin counties. The ABG is monitoring several documented sites in Gulf and Franklin counties (Cooperative Agreement No. # F21AC02540-00). However, it is recommended to set up more subplots and monitor abundance and survival of both flowering and nonflowering individuals over time, whether seedling recruitment is occurring, and the effect of mechanical site preparation and hurricane disturbances.
    b. Continue the long-term monitoring in Apalachicola National Forest sites (FNAI 2024).

c. As sea levels rise, seawater intrusion increases in duration, frequency, and spatial extent. To **assess the effect of salinity** on *M. alba*, sites where intrusion of salt water occurs (or will occur) should be considered for long-term monitoring.

2. **Manage Rights-of-Ways**. Continue fostering conservation practices for utility and transporation rights-of-ways with the Forest Service, Talquin Electric, the Department of Transportation, and the Service and document commitment to these conservation practices in land management plans or agreements.

3. **Ex-situ seed studies**. Since there is a possibility that seeds in long-term storage are unlikely to remain viable, examining their viability is recommended using multiple methods.

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RESULTS / SIGNATURES

Status Recommendation:

On the basis of this review, we recommend the following status for this species. A 5-year review presents a recommendation of the species status. Any change to the status requires a separate rulemaking process that includes public review and comment, as defined in the Act.

_X_ No change needed.

FIELD OFFICE APPROVAL:

Division Manager, Florida Ecological Services Field Office, U.S. Fish and Wildlife Service

Approve JESSICA GILBERT Digitally signed by JESSICA GILBERT Date: 2024.11.08 13:26:56 -05'00'